The Ecologist

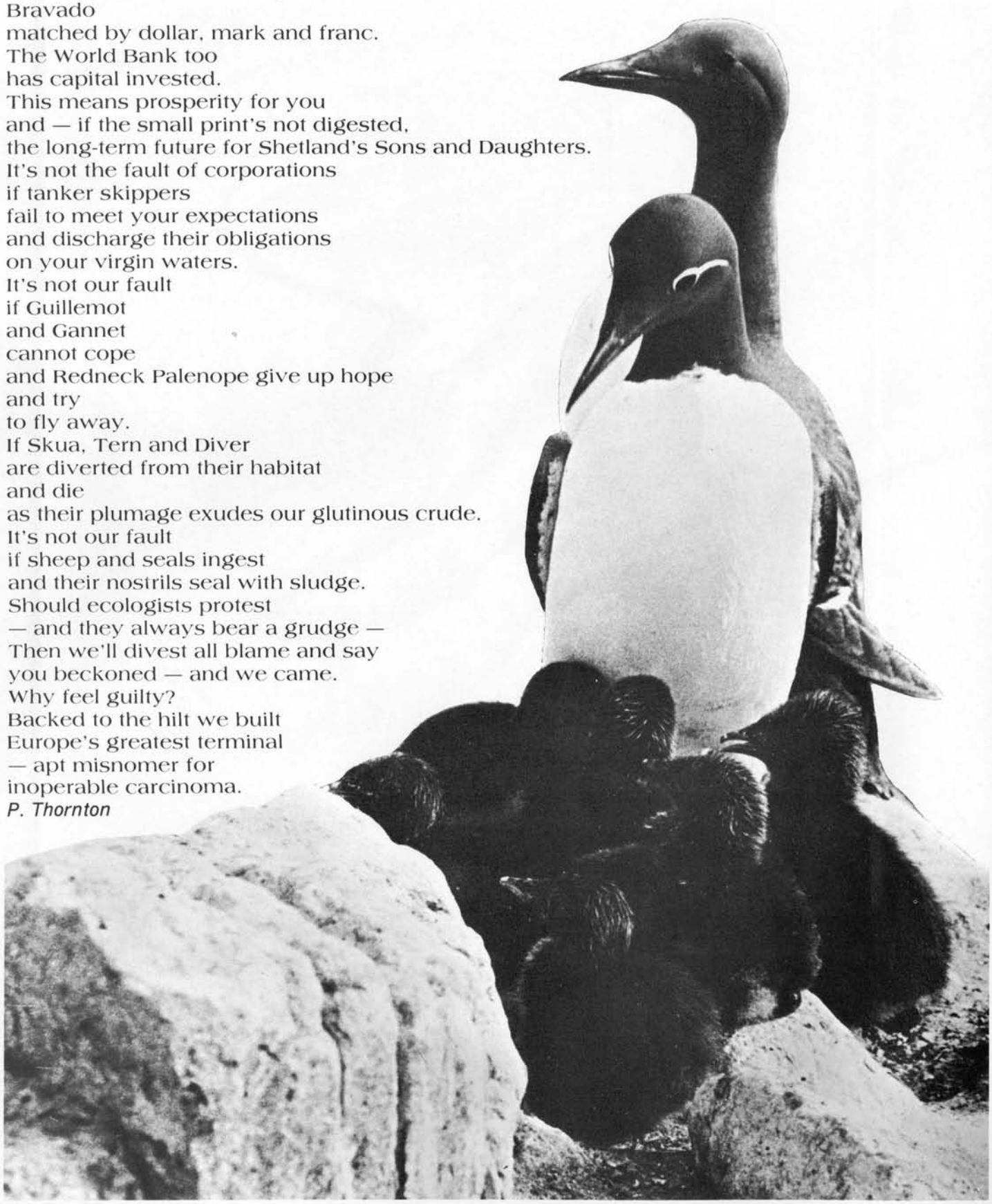
Journal of the Post Industrial Age No. 5 June 1980 80p

Tidal Barrages: Boon or Blight?

SULLEM VOE

Sullem Voe
You have our solemn vow
your shores we'll not despoil
in our quest for oil.
So assured cartels and corporations
as they began their explorations.
Hardware, software — all predict an El Dorado.
Bravado
matched by dollar, mark and franc.
The World Bank too
has capital invested.
This means prosperity for you
and — if the small print's not digested,
the long-term future for Shetland's Sons and Daughters.
It's not the fault of corporations
if tanker skippers
fail to meet your expectations
and discharge their obligations
on your virgin waters.
It's not our fault
if Guillemot
and Gannet
cannot cope
and Redneck Palenope give up hope
and try
to fly away.
If Skua, Tern and Diver
are diverted from their habitat
and die
as their plumage exudes our glutinous crude.
It's not our fault
if sheep and seals ingest
and their nostrils seal with sludge.
Should ecologists protest
— and they always bear a grudge —
Then we'll divest all blame and say
you beckoned — and we came.
Why feel guilty?
Backed to the hilt we built
Europe's greatest terminal
— apt misnomer for
inoperable carcinoma.

P. Thornton



Hans Dossenbach — Camera Press

The
Ecologist

The Ecologist Vol. 10 No. 5 June 1980

Guest Editorial

Feature Articles

Reports

Viewpoint

Cover by Bill Sanderson

Many thanks are due to Gordon Rattray Taylor for kindly consenting to act as editor for this issue of *The Ecologist.*

ERRATA

We apologise for an error on page 125 of the April issue, in an article by Peter Bunyard, where Professor Blackith is quoted as saying that caesium-137 from Windscale is diluted by only 13% on reaching the Irish Coast.

