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CONSERVATION AND MAN'S ENVIRONMENT

by IAN McTAGGART COWAN ●

Through the millenia of his birth, man was a poorly equipped, struggling omnivore inhabiting environments that offered special favour. Populations were small, and the product of a limited area was the sole support of its humans.

As man the inventor, however, he added to his inadequate physical attributes a long series of devices that extended his ability as a food gatherer and expanded his environmental tolerance.

With increasing competence, the itinerant hunter-food gatherer in his family group became the neolithic agriculturist. This was certainly subsistence agriculture but it permitted the first permanent settlements and therewith the first truly man-made environments. The discovery of the river basins with their rich soils led to the production of food surpluses and with these the specialists, the villages and later the cities.

Through these years when every man was an intimate daily participant in the struggle to wrest survival from an unpredictable environment, a rich store of folk images grew from the day to day experiences. These guided his biological routines and provided acceptable explanations for the commonplace physical and biological phenomena. He was an observant and rational creature and here and there across the world developed some effective practices to prolong the food-producing ability of his habitat. These folk techniques, however, were family or tribal in scope and died with the group. In general, early man lacked a concern for the environment, for the creatures in it and for the consequences of man's activity. Great cities were born in the Mediterranean basin and elsewhere, many to be abandoned in a few hundred years as desolate monuments to man's ineptitude. Climatic change has been proposed as explanation for these early failures of urban man. The overwhelming weight of evidence, however, points clearly to man, not climate, as the agency that let in the desert, or destroyed the capability of the soil.

Then scarcely a century ago, man turned his talents to vital invention. Aseptic surgery, vaccination, public health measures, antibiotics and chemotherapy introduced a new era in which man emerged as the first creature to directly influence the answers to the ageless questions—who dies, when, and of what? The outcome of these discoveries are clearly revealed in the burgeoning human populations.

It was the thought processes of science that consolidated the era of vital invention and started man on the harried course to large scale environmental manipulation. The scientific image emerged, frequently in sharp conflict with the folk image of the living world and its relationships. As

Boulding has pointed out, even a relatively imperfect shift from the folk image of man and society to a scientific image involves man in at least two large, irreversible, and related changes. The first of these is the increase in self-consciousness, not only of the individual himself, but also of the society in which he has been placed. The second change is the development of the integrated systems point of view, where the world is seen as functioning in an orderly and predictable way, where imposed changes have predictable consequences.

Man is no longer the frail primate, surrounded on every hand by baleful and mysterious forces, wild beasts and pestilence. He glories in his new capacity to go where he wills when he wishes, to conquer all natural obstacles, to guide his own star. We have man the despoiler, the casual pursuer of short term goals, the arbiter of survival for so much of the world's biota. At the same time, this is man the creator of majestic works, self-conscious man, the only moral creature, man the conservator ready to answer for his errors and to extend the umbrella of his competence over many lesser forms of life with which he shares his environment.

This, to me, is one of the great revolutions of attitude of all time: man the fearful becomes man the master.

The Roots of Conservation

Conservation as we know it today is a complicated and interesting area of activity. In very large part, it is the expression of the enlightened self interest of a population arising from the understanding, scientifically gained, of the laws of growth, the known facts of population regulation, and the discovery that for wild crops, as for tame, the environment has a capacity which it cannot exceed; but can sustain.

This is conservation as it is properly applied to the living, self-replacing resources upon which man can draw for his sustenance, his energy needs and his economic enrichment. The doctrine of wise use is the operating principle, properly stated, it is that a living resource may not be used at a rate faster than its capacity to replace itself. Sustained yield is the objective of the management programs in forestry, in fisheries and in wildlife management. In these areas of conservation, self-consciousness is happily bolstered by the profit motive. It profits man in the long run to conserve the renewable resources.

The evolution of the principle of sustained yield has its roots in the folk learning of antiquity, given form, substance and conceptual veracity by science. It first received public acknowledgement as the operating framework of a National Policy when, in 1910 President Theodore Roosevelt promulgated what has come to be known as the Roosevelt Doctrine. This recognized all outdoor resources as an inseparable whole; established the public responsibility for the wise use of these resources and declared science as the working instrument to guide public policy.

