

# Nature Study



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*Under the watchful eye of USDA soil conservationist Joe Weeks, Western Junior High seventh grader Celeste Theobald, Springfield, Md., measures the slope of a hill with an Abney Level. (see page 9)*

Photo by: John Metelsky

## “VALUING NATURE”

— The American Nature Study Society —



# *“Half-baked Technologies”*

Dr. Robert Pohl, physics professor at Cornell University, has given us some very timely advice on the disposal of nuclear wastes: because of the fact that there is no scientific or technical solution to the nuclear waste disposal problem at this time, nor will there be for the foreseeable future, energy authorities in Washington are looking for direction from *us*, the people! It's up to us to become informed about the problem and make our ideas known.

The key point Dr. Pohl made is this: we have only half the technology in the nuclear energy field! We know how to mine, process, and utilize nuclear fuel to produce electrical energy (and bombs), but we don't know how to dispose of the left-over waste materials.

With other technologies, such as production of fuel for automobiles or manufacture of the autos themselves, we have merely let “mother nature” take care of the wastes—junk cars left to rot, exhaust fumes dispersed into the atmosphere. (Even these “solutions” to half-baked technologies are becoming less and less tolerable.)

Nature cannot handle nuclear wastes because they are so powerfully toxic and long-lasting. Burying them in salt beds or other underground deposits may not work because we don't know what will happen to these sites as the heat from the nuclear material builds up and causes changes in the rocks themselves. In decades or centuries ahead those who come after us may be faced with the dangerous necessity of trying to remove these same wastes or else abandon large parts of the country as it becomes poisoned. In places which depend on subsurface aquifers, we may find our water contaminated.

It is time for us to *stop* using half-developed technologies! Every technological innovation *must* include not only the production and use of materials, but the proper disposal of the wastes and by-products. “Mother Nature” can teach us a valuable lesson here. She has developed many ways of producing materials—wood, bone, oxygen, carbon dioxide, nitrogenous compounds and many more. For every one there is always a way of breaking these materials down, redistributing them in the ecosystem for re-use, and rendering them harmless. If we don't do the same we will be buried in our own indestructible garbage and persistent toxins.

The current attempts to get a returnable-bottle bill in New York is to “close the circle” in a technological system which produces bottles and cans but doesn't properly dispose of them! Exhaust emission controls on autos is another example, as is the switch to non-persistent pesticides.

Dr. Pohl reminds us that California has taken action with regard to the nuclear waste problem. California law prohibits further construction of nuclear power generators until the wastes can be properly disposed of. A technology study just released shows no such disposal system yet in sight: no permits will be issued for nuclear plants in California! It's as simple as that.

It's time for the rest of us to do the same. Up to now we've been mainly concerned with the environmental effects of waste heat and nuclear leakage from the operation of these plants—still a serious concern. But now we must be concerned about the disposal of the waste fuel itself, which remains hazardous to all life for thousands of years! Nuclear fuel, used for production of useful electricity, becomes a potential atomic “bomb,” slowly ticking away wherever it is stored, always a threat should it somehow get loose.

The ironic part of all this is that nuclear energy plays a relatively minor role in our total energy supply today, and even for the long-term future; five to eight per cent. We could easily cut back consumption of energy by this much, and obviate the necessity for operating nuclear plants!

It has been shown by careful study (and by comparison with Sweden and West Germany with their equally high-technology societies) that we consume perhaps 40 or 50 per cent more energy than is necessary to maintain our standard of living. If we cut down on wasting energy, we will cut down on the wastes produced in generating the energy. How foolish of us to continue to waste energy until it becomes economically burdensome to do so, when it is already biologically and ecologically burdensome and dangerous to do so!

The reason there is uncertainty about what to do with nuclear wastes is that no one has a sure-fire solution to the problem—not even the scientists who work with nuclear energy. The decision on what to do, therefore, cannot be made on scientific or technical grounds, but will have to be made on the basis of social and moral considerations—our selfish, short-term interests against the well-being of future generations.

J.A.G.



# Five Vignettes For The First Interpretive Spring Wildflower Hike

by Sandra Poneleit Veverka  
Student, Environmental Interpretation, The Ohio State University, Columbus, Ohio

Visions of the fury of a winter blizzard and the tingling sensation in mitten-bound fingers may still be fresh memories at the time the spring greening-of-the-land begins. There's no doubt that the first wildflower seekers will be an anxious crew, anticipating a glance at harbingers of the coming woodland bloom extravaganza. While the stick-like stalks of winter weeds may yet remain, it is the juvenile curved green stems and dainty pastel petals that will be sought.

To make these spectacular early spring wildflowers come to life for interpretive hike participants is one of the goals of the interpreter\*. Recording the number of species, their distribution and the quantity in which they occur is a purpose best left to an entirely different kind of hike. If even *some* of the visitors can leave your interpretive program knowing the names and a provocative insight into just *five* of the common early

spring wildflowers in the woodland through which they have just hiked, you, as the interpreter, will have enriched and changed their lives. Toward this end, you can strive to interpret the delicate messengers of spring using provocative, question-raising declarations that reveal their essence and relate to the experiences of the visitors (Tilden, 1967).

What follows is a sequence of five vignettes for use while interpreting wildflowers at stops along an early spring wildflower hike. The species chosen commonly occur in woodlands in the northeastern and north-central United States, blooming or in the plantlet stage in late March, April or early May (please refer to illustrations).

\*Spelled with an "or" to distinguish him/her from the foreign language translator. Cherem (1977) and Scanlon (1974) use this spelling.

## May-Apple, Mandrake (*Podophyllum peltatum*)

Though not deadly, handling the roots and other plant parts (in powdered form) *can* cause dermatitis! These umbrellas of the forest floor grow in two forms—single-leaved and fork-stemmed with two leaves. Usually it is the fork-stemmed varieties that bear a lone ivory flower in May and, later, the yellow crabapple-sized fruit. Ripe may-apples are enjoyed when ground up for use in making delicious, spreadable—and edible!—preserves.



Wild Columbine



May-Apple

## Wild Columbine (*Aquilegia canadensis*)

A crimson and yellow natural work of art, the Wild Columbine is best left undisturbed so that others who pass by can enjoy it. Imagine a group of pioneers coming upon a patch of the blooms and thinking that the swaying petals resembled a flock of hovering doves! It is they who named the Columbine after the Latin word meaning dove. An ancient myth claims that lions would eat this flower in springtime in order to increase their strength, thus giving this plant its nickname, Lion's Herb.



### Skunk Cabbage (*Symplocarpus foetidus*)

Nestled like islands in the February snow, every mottled-brown, hood-shaped vase before you houses a bouquet of more than a hundred pollen-coated flowers. The way the newborn leaves unfurl and the odorous plant juices give this spring precursor its name, Skunk Cabbage. Indians supposedly boiled the young leaves to eat as salad greens. They would also grind up the dried roots into flour for bread-making.



*Jack-in-the-Pulpit*

### Common Blue Violet (*Viola papilionacea*)

If you like to start your day with a glass of orange juice, there's something even *better* for you! The lavender-blue blossoms of the Common Blue Violet contain three times as much Vitamin C by weight as oranges! Should you miss out on these vitamin pills in the morning, a dinnertime side-dish of cooked violet greens is a delicious source of Vitamin C and Vitamin A. When you see the heart-shaped leaves, you'll know you've found a patch of these forest valentines!



*Skunk Cabbage*

### Jack-in-the-Pulpit (*Arisaema triphyllum*)

Standing tall under their canopies, they preach a warning to passers-by. Should anyone try to snack on this plant, they'll get nothing but a sore, burning throat! The message comes not only from Jack-in-the-Pulpit, but Jill-in-the-Pulpit as well. The cluster of flowers down inside of a pulpit is usually either all male or all female. An egg-shaped bunch of scarlet berries will catch your eye if you check these preachers later in the summer.



