

# The Ecologist

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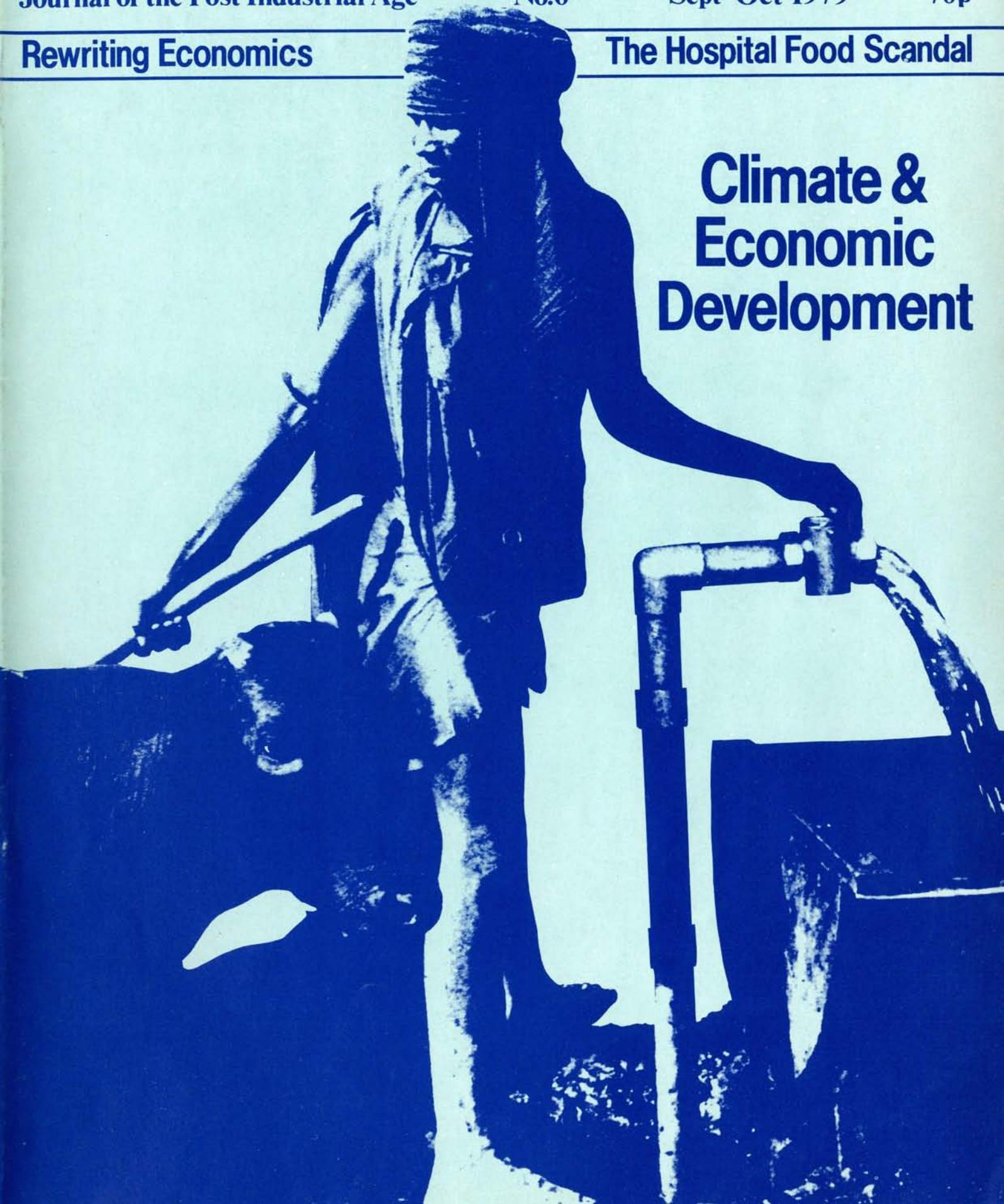
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70p

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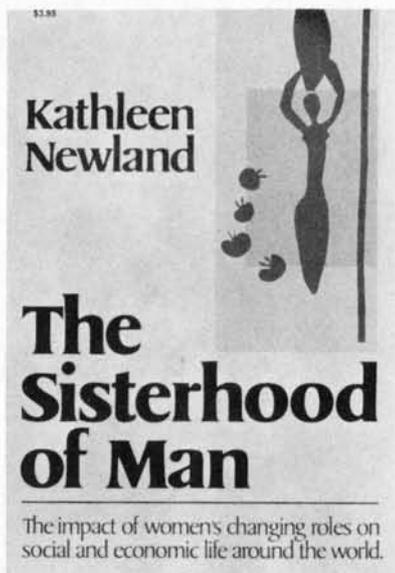
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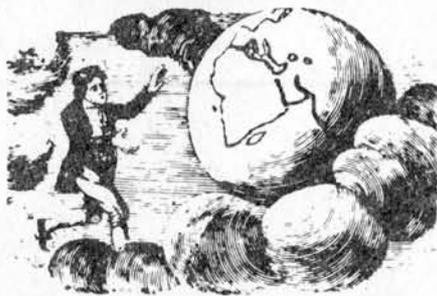
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## Ecology and Economics

The last few months have seen renewed calls for tougher penalties for violent crimes: the courts have again been criticised by the Police Federation for acting too leniently towards young offenders; and the House of Commons recently debated (and rejected) a Private Member's Bill calling for the reintroduction of the death penalty.

Crime is on the increase, present methods for dealing with the problem are clearly not working and inevitably there has been a reaction. Since the early sixties, our attitudes towards punishment have largely been moulded by a predominant liberal philosophy: namely, that society should go easy on violent criminals — particularly young violent criminals — because in most cases society itself is responsible for their violence. That philosophy is now under attack. Clearly some young offenders do commit crimes as a 'cry for help', but to judge all cases on that assumption undoubtedly breeds a disrespect for the law and with it an increase in crime.

That said, however, I wonder whether we are not in danger of throwing out an important social insight — one that could in fact provide the key to a more stable social future — with the liberal bathwater. I wonder, too, if we are not deluding ourselves that by treating the symptoms of crime we are also treating the causes of it. For will tougher penalties really succeed in cutting crime rates? Will they get to the root of the problem? Or are they just a stop-gap measure that will ultimately only perpetuate the disintegration of our society?

To deny that upbringing and social conditions have any bearing whatsoever on individual behaviour is really to deny the whole notion of society. If society holds together it is because individuals have been socialised into its ways, learning to respect its traditions and to act according to its cultural norms. As socialisation weakens, so society breaks down into a mass of isolated individuals, acting as they wish with no regard for others or for the good of society as a whole.

Under such conditions, behaviour is entirely random — and crime, after all, is nothing but behaviour which is random to the social system and which thus threatens to undermine it. For that reason, there is nothing implied in the nature of an act that is defined as a crime by one society which automatically makes it a crime in

another society. Each society defines crime according to the demands of its own social system, for what is random behaviour to one system may be integral to another. If, for instance, the Nagas of Highland Burma fête headhunters, it is **because** headhunting plays a vital role in Naga society, a source of prestige for young warriors and the basis of the whole political hierarchy. Inevitably when headhunting was banned by an outraged colonial government, considerable social disruption followed. Clearly Western society would be torn apart if gangs of headhunters were to roam the streets, and the Naga justification for headhunting — that by decapitating one's victims one assures their total subservience in the next world — would carry little weight with either judge or jury. It would be straight to Broadmoor for any British headhunter.

At its most basic, the liberal philosophy claims nothing more than the obvious truth that people who are poorly socialised are likely to be poorly integrated members of society. That truism is born out by numerous studies of tribal societies. People do not turn to crime simply because they suddenly get it into their heads to turn criminal. They turn to crime because the social relations that would normally give them support and security are broken down, as are the social constraints that would normally keep aberrant behaviour in check. In tribal societies, those constraints are of the most subtle kind, ranging from obligations that accompany particular social relations, through religious sanctions, to social ostracism. Direct punishment, such as we know it, only occurs when a crime has actually been committed (a rare thing in tribal societies) and is regarded as a mark of failure, a hamfisted last resort.

If stable social relations are the key to low crime rates, then it must follow that a child from a broken home is more likely to behave anti-socially than a child from a stable family background. Excluded from a whole range of social relationships because his parents are divorced, separated or have simply never lived together, the child from a broken home is inevitably less socialised. If he comes from an area where one-parent families are common, divorce rates high, and alcoholism, baby-battering, gang-warfare and unemployment endemic, then the likelihood of anti-social behaviour is still higher for socialisation will have been reduced still further.

That principle applies as much to members of the Jet Set as to someone from the East End, though the process of socialisation will have been undermined for different reasons and less obviously. It would seem that material wealth cannot isolate the rich from the effects of social disintegration: I do not think that it is any coincidence that the middle classes, despite their vociferous calls for more law and order, seem themselves to be showing less and less regard for the law — be it the debutante who snorts cocaine at a party or the business man who falsifies his tax returns. The crimes may not

be judged as heinous as a mugging in Brixton (one of the things most at fault with our legal system: but more of that later) but there is little doubt that increased criminality has pervaded all walks of life. Indeed material poverty seems to be a marginal factor in the dramatic rise in crime rates over the last decade: the post-war economic boom has raised everybody's standard of living, but it has brought with it a new sort of poverty — the poverty of social disintegration. That poverty is not class-specific: it affects everybody regardless of their status. The rich may be able to insulate themselves from its worst excesses, but ultimately they can no more escape it than can the very poor.

If we accept that behaviour is largely determined by social factors, how do we act on this insight? Do we take the liberal line and impose lenient sentences on those from socially deprived backgrounds? Do we toughen up sentences for all criminals, regardless of their background? Or do we impose punishment *not only* on those directly involved in a crime but *also* on those indirectly responsible for it — parents, administrators, architects, local politicians and whoever helped give rise to the social conditions that permitted crime to flourish in the first place? Is that not the only way to treat the causes of crime as well as the symptoms? Where, after all, is the justice in punishing front-line soldiers for losing a battle whilst letting the General Staff off scotfree?

Consider the Inca attitude to theft. "Theft was regarded as an aberration," writes Wolfgang Von Hagen in his, *Ancient Sun Kingdoms*, "and when theft did occur, there was a differentiation between robbery from malice and robbery through necessity: if the Indian robbed through want, the local official was punished for his lack of administration which brought about the crime." Moreover the harshest punishments were reserved for those who committed crimes whilst in a position of responsibility: Inca law distinguished crimes involving nobles from those concerning the common people, and the upper classes were given more severe punishment than the lower. What was a mere rebuke for the common people became for the noble, when involved, banishment; what was torture for the common Indian was death for the nobleman."

We in the West seem to work on precisely the opposite principle. The general public have become justifiably cynical about justice being done where the rich are concerned: the more money one has, the easier it seems it is to get off lightly — particularly when trials appear to be decided as much by the brilliance of one's lawyer as by the facts presented. Nor is public confidence in the law boosted when leading politicians (President Nixon is a good example) are pardoned for gross abuses of power whilst their minions are tried and sentenced to terms in jail. Surely the higher ones position of power, the harsher penalties should be for misconduct?

The Inca attitude to punishment goes against all the established traditions of British justice. Yet the very principle of government surely rests on the notion that government is responsible for the state of the nation.

That responsibility must entail more than issuing laws and blaming their ill-effects on the proceeding government: it must mean being answerable for the consequences of one's actions. That the law has to be brought to bear to make politicians responsible for the power they wield is in itself a sad reflection on the quality and integrity of modern politicians.

Where the liberal philosophy fails so disastrously is not in assuming that social disintegration is to blame rising crime rates but in refusing to act on that knowledge. There is little to be achieved by moaning about the evils and unfairness of modern industrial society and yet refusing to take any steps to put society back on a sane path. To do so means taking measures that are often antithetical to liberal dogma — not least taking the accent off the individual and putting it on society. If crime rates are to be cut, it means not only treating the symptoms of crime but also its root causes. It means re-establishing the bonds of family and community, organising society in such a way that children can be properly socialised — for socialisation is impossible if there is no social system for a child to be socialised into. It means also making those responsible for socialisation — from parents to politicians — answerable when they fail to deliver the social goods. For perhaps the greatest crime of all is to create a society in which crime can only flourish. Were that principle to be written into the statute books, perhaps those in authority would be less willing to take social risks for short-term economic and political advantages. That in itself would be a major step towards a more stable and less criminal society.

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# The Hospital Food Scandal

by Ross Hume Hall

*Professor of Biochemistry, McMasters University, Ontario*

**Sick people need good nutritional food. But are modern hospitals supplying it?**

Imagine a large aseptic room in the basement of a modern hospital. In the centre of the room, trays roll down an assembly-line whilst hospital workers add the finishing touches to the day's main meal: a squirt of mashed potatoes here; a dollop of creamed spinach there; a chop dolled up in fried bread crumbs; a dab of apple sauce; a plastic cup of pickled beans; a rectangle of apple pie; and, finally, a slither of margarine. Once assembled, the meals (still only partially defrosted) are placed in a refrigerator to wait several more hours before being delivered to the wards. There, the main dishes are heated to more than 160°F in a microwave oven and, by now piping hot, the food is ready to be served.

The problem of feeding large numbers of people severely challenges any organization. Even the traditional hospital kitchen, with its steaming cauldrons, hot-plates, and hordes of workers does not always deliver high quality, nourishing food. Too often, vegetables are boiled hours before they are to be eaten, then trundled off to distant patients, to arrive in a cold soggy mass. But does high-technology really answer the problem of a poorly run institutional kitchen? To be sure, it cuts down on labour: no well-paid chef is needed to oversee the modern catering service — his skills have

been replaced by a manager who simply shuffles time-sheets and ensures the orderly flow of pre-cooked, pre-packed food to the assembly-line. Below him, a dozen or so unskilled workers are all that are required to 'construct' well over a thousand meals a day. But at what nutritional price? And who eventually pays?

## Portion Control and Dry-cleaned Chips

The food eaten by the patients is prepared by intermediate processors usually based miles from the hospital, often in other cities, and sometimes at the opposite end of the country. One of their tasks is to calibrate the cooked food into exact portions. A block of beef, for example, will be sliced, exactly 75 slices to the pound. These slices are then refrozen (the meat having been in cold-storage) in 7.5 pound polyethylene bags. Thus if the hospital workers are told to give each patient 2.13 ounces of beef, they merely count out ten slices per plate.

The intermediate processor must reckon that natural crispness, taste and colour have all been drained from his product by the rigours of preparation, so a variety of techniques are used to restore a sense of freshness. Usually it is simply a matter of adding sugar or burying the food in an artificial sauce, but in the case of potato

chips a more elaborate method is used. Each potato is cut into exactly the same sized chips which, once cooked, are immersed in a bath of difluorodichloromethane, the kind of solvent used for dry-cleaning clothes. The chips freeze in the solvent, from which they are then removed, warmed in water, drained, partially fried in oil and, finally, refrozen. The procedure leaches out sugars and other soluble constituents of the chips (including presumably vitamins and minerals). Despite this, government technologists from the US Department of Agriculture, where the process was invented, claim that the product is superior in overall quality to any other commercially prepared sample.

Behind the intermediate processor lies another tier of manufacturers who freeze and can vegetables, butcher meat, and provide the hundreds of special ingredients that are necessary for the whole vast system to tick over. Supposing, for example, the intermediate processor needs raisins. Raisin supply can be uneven depending on crops and weather. Hence a raisin-substitute is available, manufactured from a mixture of wheat bran, chemically treated flour and raisin juice. According to the manufacturer, such 'raisins' have the dual advantage of a longer shelf-life and of being forty per cent cheaper.

The unskilled food assembly-line workers in the factory thus form only the visible pinnacle of a pyramid of suppliers, manufacturers and chemists. In effect, the once skilled art of cooking has been broken down into little bits. No single person has any knowledge of (or indeed interest in) the nutritional quality of the meal that reaches the patient, since each link of the manufacturing chain is responsible for only a segment of the operation. The highly-trained cook has been replaced by a motley army of assemblers who require precious little imagination and no skill whatsoever.

### Nutritional Quality

Any manipulation of natural food (be it freezing, heating, grinding or cutting) causes irreversible changes and, inevitably, a loss in nutritional quality. A good cook prepares a meal in such a way as to minimize these losses, but what about the food being used by modern hospitals? Months, years and a long list of production processes may elapse between harvest or slaughter and the food actually reaching the patient. What happens to its nutritional quality?

### Damage from Freezing

Consider the tissue damage that is done every time food is frozen and defrosted. As the food freezes, tiny ice crystals form which disrupt cellular structures. As the product thaws, its damaged tissues yield up some of their vitamin and mineral content, which then leaches out in the melting ice. In the preparation of the ultra-modern hospital meal, much of the food will have been frozen and defrosted at least two times. Moreover, frozen vegetables have to undergo an additional process which still further diminishes their nutritional quality. To kill off enzymes that would continue to work even in the frozen tissue, the vegetables are blanched by immersion in boiling water for a few minutes. The blanching leaches out vitamins and minerals to such a degree that some municipalities where blanching

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**Any processing of food causes a loss of nutritional value. A good cook minimises such losses but modern hospitals seem intent on maximising them.**

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plants are operated now complain that their sewage disposal systems are being seriously overloaded.

When a manufacturer *mixes* vegetables into a pie or some such dish, the vitamin and mineral loss may be unpredictably accelerated. Dr. Paul Lachance and his colleagues at Rutgers University, for example, studied the fate of vitamin C in a commercial frozen chicken pie. Although the pie was choc-a-bloc with vegetables, Lachance could find no trace of any vitamin C when it was defrosted.<sup>1</sup> Subsequently he added a known amount of vitamin C to the pie and refroze it. Two days later, the pie was thawed; twenty-five per cent of the vitamin C had been destroyed. If the pie had been kept over a longer period, that percentage would have been higher still. Indeed, as a rule-of-thumb, frozen foods should not be kept for more than one year; the loss of vitamins from common vegetables after blanching, freezing and storage for twelve months averages fifty per cent, and for vitamin B1 (thiamin) it is almost sixty per cent.<sup>2</sup>

The type of study conducted by Paul Lachance is rare indeed, for there has been little or no work done on nutritional losses in food prepared by modern technological methods. Dr. J.W. Erdman, from the University of Illinois, points out that the US Department of Agriculture's *Nutrition Handbook*, the bible of dieticians, contains no information whatsoever about the vitamin and mineral content of foods stored and prepared under modern conditions. It is a sad comment on the Department's role in the food industry, for although government money is always readily available to devise new techniques for dry-cleaning potato chips, creating square tomatoes, and otherwise supporting high-technology food processing, the powers-that-be have never thought it important enough to study the nutritional quality of the products produced.

