To Protect Our Natural Environment

The immediate overwhelming impression I had on seeing the first clear picture of the earth taken by the Apollo 8 astronauts from thousands of miles out was the littleness, the frailness, the loneliness of our planet in the emptiness of space. I looked long at that picture of our streaked white and blue sphere, becoming increasingly awestruck by the thought of all that has been going on for so many hundreds of millions of years on this speck of matter. Every manifestation of the phenomenon we called life, beginning with the dim record found in ancient rocks and progressing through uncountable variations up to the living forms of the present time, originated on the surface of this small globe, powered by thermonudear fires of one star alone. And a more terrifying thought came to me that this amazing phenomenon, which began as a result of most improbable circumstances, could be wiped out by inherent failures of the phenomenon itself. The disaster might occur catastrophically, or insidiously over a long period of time through mismanagement by the most sophisticated product of that development, man himself. But I realized too that however it might happen the planet would continue to ride a predetermined orbit around its star unchanged in outward appearance. Tragic only to the conscious product of the experiment (of life), the event would go unnoticed in the totality of the universe. The experiment of life - the only one we know about - is answerable solely to and for itself. Self-contained, self-generating, and potentially self-destroying its future for all time is carried encoded in the basic genetic we structure of all living substance. If the genetic material is destroyed life ceases.

Without doubt the most remarkable endowment of life is intelligence. It gives to man, in whom it has attained its highest development, unique powers of self-examination and self-control. He can if he wishes direct his own future. The difficulty is not with capability. Knowledge he has in plentiful supply and he is continuously storing up information at a prodigious rate. The difficulty lies with the self-assumed quality, wisdom. Wisdom is what gives men the ability to judge the best course of action in terms of their own self-interest. The farther into the future thay are able to project the determination of self-interest the wiser they are.

from page 3

Man has arrived by diligent application of knowledge to the manipulation of his environment at a crossroad in his destiny. One direction leads surely to oblivion for himself and for many, if not all, of his fellow passengers on the planet. Others lead to perhaps two better solutions but by no easy routes. All ways will be beset by difficulty, by hard choices, and by the severest tests of his intelligence and wisdom. The direction that seems to promise the greatest rewards, the surest fulfillment of the hopes and aspirations of his troubled and inquiring spirit, and of a distant and ultimate happiness, is a course of least arrogance towards his living companions; a course even less negative than the absence of superiority - a course of humble respect for life, an empathy which sustains a recognition of the essential interdependence of all living things.

The greatest good which could derive from the perspective gained of our planet from the Apollo missions is an appreciation that the health and ultimate survival of the human race is entirely dependent on the

~~self-contained~~
~~resources of man's world, without recourse to on the ingenuity ///,~~
~~/////// self-restraint, and widom with on the ingenuity~~
and wisdon he
the self-restraint /// exercises in the exploitation of the finite
resources of his ~~/// finite~~ world

benefit from
The greatest good which could come ~~out of~~ the space program
is a deep understanding of the responsibility man bears for the
continuation
~~perpetuation~~ of life on the planet he inhabits. The photographs of
~~provide~~ give a new
the earth from outer space ~~should give him a~~ perspective on his world,
~~an appreciation that the health and ultimate survival of the human~~
from comes
~~race from~~ which ~~provide~~ the knowledge that the health and ultimate
survival of the human race depend entirely on the self-restraint and
wisdom he exercises in the exploitation of the finite
and
resources of the earth, /that no resource from outside ~~is~~ will be available
~~to him for correcting /// his blunders.~~ the damage done by
to repair/his reckless acts.
effect
Since the end of World War II the ~~impact~~ of man's activities
on the environment have become obvious to the most casual observer.
the
Stimulated by /// military requirements during the war for the defeat of
our enemies, technology, especially in the United States, which was not
a battlefield as were ~~all~~ must of our allies, made enormous advances in
inovative developments of which the harnessing of nuclear power is the
most notable. But ~~there were~~ many other fields ~~of~~ technological
since the war have continued and
advances such as ~~the~~ in the chemical industry, in electronics, im
metalurgy, in agriculture, and in medicine and biology. And in
engineering the period witnessed the development of much more sophisticated
machines for the exploitation of resources and for the manufacture of
products which the growing economy was easily ableto absorb. The
twentyfive years since the war has been a period of technological
revolution. Its impact on sobiety has been to produce many cultural

Stimulated by the military requirements for the defeat of our enemies during World War II, technology, especially in the United States, which was not a battlefield of the war as were most of our allies, made enormous advances in inovative developments of which the harnessing of nuclear power is the most notable. Since the end of the war the effect on the environment of man's activities has become obvious to the most casual observer. During this period a technological revolution has been in progress encompassing all levels of industrial scientific and industrial endeavour from engineering and extractive industries to medicine and biology. The impact of the revolution on society has produced many cultural changes. All sorts of new products have appeared on the market, which are now considered necessities.