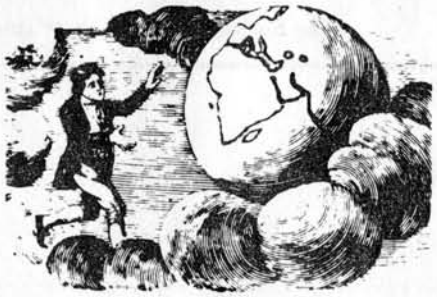
The quotation should read: "Dissolved wastes from Windscale reach the north Co. Dublin coastline diluted by a factor of only 13 times the concentration found near the discharge point."

Published by Edward Goldsmith, Ecosystems Ltd, 73 Molesworth Street, Wadebridge, Cornwall PL27 7DS, UK.
Editors: Edward Goldsmith, Nicholas Hildyard. Managing Editor: Maria Parsons.
Book Review Editor: Ruth Lumley-Smith. Design: Katherine James
Associate Editors: Robert Allen, Peter Bunyard, Brian Johnson, Bernard Gilbert, Jimo Omo-Fadaka, Andrew MacKillop, Robert Waller, Lawrence Hills, John Papworth, Nicholas Gould, Raymond Dasmann, Richard Wilson, John Milton (USA), Henryk Skolimowski (USA), Manfred Siebker, Sigmund Kvaløy (Norway).

ISSN 0141-6952

Advertising: Maria Parsons, 73 Molesworth Street, Wadebridge, Cornwall. Tel: 020-881-2996

Printed by: Penwell Ltd, Parkwood, Callington, Cornwall.



Decentralisation or Dilution of State Power?

Guest Editorial by Gordon Rattray Taylor

A change is taking place in society which has so far not been fully understood and which needs to be appreciated by ecologically-minded people.

On the one hand, there is a trend towards centralisation of power. We see central governments restricting the power of local authorities; we also see international governmental bodies limiting the powers of national governments. In industry, too, organisations become ever larger and authority more centralised, even if power is, in daily practice, delegated. It is taken for granted that policy as regards energy supplies, motor routes, telephone systems, defence, policing, etc. shall be settled at least at national level, while many press for international co-ordination of such policies.

There are irrefutable arguments in favour of much of this. We cannot expect to telephone anywhere in the world unless there is mutual agreement on the coding systems. Crime is international and police forces in different countries must co-operate more closely than ever before. It is convenient to have the same conventional signs on motor roads in every country, in a world where people move so freely and numerously over national frontiers.

The trouble is that society is becoming too complicated — and moves too fast — for central bodies to control efficiently. We can see this best in Russia, where the trend has gone furthest. According to a recent report, top priority has been currently given to the manufacture of trousers. Unfortunately no one thought to give high priority to the manufacture of zip fasteners. Embarrassing result. For more serious examples, see the article 'Planning becomes a Nightmare in *The Times* of April 16 last (p 19). Fertilizer supplies increased much faster than did the means to spread it on the fields, for instance.

As we move into the future this defectiveness of control will get more marked. The cost of planning errors and misjudgments will soar.

But in contrast with all this there is a distinct trend towards decentralisation. This is not simply a reaction to the inefficiencies of central control but rather a social change. You cannot educate people on a mass scale for several generations without them wanting to understand and take part in the decisions which affect them. In the nineteenth century the mass of the population were content to leave the policy decisions to their 'betters'. No longer. The very idea that the élite are genuinely 'better' has vanished. Behind this lies a strong unwillingness to be treated as a cipher: it is a matter of personal identity. From this stems the rise of pressure groups, protest movements, etc.

Which of these contrary trends will predominate? This is the question which is of first importance to the ecologically-minded.

The answer is: both. The arguments for centralisation are as solid as those for decentralisation. The problem we — mankind — face is how to combine them.

To give colour to this assertion let me take one example, or possibility. Perhaps it is the case that we need to revise the concept of national citizenship. In a world of mass transport and mass communications, a growing number of working people (let us think of an industrial designer) can spend spring in the south of France, summer in Britain, autumn in New York and winter in Barbados, sending in his designs by computer graphics on tape. In effect, he or she is a world citizen and arguably should contribute to the costs of running the several countries he or she resides in as well as having a say in how they are run. At the same time such a person will probably not want to give up his natal nationality and should both have a vote and pay taxes in his country of birth, even if he spends most of the year out of the country. Finally, he will want a say in local affairs and will contribute to local taxation, wherever he is resident. In a complex world the status of the individual citizen necessarily becomes complex too.*

This, of course, is only a single facet of the problem. We have come to accept the idea of a central government ruling a more or less acquiescent mass as if it were normal and inevitable. Any anthropologist can demonstrate that it is not. We must learn to see central control as only one of a number of interlocking systems of decision making. Governments, of course, are especially prone to think that their authority is God-given and need to think harder about these issues.