### Damage from Canning

Many of the vegetables used by intermediate processors arrive canned. Yet Dr. Daryl B. Lund, Professor of Food Science at the University of Wisconsin, believes that canning "results in rather substantial degradation of vitamins."<sup>3</sup> Something of an understatement, one might think, when one considers the figures: canning destroys eighty per cent of the folic and pantothenic acids in vegetables; seventy-five per cent of vitamin C; fifty per cent of vitamin A; and equivalent amounts of other vitamins. As for minerals, they soak into the canned juice around the vegetables and are, of course, poured away with it.

The intermediate processor dresses up the canned vegetables by means of a sauce or by incorporation into a mixed dish, such as a pie. With the skill of a good

Special meals are prepared for patients being nursed under strictly sterile conditions. The food, plates and cutlery are all prepacked and double sealed in nylon film before being sterilized. They are then irradiated with an exposure of 2.5 Mrads. The food may now be sterile, but what about its nutritional value?

(Photo: UK AEA/Barnaby's Picture Library)



mortician, the manufacturer successfully disguises the true, thoroughly dead, state of the vegetable. When the pie is subsequently frozen and defrosted, the nutritional quality of the vegetables receives one more insult.

### Damage from Microwave Cooking

It was the introduction of the microwave oven that first enabled hospitals to scrap their kitchens and go over to assembly-line catering. Whilst a conventional oven heats food from the outside in, a microwave appears to heat food from the inside out. Indeed it is possible for a microwave oven to char the inside of a potato whilst the skin remains uncooked.

Any form of heating causes loss of nutritional quality. (The Chinese stir-fry method or brief steaming for vegetables causes the least destruction of vitamins.) Loss of minerals and vitamins in meat and vegetables is about the same in a microwave oven as in a conventional one, assuming optimal cooking in both cases. These losses, however, add to those already accumulated during the rest of the production process — freezing, defrosting, canning, refreezing, thawing again, and prior cooking. The microwave technology offers no nutritional advantage at all. It offers only convenience to the hospital personnel and, more important still, it provides the keystone on which the whole pyramidal network of mechanised food preparation rests.

### Advancing Backwards

Running right the way through this network, there is a streak of unpardonable arrogance. Nourishment is a relationship between the human consumer and the food eaten, and nature has imposed very strict limits on how far that relationship can be stretched. Yet those limits have been totally ignored by the engineers and food technicians who designed the system.

They need not have. Surely they could have designed a system of cooking that virtually eliminates nutritional losses? Instead they have come up with the microwave oven which is no improvement over a conventional cooking technology that is several thousand years old.

The reason for their failure is clear: nutritional quality has never been a concern of these technologists.

### Planned Ignorance

The astonishing lack of nutritional data on processed foods shows clearly in the food science literature. There are a welter of articles on how to synthesize sauces; where to store frozen products; why it is important to use this or that chemical ingredient; and all the rest of the technical minutiae necessary for running this complex mechanical system, but substantive articles on the quality of nutrition practically do not exist. It is as if food technologists are afraid to subject their products to the light of scientific scrutiny.

Just what such a close examination of processed foods might reveal is demonstrated by a recent experiment.<sup>4</sup> Rats can grow and lead a healthy life eating nothing but eggs. A commercial egg-substitute, according to chemical analyses, contains the same amount of fat, protein and selected vitamins as eggs. Yet rats cannot survive more than three weeks on this substitute. Despite this, real eggs never see the inside of many hospitals: instead omelettes and scrambled eggs are made the day before they are eaten from this very egg substitute.

### Do the Hospitals Care?

If the food industry and its experts provide little useful information about the quality of its products, one might expect that an institution devoted to the restoration of health might do some studies of its own. In the USA, one ultra-modern hospital (with no means of cooking other than by microwave) owns millions of dollars worth of advanced equipment, beautifully equipped laboratories and has a staff of talented medical scientists. Yet the only food study it has ever undertaken was an attempt to overcome the problem of 'microwave cooking times'. Because different foods heat at different rates, it has always been difficult to ensure that all the dishes cooked in a microwave oven emerge at the same temperature — usually some are stone cold and others boiling hot.

Hence the hospital research staff designed a balanced meal — balanced, that is, not in terms of nutritional value but of heating rates. Not one dollar, not one hour of a scientist's time has ever been allocated to research into the nutritional quality of the patients' food. The only test conducted is to 'cook' one meal from each production run and have a dietician eat it.

As for the medical staff, through indifference, they could not care less whether the patient gets a high-technology, microwave, frozen-defrosted-refrozen-defrosted cabbage roll or a nutritious meal prepared from scratch. Thus, they are easily influenced by the high-pressure sales pitches of the food industry which promise cost containment, portion control and a lower wages bill.

### Cutting Costs: a Cause of Malnutrition

Indeed the major preoccupation of the hospital administration is for cutting costs. In 1976, the average stay in hospital cost about one thousand dollars, of which sixty-six dollars (six per cent) was spent on food services. This amounts to about twelve dollars a day, including the cost of the food, salaries and a share of the hospital overheads.<sup>5</sup>

Twelve dollars a day may seem like a large sum in terms of what the patients receive, but it is miniscule in comparison with the money spent on the treatment of diseases, many of which, ironically, are precipitated by the poor eating habits of the patients. Moreover, reducing nourishment in hospitals to a question of costs can be disastrous. Studies conducted in the early 1970s in Alabama and New England showed that many patients confined for extended periods became victims of the same pattern of nutritional diseases usually associated with the impoverished of the Third World.<sup>6 7</sup> The author of one of these studies, Dr. Charles Butterworth, concluded that "malnutrition is a common accompaniment to the stress of illness among hospitalised patients." Butterworth felt the root of the problem lay in the neglect of nutrition in medical education.

### Hospitals can serve Real food

Not that all hospitals show such indifference to the welfare of their patients. Appalled by the direction hospital catering is taking, the medical director of Meadowbrooks Hospital, Los Angeles, decided to serve only natural foods.<sup>8</sup> At the time the staff (who worked in a conventional kitchen) were accustomed to preparing meals from instant pancake mixes, frozen meat, powdered gravy mixes, canned goods and oversteamed vegetables. Asking them to cook with natural ingredients seemed as strange to them as if they had been asked to learn Swahili. Nonetheless, they gradually adapted. They discarded their canned vegetables and started preparing frozen or fresh vegetables, slightly steamed rather than boiled. Whole wheat products were baked daily in the kitchen. Sweet puddings disappeared in favour of a fruit basket placed in the room of each patient and constantly replenished. Processed cheese was discarded in favour of natural cheese. All the patients received a fresh boiled egg for breakfast instead of a rectangular slab of scrambled egg substitute. Luncheon meats and frankfurters — with their high salt and fat content — were banished in

favour of meat from local animals raised on a drug-free regimen. Patients received freshly prepared fruit and vegetable juices three times a day, as well as snacks of seeds and nuts.

One of the pleasurable side effects of the switch-over has been the catering staff's interest in the patients' welfare. They now think in terms of *nourishment* rather than simply filling stomachs. They can easily cook special meals — something that is impossible in the assembly-line kitchen where kosher or vegetarian diets are excluded from the menu — and they take particular pride in being responsible for the patient's nourishment right from the initial step of preparing the basic ingredients through to the final cooking of the meal.

### Why Die of Hospital Food? Bring your Own

Assembly-line catering is not, of course, confined to hospitals. The same multi-tiered network of suppliers, intermediate processors, vendors and chemical plants provide school lunches, fast food take-aways, frozen dinners and snack foods — all produced in the same rigid manner. In fact, sixty per cent of all the food eaten in North America in 1975 was prepared outside the home, most of it by this system.

The once highly individualistic and creative activity of nourishing one's family has been removed from the home and trampled under the sheer weight and complexity of the ponderous food industry. The ultra-modern hospital with its battery of microwave ovens has no freedom to innovate or meet special patients' needs. Indeed lack of true biological variety in the food it produces is one of the system's most serious failings. For although assembly-line catering produces cosmetic variety, on close examination we find that seventy-five per cent of the calories it generates are derived from sugar, highly processed (hydrogenated) oils and fats, refined bleached flour and chemically modified corn starch.

High quality, nutritional food is the very foundation of healing and health. For those who consume the products of the ultra-modern food technology, the price can only be measured in lowered health expectations. Surely it is doubly important that during illness one aid, not hinder, the natural recuperative powers of the body by eating as nutritionally as possible? Indeed, if you or a close friend require hospitalisation, you would be wise to look into the hospital's food system before committing your nutritional welfare to it. If the situation looks bleak, good quality food brought from home may be your only recourse.

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# Climate and Economic Development

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Even the most cursory glance at the literature on economic development quickly reveals that little attention, if any, has been given to the relationship between a country's economic performance and its overall climate. This is somewhat surprising if one considers that most of the countries with tropical or semi-tropical climates are either poor (per capita GNP of 100 to 299 dollars) or very poor (less than 100 dollars). By contrast, most of the countries in temperate climates are either rich (per capita GNP over 1000 dollars) or semi-rich (300 to 1000 dollars).

This 'location factor' has attracted some limited interest. For example, Kenneth Galbraith pointed out in 1951 that "If one marks off a belt of a couple of thousand miles in width encircling the earth at the equator, one finds within it no developed countries...Everywhere the standard of living is low and the span of human life is short." A decade later, a UN report on the world social situation stated: "If the industrialized countries are marked on the map, they will be seen to be located as a rule in colder climates than the underdeveloped countries. This cor-

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**Is it a coincidence that the world's richest nations are found in temperate zones and the poorest in the tropics? Or has the influence of climate on economic development been underestimated?**

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relation with climate is as good as most correlations between non-economic factors and economic development."

For all practical purposes, however, climate is not discussed *at all* in most of the books concerned with theories of regional development. Even agricultural economists like Mellor (1966) and Lester Brown (1974) do not consider the subject. Mellor's book, *The Economics of Agricultural Development*, does not even have an index citation on climate. Considering the close relationship between climate and agricult-

ural production, such an omission is hard to understand, particularly when agriculture provides the basis for many Third World economies.

On the rare occasions when climate has been mentioned as a possible contributing factor to the status of development in the tropics and semi-tropics, there has been a tendency to give it somewhat cursory treatment. Thus Lee (1957) suggests that "Climate and economic development in the tropics is a convenient bogeyman to be blamed for psychological difficulties whose real origin is much more personal." Similarly, Lewis (1955) comments: "Because economic growth is currently most rapid in temperate zones, it is fashionable to assert that economic growth requires a temperate climate, but the association between growth and temperate climate is a very recent phenomenon in human history."

In spite of such casual dismissals, it remains true that the principal failure of economics, certainly within the last three decades, has been in the area of economic development — despite the massive resources that have been committed to its success. As Boulding (1970) puts it:

The refinements in theory over the last generation do not seem to have carried us very far towards a real understanding of the development process as a total social process, and we do not really understand what it is that makes the difference between a developing and non-developing society.

...One wonders whether cultural blindness may not have something to do with this relative failure. Development, like economics, has been very largely a Temperate Zone product. The complexities both of tropical ecology and of tropical societies are beyond easy access for those raised in essentially Temperate Zone cultures. This is not to suggest a naive climatological determinism, but just as tropical biological ecosystems differ very markedly from those in the Temperate Zone, it would not be unreasonable to suppose that the processes of social evolution would likewise produce marked adaptations to the peculiar rigours and delights of tropical climate and life style.

#### Western Bias in Theory and Practice

One can argue that the general failure of social scientists to recognise the importance of the possible connection between climate and agricultural production, and thus economic development, is to a certain extent another tragic result of technology transfer — defined in a broad sense. The situation is comparable to the failure of several grandiose schemes in developing countries based on well-proven and workable models in developed nations. This, however, is not surprising since virtually all of the developments in theoretical economics or economic geography have taken place in the Western World. The fundamental principles have been developed over the years and are generally based on the conditions prevalent in the developed countries.

Myrdal, in his monumental and classical work, *Asian Drama* (1968), consistently criticizes the biases introduced by the use and application of Western concepts, theories and models in the study of the economic problems of South Asian countries. He points out that such analyses seriously distort the results:

The very concepts used in classical economics aspire to a universal applicability they do not in fact possess. As long as their use



Poor rainfall means poor irrigation. Often water has to be carried over a considerable distance

is restricted to our part of the world this pretence of (universal) generality may do little harm. But when theories and concepts designed to fit the special conditions of the Western world are used in the study of underdeveloped countries in South Asia, where they do *not* fit, the consequences are serious.

One might legitimately ask: if Western scientists have not been very successful in developing theories of economic development that are applicable to the developing countries, why haven't scientists from the developing countries come up with a more satisfactory explanation? Herein probably lies one of the dichotomies of the whole situation. The majority of the elite in the developing world tend to be trained in the West and, in general, Western thinking is considered to be more "progressive" and "scientific". Because of their training and social attitudes, these intellectuals often

produce dissertations that are replete with the traditional theories of classical Western economics.

#### Climatological Determinism

A bias has thus been created, an almost all-pervasive bias, against the consideration of climatic factors within the framework of economic development. Often the mere mention of climatic factors has brought forth accusations of subscribing to the naive and simplistic theory of climatological determinism, and yet the correlation between climatic regime and economic development is as good as most correlations between non-economic factors and economic development. This, of course, does not mean that there is one-to-one relationship between climate and economic development, but rather that present development theories for the tropical and semitropical countries leave much to be desired.

The close linkage between econ-

omic development and agricultural production can be easily confirmed by analysing the historical trends in developed countries. It should be noted that historically very few countries have managed to industrialize without initially achieving a high degree of agricultural self-sufficiency. At the risk of oversimplification, one can argue that industrial revolution requires a prior agricultural revolution, or at the very least, a concurrent agricultural revolution. According to Kellogg (1963):

Historically, an agricultural base able to provide a surplus over the needs of the family farm made possible capital accumulation for industrial development. Industry, in turn, furnished materials and services for a still more productive agriculture. Thus has agriculture initiated the kind of industrial development that characterizes the economic growth of the so-called advanced countries. The levels of agricultural production/per man hour/per hectare have steadily increased as the materials of industry have been substituted for direct farm labour."

#### Industry needs a Healthy Agricultural Base

The leaders of most countries in the tropics and semitropics profess to have understood the importance of an agricultural revolution for expediting development in their own countries. For example, Jawaharlal Nehru, the late Prime Minister of India, emphasized that "the whole success and failure of all our planning hangs by that single thread of our agricultural production and, specially, food production." The same point was made over and over again by many leaders of the developing countries at the World Food Conference, held under the aegis of the United Nations at Rome in 1974 (Biswas and Biswas, 1975). A critical analysis of their past performance, however, indicates that very seldom has adequate priority been given to much-needed land and agrarian reforms. Much of the emphasis has often been only lip service.

The lack of self-sufficiency in food production in developing countries is a serious hindrance to their further economic development. For example, if current trends continue, by 1985 the developing world may face annual deficits of eighty-five million

tons in normal years over one hundred million tons in years of unfavourable climate. Continually escalating prices of the energy, food and manufactured products which these countries have to import for mere survival, combined with the falling prices of raw materials which they export, have already created serious balance of payment problems for many of the Third World countries are now in rather poor financial state. The twin crises of energy and food hit most of the developing countries very harshly, especially between 1973 and 1975, not only because the price rises were very swift



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and very large, but also because the economies of most developing nations were not resilient enough to absorb them without major social and economic upheavals (Biswas and Biswas 1976).

#### How Much must Output be Increased

Viewed in global terms, the food-population equation from 1951 - 1971 was quite reasonable. The production of cereal grains, the principal source of world food supply which dominates the world food economy, more than doubled, whilst there was a less than fifty per cent increase in population. Thus the average amount of cereal available per capita increased by about forty per cent. Because of regional disparities, however, this increase was very unevenly distributed: more than half was accounted

for by the richer thirty per cent of mankind, and the balance — less than fifty per cent of the food supply — was left for the poorest seventy per cent. Even this amount was inequitably distributed, ranging from a high per capita annual increase of 0.9 per cent in Latin America to an actual per capita decline of 1.1 per cent in Africa during the 1953 — 1971 period.

If the dependence of the developing countries on imported food is not to increase, the growth of food production must be increased by over fifty per cent in Africa (from 2.5 per cent a year to at least 3.8 per cent); over forty per cent in Asia and the Far East; thirty per cent in the Near East; and nearly twenty-five per cent in Latin America. These are no mean targets, and yet such rates of growth should be considered the minimum necessary to satisfy basic human needs: they fall far short of the United Nations' overall goal of four per cent annual increase in agricultural production. If these minimum requirements are to be met, there has to be better understanding of the interrelationship between climate and agricultural production, and thus eventually between climate and economic development.

#### Climate and Soil Management

The variation in precipitation in the tropical climates tends to be greater than in temperate regions. For example, in Pakistan, total annual rainfall in any given year can be expected to exceed or fall short of the mean annual rainfall by an average of thirty per cent or more (Stamp, 1966). This is problematical from an agricultural viewpoint, since rainfall tends to be either too much or too little for crop production. The distribution of rainfall during the growing season is an equally important factor. In the monsoon countries, the time of the onset of the monsoon could easily determine the difference between a good or a bad crop year. In other words, nature does not always provide the right amount of rainfall at the right time and at the right place. Some of the worst famines of Southern Asia can be attributed directly to the summer monsoon rains not starting as early as usual.

A few examples highlight the extent of climatic fluctuations in the tropics. In one month alone (July

1972) nearly 4,455 millimeters of rain fell in Luzon, where much of the high-yielding crops in the Philippines are concentrated. It affected some one million acres of rice plantations, and reduced the yield to 1493 kg/ha, compared to 1,717 kg/ha in 1970. It also destroyed nearly thirty per cent of the sugar crop, which is the country's main export earner. Similarly, persistent drought steadily reduced the total area of millet cultivation in Chad from 1.23 million hectares in 1961 to 0.80 million hectares in 1972. The yield during the same period decreased from eight hundred and forty-two to five hundred and forty kg/ha. The flow of the River Volta at Akosombo fluctuates between three hundred and fifty thousand cusecs at the peak to about one thousand cusecs during the period of low flows. Because of such wide climatic fluctuations, and because a major portion of the population in these countries depends on agriculture for its livelihood, rainfall is often the central concern of the year. Indeed Hoagland (1973) suggests:

If the question, "How do Africans live?" means how do most of them spend the majority of their time, the answer probably is "Thinking about rain." Life tends to be organized around it, in the way consumer goods are the centrepiece of Western societies.