Agricultural practice has ungone drastic revision with the introduction of cheaper chemical fertilizers and a whole spectrum of organic insecticides. The revolution has been accompanied by and The economic growth has increased affluence and concomitantly the level of which has raised the rate of consumption, which has back-fed to further stimulate the economy. Built into this rising spiral of consumption is a skyrocketing demand for power and water. Underlying this situation and feeding it is the rapidly increasing population. These factors are not only changing the face of America, they are altering the whole world.

With these physical changes brought about by the technological revolution and the multiplication of people, the quality of life has undergone a change. People are becoming crouded into larger and larger communities, partly because this is the way they prefer to live in close juxtaposition with their neighbors, but also because it is cheaper to live (in communities). Unban sprawl is

pre-empting farm lands and open space near all centers of population. The spreading goes on despite warnings that if it is not contained disaster will be the end product, but no solution is offered except that runs against the popular demands. To provide the industries for raw materials is accelerating at a frightening rate. Trees for lumber are needed in an ever increasing quantity. Forests are cut down with little thought for the future, and the Forest Service collaborates in this mining of resources by proposing a higher rate of cutting on National Forest land. Watersheds too steep for lumbering are denuded exposing them to erosion with all the consequences of permanent land destruction, devastating floods and stream pollution. To supply the increasing demands for fuel and power coal companies resort to more destructive methods of strip mining, and oil companies ignor public warnings, and even the information they have themselves gathered, that a particular project is a threat to the best interest of the community - as the Santa Barbara oil disaster so conclusively exemplifies. Coastal areas are being taken over for both nuclear and thermal power plants by the utilities, because the oceans are the cheapest for cooling, giving no thought to the beauty they destroy, or the limitations they impose on human recreational, or the ecological disruption they cause. To accommodate the increasing millions of automobiles every year thousands of acres of land are covered with concrete and asphalt to provide parking lots and faster highways. The highway departments of many of the states have the power of eminent domain and exercise it ruthlessly by building freeways through state parks, and untouched wild areas for no better reason than to shorten the driving time from one place to another. Most people accept without protest these "improvements" which destroy

much of the beauty of the places they were ostensibly intended to make more accessable for general enjoyment. National Park policy has not always been to promote visitation as it is today. National Parks were in the beginning were places of outstanding natural beauty and scientific interest set aside for preservation in perpetuity in their natural state condition without alteration or interferance for the enjoyment of all people. With the increasing wealth and mobility of Americans, with a highway system that facilitates mobility, with the promotion of parks by the National Park Service, and with the desire of most people to get away escape for a time the pressures of industrial civilization, more and more millions of people have been seeking respite in National Parks. Paradoxically, however, they prefer those parks which have been made most accessable and have been provided in which the most comfortable fascilities where they can enjoy conditions most like those they left behind. They croud into these parks by the thousands. They go not to see the natural wonders for which the park was established or to experience the joy of solitude and untrammeled nature, but to carry on all the complex activities of social intercourse available only in dense communities. Steven Roberts, writing for the New York Times, describes Yosemite today: "The constant roar in the background was not a waterfall, but traffic. Transister radios blared forththe latest rock tunes. Parking was at a premium. Dozens of children clambered over the rocks at the base of Yosemite Falls. Campsites, pounded into dust by incessant use, were more crouded than a ghetto. Even in remote areas, campers were seldom out of sight of each other. The whole experience was something like visiting Disneyland on a Sunday."

The demand for establishing permanent recreational facilities in wilderness areas is becoming almost irresistable. Government agencies,