*Common Blue Violet*

The five preceding interpretive vignettes exemplify the kinds of provocative insights that may inspire lasting images of the ephemeral blossoms encountered by early spring hikers. Imagination is the interpreter's only limit in achieving the goal of making such objects come to life for visitors. The woodland paths await, so bring on the interpretive fare of spring!

(continued on page 3)



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### HELP REQUESTED!

The Village of Bellevue, Michigan, is now in the process of developing two abandoned limestone quarries and surrounding land into a natural environmental park. It is to be used in close conjunction with the community schools as an educational laboratory. The goal is to provide a site where interpretive programs can expand one's knowledge of nature and at the same time provide enriched habitat for all forms of wildlife and a pristine environment for man to enjoy. According to Robert Montgomery, Park Director, there is a need for technical information on site development, interpretive centers, habitat enhancement, requirements for various forms of wildlife, examples of other such parks, and management practices. Send materials to him at 15357 Wing Rd., Bellevue, MI. 49021.

# Valuing Nature

Roland C. Clement, Vice President, National Audubon Society

A generalist who undertakes to address a group of practitioners is always in danger of overextending himself, or of rehearsing the obvious. And yet, although I focused elsewhere most of my life, I have always been one of you—in search of better ways to interest people in nature.

While at the University of Massachusetts in the early 1940s I audited one of William Gould Vinal's courses and absorbed much of the philosophy of his classic *Nature Guiding*. At Cornell some years later, I took a course with E. L. Palmer to see for myself how that other noted nature guide measured up.

When I saw that Clifford Knapp was to lead a workshop on Values Clarification, I asked for a preview of his ideas, since the question of values is what interests me most at present. In one of his 1975 papers<sup>1</sup> Knapp invited comments on his approach, so I hope we may indeed help each other if I use that paper as a point of departure for my own attempt to clarify nature's values to you and to myself. I offer it in the same spirit as Dr. Knapp, "as a beginning that hopefully will never end."

I have not studied the growing literature of Values Clarification, but I gather that much of it is Utilitarian. For example, Knapp's first example of a strategy for clarifying values is to ask about the usefulness of the trees of the area. The usefulness refers to uses to which a tree may be put. It is true that our American civilization is a utilitarian one, in which things are valued for the uses to which they may be put by men. This may make utilitarian educational approaches functional, but I think analysis will show that it is just this notion of utility, when applied to Nature, which is responsible for our failure to value Nature for itself. Knapp introduces doubt regarding the adequacy of a utilitarian approach in a seventh strategy, when he asks whether all objects can be valued in economic terms.

In general, I find that the sort of exercises being elaborated by the practitioners of Value Clarification are useful in developing awareness of the differing status which existing things possess. Also clari-

fied is the difficulty of agreeing on the values (or status) which individual things possess, because there is so much variation in the backgrounds and the sensitivity of the individuals who do the judging. But these exercises otherwise seem to me to do little to *clarify* values, in large part because the valuing process, where applied to Nature rather than to other people, is economically biased, and because the so-called goal of valuing remains vague or even unstated.

My own approach to values and valuing is an attempt to apply some of the process philosophy of A. N. Whitehead to the problems of conserving Nature<sup>2</sup>.

In considering the components of the valuing process, I suggest that we must put Prizing first. To value, as prizing, means becoming aware that other existing things, like us, partake in a process of continuing creation. They are to be valued because each existent (actuality or entity) represents a measure of achieved order in an evolving universe. What comes into existence shares in the creative process. In this process, many elements from the immediate past have been integrated and added to in order to achieve a new unity. Existence is thus an unending process of creative synthesis.

The value which results from this accomplishment is first of all a "satisfaction" for the new existent. It has value in itself because every existent must be assumed to value itself. This satisfaction is not an intellectual process except in the more complex forms of the animal kingdom. It is perhaps because we have over-emphasized the cognitive-intellectual element in our own lives that we have forgotten that the process of satisfaction is more primitive and can thus be enjoyed at lower levels of existence.

For us, valuation is the recognition of kinship between ourselves and all other created things: first because we all share in the accomplishment of having come into existence and persisted in it; because each of us represents an end stage in a long evolutionary line—we are the world in microcosm; and because we are, together, the building blocks for all future evolution.

(continued on page 4)



This is elementary but marvelous, and our current problems largely stem from our having lost the sense of miracle involved in this creative process.

Nature is so ordered, however, that continuing existence imposes a hierarchy of dependence, wherein one group can grow only at the expense of another. The most familiar example is the relation between plants and the herbivorous animals who feed on them, the plants having organized mineral nutrients into new units the herbivores find digestible. This interaction paves the way for carnivorous animals to live off the herbivores. Albert Scheitzer could not reconcile himself to this seemingly harsh relationship because he overlooked that evolution is a process of making-do with what exists at the time. This is why the diversity accomplished by the evolutionary process throughout history matters for the future.

Once aware of these relationships—and it should be the goal of education to make us aware—we inherit a responsibility to use others only to serve a higher purpose, i.e., a higher form of ordering. We may perforce subsist on individual plants and animals, but not at the expense of the species they represent. We must, in short, limit our demands to the population surplus those species can produce. This is why the domestication of plants and animals serves the double purpose of feeding larger numbers of us while reducing pressure on other forms, though even this domestication process must be pursued moderately, lest it dispossess other forms. Our own existence requires us to take enough from the ecosystem to maintain and advance ourselves, but awareness of the process as process imposes a restraint on the greedy temptation to take for the sake of taking, or of exceeding the carrying capacity of particular environments by multiplying our own numbers heedlessly.

The need to restrain our numbers and our appetites is much greater than we have yet acknowledged. This is so because even though man is the highest product of the evolutionary process to date, the demands he makes in seeking to achieve his full potential must not foreclose the potential inherent in all those "others" who also have destinies as mysterious as our own. We must not short-change them because they may yet outdistance us if we mismanage our own destiny. Richard Laws, one of our foremost students of large mammals, has suggested that if man

had not first made the quantum jump to reflective awareness, the elephant might have done so. We cannot help wondering, also, how close the cetaceans may be to this psychic threshold. It is now obvious that we were sadly misled by Descartes who said, about 1640, that "an existent is a thing which requires nothing but itself in order to exist." There are no such existents.

The second component of the valuing process is that of Choosing. This choosing among alternatives is necessary for continued existence, but it must be done so as to impose as little disturbance on the ecosystems that support us as we know how, and so as to contribute to creative advance if at all possible. How does one advance evolution?

Every choice, every valuation, means valuing up or down. We can value so as to preserve or make constructive use of other existents; or so as to disregard, deny, or destroy them. Every choice therefore involves risk and is subject to error. This is an inevitable tragedy of existence, since we can never know everything we should know to make the wisest choice. And yet we must choose. There is, indeed, an unavoidable conflict between potential goods which is a principal cause of the evil of this world.

What is often separated as a third component of valuing, as Action, is simply the carrying out of our choices. We stress it because many of us "say" we value something, but are then derelict in effectuating the choices involved in valuing.

We must act, not on the basis of utility, nor of right, but out of duty. Utility says that I choose to do something because the results will be useful to me. It was the Greek way at the dawn of our civilization. It is clever, but socially and morally primitive. To do what is right means to follow a rule, not because it will prove useful, but because it will accomplish a more general good, such as salvation. It was the Medieval way, and is socially responsible but individually primitive. Unfortunately, when we abandoned it we relapsed to mere utilitarianism instead of advancing to what is our duty. To do something out of duty is to accept full personal and moral responsibility for one's actions, which are one's choice or values. It requires the highest rationality<sup>4</sup>.