But though the Roosevelt Doctrine marked the inauguration of the era of scientific conservation, it was itself the outcome of half a century of struggle acted out in the political arena of the United States as the old concepts of the private right to all public resources were defeated in the devastated forest lands of America, and the role of water on the arid lands of the central continent became established in law. The names of Carl Schurz, United States Secretary of the Interior under President Hayes, and of John Wesley Powell are prominent among those who saw the message of conservation boldly written in a troubled landscape nearly a

NPS Photo by Jack E. Boucher



Lower Falls, Yellowstone Nat'l Park

NPS Photo



Grizzly Bear in Yellowstone Nat'l Park

NPS Photo by Woodbridge Williams



Upper Geyser Basin, Yellowstone Nat'l Park

century ago. But, as usual, reason was slow in acceptance, as its adversary was the easy short term profit where wealth and political influence were bedfellows.

In almost every instance it was born of human tragedy; ghost towns in a chaos of ravished forest land, towering clouds of topsoil that carried with them the hopes of thousands in Oklahoma and the other dustbowl areas of the world, surging flood waters on the delta lands, stinking rivers carrying sickness to all who used them. Always the task faces by the ecologist in conservation has been to rescue man from the consequences of ignorance, avarice or folly.

The continent is still repaying the debt that was ruthlessly extracted from the landscape in the nineteenth century. "In the forests, as on the ranges, and in the mines, it was every man for himself, and it would take a generation of protest, and a Rough Rider President, to slow down the onslaught and put the get-rich-quick capitalists on the defensive. The nineteenth century lumber tycoons, to give them full credit, housed a growing nation, cleared land, and hastened the pace of westward expansion. However, they set world records for waste, and their prodigal prosperity consumed the stored capital of nature—which, by right, belonged to other generations." (Udall 1963:98)

The other parent of today's conservation takes its origin from more complicated sources. Moral conscience offended by killing beyond need, religious concepts of cruelty and a genuine concern to retain for our enjoyment creatures whose beauty of colour, form, movement and sound appeal to the senses and give us pleasure. The protectionist movement has its roots as deep in human antiquity as art, music and religion. In its earliest manifestations, it is a folk movement strongly espoused by an ever-enlarging segment of our society. However, along the way, it is gaining the strength of true understanding derived from scientific inquiry and the unarguable power of the market place. People will pay for it!

This aspect of conservation was at first concerned with the protection of birds by the establishment of refuges, but rapidly broadened to encompass the preservation of entire areas of special beauty or unique biota. The National Park concept emerged as one of the most powerful popular movements of our time.

Perhaps the dominant trend in conservation today arises out of our growing realization of the influence human populations have already had on their environment. If indeed we seek mastery of our fate, of fundamental importance is control of ourselves and regulation of our actions as degraders of the potential contribution that environments may make to future generations. The frontier philosophy of do what most profits without thought for tomorrow is no longer tolerated as a working principle by any advanced society.

It is near thirty years since Aldo Leopold gave expression to the "ecological conscience", recognizing each generation not as owners outright of the land and its resources, but the holders of life rent with the responsibility of wise custodianship without reduction in potential. Ecologists have been slow to involve themselves with a study of man as the dominant influence in the world's terrestrial ecosystems. But, even so, our knowledge of human ecology is growing rapidly, paced by such exhaustive summaries as the Wenner-Gren Foundation report on Man's Role in Changing the Face of the Earth (1956); the searching studies of the British scene by Nature Conservancy; and the recent conference on the Future Environments of North America (1964). As the understanding of the ecologists increases, so also does appreciation of our potential for actions detrimental to human environment.

The complex web of man's impact on his environment defies neat compartmentalization, but there are five areas that by virtue of differing group interest and research need justify separate comment: 1) Soil conservation; 2) The role of man in the survival of the biota or of its productive capacity; 3) The ecology of man-made pollution; 4) The maintenance of natural beauty and the opportunity to relate to nature; and 5) The maintenance of genetic variety and the preservation of opportunity to learn.

Soil Conservation:

Here and there in time and location man has gleaned bits of information on the nurture of the soil as he extracted his crops from the arid lands or sought his livelihood on the steepening hillsides of an over-crowded habitat. The great drought period of the 1930's in central North America, however, for the first time found man ready for massive, effective, science based attack on the soil problems of a continent. The Soil Conservation Service of the United States established under Franklin Roosevelt's administration, can fairly claim to have changed the face of a continent in its 30 years of existence. In so doing, it has mustered an understanding and a technical force that is carrying its influence to many lands.

Soil conservation in North America has made possible the tremendous food-producing potential of the continent but beyond this it has had immeasurable influence on all other aspects of natural resource conservation.