legislatures, and Congress are being pressured to authorize ~~permit the opening~~ ~~up of wild areas by concessionary~~ private profit motivated projects for vacationers ~~the vacation industry~~ on areas specifically on wild puplic lands except those set aside as wilderness ~~areas~~. These include the construction of marinas, ~~shores of public reservoirs for the use of boat owners; the building of~~ government lodges, ~~access roads~~, ski resorts, and long term leases for summer homes, ~~access roads and lodges in the remote parts of National Parks. The development of resorts for skiers and summer resorts for golfers~~ including, of course, all necessary access roads. ~~visitors in game preserves and National Forests; and the~~ year around ~~long term leasing of National Forest tracts for summer homes.~~ The usual defense of these projects is that they ~~conform~~ the claim are democratic and conform to national tradition ~~with democratic principles and practices~~, whereas to deny such developments shows favoritism for the prosperous who alone can aford the luxury of going into wilderness areas under their own resources. Nothing could in fact be farther from the truth. Any one who has an interest in wildness can visit an established wilderness on foot or horseback. The most he needs is a knapsack and bed roll, but the prices which prevail at lodges and resorts, though regulated by the Government, are prohibitive to all but ~~except~~ the well-to-do. The marinas on the shores of Lake Mead and Lake Powell again are facilities for the affluent boat owner. Before the damming of Glen Canyon it was possible for people with small rafts or conoes to make the trip through the canyon with perfect safety and at minimum expense. Today they can get nowhere except in a motor boat.

These demads for the development of wilderness, ~~fostered~~ by interests like the Disney Enterprises and ~~by~~ the manufacturers of expensive equipment (campers, boats, outboard motors, snow mobiles) are not going to diminish while the economy remains strong and the population continues to grow. And there will be attempts to subvert our

the intent of the wilderness act to allow establishments to be constructed in wilderness areas.

So far I have only ~~considered~~ planned changes to the environment the ~~problems~~ arising from exploitation of ~~material resources both commercial industrial and non-commercial~~ material resources. These have the most obvious and visible effect on the environment. However, there are less easily discernable changes being wrought by more subtile and generally ~~largely~~ inadvertant causes, and because they are wide-spread in their effects, and are constantly at work on the environment, and go largely unrecognized, the injury they cause is the severest and most alarming. Adverse effects on the environment in this category are almost entirely the by-products of human activities. A good proportion of the harm done is a direct consequence of industrial technology which ~~is though aware of the cause of the damage disparages its significance.~~ must dispose of waste products and does so by dumping them into the water systems atmosphere and ~~into lakes and rivers~~. A large number of poisonous substances are disposed of this way without regard to the effect on the environment or even on the health of the human inhabitants. The air around industrial regions is being heavily polluted with all sorts of organic chemicals, the combustion products of low grade fuels and solid materials which that may create an opaque blanket of smog reducing visibility to night time conditions in cities, and renders the atmosphere almost unbreathable. Any one who has driven ~~out of New York~~ on the New Jersey Turnpike near New York will have experienced this condition. Industry is well aware of the dangerous situation it is creating, but disparages its significance because of the cost of correcting it. Improvement will only be forced by ~~come about as the result~~ of overwhelming public protest. ~~An example of the selfishness and~~

Among the most poisonous substances being dumped into the atmosphere

are the oxides of ~~sulfur~~ sulfur and nitrogen, They kill not only ~~the vegetation and~~ plants and animals but people too. Near the town of Sudbury, Ontario, where one of the largest nickel smelters in the world is located, thousands of acres of surrounding land have been completely denuded of vegetation, all life destroyed, and the rocks blackened to a lava-like appearance by the waste gases. Recently a powerful coal company has brought suit against the state of Missouri to force the ~~state to withdraw~~ withdrawal of regulations governing the maximum sulfur content of coal that may be burned in the state. While this action was in process, a situation developed in St. Louis - ~~the largest city in the state~~ - where industry is dependent on the low grade fuel supplied by the coal company which ~~threatened the~~ presented a serious ~~threat to the~~ hazard to health of ~~the inhabitants~~. Owing to the occurance of atmospheric inversion - a not uncommon ~~phenomenon~~ occurance over the city - the sulphur dioxide ~~monitors~~ monitors of ~~air~~ atmosphere in the air suddenly began to show the highest concentration ~~in the air~~ on record. Prompt action by the city authorities ~~arising~~ advising people to stay in doors, may have prevented a repetition of the London disaster ~~of several years ago~~. more than a decade ago. In the northwestern corner of New Mexico a thermal power plant using ~~low grade~~ locally mined low grade coal is pouring permitting hundreds of tons of fly ash ~~to~~ into ~~enter~~ the atmosphere each day. The ~~amount~~ quantity is estimated at considerably more than ~~that being~~ the solid matter released per day over ~~the~~ greater New York ~~area~~. The particles of ash are so fine they do not settle but are ~~so being~~ spread by air currents ~~over~~ for hundreds of miles ~~of~~ in northern New Mexico and Arizona. The Rio Grande valley is/experiencing repeatedly days of low visibility and the smog is reaching over into the Colorado River basin. This is happening in a region ~~of the United States~~ which used to ~~benefit by having~~ enjoy the clearest air of any part of the United States. The

utility officials responsible for the operation of the power plant, the Legislature and Governor of ~~the~~ New Mexico have exhibited callous indifference to ~~the/con~~ a condition which is rapidly worsening. Here again resistance to corrective measures is economic, but the cost in terms of environmental ~~in~~ degradation ~~of the environment and~~ and deterioration of the quality of life is considered immaterial. Only massive public protest will ~~alter this attitude.~~ force correction, alter the situation