An awareness of our indebtedness to the social and ecological systems that produced us is the key to responsible valuing, since to do one's duty is to

honor one's debts. All contingent things are indebted to the processes they partake of.

The Goal of the valuing process is thus that of accepting the responsibility of advancing the creation as best we can, and of not truncating the destiny of other species. It is a call to "celebrate the creation by affirming the universe."

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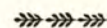
A talk to the American Nature Study Society and the Pennsylvania Alliance for Environmental Education, Oct. 22, 1977, at the Schuylkill Valley Nature Center, Philadelphia.

<sup>1</sup>Clifford Knapp, "Outdoor Environmental Values Clarification." The Communicator: J. N.Y. State Outdoor Educ. Assn., 7:1:9-11, 1975.

<sup>2</sup>for a recent comment on process philosophy, see Nathaniel Lawrence's book, *A. M. Whitehead* (1974), Twayne Publ., N.Y.C.

<sup>3</sup>for an intriguing discussion of how prey and predators co-exist, see L. D. Mech in *Science* (21 Oct.) 1977.

<sup>4</sup>the rationale of utility-right-duty is best described by R. C. Collingwood in *The New Leviathan* (1971) T. Y. Crowell Co.



## NEWS and NOTES

### PAEE & ANSS AT SVNC

A most successful and exciting week-end conference was held in October, 1977 at the Schuylkill Valley Nature Center, Philadelphia, sponsored jointly by ANSS and the Pennsylvania Alliance for Environmental Education. Using the theme "Utilizing Your Site," the participants engaged in workshops and field trips led by such luminaries as Helen Ross Russell, Dick Baldauf, Martha Sykes, Bill Davis, supported by Craig Chase and John Brainerd. Host for the occasion was retiring president Dick James, who took advantage of the occasion to hold an ANSS Board meeting. Main speaker at the evening banquet session was Roland C. Clement of the National Audubon Society, whose address is printed elsewhere in this issue.

ANSS, through joint sponsorship of regional meetings such as this, greatly expands its ability to serve environmental leaders and help develop the nature study philosophy.



# No-Trace Moving About Pond Island

John W. Brainerd

Pond Island is for strolling, not hiking. Speed of movement increases disturbance. Tread gently. Please mostly stay on the beaches, where your footprints will vanish with the next high tide (twelve hours at the most), or walk on the ledges, where your impact will be minimal.

**Walking On The Beaches:** If the weather is warm, barefooting is to be recommended. There is a minimum of sharp glass on Pond Island. If absent-minded, tie your shoes together and hang through your belt in back; they will be waiting for you and not drifting off on an incoming tide! Feet help you feel the different kinds of sand and gravel, their firmness and softness, their wetness and dryness; their warmth and coolness. Dig a pool; build a castle; watch for worm holes and worm tracks; follow the swashes; sit to watch waves; linger.

(but watch for sunburn.)

**Walking on Tidal Ledges:** Be careful! The uppermost tide-washed ledges are usually dark with an almost invisible film of blue-green algae which are *very slippery*. A little lower is often a whitish zone of barnacles which are *very sharp*! They give good footing but can cause severe lacerations if you brush against them or fall on them. It is best to wear old wading sneakers when scrambling on these ledges. The brown algae zone below the barnacle zone is more or less covered with the slippery Rockweed and Bladderwrack, stringy seaweeds which tend to hide uneven rocks and crevices, thus making treacherous footing. Here it is wise to go on all fours (hands and feet) or at least keep one hand down on the rocks or seaweed for stability. Test each footplace before trusting your weight to it. Often, move with feet first, buttocks under, and hands following. It is a long way to the Blue Hill or Castine hospital! But the ledges are worth the perils. They provide a world of mystery well worth leisurely exploration. Lift the curtains of seaweed to look for crabs and whelks. Peer into the tide pools. Sit on a ledge and watch the waves come and the backwash go. But do not get marooned by an incoming tide and do not take any chances of slipping off into deep water. You might never get back.

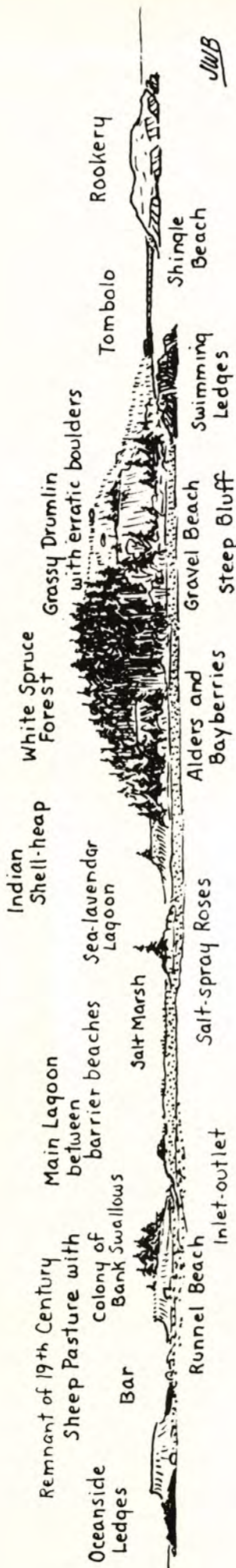
**Walking on Dry Upper-Beach Boulders:** Boulder-hopping has minimum impact on the environment and gives a challenging change of pace from strolling. Be careful, though: it is easy to sprain an ankle or even break a leg if you misjudge a jump or if a stone rolls or wobbles unexpectedly. Do not race—and do not leap to the same stone that a companion is just leaping to! Enjoy the various sizes, shapes, textures, colors, and temperatures (on a sunny day) of the no-two-alike boulders. Puzzle about why they are there. Find the one which makes the best seat for your size bottom.

**Walking and Climbing on Dry Ledges and Cliffs:** For personal safety, be careful to select flat or in-sloping toeholds in steep places. Be *sure* any toeholds or handgrip places are on strong rock and not on *rotten* or frost-cracked pieces which might give way to your weight. Test them each time before using them. Do not climb up any place you are not willing to climb down, and vice versa. For care of The Island, be considerate of crevice plants; their safety depends upon the shelter of a crack and its bit of soil. Give thought to lichens growing so slowly on exposed rock surfaces. The delicate covering which a careless foot can rub off in a second may take years to regrow.

**Slogging Through the Saltmarsh (Merse):** Preferably only skirt the margin of the merse, all of which is immersed in sea water at high tide. Walk along the inner side of the barrier beaches on the northeast or southwest sides. Step around the rosette leaves of the sea-lavender (also called marsh-rosemary) which is abundant here.

Along the northwest side of the merse where the spruce woods come down to meet it, step and hop along the large pieces of driftwood, flotsam from shipwrecks, broken wharfs, and tree trunks toppled into the ocean from wave-cut banks. Avoid when possible walking on the cordgrasses, sedges, bulrushes, and the many wildflowers (often inconspicuous when not in bloom) whose way of life depends upon having soil which is soft and not compacted by human feet.

If you really need to leave the beach





or driftwood track to cross the merge to mudflats or lagoon, tiptoe; slip your foot down between the plants rather than step on them. Try not to walk where you can see others have walked and thus distribute the wear on marsh soils and vegetation. Little animals too can benefit from your thoughtfulness.

**Walking Through the Spruce Woods:** Spruces, unlike firs, have prickly foliage, and their twigs too are scratchy. Stay on the narrow, low-trimmed trails, ducking under branches or gently bending them aside just long enough and far enough to let you slip through. Stay in the center of the trails, thus keeping them as narrow as possible, to minimize erosion and protect trailside plants. These woods are not to race through on highways but to explore slowly with true caring, for all that live here call them Home.