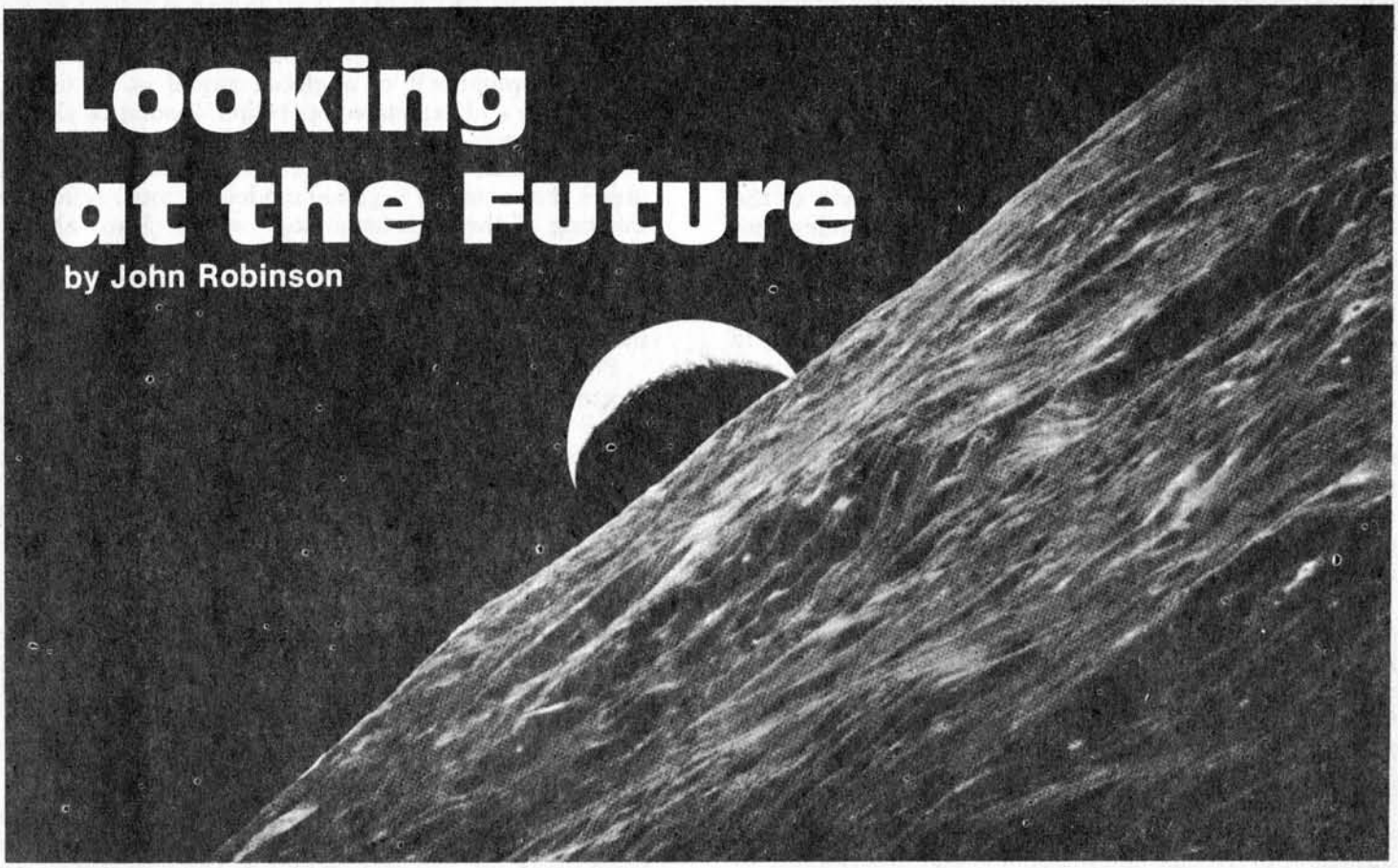
So, to come to the ecological point, ecologists will not achieve the kind of society they want simply by advocating regionalisation and decentralisation: they have to demonstrate how these desiderata can be combined with the essential minima of co-ordination on a world scale. It is by advancing understanding of this viewpoint that we can best advance the eco-viewpoint. It is not, finally, a question of pressure groups battering away at an entrenched central authority but much more one of diluting and diversifying that authority.

The numerous conferences, declarations, seminars, etc. with which the ecomovement occupies itself at present are of limited value only. The same things are said again and again and are heard by the already-converted, who applaud. The situation remains substantially unchanged. To advance, not only is a profounder understanding of the social dynamic required, but the administrative details have to be hammered out. Well-thought out reports will do more good than crying doom and speech-making.

* I owe this thought to the authors of *The Third World War* (Sidgwick & Jackson, 1978)

Looking at the Future

by John Robinson



Nasa

A few years ago I was forced to leave my home in the backwaters of New Zealand and to travel to a crowded technology-dominated Europe; to study the art of futures research and to work for some time in the OECD Interfutures project. In that time, as well as developing some ideas concerning the general subject area, I continued to build a degree of familiarity with a series of computer models of the world, which had started with my writing articles in support of *The Limits to Growth* in 1973, and which now includes work considering the usefulness of the UK Department of the Environment model, SARUM (used by both Interfutures and the New Zealand Commission for the Future). Last year I spent several months in the rain forest of Northern Queensland, a period of rather idyllic existence, tutoring my children in the mornings and swimming in a deep clear lake most afternoons. As we explored that part of Australia, with the coral reefs crowded with amazing fish and plant life, with startlingly coloured butterflies and parrots, with the fires of burning bush and sugarcane at night, I pondered yet again the value of my work experiences. In this article I hope to touch upon the limitations, dangers and misuse of the computer and a few results from computer studies which do provide us with a greater understanding of future choices; but above all to show how such activities may lead one astray — that the main thrust of futures thinking must lie elsewhere.

I would like to draw your attention to the value of a general understanding of our human predicament provided by a children's history book (from prehistory to the present day in one clear exposition), a basic text on evolution and a TV programme by Jacques Cousteau, compiled with the appreciation of the setting sun over an empty beach. Such understanding far outweighs the false trails and negative information of spuriously complicated computer models and the output of the technocratic power machine (which of course is itself dancing to a tune played by its controlling agents).

