



Our Changing Environment

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Talk given May 18, 1968 at the 29th Annual WSO Convention at Green Bay, Wisconsin.

Everyone today is conscious of the deterioration of our environment, as even our newspapers give us such words as Eutrophication, Biocides, Conurbation, Ecology, Biological Oxygen Demand and Radioactive Contaminants. There is emphasis on environment in state and federal policies through such programs as Beautification, Pollution Abatement, Anti-Litter Campaigns, Regional Planning and Conservation Education. The public is beginning to face the reality that we must decide what kind of environment we want in the future. We must choose whether we would rather limit the number of people who want the materials of the affluent society, or whether we want to lower the standard of living in order to accommodate more people. There has to be a balance between man and land; harmony between population and environment.

Scientists are telling us that the natural systems of which we are a part, are not only more complex than we think, but they are more complex than we can think. They are talking about ECOSYSTEMS. This is not a new word, just a word that is now popular as is escalation. "Eco" comes from the Greek word OIKOS meaning home. We are acquainted with it in Ecology, which is the study of mutual relations between organisms and their environment and economics which is the relation of money with home. An ecosystem is the system which ecology studies. That is, an ecosystem is a self-sustaining community of organisms—plants and animals—taken together with its inorganic environment. The interaction of community and environment constitutes the ecosystem.

An ecosystem is very intricate, and minor change may create major disturbance often felt throughout the entire system similar to a "run" in a nylon stocking. For example the Canadian Wildlife Service is now faced with the task of saving the Ipswich Sparrow. This sparrow is endemic and breeds only on foggy, stormy Sable Island. Some time ago man introduced rabbits to the island. The rabbits ate up much of the vegetation. The loss of vegetation increased erosion. To control the rabbits, man introduced the cat. The cats ate some of the rabbits and lots of the sparrows. To control the cats, man introduced foxes. In one season the foxes wiped out both the rabbits and the cats. Some of the

sparrows survived. Now the birds are facing two new perils, oil drilling on the island, and erosion of the land itself. The Canadian Wildlife Service has a real problem.

Another attempt to improve an ecosystem began in 1520 when the Spaniards took sugar to Jamaica. The sugar prospered so well that most of the native flora was dug up to make room for plantations. Rats were attracted to the sugar cane and thrived at the expense of the plantation owner. The snakes would have kept the rat population down, but unfortunately the slaves working in the fields were afraid of snakes and killed all they could find. Rat bounties were tried, and helped a little. One bounty collector destroyed 20,000 rats in a single field. But still the rats abounded. Cuban ants were brought in because they were reputed to destroy young rats in the nest. The rats multiplied in spite of the ants, and the ants multiplied too. Ferrets were introduced to control the rats, but chiggers quickly eliminated them. Large meat-eating toads were tried in 1844 and they settled down to enjoy themselves. They dined primarily on the Jamaican insects. By this time the Jamaicans were ready to welcome any assistance against the rats, and in 1870 mongooses were brought in from Calcutta. In 10 years the mongoose attacked the rats so ferociously that most of the Norway rats were destroyed, and all the native spiny rats. The black rats saved themselves by living in tree nests and in houses. The mongoose began to ravage the native animals and domestic stock and even took to eating sugar cane. They killed the lizards which ate the white grubs that attacked the sugar cane, and the resulting increase in the beetle population caused more damage to the sugar cane than the rats had inflicted in the first place. Now the planters are dousing the island with insecticides, and they still have the mongoose which has killed off all small animals and all birds on the ground level. The government is now using the deadly poison 1080 sodium thallamate on the mongoose. We have abandoned this poison as being too dangerous and non-discriminatory. Let us hope that the Jamaicans do not have side effects from this program that is equal in damage to the mongoose.

Fortunately people are waking up to the dangers of making changes in the environment without first studying the ecosystem and calculating the effects. Changes made by bulldozers and draglines can be just as disastrous as the introduction of new species. Such dramatic books as Rachel Carlson's **Silent Spring**, Udall's **The Quiet Crisis** and Vogt's **Road to Survival** are sounding the alarm. Our whole future is at stake. Are we going to let desecration of the air, water, and soil destroy mankind? It is as great a danger as the atom bomb except that it works more slowly.

I was talking to a landscape planner recently about his idea for a Green Corridor to be formed by a road which he wanted to build so that it would follow the river highlands to afford a beautiful view. He was unaware that cutting down the trees for such a highway would affect the cold-water stream; that salt used for removing snow on the highway would wash into the water; that the drainage ditches dug for the road would have a permanent effect; that the traffic with its fumes and noise would bring changes in the fauna and flora. Not only was he unaware,

he seemed unconcerned. He was still living with the erroneous idea that we now know is incorrect: that human population is one side of a coin and the environment is the other. We humans are egocentric. We think the universe revolves around us. Actually that coin is a solid unit called the ecosystem—people are biological organisms and are part and parcel of the entire Biosphere. The Biosphere is the collective totality of living creatures on earth and all the ecosystem on it. Man has tended to ignore that he is entirely dependent on the biosphere: a vast web of interlacing processes and organisms that form the rhythmic cycles and food chains in which one part of the living environment feeds on another.

