REITH LECTURES 1969: Wilderness and Plenty

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Lecture 2: Impact of Man on His Environment

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In my first lecture I argued that although man is not yet lord of creation, he is undoubtedly the dominant species on our planet. Moreover, he is such a complex creature that he is constantly challenging and altering his environment. As soon as he became man—and we need not bother just when it was—he began to alter the face of the natural world as it was until then. While he remained a hunter and food-gatherer he was little more than another indigenous animal. But as soon as he burned wood to keep warm he was consume in it in a different way from natural decay, with different consequences. When he used fire as an aid to driving wild animals into places where he could kill them more easily, and by burning the bush could encourage hooved animals to graze on the young grass which followed, he’d begun his ceaseless attrition of the natural wilderness.

At first men were presumably few, and they evolved on an Earth that had already been amassing biological wealth for millions of years. Their burning of habitat for hunting was, of course, a prodigious expenditure of organic matter for momentary expediency. And as the human species in crease more men meant more burning. The same ground was burnt too often, and this led to an impoverishment of the broad spectrum of species of plants. Biological productivity and ecological wealth rest on the wide variety of species, which means flexibility and unconscious co-operation within the whole ecosystem. When man alters natural ecosystems by design or ignorance, they are usually simplified or made less complete, and they lose something of their holistic quality of resistance to invasion by foreign species. The Neolithic Revolution was indeed that for home areas—as natural habitats became fields for the production of a single crop. There was an initial loss through this cultivation until man learned to sustain his arable land, but again, the Earth was big and men still relatively few.

Domestication of animals must have caused some measure of over-grazing very soon, for the great advantage of domestication was having the animals where you wanted them when you wanted them, and usually in greater density than they would be found in nature. Throughout history over-grazing has been a great creator of deserts, and still is. Nomadic animal husbandry, following the grass, using different animals for different habitats, was a considerable technical advance. Maintenance of these grazing lands of several kinds was necessary for the survival of tribe and culture.

The advent of the Bronze Age gives us rather more to bother about in the way of impact on habitat. Native copper was originally found in lumps on rocks in Anatolia. It could be hammered by stones into useful and decorative artefacts. Then it was discovered that metal could be extracted from ore by heat, and some genius of the region discovered the advantages of alloying the rather soft copper with tin. This needed more heat still, and more heat needed more fuel, and that meant less forest.
Man was truly in business as a consumer of the planet’s riches of natural resources. The discovery of iron and the ability to work it enlarged the scope of the smelting industry, at the same time increasing the strain on the fuel-producing forests.

Making pots was probably a woman’s discovery, but it is man who streamlines processes and fosters efficiency of production. The roots of the notion of mass production go down to our technological beginnings. The Chinese, above all others, perfected clays for different kinds of pot and learned the art of reaching intense heats in kilns and of regulating heat. Once more the forests provided the fuel, and China today has a continuous problem of barren hills and silting rivers, stemming from the centuries when the sky of Chekiang was black with the smoke of the busy kilns.

The introduction of coal—fossilised energy from the past—must have given breathing space to the world’s forests near to populated areas, but it was almost too late. England’s forests were in tatters by AD 1700, and those of Scotland were next assailed. Ships carried cargoes of iron ore up the long sea lochs of the West Highlands to be smelted in furnaces fed by oak and pine. And the process continued elsewhere.

A fundamental point which we can observe in the impact of man on natural habitats is that it is most severe and destructive when some natural product of the habitat, such as timber, or some technical product like China’s pots, is exported from the region. The cedar forests of the Lebanon have gone: Solomon, and the ancient Egyptians long before him, had imported it in quantity. The onslaught of the 19th century on the forests of North America was so shocking that I have the feeling this was the reason for the early rise of a sense of conservation in that country.

These problems are of course not confined to temperate lands. Tropical forests have always been treated extractively and with little heed for consequences. The trees are so monumental, and the forest gives such a sense of permanence, that the fragility of this oldest life-form on Earth is not generally realised. But tropical rain-forest is primarily a natural photosynthetic factory and store of cellulose: protein production as animal life is secondary and incidental. For many thousands of years the floor of the forest has been sheltered from the sun, and within there is an intricate and efficient conversion of organic matter into nutrients for new growth. When, after felling, the floor is laid bare to the tropical sun, there is rapid oxidation of the soil, which, indeed, proves to be scanty and poor once the organic matter and the organisms achieving the cycles of decay and renewal are gone. Yet a most wasteful felling and pushing aside of forest in the Matto Grosso of Brazil is going on right now.