Peeling the Onion

Behind each thesis, each statement, is an attitude towards life and an intent, a goal to be achieved. I become more and more appreciative of the warning (from *Planning Alternative World Futures,* ed. Beres and Tang) that "planning is the way for those who presently hold power to project their continuation in power over the periods of years ahead," since I have taken part in such planning exercises myself. It is of course obvious that this should be the case and indeed any government or other organisation which actively explores real alternatives might find itself swept away in a subsequent shift of priorities. We cannot, for example, expect a centralised power generation system to plan a shift to local self-sufficiency, for that would remove the prestige, and indeed the employment, of the central organisation. This type of behaviour is simply part of the inbuilt inertia of a successful system.

Training as a mathematician has given me an understanding of the basic rules of logic and thus has led me to appreciate that each and every model exercise or logical structure is based on a set of assumptions. The key to each hypothesis or analysis is thus to be found in the search for those assumptions — which in futures research include value judgements on the worth of individual humans and the greater ecosphere. Strip away the layers of the assumed — and rarely stated — philosophical structure and one comes to some very basic questions, which *must* be answered before the reconstruction of a more meaningful set of futures alternatives is attempted.

Should we then leave a substantial part of the ecosphere for the use of other forms of life, as we have *not* done in the past, or has the world been constructed purely for the exploitation of a man-god? The latter ethical position is central to most futures work, and certainly to the computer studies. We will consider below the reason why this should be by the very nature of the exercise.

God and the Sunset Cowboy

A lengthy period of expansion and conquest is now at an end. Yet the experience of the past five centuries, during which time Europeans, and European thinking, spread around the globe, will continue to play an important part in man's self-image for some time yet. Boulding has aptly named the pursuit of growth as the cowboy economy, yet it is not only in economics that such expansive egocentrism holds sway, for there is a parallel in much religious thought. Teilhard de Chardin for example, looked towards a time when a collective consciousness, a noosphere, would envelope the world in a psychic, as well as a physical domination of man over nature.

Thus we are presented with the picture of a cowboy man-god riding into a glorious psychedelic sunset; a further step in the development of the man equals god equation, which by ostensibly stating that man was created in the image of god has in reality invented a supreme being in the image of man.

This extreme concept, carrying with it a submergence of individuality and of individual responsibility, is in accord with the modern belief in technology as the driving force, the determining factor in our human future. Indeed it is technology which is to provide the global linkage which makes a collective consciousness possible. Man in this picture is forced into a pattern of behaviour which is determined by the former servant; and we are asked to accept such trends rather than to question, to criticize and to demand self-determination.

Fortunately the limitations of technology are becoming apparent — developments such as the faltering of the nuclear power generation industry and the commercial failure of the Concord aircraft have considerable implications for the future. With the collapse of the technocrats' dream-world (remember MacNamara and Vietnam), we can choose to follow a more human and endearing path into the future (MacNamara again, emphasising the plight of the world's poor at the World Bank).

The view of man's place on earth colours our thinking, as it did that of Einstein and Lord Clark. It is an intriguing exercise to search for such basic viewpoints, to seek out the clues in the writing and statements of prominent thinkers and leaders.

Why Futures Research?

Concern that there may be limits to growth — physical, economic or social — has become widespread in the past decade. The implications of, for example, massive resource use, have become already a part of our daily lives. As a reaction to an interlocking set of problems there has been a desire to evolve alternative futures and to move away from the current Western paradigm.

Within the same decade a second impetus towards planning has appeared, for as the signs of strain in the dominant paradigm have become apparent, principally through the combination of high inflation and unemployment, the controlling agents have realised that the system, which is the Western world, will not continue to function effectively without interference, and that great efforts must be made if the status quo paradigm (which embodies the world views and the career opportunities of the present powerful) is to continue.

Thus two opposing stimuli for futures research are in operation, based on the antagonistic aims of replacing or of supporting the current paradigm. The subject is divided into establishment and anti-establishment groups, with the establishment group having a much greater access to facilities and to monetary support.

The development of a global model is, to date, a large-scale and expensive operation. Insofar as the tool utilised, a complicated and expensive high-technology computer, has an influence on the project ('the medium is the message'), global modelling must reflect the thinking of the high-technology school. Since alternative thinkers insist on a different emphasis, they do not take part in these projects. By the very nature of the exercise, the use of global models will belong to status quo thinkers.

These comments illuminate my own situation. I have written articles in support of *The Limits to Growth*, and I find common ground with the excellent and diverse grouping of alternate thinkers in New Zealand. I wish to develop my thinking in a direction which will lead to a deeper questioning of fundamental beliefs, and to join in the effort to move towards a future which makes proper use of human achievements and understanding. Yet as a mathematician I have been drawn into a study of computer models and status quo dominated projects. It is no surprise then that I should conclude that much of my time has been wasted as far as my goals for myself and for my role in society are concerned.

Tricks of the Trade

Futures research is intended to extend our planning horizons to include factors which are ignored in short term planning — evolution of new technologies or new energy forms, changes in attitudes and in social structures, and so on. An indication of the time-scale involved is provided by a number of straightforward considerations such as the century for the use of the majority of the world's petroleum supplies, the 50 years of long-scale Kondratieff economic cycles and the similar time-scale for the full utilisation of technological changes, the 50-100 years for demographic changes to work through until a stable population may be achieved and the 50 or so years until the limits to growth forecast by the study of that name are approached. A natural desire to consider the implications on the lives of our children and grandchildren of present decisions points then to a time scale of 70-100 years, to about 2050-2080.