### Problems of Irrigation

Because of such intense fluctuations in rainfall, irrigation is essential for a significant portion of the tropical countries in order to control water availability. But irrigation practices in the tropics have resulted in a problem that is rarely seen in the temperate climates. It is the spreading of water-borne diseases, and the consequent suffering of millions of human beings and animals. In the tropical and semitropical regions of the world, irrigation schemes have enhanced and often created favourable ecological environments for parasitic and water-borne diseases such as schistosomiasis, liver fluke infections, filariasis, and malaria to flourish.

### Soil Erosion

The rainfall and temperature patterns in the tropical climates also create other problems. In some

countries, where there are definite dry and wet seasons, the climatic factors tend to accentuate the problem of soil erosion. During the long dry season, there is some loss of topsoil due to wind erosion. However, far more damage is done during the onset of the rainy season. The vegetative cover, at the end of the dry season, is already at an absolute minimum. Thus, when heavy thunder storms occur, the water does not seep into the soil as effectively as in light steady rain, and year after year soil erosion takes place due to surface runoff. Tempany and Grist (1958) have suggested that if the



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heavy rains double the water flow, "scouring capacity is increased four times, carrying capacity thirty-two times and the size of particles carried sixty-four times." Fisher (1961) estimates that these processes have contributed to the erosion of nearly a hundred and fifty million acres in India alone. Even accepting that soil is formed more quickly in the tropical region than in temperate climates — Veleger (Fisher 1961) estimates it to be ten times faster in the tropics — the soil formation is much too slow to replace the loss.

### Erosion in Tropical Forests

The situation is somewhat different in tropical forests and woodlands (Richards, 1977). They absorb large quantities of water from the soil and also give out large amounts of water vapour. The closed type of tropical

forests, because of their multi-layered structure, successfully intercept rainfall, and thus protect soil from direct impact. This contributes to very little runoff and soil erosion. Much of the water infiltrating into the surface is absorbed by the network of roots, which is approximately three times as dense as that in a temperate forest (Klinge, 1973).

Destruction of tropical forests, and their replacement by grasslands or other herbaceous vegetation, changes the ecosystem, and the soil then becomes exposed to the effects of sunlight, heat and rain, which all increase erosion. Such destruction further reduces rapid and efficient recycling of water, as well as the water holding capacity of the soil. Greater amount of surface runoff tends to increase the frequency of floods and accentuates sediment loads in rivers and streams.

Tropical forest ecosystems are thus both stable and fragile. They are stable because over long periods of evolution, spanning the geological time scale, they have developed resilience which allows them to withstand climatic and other environmental hazards. However, faced with modern technology, the ecosystems may prove to be quite vulnerable. The ecology of tropical forests has to be much better understood before any long-term sustainable development plans can be made with any degree of confidence.

### Deceptive Fertility

Tropical vegetations often give a deceptive impression of soil fertility. Major tropical forests are often on nutrient-poor soils, especially in terms of phosphorous and potassium. During their evolutionary process, they have become adapted to such soil conditions by developing complex nutrient-conserving mechanisms, so that the loss of nutrients through drainage is compensated for by nutrients from rain, dust in the atmosphere and the weathering of minerals in the soil. Furthermore, since the majority of the nutrients are usually held in biomass rather than in the soil, the resulting loss through drainage is minimal.

This nutrient cycle, however, is broken by the destruction of the forest, especially by burning of the

trees. The loss of nutrients under such conditions is extremely high. If the forest sites in the humid tropics are to be converted into agricultural areas, inputs of fertilizers often become necessary, but their effects are somewhat short-lived since they are rapidly leached away by rain (Richards, 1977).

This creates two problems: agriculture under such conditions is often uneconomic, and leached fertilizers could contribute to adverse environmental effects. Richards (1977) states that "in some areas climax forests exist under conditions of nutrient deficiency so extreme that they cannot be replaced by any form of permanent agriculture, e.g., the 'campinas' and 'pseudo-caatingas' on podzolic sands in the Rio Negro region of Amazonia and the 'Kerangas' (heath) forests of Borneo."

#### Planting and Climate

Preparation of the land for planting in the tropics is generally carried out prior to the onset of the rains. This means that this arduous task has to be carried out very often in what turns out to be the hottest and driest season of the year. In contrast, in temperate climates, precipitation exceeds evaporation during winter months, and consequently it is comparatively easier to work with the moist soil in the spring. In addition, the easy availability of mechanical instruments makes the job much simpler and less onerous than in the tropics.

#### Climate and Pest Management

The tropical regions are extremely rich in species of plants and animals. This becomes abundantly clear if the "World Life Zone System" of ecological classification, developed by Holdridge (1967), is considered. This multifactorial classification scheme provides a quantitative relationship between climatic parameters and the principal features of associated natural vegetation. Thus, each life zone defines a distinctive set of possible ecosystems that are unique to the given climate. Globally, approximately 120 different bioclimates can be observed under the life zone system. Of these, thirty-nine life zones are in the tropics and another thirty-one in the sub-tropics, which account for the fifty-seven per cent of

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### With no winter frosts, pests in the tropics can proliferate throughout the year, unhindered by any climatic checks.

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the world total. In contrast, warm temperate regions contain twenty-three life zones and cool temperate regions another sixteen. And yet virtually all the industrialized countries together with all the high-yielding agriculture seem to be concentrated within these two temperate regions (Toshi, 1975).

The situation is even more dramatic if the life zones of individual countries are concerned. Toshi found thirty-two tropical life zones in Peru, and expects another twenty-five subtropical life zones in the southern quarter of that country. Both Panama and Costa Rica have twelve life zones each, and Nigeria seems to have seventeen. In contrast, temperate countries like Holland have only one life zone, and the entire United States, east of the hundred and second meridian, seem to have only ten.

#### Monoculture and Diversity

Such diversity of species in the tropics has its attendant problems, especially where monoculture is concerned. In a temperate climate, there are comparatively few species of plants, all but one of which have to be suppressed at any place to develop monoculture. Similarly, there are fewer species of pests in the temperate regions. In the tropics and sub-tropics, however, many more varieties of plants and pests have to be suppressed, if monoculture is to be profitable. That in turn entails a higher demand for energy, and inevitably the overall management necessary to obtain good yields from tropical monoculture becomes an even more difficult process than it is in temperate climates. The situation is still worse when one considers that farmers in the tropics tend to be much less educated than their counterparts in temperate areas and, moreover, do not have similar access to such necessary items as fertilizers or energy.

#### Colder Winters kill Pests

One of the major advantages of a temperate climate over tropical and subtropical ones is the colder temperatures of winter. The presence of frost and snow over a significant portion of the year ensures the eradication of pests, parasites and weeds that affect man, agricultural products and animals. The absence of frost in the tropics means that insects pests and parasites can continue to proliferate unabated throughout the year, their lives unhindered by any climatic checks. In comparison, in temperate zones, winter acts as the great executioner of nature. According to Wrigley (1969):

The tropical environment which favours the fast luxuriant growth of crops and vegetation also favours the weeds which compete for moisture and nutrients: and the parasitic fungi, insects, spider mites, eelworms and virus diseases which make for serious reductions in the crops. Without a 'close season' for plant growth, these pests may thrive all the year.

#### Pest Outbreaks

Monoculture faces a high probability of attack from pests in the tropics. Even when a species of crop is well established, there is always a possibility that a new species of pest will suddenly appear. For example, the Philippines, which became self-sufficient in rice in 1967, due to the introduction of the high-yielding varieties, had to reimport rice in 1971, since the new varieties were subject to major pest outbreaks. Similar pest problems have seriously affected agricultural production in the tropics; coffee rust eliminated the arabica coffee industry in Sri Lanka; and blister blight in tea was a very serious menace in India, Indonesia and Sri Lanka, until control measures were found. Other examples are the effects of stem borers and blast on rice in Asia; *Phytophthora Palmivora* on cocoa in Cameroon and other West African countries; cotton pests in Egypt, Peru and Nicaragua; "sudden death" of the Zanzibar cloves; "wither-tip" of the Dominican limes; and the Panama disease of the Caribbean and Latin American bananas. Every cereal or crop has at least one serious pest that affects its yield.

Tropical agriculture faces other pest problems uncommon in temperate zones: One of the most severe is locusts, which are a serious threat to all foliage in Africa (except Madagascar), all of Middle East, India, Pakistan, and Afghanistan. The locusts appear in large swarms, and can easily eat as much food in one day as some ten thousand people. Locusts also created serious farming problems in the United States until they were controlled during the nineteenth and the early twentieth centuries. The problem of the Rocky Mountain locust, however, was certainly much smaller than its tropical counterparts.

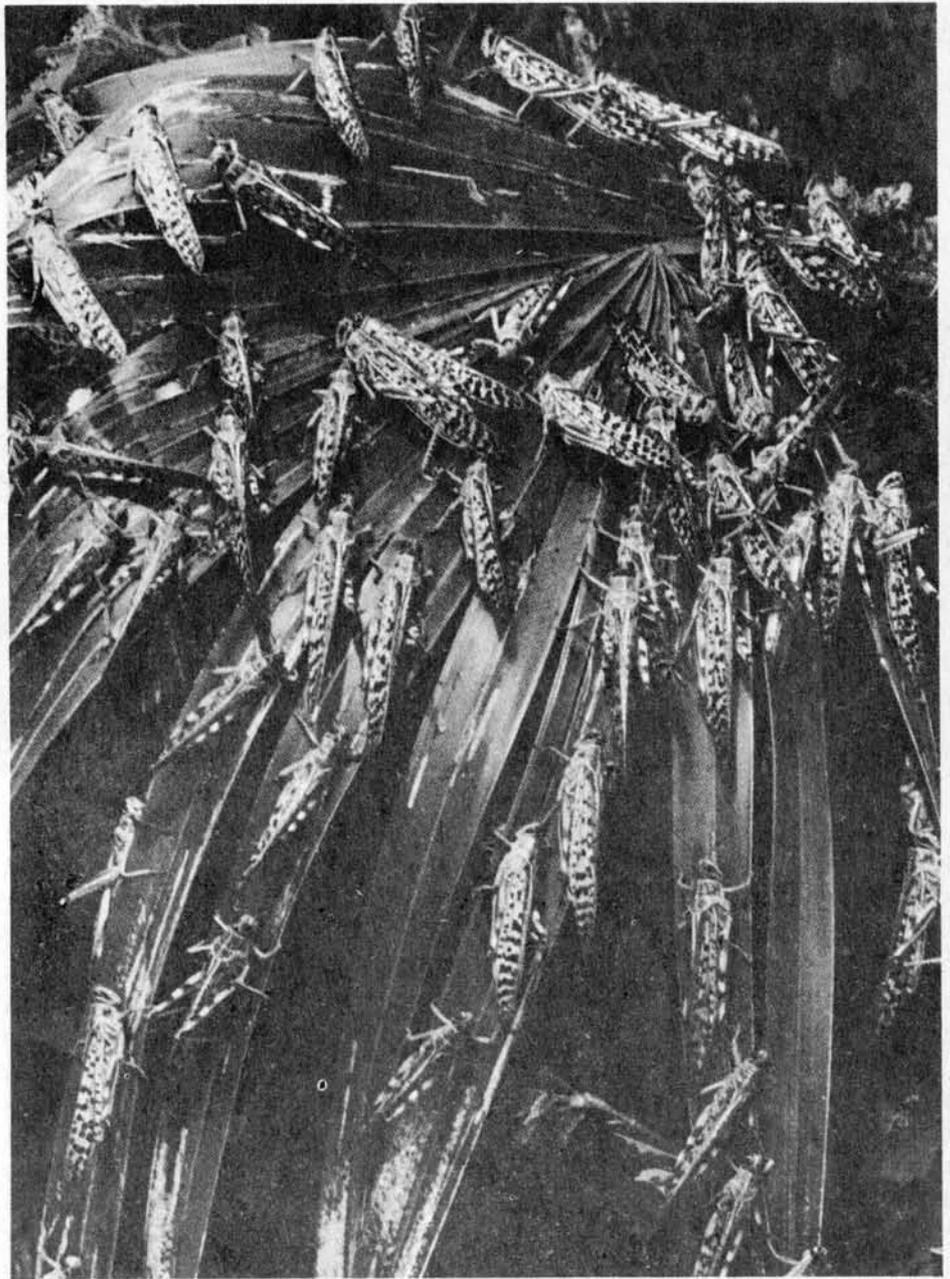
### Pest Problems in Animals

Properly managed, animal husbandry can play a significant part in improving both the income and the diet of the people in developing countries. Raising livestock, however, presents some difficult problems in tropical climates. Like their human counterparts, animals often have to survive at subsistence levels: good pastures are often lacking, and the grasses they eat often have poor nutritive value owing to the lack of essential minerals in the soils.

Diseases also keep animal production low. To cite just one example, the present production of beef and veal in the tropics averages about 14 kg/head compared to about 75 kg in temperate climates. The National Academy of Sciences, in a report on Tropical Health (1962) stated:

Intestinal parasites are almost universally distributed in domestic animals throughout the tropical world. The economic effects are multiple and not necessarily confined to mortality in infected animals. These parasites are responsible also for retarded development of young animals, reduced yields of milk and meat, lowered wool production, and impaired working capacity of draft animals.

...Conditions in the tropics are conducive under most circumstances for the transmission and perpetuation of gastrointestinal parasites; transmission can and does take place in most instances throughout the year, whereas in the temperate zones low temperatures serve as a barrier to transmission during the winter months.



Locusts: a serious threat to Third World crops.

It can be argued that animal trypanosomiasis is one of the major causes of the underexploitation of the land and water resources of a significant portion of tropical Africa. If trypanosomiasis could be brought under control, it has been estimated that the region could carry a supplementary cattle population of about a hundred and twenty million head. This could produce an additional one million, five hundred thousand tons of meat each year, representing a value of at least seven hundred and fifty million dollars (UN World Food Conference, 1974).

The tse-tse fly which carries animal trypanosomiasis is also the vector of human trypanosomiasis (sleeping sickness), and causes untold human misery. The seriousness and magnitude of the problem

was recognised at the World Food Conference at Rome, and one of the main resolutions passed was on the control of trypanosomiasis (Biswas and Biswas, 1975).

### Climate, Health and Development

Inevitably these problems have a considerable impact on the life style (including standard of living) of Third World countries. There are certain other factors, however, which directly affect human health, creativity and work efficiency.

The relationship between human health and economic development has not been much explored in recent times, and this indicates another "Western" bias in current theories of development. While the average worker may be considered to be healthy in the temperate zones,



he is far from being in good health in the tropics for a variety of reasons, including poor nutrition (M.R. Biswas, 1978). Bad health obviously affects general attitudes to work, and hence contributes to inefficiency.

Even though the interrelationship between tropical climate, health and work efficiency has not been conclusively established, several comments can be made. Because of socio-economic and climatic conditions, diseases seem to be quite prevalent in the tropical and semitropical regions. Indeed the whole situation gives rise to a vicious cycle. Lack of appropriate development means that people do not have adequate education, nutrition, sanitation, or health care, all of which contribute to making them more prone to diseases. That in turn affects efficiency of work, which further reduces rate of development, whilst the warm and humid climates of the tropics aggravate the situation.

#### Water Supplies and Efficiency

According to a survey carried out by the World Health Organization (WHO) on the extent of water supply and sewerage facilities available at the end of 1975 in sixty-seven developing countries, only twenty per cent of the rural population have access to safe water. If both urban and rural sectors are considered, thirty-five per cent of the people are

adequately served. This means that women and children have to spend some of their time in collecting water. Hence, if the water supply of the various regions was developed, it would reduce the water collection journey of women and children, who currently spend up to five hours a day collecting family water requirements. Inevitably the time spent in carrying water is a function of the distance of the source from the consumer; it shows that if the water source is about four and a half miles away, a woman can be expected to spend at least three hours a day carrying water, or fifty per cent of her daily working time. If this time can be freed by providing water closer to home, it can be used for productive work.

Time and inconvenience are not the only disadvantages of long water-collection journeys in the tropics; it increases other costs as well. It has been estimated that it takes up to twelve per cent of daytime calorie needs of most carriers in wet areas; and in drier areas and in mountainous regions, energy spent in collecting water and firewood may take up to twenty-five per cent or more of daytime calories (Cleave, 1974). Thus, elimination of the water collection journey has not only important implications in terms of reducing disease (since contacts with disease vectors during long water-collection journeys will be eliminated) but also

in terms of nutrition, a fact often overlooked by planners and politicians.

Water development will undoubtedly reduce health hazards like cholera, typhoid, infectious hepatitis, amoebiasis, enterovirus diarrhoeas and bacillary dysentery. It would further reduce human contacts with vectors of water-borne or water-based diseases like schistosomiasis, trypanosomiasis and guinea worm (*Dracunculosis Medinensis*). These are primarily tropical diseases. Schistosomiasis is currently endemic in over seventy countries, affecting over two hundred million people. Guinea worm infection currently affects forty-eight million people, chiefly in India and West Africa. Some have estimated that the incidence of *Trypanosoma gambiense* can be reduced by eighty per cent by good water supply schemes (Bradley, 1974).

#### A Host of Diseases

Man is also affected by other diseases in the tropics. Among these are malaria, filariasis, river blindness, leprosy, dengue, etc. More than two thousand million people are now exposed to malaria (UNEP, 1977), about two hundred and fifty million people have some form of filariasis (Kamarck, 1973), more than ten million people are infected by leprosy, and some twenty million people have been blinded, totally or

partially, by river blindness. While billions of dollars are being spent on research to find cures for diseases that affect inhabitants of temperate zones, a mere fraction of that total (probably much less than ten per cent) is being spent for research on the tropical diseases. And yet, there is no doubt that tropical diseases affect many more people than temperate zone diseases.