The ~~S~~mog/is increasing everywhere is not due solely to industrial pollutants. A large share is attributable to automobile exhaust. The automotive industry , typical of the attitude of industry in general, resists making improvements in ~~their~~ products, which reduce profits or raise costs to the consumer, without adding a visible new feature with sales value. Millions will be spent on promotion as opposed to thousands for improved combustion. No one can see the reduced fumes but everyone notices a new gadget. ~~Everyone is~~ We are all familiar with the plight of Los Angeles where the smog which lasts often for days is now believed to be caused by the exhaust from automobiles. In spite of the sore throats and irritated eyes, not to mention more serious effects, suffered by millions of people, from the products of incomplete combustion, automobile manufactures felt no responsibility to make any improvements in ~~incomplete~~ combustion ~~engines~~ efficiency until ~~forced to~~ required by California law, and then ~~they did it~~ made them only in automobiles ~~to be sold in~~ for sale in California. The dangerous products of ~~incomplete~~ incomplete ~~combustion~~ of gasoline are hydro-carbon fractions and carbon monoxide, ~~and~~ ad oxides of nitrogen, ~~and~~ sulfur, and lead ~~are also produced~~, ~~and~~ it may be the first ~~two~~ of these which will have the most insidious effect on human health. Lead is an accumulative poison which is being distributed all over the world by automobile exhaust. Lead is found even on polar snows. However, ~~it is~~ the incompletely burned hydrocarbon fractions ~~that~~ cause/smog and mucus membrain irritation. On the eastern seaboard smog from all causes is gradually invading all the atmosphere where, away from cities, ~~it is~~

its presence is most dramatically ~~detected~~ evident from the air. A few years ago a layer only three thousand feet thick was observed from airplanes; now the layer is five thousand feet thick and ~~it~~ extends all the way from New York to Washington. At the present rate of increase in a few years it will reach altitudes of ten thousand feet and cover all the eastern states from Maryland to Massachusetts and beyond.

Of at least equal and perhaps more important concern of those who are anxious to prevent irreparable harm to the environment, is the incredible and continuing pollution by both industry and municipalities of the lakes and river systems of the United States. Fortunately, signs on the horizon point to a growing awareness by the executive and legislative branches of the national and ~~several~~ state governments, responsive to an aroused public, of the seriousness of this state of affairs. Many bills have already been passed by Congress and many more rest in its dockets for consideration to rectify ~~some of~~ the worst current practices. However, there is yet no justification for great optimism since the pollution problems are just beginning to be recognized and the solutions proposed will certainly be met with strong and organized opposition from the polluters, who regard rivers as ~~the most desirable and reasonable means of~~ their rightful means for disposing of wastes. Polluters They are treated ~~like~~ as natural sewers, and in truth become nothing less as municipalities pour ~~into them~~ raw sewage, and industries dump ~~their~~ oily and chemical laden effluents into them. They are used ~~as~~ for dumps for garbage and solid trash and even automobile carcasses. Expostulation against these practices are more often than not met with ~~a callous shrug of~~ indifference or vociferous defence, for rivers in America have traditionally been used as ~~sewers and~~ dumps for ~~getting rid of~~ the ~~used up~~ trash of civilization. Their beauty has gone unappreciated their banks have been ravaged by inappropriate exploitation, their

riparian life destroyed , and when they can no longer be used as super disposalls they are dammed up. So far has this raping of the rivers of the United States gone that one is hard put to find a pure unpolluted stream in its primeval state. The Merimac on which Thoreau and his brother made their famous excursion more than a century ago is so badly polluted that it is not safe to ride on it in motor boat.