If you must leave the trail, use either of two methods: (1) tiptoe, keeping your big feet off delicate mosses, mushrooms, Canada beadruby, enchantress' nightshade, and other herbs of the forest floor; or (2) proceed on all fours (hands and feet) the better to appreciate the little things living there at close eye-range, or maybe on all sixes (hands, knees, and feet), although that sometimes causes more soil compaction and bulldozing of plants than does going on all fours.

**Walking Through Blowdowns:** Avoid blowdowns if you do not enjoy the challenge of laboriously climbing over old windthrown trunks. But blowdown areas yield some of the best raspberries; and from the top of a big log you can often get the best views of birds and other wildlife. Blowdown travel is easiest if you follow the direction of the wind that toppled the old trees, using the trunks as elevated walkways as much as you can. Rest frequently astride or athwart an old forest giant to look about you, listen about you, smell about you, and quietly let yourself blend with your environment so that animals may accept you and come close. (In bug season, it is wise to have insect repellent: you can sit more quietly!) Don't crash through blowdowns destroying the quiet along with the environment; and don't use trunks as trampolines, bringing them down to the damp earth for premature decay.

**Walking Through Raspberries and Blackberries:** Stay on any trail as much as possible. If you must leave the trail, try to slip between the canes (stems) without breaking them. With stiff-

stemmed blackberries, use an old woodsman's trick: step gently against the base of the canes with your sole tipped upward and outward; then roll your ankle and knee outward as you tread down to bend the canes to the side out of your way. If a thorn grabs you, stand still until you extricate yourself. If you push, the thorns will tear. Don't pick more berries than you need. Others coming after you may want berries too; and squirrels, voles, deer mice, and birds will appreciate every one you leave as they store energy in their fat tissues for a hard winter (as every winter is for the wildfolk on Pond Island).

**Walking Through Beds of Hay-scented Fern:** Following existing trails so as to leave unbroken as large areas as possible of the spring and summer carpet of lacy green, or in autumn of gold drying to pale tan. As always, try to keep the trails narrow. In a few places, a short side trail should end in a small cul-de-sac ("neck of the bag"), not going farther. This should be a sitting or lying spot no more than six feet across where one can relax for mouse-eye-level contemplation of a fern forest. If you come early in the summer and no such spots have been made for you, you can be privileged to plan and make one, a small, sensitive one for off-the-road serenity.

**Traversing a Grassy Area:** Pond Island grass is *not* an athletic turf kept sterile with insecticides and mollycoddled with fertilizers. It is a natural and essential protective cover for the easily eroded glacial soils. It is Home for field mice and a wealth of insects and spiders. Watch where you step—each step. That will slow you down and help you see the tunnel highways for the mice's smaller scale of living. Perhaps you can find their hay mows in their mini-pastures, and maybe a store of juniper berries, bayberries, or cherry pits. Settle down at least briefly in their grass-world; then lift your eyes for distant views of spruces, ledges, beaches, the bay, and far islands. Lie down too, to contemplate the sky, maybe with white clouds or gray fog, or perhaps with raindrops splashing cold upon your face from the dark nimbus of a thunder squall (safer here than under a tall spruce). A grassland, even a very small one, is a place to glory in. Don't fail in season to note the other herbs which bloom along with the grasses. Tread gently, perhaps barefoot. This is not a football field for cleated boots.

**Climbing Up, Down, or Across Any Banks:** If they are bare or poorly protected by plants, please DON'T. Also please stay well back from the tops of banks, which are often undercut by erosion and easily pushed down by a careless foot, tumbled and irreplaceable.

**In Short:** Move slowly and thoughtfully, mostly on beaches, ledges, and existing trails not to be widened. If you must move off a trail, practice no-trace walking so as not to trample vegetation, break branches, or compact or dislocate the soil. Hopefully wildlife will not hear you coming and nobody will know that any human has passed that way. Tread lightly on Planet Earth. Practice on Pond Island.

(If you can share further ideas on No-Trace Moving Through Natural Areas, your thoughts will be welcomed by the author: John Brainerd, Springfield College Biology Department, Springfield, Mass. 01109.)

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#### DAVE JUNKIN AT BEAVER MEADOW

ANSS member Dave Junkin II has assumed the position of Naturalist-Director at "a jewel of a nature center" outside Buffalo, N.Y., at North Java: the Beaver Meadow Audubon Center. He began his work there April 1. Dave indicates that students wishing to do intern-training at a nature center should write to him about the possibility of working at Beaver Meadow.

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#### BALDAUF TO LITTLE ROCK

Effective June 15, former ANSS President Richard Baldauf will assume the directorship of the Museum of Science and History, MacArthur Park, Little Rock, Arkansas 72202. In addition to other activities, the Museum conducts a state-wide Environmental Awareness Program. We wish Dick well in this new endeavor.

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#### DICKEY HONORED

Miriam Dickey, long-time ANSS member and a teacher with the Massachusetts Audubon Society's education department for ten years, has been awarded the 1977 Environmental Educator Award by the Massachusetts Conservation Council. She was selected because of her outstanding contributions to the field of environmental education. Before coming to Audubon, Miriam was instrumental in the development of the education program at Boston's Children's Museum.



# An Energy Primer

Richard J. Baldauf

The fact that an energy problem exists is not new, and it involves more than just getting another gallon of gasoline for the auto, finding a new supply of natural gas, or laying bare another piece of land for a lump of coal.

The energy problem is more basic than that, but the public has not been conditioned to accept the basic elements of the problem.

The Earth runs on solar energy. This is the energy that keeps intact and viable the ecological systems of the Earth. Thus, green plants utilize radiant energy to stoke their photosynthetic furnaces via chlorophyll. With this supply of energy green plants produce their own food. It's the only way green plants can operate. And most animals, including people, are absolutely dependent on green plants.

All the green plants on Earth use much less than 10% of available solar energy, with 90% being reflected back into space. But look what they can do with only 10%! Grass-covered prairies use some of this 10% to feed cattle. Cattle produce animal protein, and that's good, but it occurs at a ratio of about 16 pounds of grass to one pound of beef. Trade-offs are to be found at every turn on the road to energy.

But when cattle eat grass to get energy (which comes from the sun) there is waste. The animal loses some of the energy in the form of heat; it uses some just to stay alive; in fact, only about 10% of the energy intake (the grass) is converted into protein and up to 90% is lost as heat. Such energy losses occur at each level of a food chain, and the chain of grass-cattle-people is no different.

Fortunately, solar energy is free and non-polluting and the system can continue, if people allow it and if their energy demands are conservative. But that refers to those living in a developed country. Let's look at a so-called underdeveloped country—Bangladesh.

Bangladesh is about two-thirds the size of Kansas, with a human population of over 80 million. The Bengalees also need energy in the form of food. To help supply this the genetics of selected crop plant species have been manipulated to produce hybrid strains of grains which

will outproduce anything grown in the past in that country.

Hybrids can produce more bushels per acre and more crops per year, but there's a catch. Hybrids were developed by carefully trading off (genetically) certain traits for other more desirable ones. But genetic variability was lost in the trade-off. Thus, the new hybrid will not grow and produce according to its genetical plan unless all environmental requirements are met: the correct supply of the right kind of water, a good supply of nitrogen-rich fertilizer, and suppression of plant pests.

The Bengalees cannot depend on animal manures—the genetic hybrid demands more than that. The required nitrogen-rich fertilizers are produced from petroleum and natural gas, with emphasis on the latter. Natural gas and petroleum are fossil fuels, i.e., they were formed millions of years ago from living organisms and got their energy from the sun. But the conversion of energy from fertilizer into grain in Bangladesh is not a simple matter.

The supply of natural gas in the United States and in the world is finite. The end is in sight. The crisis is here now. Citizens of the U.S. are paying more for energy and not necessarily living a better life. The Bangalees are hungry today.