### Nutrition, Climate and Work

Lack of nutrition in the developing countries also affects work efficiency and the general attitude to work. Increasing population and lower standards of living in most countries of the tropics and subtropics means that agricultural workers, one of the most underprivileged groups, do not get adequate food, neither in terms of quality or of quantity. Hence, it is going to be difficult to increase the agricultural production of the developing countries unless their farmers have better nutrition and education. Physical inputs like pesticides, fertilizers or better water control will certainly help, but in the final analysis it is the agricultural workers that produce food, and they must have a better quality of life. As Myrdal (1968) perceptively comments:

The popular theory that indigenous people are more able than Europeans to cope with the climatic stresses of the region is not established: the opposite might be true in view of the European's better nutrition and health. In any case, the sultry and oppressive climate that much of South Asia experiences all or most of the time tends to make people disinclined to work. Manual labourers, for example, habitually wield their tools with a feebler stroke and take more frequent and longer rest pauses than workers in cooler climates."

### Time for Action

Climate is an important parameter that should be considered in any theories of economic development, especially in the tropics and subtropics. The physical, social, economic, cultural and institutional conditions are very different in the tropics to those in temperate zones. Development plans for the tropical countries must consider these special characteristics, and then devise ways to maximize each country's assets and minimize its liabilities on a long-term sustainable

basis. For example, tropical forests are estimated to be responsible for some sixty-nine per cent of the earth's biological productivity (Brunig, 1974). The question then arises how man can take advantage of this natural phenomenon. Whatever strategy is adopted, it must not be based on obtaining quick financial return by the realization of capital, which would ultimately prove to be a self-defeating strategy.

It is important that strategies developed are compatible with the laws of nature, not against them. Hence, the problems of pest control or monoculture or the reduction of forest areas to grazing lands, can often be solved only when the ecology of the balanced natural systems which have been replaced, is studied and understood.

There are many areas where we already have adequate knowledge to solve the problems facing us, but for a variety of reasons it is not being used. For example, it should be possible to prevent much of the loss of productive soil in the tropics, but countermeasures for such prevention are not being taken. Plato graphically described some twenty-three centuries ago how deforestation increases soil erosion and floods: and the need for terracing on sloping land to prevent soil loss was pointed out by Bernard Palissy at least four centuries ago (Biswas, 1970). One wonders why such simple measures are not implemented. The technology has been available for centuries; it is certainly widely known; preventative steps are not expensive and are urgently needed; and yet they are not used in practice. Research by itself is unlikely to solve any problem, unless the results can be brought to bear in real life. As Confucius said in the fifth century B.C., "The essence of knowledge is, having it, to apply it."

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The following articles are the first in an occasional series on the need to re-examine the basic tenets of modern economic theory. In future issues, *The Ecologist* will look at the economics of natural systems and pre-market societies.

# The Need for a New Economics

by Edward Goldsmith

**Economists can no longer predict the course of our economy. The limits of their discipline are now apparent. A broader economic theory is required to deal with the post-industrial age.**

A year ago the major industrial countries met in Bonn to discuss their economic problems. From this meeting there emerged a whole set of targets and solemn promises, but these as Ivan Fallon of *The Times* points out "have been forgotten or swept aside". None of the countries (with the surprising exception of Italy) have been able to maintain the growth targets fixed at that meeting. Undertakings to reduce unemployment have on the whole failed, in particular in Germany, France and Japan. Firm commitments to resist all trends towards protectionism have not been kept, for protectionist pressures have proved irresistible. The US oil deficit which President Carter undertook to reduce has instead continued to grow, helping to increase still further the imbalance between the US deficit of 22 billion dollars and the huge Japanese trading surplus which has nearly doubled this year to 19 billion dollars.

This is not an isolated incident. If our politicians and their economic advisers are proving less and less capable of controlling our economy, they have also shown themselves to be singularly incompetent at predicting economic changes. The British Treasury's forecasts for economic growth rates, for instance, have proved consistently wrong. The closest they were to the mark was in

1969-70 and again in 1971-72 when their predictions were only out by 15 per cent; their most spectacular error was in 1973-74 when they were wrong by 90 per cent.

Their ability to predict major economic discontinuities has been even more lacking. Thus, in September 1973 Mr. Heath told the British Nation: "We have made good progress towards achieving a prosperous, fair and strong society. Already as a result of our policies the standard of living of people in this country has gone up half as much again in three years of Conservative rule as in the whole of the six years of Labour government." In less than a year, the country had been plunged into the worst economic depression since 1929, and today's economic future looks grimmer than ever before.

To quote *Business Week*, "Economists no longer know what to make of figures that they once thought they could interpret with confidence. The prime statistical series that every forecaster reviews for clues to evolving trends has begun to give bewildering signals."<sup>1</sup> Changes in the value of "the leading indicators" (which include such things as hours worked; unemployment claims; orders for capital goods; stock market prices; and company profits) no longer seem to provide an accurate guide to changes in the economy.

Something has gone radically wrong and, as Alan Codrington points out, it is not just "an occasional breakdown or shortcoming in analytical capacity, but an overall loss of confidence. It is not just that the least able are stumbling, but that the finest minds are missing the mark so widely."

## **Economic Theory: A Toppling Edifice**

This can only mean that it is not our individual economists who are to blame but economic theory itself. This is also *Business Week's* conclusion: "When all forecasts miss the mark, it suggests that the entire body of economic thinking - accumulated in the 200 years since Adam Smith laid the basis for modern theory with his inquiry into *The Wealth of Nations* - is inadequate to describe and analyze the problems of our times."

What has happened? As *Business Week* points out "a number of economists fear that they may have defined their science too narrowly. One such economist is Robert J. Heilbroner who sums up this viewpoint: "Economists are beginning to realise that they have built a rather elaborate edifice on rather insubstantial narrow foundations." In his opinion, economics must resume its original name, 'political economy', and draw on political science, socio-

logy and psychology as well as on its own traditions. The result would be an eclectic theory that asks the questions economics doesn't ask and answers some questions that conventional economics does ask in a rather unconventional way."

Heilbroner is obviously quite right. Modern economics like most of the disciplines into which knowledge is at present divided is studied in almost complete isolation from everything<sup>2</sup> else. As Georgescu-Roegen points out, the economic process, is depicted in the standard text-books, as "a circular diagram, a pendulum movement between production and consumption within a completely closed system." This means that it is seen as governed exclusively by its own laws rather than by those that govern all the other processes occurring within the natural world. The fact that there is "a continuous mutual influence between the economic process and our physical environment carries no weight with the standard economists. And the same is true of Marxist economists who swear by the Marxist dogma that everything nature supplies man is a spontaneous gift. In Marx's famous diagram of production, too, the economic process is represented as a completely circular and self-sustaining affair."

#### Nature Discounted

Nature, in the modern economist's model of the economic process is thereby treated as a constant rather than as a variable. It does not take into account that our modern economy is, among other things, parasitical to (and hence totally dependent on) the biosphere from which it derives its resources and to which it consigns the waste products it must inevitably generate. As Lester Brown writes "Economists are unaccustomed to thinking about the role of biological systems in the economy, much less the condition of these systems. The economist's desk may be covered with references containing the latest indicators of the health of the economy but rare indeed is the economist concerned with the health of the earth's principal biological systems. This lack of ecological awareness has contributed to some of the shortcomings in economic analysis and policy formulat-

ion during the seventies.

"Four biological systems — fisheries, forests, grasslands, and croplands — form the foundation of the global economic system. In addition to supplying all our food, these four systems provide virtually all the raw materials for industry except minerals and petroleum-derived synthetics. The condition of the economy and of these biological systems cannot be separated."<sup>3</sup>

#### Nature Can No Longer Meet Needs

But why, we might ask, has this insight suddenly become so important? The answer is obvious: a man with a hatchet in the middle of Amazonia can, for a very long time, cherish with impunity the illusion that the forest goes on forever, that it is infinite. If he is joined, however, by hordes of people, all of whom are equipped with the latest and most sophisticated bull dozers, it will not

be long before his notion of the forest will be found wanting and its fundamental flaw exposed.

This is precisely what is happening today. Our fisheries, our forests, our grasslands and our croplands are all under such incredible pressure as a result of the unprecedented increase in our numbers and in our per capita production and consumption, that they are deteriorating fast and are ever less capable of satisfying our growing requirements for their produce.

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**"Economists are beginning to realise they have built an elaborate edifice on rather insubstantial narrow foundations"**  
*Robert Heilbroner*

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The Bank of England: symbol of an outdated economic system?

## The Scientific Community is partly to Blame

There is no point in simply blaming our economists for this obvious deficiency in the theory that they have developed. It is our natural scientists rather than our economists who should have realised long ago that the Earth was finite, and that an economy that could only survive by systematically pillaging it must of necessity be short-lived. That the scientific community has, on the whole, been as blind to this obvious fact as have the economists, was shown by the way it responded to our *Blueprint for Survival* and the *Limits to Growth* and other such studies.

In general, the attitude of the scientific community and of the economists — in spite of their claim to objectivity — simply reflects that of the public at large, for whom the world remains as bountiful as ever. Even today a Gallup poll taken a few months ago showed that sixty-eight per cent of Americans still refused to believe that there was a real world oil shortage. The present crisis, they insisted, was but the result of some sort of conspiracy on the part of the oil companies. People may pay lip service to Kenneth Boulding's concept of "space-ship earth" but it has not yet permeated into their consciousness and the mental climate that still prevails continues to favour the 'cowboy' rather than the 'space-man' economy.

## Economics: A means of Reorganising Nature

The interrelationship between the economy and the biosphere is much more subtle than this discussion so far reveals, however. Our modern economy, besides extracting resources from the biosphere and polluting it with its waste products, actually sets out to reorganise it in that way which best satisfies economic requirements. Thus to satisfy economic exigencies, our forests must be transformed into plantations or into fields having the shape and size that are most favourable to whatever agricultural techniques are economic at the time. The shape of our cities must also be modified, as must the very fabric of our society, which much now be that which most favours the performance of what, within a market economy, become

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**"The economist's desk may be covered with references containing the latest indicators of the health of the economy but rare indeed is the economist concerned with the health of the earth's principal biological systems"**

Lester Brown

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the principal functions of man; to produce and to consume. This rearrangement of the biosphere to satisfy economic exigencies can only be achieved with impunity if its viability, and hence its ability to provide us with the innumerable non-economic benefits on which we depend for our biological survival, *is not itself dependent on the maintenance of its original structure — if, in other words, its original organisation was a purely random one.*

Surprising as it may seem, the scientific world as a whole, until a century ago, seemed to assume that this was so, even though it is difficult to see how such an assumption could be reconciled with such things as the theory of evolution, to which most scientists were already at least paying lip service. It was only in the latter part of the last century that it was shown that discrete parts of our natural environment such as a forest, a marsh, a river or a sea were self-regulating units of behaviour — 'ecosystems' as they were first termed by Haeckel in 1875. It has since been shown that ecosystems have much in common with other units of behaviour, or "natural systems", such as molecules, cells, biological organisms, populations etc.

## How Natural Systems are Organised

Now the main feature of a natural system, as we learn from General Systems Theory is that "its parts are in dynamic interrelationship with each other"<sup>4</sup> and hence that it displays organisation. This means that it is more than the sum of its component parts. In fact, if a system is capable of self-regulating adaptive behaviour, this is not solely by virtue of that particular set of constituents into which it can be broken down, but *by virtue too of the way these are organised.* What is more, this organisation is critical. It cannot

be modified without reducing its viability.

Surprising as it may seem to those brought up in a disintegrated modern mass society, a normal human society, i.e. one that is organised on a tribal basis of a type in which at least ninety-five per cent of all men have lived, can also be shown to be but a specialised instance of a natural system and the generalities of its behaviour subject to the same set of laws that govern those of other natural systems.

This, our sociologists are still loath to accept. Imbued with the empiricist philosophy that still underlies both the natural and the social sciences, their reaction to General Systems Theory is that it does no more than draw a vague analogy between the behaviour of things that are in reality very different from each other. To oppose General System's Theory on this score, however, is, as Von Bertalanffy<sup>5</sup> points out "tantamount to criticising Newton's Law because it draws a loose analogy between apples, planets, ebb and tide and many other entities or if one would declare the theory of probability meaningless because it is concerned with the 'analogy' of games of dice, mortality, statistics, molecules in gas, the distribution of hereditary characteristics, and a host of other phenomena".

If they were identical then there would be no need to compare them. Systems are basically comparable, however different they may seem, if the generalities of their behaviour, at least, can be represented by a model *that makes use of the same set of variables*, and this can be shown to be the case for all natural systems.<sup>6</sup>

## Society cannot be Reorganised to Economic Ends

Not surprisingly, sociologists who, almost all, in effect, reject the systems approach, though they may pay lip service to it, still tend to regard society, as it is fashionable to do today, as a random assortment of unrelated people who happen to inhabit the same area and are thereby governed by the same administration — and this, it is important to realize, is *the only view of society that justifies the notion that it can be reorganised with*

*impunity to satisfy economic ends.*

What is true of individual ecosystems and the human societies that inhabit them, must also be true of the biosphere itself, the ultimate ecosystem that englobes all others on this planet, and whose basic structure is also essential to the maintenance of its overall viability.

If the main feature of the biosphere and of its component sub-systems is that their parts are inter-related in that way that assures their viability, then they must be affected by and, in turn, themselves affect the behaviour (including the economic behaviour) of specific sub-systems (including human populations). If this is so, then we must go further than Heilbroner suggests and examine the economic process *in the light of a general model of the biosphere seen as a single system.*

#### **Internalising Externalities**

If economic behaviour must be examined within its total spatial context so must it be regarded too

within its total temporal context i.e. in the light of the total experience of man which is largely that of pre-market and pre-industrial societies and indeed of the other natural systems whose general behaviour we have seen to be governed by the same basic laws. Of course this would involve, among other things, depriving economics of what *Business Week* refers to as "one of its most useful devices — the ceteris paribus clause, the stipulation that other things must remain unchanged for the theory to work." On the contrary, we must assume today that things must change. Such changes, rather than being regarded, however, as 'external' to our theory must now be taken as 'internal' to it, as part of the legitimate subject matter of economic theory. Of course, if this were done, then very little would be left of the discipline of economics as we know it today. What would emerge would be a very different discipline, perhaps more closely

akin to the original economics of the 18th Century, that of de Quesnay and the physiocrats who actually coined the term, and who saw it as a branch of Natural Science rather than as a form of mechanics — "the mechanics of self-interest" as Jevens referred to it, which is what it essentially remains today.

In a future issue of *The Ecologist*, Edward Goldsmith considers the economics of natural systems and pre-market societies, illustrating how the distribution of resources helps to maintain stability rather than threaten it.

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# Economics for a Post-industrial Society

by Ken Penney

Lecturer in Environmental Economics, University of Exeter

**Economics dominates our lives. Yet the bulk of modern economic theory is based on an edifice of false, sometimes laughable, assumptions. Why then do economists insist on the infallibility of their discipline?**



Barnaby's Picture Library

In his *Nature of Scientific Revolutions*,<sup>1</sup> T.S.Kuhn suggests that throughout the history of science, scientists have asked a body of riddles. As long as some of these riddles remain unanswered, the scientist is continually obliged to re-think accepted theory, to 'flip' into an entirely new paradigm of explanation in which the old set of unsolved riddles suddenly seem to have answers.

Perhaps the most pronounced 'paradigm flip' in recent economic theory occurred when John Maynard Keynes tried to show that the price mechanism, if left to its own devices, was incapable of providing jobs for the three million or so men and women without work in the 1930s. Anyone who can bring themselves to read the first chapter of Keynes's *General Theory*, and it is only one page long, must be struck by the way in which he was forced to set up, and attack, a straw man — the so-called 'Classical Economist'.

Many scholars have since pointed out that such a figure never really existed. Nonetheless, I sympathise with Keynes's dilemma, for in my own work I have found that any scholar who is trying to shock the establishment out of its complacency has to attack the very heart of conventional wisdom. Certainly it is true that we rarely find any one person who accepts without reservation every last detail of contemporary dogma, nevertheless it is this general body of dogma that is used to justify a lack of concern for many of society's most pressing problems. In Keynes's time it was the level of

unemployment in our time it is the threat of global pollution, nuclear catastrophe and the possible extinction of the human race.

## Deliberate Myopia

The straw man approach is an inevitable trap that we all fall into and, in fairness, I must state at the outset that some economists *are* concerned with pollution, yet they treat it as if it were a special case and not central to economic theory. Hardly surprising, perhaps, since conventional economic wisdom developed in an intellectual atmosphere which saw pollution only in terms of the individual not of society; and which has always assumed that every individual is able, willing and well-informed enough to take action to remedy the problem. Such an assumption is fine when one is dealing with a person polluting his neighbour's back yard, but deliberately myopic when the pollution is global.

So too is the assumption that technology is a completely neutral factor in the determination of social and economic events. Whenever reference is made to technology in standard economic textbooks, it is usually labelled the 'state of the arts' — an indication of the quaint attitudes of economists to technology.

## Mechanistic Universe

I suggest that the whole conceptual structure of the present school of economics was inherited from the mechanistic notion of the environment developed by Sir Isaac Newton; we are now moving rapidly into the

relativistic universe of Einstein. In this world, two and two do not necessarily make four, so my pollution plus your pollution could generate far more than the sum of its parts — the notion of synergy. Georgescu-Roegen has gone to great pains to explain how the concept of entropy, as developed within physical systems, can also be applied to economic systems so that economists can no longer assume that growth can go on without interruption. By establishing apparent order within one part of the economic system, we can only do so at the cost of greater and greater chaos within the rest of the system.

Technology can affect economic systems in less spectacular ways than affecting the total conceptual structure. Alvin Toffler, in his book *Future Shock*, has graphically illustrated the astonishing impact of accelerating technological change upon human attitudes. If we look at the work of early economists like Adam Smith<sup>2</sup> and David Ricardo<sup>3</sup>, however, we find a firm conviction that the relationship between technology and society had remained stable for generations, and hence would continue to do so for generations to come. That assumption provided the basis for the labour theory of value, which argued that since it was a well-known fact that so many hours of labour were required to produce a certain amount of wheat; and since that input-output relationship had existed since time immemorial and would go on existing; then it was possible to make labour both the source and the measure of the value of commodities, a measure that would remain independent of the actual money price of the commodities themselves.

