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The

Ecologist

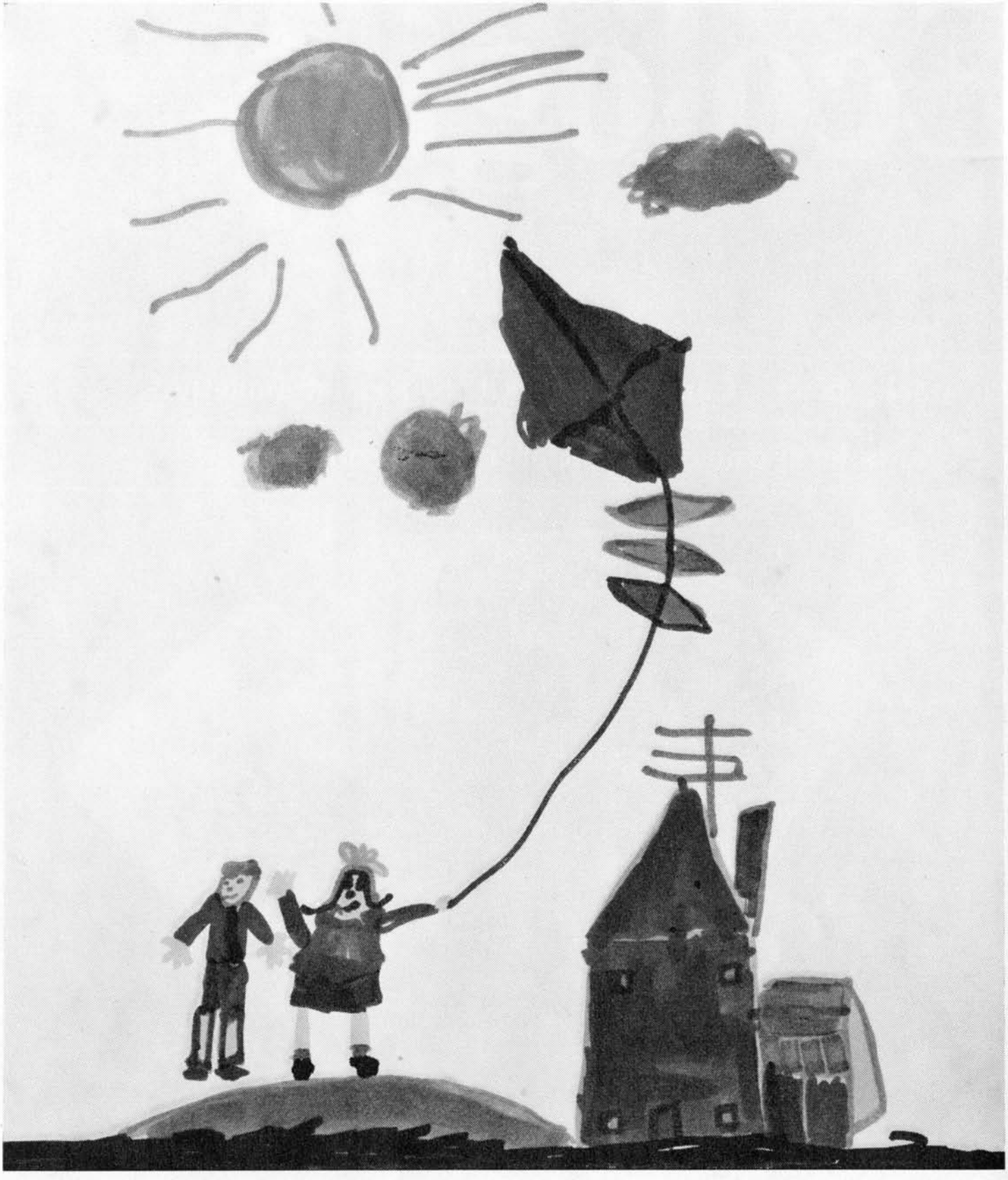
Man and the environment ▪ The Quality of life ▪ Pollution ▪ Conservation

Vol. 1. No 6 December 1970

The stable society. Can we achieve it? ▪ Russian roulette

A lesson to local councils ▪ Spanner in the soil

European Con Year



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The Ecologist

Vol. 1. No 6 December 1970

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Editorial: *The prostitute society*

All but one of the papers presented at the third (and last) Conference of the Countryside in 1970, the great setpiece of European Conservation Year in Britain, accepted the narrow criteria of current economic thinking. Yet in the sewage fracas they had before them a textbook demonstration of the consequences of our obsessive regard for lucre—this time made filthier than ever. The health of the nation was jeopardised, and our rivers sacrificed on the altar of cash.

It is time we rethought our values. There should be a limit to the damage we are willing to do our society and its environment for the sake of a little money. Yet the more we look around us, the more apparent it is that no such limit is likely to be set or even considered. Everything we cherish most is today for sale to the highest bidder. We are truly a prostitute society.

St. Paul's, for example, one of the most magnificent cathedrals in the world, should be set in a fine square with avenues leading up to it on either side so that it may be contemplated from a distance. Instead, so that every available inch of land can be exploited commercially, it is so hemmed in by office blocks that one needs a helicopter to see it at all!

Hyde Park Corner, a spacious and well laid out place, whose harmony has already been compromised by traffic, is now to be destroyed (with the connivance of the Fine Arts Commission!) by a monster hotel.

Woburn Square, Carlton House Terrace, and 266 listed buildings were wrecked in 1969. Who benefits? Why are so many of our towns and villages being transformed into shapeless, soulless wastes?

Each month comes news of further inroads on our countryside. Whitbread's brewery in country near Salmesbury; potash mines in the North York Moors National Park; copper extraction and an electricity sub-station in Snowdonia; proposals by Rio-Tinto Zinc to block the Mawddach estuary and dredge it for gold; the flooding of Welsh valleys; the construction of a power station on the lovely Tamar River.

Pesticides and fertilizers are still being manufactured in increasing quantities in spite of mounting evidence that used as widely and indiscriminately as they are, they are not very effective—and incidentally contribute to the deterioration of soil structure and the soaring toll of birds

and other animals. Even Dr Borlaug, Nobel Peace Prize winner and "father of the green revolution", has stated that the green revolution—so lucrative to the agro-chemical industry—has merely bought us a scrap of time, ten years at the most.

Nor do we confine our greedy disregard to other species. Consider the two million Biafrans killed in the recent war, mostly with weapons made in this country and sent to their opponents partly at least to protect our Nigerian oil interests.

By insulting our rivers, desecrating our cities, degrading our countryside, killing off our wild life, endangering our health with pollutants, and helping to exterminate two millions of our fellows, we have doubtless made quite a bit of money. What are we going to do with it?

As we approach the season of goodwill, one might be forgiven the hope that some of these horrors had been perpetrated in the name of some lofty ideal. Unfortunately the motives are mean. Progress for us is "economic growth", and our ill-gotten gains will simply be spent on more office blocks, hotels, power-stations, barrages, mines, chemical plants, supersonic jets, oil—and wars to protect our sources of supply. All of which means the destruction of everything that gives quality to our lives, that makes them worth living, and ultimately of—almost everything . . .

We are trapped in a vicious circle, one of our own devising. Perhaps the day will come when we no longer take pride or pleasure in the gew-gaws of our culture, when we realise that fulfilment does not come with trinkets, however sophisticated. It will come the sooner when those already concerned with the quality of our environment refuse to supinely accept economic dogma and begin to defend and campaign for the wider acceptance of ecological principles.

The real problem we face today is how to ensure a harmonious transition from an economy of "growth" to one of the "steady-state". This does not mean stagnation, but dynamic equilibrium. This should be the brief of the Standing Royal Commission on the Environment; it should pervade the thinking of Mr Heath and his brand new Secretary of State for the Environment; and it should exercise the minds of all of us this Conservation Year Christmas.

European Con Year

by Robert Allen

'All talk and little action—that's the state of play in European Conservation Year. Already the cynics are calling it European Conversation Year.' So cried Christopher Chataway, Opposition spokesman on the environment and thorn in the flesh of Anthony Crosland.

As years go ECY has been all too brief. Given a portentous send-off at Strasbourg in February, it was politely ushered out at the Guildhall in October. Chataway's outburst coming in March was perhaps a little premature. Now nine months later, with its author safely tucked up in Telecommunications, there is much justice in the accusation, though ironically it is Mr Heath and his Secretary of State for the Environment, Peter Walker, who are in the dock.

By a nice quirk of fate the eight months odd of ECY have been shared equally by the Labour and Conservative Governments. During their time, Labour managed to set up the Standing Royal Commission on Environmental Pollution, appoint a Central Scientific Unit (also on Environmental Pollution) under Dr Martin Holdgate, and publish the White Paper, *The Protection of the Environment: the fight against pollution*. The year before they had created the post of Secretary of State for Local Government and Regional Planning, thus giving Anthony Crosland overall responsibility for the environment. All this they did to a background of merry hoots from the press, the greater part of which misinterpreted ECY and activities associated with it as the first fitful movements of a bandwagon which after cavorting crankily for a month or so would clatter off into oblivion.

By another nice quirk the press began to change their minds soon after the election. Rude things were said about a fledgling government, whose contribution to Conservation Year was to have its members laze in their private environments, quite content to have returned environmental responsibility to the dreary confines of the Ministry of Housing and Local Government. Reports commissioned by the Labour Government like those of the Working Party on Sewage Disposal and the Technical Committee on the Disposal of Solid Toxic Wastes were received in silence. It was left to the Chief Inspector of Alkali & Works to publicly shake his fist at certain prophets of doom who, he claimed, were making his life a misery.

Shadowy gremlins

Finding skeletons (prophets of doom, alarmists, neo-Malthusians) in their own cupboards and giving them a good shake now and then has been a favourite pastime of environmentalists. Curiously none of them are ever named: we are left with the impression that the environmental lobby is perfectly capable of coping with wily politicians and greedy industrialists (tact and a spirit of compromise is all you need with them), but not with the shadowy gremlins claiming to be on their side and doing the most ghastly damage by predicting that *unless* we mend our ways life is going to be very unpleasant indeed. Even Bob Boote in his Review for the 3rd Conference of "The Countryside in 1970" could not resist a reference: "If we underestimated the task in 1963," he writes, "this is no cause to accept the clamour of the neo-Malthusians that we face impending doom."

This is just eco-polemic (note how sinister neo-Malthusian is made to sound—like Trotskyite). It's a device to show how reasonable the writer is. Most ecologists accept that unchecked growth, whether economic or demographic, will end in disaster; they choose however to assume that the checks will be imposed, and thus they cast themselves as moderates. It's a pity, really, because even though prospects for ecological sanity are not so dim as they were, there is still a great deal to be done, and going out of one's way to be meek and supplicant while sticking one's tongue out at the rough boys next door, is not the way to do it. Besides some of those rough boys next door are quite respectable: U Thant—"the environmental crisis is the greatest danger mankind has ever faced"; President Nixon—"we face the prospect of ecological disaster"; and Dr Norman Borlaug, father of the Green Revolution and latest winner of the Nobel Peace Prize—"unless we strike a proper balance between population and food resources, we will face more and more problems. Within 30 years, there may well be a monumental crisis".

In from the wilderness

It is fruitful to discuss the language of ECY in this way, because Mr Chataway was right—it has been all talk and little action. This is no criticism of the magnificent work of the understaffed, underfinanced secretariat of "The Countryside in 1970" Committee. ECY is the brainchild of Secretary Boote and he can claim with justice that it has put new heart into the conservationists, bringing them in from the wilderness they so earnestly strive to protect. There is no doubt that without him and his colleagues little of the talk would have been as informed as it has been.

Yet although some politicians and industrialists have been persuaded to grasp the nettle, most have side-stepped the deeper implications of ECY. At the "Countryside in 1970" Conference, for example, the reports on Agriculture, Urbanisation, and Industry showed no appreciation of the special issues mentioned by Mr Boote in his Review: "We shall soon find our options severely curtailed," he writes, "unless we decide consciously to bring our numbers into harmony with the resources around us." Our goal should no longer be growth but the establishment of that level of material well-being "compatible with retaining and enhancing long-term resources—such as healthy land, clean air, pure water, wild-life and space for good living, work and recreation".

The Agriculture report, flying in the teeth of the latest evidence (see *A Spanner in the Soil*, p. 24 and *The Bugs Fight Back*, p. 29) stressed that machinery should be put to maximum use and claimed that "with proper fertilizer treatment and pest and weed control land may be used for more continuous cropping without break crops". In both that and the Urbanisation report, much was made of the argument that not a scrap of primeval Britain remains, that therefore our countryside is man-made. The implication is that given a bit more care and cash we can go on making it more or less as we like. Of course this is nonsense. Not a scrap of the countryside is man-made—it is man-influenced, and we must take care that our influence does not become imposition. Attempts to turn agriculture into agri-business may show remarkable results for short periods but over generations can lead only to gross ecological instability and a progressive loss of fertility.

Industrial threats

Another oft-repeated contention, particularly by industry, is that the public must pay for amenity. Keeping the environment clean and tidy is an expensive business, and if the public want to stop industry fouling it, then they must be prepared to dip heavily into their pockets. So far the conservationists seem to have meekly accepted these notions; protest has been left to the National Union of Students Committee on the Environment which, among many other good points, suggested that phrases like "realising our full potential as an industrial nation" be regarded as "the threats they are rather than as the promises they pretend to be".

The candour and analytical muscle of the students make industry's approach to the problems it faces seem at best unimaginative, at worst petulantly defensive. At the CBI Conference on Technology and the Environment, by most accounts a complacent self-congratulatory affair, Portland Cement's John Taylor insisted that firms should receive

rebates on pollution expenditure as the present system was "a wicked disincentive", smacking of "inequity". What an unfortunate contrast with the president of Gulf Oil Corporation, who has gone so far as to announce that the "well-being of society" is of greater importance than "maximum financial gain".

It is a pity that we are not so brave as the Swedes who now require proof from all new factories that they will not pollute before they are allowed to build. Existing factories have been given schedules by when they must have complied with the new anti-pollution legislation, plus a 25 per cent grant to give them a hand. It is accepted that some firms may be forced to close. Yet more and more of those that are left discover previously unsuspected advantages to being clean. Chemicals, for example, that formerly were sent down the drain to prejudice the health of honest citizens are now reclaimed and used again.

But ECY has given us no new legislation to speak of, let alone any measures as enlightened as those proposed for Sweden. Even the word-making stopped paradoxically during the general election, notwithstanding pleas by Peter Scott and Sir Julian Huxley in the columns of the *Guardian* and the *Times* that the environment be made an election issue. Though hardly a word was spoken, it is worth bearing in mind that the Conservative manifesto promised us "clearly defined aims and target-dates for the achievement of cleaner air and rivers, and for the clearance of derelict land". Well, Mr Walker, when may we expect them?

More promises were made, somewhat later, when Mr Walker received his pasting at the Tory Party Conference in October. Polluters must pay the full cost of their pollution; approved green belts will be defended, and more approved. Finally, housing and local government, public building and works, and transport, have been brought together under the new Department of the Environment—Peter Walker goes one logical step further than Anthony Crossland.

Will it work ?

It's certainly a step forward, but is it enough? Assuming he has both the will and the ability to weld different teams of civil servants accustomed to working towards relatively limited ends (like transport) into a single team capable of appraising larger environmental and social consequences; what will be Mr Walker's relations with the Department of Industry and Trade, with which there may be conflict over energy policy or mineral concessions? and with the Food and Agriculture Ministry—which may find itself pressing for much unpopular re-organization of the countryside?

Lord Kennet liked to remark that you can't have a Minister of the Environment because he would have to be Minister of Everything. There is a lot of truth in this, and my own view is that we should take a leaf out of the Americans' book, and establish something like their Council on Environmental Quality. Every federal agency, regardless of size or influence, must lodge with the CEQ an "environmental impact" statement on any item of policy, action, or legislation. Normally these are received when the item is in draft form and the CEQ will ask for the comments of any other agency or department it thinks appropriate. In this way the likely consequences of a particular proposal are made public. If this is too heady a prospect for Mr Heath, then perhaps he could recommend to Lord Rothschild that he bring an environmentalist into his cability unit.

Had ECY been taken seriously by Government we should have witnessed some constructive political action by now. Many of the voluntary bodies (the Noise Abatement Society is a good example) have made positive proposals for change which have been ignored, while next to nothing has been done to improve our air and water. Action on river quality and sewerage awaits the Report of the Central Advisory Water Committee and the River Pollution Survey of the Water Resources Board. But as I suggest in my comment on the sewage strike (p. 35) the general approach to clean water has not been changed by ECY. It is still short-sighted and mean. We are more concerned with how much pollution we can get away with, rather than what standards we have a right to expect.

Of course it all costs money. Over the

In ECY, no less than in any other year, our National Parks have been under severe pressure. The Peak District is suffering serious erosion and is also the home of Laporte's hunt for fluorspar.

past 10 years industry has spent an average of £32 million a year on air pollution control—as against the £350 million a year which air pollution costs the country (Beaver Committee estimate)!

At present ¾ million tonnes of smoke are discharged into our air—and almost 6 million tonnes of sulphur dioxide (the main offenders being electricity power stations—2 million; and industry—2¾ million). This figure is gradually declining as a side-benefit of the Clean Air Acts but not fast enough. Monsanto's Cat-Ox system removes up to 90 per cent of the sulphur dioxide; and this or the Swedish AB Bahco So_2 Scrubber system should be compulsory in coal and oil burning plant. This would result in a considerable improvement in the quality of the air we breathe. Peter Walker is really quite unjustified in claiming, with reference to air pollution over Teesside, that "there are no specific measures that could produce an immediate improvement short of closing down industry and putting people out of work". (*Weekly Hansard*, July 10th 1970).

The Department of Industry's Warren Spring Laboratory keeps careful check on smoke and sulphur dioxide levels, but on nothing else. As Dr Eric Albone wrote in our September issue, "Nitrogen oxides and oxidants should be added to the list... And a much more general approach to assessing air quality should be initiated." What about carbon monoxide, our greatest single pollutant (some 7 million tonnes a year)? And what about pollution by metals? Lead, for example, of which the Labour Government's White Paper remarked: "Lead is a well-known poison, but the amount that is emitted from motor vehicle exhausts is, in this country, trivial. The air in the most congested street contains far less lead for people to breathe than is safely permitted inside factories. There is no evidence that cars add significantly to the lead which occurs naturally in the soil or in the vegetable food we eat."

Lead-free petrol

This is a non-argument—the safety limits in factories are obviously too high. The quantities produced by cars are additional to natural levels—by some three thousand tons a year; and evidence is mounting fast that the safety limit is very low indeed—especially for children. Dr Lennart Danielson of the Swedish Natural Science Research Council considers that at the most an acceptable dosage is between 5 and 10 micrograms a day, which is slightly more than we absorb normally in our food. If our lungs absorb only half the lead that is present in city air then the dosage rises to between 20 and 30 micrograms a day—levels at which lead is undoubtedly harmful: it interferes with the synthesis of haemoglobin and affects the central nervous system. Recently it has been shown that 20 micrograms (half the "acceptable level") can lead to brain damage in children.

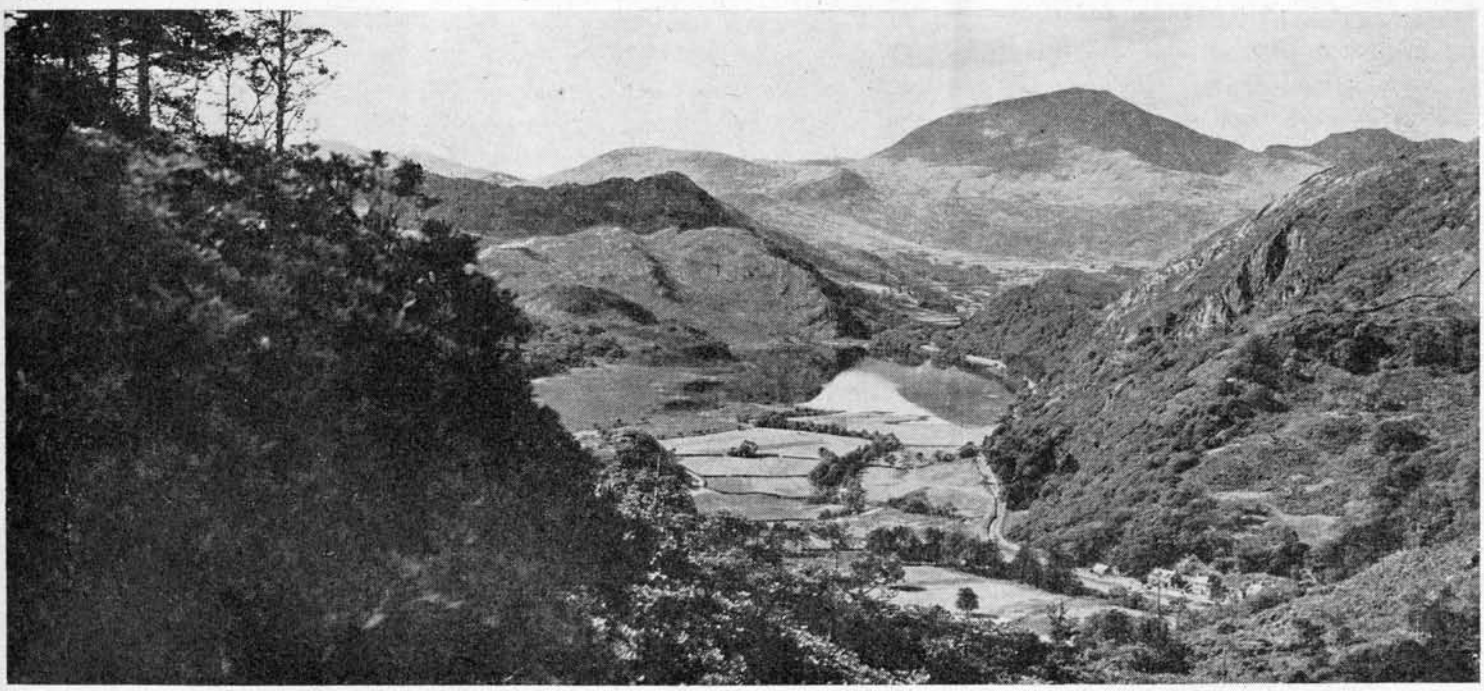
Modifications to cars to cut down on emissions of carbon monoxide, hydrocarbons, and oxides of nitrogen, do not put more than £50 on the price of a car; they have to be included in models for export to the USA to comply with her more humane legislation. The Labour Government's White Paper pronounced them unnecessary as it has not been proved that at present levels these gases are harmful to health. Nor has it been proved they are not. Why take the risk?

The only legislation contemplated here is that by October 1971 all new vehicles should be fitted with a device to cut down hydrocarbons by 20 per cent—presumably because it only costs £1 and because half the current output of cars is already fitted with it...

When it comes to farming and food quality the hollowness of Governmental committment to ECY is even more apparent. Most of the recommendations of the Brambell and Swann Committees have still to be implemented. The Government should explain its willingness to jeopardize our health.

As for a population policy, that must remain a vain hope. For not even the Conference of "The Countryside in 1970" could bring itself to recommend it. When the converted are afraid of their own arguments, what point is there in propaganda exercises like European Conservation Year. The press and public have doubtless realized that the environmental bandwagon has barely moved: between them Government and Opposition have jammed the wheels.

Snowdonia in addition to sheltering a nuclear power station is now threatened by Rio-Tinto Zinc's plans to opencast mine for copper.



The stable society- can we achieve it?

by Edward Goldsmith

Affluence for everybody is an impossible dream: the world simply does not contain sufficient resources*, nor could it absorb the heat and other waste generated by the immense amount of energy required.

Indeed the most important thing to realize, when we plan our future, is that affluence is both a local and a temporary phenomenon. Unfortunately it is the principal if not the only goal our industrial society gives us.

Yet it does not even provide the satisfaction claimed for it. The more affluent a country is, the more unhappy its members seem to be—the US is a good example. This is not to use the term "unhappy" in a loose way. There are recognized and measurable symptoms of unhappiness: drug addiction, alcoholism, crime, delinquency, mental disease and suicide—all different ways of reacting to an environment to which people cannot adapt and consequently to a life that they cannot tolerate.

Such symptoms are rarely to be found in traditional rural societies, still less in the tribal societies of so-called primitive man. Is there anything we can learn from them? How can we replace our society, and what alternative should we aim for? This article is a first attempt to answer these questions.

* see 'Mined out!' *The Ecologist* Vol. 1., No. 2.

What do we require of a society? Firstly, people must be happy—which means that it must provide them with the social and physical environment they really want. Secondly, it must be designed to last, so that it will not be cut short by the sort of cataclysms presently menacing the survival of our own society. In other words, it must be a "stable" or a "steady state" society.

I shall try to show that a society which displays the first of these qualities must automatically display the other, that they are, in fact, different aspects of the same thing.

The trouble with "happiness" like "heat" is that it is a subjective term. As such, it cannot be made use of in a scientific context, for it is not measurable, nor can it be related to the other variables of a scientific model.

The science of thermodynamics could only be developed once it was found that heat was not only a sensation but also a form of energy and as such, could be measured and related to other forms of energy.

In the same way, the concept of "happiness" can only be taken into account in a scientific theory of society once it is shown to be something other than a sensation, something in fact that can be measured and related to the other variables made use of in this science.

Happiness

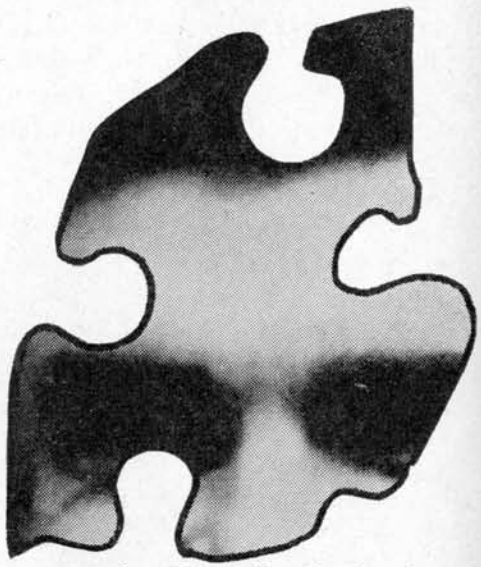
It is a feature of all natural systems including social ones, that they develop by differentiation, which means that at each stage the functions previously fulfilled in a general way become fulfilled in a more differentiated one. The new parts that ensure this extra differentiation have thus come into being for a specific purpose, for which, in the case of social systems, they have been designed genetically and culturally.

Differentiation occurs because environmental challenges require it, or more precisely, because a system must become more differentiated if it is to remain stable in the face of new environmental challenges.

On the other hand, once these challenges have disappeared, the extra differentiation is no longer necessary and the parts developed to ensure it become redundant. I shall equate "happiness" with adaptability and "unhappiness" with redundancy. In fact, I believe that no other interpretation is reconcilable with a systemic approach to the study of sociology—an approach which I am certain will be in general use within the next decade.

This simply means that a man is happy in the fulfilment of his natural functions and unhappy when his social and physical environment renders their fulfilment impossible, i.e. when he has become redundant. Thus a man needs to drink, eat, walk, work and struggle (and the last of these activities is by no means the least important).

He needs to court his mate, marry her, love her, protect her and provide for her. She in turn needs to be married, loved, protected and provided for. She also needs to work so as to provide a



warm and aesthetically pleasing home. Both of them need children and they in turn require all these things which, in a stable society, their parents obtain maximum satisfaction in providing.

The small community

But a man is not only a differentiated member of a family but also of a small community. I say small, because there is an optimum and also a maximum size for any system including a social one. (See "Bringing Order to Chaos" *The Ecologist* Vol. 1 Nos. 1 & 2). When this is reached, a system can only continue to grow by associating with other systems at which point a new level of organization is said to have been attained. The maximum size of any system is largely determined by the extent to which the bonds holding it together can be extended.

A community appears to be held together by a set of bonds that are but extensions of those which hold a family together. Malinowski was the first to show that no other bonds can be exploited for this purpose. In each different culture the members of a community are unconsciously classified in

terms of the way they are associated with the different members of the family—hence the elaborate kinship terminology developed by primitive societies. Unfortunately these bonds cannot be extended to include more than a very small number of people. It is for this reason that a stable community is made up of countless small groups or associations that are closely interwoven with each other.

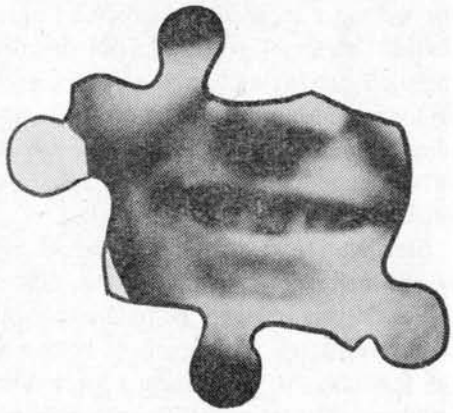
Thus, in a primitive society, a man is at once a member of a maternal and a paternal kinship group. He is also probably a member of an age grade, of an economic association of some sort, of a secret society, of a military group etc. It is his position as a member of each of these groups which provides him with his "status" or identity as a differentiated member of his social system. In an unstable society whose social structure has disintegrated, he has no such identity. He is lost in a vast anonymous mass of humanity. It is this lack of identity which is normally referred to as alienation: it is that terrible feeling of loneliness when surrounded by a vast number of people that is so much worse than loneliness in a desert. It is when a society grows too fast or its mobility increases in such a way that the bonds do not have time to develop, that its essential social structure breaks down, that development occurs by multiplication rather than differentiation and that alienation inexorably sets in.