Conservation of Species:

The expansion of natural history into ecology during the scientific revolution saw the principles upon which the idea of conservation rests added to abundantly, both at the operating level and in concept. The community as a vital entity operating in accord with discernible laws that could yield prediction; the idea of the limiting factor, and of density dependent feed back between organism and environment, were among those hypotheses that provided new conceptual equipment.

The idea of altering the natural forces that were regulating the lives of creatures other than ourselves is a major landmark in the flowering of human ideas, its emergence marked the transition between simple protection and management; the purposeful attempt to alter the environmental impact on a species or community, to produce a preconceived result. Management includes the regulation of the direct or indirect impact of man on the species or community, as well as all attempts to alter such other features of the environment as water, food, shelter, parasites, disease, predation, special facilities, competition or distribution. The objective of management in conservation today is much broader than the mere maximizing of profit. Each living organism is seen as the repository of a unique assortment of biological information gained through the eons via the process of evolution. Each offers a potential enrichment of human knowledge, and enjoyment that is limited only by our capacity to appreciate. The loss of any single element in the world's store of varied life is viewed as an erosion of the quality of the human environment.

In general terms, management is directed to the encouragement of those species we desire to assist, to reduce populations of creatures we regard as damaging our interests or to maintain the integrity of an entire assembly of plants and animals; that is, to maintain a community for its riches

of species and associations. Species-oriented conservation falls into three main categories: Management for survival; management of distribution; and management for harvest.

Management for Survival

In nineteen hundred years the world has lost 107 kinds of mammals, and close on 100 kinds of birds. The extinction of plants, and the lesser animals is not known but probably vastly exceeds that of birds and mammals. Nearly 70 per cent of these losses have occurred in the last century and mostly through the activity of man. Here and there throughout the world, on every continent and on many of the remotest islands a host of other species, more than 1000 strong face the imminence of complete and final passage from the world's fauna.

Extinction has been an essential companion of evolution since the beginning of time and there is no reason to believe that the process is complete. Nonetheless, it is an ideal of conservation that no creature should pass from the face of the earth through the instrumentality of man. If we would pose as the masters of creation, to prevent extermination of a large and obvious form of life stands as a challenge to our ingenuity and our competence.

There is an element of drama also in the plight of a vanishing creature that captures the imagination. The challenge to aid the troubled species thus has consequences far beyond the retention of its genotype. It becomes an instrument of enlightenment, thousands of people develop an increased awareness of the principles of conservation through identification with the endeavour.

Several special agencies make their particular concern the assembly of all available data upon endangered species. The International Union for the Protection of Birds, the Survival Service Commission of the International Union for the conservation of Nature as well as many agencies of western governments, Japan and several European nations contribute in important degree to the identification of species in trouble and in coordinating assistance programs. The International Union and the World Wildlife Fund muster the skills and organize the support for emergency attempts to redress the havoc man has wrought upon wildlife in the farthest corners of the world. In the United States the recent Land and Water Conservation Fund Act provides for the protection of endangered species there. There are substantial successes but the tasks are huge and without precedent. Species that are in trouble as an outcome of man's alterations of habitat have proven most difficult to assist, as have insular endemics. Long periods of evolution out of contact with the specialized competitors, predators and diseases of the continents have rendered island species most vulnerable to the impact of man-induced changes in environment. Islands are unique and desperately fragile. They require special care. Introductions of exotics, domestic species, or of diseases are almost certain to be catastrophic.

A recent approach to the restoration of endangered species is through the instrument of captive rearing for later release into the wild. It cannot be regarded as the perfect answer as many species are not susceptible to confined rearing, and others have been shown to possess a heritable factor for wildness that may be selected against in captive breeding.

There are two other potential hazards to releasing hand-reared or even wild-caught stock from elsewhere in an effort to increase the numbers of an insecure population.

One is the danger of introducing a different and less well adapted genotype. The second is the risk of introducing disease organisms foreign to the creature.

An ever-present danger of such programs of introduction or reintroduction is the loss of the genetic distinction of a local endemic form. The widespread transplanting of such native North American species as bobwhite quail and cottontail is suspected of having changed the genotype of some local forms. On occasion, the hybrid has locked the time earned adaptive features of the local race and what started as a logical attempt to aid a struggling population became the kiss of death.