Since natural gas is in short supply the price has increased dramatically, and news accounts regularly suggest the need to ration natural gas to some U.S. industries during harsh winters. This short supply has a direct effect on the price of fertilizer in Bangladesh and in the U.S. The influence of affluence allows us to drive a 5,000-pound auto to the local garden center to buy a 50-pound sack of nitrogen-rich fertilizer. It is estimated that it takes about 162,000 BTUs (a measure of energy) to make the average 50-pound bag of fertilizer which will be spread on lawns, cemeteries, and golf courses in order to raise a weekly crop of grass which will be harvested and thrown away in a plastic bag made from petroleum. Further, about one-half million BTUs are used in running the power mower used in reaping that harvest of the average 10,000 square foot lawn. In the meantime, Ban-

galees try to raise another handful of rice to live another day.

This suggests that people in developed countries waste energy. That's right. It also suggests the need to understand the subtle ways by which energy is "lost," which requires an appreciation for the laws of thermodynamics. The first law relates to the fact that the amount of energy is constant and that energy can neither be created nor destroyed. Everyone accepts that, just as the law of gravity is accepted.

Although complicated in the scientific sense, the second law of thermodynamics can be appreciated in a practical way. For our purpose in this article, the essence of the second law can be summed up as the *quality* of energy.

It is easy to understand that some kinds of energy are readily available and usable by people. Thus, a switch can be turned on and off to control the flow of electrical energy through a conductor. When the switch is on, electrical energy might flow through a wire to produce light in a bulb. The light produced represents only some of the energy put into the bulb. The remainder of that input is transformed into heat energy, just as some of the energy input of a cow is transformed into heat. Energy can be changed from one form to another, but it can't be destroyed. And with each change in form there is a loss of *usable* energy.

It is the amount of energy being changed to a form not easily usable that is causing many of the problems. In the absence of a universal catastrophe, the Earth will continue for eons, but the *way* it continues depends on how people change it.

The environment is changed for human comfort and profit, but the changes require energy. More changes require more energy and produce more energy not readily available for reuse. In other words, we have become highly efficient in wasting the waste! A common example lies in an understanding that it takes more energy to produce plastic than to produce leather shoes—but the result is the same: a pair of shoes.

(continued on page 9)



# *Interpretation: A Vital Necessity In Wildlife Management*

Robert Lochmiller, Department of Fisheries and Wildlife, Virginia Polytechnic Institute

We are all somewhat blind in viewing and understanding our environment. Even the most informed park visitor lacks a complete understanding of his environment and the role he plays in it. Many parks have begun programs designed to create a national environmental ethic leading to greater insight and understanding of nature. Interpretive programs should be a first step taken by wildlife agencies to broaden their support by appealing to a wide variety of people interested in their services and products.

In the past, the production of game has been financed almost solely by the sale of hunting licenses and taxes on the sale of hunting equipment. These funds will no longer be sufficient in supporting wildlife management. The monies generated by hunters and fishermen will prove to be inadequate for financing continued increases in management and protection of diverse forms of wildlife, both game and non-game. It has become necessary to develop ways for the non-consumptive user to finance some of the benefits of wildlife management. The wildlife manager is obligated to see that non-consumptive interests pay a fair share for the work we do on their behalf. A variety of ideas and methods can be implemented to charge non-consumptive users (Hatter 1971). Inclusion of items such as birdseed, binoculars, and bird feeders in the tax schedules is one such method; however, implementation of such methods may not suffice. For fish and wildlife agency programs to become fully accepted it is also necessary to educate the public on the benefits gained from these programs. One way to accomplish this education is through interpretation programs sponsored by wildlife agencies.

One goal of interpretive programs is to motivate individuals to acquire the skills and values necessary for understanding the environment and promoting its protection and management. The National Park Service, for instance, offers numerous programs designed to achieve this goal. These programs can be adapted by wildlife agencies and can become a valuable tool in helping people recognize the benefits they reap from wildlife management practices.

## Accomplishing the Desired Goals

The type of interpretive program to be implemented depends on: (1) the size and character of the area; (2) the emphasis to be given (natural history, management, biology, culture); and (3) the type of people who will use the area (bird watchers, nature photographers, family groups, or children). The program should reach the greatest possible number of people. The more individuals an agency communicates with, the greater the chances for achieving desired management goals (Derr 1974).

Traditional interpretive programs have included nature centers, museums, exhibits and, of course, the nature trail (Ashbaugh 1965). The advantage of the traditional programs is that the recreation visitor can take as much time and opportunity as he pleases to observe and learn about wildlife management.

To answer questions that are not resolved on the nature trail, the wildlife agency can utilize the nature center or museum (Ashbaugh 1963, Shomon 1962). Museums make it possible to tell the story of wildlife management to a great number of people in addition to serving as a reference library for people seeking additional information. They can be designed to expose the visitor to wildlife management without resorting to the use of a hard core instructional approach.

Another interpretive facility that has gained popularity is the utilization of technological devices such as slide shows and movies. These have proven to be as efficient and beneficial as traditional methods, if not more so. They provide interpretation in areas that lack sufficient personnel.

Short introductory field demonstrations and instructional sessions on bird behavior, nature photography, bird identification and other subjects are popular to the visitor. The personal contact has proven to be very stimulating, producing better understanding of the subject (NPCC 1972). Schick *et al* (1976) proposed the use of wildlife workshops for elementary and secondary teachers.

Gilbert (1960) outlined the techniques in utilizing wildlife television. Television

has the advantage of reaching people in all walks of life. In addition, the medium holds interest because programs can be seen as well as heard and timeliness in relation to current happenings can be easily controlled. The cost per individual contacted through television would probably be low.

Approaches to interpretation are limited only by the creativity of the interpreter. Guidelines and techniques established by the National Park Service through years of experience provide an excellent reference to beginning a wildlife interpretation program. The above discussion outlines a few of the many possibilities which are available to educating the non-consumptive beneficiary of wildlife management. The emphasis placed on the need for alternative forms of financing wildlife management clearly includes the educating of the non-consumptive user of our wildlife resources. Thus, interpretation programs are a vital necessity to the future of wildlife management.

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Derr, Rex E. 1974. Interpretation for recreation. *Trends Vol. II*, No. 2.

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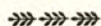
The manufacture of shoes or other items produces heat. Some of the heat is usable, but most of it is lost. Friction produces heat—primitive tribes learned that much. Sophisticated inhabitants of developed countries have failed to learn that an increased amount of low quality heat—that which can't be easily used—is produced each day by their daily comfort requirements. The heat produced by an electric typewriter, a light bulb, or an electric toothbrush is not available for use. Thus, whatever we do, whatever is manufactured, dissipates energy in the form of unusable heat.

The quality of energy can be interpreted in another way, too. High quality energy is required to operate an electric motor, and here the efficiency of energy-use can be fairly high. The energy required to heat air in a house does not have to be of that quality.

It is not efficient to produce electricity (a process which produces heat) to be used to energize a heating element to heat air, because in this cycle heat is produced twice—once it's wasted and in the other instance it is used to heat air. Air or water can be heated with low quality energy. This is the reason for increased interest in solar energy, wind energy, and other types of soft technology.

There is no question that high quality energy will always be needed to sustain some kind of quality to human life; there is also no question that some of that quality can be maintained by using energy produced by the sun and present at the surface of the earth. After all, that's the kind that runs the earth!