Both Smith and Ricardo were writing at a period of rapid industrial change we now refer to as the Industrial Revolution. Today we are living in a world of even more rapid technological change in which micro-processors will produce massive unemployment and problems that will make the social ills of the Industrial Revolution look like a family quarrel in a country vicarage. For that reason alone, I believe it is necessary to shock fellow economists into looking more closely at the underpinnings of their discipline.



Adam Smith (top) and David Ricardo (bottom) formulated the labour theory of value. But its basic premise has now been proved false.



## Consumption: Are we really so Greedy?

For the orthodox economist, the notion of consumption is self-explanatory. Consumers are people who consume things, and since consumption satisfies greed, it is thought to be the sole motive of human behaviour. Adam Smith writing back at the end of the 18th Century thought he had found the counterpart to Newtonian gravity in greed. It was greed that made people produce the things that other people wanted, otherwise they clearly could not earn the money to buy the things *they* wanted. People would sell *their* labour and *their* resources to the highest bidder because *they* wanted to earn as much as *they* could get to satisfy *their* greed. Who would be the highest bidder? Why the person who was producing the things that other people wanted. The simplistic jig-saw of Newtonian mechanics seemed to be applicable to economic society as long as the sole motivation of human behaviour was greed and greed alone.

Adam Smith, of course, had written in his earlier *Theory of Moral Sentiments* that human motivation was a much more complex mechanism and peoples' greed was countermanded by such things as charity, love, affection and other more admirable human characteristics. However Smith's ideas had a definite use value to the emergent capitalists class and his theories were used as an intellectual justification for the political policies they wished to implement.

Can we really accept that consumption is the be-all and the end-all of human activity? Certainly it is not consumption alone but the maximising of consumption that is assumed to be the determinant of human behaviour in economic textbooks; but even within our own society are there not social constraints upon maximisation? A person who tries to maximise his consumption of sex, food or alcohol is usually considered to be a social aberrant; most of us are conditioned not to maximise but to "satisfice", that is to proceed to the level of satisfaction in the consumption of any one commodity or service and there out a stop to it.

The conventional paradigm somehow equates consumption with human happiness. What a cruel

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## Can we really accept that consumption is the be-all and end-all of human activity?

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myth indeed. Generations of people have been led to believe that they will automatically find happiness by actually possessing a range of commodities. Fortunately more and more people today are realising that consumption on its own cannot yield happiness — a factor which is beginning to change the direction of our economic system.

### Economic Behaviour: Groups vs. the Individual

The orthodox economic model sees behaviour as beginning and ending with the individual. Yet sociologists and psychologists have provided us with abundant evidence that most of us are motivated at a group level more than at an individual level; that our wants, as opposed to our needs, are much more group determined than individually determined. If this insight could be incorporated into economic theory, the conceptual change that environmentally-minded economists need might be achieved. Even this rather simple innovation would deal such a powerful blow to the conventional paradigm that it is resisted with a ferocity that has to be seen to be believed. I argued once in an academic seminar that cultural values could actually affect the pattern of individual consumption and rather angrily I was asked to provide examples. I suggested that orthodox Jews might not wish to buy pork because of ethnic considerations. Quick as a flash came back the orthodox response. If an orthodox Jew does not wish to buy pork because of ethnic considerations, then pork was, by definition, not an economic good for Jews. Game, set and match to the orthodox economists. As long as economists put up such barriers to evidence provided by research in other disciplines — and attempts to assert that it is apolitical — there is little hope of bringing the really important issues

onto the centre of the intellectual stage.

### Whose Rationality?

Lurking there in the conventional paradigm is a notion of rationality implying that individuals are both capable and willing to maximise their consumption patterns. Yet, I have often teased my orthodox colleagues with the question, 'would somebody in their right mind be willing to pay around £15 for something they could buy for 2p?' They think this is absurd and when I tell them that people buy electricity in the form of transistor batteries for around £15 a unit when they could buy the same thing for 2p out of the plug, I am inundated with explanations as to why electricity in transistor batteries is not the same thing as electricity from out of the plug.

In fairness, I concede that conventional economists do accept that our pattern of consumption can create problems — known as externalities — for the rest of humanity, but again the problems are always played down. In the textbooks, for instance, there are many examples of gardeners causing annoyance to their neighbour with their power mower, or by playing their transistor radio too loud, but rarely do we hear of cases of British sulphur dioxide polluting the lakes and forests of Norway and Sweden. Externalities are assumed to be a *very special case rather than the general case*. What we should be doing is to make the distinction between public and private goods clear to everyone, *and then make public goods the major concern of economists and reduce private goods to the special case*.

### A New Taxonomy: Private and Public Goods

Maurice Peston's taxonomy<sup>4</sup> will give an indication of the distinction between the types of commodity, (see Diagram). He suggests that all commodities and services have at least two characteristics. First of all there is the notion of their being excludable. A commodity is excludable if we can prevent other people actually enjoying the commodity. For example, a painting locked up within a great palace with public servants employed to prevent the tax payers peeping in might fit the bill. However, it may be impossible to exclude

from view the sunset or the outside of that palace, and these rank as non-excludable commodities.

The other item in Peston's taxonomy is that of the rival nature of some commodities. A commodity is rival if by consuming as much as I want of it I prevent somebody else having as much as they want. By taking up as much space on a restricted seashore as I want, I may prevent someone else having as much as they want; in this case the seashore becomes a rival commodity. However, if the seashore is so vast that I can have as much as I want of it and somebody else can have as much as they want of it the commodity becomes non-rival. Within the matrix we then have four possible combinations. Commodities that are rival and excludable; rival and non-excludable; non-rival and excludable; non-rival and non-excludable.

It is the commodities which fall in the rival and excludable categories that are the pure private goods and the commodities that are non-rival and non-excludable that can be considered to be the public goods. The two intermediate cases are hybrid types and are part private and part public. Only if we switch the emphasis of economics to the public aspects of commodities and to the way that consumption and production affects other people and the environment, do we stand a slight chance of tackling the problems that face world society.

### Changing Patterns of Consumption

Fortunately within the western world we can distinguish a changing pattern within consumption. Back in the late 50s when J.K. Galbraith produced his book *The Affluent Society*,<sup>5</sup> he was howled down by both the left and the right for daring to suggest that people in the undernourished two-thirds of the world were living in a state of affluence where they could afford not to consume as much as we do.

Anyone who actually read what Galbraith wrote would realise that he was only speaking in terms of the wealthy elite of western society; a group whose upbringing had taught them that the possession of material goods paved the road to happiness, but who had realised that this was not so and had begun to reject the

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**Generations of people have been led to believe that they will find happiness through material goods. It is a pernicious myth.**

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materialism of their parents.

This trend has become much more evident in recent years. I am not trying to say, however, that people who are rejecting materialist notions are going back to standards of discomfort; they have a fail-safe level which is probably still far higher than that enjoyed by most of the people in the Third World. But the important point is that they are no longer going all out to consume as much as they possibly can. This could not only cause problems for the current economic system (which after all thrives upon an increasing level of consumer demand), but also provide the solution to our current ills. At my university, for instance, we have had vegetarian tables in halls of residence for many years, but in the last year we have found it necessary to have a complete hall of residence that is vegetarian, such is the demand for food without meat. Of course this tendency is small and restricted to a small sector of society but I remember that, in my own childhood in the dockland of East London, we were led to believe that rich people ate nothing but beef steak at every meal. As our material standard of living rose it was evident that the people around me were trying to emulate what they thought was a higher standard of living, and soon they began to refuse to eat anything else but steak. Now the people they were trying to emulate are vegetarian and this in itself might

well lead to a mass reduction in the demand for high energy-consuming meat products.

### Missing out on Social Relations

There are tremendous problems in seeing consumption only through the eyes of the individual. When I was working in the United States I was a guinea pig on a starvation experiment; the real problem was not so much going without food as going without all the social relationships we have come to accept as necessary to our mental well-being, for so many of our social rituals are centred around eating. You are not just refusing food when people offer you coffee, cakes and cookies, you are refusing their hospitality, and in many ways you are refusing their way of life. Since that time I have given up both cigarettes and drinking and I now realise that the main problem of abstinence is in setting oneself apart from the social groups where the consumption of these commodities take place. Anyone who has given up smoking must know the way in which other smokers try to convince them to smoke again. This may be an attempt to share around the guilt they feel, I don't know, but I certainly feel that by giving up drinking I have become somewhat socially emasculated sitting there in a good working-class beer-drinking society sipping my orange squash. If consumption in the future is to be reduced, as it must be, it will have to receive group endorsement; little is achieved by going it alone.

### The Factors of Production

The second major interest of orthodox economics concerns the factors of production. The definition of these largely stems from the social conditions prevalent in the U.K. in the late eighteenth and early nineteenth century. Adam Smith himself speaks of "the rude state of nature" before the

### Peston's Taxonomy of Public and Private Goods:

	Rival	Non-Rival
Excludable	Pure Private Goods	Hybrid
Non-Excludable	Hybrid	Pure Public Goods

appropriation of the land and the accumulation of stock; it is in this "rude state", as he calls it, that value is seen to be determined by labour alone. In deference to Smith, later economists decided to neglect the intervening stage during which the accumulation and the appropriation took place. As a result we have the notion of land, labour and capital, each earning rent, wages and interest.

Of course if we look at any other country we find that there are different attitudes to these factors. It was a customary requirement in England for the ruling class to own land and the emergent capitalists to own capital, but in France the hereditary landowners very often owned the capital as well. Despite these regional differences, the conventional classification of the factors of production remain unchanged.

### The Crusoe Economy

There is a particularly intriguing mythology about the evolution of capital. In the textbooks, it is often assumed that capital was derived as in a Robinson Crusoe economy. The shipwrecked Crusoe first of all satisfies his hunger by catching fish with his bare hands. Having built up his strength, he then decides that he could possibly do without fish for a day or two while he constructs a net from the freely available vines and plants growing on the island. Having done so he catches a greater volume of fish, and that greater volume of course constitutes the reward for his previous abstinence. Having built up his strength yet again he then

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**"Many of the basic assumptions of economic theory are so unrealistic as to be laughable."**

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proceeds (apparently without any previously acquired knowledge or inherited know-how) to build a boat; again the increased catch is a reward for his abstinence while he was building the boat.

In fact Defoe's *Robinson Crusoe* provides a far better picture of the development of British economic history than we might suppose. When Crusoe landed, he brought along with him a shipload of capital goods he had purchased with the proceeds of his profitable adventures in the slave trade. One might also recollect that one of the first things he did when he met Man Friday was to put his foot on the fellow's head and teach him how to call him 'master'. To a large extent, the capital upon which the British Industrial Revolution was founded came from the slave trade and the colonial exploitation that followed the dispossession of the rural proletariat within the United Kingdom.

### Twenty-seven Laughable Assumptions.

The orthodox conception of production is still really confined within a pseudo nineteenth century universe of small firms existing within a highly competitive market. Many people today who prattle on about the supposed efficiency of the free enterprise system and the utopian nature of possible alternatives, would, if they were presented with the twenty-seven or so assumptions

that underlie the economic model, probably collapse in fits of laughing. Thus it is supposed that coal mines could convert to the production of ice-cream should the relative price of coal and ice-cream change; that brain surgeons would down tools and become dock workers if the rates of pay of the two professions altered significantly; that a little black boy in Lewisham might decide to become a High Court judge if judicial salaries rose; or that a dolly bird in Roedene might decide to become a welder if welders wages saw a substantial increase.

### No Relation to the Real World

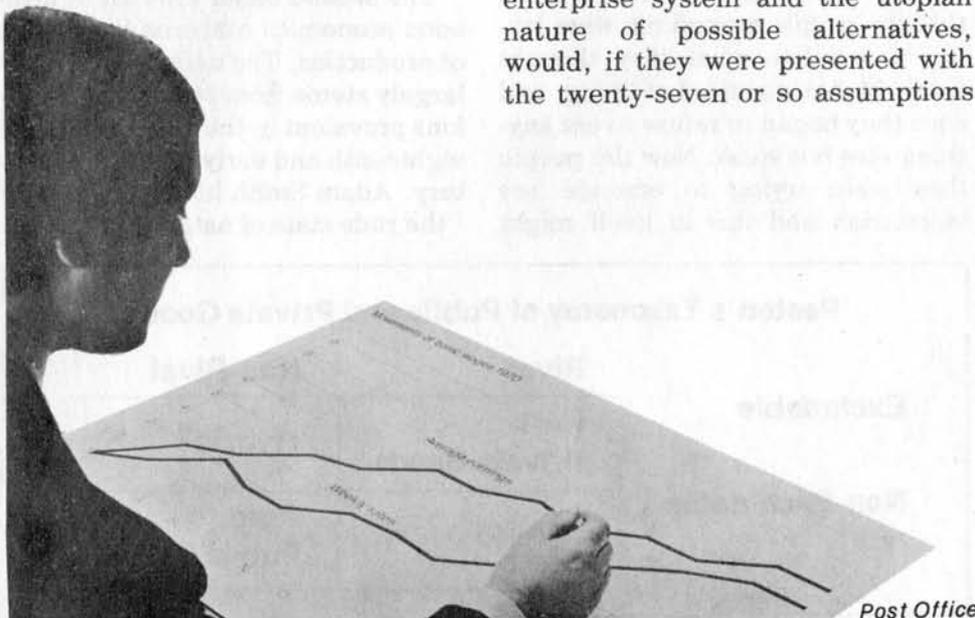
It is a necessary assumption that all factors of production are perfectly mobile and although many economists would accept that these assumptions do not necessarily correlate with the real world, such is the persuasive power of the paradigm that mobility is held up as a sign of the efficiency of the economic system. Rarely do we see a discussion of whether labour is mobile out of choice or because of lack of jobs within a given locality. Rarely too do we see a discussion of the social costs of such mobility: the breakdown of the community; vandalism; the breakdown of family life; the breakdown of extended family; and all the other social factors that tend to destroy social harmony.

Even though many of these assumptions are so utterly unrealistic as to be laughable, the great high priest of orthodoxy, Milton Friedman, the Nobel laureate, has suggested that if a theory produced good predictions then it matters not a jot if the assumptions are as absurd as those underlying the orthodox model. I have often taken this point and suggested that if I assumed that there was an invisible weightless man standing on the North Pole cranking the world

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**Classical theory supposes that coal mines will convert to producing ice-cream should the relative price of coal and ice-cream change . . .**

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around once every twenty-four hours, this would give a good predictive explanation, which under the Friedman criteria, would make my theory a good one. (I wasn't aware that Maxwell long before me had postulated the notion of a demon, who in much the same way created the sort of chaos and behaviour of atomic particles.)

### The Take-over of Monopolies

It is strange how the ideas of some economists receive publicity even though they may be unrealistic and of the nature of Friedman's, while others are ridiculed and subjected to contempt. Take the great household god of the orthodox school, Alfred Marshall. Writing in the 1890s Marshall<sup>6</sup>, who is praised above all for being an applied economist (one who looked out beyond the confines of his ivory tower at the world about him), was able to suggest that the reason why the industrial structure in Great Britain was highly competitive was because firms grew from the energies of their founder and were dissipated by his effete and dissolute offspring. This is the stuff of novel and legend, but any outside observer could have seen that a highly competitive market structure was certainly not to be found in Great Britain at that time, for the multi-national monopolies had already begun to exert their power.

Over in the United States, Thorstein Veblen<sup>7</sup> had chronicled the take-over of the vast monopolies and had produced economic theories which were suited to this industrial structure. Yet you may seek in vain for a mention of Veblen's work in most economic textbooks, and when he is mentioned it is usually in anecdotes recalling how he often strolled into the lecture room at Cornell University, speaking in Hebrew or Aramaic out of absent-mindedness. Adam Smith did similar things, but he was not laughed out of court. One of the intriguing ideas that Veblen did put forward was that in the highly monopolised market structure, consumption and production were quite different — and done for different reasons than those assumed in orthodox economic theory. People consumed not so much to satisfy their needs but in order to satisfy their peer group. Meanwhile their peer group con-

sumed in order to impress other people and so an unstable bandwagon of consumption was set in motion. In many ways production was not necessarily undertaken to produce profit but was to extend the power and share of the market of the firm and its board of directors.

### The Armaments Trade

It was really left to J.K. Galbraith to extend Veblen's theories into the modern world. In his *New Industrial State*<sup>8</sup> and his *Age of Uncertainty*<sup>9</sup>, Galbraith outlines a frightening tale of post-war events. Instead of producing commodities in the hope that consumers will buy them, Galbraith paints a picture of a world of high technology in which commodities take as much as thirty years to develop. He suggests what must be self-evident; that producers will not undertake such productive processes in the vain hope that at the end of the day consumers may or may not buy what they have to offer. What they will do, of course, is first of all to prepare the market to want the things that are being produced and secondly to go ahead and secure firm contracts to make sure that what they are producing will be bought. Who are the best markets for long term contracts? Why, national governments? And what are the sort of commodities that national

governments want? Why, all the commodities, electronics and such-like that are required for the arms race?

Here we have the absurd irrationality of a national productive system. Armaments are unique in as much as the supply of arms to one country immediately creates a demand for armaments in their rival countries. A case of supply creating its own demand. How often have we heard enthusiastic news reports when Britain has achieved an arms contract with some highly volatile part of the world? The sale of armaments creates profits and employment for trade unions. Governments can always talk about the barbarians on the other side who are preparing vast outputs of armaments and this is justification enough for their own country to do the same, but by doing so they inevitably give a justification for the barbarian governments to do likewise. Since the war we have seen a

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**Producers only produce for a market they have already created. In the government's case, that means the arms trade . . .**

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Mary Evans Picture Library

Robinson Crusoe; model for classical economists



growth of this sort of bandwagon. Even the space race seems to have been a part of this insane process. Of course the protagonists of this system point out all the great benefits we get as a spin-off of the warfare state; the micro-processors and the non-stick pans — but at what cost?

#### Other Goals are Possible

Many people, when they hear my lectures on the cost of economic growth and the alternatives I put forward come out with the platitude "We must not stop progress", just as if the economic system can only ever go in one direction. I try to suggest that there are a whole array of goals for which any system can strive; peace; putting a man on the moon; curing the common cold; satisfying peoples' needs; feeding the hungry; winning the arms race; or whatever. We seem to have made the choice of trying to win the unwinnable arms race and the whole of our system seems to be geared to that insane objective.