We have slowly learned to appreciate the tolerance developed between disease organism and host during eons of mutual evolution. But experience has been a hard teacher and many an organism has suffered the devastating consequence of either our ignorance or our stupidity as we refused to apply what knowledge we had gained. A case in point can be seen in the plight of the largest wild-living stock of American bison in the world. The transplantation of a disease-ridden herd of plains bison into the last remaining stronghold of the wood bison in Wood Buffalo Park, Canada, led to the predicted but ignored consequences. These may not only finish the race but see the transmission of the disease into clean stocks of moose and barren ground caribou.

It is impossible to foresee the direction that our interests in the biota will take as human tenure of the earth lengthens, as our populations increase, our demands upon the resources expand and our understanding of the environment becomes ever more detailed. Today our concern is for the forest trees, certain more obvious plants, and for the mammals, birds, some fishes and some reptiles. Our knowledge of the ecological facts pertinent to the management of most of these is inadequate and we are totally innocent of the data that would permit us to manage the populations of most of the living creatures of the world. The only tenable approach to the maintenance of the largest part of the biota is through the management of ecosystems rather than individual species.

Where climax situations are concerned the task, in theory, is relatively simple. On the other hand, the restoration and maintenance of any of the transitory serial stages in a living community of plants and animals is a task of great complexity. So much so that we are at present almost powerless to plan for the successful ecological management of even the smaller National Parks of this continent.

The usual approach to the conservation of vanishing plants or animals has been to create a refuge or park to contain it and to exclude fire. Special reserved areas have been established to maintain stands of climax redwood forest, Douglas firs, monterey cypresses, organ pipe cactuses, Joshua trees and the entire flora of some of the Hawaiian craters. These measures are seldom adequate and the truly ecological view of the objectives is only beginning to enter into planning and administration.

Management of Distribution

In general, a species becomes less vulnerable as its distribution widens. Of special importance is discontinuity of distribution as this protects against the inadvertent catastrophe that can overwhelm a single small population.

We can sometimes foster discontinuity of distribution by carefully selected transplants of a species into unoccupied but apparently suitable habitat.

This, at the same time, provides a unique opportunity for the establishment of a disease-free nucleus population. Natural extinction has been an active process through all existence. Although we have little knowledge of the causes of extinction, epizootic disease is a possibility. Thus the establishment of disease-free discontinuous populations should give added survival value to the species and will provide additional surety to our objective of management for variety.

Management of Numbers

In general, the utilization of a new element in the biological resource still follows the primitive pattern. Thus for each new species for which we find a use there occurs first a period of uninhibited exploitation, as if the resource was unlimited. Sooner or later, declining availability arouses concern that the stock will be commercially eliminated. Too frequently, the rising cash value emerging from progressive scarcity obscures the biological situation and renders politically difficult the establishment of measures adequate to restore the productivity of the resource and to place it on a basis of sustained yield management.

Conservation practices designed to manage for sustained yield consist of fact-finding, restrictive regulation and positive management. The important difference between the last two is that, while restrictive regulation is designed to regulate human exploitation of a wild species to a level at or below the mean replacement rate, positive management is oriented toward increasing the production or survival of young, and to lengthening the life of adults of the managed species. In terms of the classical sigmoid of population growth the objective of conservation of a harvested population is to maintain the population at the level of greatest rate of increase while at the same time moving this upward by raising the ceiling imposed by the environment.

Most wild populations exist within a delicately balanced complex of species that make mutual use of the food potential of the environment. Some competition between species is frequent. The consequence of human depletion of certain species is often to promote a new balance within which the preferred species plays a lesser role. A biological vacuum often does not arise and for this reason it may be impossible to restore the population to its early productivity even under the best of management.

Where the demand is greatest, the concept of maximum sustainable yield has come into being. This may be expressed in terms of numbers, weight, or cash return.

The simpler task of sustained yield management is that confronting the forester whose product is wood. His populations are immobile and easily measured, the regulation of size of harvest presents few biological problems of decision. The unique factors are the long period of growth between harvests and, in the north, the vast areas of almost single species forests. These render protection from fire and pestilence the major hazards to success and the technology of these tasks becomes limiting.

Increasingly, the value of many forests arises not from their primary product but from their contribution to maintaining the integrity of watersheds, as an environment for wildlife and as a place for human recreation. Here the designation of goals is more difficult, and the knowledge demanded for successful management more precise. In only a few areas is adequate research information available.

Few among the world's fishes provide commercially

important harvests and for only a handful of species can it be claimed that effective, sustained yield management is in force. In many instances our biological ignorance is inhibiting the development of management routines. For more of the marine fishes the political complications of the multinational competition for the crop frustrate the application of even existing information to the task of conservation.