Our lakes have fared no better. Lake Erie, long used as a cess pool, is now destroyed as a living lake; its fish are dead, to swim in it is to risk contracting enteric desease; dissolved oxygen has been absorbed by decaying ~~and as a last downward on its descent of~~ As it descends the ecological spiral it approches the last abhorrent stage: a body of bubbling, ~~odorife~~ slime. Lake Michigan is approching this same fate, ~~and whether it can be saved~~ it will ~~depend on the~~ require heroic effort to change the habits and practices of the people of four states. Lake Tahoe in the Sierra Nevada ~~range~~ which once held the clearest water in the world is becoming green with algae from pollution.

Debasement of the biotic environment by pollution of the water systems of the United States is far more serious immediately ~~serious than through the~~ than by pollution of the atmosphere, although what the relative long term consequences might be is debatable. From the short ~~tern point of~~ view, however, pollution of water destroys more life ~~than.~~ ~~Pollutants in water~~ When certain chemicals are dissolved in water they immediately enter the food chain of an ecological system and are passed along it causing damage at one level or another before they are broken down. Those resistant to metabolic process and which ~~are~~ at the same time are soluble in fatty tissue become concentrated as they are passed from one class of predators to the next ultimately causing catastrophic die-offs. ~~Other~~ pollutants ~~may~~ cause

damage by sheer quantity , suffocating acquatic vegetation by suffocation fish by causing the removal coating it with oily films, or ~~by removing all the dissolved oxygen for oxidadtive decay~~ through decay processes. ~~Oily wastes are particularly harmful for both plant and animal life. Strong chemicals.~~ Many chemicals flushed out into streams act in low concentrations as metabolic poisons. All these damaging ~~effects~~ events disrupt ecological interrelationships to a greater or less degree and sometimes ~~the~~ what appears to be/rather a insignificant loss of life leads to/ unanticipated and surprisingly wide-spread ~~destruction~~ destruction. Killing off ~~of~~ acquatic insects could lead to the/disappearance of fish;/poisoning/crustaceans starvation and inadvertant of has resulted in a ~~decline~~ precipitous decline in wading bird populations ~~and~~ the abandonment of rookeries; eliminating acquatic plants by thoughtless disposal of wastes has produced a lethal chain reactions drastically reducing fish, bird, and mammal populations; ~~The destruction~~ extirpation of a predator whether insect or mammalian is followed by/explosive increase of its prey which,if it happens to be an herbivore, ~~destroys the vegetation on which it it~~ eats up the food supply shared with other animals who then all die off from starvation.

A ~~concern~~ anxiety still greater/ ~~if that is possible,~~ for what is happening to the environment (and the insidious consequences of their immediate effects) than for that caused by pollution, is being expressed about the application to the surface of the earth of chemicals for biotic control. There are two general catagories of substances in common and increasing use today: those ~~used~~ designed to destroy life and those ~~used~~ to stimulate it. The first ~~are the controly agents which include~~ belong to the insecticides, fungicides, and herbicides;/the second ~~are~~ fertilizers and growth stimulants. A class of chemicals developed since the war, which ~~are~~ is being manufactured in enormous quantity and distributed throughout the world, for the control of insects ~~are~~ is the group of chlorinated hydro-

carbons. They are artificial compounds unknown in nature. They are non-selective highly toxic nerve poisons active in extreme dilution. Their use in the control of insect infestations of crops and forests, prophylactically on crops, and to eradicate noxious and desease carrying insects. Being water insoluble they are applied as sprays in emulsions or as dusts. Their use has proved highly effective, on the whole, but they are extremely persistent since they are non-biodegradable. This last property, as well as their non-specific action, is at the root of the growing alarm over their continued use. The commonest chemical in this class is DDT.

The trouble with cholinated hydrocarbon insecticides is that they kill much more than the target species; they kill the desirable as well as the undesirable insects, and they kill also many higher animals. The bad effects from using DDT as general insecticides were predicted by Rchel Carson in 1962. She was ridiculed and condemned by the manufacturers and users of these chemicals alike, but her pesimism has been overwhelmingly vindicated by subsequent events. The justification for their use commonly put forward always belittles their undesirable properties. When the harm is pointed out it is either denied off hand or accepted as the trivial cost of the benefits. The benefits are larger and cheaper crops and healthier and more profitable forests, less annoyance from biting insects, and saving lives caused by insect carried deseases in foreign lands. What are the disadvantages? They were not at first apparent, but it is now becoming recognized that the chlorinated hydrocarbons can have a devestating effect on the total ecology far distant from the place of application. When used for mosquito control they kill crustaceans in concentrations a thousand or more times less than that needed to kill the insect. They also kill