Stability

Why a society that provides an optimum environment for its members should be stable is quite evident. The principle involved can be formulated thus: "If a system provides its parts with an optimum environment, then they will tend to conserve it." Thus for man to strive to conserve the social system of which he is part, the latter must provide those outlets which will enable him to fulfil those functions for which he was genetically and culturally designed. I have written a lot on primitive societies. It is not so much the fact that they are primitive, but that they are stable that is of interest. This is particularly true of hunter-gatherer societies which have survived unchanged for thousands of years, making little impact on their physical environment.

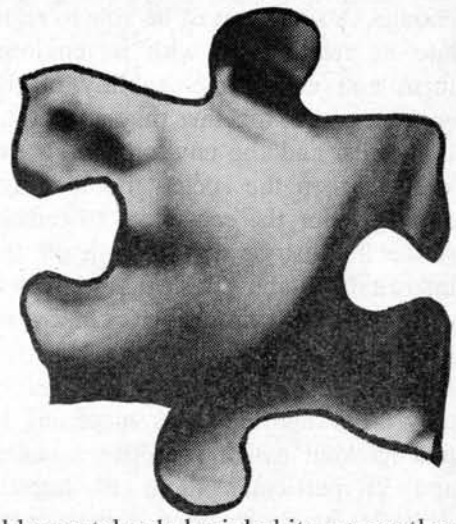
What are the principal features of stable societies? It is only by finding this out that we can hope to develop a stable society of our own. One such feature is that their members have a strong sense of duty to their family and to their community. As social structures disintegrate, this disappears and the only duty that is eventually recognized is that of the society towards its members. That this transformation occurred during the decline and fall of the Greek city state and of the Roman Republic is revealed in the speeches of Demosthenes and the writings of Cicero. It is this family feeling, and this sense of community that enables society to exist as a unit. Its absence must ultimately cause its disintegration.

In the former case the society is self-regulating, while in the latter it must be regulated from the outside. Self-regulation or self-government in the case of a society is a *sine qua non* of stability in all systems. It is this that the Greeks called "liberty". Once a society loses its basic social structure and requires to be regulated from the outside, decay proceeds by positive-feedback, since autocracy breeds the need for further autocracy by destroying the spirit of self-government. This process has been best described by H. T. Buckle in his sadly neglected masterpiece *A History of Civilization in Britain*.



Small populations

Such societies usually have small and stable populations. The Great Plains of North America which supported some fifty million bisons, sustained only thirty thousand Plains Indians. The vast expanse of Australia harboured just half a million aboriginal tribesmen while the population of the now extinct Tasmanians has been variously estimated at between two and twenty thousand. A small and stable population was achieved partly because of a high infant mortality rate but also because of the application of various human controls. Among these, infanticide played a big part. The Kalahari bushman kills a new born baby when his wife is still suckling a previous one. In the inhospitable wastelands he inhabits, no mother can look after two children at once. However barbarous this custom may seem, it betrays a deep sense of responsibility towards his wife, family and community, one which is absent today.



Contraception is also made use of among many primitive peoples. Among certain Nilo-Hamitic societies, the adolescents of both sexes live together on the outskirts of the village in apparent promiscuity, yet as far as I know there is no record of any children being born to them. It is generally assumed that they make use of some secret means of birth control and I have even heard of pharmaceutical firms attempting to extract the formula from them. They are not allowed to get married so it is important that children be avoided as these would not be brought up in a stable family environment. Once more we are struck by the sense of responsibility that characterizes members of simple societies.

Contact with nature

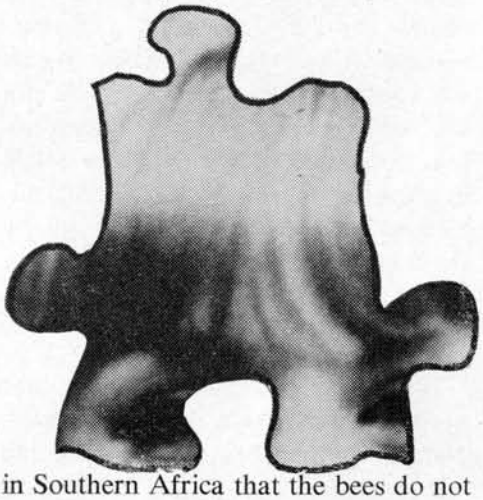
If a society is to remain stable it must not break away from nature too much. Natural mechanisms are complex and self-regulating. All people depend on these, and those who least alter them are far less vulnerable than the members of those societies which have developed, and grown to rely on, an intricate (but inevitably less complex) technosphere. As the latter grows at the expense of the biosphere, so must the amount of human energy and ingenuity required to control it. This renders it terribly vulnerable to human error, industrial disputes, sabotage, and human inefficiency in all its forms. In addition its vulnerability to technical hitches, shortages of raw materials, and pollution problems of all sorts, is only too evident.

Consumption of natural resources

Internal self-regulation alone is not

enough. A society must be able to regulate its relationship with its environment and ensure the stability of the ecosystem that together they constitute. If it fails, and the environment is destroyed, then the society becomes redundant. For the ecosystem to remain stable it must be able to live off the interest from the physical resources it requires for its sustenance rather than from the capital; otherwise, as is the case with us, it is only a matter of time before they are exhausted. It is surprising to find to what extent primitive societies and in particular those of hunter-gatherers have succeeded in developing a cultural behaviour pattern that enables them to accomplish this.

This is made possible by a philosophy that teaches that man is part of nature rather than above it. Primitive people do not regard the possession of a soul for instance as a prerogative of man distinguishing him from all other creatures. All have a soul, and often the primitive hunter will pray to that of the animal he is about to kill, explaining the necessity for the crime he is about to commit. Seldom too will he kill more than he strictly requires. Indeed, it is said



in Southern Africa that the bees do not sting the bushmen because they know he will take only the amount of honey he requires, never more.

To sum up, stable societies have many features in common, the principal ones being: they are organized in families and small communities, which are held together by a closely interwoven set of associations that assures that everyone is linked, in some way, to everyone else. They are self-regulating and do not require any external force such as an autocrat or a cumbersome bureaucracy to govern them.

Their members have a strong sense of responsibility towards their family and their community. Their numbers are small and they are imbued with a deep respect for the natural world surrounding them, of which they know they are an integral part. This prevents them from destroying the environment on which they depend. Their members are happy in the fulfilment of their natural roles as differentiated members of their families, communities and ecosystems, and it is this happiness above all else that creates the stability that still eludes us.

Can these principles be applied to our society?

Though we cannot imitate primitive societies in every way—and few would want to—the basic principles that ensure their stability can undoubtedly be applied in the reorganisation of our society. In fact it is essential that they are if we are to avoid the social and ecological upheavals that threaten to annihilate us in the none too distant future.

How are we to set about doing this?

Population Control

The first and most urgent task is to control our population. Not only must any further growth be avoided, but its present level must be reduced probably at least by half.

It is only in this way that this country can hope to feed itself in the long-term, for we must soon return to sound agricultural methods which do not destroy the food-producing capacity of the land, and we cannot long depend on food supplies from abroad. Every possible device should be made use of to ensure that we achieve this goal.

Sterilization centres could be set up and abortion could be made far easier.

Pensions could only be paid to people with no children. This seems to be one of the few ways of penalizing people with children, without penalizing the children as well—at least until they were grown up. It might also increase the cohesion of the family unit by emphasizing the duty of looking after one's parents in their old age.

A more ambitious scheme would be to negotiate a mass emigration programme as part of a package deal with Canada and Australia (two of the last countries in the world with a lot of space). This deal might provide an alternative to Britain's entry into the Common Market. It must not be forgotten that in addition to space, these two countries possess three of the other things that we will be needing a lot of in the next 30 years: mineral resources, fossil fuels and food.

All immigration could be stopped and every possible inducement given to immigrants to return to their country of origin. I know that this is an emotive subject but if we are to be consistent it is necessary to raise it.

Finally, if all these expedients are not sufficient, a licensing system could be introduced. Wayne Davis suggests that licences might be negotiable which would mean that only those people who really wanted children would have them. It would also mean that the rich would have more children than the poor which would tend to make them poorer (in view of the cost of bringing up children) and by the same token, the poor richer.

Decentralization

Next we must reduce the impact of each man on the environment by cutting down his energy consumption. An energy tax would clearly be a useful expedient, but the most effective way of accomplishing this would be to decentralize our society, both politically, administratively and economically. This would lead to that other prerequisite of stability—the development of small self-regulating communities.

The totally absurd notion that bigger things must inevitably be better, must be abandoned and with it the false ideal of "maximizing" productivity which is the pretext normally given for making things larger and more centralized.

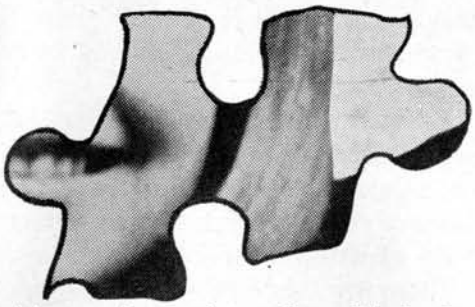
Indeed it should be a precept of Government, as it is of the organization of nature, that everywhere there should be the maximum decentralization. Nothing should be done at village level which could not be done by the family; nothing at county level that could be done by the village, and so on all the way up.

A nation consisting of 56 million people can constitute a society only if it is highly organized into families, small communities, provinces, etc. Their members must be responsible for running their own affairs. They must be self-regulating for only in this way can they be stable.

Welfare

Among those activities which must be radically decentralized is welfare. At the moment the State, by usurping all those responsibilities that should be fulfilled at the communal and family levels, is contributing to their disintegration by rendering them largely redundant.

Economic activity should also be decentralized. Small traders, artisans and businessmen are on the whole stable



citizens who tend to take pride in the quality of their work and in the services that they render the community. This should more than compensate for their lack of "productivity". It is quite clear that stable societies cannot be created out of soulless housing estates whose inhabitants work elsewhere, and among whom few ties can be established.

Agriculture

Agriculture must also be decentralized. Contrary to what is generally thought, its output is probably increased by reducing the size of units rather than by increasing them (see "A jump ahead of Malthus". *The Ecologist*, Vol. 1. No. 1). In any case, intensive modern agriculture which requires larger units does not appear to be the way to increase long-term food production. It leads to the deterioration of soil structure (see "A Spanner in the Soil") and to considerable pollution.

The flight to the towns must also end. The total destruction of rural life and the elimination of the small farmer, who should normally constitute the backbone of a stable society, is a social disaster whose cost to the community cannot be over-emphasized.

Energy consumption

Decentralization would help fulfil yet another purpose. Man's impact on his environment is best gauged in terms of the amount of energy he uses. The more technological devices are allowed to replace natural ones, the more dependent we become on manufactured goods, and the higher must be our energy consumption. This can only be reduced by developing labour intensive industries so that human energy can slowly replace that of machines. Whether we want it or not, this is bound to happen in the end, as our fossil fuels run out and our supplies of non-renewable mineral resources are exhausted. But if we wait until this happens, by which time our dependence on technology will have substantially increased, the problems will have become that much more difficult to solve.

The most serious challenge is clearly the provision of alternative employment for the countless millions of people who depend on technology for their living.

Decentralization would contribute towards this by furthering the development of divergent cultural patterns, and of new activities to replace those that are no longer possible.

Ritualization of economic activity

The construction of beautiful buildings, the manufacture of fine furniture, the development of local arts and crafts, the revival of local festivities and religious ceremonies; all these things will provide a worthwhile substitute for the haphazard accumulation of manufactured goods to which our society is geared. In this way economic activity could be "ritualized" as is "aggressivity" among stable societies (both human and non-human). Ritualized aggression provides a satisfactory outlet for a society's aggressive requirements without its leading to the annihilation of its enemies. Similarly, ritualized economic activity can be regarded as providing an outlet for man's essential requirements for creative work in such a way as to minimize the resultant damage to the environment.

Decentralization will result in a reduction of mobility. If people are employed where they live, fewer cars will be used. By reducing our dependence on technology, decentralization would fulfil yet another essential function: that of reducing our vulnerability.

The complex and self-regulating systems of nature would be allowed to slowly replace the relatively simple and externally regulated systems of our technosphere, a substitution essential to the establishment of ecological stability.

National Service for Conservation

Clearly the transition to such a society would not be easy. The principal problem obviously would be how to provide satisfactory employment for so many people. New occupations that do not require the use of power, would probably take some time to develop. The dole does not solve the serious psychological problems of unemployment. It is at best a palliative. The only alternative is to accept that a vast amount of work is required to clean up the mess resulting from a hundred and fifty years of uncontrolled economic growth.

A sort of national service for conservation on the lines of the Conservation Corps could be instituted, and the more decentralized its organization, the more effective it is likely to be, as people will be keener to help clean up their local environment than that of people living at the other end of the country.

"Unproductive" employment

Also it must be accepted that people should be employed whether or not their employment is justified on "economic grounds". This is already the case in the Soviet Union. "Economically unproductive" work of this sort would undoubtedly lead to a situation in which there would be more money around than goods to buy, again as is the case in the Soviet Union. The dissatisfaction this might give rise to would be partly offset by the development of the new occupation already referred to, as economic activity becomes ever more "ritualized". Meanwhile there will certainly be inflation—but on nothing like the scale that would accompany the total breakdown of our society, which is possibly our only alternative. Besides, monetary considerations should be looked at in their correct perspective. Inflation is by no means the tragedy it is made out to be by today's economists.

A more serious objection is that the transition to a stable society would probably have to be carefully orchestrated as a single programme. If any part of it is left out, because it is regarded as objectionable by some sector of society in terms of current ethical norms, then the whole programme may well be a failure.

It follows that this social transformation can only be ensured by a Government having a mandate to plan and implement such a programme as painlessly as possible i.e. over the maximum period consistent with avoiding the catastrophes with which our society is at present menaced.

Down to Earth

by Lawrence D. Hills

The ecological orchard

What will become the most famous orchard in England is at Stock, in Essex, where John Habgood has learnt to apply the principles of ecology to growing fifteen acres of apples entirely without spraying. There are many orchards unsprayed through neglect which produce small crops of scabby fruit, but John Habgood grows up to 18 tons an acre of first class Scarlet Pimpernels, Worcesters and Cox's Orange Pippins for sale in 30 lb. boxes to health food shops and customers all over Britain.

The orchard is grassed down and the 10 ft. 6 in. between the rows is mown three or four times a year with a tractor-drawn rotary mower, while a large lawn model is used in the 5 ft. 3 in. gaps between the dwarf pyramid trees. Every winter, about 15 cubic yards an acre of compost is spread along the rows, made from the mowings of three acres of grass and clover ley, with horse manure and spent mushroom bed material.

This generous feeding not only supports the trees with their heavy yields, but also the earthworms that take under dead leaf and even soft summer prunings. It is now known that 97 per cent of the spores of apple scab (*Venturia inaequalis*) over-winter on dead leaves, and the heavy worm population takes them safely underground, spores and all. A gardener aware of this principle would not sweep up his dead leaves, but chew them into fragments with a rotary mower to make sure they went safely under. Spreading extra leaves from other trees touched up with the mower would pay on sandy soils as a way of building humus to grow enough worms to control scab without spraying.

The other 3 per cent of spores will be found on the twigs, and delaying pruning until February allows them to develop enough to be seen and cut away with any canker and mildew. These prunings are burnt to get rid of the spores, for burning is the cheapest and safest fungicide. February pruning also avoids the risk of the spores of Gleosporium fungus getting into the cuts and causing the Brown Storage Rot of apples against which orthodox growers spray with captan once a fortnight from July till picking time.

Late pruning gives a chance to examine the developing buds for the first colonies of wooly aphis (*Eriosoma lanigerum*) which can be dabbed away with methylated spirit. This reinforces the efforts of *Aphelinus mali*, Britain's only outdoor biological pest control, which is naturalised in the orchard. Where wooly aphis is bad, sowing buckwheat for its white flowers through the summer will attract our two commonest hoverflies, *Syrphus balteatus* and *Sribesii* with larvae that will go in under the wool and hunt the aphides out.

Summer pruning does more than reduce the leaf area of the trees, slowing down their growth and putting their strength to fruit rather than wood production. It removes the soft shoot tips on which the apple aphides can start, so with no tips there are no aphides and no need to spray against them. It should be realised that spraying against everything as recommended by the manufacturers costs over £100 an acre, so there is a cash return from applying knowledge of entomology and ecology to fruit growing, apart from any premium from selling unsprayed fruit to a clamouring and expanding market.

John Habgood's trees are green with algae and dappled with lichen and therefore he has no trouble with red spider mite, which is an entirely man-made pest. After the 1914-18 War winter tar oil washes became popular, controlling a number of pests and leaving the trees with clean grey bark. Then the red spider mites which had lived on algae and lichen through the long history of English apple growing, began to attack the leaves. The tar oils destroyed both their food supply and their main enemy, *Anthocoris nemorum*, our most versatile predator.

This tiny bug (which unfortunately has no popular name) is about a sixth of an inch long and capable of eating 50-60 mites a day. It breeds twice a year and hibernates only in hard weather, spending mild winter days searching for red spider and other pest eggs. In addition it eats all species of aphis, capsid bugs, scale insects, apple suckers, apple blossom weevils and small caterpillars. These include the caterpillars of the apple sawfly and codling moth when they are small and crawling from blossom to fruitlets or leaving these for large apples.

Its ally is the black-kneed capsid, which spends the winter as an egg making a smooth bulge in the bark near the bases of young twigs. It used to be safe from winter wash and carried on alone, until the new light oil washes mixed with B.H.C. and applied in spring destroyed the last of the fruit farmer's friends. This creature, *Blepharidopterus angulatus* has only one generation a year, but each can eat up to 4,230 red spider mites in a lifetime. Gardeners who prune their trees to look like crew-cut hedgehogs usually prune away their capsids, so look for the bulges before you snip, even in February.

Unlike the Aphelinus which is inclined to eat itself out of a job and then starve, leaving the orchard open to attack until another stock is introduced, Anthocoris and the black-kneed capsids will live on the millions of springtains (*Collembola spp*) that feed on the algae, for the surface "vegetation" of fruit trees is a rich pasture for slow moving herds and swift carnivores.

Our oldest application of biological control was feeding the farmhouse cat so it would always be available to eat any mice that arrived. John Habgood is feeding countless millions of assorted "mousers", while the humus in the soil below supports still more grazers, thus providing prey for a horde of ground beetles during their wait for the caterpillars of the codling, march, and winter moth to drop from the trees and pupate in the soil where they spend the winter in constant danger.

Not even the many species of ichneumon and tachinid fly or the branconid and chalcid wasps can parasitise all the caterpillars, so the many orchard birds including goldfinches, wrens and hedgesparrows are of value while the tits are hard at work all the winter. Bullfinches however are the curse of the orchard, and putting on scaraweb at a cost of £5 an acre (apart from labour) to protect the buds, then taking it off exactly in time to let the bees get to the blossom, is an annual nightmare.

So are late frosts, and despite artful gaps cut in the high windbreak hedges to let the cold air flow away like water, John Habgood has had to disappoint some customers, though in good seasons he may have room for new ones who are prepared to pay for the finest apples ever grown without spraying.

Ecotechnics

by Arthur Puffett

Recycling 'nonreturnables'

Paper and steel have been reclaimed from salvage for many years, the quantities of non-ferrous metals in household waste making further separation uneconomical. The increasing trend towards aluminium containers for soft drinks, beer and convenience food packages has not gone unnoticed however.

Reynolds Metal Company, of Richmond, Virginia, realised the potential of reclaiming aluminium. A ton of aluminium is worth $200 in the secondary market, compared with $20 for steel and $16 for waste paper. (Scrap dealers in the UK offer £100 per ton for aluminium cans, considerably more than the American market.) Reynolds originated their aluminium can recycling programme in January 1967, and their method is worth relating in full.

A chain of garages in Miami agreed to serve as redemption points for all-aluminium beverage cans. The general public was reimbursed with a coupon worth one-half cent, redeemable in petrol or oil, for each aluminium can turned in. Although many cans were collected in this initial effort, the scheme proved uneconomical.

In the second phase of the Miami trials, large waste containers were placed in the forecourts of supermarkets. A local hospital was paid eight cents per pound for aluminium cans deposited in these containers by the general public. The cans were collected by a local haulier and shredded for eventual collection by Reynolds. Again, it was found that the servicing of numerous collecting points by private contract was uneconomical.

Phase three of the trials involved a co-operative agreement with Goodwill Industries (an organization employing handicapped people, similar to Remploy) whereby special collection boxes were provided in which old clothes and other material was deposited, apart from Aluminium cans. Goodwill, for a fee, collected the cans on its normal servicing runs to the boxes, shredded them in equipment supplied by Reynolds, and shipped them back to one of the Company's reclamation plants for recycling.

The primary problem noticed throughout the various stages of the Miami experiment was that, regardless of the economics involved, very few cans were collected in relation to the total amount available in the Miami area.

Learning from their errors, Reynolds launched a test programme in 1969, in Los Angeles. The cans were collected at a Reynolds-operated aluminium can reclamation centre, and the public, organizations (particularly Boy Scouts), and local canners and bottlers generating scrap were paid a guaranteed rate of ten cents per pound. This centre also accepted all other aluminium consumer scrap, including pie plates, TV dinner trays and foil. The economic break-even point was achieved in October 1969, and has remained above this level to date.

The success achieved in Los Angeles has since been repeated in several cities in the USA, and Reynolds envisage a nationwide service in the near future, situated in every major consumer area.

"Breathalyser" for cars

Road-side "breathalyser" tests for cars may soon be the pattern on British roads. Limited legislation already exists in the United States and Germany governing permitted levels of carbon monoxide in exhaust systems.

In anticipation of future policy (endorsed by the Technical Committee of the National Society for Clean Air in their report "Air Pollution and Road Vehicles" published in 1967), J. & S. Sieger Ltd., Stanley Green Road, Poole, Dorset, have developed a portable instrument with which an unskilled operator can check the carbon monoxide level of vehicle exhausts in a matter of seconds, either at "spot checks" or as part of the standard MOT test and servicing procedures.

Termed the "COSIGN", the instrument is for use with all petrol engines, but is not applicable to diesel exhausts. Operated by a rechargeable built-in battery, the COSIGN has two unions at the rear. One is connected to a lightweight sampling probe fitted with a coarse filter which is inserted into the exhaust pipe. The exhaust sample is drawn into a cooling chamber and moisture trap and then, cooled and cleaned, is transferred to the unit by means of a pump. A second pump draws a sample of clean air from the atmosphere into the unit through the other union. The speed of the two pumps can be varied to ensure a balanced flow of exhaust gas and fresh air. A meter indicates when a balance is achieved, the mixture being fed to a sensor filament which responds to selected combustibles and gives a read-out of the carbon monoxide content, the whole procedure being accomplished in five to fifteen seconds.

COSIGN has already been sent to motor manufacturers for trials and comment, and it is now with the Motor Industry Research Association for evaluation and report to the British Technical Committee.

A lesson to local councils

A Councillor's personal view of Conservation

by John F. C. Pontin

Chairman, Buxton Borough Council Planning Committee and Chairman, Land Use Committee, Buxton Civic Association Ltd.

View of Grin Quarry.

Industry exists to exploit the environment and make profits. Politicians exist to hold office. The preservation of beauty and the creation of peace are thus the tasks of the ordinary citizen and his local councillor. Few councillors see this so clearly as John Pontin, and fewer still are so willing to espouse the causes of happiness and humanity, of values unquantifiable by economists and thus neglected by government—both local and national.

In a society obsessed by the creed of continual growth the wider spectrum of human fulfilment is lost. Conservation is not just a matter of people, buildings, or wild life, but of the whole quality of our existence. We are facing a crisis in human ecology. While many are willing to drag their feet and look the other way, there are others who like the painless kind of conservation which costs nothing, and which is concerned about problems other than those in their own locality.

It is essential that people are not too embarrassed to challenge the status quo and poke about in some grimy corner of reaction. People must look beyond their own self-interest and not fear to commit themselves.

When *Silent Spring* was published, business and government agencies tried to prove that Rachel Carson was an hysterical fool. The conservation movement has now become a revolution, in which the most hopeful sign for the future is with the young, the rebellious young, who reject many of our social-economic values. Conservation is "in", everyone pays it lip service. But defending the "ecological conscience" requires more than a lecture, more than a self-congratulatory speech: it requires real commitment.

Criticism of local industry will call down upon you a stern lecture; if you fight jumbo jets, pesticides, or dereliction, you are an extremist or a fanatic. The natural environment, our home, is in peril, and a clear understanding of our relationship with nature is vital. To this end the Christian can play his part.

Until one is committed there is hesitancy, the chance to draw back. The need is for people to act, as well as talk.

The same technology that now exploits the world could, and must find ways to make the need for present methods of exploitation unnecessary. Nearer home we can ask the questions: must the patterned vulgarities of the bulldozer and dynamite slash their way into more and more of the Derbyshire hills? An ethical obligation on the part of the private owner is the only real remedy for this kind of situation. An economic system that is based solely on self-interest tends to ignore other elements in the value scale.

As social ethics were governed over a century ago by self-interest, so are the land-use ethics of today. We need a major change of attitude away from the irresistible expediency of getting away with it a little longer. If we love the place in which we live, then the quality of human existence depends on the decision to find responses, to meet the needs of our time.

John Barr, in his book *Derelict Britain*, examines the problem and warns of the future threats to the countryside by the extractive industries. He makes the valid point that dereliction depreciates, and helps to create the sense of apathy towards the environment. As a look round Buxton will show: houses and shops in need of a coat of paint or repair, kerbs broken, trees damaged by lorries and "killed off" by road salt, fine buildings allowed to fall to pieces for lack of maintenance, and others that have not been cleaned for years. John Barr states: "Our tolerance of industrial dereliction is one of the inefficiencies which have prevented Britain from fully entering the 20th century." One might say the same for Buxton.

The mis-use of insecticides to restore "order" has contributed to the poison chain from which, in the end, man himself might suffer. The fertility of the soil lies in the top six inches, and nature's cycle is within that small area of birth and decay.

It is assumed that there are two groups within our society, one dedicated, small in size, which works to preserve beauty and wild life, and the other, much larger, which it appears cannot be moved to action by any appeal to beauty or plea for mercy.

There is still a great gulf separating the human animal from the other members of the kingdom, but different as we are from the other creatures with whom we share the earth, one tremendous fact remains: we are all ALIVE. Alexander Pope put the attitude into epigrammatic form in his *Essay on Man*, one of the most widely read poems ever written.

Has God, thou fool, work'd solely for thy good,
Thy joy, thy pastime, thy attire, thy food?

Humanitarianism, in the widest sense of the word, is firmly established in English poetry, as indeed the mutual charities between the saints and beasts, from the end of the fourth to the end of the twelfth centuries, can be found in Helen Waddell's translations from the Latin. The major villain was the great mathematician Descartes, who, to put it as simply as possible, stated that animals are only machines. It was the poets, essayists, and pure humanists who protested. The reaction against Cartesianism, directly or indirectly, can be found in William Blake's:

. . . For he saw that Life liv'd upon Death . . .
The Ox in the slaughter-house moans . . .

and:

To see a World in a grain of sand,
And a Heaven in a wild flower,
Hold Infinity in the palm of your hand
And Eternity in an hour.

Samuel Johnson, Milton, Shelley, Coleridge, Wordsworth, Keats, Hudson, Davies, and Edmund Spenser, all had a wider awareness of those creatures who share the earth with us.

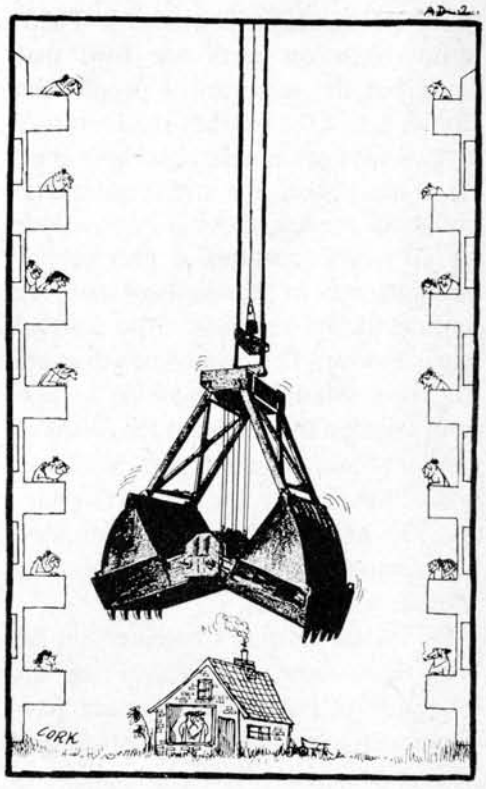
St. Bonaventura, in *The Life of St. Francis,* mentions that when Francis "bethought himself on the first beginning of all things, he was filled with a yet more overflowing charity, and would call the dumb animals, howsoever small, by the names of brother and sister, forasmuch as he recognized by the names of brother and sister, forasmuch as he recognized in the same origin as in himself." St. Francis, for some of us, is forever preaching to the birds of Alviano, and it is only with understanding and compassion that the ethic of conservation will be possible.