Some critics claim that conditions are no worse now than they were in the good old days. They point out that insecticides have virtually eliminated malaria in this country, that hardly anyone dies of typhoid fever and in spite of the outcry over water and water shortages we are able to water our lawns; have private swimming pools in the backyard, and can irrigate the deserts of the southwest. There is no projection of this increase of water use into the future and when this is mentioned the answer is that we will desalt the oceans! There is no concern on how to repair the irreparable damage to the aquifer, how to remove the non-degradable poisons from the environment or how to reclaim a once beautiful, turbulent, clean and clear trout stream with its community of birds and insects.

The biggest offenders are the local government units, both municipal and village. They state that marshes are for sanitary fill and housing units are a future tax base for better schools, roads and public facilities. They ignore that these marshes are natural catch basins that arrest floods, are spawning areas for game fish that entice people to the area to spend their tourist dollars and enrich the lives of the resident, they overlook the marsh as a nesting ground for birds that are natural controls for insects and makes the Spring as well as Summer and Fall interesting and even exciting. The marsh is the only winter cover for upland game birds yet every sportsman wants to pheasant hunt and demands more stocking.

Let us consider some paradoxes confronting us at this moment. Private wealth exists alongside public squalor. Medical services for the individual sets high standards and the nation is thrilled at the success of transplanted hearts, artificial kidneys and iron lungs. The public's concern for **the health of the environment** is almost nonexistent yet this is where we live. An individual suffering from smog attempts to migrate from the area rather than demand that it be cleaned, the same is true of the noisy city, or littered neighborhood. The most modern, sophisticated apartment house in N. Y., I read dumps raw sewage into the East River where slum children swim. New York every day dumps 200 million gallons of raw sewage into the Hudson River, this in addition to 375,000 lbs. of waste per day per square mile plus millions of cars spewing out their deadly fumes. I have been told that the Maumee River of Ohio is classified as a fire hazard because of the inflammable oil floating on its surface.

We need more "soft-heard alarmists" to present facts to the knowledge-starved public. Scientists tend to be ivory-towered and silent. We

can count on them for the facts but few of them can present them so that Mr. John Q. Public will understand their significance. At the recent Wildlife Federation meetings in Houston, it was stated that 7 out of 10 people miss conservation education entirely and those 7 live in the cities. That is 3 out of 10 people in the U. S. are given a course of sorts in conservation and none of them in the cities. So the cities are particularly in need of information. Groups like yours must push the ecological education of both children and adults. Your services are needed and some of you are already working with a vengeance.

The future of environmental improvement depends on our ability to achieve a rational, self-sustaining balance (homeostasis) in the ecosystem. The substances which constitute air, water, and land cannot be destroyed. They are consumed. They are utilized. They change form but remain. So the way to improve the environment is to recycle the troublesome substances. Piecemeal changes do not work, whether they are trying to grow sugar cane or save sparrows, or whether you are building a highway. Perhaps the systems approach is needed, that is, a computer analysis of everything in the total environment both intake and outgo. Then a city or region can make cost-benefits choices and balance the system. Such a study I understand is now being undertaken in Los Angeles. We have to look at the entire problem from the point of view of whole ecosystem. We must relate our population to our resources and keep these resources flowing through the biogeochemical cycles. It is a challenge. It is a challenge greater than landing a man on the moon!

Landscape architects draw on the findings of the social sciences in planning landscapes. And the new cities being planned and built before anyone moves in like Columbia, Maryland with its diversity of homes, stores, churches, parks and theaters, are based on sound social principles. But what about the natural sciences? Are planners aware that organisms are united as part of the Biosphere, and that people are organisms. Loren Eisely tells the parable of the Biosphere, which runs like this: . . . Man in space is empowered to see the earth, a rotating sphere; he sees it to be green, green from the verdure of the land, the algae in the sea, a green celestial fruit. Upon this celestial fruit he sees blemishes, gray, brown, black, from which extend dynamic tentacles. He perceives them to be works of man and asks, **Is man a planetary disease?**

There is argument today among scientists, laymen, and students over the word "overpopulation". Some demographers claim that the world can sustain 50 billion persons and others state that we have already overreached the limits of the earth with 3 billion and calamity is ahead. The problem is whether people, enterprises, and government are able to develop agriculture, industries and services to supply the growing numbers of people with a higher standard of living. **The world needs a double emphasis on fertility: increased fertility of the soil and a decreased fertility of human beings.** We have the know-how for both. All we need is the motivation.