acquatic insects and fish in somewhat higher concentrations, but they have another property which exacerbates the insidiousness of the action. property of fat solubility and water insolubility exacerbates the insidiousness of the damage this class of poisons can do. Because the animals that absorb them have no mechanism for breaking them down, they are stored in attics and cellars of the animal body - the lipid tissues, which are themselves stores of energy and where the hydrocarbons are in least contact with vital tissues. Invertebrates living in the bottom mud of marshes and estuaries store DDT sprayed to get rid of mosquitoes, concentrate it in their fats, and when they are eaten by bottom feeding fish the chemical enters the fishes body where is further concentrated in the fats of the fish if it survives. Carvivorous fish eat these and the concentratiom advances to still higher values. Many kinds of birds eat live on fish in whose bodies the DDT again increases. Now a new phenomenon appears which has received considerable attention recently, which is the effect of DDT on reproduction. The primary effect of DDT as a nerve poison has been explained by the inhibition of th the enzyme associated with the transmission of the nerve impulse. In reproduction the inhibition is on the enzyme-hormone complex with steroids involved with in calcium metabolism. A female bird which has ingested more than the unknown limiting quantity of DDT becomes sterile and lays infertile eggs; she may also lay eggs with fragile shells that do not survive incubation, or eggs with no shells at all. The Bald eagle, the Peregrin falcon, the Osprey, and the Brown pelecan are threatened with extinction in the United Sates by this process of interference with reproduction.

Song birds are also killed by DDT and other chlorinated hydrocarbons where they have been used for the air spraying of large tracts of land in insect control programs. They are killed directly

by nerve poisoning, and in experimental areas have been found dead on their nests. Robins have been destroyed by the thousands as a consequence of Dutch Elm Disease control programs. In this case they die from eating earth worms in whose bodies DDT, washed into the soil from the treated elms, has become highly concentrated. Rachel Carson's gloomy prediction of a silent spring might well become a reality if the widespread spraying of DDT is not arrested. A very great obstacle to stopping its use is bureaucratic inertia. For a long time after it became obvious that the fire ant eradication program in the south was not eradicating the fire ants and was destroying a large amount of wild life, nevertheless the program was continued, even over the vigorous objection of Congressmen from the states involved. The same thing happened on a lower governmental level in Detriot in an attempt to eliminate the Japanese beetle. Eradication is a favorite term among the entomologists in the Department of Agriculture although no extermination of insects by chemical poisons has been successful. The difficulty centers in the rate of reproduction in insects which produce many generations in one season giving them the opportunity to develop by mutation strains resistant to the poison. The phenomenon of developed resistance has occured time and again with mosquitoes and various other insects. The immediate reaction to the appearance of resistant strains is to pour on more and higher concentrations of insecticide, which does no good but does destroy many higher forms of life. Those who defend the continued manufacture and use of DDT on the grounds that it has saved hundreds of thousands of lives in malaria countries never mention the resistance factor. It would be interesting to know in how many antimalarial programs there has been a shift to other chemicals. A search for biodegradable anti-anopheles agents should certainly be undertaken.

More alarming ~~effects~~ results from the dissemination of chlorinated hydrocarbons through the environment are ~~beginning to be observed~~ becoming apparent. Because of the low solubility of in water of DDT and its allies, their appearance in the environment has gone largely un-noticed before the harm they produce is ~~observed.~~ evident. Thus ~~as~~ minute amounts as one part in a trillion kills ~~certain~~ of brine shrimp. Therefore to monitor the dispersion of these toxins by sampling the environment ~~is likely to be misleadingly.~~ could be misleadingly reassuring ~~It is safer to measure~~ A sounder method, which will give a more realistic picture of the situation, is to analyze ~~the~~ animals at various levels of the food chain in whom the hydrocarbons are concentrated . The sensativity of fresh water fish to DDT has been known for many years, but not until recently has an influence on marine fisheries been observed. DDT enters the oceans from the land and is picked up by ~~the lowest elements~~ lowest in the food-chain the phytoplankton, ~~to which~~ in which it acts to decreas photosynthesis. Since more than half the world's photosynthesis is carried on by these single-celled algae, any significant reduction in their activity could have profound ~~effects on~~ and possibly irreversable, effects on the equilibrium of the bioshere. ~~Any serious~~ Reduction of photosynthesis will lead to a gradual loss of atmospheric oxygen with serious consequences to all animal life including man.