To many people conservation means no more than the efficient exploitation of natural resources to produce wealth. If conservation is no more than an elaborate variation of the old idea that the world is for man's use only, then it will be unrealisable. Man must take an interest, and indeed delight, in the simple life of a flower or an animal. Above all it must be understood that practical considerations need the enlightened "moral" and "aesthetic" values.

Henry David Thoreau's search for beauty was one of the primary motivations in his life. He delivered an oration in which he said: "This curious world which we inhabit is more wonderful than it is convenient; more beautiful than it is useful; it is more to be admired than to be used." "More to be admired than to be used" may well be an exaggeration. Thoreau foresaw an imprisoned mechanised future for man, and his life was a kind of rebuke to all those around him who were merely running around earning a living. In 1861 he wrote in his *Journal*: "Thank God men cannot fly yet, and lay waste the sky as well as the earth. We are safe on that side", and then added "for the moment". Thoreau was a great naturalist, and he loved the woods and fields, the lakes, the flora and the fauna. He did not want to see it exploited, or as men say, "improved" for man's benefit. The integrity of Thoreau's art, and the fact that in the United States he has been recognized as one of their greatest writers, an influential social philosopher, and a pioneer ecologist, ends the story that he was an imitator of Emerson, or a 19th century Diogenes. He believed that nature was a pilgrimage of life, and that man was not born in a vacuum set apart from the community of animals, plants, rocks, and soil.

Today men like Konrad Lorenz, Julian Huxley, Robert L. Rudd, Aldo Leopold, C. W. Hume, F. Fraser Darling, Max Nicholson, have made their contribution to our understanding of our relations with other animals, to re-establishing our unity with nature, and to ending the deterioration of the world in which we live.

We are all deeply involved in these problems, humanist and Christian alike. The Church can make its contribution, for the wider issues need ". . . yet more overflowing charity". The infliction of pain and suffering is still with us. The tyranny of many laboratory experiments, broiler factories and the intensive rearing of veal calves are examples of man using his power to remove animals from their natural habitat. It was common practice at one time to learn to operate by practising on living horses; they died from the sheer inability to endure, having suffered between 20 and 60 operations. Today we can read of the work of infecting primates to obtain information for "the benefit of man". Pigs are no longer whipped to death to please epicures, but paté-de-foie-gras are still found in so-called high class food stores. The 1880's found men like Henry Salt, Edward Maitland, Edward Carpenter, and George Bernard Shaw fighting the humanitarian cause. Sir Lewis Morris reminds us:



. . . and while ye lick my hand
Lay bare your veins and nerves in one red wound,
Divide the sentient brain;
And while the raw flesh quivers with the pain,
A calm observer stands . . .

Today, the "cranks" are the new enlightened, who care about the real future of man and his environment, the learning to live with the plants and animals who share our planet with us. We need a theology of ecology, in that Christians must recognize that a weak faith in the value of creation means only self-interest for self-survival. The despoliation of nature has drawn some encouragement from Genesis, but it did not give man a blank cheque. It is written in the Book of Job:

Who knoweth not in all these that the hand of the Lord hath wrought this?
In whose hand is the soul of every living thing, and the breath of all mankind.

In the Koran also it is written: "There is no beast on earth nor fowl that flieth, but the same are a people like unto you, and to God they shall return." If the words are not acceptable in their literal sense, they are still fundamental truths. St. Francis of Assisi, whose love for all living creatures is part of this tradition, may in the minds of many be considered an eccentric who carried things too far. The lessons however are still there. Man has everything to gain from taking a fresh look at the world of nature, of which he is a part. We have, in this 20th century, the business technocrat who knows that the Cartesian view is nonsense, but sees no harm in using animals as machines.

Dr Fraser Darling's comment in his book *Wilderness and Plenty* on the treatment of bulls, chased round paddocks with a stick to serve a canvas cow and rubber tube, is just one example of the need for an extension of ethics into our treatment of sentient beings. The fact that girls sit eight hours a day slashing the throats of live birds in a broiler chicken processing factory, should give cause to consider the need for effective humane legislation.

The obsession with continuous economic growth is one of the major barriers to seeing ecological sense. The "conventional wisdom" (to quote Professor Kenneth Galbraith) of the presumptions and preconceptions of economic dogma, that is used to give respectability to dead spoil heaps, polluted streams, slurry ponds, hills savaged by industrial plundering, can no longer be accepted as progress. The squalid epitaph "where there's muck, there's brass" dies hard. Issues must be examined in terms of what is ethically and aesthetically right, as well as economically expedient.

A better environment calls for a new evaluation of costs and benefits, and the kind of measures required to produce better judgement values than hitherto. Policies and action which have a basic environmental valuation place a strain on short-term interests, and it is vital therefore that citizen participation should exist. The dangers inherent in planning, in local as in national government, of over-centralization sheltering behind "official" committees and bureaucratic officers ("we know what is best") must be faced. While we may look to the government to do more, ordinary people must also play their part, and so the local authority has a major responsibility to obtain and encourage citizen participation. Major planning and development call for full and active involvement at the right stage in order to avoid the *fait accompli*.

In the local effort it is possible to be wearied profoundly and even physically by the kind of response received, and by the difficulties and distractions faced every day. Inspiration, as well as facts, must be used to deal patiently and persistently with the contending forces, including the "yes—but" types. The will to reshape, as we must, and to make value judgements which will act as a guide between man's finer and his baser capacities, is not beyond the capabilities of the individual.

The first and most powerful point to remember is that, if the area around Buxton is to suffer limitless expansion of quarrying, then the basic and irreplaceable capital—the environment in which we live—will be lost for ever. The burden of proof is with the developer, that noise, dust, garbage, traffic, exhaust fumes, and despoiled areas, will have no major effect on the prospects of an expanding and "healthy" economy.

John Carr's famous Crescent, the principal architectural feature of Buxton, erected by the fifth Duke of Devonshire.

Only a public outcry over the degradation of the environment will produce a political response. The last government had a very good record in strengthening the powers available under the Town & Country Planning Act; they reduced the destruction of our present stock of historic buildings, they gave us the Civic Amenities Act and the Countryside Act. The Conservative government (to quote the Prime Minister) will "treat the environment question as of high priority". However, urgent attention and positive action is required, not just talk.

The Conservation Society warns that there can be no respite from housing shortages, overcrowded classrooms, congested roads, and spoilt countryside in one of the world's most densely populated areas. Conservation is impossible without some kind of balance, for no human population can go on increasing independently of its environment. Our attitude to child-bearing remains virtually unchanged from the Middle Ages. On high fecundity, let John Stuart Mill have the last word: *"If the earth must lose that great portion of its pleasantness, which it owes to things that the unlimited increase of capital and population would extirpate from it, for the mere purpose of enabling it to support a larger, but not a better or happier population, I sincerely hope that, for the sake of posterity, they will be content to be stationary long before necessity compels them to it."*

The general public must be made aware of the terrible danger that faces the community of Buxton. It is obvious that, if this town has any future at all, a passive acceptance of present value judgements will not suffice. If "quality of life" has any meaning, then the practical arguments must be considered with the qualitative ones. We must face the prospect of shrinking open spaces, pollution, noise, and increasing ugliness, until the economics of ecology are regarded by citizen and policy-maker alike, in place of the gross national product, as the chief index of the state of the nation.

E. M. Forster once offered good advice which we might heed: *"If you desire to save the countryside there is only one way: through good laws rightly applied . . . That is your only hope . . . It needs men of good will . . . lest destruction spread and cover the fields and the hills with its senseless squalor. Now is the moment. Soon it will be too late."*

Buxton today stands poised on a pinnacle. It has an overall environment that is diminished daily by pollution, noise, and blight. It is a Borough of vanishing beauty, and of increasing ugliness with the passing of each year. Shortsightedness is conservation's mortal enemy, for it presents the case "have now, pay later". The town has reached the point in its history where it is essential that a comprehensive policy be formulated to deal with the competing short-term and long-term necessities.

Gargoyle

by
Wayne Davis
Professor of Zoology
University of Kentucky

The Grim Reaper

The Grim Reaper is sharpening his scythe. He's been unemployed for some time now and is anxious to get back to work. Such a large backlog has developed that one might think he would have as much trouble making a dent on it as has Planned Parenthood. But technology has tremendously increased his efficiency; he'll probably trade in the old scythe for a fleet of combines. Once he starts swinging he will move with remarkable speed. And he shall begin within the next 10 years.

Now let me give you some figures on human population. First consider the Hutterites. Since coming to the U.S. less than 100 years ago they have doubled their numbers five times for a 33-fold increase, entirely by breeding within their own sect. Their average number of children is 10.4. Thus the average couple has its children, 108 grandchildren, 1,125 great grandchildren and lives to see the first of their 11,703 great, great grandchildren come along.

"Objection", you say. "The Hutterites are an obscure little sect and give a biased picture of world demography. There are only 15,000 of them. It would take 100 years for them to reach a million and in 200 years there would be only 55 million Hutterites. How about the rest of the world?"

All right. The Hutterites have a birth rate of 45.9 per thousand and a death rate of 4.4, for a natural rate of increase of 4.15 per cent per year. According to the 1969 World Population Data Sheet of the Population Reference Bureau, 34 nations have higher birth rates than the Hutterites. For the entire continent of Africa the rate is 46. Now when the medical missionaries really get moving and bring down the high death rates in many of these nations, they should be able to catch up with the growth rate of the Hutterites. In Nigeria there are already 54 million people, about where the Hutterites could be in 200 years. With a birth rate of 50 and a death rate of 25, Nigeria is adding people at a rate of 2.5 per cent per year for a doubling period of 28 years. If your senior med students would go over there and work on this high death rate problem, you might cut it to about five and give the nation the benefit of a doubling time of 16 years. This would give them a potential population, within 100 years, of 3.6 billion, or about the population of the world today. Now, having solved their medical problems for them we can move on to some of the other high death rate nations and see what can be done there.

The world's population is now increasing by two per cent per year, a rate which doubles the population in 35 years. This rate itself has doubled in the past decade and is still going up as modern medicine advances around the world. The growth rate could go to a doubling time of about 20 years.

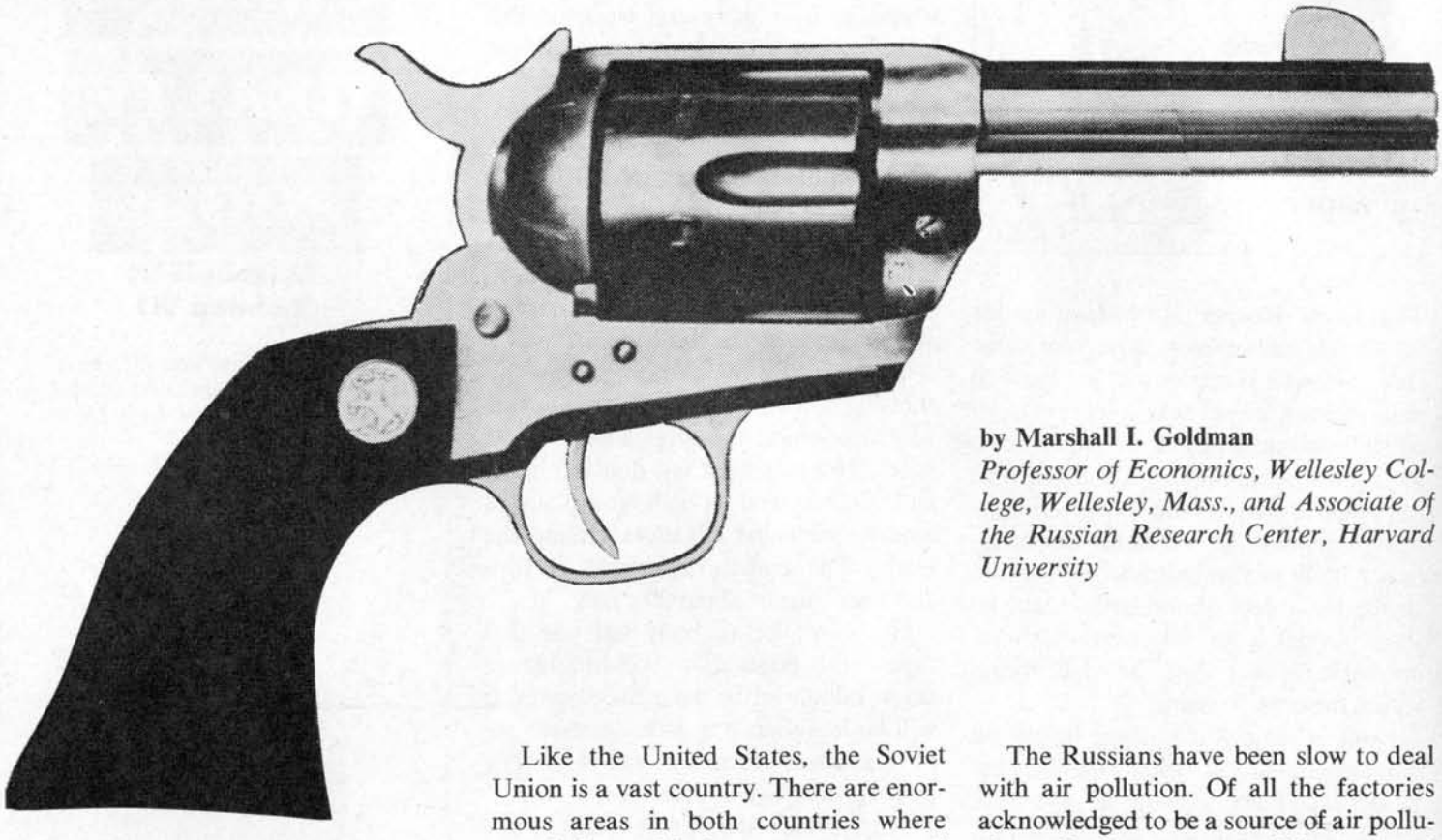
But don't let anybody tell you that the world population will double to seven billion in the next 20-35 years. It will be less than it is today because we have reached the end of the rope. The population crisis is here now.

Any serious attempt to maintain the people scheduled to be here during the next 10 years will result in ecocatastrophes the likes of which the world has never seen. For example, just to adequately feed the hundreds of millions who now get less than an adequate daily number of calories would require a six-fold increase in the use of pesticides in the underdeveloped nations which already are using most of the world's DDT. The oceans already are in serious trouble from DDT pollution. And a panel of fisheries experts recently told the Food and Agricultural Organization of the United Nations that in the Far East alone fisheries' take from the ocean must go from 14 million tons to 82 (more than this year's take for the entire world) by the year 2000.

Economist Colin Clark argues that we can support at least 28 billion people (*Nature, 181: 1235, 1958*). He thinks of man as a sessile machine into which you shovel a daily allotment of food. But man is a large organism which has a tremendous influence on his environment. Food may never become the limiting factor on his population. There are many other things such as war, pathogenic bacteria resistant to antibiotics, air pollution and pesticides which could do the job even before the food crisis arrives.

Russian roulette

Environmental disruption in the Soviet Union



by Marshall I. Goldman
Professor of Economics, Wellesley College, Wellesley, Mass., and Associate of the Russian Research Center, Harvard University

Environmental disruption is usually regarded as a function of selfish private enterprise where the public good and social costs are ignored. The Labour Party reflected this view in its election manifesto, which declared that pollution could be prevented only "by a Party which is not the creature of private profit."

So it comes as something of a surprise to learn that environmental disruption is as serious a concern in the USSR as it is in the USA. It is a major problem and the Russians are as puzzled as the rest of us that they should be so affected.

Professor Goldman, in this examination of the problem, suggests the answers to the questions the Russians themselves are asking: "Why in a socialist country whose constitution explicitly says the public interest may not be ignored with impunity, are industry executives permitted to break the laws protecting nature?" *Soviet Life*. **And "what is it in our society with its consistent progress in all spheres of life, that interferes with a rapid advance in such an extremely important field as the rational exploitation of nature?" (Academician Innokenty Gerasimov).**

Like the United States, the Soviet Union is a vast country. There are enormous areas in both countries where population and industry are sparse and where there have been no serious instances of environmental disruption; there are also regions where the ecological balance has been severely affected.

Most major Soviet cities have an air pollution problem. Tiblisi like Los Angeles has air inversions and therefore smog about half of the year. Leningrad has 40 per cent less daylight than nearby Pavlosk. The level of carbon monoxide in several Armenian cities such as Erevan exceeds the maximum norms established by the Ministry of Health. In other cities as well health has been affected and factories closed. A lead paint factory was shuttered in Krasnogorsk; 300 boilers and a zinc and lacquer factory were shut down in Cheliabinsk. Similar cases have arisen all over the country. In Sverdlosk and Magnitogorsk however, there were complaints that several of the factories remained open because the public health authorities had yielded to pleadings and pressures from factory directors. Shchkino, a major chemical complex was erected within view of Leo Tolstoy's historic country estate at Yasnaya Polyana. The estate with its museum and magnificent forests is an international tourist attraction. Due to the smoke from the factory however, some of the forests are dying.

The Russians have been slow to deal with air pollution. Of all the factories acknowledged to be a source of air pollution, only 14 per cent are fully equipped and only 26 per cent partially equipped with purification facilities.

Massive fish kills

There are numerous and persistent complaints in the Soviet press about massive fish kills. Hundreds of millions of rubles worth of fish have been killed in the Gulf of Finland, the Caspian Sea and the Volga and Don Rivers. At Ashkabad near the mouth of the Volga, the near destruction of the fish population threw off the ecological balance. With most of the fish gone, the mosquito population grew rapidly and there is now a malaria peril in the area.

Oil disposal is a particular menace. Because of the quiescence of the Baltic Sea, oil discharge from Latvia and Estonia along with that from other non-Soviet areas is not readily dispersed. Until 1965, the oil refineries at Baku along the Caspian Sea had no treatment facilities and waste oil was dumped directly into the water. Nor until recently was any effort made to prevent oil tankers from discharging their ballast overboard. However, harbour treatment plants have now been constructed and it is claimed that 40 per cent of the oil waste flowing into the Caspian Sea is cleaned up. Nonetheless, complaints still

are made about the ineffectiveness of the new treatment plants. A spectacular illustration of how seriously water courses are abused occurred in Sverdlosk in 1964, when the oil-covered Islet Rie caught fire.

To make matters worse the Soviet Union has built a massive system of dams, reservoirs and irrigation canals which has led to the diversion of so large a quantity of water that there is now serious concern for the future of the Aral and Caspian Seas. The Caspian Sea has dropped 2½ metres over the past 20 years. This has reduced the spawning areas for the Caspian Sea sturgeon by about one third. The combined effect of the oil and smaller spawning area reduced the fish catch in the Caspian from 1,180,400 centners in 1942 to 586,300 centners in 1966. The disappearance of the sturgeon has reduced the output of caviar so drastically that the Russians are talking about producing artificial caviar. Beginning in 1961, the Aral Sea also began to disappear and by 1969 it had dropped by 5½ feet. The average depth of the Sea is 50 feet which means that at the present rate by the year 2030, the Sea will have turned into a salt marsh.

No running water

Indicative of the scope of the water problem in the cities is that in 1960, 62 per cent of all the units in the urban housing fund had no running water. Since 65 per cent of the homes had no sewage system, there is likely to be considerable contamination of the ground water and well supplies. During the past decade, the situation has improved but it is likely that the figures are still high in the rural areas. Major cities like Vladimir, Orenburg, Tiumen, Sukhimi and Voronezh lacked adequate drinking water in 1967. Over 65 per cent of the factories in the RSFSR discharge their sewage without treating it and 60 per cent of the cities and suburbs in the same republic lack even the equipment for testing their water.

Lake Baikal contains more fresh water than any other lake in the world. It has almost double the volume of Lake Superior and it is five times as deep. It would take 400 years to refill it compared to about 100 years to fill Lake Michigan. Despite protests that any industrialization near the lake would destroy the quality of its water, two paper mills were built and plans for additional mills have been discussed. Stringent controls have been imposed on the mill built at Baikalsk which is already in operation. The second mill which is located on the Selenge River, a tributary of Lake Baikal, has been ordered to refrain from production until the purification equipment has been completely installed and tested. Yet complaints persist that neither treatment plant has been completely effective. A drinkable but nonetheless tainted mixture is being returned to the lake. The Limnological Institute of the Soviet Academy of Sciences reported that the number of animals and plants has recently decreased by one half to one third in the zone where the waste from the Baikalsk Plant is discharged.

Conservationists argue that the lake will only be protected if no waste at all from the paper plants is permitted. Toward that end, a proposal has been made that a 42 mile long sewage conduit be built over the mountains to the Irkut River that flows away from the lake. So far, this has not been approved, primarily because it would take at least 35 million rubles to build. But even this would not entirely prevent deterioration of the lake's water: operation of the paper plant affects water quality in other ways. To supply the paper plants with raw material, logs are rafted across the lake. It is estimated that 10 per cent of the logs sink. These sunken logs absorb some of the water's oxygen and form a covering over the natural bed of the lake which disrupts the breeding of the fish. Furthermore, the cutting of the timber contributes to an erosion problem as the removal of trees tends to loosen the soil so that the flow of silt to the lake increases. Gregory Galazi director of the Limnological Institute, points out that it is not just the Lake which is threatened, but the whole taiga region. Just a few miles from Lake Baikal is Mongolia and its Gobi Desert. The trees hold the desert dunes in check and as the trees are cut for shipment to the paper and pulp mill, there is fear that the desert will spread. Already some scientists report there has been an extension of the dunes area.

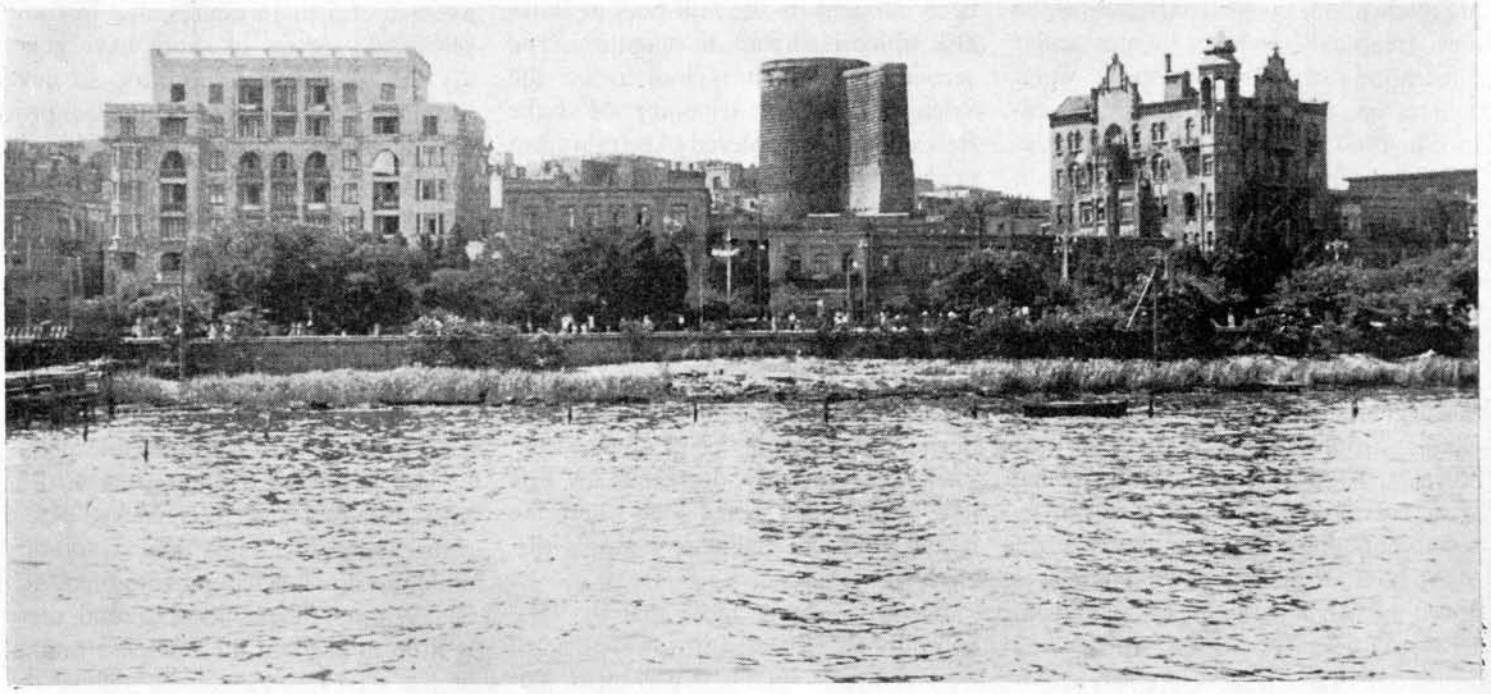
Disappearing coastline

As in western countries there has been abuse in the Soviet Union of other natural resources. There has been concern over the fate of the Black Sea coast, a good portion of which is resort area. The shoreline is disappearing. From 1956 to 1966, the sea coast shrank by an average of 5 to 16 metres, and in some places, 40 metres of shore have gone. As the sea coast disappears, so have buildings such as a sanatorium, fish processing plants and hospitals. The main rail line from Tuapse to Adler is also on the verge of dropping into the sea.

The Black Sea coast is being destroyed not only by construction too close to the shore, but by contractors who freely avail themselves of the pebbles and sand on the shore for construction inland. It is estimated that each year they remove as much as 120,000 cubic metres of beach material. Natural replenishment of these materials is blocked by the construction of dams and reservoirs along the streams feeding into the Black Sea. Without the pebbles and sand, there is little to cushion the immense impact of the waves as they crash against the coast and eat it away.

Recently other examples of resource abuse have come to light. Kislovodsk, high in the Caucasus and one of the most popular health resorts in the Soviet Union, has long been noted for its pure air. A natural protective barrier around the city was denuded recently when it was discovered that the hills above the city were rich in lime. Eight lime kilns were built to process the material and now the city is not only full of smoke from the kilns, but the mountain barrier which blocked the northern blasts of winter has been removed.

Soviet geographers and ecologists fear that the entire climatic pattern of Siberia may have been disrupted. The construction of the impressive network of hydroelectric stations, irrigation reservoirs, and canals has altered the flow of water to their traditional water bodies. At the same time it has resulted in a significant loss of water through evaporation and seepage into the ground through unlined irrigation canals. This has disrupted the traditional moisture patterns so that even rainfall cycles have been changed, while there has been widespread salination of the soil because seepage from the unlined canals has caused a rise in the water table in what are generally very dry areas. Moreover, the damming up of water bodies has had a pronounced effect on the ground water flow which has been cut off in some instances. There is fear that this may have consequences that are as yet unknown in areas which take their drinking water from wells. There are also fears that this restructuring of nature may result in the creation of new desert areas and a disruption



The Caspian Sea, where fish catches are declining partly as a result of the large drop in water level. 150 years ago it was up to the tower of Baku in the centre of the picture. In 60 years time the sea could be a salt marsh.

of the Arctic Ocean as Russia's north-flowing rivers are diverted to the more populous South. The reduction of warm water inflows might also throw off the temperature balance of vast regions.

USSR like USA

Just as many of the examples of environmental disruption in the USSR could be duplicated in almost any of our countries, so many of the explanations for it are similar. Like us, the Russians have had a population explosion, and there has been a marked migration from the countryside to the city. The urban population almost doubled from 69 million in 1950 to 134 million in 1969. As ecologists point out high population densities lead to a concentration of waste deposits in the form of nitrates and phosphates which are not easily absorbed by the land.

Malthus worried about the population growing faster than the output of food. When population exceeded food supply, population growth would be checked. A more appropriate concern is not the relatively slower growth of food production but the inadequacy of our air and water. Food supplies can be increased—water and air supplies are fixed. Unfortunately these fixed resources have to be spread thin not only because the population is growing but because each person in that population consumes a larger amount of air and water each year as industrialization grows.