The principle of abstention that is being pioneered with respect to certain of the North Pacific fisheries is a useful experiment in international conservation. Under this Canada, Japan and the United States have agreed to abstain from fishing stocks of fish under full use and scientific management by any one of them. To be effective, however, agreements of this sort require the participation of all those nations that are competing for the fish resource of the management area. An important effect of such an agreement is the incentive for additional studies and better management.

The worst example of the failure of conservation, not for want of biological information but from bad faith, commercial avarice and political iniquity, is to be seen in our treatment of the marine mammals of the world. Completely adequate demonstration has been available for at least a decade that species after species among the larger whales is being reduced to the point of extinction, and the industrial potential of the industry thus destroyed. Despite this, the responsible international organization of whaling nations has been repeatedly prevented from establishing the essential conservation measures through the political influence wielded by certain commercial interests bent only on retiring an investment as quickly as possible.

The harp and hood seals of the North American east coast are among the remaining commercially useful seal populations and they are suffering similar fate.

The Ecology of Pollution

The most insidious influences of man in the environment arises from the disposal of wastes and from the purposeful distribution of biocide chemicals to destroy plants, insects and related organisms regarded as inimical to certain human activities. These two forms of activity have the common denominator of so altering the environment chemically or physically that it is no longer a suitable habitat for many native forms of life and is often damaged as a habitat for man himself.

Egler (1964) has stated that "the problem of pesticides in the human environment is 95 per cent a problem—not in the scientific knowledge of pesticides, not in the scientific knowledge of the environment, but in the scientific knowledge of human behaviour." A combination of apathy and organized stupidity frequently motivated by the market place. The same can be said for pollution in the more usual sense. The devastating consequences of the ecological ignorance that fosters and permits such action was realistically presented to millions of people the world over by Rachel Carson in "The Silent Spring" (1962).

Again to quote Egler. "In general, we have acted with remarkable arrogance to the whole of nature of which we are a part. Any part we do not want, we seek to destroy, completely and utterly . . . With the destruction of each such 'pest' by the use of the handiest, cheapest, most quickly acting pesticide, goes the destruction of anything else about which we do not care at the moment, or the eventual destruction of other things about which we may care but by such remote side-effects that the actual connection can be disputed."

The problem is of world wide scope, increases with the rise of human populations but is most intense in the sophisticated societies with the most advanced chemical industries.

Despite the growing public awareness that there are grave consequences from our present introduction of destructive chemicals into the ecosystem, the manufacture and distribution of these is increasing annually. There is no limit to our ingenuity in designing new forms in which we can introduce chemicals into the complicated web of our ecosystems, while we are powerless to influence where they will travel and impotent to remove them.

The biological destruction of rivers and lakes through the introduction into them of sewage and the chemical effluent of industry has aroused widespread public concern. The problem has become a national emergency in many countries and has generated powerful corrective efforts. Despite local success the pollution of fresh waters remains one of the most devastating consequences of civilization.

Nowhere else in our relationship with the biological world in which we live are the lines of our understanding, our communication, our sources of political action, our economic ambitions, our biases, and our fears more hopelessly interwoven. It is difficult not to despair that an economic society is impotent to prevent the pollution of land, air and water which we now support or condone.

Viewed the world over, mankind today is indeed managing his environment. This management, however, is not the outcome of a studied attempt to proceed toward a desired objective; it is rather the cumulative result of varied extemporising, unplanned and uncoordinated directed toward the satisfaction of the immediate need. Individuals, societies and governments frequently compete and promote conflicting attitudes and acts of strong environmental consequence. We are completely without any well-defined and generally accepted philosophy to direct our specific behaviour toward our surroundings.