Fertilizers washed from the land into rivers and lakes are disrupting hydrological ecology, Nitrates in excessive amounts cause blooms of algae that interfer with the normal lake biota causing the disappearance of many acquatic types. They have probably been a contributing factor to the degradation of Lake Erie. These untoward results could be largely obviated if the practice of over-fertilization (like the practice of over-spraying with pesticides) ~~could be~~ would require discouraged, but ~~to do so would take~~ an educational program ~~to counteract~~ in conflict with the high pressure salesmanship and propaganda advertising

of the fertilizer manufacturers. In some mid-western communities nitrates in the run-off from farm land have entered water supplies rendering them undrinkable raising nitrate concentrations above the toxicity threshold thus rendering them undrinkable so that drinking water has had to be imported.

With the increasing spreading smog from industry and ever increasing numbers of automobiles; rising concentrations of CO_2 form the combustion of fossil fuels diminishing oxygen production resulting from the destruction of the world's reservoirs of photosynthesis, lessening production of atmospheric oxygen from the poisoning of phytoplamkton; shrinking numbers of animal types from the poisoning of land and water with exotic chemicals, the quality of human life on the earth is being degraded step with the degradation that man himself is working on the bioshere. Conservationists are becoming more concerned with these general consequences of industrial civilization than with the need to conserve fragments of the untrammelled environment: as wild life preserves, islands of wilderness, unspoiled seashores and national parks, necessary and desirable as they are, but they all will once beautiful land along with all the rest will descend into the sink of total degeneration if men do not learn to control their ruthless impulses, if they do not learn to recognize their own greater self-interest of their race.

Why is it to our interest to preserve the environment as unaltered as the day we first occupied it? Why should we not exploit it all for our use, eliminating that which we find valueless to make room for only what we can exploit value? In the first place we are not omnicient; we do not know nor can we imagine what material use may yet be discovered in some element of the environment which we now regard as of no value. We don't know, nor may we ever know, enough about the complex inter-relationships that govern world ecology to foresee the long range effect of manipulation, which might well be to our disadvantage.

But there is a still more compelling biological reason to eschew the temptation to simplify our environment. No people are wise enough to forecast with certainty the evolutionary potential of the mass of life. Indeed we have succeeded in tracing the histories of some individual creatures from their bones and footsteps they have left in their wandering through the ages, and we can with some degree of assurance forcast the future of a few others who seem to waver on the brink of extinction, but of the vast majority of living things we posess no inkling of their destiny. What intelligent being would have predicted, with no clues to go by other than those available to it at the time, the glorious future that lay ahead for a shy, hairy, shrew-like animal who shared the Mesozoic swamps with the Dinosaurs?

Evolution draws upon diversity. The abundance of life - its incredible variety - on the planet should make this statement self-evident. Out of the richness of life new organisms are steadily appearing to take the place of those that failed. The readiness with which replacements occur depends on the availability of organisms which potentially can adapt to new conditions, to the conditions under which the extinguished organism failed to survive. The more available organisms there are, the more quickly the vacancy will be filled, and conversely the simpler the biota the longer the time required to fill the empty ecological nitches. Many oceanic islands illustrate this effect of a simplified biota perpetuating itself. What happens on a limited scale in isolated areas has little influence, however, on the total life of the world as a whole, but when man, with his power for destruction, attacks the whole biota in the name of greater efficiency, in exploitation of his self-assumed interests, he runs the risk of carrying the simplification of the ecosystem beyond the point of recovery. There may not be enough surviving variety to fill the gaps he has created. Through ignorance he could so reduce the genetic reservoir that an unexpected disaster

any of
to/the remaining forms of life might be disasterous to his own survival. But ~~there is~~ a still more compelling argument for all ~~of~~ man's dominance on
who accept a longer view of/this lonely ~~stellar~~ satalite ~~on which man's dominance has had such short duration, and that~~ is that the so
quality of his tenure, ~~of such~~ breathtakingly short, ~~duration~~ is inextricably interwoven with the lives of all his companions. He no doubt
cannot do without them. A few pathogens could be dispensed with, but the vast majority, not confined alone to those he eats or weaves into shelter for his body, are essential to his welfare - to his psychicic health. They enter into his life on many levels, enriching it, adding variety without which living becomes a deadening monotony. It has been said that wildeness is a luxury, a commodity with which man, as his occupancy of the earth approches saturation, will be forced to dispense. I say, on the contrary, that wilderness is a spiritual necessity. Wildernesses ~~It~~ must be preserved, even though few visit wilderness areas, as a safety valve for those who never enter them but know they are there.