How can the ecological view of dynamic equilibrium be applied to the planning process? If we want to change the environment, what in-

formation do we need to enable us to work with nature than against? I see five areas for investigation: Ecological inventory, Historical review, Natural processes, Limiting factors, and Relative values. Now let's see what information we would gather in each of these categories.

1. Ecological inventory — kinds of soil, analysis of water, type of physiography; species of plants and animals.
2. Historical review — the changes that have occurred in the area through man's activities and their apparent effects, such as mining, damming, plowing, flooding and burning.
3. Natural processes — occurrence of natural floods & droughts, direction and velocity of winds, depths and nature of ground water, stages of succession, climax community, prevailing disease.
4. Limiting factors — number of frost-free days, height and depth of snow and ice, low and high rainfall and its occurrence, drainage pattern, exposure to sun, soil fertility, predators and parasites, alkalinity or acidity.
5. Relative values — value of forest to surrounding land, value of minerals, value of wildlife for recreation, scavengers, predators, cash crops, pollinators, esthetics, social and historical values.

Having gathered these five kinds of information about any given piece of land, the planner can identify the major resources of the area, and see the links between the fundamental natural processes. Then he can balance the factors and make his plans. If our planners had utilized these criteria I'm sure such an enterprise as that of trying to make a trout lake, hills and create wooded borders in a former flat pasture field would not be undertaken. But such is on the planning board for Winnebago County not over a mile or so from the Lake.

Man has a wider pattern of ecological behavior than other animals. His greater intelligence allows him to adapt to living on the bottom of the ocean or in a space ship 100 miles above the earth, in the heat of the jungle, or cold of Antarctica. But human adaptability depends on balance in the ecosystem just as surely as it does for other living creatures. When we disturb the ecosystem with atomic radiation or smog, extensive drainage or denuded landscape, we suffer from the resulting imbalance. This is as true for people as it is for micro-organisms. There is a necessary numerical relationship between plants, herbivores and carnivores—and man is both a herbivore and carnivore. It is stated by scientists that CO_2 will start preventing heat from escaping into space. They foresee a hotter earth that could melt the polar ice caps, raise the oceans as much as 400 feet and drown many cities. Others think the smog collecting in the atmosphere will block the heat from the sun and create a colder earth with more rain and hail and thus increasing the polar ice caps and curtailing food production. In either event a disastrous condition.

A long life, rapid growth and good health comes from meeting the requirements of the environment. If we meet them, we can achieve what Julian Huxley calls the ultimate goal. To quote Huxley: "Fulfillment

is probably the embracing word; more fulfillment and less frustration for more human beings. We want more varied and fuller achievements in human societies, as against drabness and shrinkage. We want more variety as against monotony. We want more enjoyment and less suffering and disciplined freedom, as against routine and slavishness. We want more knowledge, more interest, more wonders as against ignorance and apathy." So it seems that man's fulfillment depends on putting maximum diversity into man's ecosystems. This concept, however, is contrary to efficiency. The urban developers conceive of a city with high rise apartments in geometric designs which can be planned for traffic flow, water accommodation and sewage disposal plus maximum parking in multi-stories parking plazas between the buildings. The parks must be those which can handle high density and the multi-use of all ages. The shopping complex is strategically placed and offers all needs of our complex society in a compact unit reached by car. There is no room for idle space, large trees, open lakes or ponds or unclipped and informal flower oasis which are not nurtured by artificial fertilizer, watering and insecticides. Why can't we have miniparks in each neighborhood, underground telephone wires and overhead trees along the streets? Why can't cemeteries be made into green areas for contemplation and shopping areas diversified with walking malls and no cars? Why can't apartment houses be built after the pattern of those exhibited at Expos 67 with each apartment a self-contained unit built into the entire unit with various views, gardens, trees, and maximum interest?

Without diversity life is drab. A monotonous, uniform biological world would be very dull. But uniformity is more than dull—it is dangerous. The danger arises where disease organisms evolve new and virulent forms which can wipe out an entire species which has no biological resistance to the attack. If the area is covered by that one species the land would be denuded. That is what happened in the potato blight in Ireland for example. Charles Elton in his **Ecology of Invasion** suggests that the very complexity of the tropical forest, with its great numbers of species occupying all sorts of ecological niches, tends to keep one species from outbreaks which could disrupt the system. Insect outbreaks or epidemics are almost unknown because there are always so many enemies and parasites ready to utilize the new food supply. This is in contrast to our own plagues of Spruce Budworm, Pine Blister Rust, Root Collar Weevil and Dutch Elm Disease. Further evidence on the effect of biological heterogeneity in maintaining stability or balance can be found in **Plants, Man and Life** by Edgar Anderson. He describes the causal and randomly planted Indian gardens of Central America which are made up of many kinds of plants, trees, shrubs, vines and herbs all growing together in a hit or miss fashion. There are no insects or weed problems in such a garden. The American Indian planted his garden of corn that way with Lima beans growing as a vine and pumpkins spread between the corn hills. He kept the weeds down and got three crops at the same time.