High quality energy is needed only because of human existence, because there is the constant desire to change the Earth. Since some sources of energy are in low supply or cost too much, there is the need to look at all aspects of energy use, reuse, abuse, production, and conservation. That's why Congress is arguing about an energy bill; that's why it costs more to live. It is now necessary to take a positive and realistic look at the available options. No matter what you do, how you live, or the nature of the income, energy is the name of the game. In spite of everything, the next move in the game is *yours!*



## Soil Conservation Service Specialists Conduct Mini-Field Trip At Western Junior High

Sonia Metelsky

"They're beautiful." That's how Joe Weeks, U.S. Agriculture Department soil conservationist, described Bethesda's Western Junior High seventh graders last fall during a mini-field trip on environmental conservation. Weeks, an enthusiastic instructor, said, "They pay attention and are eager to learn about soil and water conservation. You can tell they've been well prepared."

Seventh-grade science teachers Lynn Salvo, Susan Schmitt, and Philip Schreiber can take credit for preparing the youngsters.

Mrs. Salvo, who took a natural resources conservation course last summer at Maryland University, thought a lecture tour by conservation experts would make the seventh graders' plant-life course more meaningful. So, with the full support of Western principal William H. Snyder, she invited Joe Weeks and Dave McKelway, resource conservationist with the Montgomery County Soil Conservation District in Rockville, to come to Western and conduct a mini-field trip around the school grounds and to a nearby stream—Little Falls Branch.

About 220 students, including seven in Special Education, made the trek for a firsthand look at soil, water erosion, and wildlife. They went in groups of 30-50 throughout the six-period day.

Nature cooperated with the Soil Conservation Service specialists—it rained all day. A slightly soaked but undaunted Mrs. Salvo said, "The students saw the water erode the soil and carry it down the hill to Massachusetts Avenue."

As the rain continued, the water level rose in Little Falls Branch and slowly covered the bank where the classes stood to see the exposed soil profile (layers of soil). Finally, Weeks and McKelway took to higher ground to show the students the various types of soil and explain their uses. Mrs. Salvo stressed that "it takes so much time for soil formation compared to the very brief time needed for soil erosion."

While the students sloshed through the rain to and from the small stream that flows to the Potomac, the conservationists showed them spots near the sidewalk where soil had eroded, niches in the grass where the rainwater was depositing silt,



Montgomery County resource conservationist Dave McKelway describes the various soil layers to Western Junior High seventh graders on the banks of Little Falls Branch in Bethesda.

Photo by: John Metelsky



and dense ground covering that holds soil and provides wildlife protection. Charming seventh grader Ingrid Arthaber of Green Acres, said, "I learned a lot about the earth, but the mud was horrible."

Weeks showed the youngsters the two main tools of a soil conservationist: the "Soil Survey Manual" and the Abney Level, which measures the slope of hills. Under his guidance, the budding scientists measured the slope from the schoolyard down to Massachusetts Avenue and learned to interpret these measurements. "The steeper a slope," he explained, "the more likely soil erosion will occur. Other factors of erosion are: length of slope, amount of rain per minute, and soil type."

While raindrops kept falling on his head, amiable Dave McKelway told the seventh graders, "Soil Conservation Service specialists here and throughout the country will lecture to schools, civic groups, and other organizations about conservation. They'll even come to your homes to analyze soil and water, and tell you how to prevent wet basements or

soggy yards. The Soil Conservation Service (SCS) was established in the U.S. Agriculture Department in 1935 to plan and carry out a national program to conserve and develop our soil and water resources." He told the attentive audience how to correct some erosion problems on the school grounds and the track.

Mrs. Salvo encouraged the youngsters to use some of these conservation methods around school for follow-up projects. She feels, "It's important for them to think about nature in their daily lives. They learn a lot at nature centers and at the county outdoor education centers, but seeing the birds and squirrels near the school and noticing potential erosion problems every day makes them more aware of the importance of conservation."

Smiling through the drizzle, Jacqueline Orwick of Glen Echo Heights agreed with Mrs. Salvo: "The mini-field trip was neat; because instead of just hearing a lecture, we got to go out and see about the environment for ourselves—right in our own back yard. It was fun."

Back in the classroom, Dave McKel-

way wrapped up the tour with a reminder to the water-logged students: "We have to prevent erosion, because soil is the basis for our existence on this planet. Top soil holds roots for plant life, and we need plants to exist." One studious seventh grader, David Wisdom of Springfield, got the message. He proclaimed his own words of wisdom. "The class was interested, because it's important to understand the balance of nature."

Joe Weeks was glad we came to Western. He said, "These students are lucky. Western is an ideal site for studying conservation, because it's surrounded by trees and thick ground covering and has a nearby stream. Some city schools have to use greenhouses for their conservation projects."

"We like to teach kids this age about environmental conservation. If we can impress them now about the problems, maybe they'll practice good conservation techniques in the future. Also, we try to inspire young people to enter conservation careers. They are our hope for the future."

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## NEWS and NOTES for Environmental Education . . .

### AN UPDATE ON . . . I.U.C.N.

The International Union of Conservation of Nature and Natural Resources (IUCN) is an independent non-governmental body founded in 1948 to promote scientifically based action for the conservation of wild living resources. A.N.S.S. has been an affiliate organization for over ten years.

The functions of IUCN are:

- to monitor the state of the planet's living resources—the plants, animals and ecosystems on which the survival and wellbeing of humanity depend;
- to determine scientific priorities for conservation action;
- to mobilize the scientific and professional resources to investigate the most serious conservation problems and recommend solutions to them;
- to develop, within a coherent global strategy, programs of action to protect, sustain and use rationally the most important and threatened species and ecosystems;
- to assist governments and other bodies to devise, initiate and carry out projects for the conservation of wild living resources.

At present IUCN has 424 voting members in 102 countries, these members being States (48), government agencies (109) and non-governmental organizations (267).

In addition, IUCN maintains a global network of more than 700 scientists and professionals organized into six commissions covering: threatened species; national parks and other protected areas; ecology; environmental planning; environmental policy, law and administration; and environmental education.

The members and commissions, and the many other scientists and professionals with whom they and the IUCN secretariat are in touch, provide the authoritative information and advice on which IUCN bases its programs.

Essential information is published in key source documents, notably the *Red Data Book* (describing all threatened species of mammals, birds, amphibians and reptiles, and fish) and the *United Nations List of National Parks and Equivalent Reserves*.

IUCN is now preparing a World Conservation Strategy which is intended:

- to identify the principal ways in which

species and ecosystems are depleted, degraded or destroyed;

- to define effective preventive or remedial action (by governments, inter-governmental bodies and non-governmental bodies); and
- to propose priorities for action.

The Strategy will draw upon the accumulated expertise of IUCN's members and commissions as well as many other organizations and individuals. From it IUCN will derive its own three-year program, and also develop programs for the World Wildlife Fund.

Two-thirds of IUCN's income comes from the United Nations Environment Program (UNEP) and World Wildlife Fund. Members supply about a fifth, and the balance comes from smaller grants and contracts.

IUCN has formal working relations with a wide range of intergovernmental and international non-governmental organizations. Among UN bodies, IUCN works especially closely with UNEP, FAO and UNESCO—all members, with IUCN, of the Ecosystem Conservation Group, set up by UNEP to help coordinate the conservation work of the four organizations.



# NEWS and NOTES for Environmental Education . . .

## ALLIANCE HOSTS NATIONAL CONFERENCE

The Alliance for Environmental Education sponsored a national working conference for environmental education leaders in Washington March 28-30. The conference briefed the participants on the Intergovernmental Conference on EE held in Tbilisi, USSR in October, 1977, the first of its kind. Conferees also considered the need for legislation to support EE on the state and national levels, and what the content of such legislation should be. It dealt with the role of private organizations in EE, and explored ways to improve the interaction between private groups and government agencies.

One hundred twenty EE leaders were expected. The Alliance provided a summary of the Tbilisi conference, which served as a starting point for workshop discussions. The summary is given below:

From October 14 through 26, 1977, official delegations from 70 nations took part in the Intergovernmental Conference on Environmental Education in Tbilisi, Georgia, USSR. Also at the conference were representatives of 8 organizations of the United Nations, 3 other intergovernmental organizations, and 20 international nongovernmental organizations.