With wildness all gone, paved over, plowed under, deforested, leveled, and by bulldozers, built on, sterilized; with recreation mechanized, regimented, ~~controlled~~ and socialized; ~~and~~ with all these ~~all~~ in the face of increasing need to escape the dull, deadening humdrum of their self-imposed ~~em~~prisoned ~~lives~~, men ~~will sink into dispair and~~ will cease to ~~behuman because they will have~~ biologically integrated lead lives because they will have basis
destroyed the essential ~~conditions~~ for participation in the total meaning will
~~biological~~ community. Under these conditions ~~the joy may~~ go out of life, inspiration and joy will fade away, people will become apathetic - listless - and, if observations on other animals has any significance for humans, sexual drives will wither. When this happens the ~~population~~ birth rate will ~~begin to decline~~ fall; no effort to reverse the trend

could be sustained. The end result: extinction. Perhaps we see here nature's way, short of war or famine, of solving the population crisis, but I, in the light of man's manifest intelligence, even without much wisdom to go with it, I find it difficult to accept such a solution. Before it is too late men should, men must, ~~wake up to~~ awake to the hard facts of their ~~greatest~~ encompassing selfinterest.

At the foundation of these awesome problems facing mankind is the elementary one of numbers. Of how many people is consistant with the health and survival of the species. Animals are not very good at ~~this~~ this kind of self-appraisal. No species has ever voluntarily brought multiplication to a halt, but then there never has existed before a creature endowed with a brain capable of ~~an ability for~~ self-examination So perhaps ~~this time~~ at last the ~~miracle~~ of self-limitation will take place. Unless ~~we~~ mankind does stop the run-away ~~increase in his numbers and~~ population growth and stabalizes his ~~population~~ numbers at a level ~~consistent~~ campatable with a maximum enjoyment of the resources of the earth, all ~~our~~ efforts to prevent degradation of the environment by pollution, ~~by insecticides,~~ by the distribution of chemicals, by misuse of land, by improvident mining of resources are ~~doom~~ doomed to failure. And when these efforts fail the reservation of National Parks, wildernesses, and wild life preserves become meaningless because they will protect nothing.

The world-wide spurt in the human population ~~this century~~ which has been ~~observed~~ with growing misgivings by conservationists, ecologists, demographers, and ~~some~~ politicians alike is a direct consequence of the phenomenal advances in public health and medical science in this century. The series of technological break-throughs in medicine which have occured since ~~nineteenhundred~~ 1900 have drastically reduced the death rate ~~form disease~~ in all the densely populated countries of the world so that their populations have doubled and ~~redoubled~~ redoubled during this

At/the/same/t During the same period the productivity of the world has not kept pace with the growing population numbers of people. Today a food deficit exists creating starvation conditions for millions ~~of~~ in the under-developed countries, in which violance, riots and mindless slaughter are becoming ever more frequent phenomena. Within the next decade ~~it is~~ some ecologists predicted, and the time is probably too late to prevent them - wide-spread famines will overwhelm densely populated regions of the world like India and South America. Death by starvation is nature's way of re-establishing a balance between populations and food supplies, but it is not an orderly way; ~~it is messy and disrupts~~ chaos disruption of whole civilizations and chaos are the ~~returns~~ by-product. An attempt, however, is called for to ameliorate this situation by lowering the birth rate, to bring it into correspondence with or below the death rate. Responsibility for devising a program to realize a stable population rests with science, particularly with medical science. ~~Medical science~~ William Vogt in Road to Survival in 1948 persuasively describes how modern medicine ~~with callous~~ indifferent to long tern effects has successfully reduced the death rate from/from disease in the most over-crouded countries ~~and never attempting making a gesture towards~~ without devoting comparable effort to birth control. The result has been an a net increase in misery and hopelessness.

If doctors ~~have~~ feel a moral obligation under the Aesculapian code to alliviate human suffering, and in the process of saving lives foster more suffering ~~because of~~ by raising the population density beyond the carrying capacity of the available resources - and ~~by resources~~ I mean intangible as well as tangible resources - then they have tacitly accepted an equal moral responsibility for preventing ~~people from~~ children being born into misery. To prevent death from small pox, maleria, ~~or~~ cholera only to postpone with no greater assurance than and innumerable other diseases promise

a life of misery and dispair, with ultimate death from famine, is no fulfillment of the pledge. Better not to have been born at all than ~~xø/øø~~ kept alive for such a miserabal fate, and ~~xhøx/xø~~ since the prospect ~~øf~~ for hundreds of millions of children yet to be born in this century is no less desperate, ~~then~~ the obligation of the medical profession ~~is~~ to work towards a reduction of the birth rate is clear.