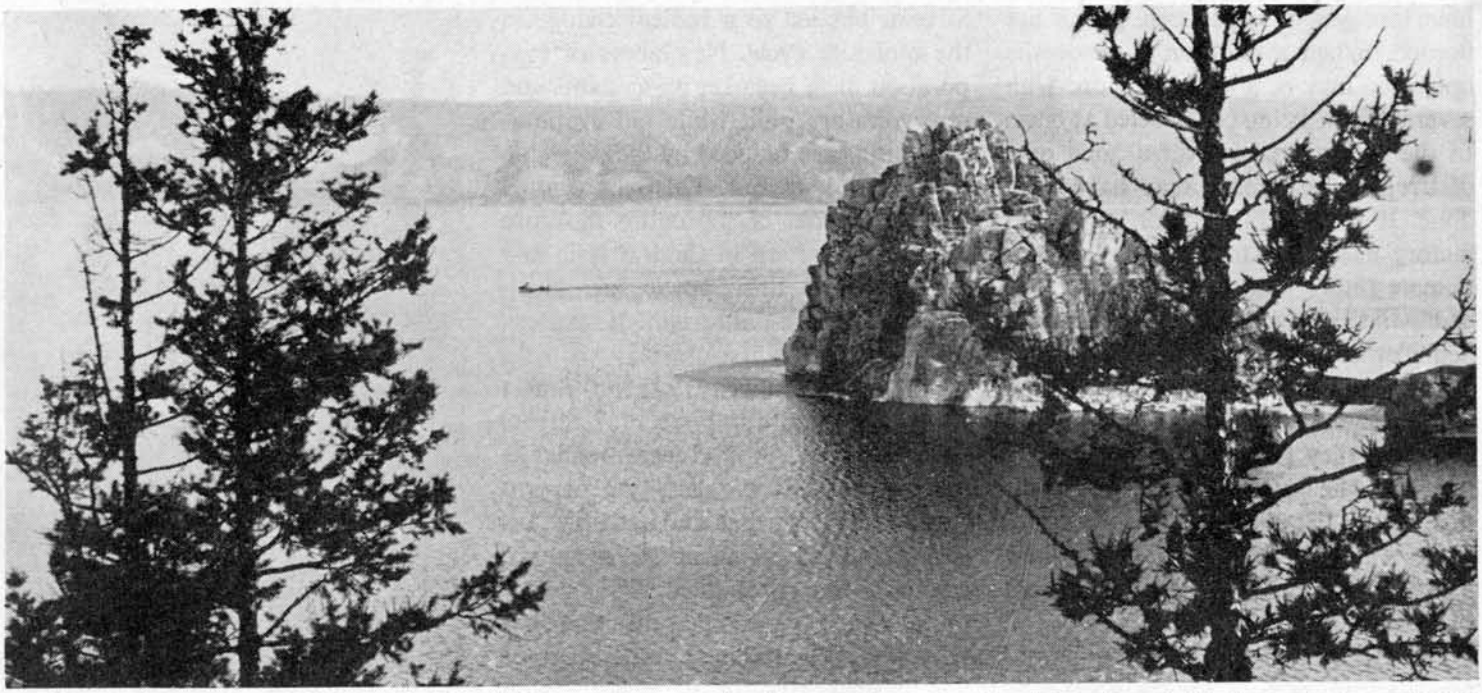
Basic to the whole process of industrialization is the transformation of natural resources. Environmental disruption results when too many of the resources are taken from their natural state and transformed. In the course of production, some by-products have no value and so they are discarded into the air or water, or left on the ground as solids. In addition the product is also likely to be discarded after a time and it too is likely to end up by being put into the water, air, or discarded as a solid. The more production there is, the more there is to discard and as our cities grow, the more concentrated these droppings become. Again excessive concentration places an undue burden on the digestive powers of nature. The task is made all the more difficult by technological innovations in the use of new and synthetic compounds. Plastics and detergents which are just appearing in the Soviet Union are not easily decomposed, reprocessed or recycled.

Inadequate legislation

Although the hazards of environmental disruption are recognized and laws are passed to preserve or protect natural resources, the laws are often violated. This happens in the USSR as well as elsewhere. At Lake Baikal 50 ruble fines were imposed for infractions of the law by the paper plants. The law was violated because the penalties imposed were not nearly enough of a deterrent to the paper plants. It was much cheaper to pay the fine than improve the machinery or close down the whole operation. In other instances, the law is not enforced. For example, in 1960, the Supreme Soviet of the Ukranian Council of Ministers passed a law protecting the republic's natural resources. But deterioration of the air and water in most regions of the Ukraine has become considerably worse since that time. The same kind of law exists in Kirgizia but no one has ever enforced it.

The problem of law enforcement is hampered because the Soviet Union like other nations has not established clear lines of authority over the different forms of pollution. In the republic of Moldavia for instance, there are seven different ministers or agencies responsible for the quality of the water and no one knows who is ultimately in charge.

The temptation to violate the law is enhanced by the fact that the violator faces only his private costs and is not held responsible for the social costs of his action. Some economists assumed this would not happen in a socialist economy but that each government factory would include in its price an amount equal to the social costs for which it is responsible. While the Russian accounting system of Khozraschet does involve charging for the cost of factors involved directly in consumption, the Russians have been no more successful than the rest of us in making explicit the social costs arising from an enterprise's activities and including them in the cost of production. Like most of us the Russians feel that air and water are free goods and therefore there is a reluctance to attach any value or charge for them. This would appear to be an especially inappropriate step in a socialist



Lake Baikal—the deepest lake in the World. It contains more fresh water than any other lake, though this is now being seriously contaminated by paper plant operations.

country. Even if they wanted to of course, the Russians would find it hard to measure the consumption and discharge of the air and water by a particular user. This is something that almost everyone in the world has trouble doing. So air and water are generally treated as free or undervalued goods. Inevitably this leads to misallocation. An example is the overuse of water in irrigation. At best the Russians make a minor charge for the water and very often it is free. It is estimated that this leads to a 25 per cent overuse of water.

Seven unique factors

If environmental disruption and some of its causes are no different in the USSR than in the other developed countries, it is possible to identify at least seven factors unique to an economic system like that of the Soviet Union.

Industrialisation has come only recently to the Soviet Union. Even though the USSR produces the world's second largest gross national product, there are some economists who feel the Soviet Union has a long way to go before it is industrially on a par with Western Europe, Japan and North America. In their desire to catch up the Russians place a heavy premium on continued investment for future growth, so they are usually reluctant to divert funds from productive to non-productive uses. Unfortunately, expenditures on pollution control tend to be regarded as non-productive. "Conserve" seems to stand in opposition to "produce".

Since the Soviet government is the sole owner of all the country's productive resources, it is ill-equiped as an impartial referee between industry and the citizen consumer. Since the state *is* the manufacturer, there is an identity of interests between factory managers and local government officials. Traditionally, the most applauded government official is the one who facilitates the most rapid growth in the region under his jurisdiction. The prime question is, how much has production increased in your region, not how much cleaner are your rivers this year.

There is pressure to exploit natural resources to the utmost. For Goslan and other government organizations which are striving to increase their output quickly the virgin timber on the shores of Lake Baikal is a great temptation.

At one time many of the capitalist countries were under the same kind of pressure. Now as more people have become aware of the issues private industrial interests are frequently offset by diversified and often anti-industrial interests. No governor or prime minister wants economic depression in his area, but to the extent that he has to appeal to the voting power of conservation-minded groups, he is more likely to serve as an impartial mediator.

Massive lurches

Because of the centrally controlled nature of economic growth in the Soviet Union, Soviet economic activity often lurches suddenly and massively in new directions. Such was the decision to expand chemical production in the early 1960's. Another is the effort to triple the output of automobiles by 1971. In economic shifts of this nature, it is impossible to anticipate the effects on the existing ecological balance.. For example, there are some Russians who have perceived the dangers to air quality in the rapid increase in the number of automobiles on Russian streets. But though the increased production of automobiles is scheduled for this year, only recently has there been talk of the need for automobile exhaust controls. And nothing is apparently being done towards the production of such devices.

Although the Russians are experimenting with more flexible and decentralised forms of managerial initiative and plant operation, tight controls continue to be exercised from Moscow. This commitment to centralised control together with the fact that supervision must be conducted over such a large country tends to make the Russians insist on uniformity. The effect is often that no provision is made for the peculiarities of local conditions. Thus one writer complains that the standardized rock wool manufacturing plant may be perfectly suitable for most of the country, but not for Moscow. Nonetheless the Izolit Rock Wool Plant with standard equipment was built in Moscow and disbursed phenols in the air throughout the neighbourhood.

This restraint on local initiative has also hindered the establishment of pollution control industries. Such gaps often exist in the Soviet system. The central planners and allocators of capital simply

have not yet decided such plants are needed. When a decision is made the operation may be a large scale one with several plants being constructed at once. In the meantime however a good deal of irreparable damage may have been done. It is very difficult for a Russian factory enterprise to innovate and anticipate future needs by itself. In other economic systems, private entrepreneurs or corporate entities with access to their own sources of capital often seek to anticipate needs. If they predict correctly, they profit; if they are wrong they risk the loss of their capital. But this ability to take risks and the existence of private and decentralised sources of capital facilitates the process of innovation.

The Russians recognise that their system does not provide for such forms of innovation. They now regard this as a handicap and for that reason, one of their current goals is to decentralise initiative.

Not only do the Russians lack factories devoted to the production of pollution control devices there is even a shortage of specialists in pollution. Many factory managers have nowhere to turn for advice when they are ordered to improve the quality or reduce the quantity of their effluent. Moreover in the absence of specialised production facilities, anything that is produced is usually built on a custom basis by a firm specialising in something else. This often results in inefficient equipment and duplication of effort.

A well-intentioned programme may create unanticipated by-products which have disastrous consequences for the environment, e.g. the use of DDT destroying fish and bird life. This is a hazard which confronts all societies, but when the state gathers all the economic power in its hands, the likelihood of a major disruption is greater. Some Soviet scientists fear that a fundamental disequilibrium in the climatic balance of Siberia has already been set off. This is not to say that similar situations could not occur in nations with private enterprise but the more diverse the economic interests and power, the harder it is to organise a massive reconstruction of nature. An exception was the Tennessee Valley Authority project in the United States but such an undertaking would probably be much more difficult to arrange in a non-depression period.

As a case in point, the diversion and redirection of rivers in Central Asia and Siberia, has led to a radical change in the moisture cycle. New areas of evaporation have been set up as dams and reservoirs are built while old evaporation basins are reduced by the diversion of inflowing streams. This has resulted in a disruption of the entire moisture circulation pattern in Central Asia and Siberia. New dust bowls are being created and the entire climatic pattern may be affected.

Another peculiarity of the Soviet system is that until July 1st, 1967, all raw materials in the ground were treated as free goods. This was largely a by-product of the theory that land had no value. In addition, private ownership of natural resources was prohibited. This meant to the mine operator that all mine sites were free. Whenever the mine operator had finished extracting the richest ore on the site, he was prepared to move on if he could find another site where he could extract more material at a lower cost. So mine operators did not care much about intensive exploitation of their mine deposits and K. E. Gabyshev states that some mines and oil wells in the USSR had only a 50 per cent recovery rate. A result of these processes was that large quantities of salvageable materials were often discarded, increasing the amount of waste to be disposed of.

In partial recognition of the distortions generated by the refusal to acknowledge the value of unmined minerals, the Russians introduced rent charges as of July 1967. It is not entirely clear how these rent fees will be applied. Obviously it is intended that miners and drillers will work their raw material deposits more intensively so there will be less waste. However it is possible that unless the charges are properly scaled, rental charges on mining land may actually accelerate rather than retard mine abandonment.

Strangely enough, there are some instances where an absence of private property may actually lead to environmental disruption that a system of private property might prevent. This happens when a private property holder calculates that his private benefit from converting the land to some new destructive use is *not* greater than the private cost he would bear from yielding the land. For example, a resort owner or a landowner might feel that he would prefer to keep his beach as a swimming area for himself or even preserve it for future sale at a much higher price to a large resort owner rather than sell it to a contractor who would tear up the beach and use the sand and pebbles for construction purposes. The absence of private property and a failure to make such a calculation seems to be the major explanation for the erosion of the Black Sea coast.

Lake Ritsa, Georgia.

Advantages

What then are the advantages of the Soviet system from the point of view of environmental destruction? The unbalanced nature of Soviet growth in some respects retards the production of goods for the consumer. This may result in less environmental disruption. If fewer synthetic or exotic compounds are developed, there are likely to be fewer noxious by-products. For many years the Russians were criticised because of their failure to provide high-test ethyl gasoline for use in their automobiles. Today Moscow is the only major city in the world where the cars do not pollute the air with ethyl-lead. (The question remains however as to how much this was a case of foresight and how much a lucky accident.) Similarly, for a long time, one of the reasons given for the decision not to produce more automobiles was the desire to avoid the increase of air pollution.

To the extent that the Russians have de-emphasised the production of consumer goods, there is less waste to discard; they do not have to contend for one thing with disposable bottles. The cheaper cost of labour in relation to products helps to explain why there are few empty bottles lying around Russian streets. Bottles are in short supply and their deposit value is high. Therefore

it pays to devote labour to picking up and sorting a valuable commodity. Cheap labour also explains why so many societies including the Soviet Union can handle their sanitation problems despite the absence of sewer systems. The cost of collecting night soil is offset by the value it has as a fertilizer.

The junk business in the Soviet Union is still a vital industry. In the USA where the price paid for waste paper, metal, oil or used clothing has trouble keeping up with the rise in the price of unskilled labour, it has become unprofitable to collect certain kinds of scrap. This disrupts the recycling which most ecologists view as essential. In most American cities, the owner must pay the junk man to haul away an old car. In 1969, over 50,000 cars were abandoned on the streets of New York City. Because of the reversed values in the USSR, no one would dream of abandoning a car. It would be repaired or at least reused as a set of spare parts.

Social costs

A traditional criticism of the Soviet price system is that it frequently bears no relation to scarcity values or market clearing prices. While this creates other difficulties, some day it could be used to advantage in contending with environmental disruption. Just as Russian prices in the past have not reflected land and capital costs, so future Russian pricing officials might decide that all Russian products henceforth will include some specified markup reflecting social costs. It would still be hard to determine what social costs are attributable to which products, but implementation of this decision should be easier to carry out in the USSR than in other countries.

Because government agencies own the utilities as well as most of the buildings, it is relatively easy for the Russians to avail themselves of certain economies of scale in dealing with environmental disruption. For example the Russians make extensive use of a system of centrally supplied heat. In densely populated urban areas, this eliminates the need for each building to have its own furnace and hot water heater. In most large Russian cities, heat and hot water are supplied to an entire neighbourhood by the Telovaia Elektrot-sentral' or TETs. Fifty per cent of all heat consumption is provided centrally in the USSR and 65 per cent of this central heat is supplied by a network of TETs stations. Similar systems exist in most large American cities, but individual landlords are not compelled to participate in the system. Consequently some of the advantages are lost. Normally a TETs type system makes possible a hotter fire, better smoke control equipment and therefore a more efficient form of combustion and less air pollution.

Occasionally there are drawbacks to such a system. Russian engineers have had difficulty providing for the varying heat needs of different buildings and rooms in TETs operations. It also happens that sometimes the gains derived from concentrating the combustion in one large furnace and boiler are offset by the need to send steam and hot water long distances. There is a tradeoff point where the loss of heat necessitates so much extra combustion that the effluent is actually increased.

The enormous power of the state in the USSR can also be an advantage. When a law is passed it can be very effective. Moreover the state can simply decree the establishment of a natural preserve. In other countries with private property, this can be an expensive and time-consuming process. It is necessary to overcome numerous court suits and compensate private property holders.

If study of the USSR demonstrates anything, it is that not private enterprise but industrialisation is the primary cause of environmental disruption. The question remains, can we have industrialisation without environmental disruption? Since the answer seems to be no, it should come as no surprise that despite the differences in the economic systems, the problems of environmental disruption in the USSR are no simpler than in the USA. It is with some disappointment that an American reads M. Loiter who implies that the Russians should adopt American methods to solve the Russian problems.

Currently the proposals for the solution of environmental disruption in the USSR seem to be no more advanced than they are in the USA. One thing does seem clear however and that is unless the Russians change their ways, there seems little reason to believe at this point that a strong centralised and planned economy has any notable advantages over any other economic system in solving its environmental disruption.

Acknowledgement

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Spanner in the soil

Why it is time to give up industry for good husbandry

by L. B. Powell

British farming has been made incredibly productive through mechanization and the massive application of chemicals. But this increased efficiency has been bought at a high price, and now we are faced with evidence that the soil we depend on for half our food cannot survive for much longer this intensive attention from the agro-industries.

By cutting back profit margins in order to compel farmers to increase their output, successive governments have encouraged agriculture to realize on its capital—the acquired fertility of the land, built up by centuries of wise husbandry. It is as if the soil were being mined—and lest the proponents of industrial farming remain intoxicated by their short-term achievements—it should be remembered that mining always ends in abandonment.

The postwar record of productivity in British agriculture betters that of most other industries. During the last two decades the increase in overall production has been estimated at no less than 35 per cent. In 1945, the year before the Agriculture Act which heralded the "great leap forward", the average yield of wheat in the UK was 19.1 cwt per acre. By 1968/9 it had risen to 28.2 cwt.

Barley showed a similar increase, from 17.8 to 27.4 cwt. Oats went up from 16.3 to 25.4 cwt, potatoes from 7.1 to 9.8 cwt, and sugar beet from 10.5 to 15.1 cwt.

Cattle and calves increased from 9,629,000 in 1946 to 12,374,000 in 1969. Pig numbers soared from 1,955,000 to 7,078,000. Sheep and lambs went up from 20,358,000 to 26,604,000 and poultry from 67,117,000 to 127,220,000.

As with crops, yields of milk and eggs showed big increases. The average yield of dairy cows rose from 544 to 815 gallons while new hybrid breeds of hens meant a rise in the average number of eggs per hen from 108 to 211.

These figures are the more striking in view of the decline in manpower and loss of farmland. The total labour force was 976,000 in 1946. It was more than halved by 1969. There are various estimates of the rate at which farmland is taken for urban development, but the figure most quoted is 50,000 acres a year, which means that in eight years an area the size of Nottinghamshire goes out of farming use. Professor Ellison, who produced an official paper for the Department of Education and Science on the multiple use of land, concluded that a further 50,000 acres per year were being taken for other non-agricultural uses, such as forestry, reservoirs, etc.

Draught power on the land shows dramatic changes. In 1946 there were 436.000 farm horses at work. By 1960 the number was down to 46,000 and for the years since no figures are available. The war boosted the number of tractors to 180,000 but in 1969 there were 420,000, nearly one for every farm worker. All other kinds of machinery and equipment showed big increases.

An imposing record

Looked at quantitatively, it is an imposing record, justifying the claim that in terms of output per man and per acre British agriculture is more efficient than that of most countries. By providing just over 50 per cent by value of our total food requirements it has been a major factor in saving us from national bankruptcy.

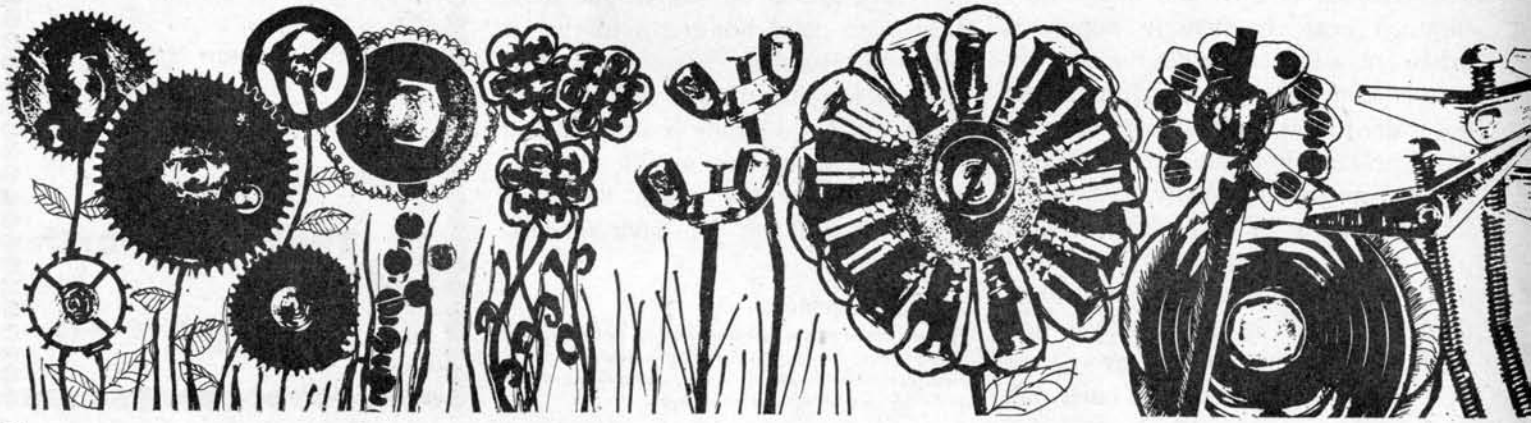
But grim, forbidding signs have appeared in this picture of progress. Efficiency is more than a matter of increased yields. The economists, technologists and chemists have been leaving nature out of account and nature is retaliating. The pressures exerted upon farming since the 1947 Act have taken toll of the most basic resource of all—the soil. Much of Britain's farmland is now debilitated to a serious degree. It is becoming worn out.

Deep misgiving

Yields have begun to decline, in some cases very substantially. Crop diseases and the ravages of pests have increased. Among farmers of the older generation, familiar with the traditional practices of good husbandry, there has long been deep misgiving, a realization that sooner or later the techniques of high pressure farming would have to be called into question.

That time has come. Warnings that it was at hand have multiplied in recent years. In a paper given to the Farmers' Club in 1967, Mr H. R. Fell drew attention to the deterioration in husbandry standards and the effects it was having on the soil. In 1969, prompted by disquieting reports from various parts of the country, the National Farmers' Union of England and Wales set up a committee to probe those problems of soil structure and texture that were most alarming

With an organization reaching down to every parish where farming is carried on, the NFU is uniquely fitted to investigate matters of this kind, and it soon became evident that trouble was widespread. During the autumn of 1968 and the spring of 1969 exceptionally bad weather over much of the country



brought into greater prominence the adverse effects modern farming practices were having on the soil and the ability of water to drain through surface layers.

Urgent inquiry

In December 1969, Mr Cledwyn Hughes, then Minister of Agriculture, called upon the Agricultural Advisory Council to undertake an inquiry into soil fertility and soil structure as a matter of urgency, and a group of specialists, headed by Mr Nigel Strutt, was appointed for the purpose.

The group's terms of reference were: "To advise whether, and if so, the extent to which, present practices are having adverse effects on soil fertility and soil structure; whether it considers the National Agricultural Advisory Service has all the information necessary to advise on methods of preventing any such damage or remedying it after it has taken place; and whether any further steps are necessary to get this advice across to farmers."

The survey was not confined to areas where signs of deterioration were most clearly to be seen. Soil profiles were taken throughout the country and evidence was submitted by many individual farmers and various organizations. Giving evidence for the Soil Association, Douglas Campbell, the Association's research farm director, helped to keep the inquiry down to earth by emptying a bag of soil from Haughley's organic section onto the table during one session. declaring: "This is what it's all about."

The upshot has been a report which, scheduled for September/October, has been postponed to November, then January, and now . . . ? Advance information indicates that this is a lengthy and factual document, confirming the widespread fears that have been expressed, identifying and analysing causes, and proposing remedies. Presumably some of them are unpalatable.

The evidence submitted by the NFU emphasized the wide ranging extent of soil deterioration. "There is no doubt," it said, "that real problems exist in most parts of the country, and that these are considered as arising from the systems of cropping and cultivation which have been practised." And the Union went to the root of the matter when it observed: "Farming practice and soil husbandry are determined, to an increasing extent, by current financial considerations, and full recognition must be given both to the economic causes of the present situation and to the changes that must be made to correct it."

Loss of humus

It is understood that the survey showed a serious decline in the organic content of soil in many areas, to sometimes as low as 3 per cent. This means a drastic loss of that essential soil constituent, humus, and of trace elements that are just as necessary for healthy plant growth as are nitrogen, potassium and phosphorus.

Humus, to quote the late Sir Albert Howard, is "a complex residue of partly oxidized vegetable and animal matter together with the substances synthesized by fungi and bacteria which break down these wastes." He went on: "This humus also helps to provide the cement which enables the minute soil particles to aggregate into larger compound particles and so maintain the pore space. If soil is deficient in humus, the volume of pore soil is reduced; the aeration of the soil is impeded; there is insufficient organic matter for the soil population; the machinery of the soil runs down; the supply of oxygen, water, and dissolved salts needed by the root hairs is reduced; the synthesis of carbohydrates and proteins in the green leaf proceeds at a lower tempo; and growth is affected."

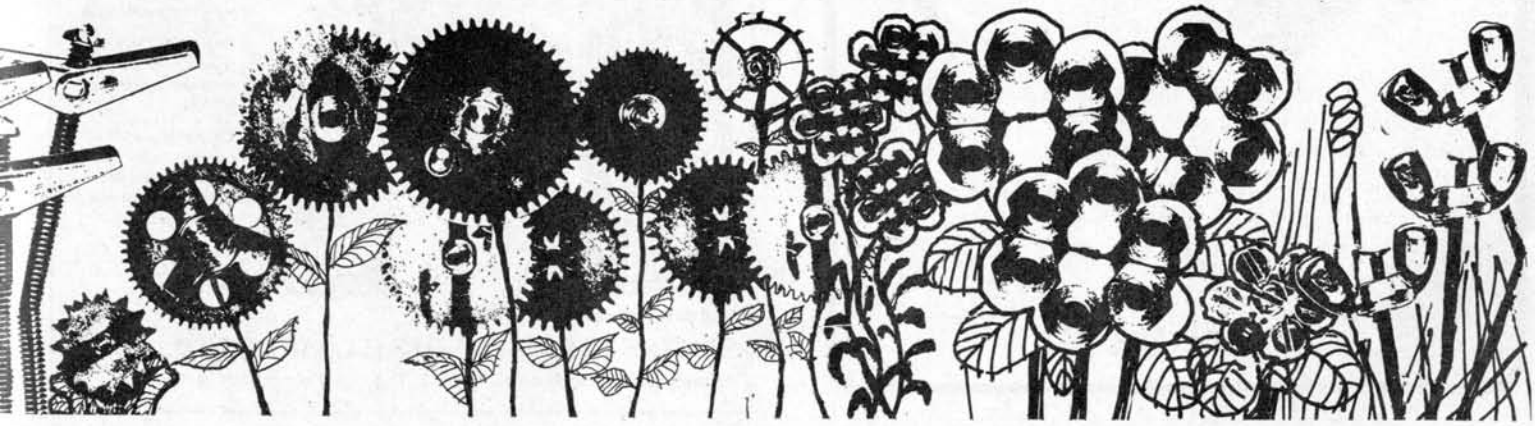
The agro-chemical era

The beginnings of this deficiency in organic matter go back to what Mr Emrys Jones, director of the new Agricultural Advisory and Development Service, has described as "the agro-chemical" era in British agriculture, when the traditional practice of returning farmyard manure to the land gave way to widespread use of artificial fertilizers, accompanied by extensive use of new herbicides and pesticides, the toxic effects of some of which persist for many months in the soil.

Ease of handling, plus the fact that these fertilizers carried a subsidy, stimulated their adoption in the early days. Another phase in the farming revolution which was to have serious consequences in soil management came with the development of intensive systems of livestock keeping—factory farming, so called—which meant vast accumulations of farmyard manure and other wastes on farms which do not have enough land for muck-spreading.

Another pronounced feature of the agro-chemical phase has been the application of continually higher rates of nitrogen per acre in spring and early autumn, necessitating the use of heavy machinery. This has been accompanied by heavier stocking, always in the hope of reducing unit costs of production and meeting the challenge of poor returns. Emrys Jones has described the most extreme example of intensive stocking he saw, on a farm in Montgomeryshire, where 75 cows were being kept on a 36-acre holding of heavily fertilized grass. The fields, he said, were literally disintegrating, the cows were pulling the soil away in lumps as big as pancakes.

The great increase in barley production which we noted above has largely been achieved at the expense of grass, the best conserver of soil structure and texture. On this the NFU evidence was illuminating. Between 1960 and 1967 there was a reduction of 350,000 acres of permanent grassland, and in the same period there was an even greater reduction in temporary grass, or leys,



amounting to some 570,000 acres. Along with this reversion from grass the old and well proven practice of fallowing was abandoned and now occurs on very few farms.

Go back to grass

The need for a substantial return to grass is one indication of the survey, but, as Emrys Jones has pointed out, this will not be easy on the clay soils of the Midlands, which he describes as having been thrashed and pounded by heavy machinery year after year; and there will be the financial problem of re-instituting herds and flocks in place of corn, potatoes and other arable crops. It is foreseeable also that there will have to be a large-scale revival of planting trees as shelter belts, and the restoration of hedgerows—not least in East Anglia where the blowing of fenland soils long ago gave warning of nature's retaliation for the removal of natural cover.

The weight of machinery used on the land has of course increased enormously, and ironically the ill-effects of this are seen where large slurry tanks have to be used, in unsuitable conditions, on land where intensive livestock systems are practised.

On this aspect the NFU stresses again the effect of economic pressures, pointing out that cultivations have become an urgent task that must often be undertaken in unfavourable weather. "Farmers are unhappy," says the Union, "that they can no longer restrict land work to ideal conditions, so that timeliness in cultivations is now an ideal rather than a practice. The evidence we have received stresses that these factors form the major cause in the formation of unrecognized soil pans and the final breakdown of the structure."

Earlier this year Mr Jones expressed the view that a massive new drainage campaign would be needed if the desired rate of agricultural expansion is to be achieved. The evidence of the NFU substantiated this, pointing out that the rate of installing drains had not kept pace with the need to replace existing systems. "Many old drainage systems are now past their useful life," it was stated, "and comprehensive redraining is necessary. Maintenance has not been kept up owing to shortage of labour, and many counties have reported that the general condition of drainage systems leaves a lot to be desired."

Will the Soil Structure report induce the Government to finance a massive new drainage campaign? It could be done for a fraction of the expenditure on Concorde and would be an investment to ensure that the national larder will be kept well filled.

Will the cost-prize squeeze which has pressed heavily on agriculture for so long be eased enough to encourage a return to good husbandry? Will it be national policy to plant great numbers of trees as shelter belts and to restore hedgerows of which many hundreds of miles a year have been destroyed? Will there be also another massive new campaign to advance the municipal composting of town wastes which could provide vast quantities of organic matter for farms, market gardens and orchards?

The report is a challenge to the Government to get its priorities right. When will it be published?