**Playing with Water**

The pressure of numbers of people has had another immense impact in the drainage of wetlands around the globe. This is another setting back of the natural wilderness. The process has gone on throughout history to create both more cultivable land and navigable waterways. Wetlands constitute one of the world’s most biologically productive life-forms—this time, of protein in the shape of animals. Much of this animal life provides desired human food but, of course, it needs catching by fishermen and hunters. Where the soil is alkaline peat, as it is in the Fens of eastern England, it becomes rich agricultural ground tendency to revert from the policy of draining wetlands to allowing them to refill and become protein producers again. This
policy is perhaps possible today only in an affluent country that produces grain surpluses, and where wetlands and their wildlife have recreational value.

The Dutch are also changing the face of their country by playing with water that ingrained masculine amusement. But this is of a different order, surely constructive and inspiring. Large areas of land are being won from shallow salt water of no great biological productivity, and research has shown how the land can be made into good agricultural soil. What is even more inspiring is that the art of landscape architecture, linked with the thoughtful establishment of nature reserves, is making these new lands into pleasant living places. There has been imagination at work as well as skill, which conjunction has not been the usual way that man has been changing the face of the planet through the years.

Omnivorous Man
So much, then, for some of the broad changes that man has wrought in his environment. Let us now pause for a moment to consider what sort of a species man is, or would like to be. In nature, he is omnivorous, the male catching the protein by hunting and the female gathering the fruits of the Earth. Later, the horse cultures of the steppes and of those rich lands of the Crimea and Ukraine lived largely from the produce of their herds and flocks, and there are cultures in the Upper Nile that still do so. Such people live where man belongs, at the top of a short food chain, of grass-animals-man. Agricultural man changed this natural order to a situation where he himself feeds to some extent directly on the seeds of cereal grasses: wheat, rye, oats and barley. As time progresses and numbers of men increase, protein gets harder to come by, and the human species has become more and more a direct consumer of starch, a more abundant derivative from the changed ecosystem, but in nutritional terms a devalued one. The more numerous people become, the more likely are they to be depressed to the state of being starch-eaters. So population increase forces the conversion of protein-producing ecosystems into starch-producing agriculture, and that magic touch of a higher standard of living which will reduce the birth rate continues to hang just in front of the donkey’s nose.

We have had lessons from the past. Salaman of Cambridge pointed out many years ago what happens in countries which, as it were, sold their soul to the potato: ancient Chile, 18th and 19th-century Ireland and the West Highlands and Islands of Scotland. The standard of living was desperately reduced and numbers rose inordinately. But the lessons are not heeded. Let me give you another example of projected change, this time in Africa. The Kafue and Chembeshi Flats in Zambia not only sustain herds of a close-herding antelope but their lagoons carry an extraordinary wealth of fresh-water fish. Indeed the development of the fisheries has been one of the African success stories in protein production, but the antelope are losing out badly through lack of a proper policy of conservation which would harvest them carefully as a valuable protein crop. Then, of course, we have had the intention to turn the flats into wheatfields, and finally, they may go under water in a dam. A further example of this way of thinking would be the Bahrel-Gazal region of the Upper Nile, ‘the country of the rivers’, potentially one of the richest protein-producing areas in the world. But the starch-growers have already got 8,000 acres as an experimental plot for rice. The Dinka are a fine race of tall Nilo-tics, living in symbiosis with their beautiful cattle
and the wild game. Will a larger number of rice-fed Dinka living in a deteriorating habitat be a more contented people? I doubt it. Starch and sedition go together.

Another impact on the face of the Earth by men’s activities is interference with drainage. This has happened as soil-moving equipment has grown more powerful. The coal measures of Britain are not only defaced by tips, but considerable acreages round about them are often waterlogged. The National Coal Board appears to be doing an impeccable job of clearing up and re-creating good landscape following their open-cast mining, which makes it more difficult to understand the dichotomy of mind shown by the Board in declining to accept a continuing intention to clear away the tips and their attendant bogs—these oppressive and depressing monuments of the age of laissez-faire. Britain has been spared strip mining and auger mining for coal, but the hills of Kentucky are being scarred by this utterly ruthless extractive process. Downstream, the good arable lands along the Ohio River are being spoiled by the silt blocking the waterway. Here, too, is another dichotomy, for the large consumer of this coal is that environmentally-conscious body, the Tennessee Valley Authority. Should a State boundary act as a blindfold to what is happening on the other side of the watershed? Our world is too constricted now for any country or authority to ignore concern for the resources of a neighbour and to say: ‘I am not my brother’s keeper.’