The spate of 'towards the year 2000' projects fail this criterion and cannot be considered as valid futures exercises. Most imply a continuation of present trends. A case in point is the OECD Interfutures refusal to consider any significant change in values.

More to the point is the habit of 'authorities' (Leontief for example) to stop their projections at the year 2000, to note no resource problem, and to conclude (with considerable publicity) that the basic message of *The Limits to Growth* is disproved. It was of course after the year 2000 that Limits, in its highly simplified and aggregated form, suggested the appearance of shortages. This is con trick number one of the futures game.

The second is to describe a future dominated by transnational corporations, even a world government, as a 'co-operation' scenario, implying an improvement over the squabbling of nation states. But the Western recession is a symptom of increasing interconnections. In ecological terms, a natural system is more stable if it is more complex. Increasing the simplicity, increasing the degree of connection among actors or decreasing the number of actors can lead to a greater instability, as all share in common fluctuations and the possibility of resonance phenomena increases. The cooperation of 'big is better' corporations then has implications for the

systems behaviour of the Western world as well as for the development of a participatory democracy.

Number three is the argument that since there is a plentitude of resources in the earth's crust (or even in the oceans) there will be no resource problem once technology has come to the rescue, an argument so ignorant of considerations of availability or indeed of energy usage as to banish such writers from all serious consideration. An allied calculation takes the supposed food productivity of the Netherlands (a protein importer), multiplies by potential world-wide arable land, and concludes that it will be possible to feed a quite enormous population. I have been personally stunned to find several oft-quoted estimates to be based on arguments as silly as this.

Number four con trick on my short list, possibly the most serious, is the 'future shock' and 'speed of change' school which insists that modern society is so complicated and fast-changing as to be completely out of control (by mortals such as you and me).

Not only is the analysis most suspect as the changes related to a booming economy and an expanding population grind to a halt, with no technological advance in the offing which will have as profound a social effect as the films, television, motor vehicles and washing machines of today; not only must we suspect any call to divest ourselves of power and responsibility to a control group, be they financiers or technocrats, but we should also ask whether our collective problem *is* so intractable. Basic physical needs are almost completely satisfied (how many in the North go searching for firewood or carry water home in a pot?) and we have a remarkable and beautiful understanding of the world around us, including evolution, ecology and continental drift. The challenge is to develop a society which can use properly the success of so much human achievement. There is no need to shrink from the 'problem' of unemployment, where the need is to spread the work round and to head off home a bit earlier each afternoon. Structural change is required — and that is the essence of the situation. The lack of apparent logic, and the introduction of false arguments is part of the self-support system of the status quo — the true source of the logic being derived from a desire to survive in a position of power rather than from an intent to discuss an evolving situation honestly. Faults in logic or the introduction of false propaganda or tricks to push a preferred viewpoint can thus be understood from a systems point of view.

In judging the value of any future picture it is then of prime importance to consider who is presenting the scenario, for whom (this is the key factor) and with what aim in mind.

Messages from Models

There has been a tendency to oversell global models. Along with other reviewers (Sam Cole in *Global Models and the International Economic Order* — note the thoughtful introduction by Philippe de Seynes, John Richardson in Global Modelling, *Futures* Vol 10, 1978, Guy Poquet in The Limits to Global Modelling, *Int. Soc. Science* J. Vol. 30, 1978, and internal papers of the UK Department of the Environment and OECD Interfutures) I would first of all emphasise the limitations of the models (*The Limits of Growth,* Mesorovic-Pestel, Leontief, Bariloche, FUJI SARUM). Thus, Richardson: "however, global modelling is still a very long way from the promised land of a policy-analysis tool which will be of practical use to policy makers. Systems dynamics has, in fact, had much less impact on global modelling than was hoped for by its proponents and feared by its opponents." And, Cole: "the assumptions used in the world models are probably no better or no worse than in other studies about the future. It would be grossly irresponsible if ill considered and arbitrary global strategies for development were to be accepted simply because they appear to have been authenticated by a method of calculation."

First then to the consensus among the modellers, except Bariloche, concerning resources.

- There will be increasing demand for mineral resources.
- It will be necessary to mine lower grades.
- The cost will increase by a factor of two or three this century.
- Inhomogeneous distribution may lead to socio-political disruption of supplies.
- Some minerals may become of short supply or unobtainable.

The Limits to Growth argues further that limitation of supply during the first half of next century may lead to a halt in economic growth.

To quote Cole again: "In terms of long-term availability of supply, therefore, the studies have a considerable amount to say, although some of it is entirely conclusive. It was pointed out that the results of *The Limits to Growth* were easily seen without the use of the model. It is also the case that most of the statements about physical limits by other authors do not come from the models but from studies carried out in parallel with the modelling effort. Thus, for most of the conclusions in this section the models are largely redundant."

My own conclusion goes further than this. Almost all statements which purport to be based on modelling reflect simply the biases and preconceived notions of the authors. The models are largely redundant insofar as the analysis is concerned, their role being primarily that of a propaganda device. We will note one or two exceptions to this general rule below.

The modelling does identify one problem as being of prime importance; the possibility of malnutrition and starvation amongst the Asian population in the coming decades, as that population continues to grow. It is felt that the ability of the Asian countries to import the required food will depend on the development of a successful industrial base. Mesorovic and Pestel are of the opinion that the amount of food required to prevent starvation, 500 million tons in 2025, cannot be supplied because of transport difficulties. H. Wagstaff, in an internal Department of the Environment (London) paper (*Food policies and prospects*: insights from global modelling) disagrees, and points out that this is only one-third of the present volume of world trade in oil, and that in the single year 1969-70, world oil trade increased by 160 million tonnes and total trade by 300 million tonnes.