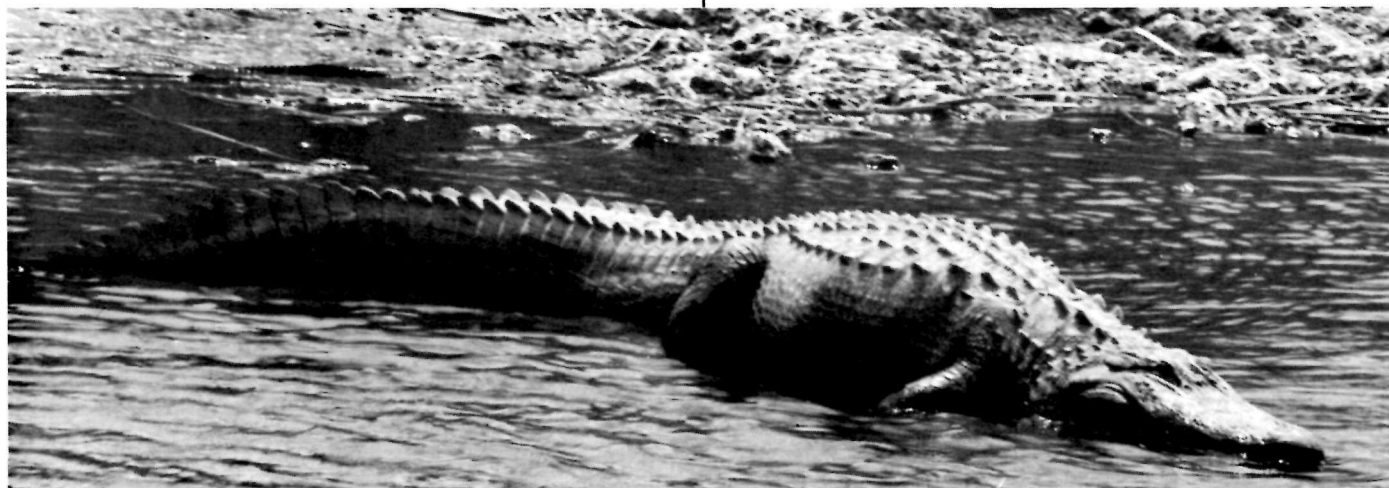
Even our governments are not organized to react effectively to a comprehensive management of our actions as they influence the human biophysical environment. We are geared for local crises, the epidemic, the crop failure, the forest fire, the devastation of riparian lowlands by flood, all trigger prompt action by some appropriate authority. These are crises easily seen and understood, dramatic in their impact on our immediate desires. The

environmental changes of the greater ultimate importance take place so gradually insidiously, unobtrusively that they escape our attention until irreparable harm is done. Cumulative contamination of the environment by the waste products of our factories, kitchens and bathrooms; gradual destruction of wildlife habitats with all they contain, the sprawling blight that flows from our cities further and further into the countryside; the indestructible wastes of our technology that beer can after auto-carcass, plastic bottle after pliofilm bag spread filth over our beauty spots, these have not yet reached that point in public understanding where consensus can lead to effective corrective action.

Man and the Enjoyment Resources

The world of today falls, perhaps loosely, into two categories of human societies. There are those which, despite improvements in scattered technologies, are concerned, at the level of the average individual, with the day-to-day task of staying alive. For them, it can be truly said that the immediate objectives and concepts have changed little since the days of human origin. The concern is living, not the quality of life. At the other extreme are those fortunate societies that have evolved through science and social ingenuity a competence that has to a very large extent banished the folk fears of starvation and pestilence and introduced new horizons to the image of life. Concern has shifted to the richness of experience that any individual can expect from his environment. It has become a proper objective of all mankind to, as far as possible, equalize the opportunity available to all individuals in all societies. There is no gain for man, however, if equalization is downwards.

The logical concomitant of this principle is that those societies that have progressed furthest in the search for quality of living should exercise a concern extending far beyond their borders. Mankind's tomorrow will be found on the world scene, not within the parochial confines of a contemporary political unit. The contribution to the food stocks and to the economic potential of a country that is to be found in its renewable consumptive resources makes these obvious first candidates for attention. But, as Sir Julian Huxley has so well said, "Human ecology involves finding out what resources are available in our environments and how to make best use of them. We have to think first



An American Alligator Sunning Himself, Everglades Nat'l Park

NPS Photo by Jack E. Boucher

of all the material resources—minerals, water power, soil, forests, agricultural production—but we must also think of the non-material or enjoyment resources of the habitat, such as natural beauty and solitude, interest and adventure, wild scenery and wildlife.”

“We should set about planning a Fulfillment Society rather than a Welfare Society, an Efficiency Society, or a Power Society.”

It can safely be said that one of the important criteria of an advanced society is its devotion to the maintenance of the ecological well being of the human environment in all its attributes. Prominent among these will be the non-consumptive uses for recreational enjoyment and scientific enrichment.