Reports

From gin to aldrin

In the March number of *Ceres*, the FAO periodical, there was an advertisement for aldrin, which is reproduced on this page. This is an organo-napthalene compound, a group which is among the most violently poisonous of all the organo-chlorine pesticides and includes aldrin, dieldrin and endrin. Dieldrin is about five times as toxic as DDT but 40 times more so when absorbed through the skin; when it was substituted for DDT against resistant malaria mosquitoes it had to be withdrawn because of attacks of convulsions among the sprayworkers that could last four months. Aldrin becomes dieldrin in the soil, so it appears to break down, but in fact has become something worse.

Aldrin itself, banned completely in Sweden and West Germany, is extremely toxic, attacking the liver and kidneys. It persists up to four years in the soil, but far longer as dieldrin. It was responsible for the widespread slaughter of birds in Michigan in 1959 when it was sprayed from the air against the Japanese beetle. In 1964 it was recommended (the Ministry of Agriculture "recommends", it does not ban, except in extreme cases) that it should no longer be used in fertilizer mixtures.

What is striking about the advertisement is the care of its wording. "It is harmless to beneficial micro-organisms in the soil." Aldrin inhibits the action of the nitrogen fixing nodules of legumes, but these are not *in* the soil. They are on the roots. In Britain aldrin is no longer used against carrot and cabbage root flies, because it produces a swift *increase* of resistant strains of the pests attacked. It kills the ground and rove beetles that normally destroy up to 80 per cent of the pupae in the winter, and leaves the surviving flies to flourish. These creatures, like the predators that fill the same ecological niche in tropical countries, are not *micro*-organisms, but insects, so the advertisement is telling the truth.

In Britain it has produced resistant strains of cabbage root fly in Oxfordshire, Gloucestershire, Worcestershire, Warwickshire, Kent and Bedfordshire, and carrot flies in Norfolk, Cambridgeshire and Lincolnshire. It is only a matter of time before resistant mole-cruckets, cutworms and other soil pests begin to increase uncontrolled by their natural predators wherever the advertisement is read. It is also recommended as a seed treatment, though it is about 100 times as toxic to pheasants and related birds as DDT.

Finally, can tropical countries like Africa and India, where there are no restrictions on the use of aldrin, really afford to poison their birds and wild life with what even Britain has banned? To quote "The Further Review of Persistent Organo-Chlorine Pesticides in Great Britain": "Thus in tropical countries where food production is vital and

there is a high incidence of mortality from insect-borne disease, the hazards to wild life and the presence of minute residues in human fat may rightly be regarded as relatively unimportant." If your child will starve, die of tick fever, bilharzia or malaria unless you use the persistent pesticides, before he is ten, why worry about the risk of tumours, leukemia, or less easily identifiable complaints in his forties and fifties?

Why not, however, grow tobacco for nicotine, pyrethrum, derris and other actual and potential pesticides that have no risk of the Nemesis of resistant strains, which are worse than before, increasing without the predators we have killed, and of the birds that are gone for ever? Grown and used by do-it-yourself methods they would not be more costly, and biological pest control could be still cheaper. We need to export skilled entomologists and ecologists, both British and trained overseas students—for the need of all the underdeveloped countries is for more biologists and fewer Doctors of Law. Today we are exporting our refuse chlorine and crude oil refinery wastes yet these are of as little permanent value in terms of a world that *is* one world, because it shares one atmosphere and seven interconnected seas, as the gin and gunpowder of our ancestors.

Lawrence D. Hills

Smokeless hocuspocus

Britain's entry into 1970 European Conservation Year has been something of a back-door affair. After a few months of what was taken to be traditional British reserve came the first glorious statement. The government, in the shape of Lord Robens, chairman of the National Coal Board, announced that the smokeless fuel situation, which dates back to the winter of 1969, when 16 local authorities were forced to suspend smoke control orders because supplies had run out, could not be put right in time for the coming winter. Lord Robens suggested that no further smoke control areas should be brought into operation until the problem had been resolved.

The causes of the smokeless fuel crisis are obscure. If tempted to look further than the popular "breakdown in communications" theory, one soon gets lost in a maze of bureaucratic buck-passing. The NCB blame the gas industry for going over to natural gas too quickly and allowing their coal-gas works, which produced coke as an important by-product, to run down. The gas industry blame the Coal Board for not making provision for their switch to natural gas, although it had been announced several years previously. The government blame the Socialists for allowing the situation to develop and the Socialists . . . presumably are holding their fire for when the crisis deepens.

The present situation is already deep enough. A total of 92 new smokeless zones have been postponed until after April; the London boroughs have received a 40 per cent suspension of smoke control orders (at the time of writing two boroughs have already had their orders lifted); supply of smokeless fuels is falling behind demand by about 400,000 tons. And the worst may be yet to come. Bad weather early next year, smog, a miners' strike, a shortage of ordinary coal could each and all make this a memorably unpleasant winter.

There is, however, another side to the story of smokeless fuels which is likely to be neglected during the present crisis.

Reports

It concerns the people who live in the areas where smokeless fuels are made and who pay the price for our enjoyment of air without smoke.

The town of Mountain Ash squats forlorn in the Aberdare valley set between hills like miners' knees. The surface of the earth is broken and bleeds dust from its open wounds. The grass is black with coal-dirt and the people all smell of soap. A shroud of yellowish smoke hangs over the town: sulphurous fumes fill your nostrils and permeate the atmosphere. Both smoke and smell, and the dirt too, come from the Aberaman Phurnacite Plant a mile or so farther up the valley. The hillside across from the plant is covered in dead and dying vegetation. It looks like a filmset for a science fiction horror movie.

Phurnacite and most solid smokeless fuels are made by heating ordinary coal so as to drive off the tar and smoke-producing constituents, leaving behind carbon and ash. But this process does not get rid of sulphur dioxide, oxides and sulphides of metallic radicals and other effluents. These escape into the atmosphere when the smokeless fuel is burned in your grate. So much for clean air. Of the effluent which *is* extracted in the process of making coke, a considerable amount escapes into the atmosphere direct from the smokeless fuel plants themselves. The people and other life in the vicinity of these plants are subjected to this pollution. If you sometimes wonder where the smoke from smokeless fuel goes to, ask them—they know.

The plant at Aberaman went into operation 28 years ago and in 1947 was taken over by the National Coal Board. The NCB have since made several extensions to the plant, which now produces over 800,000 tons of smokeless fuel a year with a projected 930,000 tons for 1971/72. Pollution has always been severe, but during the last seven years the situation has steadily deteriorated as the plant has expanded.

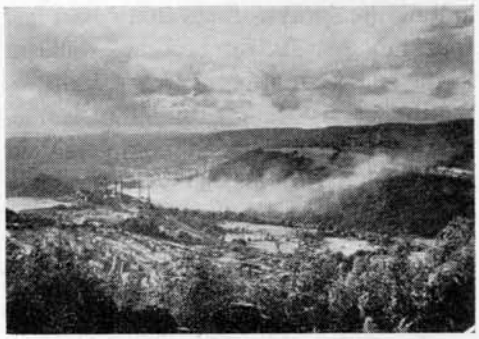
In 1963, however, one or two determined valley dwellers came together and formed the Abercwmboi Clean Air Committee specifically for the purpose of fighting pollution from the phurnacite plant. Since then it has campaigned intensively, holding meetings with the public and the NCB, organizing petitions, taking photographs, writing letters, even trying to force the Welsh Office to set up a public inquiry (though this was neatly side-stepped by the NCB).

In the last year or so the Committee's efforts have at least been rewarded by signs that the people of Mountain Ash are beginning to shake off their apathy and react positively against the filthy conditions created by the plant. The valley doctors have written to the *Aberdare Leader*, the local newspaper, expressing concern at the dangers to health arising from the dust and fumes and stating that bronchitis had increased in the area in recent years. The staff of the local Comprehensive School, situated in the shadow of the plant, have set up monitoring systems for measuring the amount of solid particles deposited in the atmosphere. And now the housewives are up in arms and ready to fight to the last. As one of them put it: "When you can't put a baby outside in a pram for more than an hour without its face getting covered in black smuts, I don't see how anybody can remain apathetic."

But although people are coming together at last to combat the pollution, no one wants to see the plant closed down. The old fear of unemployment is still very real. The plant provides about 800 jobs itself and many more in the five collieries serving it with coal, most of which would have to close down if the plant were to go. As it is one colliery is only being kept open because of the smokeless fuel crisis. But eventually the pits will close and the phurnacite plant will have to import its coal from farther afield. In the meantime new industries are staying away from the valley because of the pollution.

The NCB have met the barrage of complaints and questions over their plant with equanimity and polished answers. They recognize with requisite grace that all is not as it should be. The trouble, they say, is being caused by worn-out equipment which is gradually being replaced. They also admit that the Disticoke process, always used at the plant, although economic is not particularly clean. For this reason they set up an experimental plant on the site using the cleaner Balfour process, which was intended, so they said, to replace the Disticoke batteries.

But the experimental plant has been in operation now for over two years and has known nothing but technical difficulties and failure. Mildly put, it's a wash-out. The NCB do not seem overconcerned, but then why should they be? After all the Disticoke batteries do produce large quantities of first rate phurnacite. As for pollution, the NCB claim with pride that they have spent more than £½ million on anti-pollution measures. What they omit to say is that this amount has been staggered over a 20 year period. In fact the Coal Board appear never to have taken the Balfour process very seriously, as is borne out only too clearly by the new Disticoke oven nearing completion, and by contracts that have been made for a further three Disticoke batteries. These could increase pollution of the Aberdare valley by as much as 50 per cent.



Aberaman Phurnacite Plant

One aspect of the problem which the inhabitants of Mountain Ash find particularly galling, is the persistent rumour, circulated by the men who actually operate the ovens, that the pollution is largely avoidable given correct working of the plant. The NCB of course flatly deny it. However, I was told by Mr Williams, secretary of the Abercwmboi Clean Air Committee, that because of the national shortage of smokeless fuel a circular had recently gone round at managerial level which stated that nothing must be allowed to interfere with the smooth running of the plant. Production must go on at all costs. When I took the matter up with an official at the plant he denied categorically that such a document had ever existed.

At night the pollution from the plant is worse. The smell of sulphur is stronger and the fall-out of dirt, heavier. Nobody in Mountain Ash leaves their windows open at night or their cars out of doors. It is assumed that what anti-pollution safeguards exist at the plant tend to go by the board under cover of darkness. Whether this is so or not, heavier pollution by night is also caused

by a minor temperature inversion which forces the particles in the atmosphere down into the valley.

A temperature inversion is an interface in the sky at which warm air rising hits cold air and then inverts. According to Mr H. Harrop-Griffiths, an orthopaedic surgeon associated with the Sabrina Project and particularly concerned with the effects of air pollution on health in South Wales, "a temperature inversion in the Aberdare valley could very easily happen on a larger scale, given the right climatic conditions, and if it did, it would undoubtedly carry off a lot of people. We have in fact got another Aberfan building up under our noses."

To put all our minds at rest an Alkali Inspector is making a report on the pollution of the Aberdare valley, but it seems that his information will not be available for at least a year or so. Also comforting is the knowledge that a team from the University of Wales Institute of Science and Technology is making a study of the dead vegetation on the hillside opposite the plant, but their information will not be ready for three years. Meanwhile the likelihood of any serious measure being taken to halt the pollution is slim. But the people of Mountain Ash will not tolerate the fumes, dirt and dangers indefinitely. Already incensed, they could become militant.

The NCB claims that not all its smokeless fuel plants pollute as badly as the one at Aberaman. But whether they do or not it is evident that we are not getting our smokeless zones for nothing. Nor can we afford to fool ourselves that transferring pollution from one place to another has anything to do with controlling it. But smokeless fuel is less harmful than ordinary coal and the present crisis is in no way eased by learning a few ecological home-truths about smokeless fuels. A clean air policy, however self-deceiving, is better than none.

The real danger of the crisis is that it will have a long-term effect on the fight against air pollution in this country. As was pointed out by the North West Economic Planning Council recently "Interruption and delay to particular orders will reflect on total programmes, and once these have slowed down it will be a long and difficult task to regenerate the previous impetus." The irony of such a setback is that it may well rate as the most significant aspect of Britain's contribution to Conservation Year.

Charles Maclean

From Snowdonia

The Snowdonia National Park, site of a nuclear power station and associated dams, reservoirs, power grids and three proposed new pump storage schemes, is threatened again. Rio Tinto Zinc have applied for permission to drill for copper in a large area of the upper Mawddach, the river that forms the estuary inland of Barmouth, well known to tourists and salmon fishermen.

Although the public inquiry isn't to be held until December 15th, RTZ have been drilling for two and a half years. Apparently they can do so if they don't remain in one place for longer than a month. However, if they're caught out, all they need do is apply smartly for "permission to drill" and continue as before. A good case for plugging a legal loophole?

RTZ say they have spent £100,000 on drilling so it's to be assumed they've found what they're looking for. Deep mining in this area is impracticable. It's more likely that the mines will be opencast and there is talk of their being two miles square. With modern methods of extraction the area needn't look to a solution of the employment problem.

The local occupations are farming, forestry and tourism, all doing well. Forestry will survive but with an opencast mine farmers will be dispossessed and it will be the end of tourism.

But this is only one half of RTZ's project. Having made a survey of the estuary they have applied for permission to drill for gold which may lie on bedrock at a depth of 200 feet. Extracting it will necessitate a barrage across the river mouth and a dredger 300 feet long, 80 feet wide and 80 feet high. It would take 15 years to work the area and in the process it would ruin the salmon fishing and upset the ecological balance along the banks. In one place there is a raised bog, a site of special scientific interest which would be specially liable to flooding in the event of sluice gates in the barrage being unable to cope with flood water or melting snow. Farmland might suffer, floods could even back up and affect Dolgellau. With a northerly current in Cardigan Bay it is likely that resort beaches as far away as the Lleyn peninsula could be silted up, but the people who would suffer most would be the residents of the area, most of them incomers who came here to live because the estuary is one of the loveliest in Europe.

Gwen Moffat

The bugs fight back

Archie was a cockroach who lived in the *New Yorker* office. In Don Marquis's famous *Archie and Mehitabel* books Archie learned to write messages by jumping on the keys of a typewriter. One of his pleas was for a stronger cockroach poison to be left around: the boys weren't getting kicks from the old kind any more. At long last his request has been answered. They are changing the pesticide because *Blattella germanica*, the German cockroach, is now resistant to DDT and dieldrin.

James R. Busvine, Professor of Entomology as Applied to Hygiene at the London School of Hygiene and Tropical Medicine, believes that pest resistance to pesticides will prove to be a more serious problem than the pollution they cause. Already resistance is hampering disease control programmes in the tropics.

We usually think of pesticides in connection with the control of agricultural pests, but in developing countries they are used far more widely to control disease. Anti-malarial insecticides are sprayed on the inside walls of houses. In the early days of the anti-malarial programme it was believed that the disease might be eliminated entirely through prolonged control of the vector, the mosquito; and indeed this has happened in a number of countries. The insecticide ideally suited for the purpose appeared to be DDT, which is cheap, relatively safe to handle, and persistent, a factor which reduced the frequency of necessary applications. But DDT has been a victim of its own success. Its persistence and the widespread use that has been made of it have caused pollution and at the same time the mosquitoes themselves have evolved into strains which have the inherited ability to detoxify it. This is a serious problem in itself, but the response to the first appearance of resistance is likely to be an anxious search for alternative pesticides, some of which may pose a direct threat to

the health of those exposed during the application, increased pollution, and a further increase in resistance on the part of the pest.

Resistance is a response to pesticide use. In any population there will be individuals possessing the necessary metabolic pathways to detoxify the pesticide, or which simply have skins too thick for it to penetrate. These individuals will survive to breed. With successive applications the proportion of resistant individuals in the overall population will increase until resistance is sufficently widespread to render further applications useless.

The biological mechanisms by which resistance develops are now well known. DDT may be dehydroxychlorinated to DDE or oxidized to dicofol. Organophosphorus compounds can be hydrolized in various ways. The story is complicated by the fact that a number of enzymes and several metabolic pathways may be involved and detoxification may take place through any of them or through several simultaneously.

DDT is an organochlorine compound, a relative of dieldrin, aldrin, chlordane and heptachlor. The most effective alternative to DDT is dieldrin and one may be successful where resistance has reduced the effectiveness of the other. Nevertheless, such a substitution frequently provokes a similar resistance to the substitute. Because they are less persistent and are not carried along food chains, there is a preference nowadays for the organophosphorus compounds, such as malathion, but scientists have traced the ways by which insects may detoxify these compounds too.

Resistance is now widespread. Prof. Busvine and Dr R. Pal, a biologist in the Vector Biology and Control section of the WHO, have summarized the results of an investigation into pest resistance, particularly with regard to disease control. In an article in the WHO *Bulletin* they have reported that malarial mosquitoes in many countries are resistant to DDT and dieldrin and in the areas of the world where malaria is still a major problem eradication programmes are suffering severe setbacks. Yellow fever is transmitted by culicine mosquitoes and DDT-resistant strains are now invading parts of Central America and the Caribbean from which they had been eliminated. It is doubtful whether yellow fever can be eradicated at all. Typhus and relapsing fever are transmitted by lice but although a 1965 survey showed widespread resistance, the typhus control programme has not been severely affected so far. Plague has been eradicated from most of India, but there is concern that the malarial campaign may have produced resistant strains of the fleas that transmit it. There have been outbreaks of plague in Vietnam and control has been hampered by the resistance of the vectors. There have also been outbreaks in Tanzania. A number of enteric and ophthalmic diseases are carried by flies, but since there are also other ways in which these diseases spread the significance of the fly is difficult to assess. However, resistance among flies has now reached the point where chemical control does not work at all. Bedbugs are also resistant to insecticides and although they are not important disease-carriers they are a nuisance and a failure to control them tends to antagonise householders; this hampers anti-malarial campaigns. Chagas' disease is carried by the big tropical "cone-nose" bugs, which are naturally tolerant to DDT. Resistance to the alternatives, dieldrin and HCH, has been reported from Venezuela and Brazil. Trypanosomiasis, transmitted by the tsetse fly, has not been controlled with insecticides until recently. So far resistance has not presented problems, but the areas treated represent only a small part of the total area inhabited by the tsetse fly.

At a July meeting of the FAO Working Party on Pest Resistance to Pesticides, of which he is a member, Prof. Busvine made an urgent plea for more research into alternative methods of pest control. He reported on 600 cases of resistance, involving over 100 different types of pest. "And these only represent the cases we have verified," he said.

Although Prof. Busvine is concerned mainly with human health, agricultural pests are also acquiring resistance. Frank Wilson, who is in charge of the Sirex Biological Control Unit, said in a lecture on September 18th that about 250 farm pests are now so resistant that pesticides can no longer be used against them. The Battle of the Rats has also suffered a serious reverse recently when Warfarin-resistant strains finally broke through the cordon sanitaire that had confined them to Wales and the border counties.

We shall have to depend on pesticides for at least a decade, in spite of their diminishing effectiveness and the many dangers inherent in their use. However it is obvious that we cannot rely on them indefinitely. "I cannot put the case strongly enough for the need for new measures," Prof. Busvine told the FAO meeting, "It is no exaggeration to say the future of world agriculture may well depend upon it."

Michael Allaby

First annual conference of CoEnCo

Conservation or conversation? The joke may be corny, but the problem is real. There is a new division in the conservation movement, part generation gap, part political, part a fundamental difference in approach which arises from two quite dissimilar appreciations of the problem.

The traditional conservationist is concerned with wild flora and fauna. His aim is to preserve the species in which he has a particular interest. He opposes threats to them or to their habitats.

This is very worthy and very necessary. If he is challenged he will point out, quite rightly, that it is a poor civilization that has no room for corners of wilderness, that cares nothing for the survival of non-human beings. He may suggest that a reduction in the global genetic pool, particularly of plants, may be dangerous. If pressed he may say that the wild creature is like the miner's canary. If it cannot survive then how long will it be before man cannot survive either?

This argument was advanced at the first annual conference of the Committee for Environmental Conservation, which was held at Bedford College, London, on September 23rd. Mr Richard Fitter, of the Fauna Preservation Society, was replying to criticisms which had been advanced by some of the young delegates, who accused the conference of being concerned more with the "lesser crested grebe" than with man. They were right, and so was Mr Fitter.

The new conservationist has an outlook which is frankly anthropocentric. Man is at the centre, only now it is his survival that is in question. He considers man an endangered species, hell bent on his own destruction. The traditionalist regards him as a rather messy fellow;

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careless of the welfare of the other species with which he has to share the planet.

The aim of the CoEnCo conference was to present to other organizations a report which CoEnCo had prepared and which it planned to take forward to the October Countryside in 1970 Conference. CoEnCo hope to take over from the Countryside in 1970 Standing Committee the task of co-ordinating the work of the many voluntary bodies, local authorities, government agencies and ministries in the broad field of environment and amenity.

After a brief introduction by the chairman, Lord Molson, the conference began with an address by Mr Anthony Crosland, the Labour minister who was given overall responsibility for environmental matters.

The division between the two kinds of conservationist appeared at once, for Mr Crosland spoke of economic growth. The new conservationist is opposed to unbridled economic growth which he sees as the cause of the degradation of the planet, while the traditionalist may believe in "progress" and increasing prosperity which will provide the funds to clean up the mess. Mr Crosland steered a middle course. Economic growth at any price, he said, was a nineteenth century attitude not found today, but no growth at all would result in social atrophy. If the conservation movement were to adopt this view they might come to appear as an affluent group of people telling working people they could never enjoy a middle class standard of living. He was sure CoEnCo would not fall into this trap.

He spoke, too, of the achievements he has seen in improving the environment. Complacency is in the ear of the listener, but if you believe man's survival is in doubt talk of past achievements is macabre. Population growth, in Mr Crosland's view, is possibly the world's most serious problem, but one which does not concern Britain at the present time. He welcomed the fact that in the US ecology has become an election issue.

Mr Crosland listed what he regarded as four essentials: more research, more public expenditure, a central body to survey the field, and continued voluntary activity.

The conference then went on to consider, and adopt, four reports from CoEnCo sub-committees. The first, on water, summarized the present situation and made a number of minor recommendations. In the discussion, Laurence Hills of the Henry Doubleday Research Association called for stiffer penalties for pollution, and other speakers urged stronger legislation or more effective enforcement of the laws that exist.

Mr Stanley Cramp, chairman of The Royal Society for the Protection of Birds and vice-chairman of CoEnCo, introduced a report on environmental pollution, which consisted of a résumé of the main sources of pollution, including pollution by noise, and 25 recommendations, including immediate control of pesticide use and a ban on persistent organochlorines, legal controls on materials discharged at sea outside coastal waters, further examination of alternatives to the petrol engine, the suppression of chemical emissions from industry and stricter control of noise.

The sub-committee which considered the sonic boom found itself in difficulties for lack of information. It seemed unaware of the extensive research conducted in the US. It concluded that a continuing watch must be maintained while Concorde undergoes flight trials. Other speakers cited specific instances of damage caused by supersonic overflying and one said that Concorde costs £100,000 per day in damage, a cost which should be recovered from the operator.

The report on road transport recommended no increase in the maximum permitted weight of heavy lorries and stricter control of heavy traffic generally.

The conference ended with a discussion of CoEnCo's future strategy. Mr Rolf Gardiner, of the Soil Association, suggested three themes for exploration; a search for a thriftier style of consumption, the removal of cover from farmland, and the use of organic manures. Other speakers challenged the general acceptance of economic growth and the rate at which Britain consumes world resources.

The general tone of CoEnCo's first annual report was mild and in spite of the efforts of some of the smaller bodies represented, the debate never became animated and radical alternatives to our present industrial society were not considered.

It is one of CoEnCo's stated aims "to develop the process of explanation and education in environmental issues, particularly among townspeople and among the young." We must wish CoEnCo well. It is the most serious attempt so far to bring together the leading conservation and amenity organizations. It could become extremely powerful and could exercise a unique watchdog function over the whole environmental field. If it is to do so it must develop the teeth which at present it lacks. If it is to capture the imagination of the young it must be prepared to take account of their sense of urgency and it must consider and discuss openly the basic causes of the problem it attempts to solve. If it fails to do this, if it is timid and superficial, it will fail utterly. The day before the conference Mr Peter Scott gave a talk in which he challenged the concepts of economic growth and affluence. There is yet hope.

Michael Allaby

The Bangle Farm story

In November 1968 the Minister of Housing and Local Government, on the recommendation of his Inspector, rejected an application to quarry gritstone on Bangle Farm, Chantry, near Frome in Somerset. This application had been the subject of a Ministerial Inquiry which was expected to last four days, but in fact lasted for two weeks. To understand the reasons for this long drawn-out proceeding it is necessary to know something of the background of the quarry industry in the East Mendips.

Shortly before the 1947 Planning Acts a number of quarrying permissions were granted which were, of course, unrestricted. Most of the firms concerned were family businesses, giving employment to a neighbourhood badly hit by closure of the coal pits in the North Somerset Coalfield. Quarrying had always been a local industry. The slow extraction rate, however, allowed nature to recolonise a worked-out quarry with a rich variety of bird, plant and insect life.

In twenty years the situation has changed completely owing to the vast demands of road construction schemes, and the enormous increase of the extraction rate made possible by modern machinery. With a few exceptions national firms have absorbed the family businesses. This expansion has *not* been accompanied by an increase in the num-

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bers employed at the quarry workings. One company has even gone so far as to say that they have doubled their production with a reduced labour force.

A situation has arisen in the East Mendips where a seven-mile belt of expanding quarries is only interrupted by one mile of unspoilt country. It was local efforts to protect this "lung" of open country from the proposal to quarry gritstone on Bangle Farm that resulted in a presentation of evidence to the Minister's Inspector, who gave it considerable prominence in his report. This concluded by recommending that planning permission should not be granted. It may be of value to those struggling to protect man's environment to know some of the steps by which evidence was collected and the source from which help was obtained.

As the whole neighbourhood was already suffering from nuisances caused by dust, blasting, pollution of streams and waterways, and heavy traffic on roads totally unsuited for lorries, there was no question that objections were coming from only one section of the community. This was underlined by a three to one victory in a current Local Government election for the candidate who opposed the application. Advice on various aspects was sought from the Council for the protection of Rural England, the Angler's Co-operative Association, the Country Landowner's Association, the Mendip Preservation Society, and from individuals who were possessed of a familiarity with the natural history of the district. The Somerset Trust for Nature Conservation considered the matter to be of such importance that they were legally represented and their witnesses supplied evidence that was incorporated practically verbatim in the Inspector's report.

The Member of Parliament for Wells, who frequently received complaints in the past from constituents on the nuisance caused by the quarrying industry, judged this to be an appropriate moment to propose the setting up of an advisory committee which could handle complaints about dust, blasting, pollution and traffic problems. The Bristol Avon River Authority objected to the application because the authority feared, not only further pollution, but also a disturbance of the water system of the East Mendips. County and District Planning Officers, although naturally required to preserve a degree of detachment and to avoid partisanship, were invariably helpful when applied to for information.

In his conclusions the Inspector said that he was not satisfied that the Bangle Farm site was capable of yielding the suggested quantity of gritstone and that it was in the national interest that the site should be exploited. But from an ecological point of view his conclusions on the damage that would be done to the environment were even more important and interesting. He found it very important that this unspoiled valley should be preserved, and considered that the proposed workings would result in the drying out of the valley's eastern slopes with consequent destruction of the vegetation from which fauna and flora might still be able to re-establish themselves in the worked-out quarries.

Everyone working for conservation and ecological re-establishment in the East Mendips is only too well aware that perpetual vigilance is necessary. The result of the Bangle Farm Inquiry shows that time and money spent in this way is not always wasted. It showed that, even in the most desperate cases—such as in the early stages, Bangle Farm appeared to be—it is well worth presenting a reasoned plea for protecting the environment, and following it up energetically.

Only too frequently protesters have their mouths stopped by the insistence that some fresh ecological outrage is in the "National Interest", that combination of bugbear and will-o'-the wisp, whose benefits, if any, are invariably applied to areas far from the sufferings it inflicts. Often protesters are discouraged by the prospect of fighting large industrial firms with unlimited financial resources. If combined local effort expended on the Bangle Farm Inquiry has done something to undermine these misconceptions that effort will not have been in vain.

Violet Powell

Ecologue

DEMOLITION: GLASGOW 1970

I hate the long, slow death-by-torture
These houses die.

Made destitute first,
Tenants evicted.
Vendor dispossessed, they bare
Blind, greying faces to the vandal's stone.
Starved next,
Deprived of heat,
Water, light, they wait,
The due arrival of the disposal team.

Tile by tile the laths are bared
Till my nerves quiver as though skin were peeling
Strip by strip from off the reddening flesh.

Slowly lie revealed
The intimacy of cupboards,
The garrulous bravery of wall-paper,
The antique, ineffectual grate;
And unsupported floorboards sag beneath
The litter of disintegrating walls.

I do not care
That these were slums, insanitary, out of date, or that
Delinquents, rats and bugs infested them.
Their teeming life deserved a better death.

B. M. Cook

Ants

Busy ants, like the fingers of restless hands,
Run through the sands,
Bent on patterning mutely,
Minutely,
For ages and ages,
Innate images
Of industrious hills,
The ant production mills
From which ever new colonies grow,
Though the ants don't know
What all this is for and why this is so.

Claire Russell

No Daffodils

I wander'd lonely as a cloud
That floats beneath the stratosphere
But all the time my head was bowed
And heavy was the atmosphere.
Beside the lake, below the hills
There were no golden daffodils.