Dr. Mary Berry, Assistant Secretary for Education, Department of Health, Education and Welfare—the highest ranking education official in the U.S.—headed the official U.S. delegation. Accompanying her to this *first, global, ministerial* level meeting on environmental education were senior officials from several federal agencies and private organizations.

Organized by the United Nations Educational, Scientific and Cultural Organization in cooperation with the United Nations Environmental Program, the Conference was the culmination of planning that began with the Belgrade workshop of experts in 1975 and continued at five regional meetings of experts. The Alliance contributions to the conference were made through the published reports of its 1975 Snowmass conference and the 1976 St. Louis North American Regional Conference.

At the Tbilisi conference, delegates approved a draft final report in the closing plenary session. Substantively, there were few surprises in the recommendations adopted. But because it was the highest level international meeting on en-

vironmental education yet held, the recommendations warrant close scrutiny as guidelines for governmental policy. We do not lack for good ideas about who should be reached with what kinds of materials through environmental education. It is the gap between ideas and implementation that deserves attention. The missing ingredient in effective implementation of environmental education on a significant scale is the low priority for environmental education on society's education agenda. It is well past time for matching environmental education rhetoric with environmental education performance.

## SOLARIZE . . . BEFORE WE POLARIZE

### "If We Try Hard Enough"

If we try hard enough, the United States can meet up to one-quarter of its energy needs through solar technologies by the year 2000, according to a report released by the Council on Environmental Quality. Moreover, for the period 2020 and beyond, it is now possible to speak hopefully of our becoming a solar society. A national goal of providing significantly more than one-half of our energy from solar sources by the year 2020 should be achievable if our commitment to that goal and to energy conservation is strong.

*Solar Energy: Progress and Promise* is a 52-page report based on an extensive literature review and on numerous discussions with solar experts within and outside government. It summarizes the technical status of each solar technology and bases its optimistic findings on recent improvements in the development of solar technologies and on expected rises in the costs of competing energy sources.

By the year 2000, the study estimates, the United States could save more than 20 quadrillion BTU's ("quads") of fuel through the use of solar energy—the equivalent of 10 million barrels of oil per day and more than the energy now produced in the United States by coal and nuclear power combined. Total U.S. energy demand in 1977 was 76 quads. One quad is equivalent to enough energy to heat 500,000 homes for 20 years or to operate 20 large electric powerplants for 1 year.

The report concludes with a summary of recommendations, made by a variety

of sources, for accelerating the use of solar energy. The Council does not specifically endorse any of them but offers them as discussion points for possible changes in federal programs.

*Solar Energy: Progress and Promise* is available from the U.S. Government Printing Office, Washington, D.C. 20402: request Stock No. 041-011-00036-0 (\$2.30)

## STABILIZING COASTAL DUNES

Shifting, whispering sands may be romantic in song but not along the mid-Atlantic coastal beaches where coastal storms and windblown sand do millions of dollars worth of property damage each year.

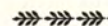
Sand dunes provide the best protection against damaging coastal storms. But dunes are unstable and must be protected from wind and waves by vegetation.

A recently discovered superior strain of American beachgrass has proven effective in stabilizing dunes and the shifting sands in coastal areas from Maine to North Carolina.

Named "Cape" American beachgrass after Cape Cod, where it was discovered, this robust, easy-to-plant species can be used either to stabilize existing sand dunes or to build new ones. It can also be planted to stabilize sandy areas inland such as roadbanks and abandoned gravel pits.

Planting stock is now generally available from commercial nurseries along the mid-Atlantic coast.

For information on how, when and where to plant "Cape," call the local office of your soil conservation district or write to Publications, Soil Conservation Service, P.O. Box 2890, Washington, D.C. 20013. Ask for a free copy of a new color leaflet: " 'Cape' American Beachgrass: Conservation Plant for Mid-Atlantic Sand Dunes."



## Briefly Noted

"Texas Wildlife" is the title of a new book published by Texas A&M Press. Containing 232 color photographs, it will be of interest not only to Texans and their neighbors but to all persons who enjoy wild animals.



# GOOD READING *for Environmental Education and Interpretation*

Ben Hall

**The Audubon Wildlife Treasury.** Edited by Les Line. Ill. with black-and-white drawings by Chuck Ripper, and full-page color photographs. J. B. Lippincott, Philadelphia and New York, in cooperation with the National Audubon Society, 1976. 192 pp. \$15.95.

Here is another volume of the series of *Audubon Treasuries*. I reviewed an earlier one, entitled *The Pleasure of Birds*, in Volume 30, Number 1 of *NATURE STUDY*. Like *The Pleasure of Birds*, this book is made up of outstanding articles that have appeared recently in *Audubon* magazine, selected by the competent editor of that periodical, Les Line. Chuck Ripper's black-and-white drawings decorate the title pages of the essays. In addition, there are two "Portfolios" of full-page color photographs, by a number of skilled photographers.

In his Foreword Les Line solicits the aid of Joseph Wood Krutch in a contradiction of the idea, often heard in recent years, that Natural History is dead. So also, in greater or lesser degree, do all the articles in this anthology. The enduring support of the great French entomologist, J. -H. Fabre, for the importance of what he called "the incomparable museum of the fields," is found in the eloquent essay by Loren Eiseley on the "Coming of the Giant Wasps." Another strong supporter of the natural history viewpoint is Edwin Way Teale, who has contributed an article on "Windows on Wild Life." To judge by the writings of these, and other authors included in the Wildlife Treasury, the "obituary of Natural History is premature," to say the least.

But this book contains more than the items I have stressed. Its cast of characters (to limit ourselves to an incomplete list) includes whales, iguanas, coyotes, martens, bears, bobcats, shrews, snakes, gannets, vultures, crows, a wild boar living in a city park, and even unicorns!

These essays embody two approaches to Natural History. One can be called the "stay at home" method: it is well illustrated by the essays of Eiseley and Teale. The other approach involves travel to distant places. In the volume here under consideration, Peter Matthiessen takes us to the Galapagos Islands, the site of one of Darwin's major observations. With Louis

Halle we go in imagination to a public park in Geneva, to see—of all things!—something of the ways of a wild boar. These contrasting styles of observation are, in my opinion, of equal merit; both have much to contribute to the experience of the naturalist.

May the readers of this review share with me the enjoyment of these excellent *Audubon Treasuries*.

**Birding from a Tractor Seat** by Charles T. Flugum. Ill. with black-and-white drawings by Walter J. Breckinridge. Thomas Y. Crowell Company, New York. 1975. 422 pp. \$8.95.

This book consists of 137 monthly columns that appeared in the *Community Magazine* in Albert Lea, Minnesota, where the author's farm is located. The essays are of more or less similar length, the average being approximately three pages. Most of the essays deal each with a single species of bird, or several closely-related ones. The author is largely self-taught, both as writer and as ornithologist; and he has learned well.

In the Author's Preface, Mr. Flugum explains the advantage of his use of the tractor seat for bird watching. "I discovered that, as a vantage point from which to see birds at close range, a tractor seat is ideal. Birds that could not be approached within several rods by bird-watchers on foot would remain perched or walk confidently within a few feet of my noisy tractor. Apparently birds consider the driver to be a part of the machine and do not associate the tractor with danger."

The bird lore is interspersed with autobiographical reminiscences, such as that dealing with a tame grackle, "Black Donald." And often the text, while dealing with familiar things, adds interesting details that are less commonly known, as, for example, the eating of spiny tent caterpillars by cuckoos. "Caterpillar hairs and spines," Flugum writes, "also pierce the cuckoo's stomach so that digestion is obstructed. When this happens the cuckoo sheds its entire stomach lining, having meanwhile grown a new one so that it can go merrily on eating hairy caterpillars."