#### Efficiency?

We also have the carefully cultured myth that our system is geared to the dictates of efficiency. Yet there are many definitions of efficiency (mechanical, technological, economic, social and human, among others), and the attainment of one sort of efficiency may be done at the cost of inefficiency in some other area. For example it seems to be financially efficient to adopt tech-

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### The orthodox economic model sees behaviour as beginning and ending with the individual. But what about group motives?

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nologies that put people out of work; to produce commodities that fall apart more and more rapidly; and to use resources that have a greater and greater energy cost. All this seems to provide people with work, in order for them to earn incomes to buy the things that fall apart more and more quickly.

#### Gross National Costs or Gross National Product?

The readers of *The Ecologist* are quite aware of the costs of economic growth and there is no need for me to repeat some of these points here, though I fear from the information I have gathered from my lecture tours that the general public very rapidly forgets such events as the Michigan PCB disaster, Minnemata or Seveso. Instead of lumping the wages and profits that are engendered by cleaning up the disasters created by economic growth and adding them to the total of the Gross National Product, we should separate these costs as a Gross National Cost and publish them regularly alongside the figures for Gross National Product. We should then be able to see the sort of

costs that are involved in our economic growth. This would not be a difficult job to do and there are plenty of redundant and under-employed accountants who could do the job for us.

#### A New Economics

My aim is to produce a brand of economics that is able to tackle the great problems we now face in our world society. Instead of the twenty-seven rarified assumptions of economic orthodoxy, I shall restrict mine to only three, but I hope that these three will create a model within which a large number of important questions can be asked and answered. This will not be an easy task because the questions and conclusions that stem from the assumptions of the orthodox model have the great power of simplicity. I am told over and over again that there will be no problem of depleted world resources because as soon as a commodity becomes scarce its price goes up; with the effect of reducing consumption and making the production of alternatives more profitable. This I am assured always has worked in the past and will continue to work in the future. Yet innovation nowadays requires a long lead time; if we are trying to tackle the problems of the year 2000 we should have started work at least five or ten years ago. The price mechanism certainly did not give these signals at that time, and even now it is failing to do so. The author of a well-known economics textbook, who denied the use

of the term 'lead time' in engineering and production, actually assured me that my concern with the environment was a 'non-subject' and to back up his contention he told me that the Japanese had solved all of their environmental problems! Perhaps this should give you some idea of the difficulties that we environmentalists face.

### Three Basic Assumptions

What are the assumptions that I am employing? First; that today's technology and knowhow are capable of being employed to satisfy all the needs as opposed to wants, of the present world society. Second; that no new needs or rather wants are created by the system. Third (the most important and probably the most heroic assumption of all); that our society allows technological knowhow to be used to satisfy the needs of world society.

Although these may seem pretty humble assumptions in many ways they would shatter the world of economic orthodoxy because, once needs were satisfied, the whole

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**"I am told over and over again that there will be no problem of depleted world resources."**

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notion of economic scarcity disappears. Just think what would happen if scarcity as we now know it disappeared. Many of our present day notions of behaviour, status and the relationship between human beings are based upon the property we possess and the property rights we have over other people. If there were no scarcity, there would be no need for private property, which after all is a relatively modern phenomenon. Without private property a whole array of economic restrictions upon human behaviour would be removed and we could possibly move towards the world of human fulfilment at the communal and individual level.

### Creating Wants or Abundance in a World of Shortage?

At this stage the orthodox economists gleefully produce a trump card and suggest that, on the one hand, I am trying to scare them by putting forward the notion of a world of limited natural resources and on the other hand I am presenting a model which would seem to give rise to a world of plenty. In fact this paradox of plenty amidst a world of limited resources is not a paradox at all. If we were not conditioned to want more and more things; if vast amounts of our GNP were not spent creating wants and convincing us that we can only be happy if we consume more and more; and if we used our resources to show people that perhaps we could be happier without the horrible responsibility of trying to guard our personal property and our property rights over others; then we would have abundance within a world of apparent limitations. Somehow it seems to be perfectly acceptable for businesses and political regimes to spend vast amounts of money creating needs and

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wants, but if anybody else tries to use the powers of conditioning to convince people that they could do well with less, there are cries of anguish and outrage.

However if we look at societies like the Amish<sup>10</sup> who haven't changed their lifestyle since 1700; the Hutterites in Canada; or the Oneidans who existed quite happily in the New York state in the middle of the nineteenth century; we can see that there are societies who were able to exist quite happily and still do exist quite happily, with completely different aspirations and goals from our own. Most people have never heard of groups such as these, but those who have often argue their way of life is only successful because of their high religious scale of values. I would suggest that it is only a matter of definition whether some values are religious and some are not. Could it not be possible that the profit making itself is the religion of materialism?

#### Is Self-Sufficiency Possible today?

I am not saying that it would be an easy matter for us to move into a world of de-centralised, small, self-sufficient communities such as those run so effectively by the Amish. Let us not forget that our Jacobean forebears were much more self-sufficient in their training than any of us today, yet when they migrated to the United States, a land abundant in natural resources, it took them several generations to free themselves from an economic dependence on the mother country. Let us not forget either that our sturdy yeoman forefathers were brought up to learn a wide range of crafts; that they also lived within extended families and inherited much of the capital equipment that people who attempt self-sufficiency today have to buy outright, and that because they lived in extended families they often inherited the household goods which we today feel we must buy new with each successive generation. I have the uncomfortable feeling that too many of the people who are attempting the so-called 'good-life' of today are attempting selfish sufficiency, trying to solve problems for themselves and to hell with the rest of the people who are left in the urban jungle. What we should be striving for is community

based self-sufficiency and although this is very often derided as an impossibly utopian objective, perhaps if the barriers of propaganda were ever lowered, we would realise that by and large this has been achieved in the Republic of China. I am not suggesting that we could move easily into a decentralised system in which property rights and possession had largely disappeared, but I would suggest that many things are happening in present day society to show that society as a whole is moving in that direction.

#### Hard Task Ahead

We have a very tough job to do if we are ever to change the perception of the orthodox school and the conventional wisdom. Yet I remain an incurable optimist. Sooner or later, the vast number of us who are busily changing our values will force a 'perceptual flip' upon the powers-that-be, and we will then move rapidly away from our present snatch and grab, multi-national, corporate identity towards a sharing and caring society.

How should we really tackle these problems? I have found that it is absolutely no use tackling the conventional wisdom head-on. All too often the barriers of cognitive dissonance go up and evidence is quickly labelled Marxist, radical, Fascist or whatever will render it inadmissible. Perhaps we should take notice of the teaching of the Taoists. They try to channel the natural forces that run through the universe, just as fishes do not swim against the currents but swim between them. Perhaps we too should seek out those currents in our society and seek to go between them in order to achieve our objectives rather than tackle them head-on. And to extend the Eastern analogy even further, perhaps we should realise the hopelessness of tackling the great corporations on their own terms. Perhaps when they push we should pull, and when they pull we should push. How else can the small and powerless ever overthrow the giants?

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Our Obsolete Market Mentality by Karl Polanyi, July 1974

Obsolete Economics by John Adams, October 1974

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**Why not order these back numbers (70p each) from *The Ecologist*?**

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# Capital Calamity

## The Economic Fall-out from Harrisburg

The accident at Three Mile Island signals a decisive turn in the debate over the economics of nuclear power. By dashing the hopes of the nuclear industry to 'stabilize' reactor safety standards, it ensures that the cost of building nuclear plants will continue increasing much faster than the rate of inflation. The result will be to further endorse what the safe energy movement has been claiming all along: that nuclear power is the most expensive energy option.

In the wake of Harrisburg, attention has naturally centred on the future of Three Mile Island and the financial state of Metropolitan Edison. The Nuclear Regulatory Commission (NRC) has speculated that decontamination and reconstruction could each take two years — assuming that repair is technically possible and that the plant is permitted to re-open.

Meanwhile the Pennsylvania Public Advocate is seeking to prevent Met Ed from retaining the seven hundred million dollar plant in its rate base while charging customers for replacement power. Faced with possible financial ruin, Met Ed's parent company, General Public Utilities, has suspended indefinitely the construction of the Forked River nuclear plant in New Jersey and a coal-fired station in Pennsylvania.

But the economic fall-out of the accident carries far beyond Met Ed. The most calamitous effect will be on the capital costs of other nuclear plants — the ninety that already have construction permits and the dozens more that are being proposed for the future.

Capital costs account for two-thirds of the total lifetime costs estimated for new reactors. They have been increasing at an astounding rate. The cost of a typical nuclear

plant completed at the end of 1971 was two hundred dollars per kilowatt of capacity. By the end of 1977, the cost had risen to 800 dollars/Kw. Some of the increase was caused by general inflation, which pushed up wage rates and material costs. But most of the increase came from the safety systems added in an attempt to quieten growing public unease about nuclear power, and from improvements in design to correct faults which had surfaced with increased operating experience.

Thus, even after allowing for inflation, average nuclear capital costs rose by about one hundred and fifty per cent over the six-year period. This works out to an average increase of seventeen per cent per year *above general inflation*.

The comparable rate of increase for coal-fired plants was only nine per cent, which includes the cost of scrubbers and vastly improved fly-ash controls. In late 1971, the capital costs of nuclear plants averaged only four per cent more than capital costs for coal-fired plants without a scrubber. By the end of 1977, the average difference had swelled to fifty-nine per cent — including the cost of scrubbers.

This escalation in capital costs has wiped out the advantage in overall generating costs which nuclear power gained when prices for mined Coal leaped in the early 1970s.

For recently completed plants, coal-fired plants appear to be ten per cent cheaper than nuclear ones. This is a lifetime average, which accounts for the cost of installing scrubbers; assumes a slightly better performance reliability for coal-fired than nuclear plants; estimates modest costs for decommissioning nuclear plants, and nuclear waste disposal; and assumes gently rising uranium prices.

The nuclear industry may still tout

reactors as the least expensive source of electricity, but it cannot be oblivious to the impact of rising capital costs and concomitant delays on the future of nuclear power. Before the accident at Three Mile Island, nuclear interests were stridently demanding that Congress and the NRC stabilize reactor design standards as a solution to escalating costs. Now the accident has raised the prospect of a reactor disaster from a seemingly remote possibility to a reality. This virtually guarantees that safety requirements will be stiffened so that cost will rise sharply.

A key point in this argument is that the sequence of events which caused the accident at Three Mile Island was not among the supposedly exhaustive list of possible initiating chains for reactor accidents in the *Rasmussen Report*. Therefore the nuclear industry cannot reasonably claim that it merely needs to take precautions to prevent the occurrence of a similar accident elsewhere. As NRC Commissioner Bradford noted in a Senate testimony in April this year, the accident shows that before licensing a nuclear plant, the NRC must now consider events that it previously discounted as inconceivable. The *Wall Street Journal* commented that "This could mean much tougher licencing procedures than those currently used."

These tougher procedures are likely to affect every aspect of construction, at every level of defence. Safety systems must be added, quality assurance must be tightened, and containment systems must be toughened. Plant design will remain in a state of flux, hampering attempts to speed up licensing and construction. Lead times will remain long or even increase, and the cost of interest during construction will pile up. We can expect nuclear plants installed circa 1986 to 1987 to average 2000 dollars/Kw., as compared to only half that for coal-fired plants, which could be designed to produce electricity twice as cleanly as today's newest plants. This would push the generating costs for new nuclear plants to at least fifty per cent above coal.

Nuclear costs will probably rise in other ways. The NRC will be less tolerant of plant operators cutting corners, if only to regain enough public confidence to forestall pressure from shutdowns. The result should be a drop in capacity factors from the sixty-five per cent level of 1977-78 to the fifty-eight to sixty per cent levels of previous years.

In the first bond offering after the Three Mile accident, the Virginia Electric Power Company paid 10.3 per cent interest compared to 10.1 per cent previously — equivalent to a one to two per cent higher cost per kilowatt hour.

Harrisburg has pushed nuclear power beyond the brink of economic acceptability. The nuclear versus coal controversy is all over bar the shouting. Now safe energy advocates must attack the claim that provides the basis for whatever support remains for nuclear energy; namely, that nuclear power is indispensable.

We need to emphasise that nuclear power accounts for only four per cent of total energy supply and is not likely to provide a much larger share. Reactors cannot solve the oil problem. Only ten per cent of our oil is used to generate electricity. And nuclear electricity has become so expensive that it cannot replace more than a fraction of the oil and gas used in heating, motors and factories.

Nuclear electricity now costs about one hundred dollars to deliver the heat equivalent of one barrel of oil.

The economic fall-out from Harrisburg, no less than the safety implications, dictates that to accomplish the transition to renewable energy sources we must base our energy policy on measures to extend available supplies of fossil fuels by improving the efficiency with which energy is used. Safe energy advocates have known this all along. It's time to get the word out: we *can* do without nuclear power.

Charles Komanoff

*Acknowledgement: This article is reprinted by kind permission of Critical Mass Journal (P.O. Box 1538, Washington, DC 20013).*

Charles Komanoff's study of capital cost escalation in the nuclear and coal industries was published in July. For ordering information, write to Komanoff Energy Associates, 475 Park Avenue South, New York, NY 10016.

## New Warning on Antibiotics in Animal Feeds

The US Office of Technology Assessment (OTA) reports that antibiotic resistance is continuing to increase in the US population, largely as the result of the continued use of antibiotics in animal feeds. OTA's warning came in a report on *Drugs in Livestock Feeds*, prepared at the request of Congress following proposals by the Food and Drug Administration (FDA) to ban the use of penicillin and restrict the use of two tetracyclin drugs in animal feeds. According to the pharmaceutical industry, sales of antibiotics added to animal feeds exceeded 180 million dollars last year and the industry is clearly worried at how the decision will affect its own future. Looking towards the consumer for support, it claims that the proposed restrictions could increase retail meat and poultry prices by between three and twenty-eight per cent in one year. OTA is unmoved by these warnings and remains adamant that antibiotics in feedstuffs are contributing to a "grand pool of drug resistant bacteria."

Nature 5. 7. 79

## Contaminated Plant keeps Functioning

When a nation as poor as India invests anything up to a billion dollars in a nuclear plant, it is not surprising that there is a marked reluctance to close the plant in the event of an accident. In such countries, a large power plant can be supplying as much as ten per cent of the nation's electricity — and its closure could plunge the country into a severe energy crisis.

A good illustration of how these economic pressures have persuaded a government to continue operating a nuclear power plant despite its wholesale contamination is provided by India's Tarpur Atomic Power Station (TAPS) which supplies power to the industrial centre of Bombay. TAPS was the first atomic power station to come into operation in the Third World, but defective fuel rods supplied by General Electric have led to extremely high levels of radioactivity in the plant.

*Business India*, a weekly journal, recently reported: "TAPS is so heavily contaminated . . . that it is impossible for maintenance jobs to be performed without the maintenance personnel exceeding the fortnightly permissible dose of 400 millirems in a matter of minutes. Thus the maintenance worker —

who is often not an employee of TAPS — holding a spanner in one hand and a pencil dosimeter in the other, turning a nut two or three rotations and then rushing out of the work area is a common phenomenon."

When asked why TAPS is not shut down and thoroughly decontaminated, a senior engineer replied: "Ideally that should have been done in 1974 or earlier, but there is such tremendous pressure from the Department of Atomic Energy on us to produce power that we cannot shut down."

Nature 7. 6. 79

## Holy Shit!

Seven people died of suffocation near Ahmedabad in India when a man fell into a cow dung pit and six others jumped in to try and rescue him. The dung pit is used to generate biogas for cooking and lighting in the village. We look forward to the inevitable article by Dr. Inhaber trying to prove that methane generators are more dangerous than nuclear power.

## Carter's Synfuels Attacked

America's dependence on imported oil could be cut by almost ten million barrels a day by 1990 without any need for synthetic fuels, claims the Sierra Club. The US based environmental group has drawn up an alternative energy programme which strongly criticises President Carter's energy policy.

"The President is asking Congress and the American people to support a 'hard path' energy future based on nuclear power and poorly researched high-technology fossil fuels," says Carl Pope, Assistant Conservation Director of the Sierra Club. "But our strategy can deliver dollar for dollar, three to four times as much energy much faster than the synfuels plan."

The Sierra Club's conservation alternative is based on improved public transport; energy conservation techniques; and developing such renewable resources as solar power. "Whilst the President claims his plan will save some four and a half billion barrels of oil by 1990, the conservation alternative will save almost four times that amount (17 billion barrels) for the same expenditure."

The Sierra Club is particularly concerned about the likely side-effects of the proposed synthetic fuel

industry. Among the possible ecological effects are increased stripmining; increased pollution throughout the country; the loss of a significant part of the Colorado River flow; and less water for agriculture. The synfuel programme will also increase CO<sub>2</sub> levels dramatically, with consequent climatic changes.

### **Eight Hundred Million Destitute**

One fifth of the people of the world are destitute and unless urgent action is taken that figure will rise dramatically in the next decade. This stark message emerged from papers read at a recent United Nations conference in Rome, organised to examine the reasons behind the failure of development schemes to aid the world's poor. According to papers read at the conference, eight hundred million people are destitute; fifteen million children aged under five die every year, mainly from malnutrition; and ten million more children are paralysed, made blind or deaf, or suffer brain damage and stunted growth because of disease.

*Observer 15.7.79*

### **Motorway Victory**

The Department of Transport's motorway and trunk road programme is in disarray following a decision by Lord Denning, Master of the Rolls, to back protesters and quash an order allowing the building of two motorway sections near Birmingham.

Lord Denning told the objectors: "There has been a deplorable loss of confidence in public inquiries." He said that the public believed that the Department of the Environment simply expected inspectors to act as rubber stamps. That led to protests and "deplorable as these protests are, they show to my mind that the Court of Appeals must do its utmost to see that inquiries are conducted fairly."

Lord Denning recommended that the inquiry into the M-42 motorway, closed in 1974, should be re-opened because the inspector had been wrong to stop cross-examination of experts about traffic flow figures and forecasts.

"I don't regard these forecasts as government policy," said Lord Denning. "They are predictions by experts about the future. They were relevant to the inquiry. The objectors should be able to cross-examine and call witnesses." He also said that the inspector should have the freedom to call evidence on the need for the

road, a matter on which the Department of Transport normally objects to examination.