Of course, I am not advocating that we farm in that fashion today. Tractors, combines, pea pickers, potato diggers, hay balers, etc. could never handle such a mixture of plants. But these gardens illustrate that

diversity must be one of our goals. As greater numbers of species occupy an environment, they utilize more and more pathways, and opportunities for new undesirable inhabitants diminish. The product of complexity is stability. Evolution proceeds from unicellular organisms to multicellular organisms and from one species to many species, and from simplicity to complexity. We must understand that the one maxim of nature is change and that diversity is that goal.

If we are to have maximum diversity, we must preserve genetic stocks of rare species of plants and animals. They have possible usefulness in the breeding of new varieties of plants and animals and are of scientific value for that reason. Once the genetic stocks are gone, there is little chance of getting them back. I am concerned when the Fisheries Biologist reclaims a lake that is purported to be out-of-balance. He chemically treats and kills all fish life and starts over by restocking with a desirable population of two or three species. Little concern, if any, is given to possible endemic species of fish, amphibians, and reptiles being extirpated completely from the area, some of which may be relics from a long long heritage occupying a unique niche. Such species can never be returned. Then again the flagrant use of DDT worldwide to maintain unstable populations of food crops may threaten a far removed species such as the Bermuda Petrel. Legend has it that St. Peter named the bird because it seemed to walk on water. It is now in trouble because it is suffering from DDT in the eggs rendering them infertile. They are restricted to one island and the entire Atlantic Ocean surrounding the island is contaminated with DDT—where can it migrate? Perhaps the same can be said for the Kirtland's Warbler restricted to a particular habitat of jackpine that is being changed by man. Are these species worth our efforts to save?

When a species becomes extinct because it failed to adjust to a changing environment like an ice age, that is one thing. But it is another when man, the only intelligent inhabitant of the earth, comes along and helps annihilate birds like the Carolina Auk, Dodo, Kiwi, Passenger Pigeon and possibly the Ivory-billed Woodpecker and California Condor. The same thing happened to plants. Scarcely any of the plants mentioned in the Bible, for instance, can be identified today. Man with his highways and cities has eliminated variety after variety.

There is another reason for leaving some land and lakes in an undisturbed state, also. That is to learn how natural ecosystems work. We know very little really, about the intricacies of ecosystems. If we destroy them all, in the name of progress, we will never get the information needed. There will be no place to send a scientific team to study them. **We must educate the public, particularly local government officials who decide on the deposition of public lands, to understand that the existence of natural areas for study is essential.** This is the place where the WSO can help. If you understand the situation and if you share this information with your friends, neighbors and congressmen, we will have the chance to enjoy our changing environment as nature intended.

To summarize my views, I would like to point out that the environment is changing every minute, of every hour, of every day, of

every year. We cannot keep it from changing, but we can direct the changes. The key words that I want to leave with you are ECOSYSTEM and DIVERSITY. The whole ecosystem must be considered when we plan any change whatsoever, because the effects will be far-reaching whether we like it or not. And the emphasis in our planning must be on diversity. Variety gives us a richer life and we need it to reach our own fulfillment. In addition, variety is a requirement for healthful living. Diversity is the key to successful balance in the ecosystem. In the depression of the 30's, the boys in the CCC camps were put to work planting white pine trees in reforestation projects. Miles and miles of solid white pines. It looked beautiful when young. But now it is 30 years later and what has happened? Disease has struck. Since the trees are all alike, only a few kinds of birds were attracted, only a few kinds of animals. So who has the upper hand? Insects and disease organisms. The trees are dying, and we are searching for more potent insecticides. The landscape is monotonous; our vacation trips are extended into Canada, Alaska, and Mexico. The bird population is reduced, but only a few are alarmed. A bird is a bird.

We do the same kind of thing in cities. We let slums develop where the preponderant populations are men, lice, and rats. The only birds are pigeons and starlings. Do we want this kind of monotony in unhealthy surroundings? I call on all of you to push for intelligent planning to conserve our natural resources and to provide healthy living for our people. Let's keep some non-useful marsh areas so that we can study natural ecosystems for our own understanding and guidance, to preserve genetic stocks, and to keep ourselves healthy. And let's use our heads as well as our hearts when we plan improvements in this wonderful and glorious changing environment of ours. **Let's build an ecological receptivity in the minds of our fellow man.**

I thank you.



*Discourage the use of
All Harmful insecticides.
Mary and Charlie Nelson*