Because of different treatments of prices and incomes, the models do not agree on whether moderation of food consumption in developed countries may lead to improvement in food supplies, or whether moves towards self-sufficiency in food may lead to a reduction of balance of payments deficits and to improved consumption in developing countries.

There is overall agreement that pollution can be controlled by the expenditure of about 2 per cent of GNP.

Some of the models, despite their size, are too simplistic to be of any use in considering different patterns of trade. Some of the most useful model results are provided by the Systems Analysis Research Unit Model

(SARUM) of the UK Department of the Environment. Even here of course, the modellers have had choices to make and the model embodies principally neo-classical economic concepts. However a move towards self-reliance has been successfully modelled by an appropriate variation of parameters.

Factors which inhibit the functioning of a free market in trade are modelled in SARUM via a matrix of 'trade biases' which modify the prices perceived by the consumer depending on the source. If exchange rates and trade biases are kept fixed in this model, surpluses and deficits will build up. This can be countered by a change in exchange rates, thus decreasing prices and increasing exports from a deficit region, or by a change in trade biases, thus decreasing imports into a deficit region. Since the floating exchange rate mechanism is chosen, the model has a built-in bias towards a free trade pattern.

If in an initial simple model experiment, all trade biases are lowered, demand is satisfied by an increase in purchases from the initially most efficient producer. This model suggests that in a free market the rich get richer and the poor get poorer, with the industrialised countries gaining from a free trade policy.

A model run by Parker and Raftery of SARU (*Proceedings of the International Conference on Systems Modelling in Developing Countries,* Bangkok, 1978) illustrates the trade-offs in a self-reliance trade policy. Biases in imports of capital machinery and manufactured goods into developing regions are increased — at a rate of increase which has been observed in the past. By the year 2000, over 80 per cent of demand in Africa is supplied from home consumption, compared to 20 per cent in a constant trade bias run; the production is triple what it would have been without import restrictions. The large increase in manufacturing capacity has its costs. The producer price of capital machinery is increased by 20 per cent over the constant trade bias run. The increased investment in the capital machinery and manufactured goods sectors leads to a reduced investment in the other sectors, which thus produce less than they would have done. The raising of trade biases then leads to a reduction of about 12 per cent in the consumer index in 2000.

Parker and Raftery comment on these model runs as follows: "... this experiment shows less developed countries substantially increasing their manufacturing capacity with only a small fall in living standards. However, this conclusion is only valid if the manufacturing industry can be built up by investing home-produced capital goods, rather than by importing advanced technology from the developed countries. On the other hand, it is possible that this experiment over-estimates the decrease in standard of living. Technical progress in SARUM is, at present, neutral, whereas it seems likely that when less developed countries industrialise, productivity will increase owing to technical improvements embodied in the new capital investment."

Interfutures examined a move towards self-reliance in the South in their breakdown scenario — which, as they noted, is similar to the Bariloche assumption that the three continents of the South pursue their development in virtual isolation from the North. The model results were similar to those obtained by Parker and Raftery. When the less developed regions are thrown onto their own resources for making capital machinery very high growth rates result for this sector; for example in Africa it grows at 19 per cent per annum and in West Asia and North Africa at 28 per cent. The share of developing countries plus China in capital machinery production is 33 per cent in the North-South breakdown scenario, compared to 18-25 per cent in other Interfutures scenarios. Since exports to the less developed regions are cut off, production is lower in developed regions — down by 40 per cent in the EEC and by 57 per cent in Japan.

Not a good result for the OECD, and the Interfutures chose to play down the result with the following comment, "the Third World's share in world income is now 33 per cent, but per capita income is now 640 dollars, as against 890 dollars in Scenario A. The loss is significant, even though its impact is partly offset by better income distribution."

On first reading this I saw red. For there are essentially two stages in the evolution from the high-growth Scenario A to the 'breakdown' Scenario C; the first being the exogenous introduction of lower economic growth rates (to Scenario B), the second being the change in trade biases. It is in fact the analysis external to the model which has led Interfutures to alter the input economic growth rates in the Scenario C model run - these are not determined by the change in trade patterns. The comparison has been made between high growth/free trade and low growth/protectionism.

Is this a dishonest procedure, as I migh imply by the above? Not at all. As Interfutures makes clear — to the careful reader — the model forms a part only of the scenario analysis. They do not place 'excessive' reliance on the model but include a *set* of input changes as they move from one scenario to another. However, it is then up to us to note the positive side of the self-reliant development pattern, and to balance the Interfutures viewpoint with, for example, the possibility of increased efficiences pointed out by Parker and Raftery, by the ripple effect of a successful machinery sector on other parts of the economy, as well as by a consideration of social and political implications.

In the treatment of aid most models do not differentiate well among different ways of transferring income between countries, and in fact in most models aid appears to be the deficit between the total value added during the production processes of goods in a region and the regional requirements for investment and consumption. The overall conclusion is that an aid flow of about 2 per cent of GNP from the developed region will approximately halve present inequalities by the year 2000.

The Department of the Environment again provides us with more useful information, by their use of SARUM to investigate the possible dynamic effects when aid is channelled into investment goods. Thus, world-wide, if aid is spent on consumption, the share of less developed countries in output of capital goods is the same as with no aid — about 18 per cent in the year 2000. If the aid is specifically for investment goods, the share of less developed countries in the world output of capital goods is increased to about 27 per cent in 2000.