The recognition of the deep need of man for opportunity to associate himself with nature first occurred as a revulsion from the stark surroundings of the factory environment that became the lot of the majority during the Industrial Revolution. The easily accessible Commons though not yet recognized as such—for psychiatrists were as unknown as jet propulsion—became for the toiling thousands in Britain psychiatric safety valves.

A century ago, the land grabbing aristocracy of Britain who had already taken to themselves one acre of every seven in the nation attempted to enclose Wimbledon and Epsom Commons. This was the touchstone to a legal battle of classical import. Henry Fawcett, M.P. and Professor of Political Economy at Cambridge championed the cause and saw in it the great principle that was at issue—the public right to open space reserved in its name. The legal battle was fought between the Corporation of London and fourteen Lords of Manors who sought to divide Epping Forest. The Corporation won the suit and established the all important legal principle upon which so much of our more recent conservation legislation has rested. The Act of 1876 permanently declared in Britain the public interest in open spaces as taking precedence over private desires. Since 1925, British law has given to the public a statutory right of access for air and exercise on every common or place of manorial waste and to any rural common. (Gibson 1964)

An ocean away the practical dreamers of the New World were forming ideas of similar philosophy. With the expansiveness of thinking that accompanied the great spaces, American concepts spread from such fine Civic beauty spots as New York's Central Park to California's Yosemite and the magnificent two million acres of the first National Park—Yellowstone. All this before 1870. The first voices also were decrying two and a half centuries devoted to plundering the natural resources of North America. The buffalo herds were gone as were the vast flocks of passenger pigeons, but worst, none had successfully challenged the view that the natural wealth of the biological resources was free for the taking, the continent's devastated forests were prime testimony.

It took the combination of a brilliant, visionary forester, Gifford Pinchot and Theodore Roosevelt, a president of the United States with deep roots in the wilderness, to turn the tide and to introduce the concepts of conservation. Among the first large scale tangible results was the establishment of the great National Forest system of the United States. Designed to produce timber for the long time good of the nation, these forests now contribute richly to the recreational lands of the continent. None in the new world could then foresee the crowded cities, the airports, super highways, the clatter, speed and tensions to come and the desperate need of people to find themselves again in the impersonality of unspoiled landscapes, in the surging vitality of many small lives.

“Modern man is turning almost instinctively to the last remnants of the primeval scene, to know again the mystery of the unknown and the beauties of unchanged terrain. While it is doubtful if his ancestors appreciated the intangible qualities of wild country, he is developing that capacity. Now that wilderness is no longer a threat to security or survival, he is beginning to look at it for the first time with some measure of appreciation and understanding, realizing that within it may be the answer to confusion and a source of inspiration closely allied to beauty . . . National Parks, as reservations of beauty, are sanctuaries where people may recapture at least in part, some glimmer of the visions that may have stirred their forebears.” (Olson, 1962)

With pathetic frequency our groping hands have left irreparable scars on the beauty we sought to serve. Super highways, garbage dumps, hydroelectric impoundments, mining and deforestation (cattle grazing), are only a few of the incongruous and destructive activities we have condoned in our parks but we have hammered out some principles along the way.

1. On the world scene the National Park concept has usefully served many objectives. The most frequent has been the preservation of endangered species where this depends upon intact segments of entire ecosystems. A new and exciting concept has emerged on the American continent. National parks, as we now view them, may have great value as museums of ecology, as wildlife reserves, archeological sites or for the protection of natural wonders, but their first function is to provide the setting, the beauty, timelessness and natural order in which man can regain the perspective he needs.
2. The National parks belong to all people and no part of the policy that guides their operation should be oriented to provide private profit to local residents.
3. An attested ecological objective to guide park policy is essential. The Leopold committee urges that this be to retain or restore the ecological conditions obtaining when the region was discovered.
4. Protection of park values from increasing hordes of users is among the most challenging problems today. Zoning for quality of use and the limitation of access are growing necessities.
5. The social organization requisite to the protection of State or Provincial parks whose policy and survival can be altered on executive whim has so far eluded our political ingenuity. On the American continent where the political voice of the entrepreneur is loudest the integrity of all parks required the constant vigilance of militant citizen groups.
6. For the economically oriented, it has been shown beyond doubt that well-mannered National Parks pay dividends beyond their operating costs and may, as in parts of Africa, form the basis of a major industry.