Rivers as Sewers; Detritus
I want now to refer to two aspects of industrialisation that have had profound ecological effects. While human populations were small, the use of rivers as natural sewers was perhaps of little consequence. With the coming of industry the situation changed rapidly. Industry was quick to dump its wastes into the rivers, with immediate unpleasant results. In my younger days the whole valley of the Esk in Midlothian used to stink with the effluent of paper-mills, and if the rivers of the State of Maine are flown over today in a light airplane, the pollution and obstruction of the rivers from pulp-mills is obvious. At the same time, we in this country are trying to reduce the backlog of neglect: the Thames is a cleaner river than half a century ago despite the greatly increased population living on its banks. It is conceivable that the salmon will run up the Thames again some day. But I shall have more to say about pollution of the environment later.

The other impact of man on the natural environment is one of the most regrettable of all: it is quite distinct from the pollution aspect, although there are examples of direct linkage. This is the creation of dereliction: a truly ecological disaster. Dereliction is an ecosystem set back to beyond its pioneer stage with little hope of return, and to such a picture is usually added the hardware of humanly created detritus. Through man’s history, war has been an arch-creator of dereliction; some of that wrought by Genghis Khan has not been set right yet in such places as Transoxania, Afghanistan and Persia. The ancients created much beauty and ecological repose as conscious acts, such as the Persian gardens which give us the word ‘paradise’, and the oases and irrigated lands of the Central Asian Snow Rivers. Balkh, Merv, Bokhara and Samarkand were university towns of beauty till the Mongols came. They have not yet recovered. Nevertheless, the general aftermath of the dereliction of war is to rebuild with a considerable idealism which quickens effacement of ruin. We have seen this in our own time and sometimes these re-creations have been heroic, like the old square in Warsaw.
The derelictions of the Industrial Revolution, produced around the world in only 200 years, have received little consideration or idealism. I can never quite understand why, when they have occurred, industry, government and folk should endure them with such callousness, fatalism and insensitivity. People still speak of wilderness in a derogatory way, almost as if it were outmoded in human estimation, that wilderness which carries the nobility of nature, yet until our own day few people had effectually voiced their detestation of the desolation of the land and of the spirit which has been caused by the arrogance of industrial dereliction.

John Barr, in a recently published book called *Derelict Britain*, tells us that we are still adding ten acres a day to the dereliction. What sort of people are we that, in a period of rising numbers, of affluence and mobility, and of much desired recreational space, we can filch land from posterity and turn it into squalor at the rate of ten acres a day? Government and local authorities have the legislation enabling them to tackle dereliction, but in fact most are log-rolling, acting fragmentarily with a maximum of show, rather like funeral horses trained to trot magnificently at a pace slower than a walk. Not everywhere, of course, and I shall return to examples of rehabilitation. Sometimes, also, hawthorn bushes take over dereliction willy-nilly and bird song is heard again, but in general derelict landscapes remain to foster psychosomatic disease by their primary violation of the eye. Bricks are so urgently needed for homes and work places that no one could be anti-brick, but this profitable industry, along with its brother cement, is a spectacular creator of dereliction. Could we not have some environmental socialism, whereby the dereliction-producing industries would forgo a portion of their profits to devote to the rebuilding of landscape? For the ultimate good achieved, I believe the social and political cost would be small. I think, indeed, that we need to develop some yardstick for human contentment: to be able to measure the lesser degree of discontent and psychosomatic disease in rehabilitated environments. This is the ultimate concern of politics.

With bricks and cement goes gravel, and such are the demands of construction in the Thames Valley and elsewhere that gravel diggings have created lakes. Fortunately some of these have escaped dereliction from an early moment because numerous wading and swimming birds, great opportunists that they are; have taken over the diggings and drawn to them that now considerable body of opinion, the bird-watchers. Sometimes the lakes have been large enough for sailing as a recreation and with some imaginative planting for amenity, the sites have become assets to the community. The situation is less happy when the local council buys the water-filled emptiness for the deposition of refuse, ultimately building sterile land fit only to take more buildings. It is all a question of the difference between an ecological approach, a very simple one linked with a romantic outlook, and an unimaginative, unbiological one concerned only with keeping down the rates.