*Guardian 31.7.79*

### **Let there be Light**

Candles are becoming a burning issue in the Roman Catholic Church. The old-fashioned wax candle is now being replaced by plastic imitations powered by electricity. These new aids to the devoted are said to be a great advancement in hygiene and safety. The electronic candles do not drip molten wax, nor do they give off evil-smelling sooty smoke which might blacken the ceiling and walls. They do not splutter and the risk of fire is greatly reduced. American Catholics, it seems, are particularly keen on the idea: they want to develop a five-day electronic candle. Traditionalists will be pleased to hear that real candles with live flames are still required for use on the altar.

*Guardian 31.7.79*

### **One Big Bang?**

Scientists and technicians who claim to have monitored forty accidental explosions at a Rio Tinto Zinc chemical plant are demanding an official inquiry into the entire Avonmouth industrial area at Bristol. Their chief concern is with the safety record of the huge ICS Chemicals complex, which adjoins a lead and zinc works, also owned by Rio Tinto Zinc. The lead works had to be closed down for several months in 1972 after a TUC medical investigation found that hundreds of workers had dangerously high lead levels in their blood. Now it looks as if working conditions at the ICS plant are equally dangerous.

The scientists say that most of the accidents at the ICS plant have involved emissions of hydrofluoric acid, used for etching glass and in the microchip industry. Concentrated it will rot flesh. The scientists claim that there have been twenty-one acid gas emissions since May 1976 and that five of these were serious enough to leave gouges in the windscreens of employees' cars.

"We first became concerned because members wanted damage compensation from ICS — which the firm paid," says Russ Vallance, divisional officer for the Association of Scientific, Technical and Managerial Staffs (ASTMS). "But then I thought — if it does this to windscreens, what does it do to lungs?"

*Guardian 30.7.79*

### **Fire at Windscale**

Following the latest incident of a fire at Windscale in which five workers were contaminated with Cesium 137, the UK Health and Safety Executive (HSE) has announced that it will conduct a thorough review of the plant's safety arrangements. According to the HSE, the Windscale plant has had seventy-five accidents since December 1976. Of these, three are considered serious: a still unlocated leak in the B38 silo; a potentially explosive hydrogen build-up in the same storage building; and a sump leaking 20,000 curies into the soil earlier this year.

The latest fire occurred when a fuel disassembly device jammed in a decanning cave. The fire had to be put out manually and radiation escaped, contaminating the five workers and causing fallout outside the building. The exact sequence of events is unknown and the questions raised by the incident are central to Windscale safety precautions. These include: how the fire began and why? Why the installed sprinkler system failed to put it out? Why the fire burned as long as forty-five minutes? How the radiation escaped? Whether the workers were wearing protective clothing? And how they got exposed?

*Nature 9.8.79*

### **Ninety Per Cent Against Torness**

According to a poll carried out by SCRAM, the Scottish Campaign to Resist the Atomic Menace, sixty-five per cent of local residents are totally opposed to the building of Torness nuclear power station. A further twenty-five per cent are in favour of halting construction until satisfactory guarantees are given on safety and the environment. Only ten per cent of those who responded were in favour of the scheme — and of that ten per cent, ninety five per cent worked for the electricity board at the site.

The SSEB's position has been further undermined by a motion passed by the East Lothian district council calling for a complete halt to Torness until there has been a reappraisal of the whole of the present nuclear policy and its relationship to other existing fuels. The motion, proposed by Councillor Nisbet (Labour) was passed by 29 votes to 11. The council's militant stand was partly influenced by the Harrisburg accident and partly by a recent mass demonstration on the Torness site.

*SCRAM Energy Bulletin and Guardian 7.8.79*



## Books

### Unsugared Pills

THE POLITICS OF CANCER,  
Samuel S. Epstein \$12.50 Sierra  
Club.

Eight years after the start of the government's multi-billion-dollar War on Cancer many officially-sanctioned myths persist: cancer is a mysterious group of one hundred different diseases, the causes of which remain unknown, if more money were available, the dismal cure rate would rise. The statistics, especially on the last count, belie such conclusions; if technological medicine's "cure" rate continues its slow improvement, it will be another four hundred years before 90 per cent of cancer patients can expect to survive for five years, after diagnosis.

Recently Dr. Samuel Epstein told the annual convention of the International Chemical Workers Union, whose members are especially concerned about cancer, that "We are dealing not with a scientific problem. We are dealing with a political issue." (It is not entirely an original viewpoint. A century ago, Rudolf Virchow, the noted founder of cellular pathology, wrote, "Medicine is a social science and politics is medicine on a large scale. . . The very words 'Public Health' show those who are of the opinion that medicine has nothing to do with politics the magnitude of their error.") This analysis underlies Dr. Epstein's first book, *The Politics of Cancer*. Epstein is a British-born medical doctor, a professor of occupational and environmental medicine at the University of Illinois, and an authority on the toxic and cancer-causing effects

of chemical pollution. Frequently he testifies before Congressional committees and elsewhere in support of attempts to restrict human exposure to dangerous compounds.

With great care and attention to detail, Dr. Epstein strips bare many of the current myths. He reviews hundreds of scientific reports and studies spanning several decades and shows that, in reality, very much is known about cancer — certainly enough to prevent it. Basically, the disease is an unnecessary byproduct and a direct result of our unnatural, unbalanced, chemical-orientated way of life. A few people in the anti-cancer bureaucracies are willing to admit that "the environment" is indeed responsible for 70 to 90 per cent of human cancers; in their view, however, the unlucky victim usually is to blame for exposing her or himself to too many cigarettes, excessive sunlight, and lately, alcohol (the powerful American Cancer Society claims that these factors, especially the first two, are the primary or exclusive causes of the modern cancer plague).

Meanwhile, dangerous industrial processes; pollution of water and air; the adulterated, unnatural, over-processed food supply; and the proliferation of other contaminants in the environment — all representing the profits of wealthy, entrenched industries — usually are ignored or absolved of major responsibility. One example: When it was deduced that the 600,000 American workers who come into contact with asbestos stand even a greater risk of developing cancer if they also smoke, the government stridently urged them to give up smoking and have frequent medical exams while they did nothing about the primary danger — exposure to asbestos.

These policies are lethal. Presently over four million distinct chemical compounds are registered, six thousand more are added every week and thirty-three thousand are in common use. Many of them cause cancer. In a series of case studies — on red dye, nitrosamines, DES, benzene, pesticides, tobacco, and other cancer-causing agents in widespread use — Dr. Epstein reviews the ample, unquestionable scientific evidence and the consistent failure of industry and government to protect workers and the public interest. He writes of "...

virtually no regulatory controls over industrial chemicals, the majority of which have never been tested.... Chemicals could be manufactured in limitless quantities and introduced into commerce and the environment with no effort to discover whether they were carcinogenic or otherwise toxic to humans and other forms of life." Moreover, the actions of industry conform to a shopworn scenario characterized by unwillingness to recognise dangers; falsification or cover-up of data; buying off scientists; exaggerating costs of changing processes and establishing regulation; and the most frustrating obfuscation of all — positing ridiculous risk-benefit ratios and threshold levels of exposure within or below which toxic compounds are supposed to be safe, tolerable, or at least worth the risk.

Sixty years of such conduct has resulted in a cancer incidence rate that qualifies, in the view of *The New York Times* (November 8, 1978) as an "epidemic"; previously, the word had been reserved for unrestrained outbreaks of infectious diseases. (Of the many charts, tables, and graphs in Dr. Epstein's well-annotated volume, one reveals that cancer accounted for 3.7 per cent of all U.S. deaths in 1900 versus 19.3 per cent in 1975.)

Amazingly, *The Politics of Cancer* is the first thorough, independent, well-documented effort at assigning the proliferation of chemicals its just share of responsibility for the contemporary cancer plague. Prior to late 1978, for example, government agencies and many scientists dutifully insisted that only one to five per cent of human cancers were related to occupation. Dr. Epstein exposes this figure as erroneous. In mid-September, 1978, just after Epstein's book went to press, HEW Secretary Joseph Califano "leaked" an exhaustive study by the National Cancer Institute and several other agencies that confirms Epstein's conclusions. The government study proposed that, in reality, twenty to forty per cent of all cancer is work-place-induced. (The fact that the report had to be "leaked" in the first place is illustrative of the situation prevailing in the cancer bureaucracy.)

Early in 1977 the Food and Drug Administration, citing studies that

showed saccharin caused cancer in animals, tried to ban the additive or at least restrict its use. A well-financed campaign by the soft-drink industry helped to whip up public sentiment against this proposed regulation, and Congress voted to postpone the FDA ban for at least eighteen months. The myth propounded was that the issue remained scientifically unresolved — that saccharin might be safe. Epstein convincingly shows that it is not. He recounts scientific studies dating back to 1948 showing beyond doubt that saccharin causes cancer in animals (even when administered in relatively small amounts) and more recent epidemiological surveys illustrating an increased cancer risk in humans who use it. Largely because the foods that saccharin sweetens represent a \$2 billion-a-year business, these findings have been ignored.

In November, 1978 the prestigious National Academy of Sciences, after reviewing the same studies noted by Epstein, came to the same unmistakable conclusions: no further tests are needed to determine that saccharin indeed is a proven carcinogen that poses a major threat to public health. The NAS also corroborated Dr. Epstein's contentions that saccharin possesses no medical value, is useless in controlling weight or in helping diabetics, and may cause as many as three thousand cases of bladder cancer every year. Saccharin, nonetheless, is still sold and will remain unregulated through mid-1979 or longer.

*The Politics of Cancer* also dissects the current asbestos controversy in which, similarly, health risks have been recognised by industry for more than a generation but covered up.

Dr. Epstein is at his best when he writes of the particular instances of the compromising of scientific method and the abuse of government regulation. His suggestions for overcoming these difficult problems, offered near the book's end, are less clear and convincing: He praises public interest research groups (indeed, it is useful to recall that the concept of "in the public interest" — putting the health of people first, ahead of economic considerations — is scarcely a decade old); he encourages activism and involvement of trade unions; and he cautiously

supports the gradual movement of concerned lawyers and scientists into an expanded government regulatory system. Whether this configuration of forces can significantly shift the balance away from industry remains to be seen. In many ways, especially considering the title of his book, Dr. Epstein has not adequately analyzed the fundamental, interrelated problems that encourage the perpetuation of the industrial self-interest that he describes. Often he appears to overlook the fact that the leading "anti-cancer" organizations — NCI and the American Cancer Society — are themselves a large part of the problem.

But these shortcomings are relatively minor. *The Politics of Cancer* is an important contribution, and invaluable in helping one to understand the cursory and often confusing news accounts of the seemingly omnipresent threat of cancer. In his clear, factual, well-reasoned prose Dr. Epstein shows that the knowledge needed to prevent most cancers already exists. It is encouraging news; if we can apply it, we should be able to hasten a return to environmental sanity and the better health that follows from it.

Peter Barry Chowka

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#### Best Left Alone

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CANCER: MYTHS AND REALITIES OF CAUSE AND CURE, M.L. Kothari & L.A. Mehta, Marion Boyars £5.95 hardcover, £2.50 paperback.

The authors, both Professors of Anatomy, start from the premise that specific causes of cancer are unknown and, they claim, unknowable and that diagnosis is in fact only recognition of a late stage of the disease. Prediagnosis and screening that once held out heady promises of early and therefore more effective treatment, have been shown to be a farce. The main thrust of their argument is that, while everything must be done to alleviate pain and discomfort, 'cures' are a myth and most high-technology treatments are not only useless, but all too often harm the patient far more than the condition itself harms him. Their message really seems to

be that cancer is not all that bad if we learn to live with it. For this reason the book can be recommended as enlightening and to some extent comforting, so far as it goes.

But does it go far enough? The authors rehearse again the charges, now familiar to readers of Epstein and Illich as well as of this journal, that the worldwide, and particularly the USA, cancer industry — research institutions, drug manufacturers, treatment centres, after-care and follow-up services, professional fund raisers and so on, have a vested interest in maintaining the status quo. It is not suggested here that the industry will ever be toppled by the discovery of a 'cure', but rather that a better informed and less gullible and above all a less frightened, public, will simply withdraw their support.

One cannot but feel that if the following horror story from the book, were given headline treatment in a daily newspaper, people would at least hold their hands for a moment and listen to the still small voice of sanity. Mrs. D. aged sixty-one, had some vaginal bleeding for which she was examined and found to have carcinoma of the uterus. She was a happy active woman who ate and slept well and suffered no pain. In spite of the diagnosis she did not wish to take drugs, however her physician and her family insisted. On the fifth day after starting chemotherapy she was weak and ill and had to be taken into hospital. The chemotherapy course was relentlessly pursued, but Mrs. D. never left her bed again. In three months she was dead, wiped out, one might say, by the doctor who prescribed the treatment.

The book contains some slightly interesting statistics about the similarities of incidence of cancer in widely different geographical locations and dissimilar ethnic races. It makes much of the fact that nature has arranged that if one type of cancer occurs unusually often in a certain country others are likely to be found less often, thus in Ireland there are ten times more cases of cancer of the lip than in England and the rates are reversed in the case of cancer of the lung and uterus. The authors appear to find in these geographical and racial variations some proof that cancer is universal,

inevitable and almost natural to mankind. Such a view leads them to ignore both the vast amount of evidence for environmental carcinogens and the whole question of diet both as a cause and, when it is healthy and good, as a preventative of cancer. Two such colossal omissions must seriously reduce the value of their book.

Ruth Lumley-Smith

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### A complex Landscape

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COUNTRYSIDE PLANNING by Andrew W. Gilg. Methuen University Paperbacks, £3.50.

A neighbour of mine is a skilled spare-time blacksmith, specializing in wrought iron work. Not long ago, finding himself unemployed, he proposed to turn his hobby into a full-time occupation: but the local council informed him that since this would constitute a "change of use" of the garage which houses his forge, planning permission would be required and would, incidentally, be refused. The episode is perhaps a trivial one, though it kept one man on the dole and prevented a scheme which would have enriched the pattern of life in this village. I mention it merely as one example of the way in which the power of the planners influences life in the English countryside. Other cases from my own parish include the routing of a new road through one of the county's best colonies of a relatively uncommon orchid; the insistence on "traditional" stone features in a new house, in an area where stone does not naturally occur and consequently plays no part in traditional building styles; and — as a counter-balancing example of the evils which can spring from *freedom* from planning restrictions — the replacement of an 18th century thatched barn by a row of galvanized iron grain silos like squat ballistic missiles.

Small wonder that planning is a dirty word to many lovers of the countryside. Yet, as my last example shows, a *laissez-faire* planning policy does not automatically bring desirable results. Thanks to stricter controls, the annual loss of agricultural land to urban development has

actually been less since the war than it was in the 1920s and 1930s, despite the demands of a more numerous and wealthy population. *But* "the difficulties experienced by city councils in finding development land in the countryside were partly instrumental in the decision to build the high-rise tower blocks of the 1960s that are now so universally condemned". I quote from Andrew Gilg's *Countryside Planning*, a first-rate introduction to all aspects of the subject. Gilg does not come up with slick solutions to the problems of the modern countryside: far too often, as he points out, there are no slick solutions. Planning problems, like all real-life value-judgements, are seldom a simple matter of choosing between good and evil. Again and again Gilg confronts us with dilemmas, cases where the planner (and anyone else concerned with the future of the countryside) can only weigh up the relative disadvantages of two courses of action.

Do we want our country to be more self-sufficient in food? Of course: but even if it means the reclamation of wild moorland and the draining of marshes? Do we believe in owner-occupied farms? Yes, instinctively: but what when we learn that tenancy agreements, by restricting the farmer's freedom of action, have frequently prevented undesirable changes? Do we want villages to preserve their architectural character? Yes: but can we ensure that they do so without turning into weekend colonies for the rich? Do we approve of big cities? Of course not: but as they decline, so pressure on the villages and country towns increases.

The stock Ecologist-type response to problems of this kind tends to be a fundamentalist, utopian one. We know very well the type of world we want. The problem is, how do we get there from here? My ideal Britain would have a population of say, ten million: but that doesn't entitle me to dismiss as irrelevant the problems caused by the excess fifty million. Whatever our dreams, we still have to react to today's problems as they come up. We may want to play a totally different game: but in the meantime we need to know the rules of this one.

Andrew Gilg's book is a lucid and authoritative guide to those rules.

Read it straight through as an introductory textbook: thereafter it will earn its keep as a work of reference. Where else could you find in one compact volume so diverse a body of information? The areas of the National Parks; agricultural production in Britain from 1905 to 1974; techniques for the aesthetic evaluation of landscapes; the current membership of the RSPB; the distribution of British woodland; stages in the progress of a planning application; the location of National Nature Reserves; agricultural manpower statistics — this is a random selection from hundreds I could have mentioned. A valuable feature of the book is its profusion of maps, graphs and diagrams: another is its exceptionally full annotation, amounting to a twenty-page bibliography on planning and the countryside. Andrew Gilg believes that "if we don't like what is happening at the moment we can take action, for if we want to be we can, and perhaps anyway should, all be countryside planners". Certainly he has written a book which makes the basic facts and figures of the planner's trade available to us all.

Nicholas Gould

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### Doom revisited

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THE NEXT 70 YEARS: Population, Food and Resources by B. Gilland. Abacus Press £9.50.

Mr. Gilland is a civil engineer who spends much of his time studying the future. In this book he attempts to construct projections of the trends in population, food production and supply, resource use, and economic development generally. The trends themselves can be unravelled from the published data, and he publishes a useful amount of this data. The strength of his book is derived from his practice of showing, in detail, the calculations he makes when projecting. This is very useful and should provide guidance for all students of the subjects that interest him.

The weakness of his book is inevitable and inherent in any work of this kind. With only 127 pages at his disposal and the entire world to describe, he has no choice but to

be highly selective. This leads him to include trends of one kind, while omitting trends and developments that would contradict them. It is almost a truism that futurologists habitually select the facts that support their own most preferred, or most feared, futures and Mr. Gilland seems to be no exception.