The results for Africa emphasise the change. If aid is to consumption, there is little change in production of goods by domestic industry, but imports increase by 60 per cent. If aid is spent only on investment goods, the industrial base is enlarged, by a factor of 4.5 in 2000, with substantial improvement in living standards. Thus in 2000 the consumer index for Africa is about 1,200 dollars with no aid, 1,500 dollars with aid to consumption, and 2,000 dollars with aid to investment.

The model runs indicate that the Lima target, aiming for 25 per cent of world industrial production in the developing countries (minus China) by the year 2000

may be too optimistic; and that policies of self-reliance coupled to a careful direction of aid away from consumption and towards investment may aid the attainment of that target. In addition to statistics quoted above, it may be noted that in most Interfutures scenarios as well as Mesorovic, Pestel and Leontief modelling the share of developing countries (excluding China) in world industrial output is about 16 per cent in the year 2000. This share is increased to 20 per cent in the Interfutures Scenario C (breakdown in North-South trade, i.e. push for self-reliance in the South). Changes in the share of world production in capital machinery are greater; from 18-25 per cent in other Interfutures scenarios to 33 per cent in Scenario C.

It is obvious that I have found the model runs carried out by the UK Department of the Environment to give the clearest guidance in policy decision-making. This is a group with no predetermined message to convey, and where the staff have the ability to consider very different options. It is also clear that I do not concur with the conclusions drawn by many others on the basis of computer model runs. The importance of freedom from prescribed bias has been commented on by Ian Miles of SPRU when he said: "It is likely that this approach (identifying ideologies and issues) could not have been developed in an institution without the freedom of expression and level of critical dialogue that exists within the Science Policy Research Unit."

The Present Revisited

But is futures thinking really relevant to today's world? I wish to outline some future trends in employment which have been widely discussed and to draw a few conclusions (again reasonably familiar) on the future role of the state and more particularly on an appropriate set of educational goals. It is striking to note that reactive decision-making is leading many governments to opposite, counter-productive policies. I wish to leave with you the idea that a fuller understanding of the human situation, the search for a holistic viewpoint and the development in each of us of an element of Renaissance man are necessary if we are to move towards a successful and appropriate future.

The Western world is now entering on the last phase of the industrial revolution. Increasing inventiveness and efficiency have allowed people to move from agriculture, and from industry, into other parts of the workforce. Looking after the household is no longer a full-time task and thus women are seeking a fulfilling role in employment. During the post-World War II boom a considerable infrastructure has been built up and saturation is being approached in household machinery (TV, washing machines, telephones) as well as in building stock. The remaining part of the revolution, the widespread introduction of microprocessors, will increase efficiency — freeing workers from both manufacturing and certain service tasks, — while creating relatively few new demands. The trend will be towards a greater demand for jobs as the population moves towards a stable, mature pattern and as more women decide to join the work-force; coupled with cutbacks in job opportunities in many areas. The change has been, and will continue to be, accompanied by a steady and significant change in values. There is no evidence to show that Western governments are responsive to either the changing situation or to changes in demands and values.

A few New Zealand statistics illustrate the changes. There has been an increase in the proportion of married women in the 40-44 age bracket in the work-force from 3.9 per cent in 1936 to 46.3 per cent in 1976; my projections indicate an increase in demand for employment of 30 per cent in the coming 30 years, coupled with a decrease of 15-20 per cent in job opportunities (a conservative forecast for 40 per cent unemployment?). There has been a shift away from the two main political parties, who are associated with status quo thinking, with voting support for the two dropping from 80 per cent of registered voters in 1972 to 55.4 per cent in 1978, while abstentions increased from 11 per cent to 30.8 per cent.

Technological and social achievements have provided a surplus labour force for the satisfaction of an increasing range of perceived societal demands. In Western societies certain activities remain classified as 'productive', and a distribution of income to the full range of workers is via the state, with funding through taxation. Naturally with basic needs being satisfied by a decreasing proportion of the population, the need for redistribution, and thus the proportion to be collected in taxes, has grown.

Western governments seem unable to imagine a change in organisational system. They act counter to the trends outlined (which we must remember is a feature of a highly successful human evolution) by withdrawing the state from its distribution role and by cutting back on employment. The result can only be massive unemployment and the creation of a depression of monumental dimensions. The retreat from structural change and the refusal to face the challenge of distribution of income in a highly successful society is the natural reaction of a threatened power structure. Substantial changes are required in this decade of the 80s if the West is to move successfully into the final decade of the century.

We can only analyse the full situation and chart an appropriate response if we have been educated, and have educated ourselves, to comprehend our present position in the evolution of humanity; as living beings in a complex ecosphere, in evolving societies (knowing that other societies have had to change and to adapt in the past), in individual nations in a changing world.

The time is appropriate for deep reflection, and for well considered action — not the panic responses of present Western governments.

Education must respond to the challenge of the time. And this is *not* for technological or job-oriented training. The aim of education must be the classical one, for the formation of well-rounded individuals. This aim of education is of course the obvious one for an age of increased leisure, predicated on the value of each individual human existence. The alternative is to allow ourselves collectively to be educated as the technological slaves of a dominant elite. That option is surely inhuman. Present trends in education towards development of critical skills must continue, and be protected against mistaken directives from politicians, economists and the like.

How to Think the Future

In this final section I wish to outline a few rules for futures thinking, at the personal, group and organisational levels.

Before commencing my futures exercise it is important to set up a firm basis. Remember that our education system and our society are firmly reductionist in outlook and extremely short-term in time-scale. We must learn how to link concerns and facts that are at present found under widely different subject headings; and the requirement to think long-term and to set our society in its historical and ecological framework is both fascinating and challenging.