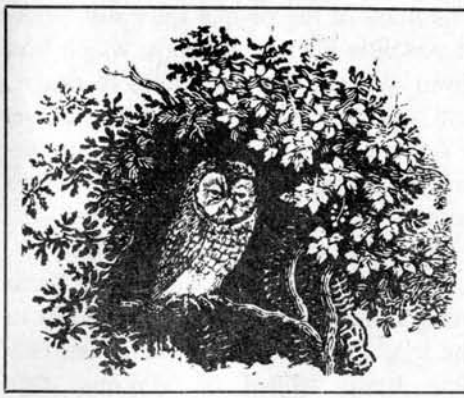
Continuous as the graphs did show
Fell particles of iodine
They came in never-ending flow
Along with strontium eighty-nine.
No cows did chew the grass that kills
—I saw no golden daffodils.

The earth was shrouded in a mist
Which reached across both land and sea
No living thing could now exist
With such foul air as company.
I gazed—and gazed—but all was still
There was no golden daffodil.

For oft, when in my tomb I lie
And ponder on this final state
I curse those men who did not try
To build a new world without hate
And then my soul with sadness fills
And withers with the daffodils.

With apologies to W. Wordsworth

Harold Goldstone



Comments

Cultural convergence

If two similar biological systems are subjected to the same environmental challenges, i.e. occupy similar ecological niches, the particularities of their respective behaviour patterns will tend to grow more and more alike, and if this process continues for a sufficient period of time, their original general differences can become obscured. This phenomenon is known as convergence, the opposite of divergence, and is one of the main features of biological evolution. Thus, the ant and the termite, which are of very dissimilar origin, one being descended from the wasp and the other from the beetle, have, as a result of being subjected over the course of many millions of years to similar environmental challenges, grown to resemble each other both structurally and behaviourally. Fish and dolphins provide another example, as do many marsupials of Australia with the placentals from other parts of the world.

There is no reason to suppose that cultural evolution does not occur in the same way.

The early ethnographers were mainly struck by exotic cultural divergences. Slowly, with the development of scientific method, the accent has shifted to the study of the much more impressive similarities between the cultural patterns of peoples occupying similar ecological niches. These were originally attributed to cultural contacts, or diffusion. But it can now be shown that similar cultural traits can be developed quite independently by people inhabiting different continents, isolated by oceans, mountain ranges, and other natural barriers, and who could have had no possible contact in historical times.

Take "ancestor-worship" or "communion with ancestors" as Jomo Kenyatta prefers to call it.

It appears to have characterised, to a greater or lesser degree, the beliefs and practices of practically all peoples at a certain stage of cultural development. Thus we find it among the Australian aborigines, the Indians of North and South America, the peoples of India and South-east Asia, and both the Chinese and Japanese. Lods tells us that it was the original religion of the Jews, Karsten that of the empire of the Incas, Fustel de Coulanges that of the ancient Greeks, and Robertson-Smith that of the ancient Semites. The latter goes so far as to say that his picture of religion, in which ancestor worship plays a preponderant part, "... holds good, I believe, for all parts and races of the ancient world in the earlier stages of their history."

The examination of magical practices leads us to a similar conclusion, as does that of the different rituals that punctuate the life-cycle of man in simple societies. Thus, initiation ceremonies appear to be common to all peoples, and very often they take similar forms. Among these, circumcision appears to be common to peoples as distant from each other as the Australian aborigines and the ancient Egyptians. The notion that during circumcision the initiate is swallowed by a large monster, who vomits him back to life, after which traumatic event the child qualifies as an adult of the tribe, is, according to Vergiat, common to the Urbunnas of Central Australia, the Anulas of the Gulf of Carpentaria, the Bukanas of New Guinea, the Sulkas of New Britain as well as to many other peoples of Australia, Oceania and Africa, such as the Bushmen of the Kalahari and the Manja of the Ubangui. Kenyatta points to the existence of this same belief among the Kikuyu and related tribes.

The study of social structures reveals astonishing similarities in those developed by peoples at the same level of complexity, and fulfilling similar ecological niches in totally distinct areas of the world. Bilateral extended families, unilateral clans, that may be patrilineal or matrilineal, rules of residence, that may be patrilocal or matrilocal, strict laws of exogamy and endogamy, age grades, secret societies, military societies, etc., are to be found among people as remote from each other as the Amerindians, the Bantu, and the Australian aborigines. Indeed, as Murdock writes, "Any structural forms can be developed anywhere if conditions are propitious."

The same is true of religious systems. Similar myths, beliefs and religious practices are to be found among peoples between whom there can have been no possible cultural contact.

Gray points to a striking example of such religious convergence: that between Christianity and the religion of the Sonjo of Northern Tanzania, which he considers was, "... developed independently (of Christianity), perhaps during a time of crisis, brought on by the incursion of the Masai into the region."

Thus, its similarity with Christianity cannot be explained in terms of cultural diffusion, and the two religions can only be regarded as adaptive reactions to similar systemic conditions, i.e. as very striking examples of cultural convergence.

Such movements, which were un-

doubtedly of a messianic or Revitalist nature when they were founded, seem to occur in periods of social disorder, after the breakdown of a cultural pattern, and their object is clearly to recreate a new one, more in keeping with changed systemic requirements. The literature on this subject is already very considerable. Norman Cohn shows how similar were the revolutionary movements in the European Middle Ages that are normally classified as heresies. Vittorio Lanternari shows how all the revolutionary cults developed by primitive peoples, whose cultures have been destroyed by contact with the colonialist powers, are but variations around this same theme. The most famous among these are possibly the Peyote religion among the Navahos, the cargo cults among the Melanesians, Rastafarianism in Jamaica, the religion of Handsome Lake among the Iroquois and that of Father Cicero in Brazil. These, however, are only a few among tens of thousands of such movements. In Nigeria alone, there are so many messianic movements developing as a result of the breakdown of local tribal cultures in an urban setting that the messiahs heading them have started their own trade union. Wherever they occur, whether it be among the tribal societies of India, Pakistan, China, Africa, Australia, or Melanesia, they will have many similar features: their leaders will have in common certain psychological traits, their doctrines will appeal to the same frustrated psychological requirements, and the responses of their adepts will be characterized by the same pattern of naïvity, self-sacrifice, and fanaticism. Lowie considered that a study of the messianic cultures of primitive peoples provides, "... an irrefutable proof that cultural traits can develop independently in distinct areas."

What is true of myths, social structures and religious movements, must undoubtedly be true of all cultural traits, and hence of cultures as a whole. Indeed, the latter can only be regarded as long-term adaptive responses, which, like all other behavioural responses, can be subjected to precise scientific examination.

Further reading

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Robertson-Smith, "Essays on the Religion of the Semites".
Vergiat, A.M., *Les Rites Secrets des Primitifs de l'Oubangui.*
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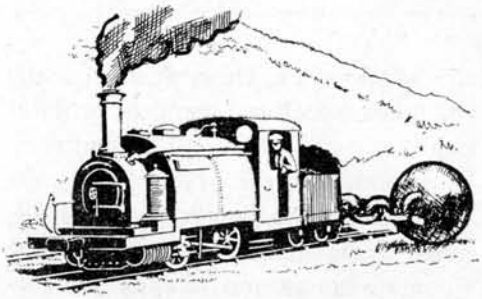
Energy-slaves



Slavery is today looked upon with horror for its undesirable effects both on the slaves and on their owners.

Gibbon, and after him, Lecky, regarded it as one of the chief causes of the fall of the Roman Empire.

Its pernicious consequences were indeed immense. As Lecky writes (A History of European Morals from Augustus to Charlemagne): "... In addition to its manifest effect in encouraging a tyrannical and ferocious spirit in the masters, it cast a stigma upon all labour, and at once degraded and impoverished the free poor. The poor citizen found almost all the spheres in which an honourable livelihood might be obtained wholly or at least in a very great degree pre-occupied by slaves, while he had learnt to regard trade with an invincible repugnance. Hence followed the actors, pantomimes, hired gladiators, political spies, ministers to passion, astrologers, religious charlatans pseudo-philosophers, which gave the free classes a precarious and occasional subsistence, and hence, too, the gigantic dimensions of the system of clientage ... And, above all, the public distribution of corn, and occasionally of money, was carried on to such an extent, that, so far as the first necessaries of life were concerned, the whole poor free population of Rome was supported gratuitously by the Government. To effect this distribution promptly and lavishly was the main object of the Imperial policy, and its consequences were worse than could have resulted from the most extravagant poor-laws of the most excessive charity. The mass of the people were supported in absolute idleness by corn, which was given without any references to desert, and was received, not as a favour, but as a right, while gratuitous public amusements still further diverted them from labour."

But there were other effects as well. Large scale agriculture quite apart from being detrimental to society, is also, in the long term, extremely inefficient (see One Jump Ahead of Malthus, *The Ecologist* Vol. 1. No. 1). And so agricultural production fell. Meanwhile the demand for corn increased as more and more unemployed thronged to the capital, and there was no alternative but to obtain if from abroad, in the form of tribute mainly from Africa and Sicily. This tended to reduce the demand for Roman corn and, as a result, agriculture became further depressed and the land fell to waste.

But slavery had still another effect: the economy became increasingly precarious. Slaves were not stable patriotic people as were the yeomen of old. They were wont to revolt. Also life-lines were long. As Lecky writes "Adverse winds, or any other accidental interruption of the convoys of corn, occasioned severe distress in the capital: but the prospect of the calamities that would ensue if any misfortune detached the great corn-growing countries from the empire, might well have appalled the politician."

Slavery was thus totally disastrous. It caused the destruction of rural society, the development of vast depressed and uprooted urban populations increasingly dependent on welfare, the decay of the countryside and ever greater dependence on food from abroad, in short, a society whose economy could be entirely disrupted by any number of accidents, one or more of which simply had to occur in the end.

Needless to say exactly the same thing is happening to us.

In the name of increased productivity we are methodically stamping out the small farmer and the small business enterprise and replacing them with giant and totally anonymous combines. In this way we are bringing into being a society made up on the one hand of potentates, and on the other of a structureless proletariat increasingly dependent on welfare, and increasingly lacking those moral qualities that characterized the yeomen and artisans whom they have now replaced.

At the same time our ever more in-

dustrialized economy is becoming increasingly dependent on imports of food and raw material from abroad, and correspondingly more vulnerable to any physical, social or economic changes that supply us with these essential products.

If the industrial proletariat is fulfilling many of the functions that the slaves once fulfilled in Roman society—their work is supplemented by a totally new type of slave, the mechanical or 'energy-slave'—whose exploitation enables the most impecunious member of our industrial society to vie with the richest Roman slave owner, in the 'standard of living' that he is capable of achieving. The term 'energy-slave' was coined by Dr. J. P. Lodge of the Centre of Atmospheric Research, Boulder, Colorado. He observed that if one calculated the energy required to maintain the American 'standard of living' and divided it by the amount of energy that could be furnished by one slave, this would give us the number of 'energy-slaves' in America. Divide this by the population of the USA and you obtain the number of 'energy-slaves' at the disposal of the average American.

This works out at an almost unbelievable figure of 500 'energy-slaves' per person. Now if there are two hundred million people in the USA and each has 500 'energy-slaves', then its true population is two hundred million people plus their one hundred billion 'energy-slaves'.

Dr Lodge speaking at the first National Congress of Optimum Population and Environment in Chicago said "The 'energy-slave' number also is the truest measure of our total impact on the environment. The wastes of these slaves comprise the true *pollution* problem, for 'energy-slaves' like humans must inhale air, excrete wastes, consume food (fuels) and dissipate their body heat.

"Overall, the *per capita* waste from 'energy-slaves' is probably comparable to that of humans, and, being foreign to the normal biological processes, many of the wastes from the 'energy-slaves' are far more difficult for the environment to cope with."

In additions, and this is not gone into by Dr Lodge, they contribute to the development of a depressed, decadent and highly vulnerable society, as is one whose 'standard of living' is artificially inflated by the exploitation of a vast slave-population.

ECY drowns in sewage

"I think the health and safety of the people is a damn sight more important than a wage claim." Thus spake brave Alderman Frank Marshall, chairman of the Association of Municipal Corporations. How we all endorsed this excellent sentiment—and how quickly the behaviour and statements of the Government, the employers, the unions, the press, and Alderman Marshall himself, demonstrated how little it was understood. For the Alderman was pleading not for the capitulation of the local authorities for the sake of a greater good, but against it. He was urging them to sit the strike out to save the extra £1 which was the cause of it all.

The local authority manual workers are some of the most ill-paid workers in the country. An ordinary sewage labourer gets £14-10-0 a week, a Class 1 operator £16-15-0. Overall, they wanted an increase of 55/-—20 per cent. Their employers demurred, offered 35/- (14 per cent), which they later raised to between 37/- and 38/- (about 16 per cent). Deadlock. For the unions the issue was clear: they deserved the extra £2-15-0. Likewise for the employers it was clear: they could not afford to fork out an extra £67 million. For the Government, benignly watching over the economic well-being of the land, clarity for it too: a 16 per cent wage increase was bad enough, one of 20 per cent was quite out of the question—the dangers of an inflationary epidemic much too great.

For their parts, the press and the public seem to have felt considerable sympathy for the strikers, recognising how essential their work is and how long they have been ignored. The consensus seems to have been that they deserve their extra 38/-, but that 55/- would endanger the nation. For economic and political reasons *The Times* (14.10.70) and in particular the *Daily Telegraph* (21.10.70) both spoke firmly against meeting the unions' demands in full.

Simple? Not quite. For the issue was only partially economic and political—it was also ecological. Before the strike, according to a spokesman of the Water Resources Board, England's rivers were among the cleanest in Europe. Now they are the dirtiest. At one point in the strike 5 miles of the River Ray and 10 miles of the Thames were grossly polluted and between 10,000 and 20,000 fish were lost. It is likely that the anglers, those champions of river health, will sue Swindon corporation for at least £25,000 to pay for restocking and restoring the fisheries to normal.

It took 10 years for the Lea Conservancy to clean up the River Lea and fish had only just returned to it. Now up to 100,000 fish have been lost, a two-mile stretch is entirely fishless, and Mr Ronald Toms estimates that "it will probably take another 10 years before the river becomes fishable again." In other rivers affected by the strike, it will take about 3 years for fisheries to be reasonably restored, but still 10 years for complete restoration.

None of this is news to those involved in the dispute, it has all been written up in detail by the press. For the unions Mr Derek Gladwin said, "We cannot be unaware that rivers are being polluted and there is a possible danger to health. That, in Conservation Year, is tragic . . ." A curious statement, suggesting that if it had happened last year or next year then it would have been all right.

But Conservation Year or no, we should no longer be prepared to allow so gross an insult to our rivers. We cannot predict the long term effects of, for example, the extra burden of industrial chemicals (the behaviour and properties of which when released as effluent are unknown). And ecological balance, once upset, may return in an entirely different form. This doesn't apply to rivers alone: nobody knows to what extent the bacteria in the activated sludge used to purify the water has been thrown out of kilter, nor how long it will take to get back to normal.

All praise then to the *Guardian*, which alone among the press, argued (16.10.70) that the dispute should have been considered in ecological terms. Nobody wants claims for 20 per cent pay rises right across the nation—but that is a risk we can afford to take. We can no longer afford to risk our water systems. The pig-headedness of most of the local authorities, the silence and inactivity of the Government, and the weary predictability of most of the press, are true measures of the meaninglessness of European Conservation Year.

Ecology Action

Conservation Directory

Many readers have written to us requesting the names and addresses of organizations active in the field of environmental conservation. The list here is by no means comprehensive and will be added to in subsequent issues of The Ecologist. *National or local bodies wishing to be included in the directory should send details to The Managing Editor, The Ecologist, 73 Kew Green, Richmond, Surrey, marked* **Conservation Directory.**

Readers who wish to protest against damage to the environment should begin by approaching their local authorities. The urban or rural district council or the county council may welcome support from a member of the public for its own objections to a private project. If the protest concerns public health in the broadest sense, then the local Medical Officer of Health or the Public Health Inspector may be able to help. If the protest concerns a river, stream or lake, then the appropriate river authority may take action. The addresses of all these organizations will be found in the telephone book, in main post offices and at the council offices.

If these approaches fail, or if the complaint is too general for them to handle, one or more of the following organizations may take up the matter.

The organizations are listed alphabetically and after each one there are key words which indicate its main value to a member of the public: *Protest* means the organization will take up individual complaints and pursue them; *Information* means it has a useful fund of information; *Direct action* means it sponsors work in the field. For ease of reference the following key suggests the main fields of concern of each organization:

A air
G general
L land
N noise
T towns and buildings
W water
Wi wildlife

It is as well to remember that many of the organizations listed are voluntary and depend for financial support on the subscriptions of their members and donations. If you are helped by one of them, think about joining or try to donate what you can afford.

W **Anglers' Co-operative Association** 53 New Oxford Street, London, WC1. (Telephone: 01–240 1339). Leading organization for anglers. Represents many local angling clubs and societies throughout Britain. Concerned about the pollution of inland water. *Protest. Information.*

N **British Association for the Control of Aircraft Noise** 2 Serjeants Inn, London, EC4. Supports the resiting of London Airport on the east coast and the redevelopment of the Heathrow site. Seeks to deprive civil airlines of their immunity from civil action for nuisance. *Protest. Information.*

G **British Society for Social Responsibility in Science** 70 Great Russell Street, London, WC1. (Telephone: 01–242 8535). Primarily for scientists, but welcomes lay membership. Led by young scientists and in touch with most British universities. Concerned with moral issues involved in the application of scientific and technological developments. *Protest. Information.*

W **Central Council for Rivers Protection** 10 Wyndham Place, London, W1. (Telephone: 01-262 9242). Association of organizations concerned with the control of river pollution. Has 24 member organizations. *Information.*

TL **Civic Trust** 18 Carlton House Terrace, London, SW1. (Telephone: 01–930 0914). Encourages high quality in architecture and planning. Aims to prevent and eliminate ugliness, whether from bad design or from neglect, and to stimulate public interest and inspire civic pride. Concerned with problems of urban development. *Protest. Information.*

WiLW **Conservation Corps** Zoological Gardens, Regent's Park, London, NW1. (Telephone: 01–722 7112). World's leading youth organization devoted exclusively to conservation in the field. Sends out parties at weekends and throughout the school and university vacations to work in and for the countryside. Its sites range from Cornwall to Sutherland, many of them in Britain's loveliest scenery. The work is hard, accommodation may be primitive and conditions may be gruelling. Volunteers are taught the theory and practice of conservation while they perform tasks of importance in the management of areas of natural habitat on nature reserves, national parks, National Trust land and farm land. *Direct action.*

G **Conservation Society** Hanyards Lane, Cuffley, Potters Bar, Herts. (Telephone: 2517 284). Concerned with man's relationship to his environment and population growth. Most vocal British organization urging a population policy for this country. *Protest. Information.*

L **Council for the Protection of Rural England** 4 Hobart Place, London, SW1. (Telephone: 01–235 4771). Strength in country branches, its headquarters will put individuals into touch with their nearest branch. Represented at many public inquiries, often effectively. *Protest. Information.*

L **Council for the Protection of Rural Wales** Meifod, Montgomeryshire. (Telephone: Meifod 383). See Council for the Protection of Rural England. *Protest. Information.*

T **Environmental Consortium** 27 Nassau Street, London, W1. (Telephone: 01–635 0726). Brings together specialists in all the fields likely to be affected in the planning of new urban developments. Advocates renovation of existing buildings in London before new ones are constructed and discusses and produces plans for new towns and cities which take account of the natural, as well as the urban, environment. *Protest. Information.*

L **Farm and Food Society** 37 Tanza Road, London, NW3. (Telephone: 01–455 0634). Small organization but an active one. Concerned with nutritional quality of food and intensive rearing of livestock. Has amassed considerable amount of information on this subject. Issues reports and takes part in protests. *Protest. Information.*

WiL **Fauna Preservation Society** Zoological Gardens, Regent's Park, London, NW1. (Telephone: 01–586 0872). Concerned with conservation of wildlife all over the world. Has access to much scientific information. Publishes a journal, *Oryx*, three times a year. *Information.*

L **Good Gardeners' Association** Arkley Manor, Arkley, S. Herts. (Telephone: 01–449 2177). Provides information, guidance and advice for those who wish to grow their own food without using artificial fertilizers or chemical sprays. Runs training courses for gardeners. *Information. Direct action.*

L **Henry Doubleday Research Association** 20 Convent Lane, Bocking, Braintree, Essex. (Telephone: Braintree 1483). Provides useful, practical information for the amateur gardener who wishes to eschew artificial fertilizers and chemical sprays. Co-operates with its members in conducting surveys and experiments related to horticulture. *Information. Direct action.*

W **Institute of Water Pollution Control** 49-55 Victoria Street, London, SW1. (Telephone: 01–799 1931). Learned society and professional association concerned with advancement of science and practice of water pollution control. *Information.*

W **National Federation of Anglers** 45 Belgrave Street, Derby. Sports organization concerned with improvement of fishery laws, development of fishing waters and combating of river pollution. *Protest. Information.*

A **National Society for Clean Air** 134-137 North Street, Brighton, BM1 1RG. (Telephone: 0273 26313). Aims to promote clean air in Britain by creating a body of informed opinion and by exerting pressure where it can. Large fund of information. *Protest. Information.*

TL **National Trust for England, Wales and Northern Ireland (The National Trust for Places of Historic Interest or Natural Beauty)** 42 Queen Anne's Gate, London, SW1. (Telephone: 01–930 1841). Exists to promote permanent preservation for the benefit of the nation of land and buildings of beauty or historic interest. Can declare its property "inalienable". *Protest. Information.*

TL **National Trust for Scotland for Places of Historic Interest or Natural Beauty** 5 Charlotte Square, Edinburgh EH2 4DU. (Telephone: 031–225 2184). Aims are similar to those of the National Trust for England, Wales and Northern Ireland. *Protest. Information.*

WiLW **Nature Conservancy** 19 Belgrave Square, London, SW1. (Telephone: 01–235 3241). Government-sponsored organization administered by the Natural Environment Research Council. Concerned with the conservation of wild flora and fauna. Owns and maintains national nature reserves and conducts research. Boasts one of the world's finest teams of ecologists. Great deal of information about wild animals and plants and effects on them of changes in their environments, including pollution. *Information.*

N **Noise Abatement Society** 6 Old Bond Street, London, W1. (Telephone: 01–493 5877). Aims to eliminate excessive and unnecessary noise from all sources by taking steps under existing law to protect the public from assault by noise, to press for enforcement of present laws against noise and for new byelaws where existing laws seem inadequate. *Protest. Information.*

L **Ramblers' Association** 124 Finchley Road, London, NW3. (Telephone: 01–435 5481). Protects rights of way on country paths, aims to preserve beauty of the countryside and secure right of public access to the open country. *Protest. Information.*

WiL **Royal Society for the Protection of Birds** The Lodge, Sandy, Beds. (Telephone: 076 78551). Protects wild birds and their habitats. Maintains thirty nature reserves as bird sanctuaries. Aims to educate the public about wild birds and to this end produces manuals, wall charts and other publications, and makes films. *Protest. Information.*

WiL **Society for the Promotion of Nature Reserves** British Museum (Natural History), London, SW7. (Telephone: 01–589 6323). Co-ordinates the activities of the county naturalists' trusts, which cover most of Britain. Trusts hold meetings and lectures and own and manage local nature reserves. Will put individuals into contact with their nearest county trust. *Information.*

T **Society for the Protection of Ancient Buildings** 55 Great Ormond Street, London, WC1. (Telephone: 01–405 2646). Advises on problems affecting old buildings and offers technical advice on treatment and repair. Circulates detailed index of threatened properties to prospective purchasers. *Protest. Information.*

WiLWG **The Soil Association** Walnut Tree Manor, Haughley, Stowmarket, Suffolk, IP14 3RS. (Telephone: 044970 235). Concerned with the relationship of man to his environment with particular reference to the long-term effects of farming techniques on the appearance of the countryside, on soil fertility and nutritional quality of food. Interested in the composting of urban wastes. Conducts research and issues publications. Advocates the production of food without use of artificial fertilizers or chemicals. *Protest. Information. Direct action.*

TL **Town and Country Planning Association** 28 King Street, London WC2. (Telephone: 01–836 5006). Issues reports, holds conferences, and publishes a monthly journal to promote an understanding of national and regional planning polices that will improve living and working conditions, safeguard the best countryside and farm land, enhance natural, architectural and cultural amenities and advance economic efficiency. *Protest. Information.*

L **Ulster Society for the Preservation of the Countryside** West Winds, Craigavad, Co. Down, N. Ireland. See Council for the Protection of Rural England. *Protest. Information.*

WiL **Universities Federation for Animal Welfare** 7A Lambs Conduit Passage, London, WC1, (Telephone: 01–242 9221). Promotes humane behaviour towards wild, domestic and laboratory animals all over the world. *Protest. Information.*

W **Water Pollution Research Laboratory** Elder Way, Stevenage, Herts. (Telephone: Stevenage 2444). Research into water pollution. *Information.*

Feedback

1 Beauty and the beer

There was no hope of reversing a decision to permit the building of a brewery in the Preston-Blackburn green belt, Mr Graham Page, Minister of State, announced at a public meeting. Subjected to a barrage of criticism, the Minister then made what was intended as a concession but may well confirm conservationists' worst fears. "It is a green area," he said "which needs very careful consideration before any infringements are made on it. It needs the same sort of consideration as a green belt although it is not such on the development plan." The inescapable conclusion was that even official green belts are far from safe from developments on the scale of the proposed 55-acre brewery planned for Samlesbury. A speaker from the Council for the Protection of Rural England said that to find the Minister of Housing making such a decision was "like catching a policeman with his hand in the till."

The Guardian

2 Final error?

The population of the world increased by 71 million in 1969—more than the combined total of everyone killed in both World Wars. This gain of 2.2 per second means that each day there were 190,000 more mouths to feed. Whether enmity between nations constitutes a greater threat to man's future than the daily avalanche of babies is debatable. Politics and economics are important, but biology is fundamental, and failure to recognize this in time and accord it priority could be man's final and fatal error.

The Lancet

3 Natural gas car

Sacramento's pollution control officer has tested a car converted to operate on liquefied natural gas, the same as that used for heating and cooking. On an 813-mile trip, he checked the volume of air pollutants emitted, the operational costs per mile and the performance of the car in various types of terrain. The test is aimed at reducing air pollution.

Los Angeles Times

4 The worm turns

Fifteen states have filed suits in the Supreme Court to force the four major automobile manufacturers to equip cars with better pollution-free engines "at the earliest feasible date". The states complained that for 17 years the major manufacturers conspired among themselves to squeeze out any competition for making and installing pollution control devices, in violation of the Sherman Anti-trust Act.

New York Times

5 Chicago crack-down

The City of Chicago has filed a suit to ban the sale of vehicles in the city if nine top automotive manufacturers fail to install effective pollution-control devices. Mayor Daley announced the suit and criticized the products of the nine firms as "inherently and imminently dangerous". Apart from laying down exhaust emission guidelines the suit also asks that manufacturers be ordered to recall all vehicles made since 1960 and registered in Chicago for free installation of the devices by June 30, 1972. Daley said contaminants from vehicles account for 60 per cent of the total air pollution in Chicago.

Chicago Sun-Times

6 Detergent restriction

A restriction on the sale of detergents or other cleaning agents which exceed a prescribed phosphorus limit is proposed in a new Chicago city ordinance. The limits follow recommendations by H. Wallace Poston, Chicago environmental control commissioner who has called for a gradual phasing out of the phosphorus content of detergents beginning on December 1st of this year.

Chicago Tribune

7 Poison in the Baltic

First steps to clear the Baltic of poison gas dumped there at the end of the Second World War have been taken by German authorities. The need for this action arose when fishermen found a mustard gas bomb in their nets last April and one was temporarily blinded. This, and cases of skin burning, led to widespread alarm and threatened to keep tourists away from the Baltic coast.

The Times

8 Carbon pollution key?

Contrary to the general view that excessive phosphates are the key factor in accelerating eutrophication ("ageing") of natural lakes—generating nuisance growths of algae and wide-spread stagnation—a new study suggests that excessive carbon may in fact be the critical factor. A new report by US biologist Pat C. Kerr, a Federal Water Quality Administration research scientist, claims that a recent series of experiments have demonstrated that carbon is the controlling factor in growth of the algae that are making waterways green and scummy. Although the studies confirm that the noxious alga blooms are dependent on phosphorus and nitrogen—important fertilizing elements—the extent that they stimulate growth is now said to be controlled by the abundance of available carbon, both in the dissolved form, as carbon dioxide gas, and as carbonate.

Sport Fishing Institute Bulletin, Washington

9 Ferromanganese shortage

There is growing concern among both buyers and consumers that ferromanganese could be in really short supply by early next year. This essential material for quality steel-making is currently in tight supply. It is feared that a genuine squeeze will develop in the coming months if world

demand continues to grow and if US domestic consumption, closely related to steel production, spurts ahead again.

Mining Journal

10 Wreckers

To our grandchildren we should be a generation that wrecked their world, without a thought for them, Mr Eliot Slater, of the Institute of Psychiatry, London, said at a symposium on human differences and social issues at the institute. Many changes could never be reversed. What was needed were new ethical principles and a humble awareness that the world is not ours to spend but is held in trusteeship. Our ethical values must be long-term, for an ethic that concerned itself solely with the here and now was already outdated. Future generations would think of us as one in which mankind multiplied without reason and without control.