It leads him to rather gloomy conclusions, reminiscent of those many of us were reaching about ten years ago, but by a path that includes a number of errors and misunderstandings. Again, this is inevitable when one deals with information obtained from fields with which one is not familiar. In analysing the food situation, for example, he begins with a bald assumption that no human diet can be satisfactory unless it contains rather large amounts of animal protein, so that the ratio of animal to vegetable protein can be used to measure the adequacy of any dietary regime. This is not so, of course, and many very satisfactory diets contain little animal protein, and some contain none at all. If everyone must live on steak, then indeed we have a problem! He calculates the amount of nitrogenous fertiliser that would be needed to raise yields to satisfactory levels and points out that the introduction of large amounts of industrially fixed nitrogen into the nitrogen cycle may affect the ozone layer, requiring restrictions on fertiliser use. This may be so, although it is controversial to say the least, but Mr. Gilland overlooks the alternatives that exist and will exist to conventional fertiliser. He mentions as a distant possibility that genetic engineering may create cereal crops that enjoy symbiotic relationships with nitrogen-fixing bacteria, in the manner of legumes, but he overlooks the several other routes to low-energy nitrogen fixation, all of which are being pursued and some of which look much more promising. He doubts whether the productivity of grasslands can be improved without heavy investment. In many cases nothing more complicated is required to improve them than better stock management. Nor is it true that grass can be conserved only as hay or silage, and that these are nutritionally equal. There are similar errors in his treatment of

demography and energy.

His description of the historical development of the present gap between rich and poor nations is much better, and he is right in pointing out the sterility of arguments that concern themselves only with blaming one group of countries or the other. He does not attempt his own explanation, which would have to be novel since all the previous explanations fail to fit all the facts.

Although gloomy, his conclusions are not catastrophic. He believes we may face many serious problems, but that the Malthusian threat is not one of them. The world will continue to stagger on for the next seventy years in much the same way that it has staggered through the last seventy. I think that if he were to take more account of recent technological developments, to treat with greater caution data — especially demographic data — that are at best approximate, and to make allowances for human common sense and adaptability to changing circumstances, he might find that we could do much better than this. The opportunities exist. Whether we use them depends on ourselves and our governments. The real issues are political and of all the arts of the futurologist, political forecasting is at once the most important and the most difficult. In his next book perhaps Mr. Gilland will explore the futures that may be permitted us by our rulers.

Michael Allaby

## Other Books Received

**Slaughter of the Innocent, Hans Ruesch. Futura £1.25.**

The author is a passionate opponent of all types of experimentation using live animals. He wastes no time on that strange euphemism 'necessary suffering' for he believes, and in this book goes a long way towards proving, that even for practical considerations, leaving morality out of the equation, all experiments on animals are useless because the differences between one animal species and another are such that the results obtained in one cannot be predicted for another. This, he demonstrates, is particularly true of drugs — porcupines, for example, can eat opium and wash it down with prussic acid without ill effects;

more to the point perhaps, guinea-pigs can eat strychnine, chloroform is toxic to dogs, and a vaccine which cured TB in guinea-pigs was found to cause it in humans. To suggest, as the author does, that those who practise vivisection and kindred experiments are all violent animal-haters is absurd and unacceptable and weakens his case by causing the recipient of his more outlandish tirades to discount him as a crank.

**The Countryside Explained, John Seymour. Penguin £1.25.**

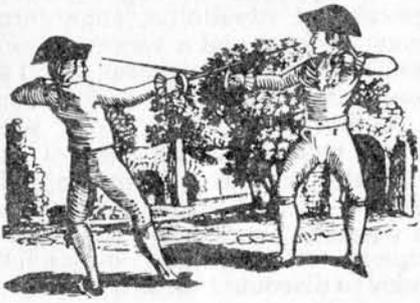
Originally published by Faber & Faber and reviewed in *The Ecologist* (March/April 1978) by Nicholas Gould, it is good that the paperback edition will bring this delightful book within reach of a wider public, for this is Seymour at his best. Informative, witty, sometimes angry, sometimes lyrical, the book ranges over every aspect, expected and unexpected, of rural life in Britain. It is a book for town-dwellers and countrymen alike: beautifully illustrated by Sally Seymour.

**Land and Leisure, Eds Carlton J. Van Doren, George B. Priddle and John E. Lewis. University Paperbacks (Methuen) £5.95.**

This is a typically American collection of essays contributed by over twenty worthy university professors. It is very earnest, very thorough and very boring. Perhaps it is asking too much that those of us concerned with the survival of the whole natural world should worry much about man's leisure activities, except in so far as they increase the rate at which the world's wildlife is being reduced, fossil fuels expended and land that should be put to better use tastefully laid out in new golf courses for the nouveau idle.

**What on Earth are we doing at Home? Friends of the Earth, Birmingham, £1.50 add 25p for postage (from FoE 54-57 Allison Street, Digbeth, Birmingham 5.)**

Birmingham FoE's team of writers are to be congratulated — they undertook a quite formidable task and have produced a book that is practical, imaginative and well designed. They offer eight basic questions (which will suggest others to each of us) that we should ask ourselves to discover to what extent we, as individuals, are contributing to the degradation of the environment, and then, section by section they give us guidelines and information and practical advice on how we may improve our use of resources and better our personal score. How often do you ask "But what can I do about it?" Please buy this book and find out.



## Letters

### Progress on a wide front

Dear Sir,

As a reader of your publication for many years may I write and give full support to Richard Williams and his committee of the Conservative Ecology Group.

He requires as much help and understanding as members of the Liberal and S.E.R.A. groups. I hope to read of his Group's activities from time to time and indeed if they have any members in the greater Manchester area I would be pleased to meet them.

Goodwill is one of the keys to understanding and we must all try and make a contribution towards the practical steps to transform Britain into an ecological society.

I am a member and supporter of the Ecology Party and while a little chest-thumping is in order from any eco-political group, I think we must make every effort to put ecology before party. If this is possible, then we stand a good chance to make progress not only within our own parties but with the public at large.

We can best start with ourselves and lead by example.

Yours faithfully,

John F. Pontin  
Whitefield, Manchester

### Planned devastation

Dear Sir,

I would once again beg leave to draw the attention of your readers to the current denudation of the Himalayan foothills which is leading to increasing ecological devastation, particularly alternating floods and droughts in the plains.

The natural climate of the hills was a temperate forest climate with gentle rains occurring periodically throughout the year. The natural vegetation was climax, mixed forest with a rich and well-protected humus soil. Thus the forests could absorb the excess monsoon rainfall and store it in natural underground aquifers, ensuring a fairly regular and clean flow of water to the great rivers of the Gangetic Plain, and a fairly equitable supply of water to local villages for agriculture and household use. Local demand for food, fodder, fuel,

fertilizer, fibre and fats (oils) were amply met from the natural vegetation of the mixed forest.

To meet the growing demand from the Plains for timber and other forest products, the British government instituted a policy of mono-cropping for commercial exploitation of the forests. In particular they planted conifers, which are only ecologically suitable for re-forestation of denuded and rocky slopes, and indeed are ecologically harmful in rich soil since they reduce ground cover and diminish the soil's absorptive capacity.

The new plantations fulfil only commercial needs for timber, not local daily needs. Yet the demand for forest products for local consumption has been rising sharply over the last century owing to increased populations of both men and cattle. At the same time ecological conditions have rapidly deteriorated, the more so since the plantations became mature enough for commercial exploitation.

There is a new and exceedingly strong demand from the Hill people for a moratorium on commercial exploitation of the forests — especially on blanket felling. This demand is only opposed by commercial interests, who are actively supported by the Uttar Pradesh government. Both the central government and press and public opinion in the Plains, however, support measures to end blanket felling.

For its part the Uttar Pradesh Forest Department insists that their policy of felling is 'scientific'. But scientific concepts have been rapidly changing throughout this century both pragmatically and theoretically. What might have been considered scientific even thirty years ago is now often hopelessly out of date. Growing numbers of scientists from all disciplines are realising that the idea of conquering nature is a myth. The most man can do is to co-operate with nature to increase her abounding generosity and to understand her ways and make good human depredations. If treated with respect, nature can supply the needs of all (even an increasing population) but not the greed of the few.

The Hill people welcome such a programme and, given correct and sincere guidance, will co-operate fully in its implementation. Yet the ecological benefits of the programme will not be noticeable on a large scale for the next fifteen or twenty years. Until then a moratorium on commercial felling in water catchment areas (and the whole of the Himalayan foothills is a catchment area) is the minimum measure required to deal with this emergency.

One deeply regrets the indifference of the Uttar Pradesh government to the resolution passed recently by the Rishikesh Conference on Forestry and Development calling for an end to blanket felling in the exceedingly sensitive virgin spruce forest in Gangi and around the head-waters of the River Bilangara in Tehri Garhwal. Worse still is its outright rejection of the demands of Shri Sunder Lal-Bahuguna, endorsed by the central government, for a moratorium on commercial logging in the area. (Earlier this year, Shri Sunder went on a twenty-three day protest fast to focus attention on

the problem of deforestation: among other things he called for a new 'social' forestry policy, aimed at providing for local rather than commercial needs. The fast was only ended when talks were set up between representatives from the Hill peoples and the central government.)

Why, one wonders, does the Uttar Pradesh government blindly continue to follow its out-dated policies in the face of protests by nature, the general public and the central government? What is the mysterious force wagging the tail of the U.P. government?

One dreads to think what may happen in the coming monsoons as a result of deforestation, particularly after this year's prolonged heat wave and drought. But will the inevitable disaster be enough to wake Rip Van Winkle from his sleep?

Yours faithfully,  
Sarala Devi  
Uttar Pradesh  
India

### Insulation by instalments

Dear Sir,

I have read that if all houses in this country were efficiently insulated we would save the energy equivalent to that produced by the nuclear industry. Most people would agree that it pays them in the long run to spend the several hundred pounds necessary to insulate their houses, but short-term needs always claim any spare cash lying around — new shoes for young Johnny, holidays, etc. To make this expenditure as painless as possible I would suggest that the local electricity/gas board lend the money and charge the interest as a separate item on the quarterly bills. The amount saved by better insulation would to some extent directly offset the interest charges on the loan, and the government could regulate or subsidise the rate of interest. I do not know whether the insulation industry is sufficiently geared up to cope with the massive demand which such a scheme would create but this could, I am sure, be organised.

Yours faithfully,  
James Graham  
London, S.E. 6.

### What do you know?

Dear Sir,

I wish to establish contact with people doing research into, or are especially knowledgeable about, the problem of providing for the cyclist in current urban planning and design. If any of your readers think they can help, I would be most grateful if they could write to me.

Yours faithfully,  
Maritz Vandenberg  
Technical Editor  
Architectural Press, Book Department,  
9 Queen Anne's Gate,  
London SW1.

# Classified

## NATIONAL TREE WEEK: 10th - 18th November TREES - DISASTER OR REGENERATION

The National Tree Week is necessary each year to focus attention on our declining tree population and to stimulate concerted action throughout the country. Our landscapes could be treeless in the future; we need to plant with and for our children. Leaflets and posters supporting National Tree Week can be obtained from: National Tree Week, The Tree Council, 35 Belgrave Square, London SW1X 8QN.

## PERSONAL

TO ALL Nuclear Information Network Members: SAFE ENERGY PETITION. The Petition now has 75,000 signatures. We are committed to hand in the first 100,000, and we think this will be a valuable pressure on the present Government - in view of their declared policies - as soon as possible. We therefore ask that local groups be told of this and recommended to use the Petition in their activities now. Forms are available from 42 Vineyard Hill Road, London, S.W. 19 (SAE please).

WE HAVE set up an appeal to be known as the OCEAN CRUSADER FUND, to purchase an anti-whaling/sealing vessel. We feel that the lack of action by the International Whaling Commission means that some species of whale could be extinct within five years unless all legal means are used immediately to halt the slaughter. We are asking for your support in this venture by donations and/or publicity amongst your friends. Any donations to help save the whale can be sent to Animal Protection Association, 21 Warwick Court, Burley Lane, Horsforth, Leeds LS18 4TB.

RAPPORT is the intelligent person's introduction service. Whatever your age, location or preferences, enrich your quality of life immeasurably with RAPPORT - and rediscover the joy of living. Special introductory rates this month for men over 45. S.a.e. for details to RAPPORT, P.O. Box 94, Oxford.

## MISCELLANEOUS

SURVIVAL-KIT for a polluted planet. Fallout-Sweet: Radiark Field - Screens: Anti-nuke, Self-defence. S.A.E. to Dr. Ash, Camstock, North Tamerton, Holsworthy, Devon (Tel. 08403440).

## BOOKS & PUBLICATIONS:

THE COMING AGE: the magazine of the primordial matriarchal tradition of the one Goddess - a faith that moves to the rhythm of the spheres. 35p. 40 St. John St., Oxford.

DIRECTORY OF ALTERNATIVE COMMUNITIES lists many such groups, £1.50 (cash with order please) from The Teachers (MG3), 18 Garth Road, Bangor, N. Wales.

WE ANNOUNCE the launching of the WORLD STUDIES JOURNAL. As from September 1979, the Journal will be published quarterly at the cost of £1.25 per number and can be ordered from: Mr. A. Dodds, Sales Editor, World Studies Journal, Groby Community College, Ratby Road, Groby, Leics.

LAND AND LIBERTY magazine deals with the economics, politics and ethics of land tenure reform. Specimen copy 11p stamp to Land and Liberty, 177 Vauxhall Bridge Road, London SW1.

## CONFERENCES AND COURSES

INVITATION and Call for Papers. Sixth Canadian Symposium on Remote Sensing, Hotel Nova Scotian, Halifax, Nova Scotia, Canada - May 21st to 23rd, 1980. Theme: 1980 - Remote Sensing at Work! Please submit proposals for papers not later than January 15th, 1980 to: Thomas T. Alföldi, Technical Programme Chairman c/o Canada Centre for Remote Sensing, 717 Belfast Road, Ottawa, Ontario, K1A 0Y7 Canada.

CARING FOR THE FUTURE - A thought provoking and informative course on environmental conservation, to be held at the Snowdonia National Park Study Centre from November 30th to December 5th 1979 (Course fee £39.00) This is not a conference for environmental "experts". It is a chance for those who care about the quality of their environment and who would like to gain a better understanding of the problems as well as discover constructive ways of helping. Further details from Alun P. Davies, B.A. Principal, Snowdonia National Park Study Centre, Plas Tan y Bwlch, Maentwrog, Blaenau Ffestiniog, Gwynedd LL41 3YU Wales.

HAVE YOU EVER THOUGHT why there's a difference between the way you think and the way you vote? In France and Germany people are now coming to terms with this dilemma. People are beginning to come to terms with it here. Join the Ecology Party, which was founded in 1973 after the publication of the *Blueprint for Survival*. It has no political connection with either Right or Left. It has put up candidates in national and local elections, and has won seats on county, district and parish councils. For further details write to the Membership Secretary, 217 Unthank Road, Norwich.

## CLASSIFIED ADVERTISEMENTS MUST BE PREPAID.

To: The Ecologist Advertisement Dept., 73 Molesworth Street, Wadebridge, Cornwall.

Please insert the following advertisement in the next ..... issues.

Cheque/P.O. to *The Ecologist* enclosed.

[Word rate 10p per word. Box No. 50p. Minimum charge £3.00].

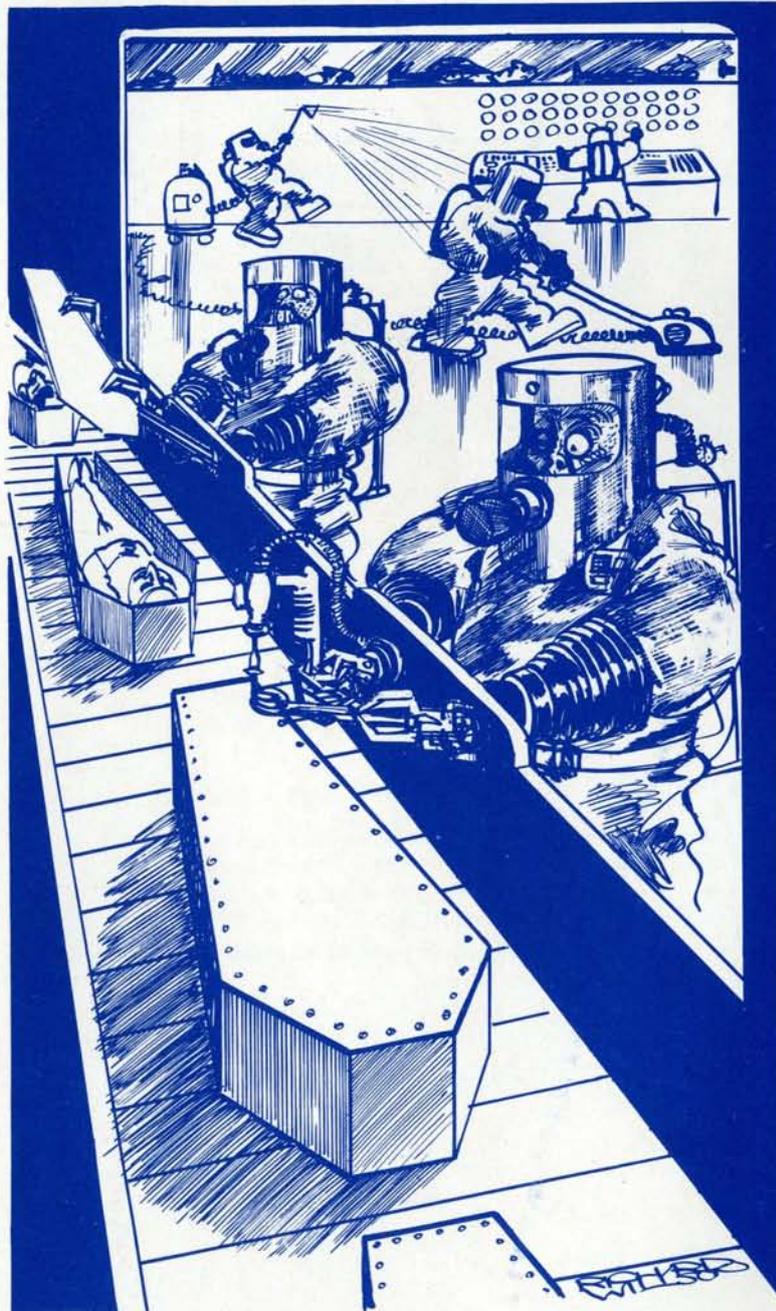

Name: (Block letters please) .....

Address: .....

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# THE ECOLOGIST ANTI-NUCLEAR POSTERS



Nuclear Power provides Employment

Available from The Ecologist, 73 Molesworth Street,  
Wadebridge, Cornwall. (Price: 75p inc p & p. Size: 20" x 15")

Also available: "Nuclear power provides the comforts of  
tomorrow." (75p inc. p & p. 20" x 9")

Please send cheque with order.