The book has an Index which readers

will find useful, with the shortcoming, however, that it is based exclusively on the names of bird species.

This is not a cover-to-cover book but a browsing one. The reader will want to keep it within arm's reach and return to it frequently. Its potential of reader pleasure is high.

**The Explorer Naturalist** by Vinson Brown. Ill. with black-and-white drawings, maps, and diagrams. Stackpole Books, Harrisburg, Pa. 1976. 288 pp. \$10.00.

This book will be a valuable source of information for young, amateur naturalists as well as mature professionals, such as teachers and researchers. Beginning with an orientation chapter on the "Living World of the Naturalist," it goes on to describe the "Tools and Methods of the Naturalist," including some of the more up-to-date, complex ones. The next three chapters deal mainly with three major fields of natural history investigation: ecology, animal behavior, and plant life.

Part II describes some of the most characteristic American habitats. Each of these habitats is illustrated with four pages of drawings of the typical plants and animals of the area.

The five Appendices should prove helpful to the student, at whatever stage of advancement. These comprise Glossaries of Ecological Terms and of Ethological ones. Suggested References, Natural History Suppliers, and Scientific Periodicals. And finally, there is an adequate Index.

We have here a useful Naturalist's Handbook of problems and the techniques of solving them. The character of the book is well-stated on the front of the jacket: It is concerned with "Pathways to nature—a guide to exploring and enjoying the outdoor world."



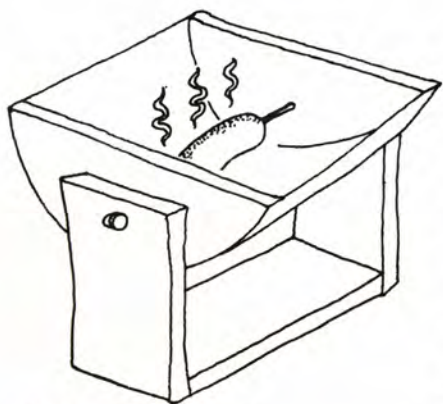
"Ecology USA" is a new bi-weekly newsletter designed to inform people working in education, industry and government. It will provide up-to-date coverage of ecology-related news in research, legislation and technology. Subscription is \$32.00/year, from Business Publishers, Inc., Box 1067, Silver Spring, MD 20910.



# SOLAR HOT DOG COOKER

Depending upon where you live, this gadget will cook a hot dog in a few minutes to half an hour. You merely point the reflector at the sun so its rays are focused upon the hot dog. You need not be a craftsman to build it. Take these plans to your local hardware store and ask a friendly clerk for help. Or maybe the school shop teacher would be willing to barter.

## MATERIALS ★★★



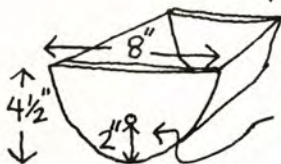
- (1) BASE. 12 $\frac{1}{4}$ " long of 1"x8" wood.
- (2) SIDE SUPPORTS. 8" long of 1"x8" wood.
- (2) NAILS to hold the dog. 4" long #60.
- (2) ROUND-HEAD WOOD SCREWS. 1 $\frac{3}{4}$ " long.
- (2) WASHERS for wood screws.
- (20 to 25) NAILS for reflector and base. 1" long.
- (1) REFLECTOR. Spectular Finish aluminum. 12"x16".
- (2) REFLECTOR SUPPORTS. 4 $\frac{1}{2}$ " of 1"x8" wood.

## DIRECTIONS ★★★

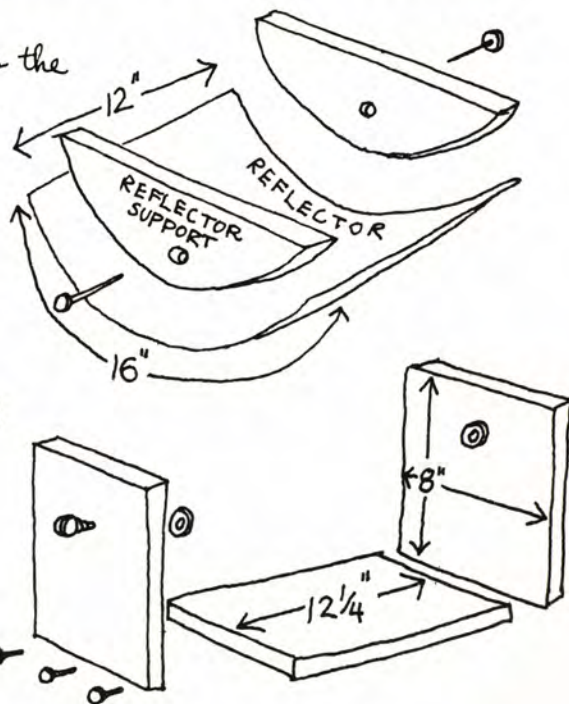
A critical but simple part of the cooker is the REFLECTOR. Aluminum works best, but you can get by with shiny aluminum foil glued to a piece of heavy but flexible cardboard. The REFLECTOR should be EXACTLY 12" wide.



\* Center REFLECTOR on REFLECTOR SUPPORT and hammer first nail. Continue nailing along curve until REFLECTOR is secured. You will need three hands to do this



\* Drill  $\frac{1}{8}$ " diameter hole in each REFLECTOR SUPPORT to hold hot dog nails. Measure this 2" distance CAREFULLY.



Adapted with permission of the Sunshine Company, University of Colorado at Denver.

"Nature's Notebook" has recently come to our attention—issue number 2, on "The Sun," to be precise. Produced by four science educators and rooms-full of classroom consultants from the 4th, 5th, and 6th grades in McCall, Idaho, the "Notebook" is chock full of ideas, sketches, puzzles, and tips on how to teach—but more important, how to *learn*! Reproduced above is part of one page of this useful and entertainingly educating publication. It may be obtained by sending \$12.00 for six issues to: Box 634, Lakefork, Id. 83635.



AMERICAN NATURE STUDY SOCIETY

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C.E.A. MEETS AUGUST 13-17

National attention about conservation education will be focused on Utah this year when the Conservation Education Association assembles on the Utah State University campus in Logan for its annual convention. In addition to members of the association, the general public is invited to attend the convention August 13-17, according to Carl Johnson, USU associate professor of forest science, and Dr. Richard Peterson, science specialist for the Utah State Board of Education, who are conference co-chairmen.

"Keeping the Environment in Education" will be the conference theme. The agenda will include a "get-acquainted" welcoming program the evening of August 13, prominent guest speakers, field trips, workshops and social activities. Teachers may arrange with USU to obtain college credit for attending the convention, Mr. Johnson added.

Richard J. Myshak, Washington D.C., deputy assistant secretary for fish, wildlife and parks in the U.S. Department of the Interior, is C.E.A. president.

— ADVANCE NOTICE —

The American Nature Study Society is joining with the Northeast Region of the Association of Interpretive Naturalists, at the invitation of the New England Regional Environmental Education Conference, in a workshop to be held at Sargent Camp November 3-5, 1978, in the Monadnock Region of Southern New Hampshire. *Save this intriguing date*, after the autumn foliage has fallen to give those longer views so often unappreciated, and before winter snows attract the speed-hungry downhill skiers.

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Editor: JOHN A. GUSTAFSON, R.D. 1, Homer, N.Y. 13077

President: Millard C. Davis, 919 Edgemoor Road, Cherry Hill, N.J. 08034

Secretary: Karen Nolan, N.J. Audubon Society, 790 Ewing Ave., Franklin Lakes, N.J. 07417

Treasurer: Crayton Jackson, 556 W. Sun St., Morehead, Kentucky 40351

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