The Times

11 California's sea birds

Evidence is mounting that a chemical calamity of unsuspected magnitude is striking species after species of sea birds along the California coast. Some populations are already threatened with extinction. It began with pelicans laying eggs with shells so thin and chalky they crumbled and broke before they could hatch. Now this has spread to egrets, herons, murres and cormorants. The calamity is apparently man-caused. The eggshell thinning is closely correlated with the presence of residues of chlorinated hydrocarbons from pesticides and industrial pollutants, most notably, DDT.

San Francisco Chronicle

12 Poachers' fraternity

The ease with which salmon poachers are able to obtain Cymag, a cyanide poison used legitimately for rabbit clearance and killing wasps, has been sharply criticized by Mr Leslie Steward, fishery officer with the Lancashire River Authority. His attack follows the poisoning of four Lancashire rivers with cyanide, resulting in the deaths of at least 500 salmon, 1,500 coarse fish and an unknown number of sea trout. A Lancashire poacher was recently fined £250 for poisoning salmon and there is a theory that recent attacks on salmon were made to raise money to pay his fine by other poachers.

Anglers Mail

13 General Smelting pulls out

Philadelphia's tenth-rank air polluter, General Smelting Co. is going out of business. After clouds of zinc-oxide fumes from their retort furnaces created a major visibility problem last year, the company had invested about $30,000 in pollution control equipment. It was facing an additional expense of up to $75,000 to curb fumes and smoke from a scrap preparation unit. Robert Nauer, plant manager, declared, "When a company has been unprofitable or marginal for a long time and then has big pollution-control expenses piled on top of its other problems, you've got to look hard at its prospects". General Smelting is the second Eastern Pennsylvania firm to go out of business within the last year under pressure of strict pollution control.

Evening Bulletin, Philadelphia

14 Paper victory

The Oxford Paper Co. has voluntarily agreed to close permanently a section of its paper mill at Rumford, Maine, to eliminate an alleged discharge of mercury into the Androscoggin River. Oxford's paper mill was one of 10 plants in seven states that the US Interior Department named when it requested the Justice Department to sue to stop the discharge of poisonous mercury.

Wall Street Journal

15 And another

In Wisconsin, the St. Regis Paper Co. has decided to shut down its pulp operation in the face of a $6 million bill for equipment needed to treat the mill's sewage to meet the State's standards. The shutdown, alluded to as "probable" in a St. Regis news release would affect about 100 employees.

Milwaukee Sentinel

16 Oh ozone!

Two plant pathologists at Rutgers University have warned that huge crops in the Garden State have died or are in danger of dying because of air pollution. The culprit is ozone, a chemical compound harmful to plants, which is formed when the ultraviolet rays of the sun react with burning gases. The most blatant examples of excess burning are automobile exhaust and factories emitting nitrogen dioxide into the atmosphere. Spinach production has dropped 63 per cent in the last 12 years as a result of excess ozone. Cabbage, lettuce and celery are also growing in diminished quantity because of the effects of dirty air.

Philadelphia Inquirer

17 With friends like these . . .

The chairman of the air and water control committee of the Chambers of Commerce of Great Baltimore told a sceptical audience of Northeast Baltimore residents that he was "not so sure that cleaner air means better health". John W. Stout, chief environmental engineer for the Baltimore Gas and Electric Company also warned of possibly dire economic consequences if strict standards for allowable air pollution in Maryland are adopted. Mr Stout said he favoured cleaner air (sic) but warned against the imposition of standards that would be too strict, and thus drive industry away from the state.

Evening Sun, Baltimore

18 . . . or these . . .

A Flambean Paper Co. news release suggests that *too much* pollution control might cut off fish food supplies. The firm said that a spent sulphite liquor evaporator installed five years ago reduced the biological oxygen demand in the river by 65 per cent, stimulating spectacular fish growth. If food escaping the plant were cut further, fish production might taper off. State fish experts concede that the mill's aerating might help but pollution experts note that stream readings of dissolved oxygen have ranged close to the two parts per million permissible. Bacteria growing on discharged sugars do feed the fish but the organisms also seriously reduce the fish's oxygen supply.

Milwaukee Journal

19 . . . who needs enemies?

The president of a Cecil county chemical plant testified today that the installation of either of two air pollution systems recommended by the state Health Department would be costly, complicated and a potential source of danger. He claimed that the "confinement" of air in fume-collecting ducts could result in build-ups of explosive levels and endanger the "community". *The Sun, Baltimore*

20 Hogwash

When Hog Builders Inc. of Nebraska put up a building on 40 acres of virgin

Missouri soil and set about raising hogs by the thousand, a farmer across the road could no longer enjoy pleasant evenings on his patio because of the stench, and the clear stream across his land became heavily polluted with their excrement. This sturdy yeoman, declared Professor James W. Jeans at a California Trial Lawyers Association seminar, sued Hog Builders for damages. "A Buchanan County jury knows how to evaluate these things," Professor Jeans recalled with relish, "and they gave the farmer $140,000 against this thin-lipped, blue-nosed Yankee bastard out of Nebraska." The lesson of this case is that good old-fashioned damage suits may well be the key to cleaning up the environment.

San Francisco Chronicle

21 Wrong end of the stick

Vitamin E might make people's lungs strong enough to withstand polluted air for longer than they do now, it has been suggested by some experiments on rats. Experiments by Los Angeles and New York researchers have shown that common elements of air pollution—ozone, a gasoline irritant found in smog and nitrogen dioxide—hasten ageing of the lungs, rendering them more vulnerable to disease. Rats which had been given vitamin E did much better in polluted air than rats which hadn't had it, experiments have shown.

San Francisco Examiner

22 Meat menace

Fresh evidence of the dangers to public health through the spreading of bacteria resistant to antibiotics is contained in a report in the current issue of the *Lancet*. An examination of 400 carcasses of pork and beef have shown that 82 per cent of the pork and 52 per cent of the beef were contaminated with drug-resistant coliform organisms capable of transferring their resistances of disease-carrying bacteria. Five per cent of the organisms from the pork were resistant to chloramphenicol, the only drug of value in the treatment of typhoid. This established a correlation between the use of antibiotics in animal feeding stuffs and the extent of antibiotic-resistant organisms in the animal.

The Guardian

23 Japanese nightmare

Trees and shrubs are dying from air pollution in the gardens of the Imperial Palace in Tokyo and the Emperor and Empress have been urged to spend as much time as they can away from the city. Tagonoura, once a picturesque village with a celebrated view of Mount Fuji is today a nightmare of a polluted port, clogged by slime from waste discharged into the water by paper factories. At Kurobe, a farmer daily pours away milk which cannot be sold because his 325-acre tract of land is contaminated by cadmium. Blindness, madness, children born mentally retarded or with defective physical co-ordination have plagued the mercury-poisoned inhabitants of Minamata and claimed 46 victims over the last 20 years. There can be no doubt that these disasters—and thousands of others like them—are a direct consequence of Japan's enormous expansion of industrial production during the last decade. *Los Angeles Herald Examiner*

24 US-Japanese co-operation

The White House has announced that President Nixon and Prime Minister Sato of Japan have agreed to an "intensified programme of co-operation in solving mutual problems". Japanese and US pollution experts will hold immediate meetings, it was announced, to map an accelerated programme of work. Special attention will be focused on air pollution problems such as those which hit the US and Japan in late July and early August. *Chicago Tribune*

25 When thieves fall out . . .

On the French Riviera, prefect René Thomas blames his polluted beaches on the human waste and industrial refuse that flows into the Mediterranean from nearby Italy. In Geneva, the Swiss claim their lake is contaminated by untreated sewage from Evian, the health resort, and other French cities on the southern bank. Swedish specialists accuse Great Britain and Germany of at least partial responsibility for their local air filth. "A confusion of pollution" European politicians dub it and tend to ignore the problem because of its international complexities. *San Francisco Chronicle*

26 The Tiber an open sewer

This summer will be remembered in Italy as the year of the poisoned sea. In most places pollution is visible to the naked eye and when the sea is calm, a wide band of scum hems in shallow-water bathers. The mouth of the Tiber and stretches of the popular beaches between Anzio, Ostia and Fregene which serve 3 million Romans are now declared unsafe for bathing. A legal dispute is now in process in Genoa after a magistrate countermanded the police magistrate's order forbidding bathing within 200 yards of any sewage canal. The degree of pollution registered by various institutes up and down the coast is said to be more than a hundred times above the safety level. It is estimated that 90 per cent of Italian industrial companies evade the laws and regulations on pollution. It is believed the cost of dealing with pollution is beyond the strength not merely of municipal finance but of the Italian state.

The Economist

27 Dirty Dutch dunes

A full-scale investigation has been ordered by the Dutch State Secretary for Health into reports that stretches of the country's coastline are polluted. A recent Belgian consumer report alleged that tourists are exposed to a variety of infections and serious diseases, including typhus and cholera. Scheveningen and Vlissingen were the two worst beaches named. The Secretary declared these findings might seriously affect Holland's tourist figures.

Travel Trade Gazette

28 Polluted Parthenon

Smog and jet aircraft sound waves are slowly destroying the Parthenon. "Within a few years the Acropolis will be hidden from our eyes behind a cloud of smog," a recent report by the Greek Chamber of Technology warned. The report claimed that the Acropolis monuments "during the last 25 years have suffered more damage than during the previous 25 centuries".

Los Angeles Herald Examiner

29 Phillipine initiative

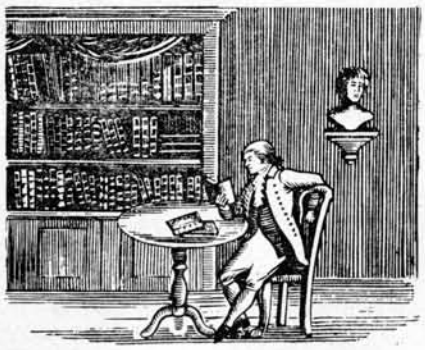
The world pollution crisis has sparked off a drive to clean up air and water in the Philippines, as yet a relatively little industrialized country. President Marcos has taken the lead in the new campaign with a personal directive ordering a clean-up of the environment.

Evening News

30 Imperilled penguin

There is now genuine fear that the rare Braying Jackass Penguin could become extinct. Flightless, it cannot escape from the oil pollution caused by increased shipping around the Cape of Good Hope since the Suez Canal was closed.

Evening News



Books

Key book *Every month a key book or books in the field will be described and analysed in this column.*

Shattered illusions

TOO MANY: a study of earth's biological limitations, by Georg Borgstrom, Macmillan, New York.

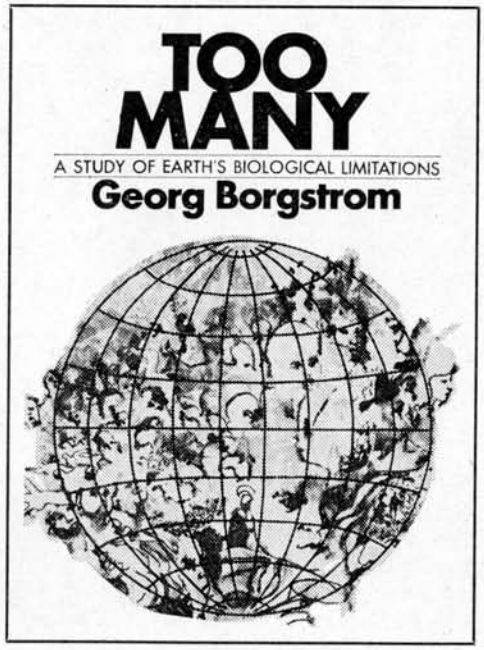
If you are alarmed that there are too many people in the world you'd better think again. At a recent conference held in Aspen, Colorado, a number of well-known scientists and intellectuals got together to discuss the role of technology in the world at large. They may not have been unanimous about very much, but very few, if any, disputed with the chairman, Professor Roger Revelle of Harvard, when he stated that the earth could support 50,000 million people if only existing agricultural techniques were applied efficiently to all cultivatable land. And that by encouraging economic development the population of the world would finally reach a stable level. This was reckoned at some 15,000 million; just about four times the present amount.

Many people are delighted to hear this sort of thing. It's most reassuring to think that the world is nowhere near too crowded yet, and that with a bit of planning and ingenuity there should be plenty of the goodies of life for all. It also means that the prophets of doom such as Paul Ehrlich, even when stridently eloquent, can be shrugged off as alarmist and thought to be well-meaning distorters of the truth.

But can we shrug off Borgstrom, who has spent a lifetime studying the nutritional problems of developing countries? His training is unlikely to make him an alarmist of the doom-gloom type, and yet his book *Too Many* makes just as much impact as any of Paul Ehrlich's controversial and explosive statements. And like Ehrlich he shatters a few glittering illusions.

Science and technology are credited with having transformed agriculture from something inefficient and rudimentary to its present state of superlative factory-like productivity. Such a claim is one of the first myths to crumble under Borgstrom's analytical gaze.

Countries like Britain, Holland and Denmark pride themselves on their high agricultural productivity, but just how do they achieve their magnificent results? According to Borgstrom their success has less to do with know-how than with rank exploitation of developing countries. Though they can ill-afford it, these export vast quantities of valuable food as fertilizer or animal feedstuffs to the rich developed nations. The internationally-backed Peruvian fisheries, for example, export almost all their sea-catch to Western Europe and the United States. The total quantity of protein exported in this way, is equivalent, Borgstrom estimates, to the



total South American production of meat. And yet the Peruvian peasant continues to live on a bare subsistence diet.

He tells the same story with regard to the protein-rich oilseeds, such as peanuts, sunflower seeds, soybeans and cotton seeds. No less than 95 per cent of these go to Western Europe, primarily to Britain. The total amount comes to some 1.5 million metric tons of protein. "Enough" says Professor Borgstrom, "to raise by 50 per cent the protein content in the poor diet of the malnourished of the world."

Borgstrom's book is full of facts and figures such as these and we can no longer ignore Paul Ehrlich's claim that the worst signs of population excess are to be found in the rich 'over-developed' nations of the world rather than in the poorer developing nations. Ehrlich estimates the population size of a country according to what it consumes, and in such terms the United States far leads the world; for with a population size of six per cent of the total world population it consumes between 40 and 50 per cent of the world's resources presently being used.

Many people argue that the only way to tackle the inequalities between the developed and developing nations is to raise the standard everywhere. There is room and food for all, they claim and they look to land that has still to be brought under the plough, to deserts which with a little water judiciously applied will flourish again, and also to the oceans teeming with unlimited quantities of exploitable food.

A few choice facts from Borgstrom and reality becomes more forceful than fiction. The good land has all been taken years ago, he says, and the 1,800 million acres that are left are second or third rate stuff. Even producing maximally this land could not feed more than 15 years' growth of the present world population.

The idea of reclaiming vast areas of desert is excellent on paper, but where will the water come from? The rate of evaporation is so high that the cost of getting water to the desert is prohibitive; it is a matter of robbing Peter to pay Paul.

The tragedy of deserts is that they are largely man-made and man's record in the 20th century is worse than it has ever been. Professor Borgstrom points out that in 1882 the deserts and wastelands of the world comprised about one-tenth of the total land area. They now comprise well over one-quarter of the total land area, and yet they expand.

For years man has been talking about exploiting the oceans as if they were a new, hitherto unexploited resource. It is now apparent that the oceans have already suffered a great deal of damage at the hands of man and that productivity instead of going up as would be expected with the expertise and technological aids now employed, is going down, sometimes precipitously. As a result, fishing fleets are having to sail further and further away from their coastal waters to make significant catches.

But much nearer home man is facing one of the most terrible problems of all; his fresh water is not only being soiled by industrial effluent, agricultural run-off and urban sewage, it is vanishing, and vanishing fast. And without water man will not be able to grow food, let alone run his industries.

Once again the developed nations lead the world in the art of water exploitation; water is used lavishly on the land to get maximum crop growth, it is used in ever-growing quantities by industry and polluted in the process, and not least it is used extravagantly by the housewife.

Crops and the livestock that feed on them require enormous amounts of water for their growth. Wheat for example needs 350 to 500 pounds for every pound of organic substance grown, and rice, grown in the heat of the tropics, requires as much as 2,200 pounds of water per pound of crop. Borgstrom reckons that the average American eats daily food that has consumed 3,500 gallons of water in its production. If everyone in the world ate like the average American there wouldn't be a drop of water left on the land. So much for everyone in the world attaining the American standard.

There are also many disastrous things going on throughout the world as a result of man's well-intentioned pursuit of greater and greater productivity from the soil. Professor Borgstrom lists many of them: the insidious and ultimately lethal build-up of salts and the formation of a hard-pan layer as a result of excessive irrigation in hot climates; the wearing out of soils through double-cropping and the lack of fertilizers whether natural or artificial to replace what has been mined out from the soil; the constant battle that has to be fought against pests particularly when the same crop has been grown year after year, and the spread of weeds that defy attempts to eradicate them.

But it would be unfair to suggest that all Professor Borgstrom has sought to do is to present a grim and disheartening picture. He has also looked at the good things going on in the world—where soil fertility, and not maximum short-term production, are still the ultimate aims.

The proper use of sewage and of animal manure are of prime importance in trying to re-establish some kind of equilibrium. They must not be dumped wastefully and irresponsibly into fresh water and into the sea where they cause eutrophication and upset the established ecology. The lesson could hardly be brought better home than by the recent municipal workers' strike.

One suggestion he has is to pursue fish farming on a bigger scale than is at present being carried out. As long as a proper balance is maintained and eutrophication avoided fish farming can be highly successful. Indeed it has a long history; and the Chinese have been expert in the art of raising carp and such fish since long before Christ.

Too often he says, well tried methods are being chucked out for novelties which in the long run cannot possibly have any future. One good example is the extensive use of nitrogen fertilizers. These are manufactured chemically—and the basis for the fixation is the burning of fossil fuels, but we know the fossil fuels are not going to last more than about half a century.

Nature has an alternative which is totally dependent on the sun for its energy: the nitrifying bacteria which live in the nodules of leguminous planets. These not only fix nitrogen *in situ* and avoid all the heavy transportation costs of the manufactured nitrogenous fertilizers, they also improve the structure of the soil by providing an organic basic. Professor Borgstrom, like many others, suggests that any sort of arable farming other than a proper rotation of crops using legumes such as white clover, beans, alfalfa or whatever, is utter folly.

The present trend in farming, particularly in the developed countries is to make it more and more intensive and to use every mechanical and artificial ploy to increase productivity. Farming has become *agribusiness*, and the small farmer who relies on labour rather than machinery and artificial aids is being squeezed out. The dangers of this new kind of baronial structure are very real for the structure of the countryside including rural social life and the arts and crafts that went with it is being eroded.

Professor Borgstrom points out that the labour intensive farm because it is based on sound principles such as energy derived from the sun rather than from fossil fuels, the recycling of waste and increased nitrogen and humus content of the soil through the use of nitrogen-fixing legumes, is more likely to be productive in the long run. By the same token he does not see a scientific or technological breakthrough in food production as solving the present desperate food shortage in many parts of the world. Important of course and terribly neglected are the problems of food storage and distribution.

"But," he says, "if we are to feed adequately the 3,500 million now living let alone any future additions to our population, it is imperative that we abandon our present hazardous ventures in favour of realistic and workable programmes that take account of the obvious limitations that prevail for man's existence."

Peter Bunyard

Calamity supermarket

THE DOOMSDAY BOOK by Gordon Rattray Taylor, Thames and Hudson, 42s.

This autumn was a sad, bad season for those concerned with the real future of Britain. Not the future of pay packets, consumer goods, economic indices, but the future of overpopulation (*more* overpopulation), vanishing countryside, simple survival. The poverty lobby mounted its biggest campaign so far to press the Government for family allowances for the *first* child (as well as increases for nos. 2, 3, and on and on), which would have the effect of encouraging young couples to breed more, more quickly. *The Times* reported renewed pressure by the Ministry of Defence (already ruining about 200 miles of coastline and estuary) to seize the wilderness of Pembrey Sands and turn it into a target range. At the British Association a professor of forestry urged us to fill up our woodlands with race tracks, discotheques and dance halls. In the magazine *Futures*, a professor of building science suggested that cheap nuclear power could turn the outdoor environments of Wigan and Bootle into the equivalent of the Bahamas or Barbados—no matter the ecological effects, so long as there might be winter sun tans for humans.

Yes, a bad autumn indeed—but for the publication of this, Gordon Rattray Taylor's latest catalogue of what may truly befall the swingers in their wooded discotheques, the ten-child families with their fat wads of state assistance—*all* of us, everywhere in the world. And a chilling catalogue it is too, its warnings the more terrible not only because they may well be shrugged off by officialdom as panicky science-fiction but because already they may well have come too late. The author is conscious of this; thus, he quotes Dr David Price of the US Public Health Service who, as long ago as 1959, warned: "We all live under the haunting fear that something may corrupt the environment to the point where man joins the dinosaurs as an obsolete form of life . . .And what makes these thoughts all the more disturbing is the knowledge that our fate could perhaps be sealed twenty or more years before the development of symptoms."

The only thing wrong here is that it is not a corrupting *something*, but a multitude of things—and that indeed is what *The Doomsday Book* is all about, a kind of supermarket of calamities: move along the shelves with your wire trolley and take your pick. There is choice and variety aplenty, so ingenious (while at the same time bumbling) is man at devising the wares of self-annihilation. They are wares familiar to anyone who in recent years has taken seriously the Barry Commoners and La Mont Coles of this world. *The Doomsday Book* is not an exercise in originality and introspection but a journalistic compilation of the forecasts of others. For the first time, they are all packaged together, professionally, clearly, readably.

Though they are not so segregated, the horrors fall into two categories: those disastrous within geographical limits, and those disastrous on a planetary scale. Of the first sort we have, say, the ever-lengthening roll call of the world's lakes already polluted beyond recall. Europeans tend to be especially smug about this particular villainy, for they have always the Great Lakes of America to accuse, the largest body of (supposedly) fresh water in the world, an area larger than the whole land surface of the United Kingdom, much of it, by humankind's abuses, now devoid of all life. But Rattray Taylor exposes this smugness with a depressingly long list of Europe's lakes already gone, or fast going, the same way: Zurich, the Tegernsee, Orta, Schliersee, Balaton. Or we have the supremely confident (ecologically supremely ignorant) "planetary engineers" with their schemes for damming the Amazon to create an inland sea a third the size of France, for originating a new sea-level Panama Canal by a fantastic sequence of nuclear blasts, for blowing apart a stretch of northern Australia's coastline to make an enormous iron ore port. (This latter proposal would have reached the explosion-point this year but for the customers of the iron ore, the Japanese, rejecting the ore on grounds of its price—a rare example of tough-minded economic considerations, rather than hastening environmental deterioration forestalling it.)

But not forestalled, as Rattray Taylor reminds us, are many already completed projects whose ostensible benefits may well prove to be obliterated by long-term hazards un-

expected or unheeded at the time, the cautions and admonitions of soft-boiled conservationists smothered by the hard-boiled economists, engineers, politicos. Consider the great Nasser dam, with its biological backlash: it has all but destroyed the Mediterranean sardine-fishing industry and has alarmingly spread schistosomiasis because the new irrigation ditches provide the perfect habitat for the snails that are the host of the disease-spreading blood-fluke. Added to this, it is reckoned that seepage losses from Lake Nasser are so great that the whole of the Nile discharge may be lost during the first twenty years of the dam's life, and there may be less water for Egypt than there was before the dam and vast lake were made by man.

Of the possible—probable?—disasters on a global scale, the author catalogues both what might be termed the accidental or negative, and the intentional or positive. Complacency, ignorance, faith in yet more technology to solve the crises created by present technology—all these can contribute to the first sort of catastrophe: the destruction of mankind by poisoned air and water, or by his own overblown ego (the failure to appreciate that he is "but one of three million species, each one of which is dependent on many others for its existence"), or by simply over-producing his own kind until the inevitable population crash.

Such a future will result from heedlessness, lack of control, and sins of omission, greed, selfishness. But there are yet greater sins, ones of *intentional* meddling with the biosphere in the name of Progress when, in fact, the consequences could mean the end not only of Progress but of Man himself. Melting the polar ice caps and swamping the world's coastal cities, raising (or lowering) the temperature of the planet until life is impossible—Rattray Taylor exposes these and numerous other lunacies of Man the Meddler. In *The Doomsday Book*, he has assembled in one place, in layman's language, everything we know so far about the real future that awaits us unless we swiftly change our ways, attitudes, ambitions. Rattray Taylor is understandably unhopeful of our doing this, and in the end the 300-plus pages of *The Doomsday Book* serve to support and expand a warning issued early on in the book: "The one solid fact which emerges . . . is that man is now so numerous and so technologically powerful that he is affecting the entire environment. What those effects will add up to, we simply do not know, but we do know that they are so large that, in one way if not another, they could be catastrophic. They could even put an end to life as we know it."

John Barr

Buildings that shape us

EUROPEAN CITIES AND SOCIETY by James Stevens Curl, Leonard Hill Books, 75s.

Our knowledge of past civilisations is based, to a large extent, on the buildings which have been left for us to examine. Literature, if it survives, can tell us much, but it is the settlements, the villages, towns and cities which provide an insight into the daily life of the people, their achievements and their dreams, their view of themselves and their world. So they are judged: so will we be judged.

This is inevitable, because buildings tend to last longer than other artefacts and town plans are not easily obliterated even though the towns themselves may have crumbled. It is also proper and a valid standard by which to judge peoples. Civilisations are based on towns which provide art, science, religion, philosophy and government and which exert their influence over the surrounding countryside. It is in their towns and cities that civilisations express themselves.

It should be possible, therefore, to trace the history of a civilisation through the design and construction of its cities. This is what James Stevens Curl has done and in *European Cities and Society* he derives standards from the past which he applies to contemporary urban development. The conclusion he reaches will come as no surprise to those who find life in suburbia stifling, but it may and should shock profoundly those who elevate modern technological attitudes to the status of a philosophy and who believe that our motor cars, television sets and washing machines set in tower blocks of flats surrounded by wide expanses of grass represent the highest achievement of the most advanced civilisation the world has ever seen.

Mr Curl is an architect and he cares deeply about the townscape and the almost indefinable qualities which make a town pleasing to look at. No doubt he is biased and his aesthetic standard subjective, but he advances forceful arguments and provides telling examples.

His main theme is that the urban environment is controlled by the dominant sector of society. It is the baron who builds the castle and everyone else must learn to live with it. If anyone should doubt that "public opinion is the negligible factor in government" let him think for a moment of a modern housing estate. Who designs it and by whom is the design accepted? Certainly the prospective inhabitants are not consulted. Cities then, can tell us much about the dominant forces in society and their view of the world and of themselves.

Cities contain—or used to contain—symbols. In the past many were built to a mandala pattern. Basically circular, this is an archetypal image representing the awakening and preserving of life according to Jungian psychology. This idea persisted right into the Utopian designs of certain nineteenth century visionaries, but as the importance of symbolism declined after the Renaissance a division appeared and the union of image and object was lost.

In all the earlier civilisations religion was an essential part of life. It was Apollo himself who ordained the site of Delphi. The Romans, however, had no religion which was truly their own and absorbed ideas from all parts of the Empire until they became "connoisseurs rather than creatures". They were superb engineers but their improvements on what they inherited were purely technological. The Empire was spiritually empty and eventually a malaise set in. Monuments became more grandiose, the proletariat was kept amused by vast, bloody and degrading spectacles, and the Baths were monumental pleasure palaces. "The grossness and vulgarity of life under a succession of debauched emperors was distinctly mirrored in the coarse facadism of the public buildings of the time, glorying in richness, voluptuousness, and enormity." By the reign of Trajan (AD 98-117) the ordinary Roman lived in an apartment and the maximum height of tenements was reduced from 70 to 60 feet to reduce the danger of fire and collapse. Thus the growth of magnificent public building was accompanied by declining standards of housing for the people.

After the fall of Rome urban civilisation did not die out entirely, although the invaders of Britain were more anti-urban than those which occupied southern Europe. Medieval cities were dominated by secular buildings, castles, town halls and market places as well as by churches, and the symbolism, particularly of the churches, was rich. Mr Curl traces the decline of the Medieval city and the rise of the new, unwalled towns. During the fifteenth and sixteenth centuries designs began to appear for ideal cities. Generally they were based on a mandala plan and some of them were actually built. It is interesting to note that Wren's London was not dominated by a palace, but by the Stock Exchange.

The story continues to the nineteenth century. Much of what was built then is now being demolished in favour of new developments. "Officially recognised slums correspond in number with the amount of housing a Government intends to demolish in a period of time plus an amount it has decided to clear later." Of modern housing schemes Mr Curl says: "The wastefulness of the windswept 'open spaces' at the bases of tower blocks; the filth and impersonalisation of communal spaces; the useless balconies; and the hearty dislike with which the tenants view the robust concrete finishes of their environment gave birth to outbreaks of violence against the buildings." The alternative may be suburbia which "evolved its own styles, founded on the debasement and misunderstanding of every known form carried to unrecognisable lengths. Its cosiness, its denial of both the scale and essence of town and country have made it a symbol of our society in our time . . ."

What has gone wrong? The dominant power groups today are the business corporations and central government and their fear of personalities of stature has led them to favour mediocrity, which has a destructive power of its own. Specialised disciplines have created islands in our culture and we have lost a sense of unity, of "wholeness" and, with it, the feeling has gone from much of our environment.