I was recently in Alaska, attending the public hearings on the projected building of an 800-mile pipe-line from the Arctic Ocean to Valdez on the Pacific Ocean. Nearly 20 years ago I travelled Arctic Alaska pretty thoroughly when the Office of Naval Research was exploring for oil west of this great new strike at Prudhoe Bay. The passage of caterpillar trains across the tundra, the dumps of oil drums, the filth of camps on permafrost, were not very pretty, and on one occasion my colleague and I dug a trench in the frozen tundra, gathered up a year’s expenditure of food cans
strewn around the tent site, and buried them. A useless gesture, doubtless, but I’m still glad we did it.

Now, the activity is terrific. Hundreds and thousands of acres of Arctic tundra will no longer rear phalaropes, sandpipers, lemmings and snowy owls, but are being reinforced to take drillings rigs, make permanent camp sites and so on. Many more cat trains are going on what will one day be a permanent road, and there are about a thousand flights a day going onto the north slope of the sublime Brooks Range. Here is going to be impact in a big way. The world does not need the oil right now, but the world political factor, which is also an ecological factor, makes it expedient that the rigs get going, the pipe-line be built, and the 1,000-foot tankers get going through the North-West Passage, even though Canada is bothered about possible accidents in those narrow seas. The oil of the Middle East is subject to the political vagaries of impulsive, compulsive peoples who can upset the world situation at any moment they choose: diplomacy and duplicity are not far apart where oil is in debate. The Alaskan strike gives the chance of more stability, so it must be developed. It could indeed be a factor in world peace. But what is going to happen to a large and biologically important area of Arctic wilderness?

It’s no good looking back over our shoulder. We simply cannot stop oil development, but we can do our utmost to canalise it and to prune wasteful movement and development over the fragile habitat of the tundra. Till recently, the State of Alaska was poor: now it is potentially rich, and desperately eager to get its fingers on the contracts and sub-contracts, the land speculation and all the rest. The State wants to get the land for itself from the Federal Government for the whole 800-mile length of the pipe-line. There are lots of eager quick-buck men in Alaska. But there is also a surprisingly large number of people dedicated to the conservation of the Alaskan environment. There are 586,000 square miles and only a quarter of a million people, over 20 per cent of them natives. The far-seeing minority, extremely well-informed and enjoying a high scientific prestige, have forced the Federal Government to hold these public hearings.

It is certain that the pipe-line will come, but the group calling for postponement, and for much better survey and research than have been applied so far, point out that the route passes through a series of changes in permafrost conditions and that it crosses an active earthquake region. Each mile of pipe-line will contain half a million gallons of hot oil. What is the risk of fractures? Breakdown could make the Torrey Canyon a drop in the ocean by comparison. The oil in the pipe-line will be hot. How far will it affect the immediate ground climate of the pipe-line? How good will the insulation be? Melting of permafrost could cause a good deal of erosion and landsliding, as well as fracture. To prevent the mistakes of the past, serious questions have to be asked now, and answers found. The Federal Government will do an honest posterity-minded job in this because it realises that oil development on the current scale is no local affair. The United States has had the salutary lesson of the Santa Barbara oil disaster to make her be more careful in Alaska. The geological formations in the Santa Barbara channel are unstable and the Department of the Interior was advised against allowing drilling in those waters. But the prize was so great that the advisers were overruled. Now the problem is to seal the disturbed strata against further seepage. The costs of this policy mistake and technological failure are going to be immense. One good thing to have come from the disaster is the extra caution which...
this administration is taking; the penalties in costs, moreover, have been set where they belong. But how soon will the underwater wonderland return? This was an area worthy of marine national park status.

Oil in our world is an international commodity and concern. So is man’s environment an international commodity and concern. The disfiguring rash of nationalism which has assailed the world has set up political factors which exemplify my thesis that politics must never be neglected as a profound ecological factor. Politics could be benign, of course, and should be, but usually is not. UNESCO held its Biosphere Conference in Paris in 1968 and we were impressed by the interest taken by the developing countries in Africa and Asia. In 1972 the United Nations will hold a conference at Ministerial level, designed for action. For myself, I have no doubts of the intention and earnestness of nations to act well and dress well, as it were. But time, it seems to me, is not on our side. Even by the 1972 conference there will be over 150 million more mouths in the world, all of whom will be demanding of technology: ‘Give us more’—not just more food, but more of everything. So technology is forced to beget more technology, and this exponential growth, and what it implies, is the main topic of my next lecture.