At this point the conservation road forks again into the scientific and the esthetic. With or without our consent, the evolutionary process will continue, new forms will arise and others vanish, most of them without our ken. The advent of man introduced a new and dominant force into the biosphere. By his selection as by his modification of the environment he has greatly altered the tempo and nature of evolutionary change. It is certain that the practical consequences of the

revolution in biology will further increase our capacity for positive influence in the evolutionary process. But this does not mean that we should ignore the challenge to interfere with the consequences of our actions or even to deny to nature the right to extirpate. The world's store of genetic material is seen as an inexhaustible source of novel combinations which can be used for the future benefit of man. Each genotype lost before evolution has replaced it is another step in the degradation of our environment. This is an expression of our pragmatic concern with conservation.

The ecologist sees yet another reason for attempting to preserve intact samples of the various biotic communities.

The task of extracting the ecological truths is far from complete and new techniques offer constant new opportunities to search more deeply. Lost segments of the ecosystem take with them their unexposed truths. Our opportunity to learn and to understand is permanently impoverished. Strong reasons, therefore, can be advanced for conserving segments of all major communities for the sole purpose of research.

In the other direction, it is being ever more emphatically asked why man should have to seek beauty only in far places. There is creative capacity in man that if given full rein could replace much that is sordid and ugly in our urban environment with beauty, clean air and green space.

As the history of this age is written, conservation as a concept will be regarded as perhaps the greatest contribution of the new world to human ideas. For the idea had its birth and saw most of its evolution in the United States of America. In a century Powell's vision of sustained yield forestry spread and adapted to encompass human contact with the entire living world. It gained depth of perception and an almost religious fervor from the Marshs, Muirs and Thoreaus, and scientific rationale from the host of naturalists and ecologists that have emerged from the universities of the northern hemisphere. It provided the banner around which rallied all those whose vision of the man at his finest involved a sensitive integration into the biophysical world. The Sierra Clubs, Audubon Societies, Wilderness Societies and Unions for the conservation of nature have given power to the cause without which the concept could not have found political and physical expression.

But the cause is far from won, at an increasing rate the twin forces of a burgeoning technology and a surging human population are posing ever more difficult problems for the conservators to solve. At an increasing rate we pollute the land, the air and the sea, convert our rivers into sewers and spread our indestructible wastes along the remotest shores. An urgent challenge to our ingenuity is the disposal of our wastes.

Over vast areas of the world even the most elementary conservation concepts have still to penetrate. Here fire and destructive agriculture rapidly narrow the gap between man's numbers and his food supply; balanced ecosystems are degraded to uselessness, biotas vanish forever.

We have not even approached the fascinating but vital problem of man in an enclosed ecosystem. In a very real sense we are denizens of a space capsule to which nothing enters but solar energy.

What population of men will the renewable resources of the world support? At what level does the addition of another million reduce rather than increase the quality of human life? These are questions as close to the core of morality as to conservation. To attack them at all demands the attention of the finest ecological, sociological and political minds we can muster. The answer is urgent as each passing decade brings us either further on the down grade or nearer the asymptote. We know not which.

It has been relatively easy to find support for conservation on the American continent where our man to space ration has been low, hunger has not been an alternative where an acre was allocated to quality of living rather than to food for survival and where the economic advantages were obvious. The pressures will change as the alternatives gain more immediacy.

Central to conservation on this continent is the gradual change in the legal view of the rights of the individual in relation to the long term benefits to society. In this context certain recent interpretations of the Supreme Court of the United States of America have the greatest significance. That the individual is a member of a society retains only those liberties specifically allocated to him by the society is an interpretation with broad impact in the natural sense. There still remains in many quarters, however, the narrow interpretation that only consumptive use is really use and should take priority in competitions. There is the demand also that even the esthetic qualities of our lives should be justified in dollar values when alternative uses of land are an issue. Conservation lives in both our worlds the economic and the esthetic, the contribution of the ideology is equally to both, but the standards of comparison are probably invalid.

It is the unique revelation of man that he is not only consciously sensitive to his own environment, but relates himself also to much larger and more complex processes in which he plays a part. His image of the world then becomes an important element in the processes of the world itself.

A central element in our vision of the kind of world we would inhabit is the ideology of conservation. Within it we find values that we will defend and ideas that we seek to propagate. Man has come full circle from the unwilling participant in the processes of survival to become the only creature whose vision influences those processes. Conservation and other ideology has played so important a part in human affairs and holds so much for man's future.

Even in those unfortunate areas of our own land and others, where avarice and ignorance still triumph the achievements and ideals of conservation stand as a constant reminder of what could be. Self consciousness once awakened can no longer be escaped.

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