There is a parallel with the latter days of the Roman Empire. Though there is hope, the message is apocalyptic. Our society is fragmented and spiritually exhausted. Like Rome, we create massive civic buildings and live in squalor.

The rather high price of the book is justified by the 131 half tone illustrations and a large number of line drawings and diagrams. Mr Curl's assessment of the state of our environment bears out views arrived at independently by a number of eminent ecologists

and must add greatly to the weight of argument in favour of radical changes in our attitude to ourselves and to the world around us which must take place if we are to survive.

Mike Allaby

Environmental squalor

THE ASSAULTS ON OUR SENSES by John Barr, Methuen, 50s.

"In Britain today our senses are being peculiarly and extravagantly abused. In town and in country an ever-spreading ugliness assaults our eyes, ever-increasing noise assails our ears. New and hazardous pollution of air and water offends our noses and threatens our very bodily wellbeing. At the same time taste and touch are more and more unsatisfied by the drab and uniform products of this technological age. We seem no longer to trust the messages of our senses, nor heed their warnings."

Thus, in his latest attack on environmental squalor in modern Britain—this time, squalor in the widest sense of the word—John Barr sets out his theme.

His book is an assembly of evidence which points inexorably to the conclusion that life in Britain in the 70s and beyond will become ever more intolerable unless the controllers of power—and all of us—fully awaken to the threats and, once awakened, bring the legislation and controls, money and commonsense required for the enormous task of saving what is still worth saving, repairing what is still reparable, preventing what is still preventable.

Two-thirds of his tract is devoted to an examination of the assaults and outrages of a technology-directed-dominated society upon, in turn, our senses of sight, hearing, smell, taste, and touch.

The chapters devoted to sight deal necessarily with a highly subjective area of human experience. To some extent, no doubt, beauty *is* in the eye of the beholder, and not everyone may agree with John Barr's strictures against pylons in the countryside, high-rise office blocks in old towns, motor cars littered about Georgian squares. To some, these are the inevitable and acceptable concomitants of the Good Life; and surprising as it may seem, pylons, skyscrapers and motor cars all have their advocates on purely aesthetic grounds too.

The section on smell—which he expands beyond simply disagreeable odours to the positive threats to human health—is less controversial. Pollution has many purveyors but few proponents, and the author compiles a persuasive dossier which shows that those two most vital elements, air and water, are fast deteriorating to danger point. With taste—foods dosed with pesticides, antibiotics, artificial flavours and colours—it is more often a matter of blandness, uniformity, though the author does not ignore the perils to the human body of the food processors' manhandling of our diet, often with chemicals inadequately tested for long-term effects. In discussing touch, John Barr is again on disputable ground: the veneers and plastics and synthetic fibres which so displease him have their defenders, if only because they are usually cheaper than natural products, bringing the artefacts of affluence to the great mass of the people. Most successful are those chapters devoted to noise on the ground and in the air, where he manages to simplify, with no more distortion than is inevitable in a serious journalistic treatment, a very complicated subject. The clattery future of this nation, which he christens Great Thunderland is summed up with a call for action: "Short of variable ear flaps we can seal ourselves up in double-glazed, air-conditioned, plastic-wool-lined rooms and go about with earplugs in or earmuffs on. But this would require tolerance of technology's assumptions about our tolerance of all things noisy. And on the issue of noise, it is time—past time—for intolerance."

The conclusions of this useful handbook of environmental squalor are far from complacent, though the author's proposed solutions suffer sometimes from vagueness and rather too much confidence in the good sense of industry and government to put things right before Britain becomes a place hardly worth living in. In his closing pages, John Barr struggles for optimism, but practically everything which has gone before belies that optimism. And even his pessimism may well be attacked by some, particularly the young, who may accuse him of interpreting the assaults on our senses from a too middle-brow, middle-class, middle-aged viewpoint. Such critics may be the inhabitants of a possible "pop" tomorrow, of which Professor Colin Buchanan has written: "There could be a real change of values. People could begin to say, 'Well, we rather *like* an element of danger in the streets; we like traffic noise, it is somehow involved with the excitement of city life; we do not all object to the squalor and the untidiness.' " If this comes, asks John Barr, "might people in fact find poetry in junkyards and spoil heaps instead of brooks and stones, be inspired by supermarkets and neon signs, not by trees and clouds? Might they eat anything so long as it is cheap, available and looks the right colour? Live anywhere so long as it is centrally heated and easy to reach by car? Or may there be a kind of technological blacklash? Are tomorrow's people quite so clearly ready to embrace a technological world?"

We can only pray that the backlash *is* coming and that tomorrow's people will not so readily let technology manipulate their environment, their lives. If not, tomorrow's Britain will be as grim as this book suggests.

Laurence Hazard

Ecology in paperbacks

PESTICIDES AND POLLUTION, by Kenneth Mellanby, 8s. THE SEA SHORE, by C. M. Yonge, 12s. THE OPEN SEA—ITS NATURAL HISTORY, by Sir Alister Hardy, 15s. THE WORLD OF THE SOIL, by Sir E. John Russell, 10s. BRITAIN'S STRUCTURE AND SCENERY, by L. Dudley Stamp, 10s. CLIMATE AND THE BRITISH SCENE, by Gordon Manley, 12s. Fontana (New Naturalist).

This selection of paperbacks forms part of a series which deals with discrete topics within the scope of ecology generally and either as an introduction to the really meaty stuff that the specialist hungers for, or as a reference library for general readers.

Kenneth Mellanby discusses the problems of pollution and pesticides in a calm, sober, reassuring way. Far from alarming everyone with cries of anguish about the way we upset the delicate workings of Nature, he quietly pin-points his punches with the authority of a pacifist in a boxing ring. But in doing so, he leaves himself wide open to the shouts and accusations of those already alarmed and, like the pacifist, he cannot retaliate. I hope he is right for if he is there may be still time to undo some of the damage; if not we are in for a pretty miserable time.

The beautiful and enchanting world of the sea and the seashore is opened up to us in staggering detail by C. M. Yonge and Sir Alister Hardy, the latter's book being merely volume one, dealing only with plankton and the like. Volume two will deal with fish and fisheries, but we shall have to wait until 1971 for the complete picture, as the book is not yet finished. Both authors show us how little we know about marine-life, and for the layman *The Sea Shore* probably has the edge over *The Open Sea—Its Natural History* for not only is it easier to see for yourself the things to be found there, but it starts more from the premise that you would want to do so. While Sir Alister Hardy's book is for marine biologists, C. M. Yonge's is for seaside enthusiasts and curiosity-filled beach-walkers.

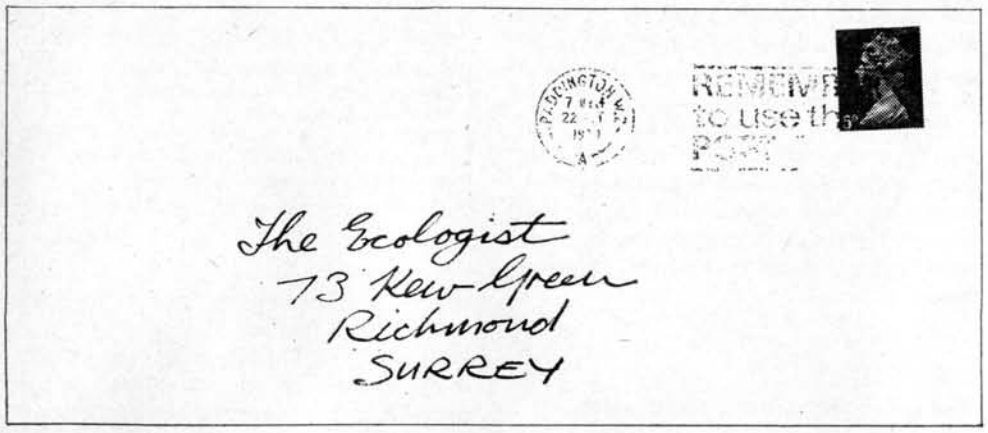
The World Of The Soil shows us how little we know about inhabitants of the soil other than worms and how they are invariably "farmers' friends". These minute organisms are almost infinite in number and variety yet we gaily kill them off, simply by being ignorant of their presence. Along with the work of the Soil Association, this book could go a long way towards making people think twice before filling the ground with killer chemicals.

For an account of the way in which Britain became the Britain of today, L. Dudley Stamp's *Britain's Structure And Scenery* excels. It shows the splitting, folding, tearing, grinding processes by which many features of our landscape (and thereby our culture and economy) have developed over the centuries. We can plainly see for ourselves though what a small period of time it takes to ruin them; and it is a pity that the book was not written with this in mind. *Climate And The British Scene,* probably the most enjoyable of the books, is regrettably, even more remote. Only the last chapter (Climate and Man) explains the ways in which we alter our climate, our landscape and thereby our resources. Apart from this Gordon Manley touches upon few subject-matters relevant to our concept of ecology and it is only as a sort of by-product that we can see the effects of radioactive fallout upon the land.

So, for a huge, clear, incredible picture of the world as it mercifully still is (one wonders, however, how many of Sir Alister Hardy's fish will be extinct before he finishes his second volume) this selection of paperbacks is very good value.

N. Rawls

Letters



Name the culprits

Sir,

The prime need in a campaign of any sort is *impact* on the partly interested. To this end I noted particularly the article in which Richard Thomas & Baldwins were named as polluting the River Ebbw. But why was it so mild? And why, when mentioning the Derbyshire bleaching firm in your August Comments column do you lightly let them off the hook with the introduction "The case is interesting"? Interesting? It sounds diabolical to me.

Would it not be more effective, rather than dealing with pollution in this manner, to concentrate on one *named* company—in the case of the Derbyshire firm name the magistrates as well!—allocate a couple of pages to it (plus pictures), interview local health and welfare workers, doctors and residents, then paint a clear picture of the inconsideration and even callousness to local inhabitants which, for the sake of corporate profit, continued pollution means. Local public opinion might be aroused sufficiently to produce results, and national publicity may also follow.

Yours sincerely,

D. H. Partridge.
118 Henley Road, Ilford, Essex.

Should Britain be a federation?

Sir,

Centralisation and vast enterprises will be for ever the enemy of a proper relationship between Man and the rest of creation, and devolution and units of government and organisation of a humane size its friends. The illusion "Huger equals Better" is responsible for most of our present ills.

Mr Evans' plan for dividing England into 12 regions is excellent. If it were implemented it would certainly save English regional culture (which is still miraculously surviving) from certain extinction, and thus save England herself from being swallowed up by some horrible mish-mash of a "Western World", losing her identity and all her real value to the world. Mr Evans very properly excludes Scotland and Wales from his scheme, for these are quite different countries, with their own language and cultures, and are lucky in being of a reasonable size already. Obviously, if "Northumbria" is to get a political identity, Wales should too. And yet, in the last election, the party to which Mr Evans belongs (the Liberal Party) effectively sabotaged Wales' effort to obtain devolution. The Liberal Party put up a candidate in every Welsh constituency, knowing perfectly well that not one of them had a chance of getting elected, but also knowing that by so doing they would effectively split the Welsh nationalist vote. The only people who would ever vote Liberal in Wales (or elsewhere) would be the people who would be in favour of units of government of a more humane size, and these would be the people who, in the absence of a Liberal candidate, would have voted Plaid Cymru. Wouldn't the most truly liberal policy for the Liberal Party, in the next election, be to stand down in Welsh constituencies, and advise its members to vote for the Plaid? If Mr Evans examines, with an open mind, the published policy of Plaid Cymru, he will find that there is very little difference (if any in fact) between it and the policy of his own great party. How absurd it is for the liberal-minded minority in Wales to waste its energies on fighting within itself.

To the argument that Plaid doesn't have a hope anyway I would point out that Plaid nearly trebled its vote in the country during the last election, and that the majority of the young people voted Plaid. I have children in three Welsh schools, and I can assert that all three of these schools are almost solidly Plaid Cymru. When the present generation of school children goes to the polls there will be a very good chance indeed of Wales getting her freedom. Let the Liberals conserve their resources for fighting in England.

Yours sincerely,

John Seymour.
Fachongle Isaf, Newport, Pembrokeshire.

SO^2 or fluorides

Sir,

In the matter of air pollution by SO^2 I understand that this substance is, in fact, being made the scapegoat to some extent for the damage being done to the environment by airborne fluorides. Dr Mellanby of Monks Wood is, I believe, of this opinion, and is also opposed to fluoridation. American farmers suffer millions of dollars worth of damage to both crops and cattle from airborne fluorides from various industries.

Yours sincerely,

L. M. Dungworth.
Hookgate Cottage, South Brewham,
Bruton, Somerset.

Anything doesn't go

Sir,

For the economists, and therefore for the government, "productivity" has become a religion. Freud's term for religion was "the great illusion".

Every society has its "ethos" and "eidos"—i.e. a code of morals, and a myth which supports the code. Even the myth of "productivity", the moral code must be "anything goes so long as more is produced".

Many of us are seeking a return to nature. "Nature" is the psychological mother-figure, and a return to the mother-figure always causes conflict.

For some of us, including myself, *The Ecologist* offers new hope of a satisfactory outcome to the conflict in a new "ethos" and "eidos". This we believe must take the form of a reconciliation between Nature and Authority—i.e. a resolution of the psychological Oedipus complex.

Is this impossible? Let us hope not.

Yours sincerely,

M. J. Woodhead, M.A.
Flat 1, 23 College Road, Norwich Nor. 52F.

Protection of hedgerows

Sir,

Readers may wonder how farmers have been able to destroy many of the old green roads (often not their property) with resultant loss of wild life habitats.

The change of character into an uninteresting arable desert is enough to deter would-be explorers, and so more lanes become completely disused. This leads sometimes to the farmer taking out a S.109 Highways Act 1959 application to the County Council who let it proceed to the Magistrates Court under S.108. The closure, if a complete one, may cost the farmer £40, but often the acreage of the lane can be as much as 5 acres. This, at £300 an acre, is good business considering that the lane was illegally ploughed out in the first place.

Much was done in the war years under the Agricultural Executive Committees who did not worry about old Enclosure Awards or about reinstatement later. In recent years, farmers saw new ploughing application laws being drafted in the Countryside Act 1968, so much ploughing occurred in 1967.

A halt is now called for by many Authorities, but the ploughing out still goes on, as taking the farmer to court seems to be more than they care to do. The loss of lanes and

of the duty to maintain them if the farmer eventually makes a closure application, are agreeable to most Councils, ostensibly on the score of saving ratepayers' money.

One main reason for this ploughing out is that the very Amenity Societies themselves caused the trouble in their desire to prevent vehicular use of Green Lanes. They swayed Parish Councils with the view that as Footpath or Bridleway use was all that was proven under the requirements of the 1949 National Parks and Access to Countryside Act survey, then the way could be ploughed. This was sidestepping the S.32/4 section of that Act about greater rights being reserved. Obviously many of the so-called bridleways were "Roads used as Public Paths" (Rupps). These had right of vehicles for many years before the Act, and the Act did not remove them. The Countryside Act of 1968 recognized the unfairness and provided for a Special Review of all RUPPS so that proven vehicular ways should be *byways* for all traffic.

Now at last many members of the Ramblers Association, and the Pony Club, are getting together with the motor-cyclists to save the RUPPs as *byways* so that their character and hedgerows will be preserved. Highway Committees must now realize that ploughing out must stop, and penalties should be imposed on any who defy them. With increased population to use the ways, once they are cleared, maybe with voluntary helpers, old vehicular roads could retain their hedges and wide greenswards, for all types of user. Horseriders and ramblers should not have to trespass to go through overgrown lanes.

Yours sincerely,

N. C. Smith.
65 Leggatt Drive, Bramford, Ipswich.

Young awareness

Sir,

As a schoolboy, I am constantly struggling to avoid being dragged into the ever-increasing armies of scholars and teachers whose attitudes on life are based on the philosophy —"Technology and Progress is the Ultimate in Human Existence". Geography teachers and textbooks have taken many years to accept the fact that the world which they study is shrivelling and accelerating towards extinction and it will be many more before they teach with a view to their pupils taking part in slowing down and stablising this imminent crisis. Teachers, textbooks etc. of other subjects seem to be utterly blind!

I was very interested and enlightened by the articles in the first two issues of *The Ecologist* and they have provoked further discussion among my colleagues and friends which I think is the purpose of the magazine.

Let us hope that any efforts made by young people (or older) to cure or to find an answer to the problems set out in your pages, are not met with the reactionary opposition from the security, money-bent majority, which usually greets their attempts to improve everybody's world.

Yours sincerely,

G. Douglas Gray.
41 Thurston Road, Glasgow, SW2.

Conservation Society

Sir,

Just in case no one else writes to you in answer to Mr Galt's letter in the October issue, on a Conservation Party and the need for the alternative for the time being of a *Conservation Society*. I trust you will point out that this already exists.

This Society introduced me to *The Ecologist* for which I shall be eternally grateful and will no doubt be responsible for introducing very many more. Perhaps you can at least do the same for them.

JUST PUBLISHED—Land and Leisure, by J. Allan Patmore, 84s. Studies the growth of outdoor recreation, and the nature of present demands and resources of land and water available in town and country for recreational use. David & Charles, Newton Abbot, Devon.

Perhaps instead of the New Party suggested in the television programme "The World We Want" September 30th, the present Conservative Government may be induced to jump on the Conservation bandwagon and become the much needed Conservation Party.

Yours sincerely,

A. Lewis-Evans.
Stoney Down Pottery, Lytchett Matravers, Dorset.

Sir,

The organization that S. I. Galt suggests in his letter (Vol. 1. No. 4) does in fact exist in the Conservation Society. This society, whose greatest concern is the need for control, was only founded four years ago and is as yet little known as both S. I. Galt's and David Whitmarsh's letters show. The Society is hoping to correct this by appealing to its 2,000 members to publicise its existence whenever possible. Money is being raised from members' donations to advertise in the national press.

Yours sincerely,

Dr Stephanie J. Tyler.
Field Cottage, Lanhill, Chippenham, Wiltshire.

In response to readers' requests for information we have begun to compile a list of the principal organizations concerned with the environment. See Ecology Action, page 36. Ed.

Ecology action

Sir,

To help realise your ideas how about a series of articles on how ordinary people can fight pollution and preserve our environment, i.e. what to buy and what not to buy (paint, toilet cleaners, soap powders, petrol, etc.).

How to have a natural garden; how in our everyday living we can work with nature and not against it; who's who in the pollution game; an exposé of the super polluters of our day.

In the summer issue of *What*?, the magazine of the National Suggestions Centre, 18 Victoria Park Square, London E2. a letter from Mr Roger Franklin suggested that all products should have a Comparative Pollution Factor rating, CPF, so that the purchaser can see the amount of pollution he is causing. Perhaps your magazine could draw up a table of these ratings?

Yours sincerely,

David Tonge.
Chapel Farm, Martin Dales, Woodhall Spa, Lincoln.

Marxism and ecology

Sir,

It's a pity that Bruce Chatwin mars his informative article on the Nemadi by so absurd a suggestion as that Marxists believe in "an end to history in a mechanized Valhalla of abundance for all".

In fact the whole structure of Marxist thought is built on the basis of a global study of nature.

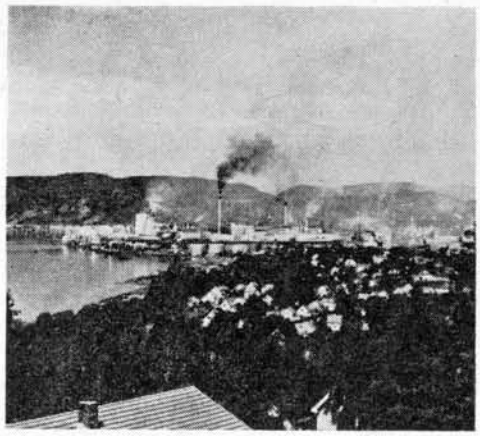
"In nature nothing takes place in isolation. Everything affects every other thing and vice versa, and it is mostly because this all-sided motion and interaction is forgotten that our natural scientists are prevented from clearly seeing the simplest things." Engels wrote these words in 1876 in his essay on "The Part played by Labour in the transition from Ape to Man", and later in the same work, making the point that man is himself part of nature, "all our mastery of it (nature) consists in the fact that we have the advantage over all other creatures of being able to know and correctly apply its laws."

Contrast this with the Keynesian (capitalist) theory that more hands, and mouths, means more prosperity, still followed by our present politicians, and we can see that Marxism has something quite vital to say to those who seriously want to help solve the environmental crisis.

Yours sincerely,

Richard Hayter.
East Ford, Tedburn St. Mary, Exeter, EX6 6ET.

Acid rain



Sir,

The Swedes will not have much of a case against Britain for turning their rain acid (cf. 'The Ailing Air', *The Ecologist*, September 1970) while their Norwegian neighbours pour a copious supply of brown fumes of nitrogen dioxide into the air. The enclosed postcard of Norsk Hydro, (near Porsgrunn) indicates that the Norwegians even think the pollution is pretty; it was brought back by friends who assure me that the emission of the fumes was on a continuous, 24-hour basis.

Yours sincerely,

Roger Franklin.
Loom Cottage, 36 Loom Lane, Radlett, Herts.

Coming events: Dec.

1–14 December—Exhibition of photographs illustrating the Conservation of Scotland's Countryside at the Glasgow College of Printing. Information from the Countryside Commission for Scotland, Branklyn House, 114 Dundee Road, Perth.

2–15 December—Kodak photographic exhibition—"Man and Nature"—at Norwich. Information from the Countryside Commission, 1 Cambridge Gate, Regent's Park, London, NW1.

7 December—Meeting of the Operational Research Society—"Multiple Criteria"—a lecture by M. Bernard Roy. Information from O.R.S. Ltd., 62 Cannon Street, London, EC4.

10 December—Final judging of the Shell/Nature Conservancy Competition. Information from the Nature Conservancy, 19 Belgrave Square, London, SW1.

Coming events: 1971

February—Second International Congress of Pesticide Chemistry in Tel Aviv, Israel. Information from the Organizing Committee, ICPC, P.O. Box 16271, Tel Aviv, Israel.

March—Environmental Pollution Control Exhibition at Earls Court, London. Information from, Mr R. Cunningham, Exhibition Director, Brintex Exhibitions Ltd., 3–4 Clements Inn, London, WC2A 2DB.

March—Effluent and Water Treatment Exhibition and Convention at Earls Court, London. Information from Mr R. Cunningham, address as above.

Classified Adverts

GRADUATE ECOLOGIST, 22, seeks interesting responsible post in scientific press or administration. Replies to Box 100, The Ecologist.

RECENT CAMBRIDGE scholar and graduate seeks employment in conservation. Interesting work more important than interesting salary. Replies to Box 101, The Ecologist.

YOUNG MAN, 25, with flair for organization, seeks opportunities in ecological co-ordination and action in London area. Replies to Box 102, The Ecologist.

YOUNG AMERICAN, graduate political scientist, journalist and photographer, Earth Day organizing experience, seeks post in Britain in the environmental field. Replies to Box 103, The Ecologist.

JUST PUBLISHED—Land and Leisure by J. Allan Patmore, 84s. Studies the growth of outdoor recreation, and the nature of present demands and resources of land and water available in town and country for recreational use. David & Charles, Newton Abbot, Devon.

WEST HIGHLAND COTTAGES to let on private nature reserve. Newly converted, low Winter rates. Donkeys, ponies and home farm. Box 104.

MAN, 41. Research technician but square peg, seeks post London area concerned with any practical aspect of Ecology—perhaps publishing. Interests Yoga, nature cure, food reform—usefulness of the work is of first importance. Box 105.

You can help The Ecologist!

Producing this magazine is very expensive. We have obtained no grants of any kind and, as you may have noticed, precious little support from advertisers. The substantial loss we are making every month is paid for entirely by one or two individuals who consider that *The Ecologist* fulfils an important social function. As a result we are having to make economies. Regrettably, this means cutting down the size of *The Ecologist* from 48 to 32 pages as from the January issue. I don't think this will be disastrous. There is probably too much reading material in each issue and I am sure that few people have the time to read it all. What is essential is to increase subscriptions, and this is where you can help. Ecology is a subject which concerns everyone, and will do so more and more. You must have innumerable friends whom you can interest in this essential subject. Please get them round to your house for tea and sell them a subscription to *The Ecologist*. We will help you by sending you leaflets, posters, subscription forms etc. and we will also contribute to your costs by giving you 10/- on each subscription sold. This help would be invaluable to us. If each of our present subscribers could bring in ten new ones we should be well on the way to success. It must be the best way of increasing our subscriptions which in turn must be the best way of making this magazine viable.

The Editor

All sewage sludge can be converted into a sterile, stable land-fill in one process. **Is the cheapest method of sludge disposal still good enough?**

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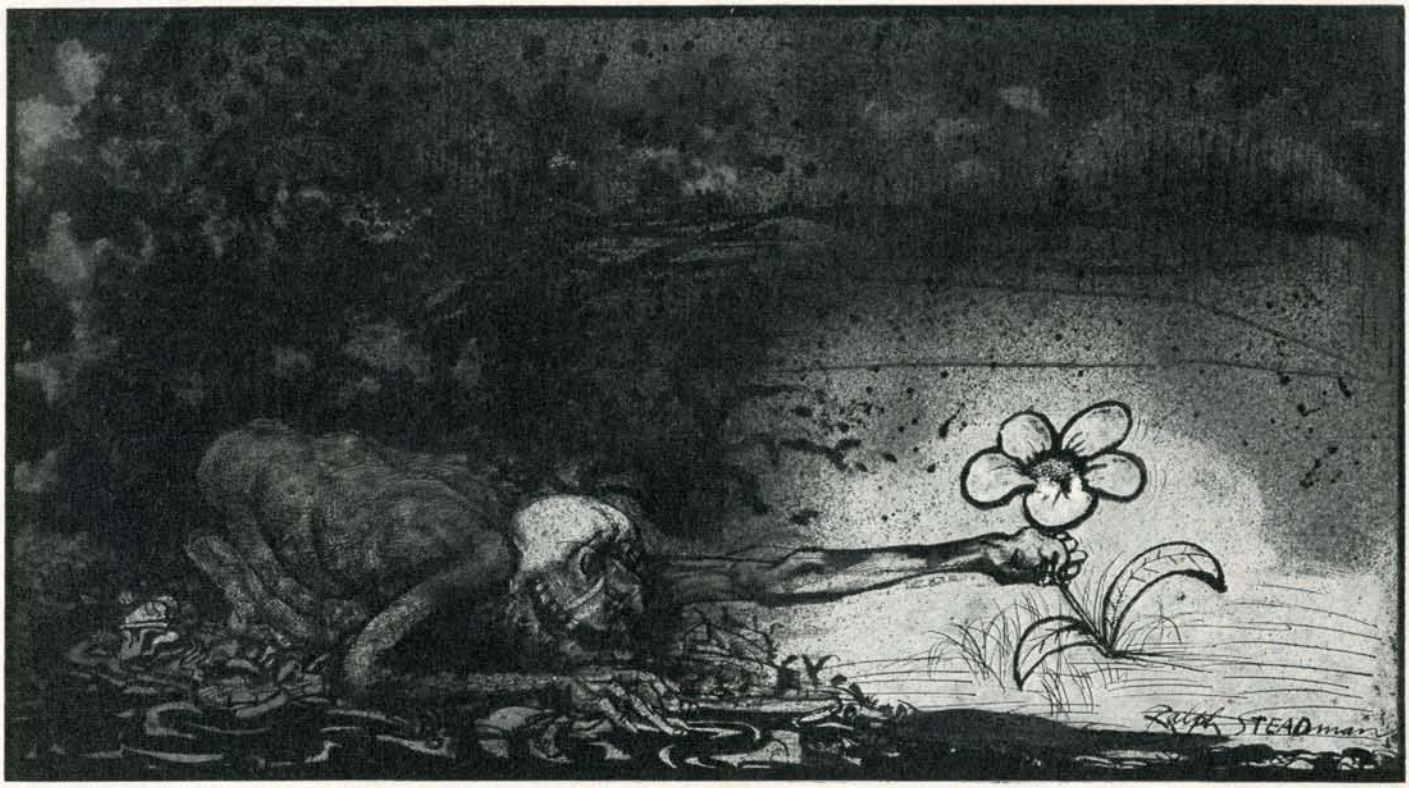

THE MAN WHO LOVED FLOWERS

We must stop pretending that pollution will go away if we talk about it enough. We need action. The Conservation Society believes that the fundamental causes of the present environmental decay are the pressures of population growth and economic greed, which between them are placing an intolerable burden on the earth's limited resources.

We are pressuring the government to:

1. **Develop and act upon a comprehensive population policy, designed to stabilise—if not reduce—our numbers.**

2. **Realise that plans for the immediate growth of material prosperity must take second place to maintaining the quality of life, and give the Department of the Environment corresponding powers.**

The Society has presented detailed proposals for such action, but needs more members and money to increase the pressure for reform.

Help us by becoming a member. Write today for details to: The Secretary, 21 Hanyards Lane, Cuffley, Potters Bar, Herts.

The Conservation Society

President: The Rt. Hon. Sir David Renton, KBE, TD, QC, MP

Past Presidents: Dr. Edwin Brooks; The Rt. Hon. the Lord Ritchie-Calder, CBE, MA; Yehudi Menuhin, Hon. KBE.

Fellows £5, Members £2, Students 10/-