Consideration must be given, *inter alia*, to the evolution of the planet and life on it; the development and spread of man across the globe and our ecological niche within the variety of nature; the growth and decay of civilisations; the spread of European power and culture, largely by conquest, around the world; the implications of the ending of the colonial era and the development of new nations and new regional groups; the various developments of the ongoing industrial revolution together with implications such as the break-up of previous community organisations; varied approaches to philosophical and economic thought; and various possible patterns of future developments.

Many basic texts on these topics are now available, and I myself have found a great deal of value in texts written for children, which provide an overview of, for example, historical developments, as well as television series such as 'Botanic Man' and 'Civilisation'. Note that the most useful and fascinating series present the viewpoint of one person who has some definite message to convey. Thus on the individual level what is required is a series of visits to the local library with the above list in hand, a careful choice of television and radio programmes, and a questioning attitude towards newspaper reporting. Then, once a background has been built up, relax, day-dream and ponder awhile the implications of what has been learnt, and consider your own choice of a preferred future.

It is important, as I have stressed repeatedly throughout this article, to consider always the bias and philosophical attitude of the writer as well as the power base of the individual and organisation concerned.

Groups (friends, clubs, or schools) can carry the lateral thinking or day-dreaming one step further in brainstorming sessions. Small groups, of up to eight persons, should spend a couple of hours brainstorming, letting ideas flow freely, interrupted by several coffee-breaks (it can be exhausting), before trying to link the main points and see if some concept of a preferred future or of key problem areas has emerged. Ideas should be listed on large sheets of paper pinned round the room; this will aid the final summing-up. It is important to allow any ideas to be expressed and explored, whether they seem at first to be strange, crazy or unacceptable to others.

Larger-scale futures exercises must be carefully organised to suit the subject. The need is to explore a set of alternative futures or scenarios, to consider the implications of different policy options and to gather information and make analyses relevant to those scenarios. The scenario analysis is best carried out by a team, working as a team, of 4-8 persons, who have the full responsibility of developing that central focus of the work. Additional information or briefs on topics and questions related to key scenario elements can be prepared, and published independently, by other individuals or groups. While stimulus of as wide a debate as possible both during and following the scenario development is a major aim of the project, the central team must be prepared to (and allowed to) develop its own set of clearly defined alternatives. We cannot question our current paradigm, and explore alternative paths into the future, by a search for consensus at this stage.

Within such a project the tools must be chosen to suit the requirements, and not the project tailored to suit the tools. The degree of sophistication of any modelling must in particular be appropriate to the task — to the degree of accuracy possible and to the level of analytic understanding. The need is often to simply check feasibility with a simple estimate, or to consider the implications of a defined trend. Above all, all parts of the analysis must be clear to the reader. Black box computer models make fine propaganda tools for pseudo-professionals, but are of no use in a serious effort to chart the future of a civilisation.

RATIONALITY, ECONOMICS AND CULTURE

How Smithian Economics has derailed Aristotelian Rationality

by Henryk Skolimowski

Aristotle defined man as the rational animal. He also defined man as the political animal. But his conception of the 'political animal' was much more elevated than the one entertained in the 20th century, when the concept came to signify a crafty creature, an opportunist, who sails with the prevailing winds. For Aristotle, man was a creature of the polis, thus charged with duties and responsibilities to maintain the well-being of the polis — which was not so much a physical, geographical or an administrative structure, but rather a state of mind. An 'idiot' was the name given to a person who refused to participate in public affairs.

Plato attributed to the laws a sacred status, the highest virtue, and it is within the bonds of the polis that some of these laws resided. Man, the political animal, living in the space called polis, was the subject of Pericles' remarks when he said in his famous funeral oration of 431 B.C., "those who do not take part in public affairs, we do not call idle, we consider them useless". Hand in hand with this conception of man went an appropriate concept of reason or rationality which informed man that to seek enlightenment and virtuous life was the highest road of freedom and of human destiny; while the pursuit of 'Techne' and other sorts of occupations which lend themselves to mere practical use signified treading a lower road. Thus the shape of the culture was clearly drawn. Whatever reservations we might have about slavery in Ancient Greece, the fact remains that the fifth century Greece provided us with ideals which have nourished us up to the present.

The Western medieval man was much less inclined to define himself as the rational animal or the political animal for he was convinced that only God was in full possession of reason and wisdom, and that only He knew the design for the *Civitate Dei*. Both the culture and economics of the time were defined by religion. The stupendous Gothic cathedrals were reckless, if not suicidal, economic propositions. But they also expressed the inward necessity of man's vertical quest towards the glorious God high up in the heavens. From a purely functional and narrowly rationalist point of view, these cathedrals are empty buildings. Yet there is a part of our reason that tells us they are magnificent. Their magnificence does not lie in their rationality or functionality, but in something else. And yet this 'something else', upon closer scrutiny, reveals itself to be a part of a larger rationality of these buildings. The point is that the rational embraces much more than the merely logical and economic.

Changing Image of Man

With Machiavelli we are beginning to articulate the conception of man as the Homo Manipulator, if I can coin a phrase. However, it will take us three or four centuries of further articulation of this conception until we arrive in the 19th century at the idea of man as Homo Economicus and Homo Faber, which are extensions of man the manipulator. The transformation of the early man the manipulator into man the consumerist is as fascinating as is the transformation of the Renaissance mind into the pragmatic technological mind. What we have gained on precision and efficiency we seem to have lost on vision; and in the process we have curiously thinned the substance of our reason.

Now the ecnomics of traditional societies are determined by their social systems. The context and ideals of culture delineate the place of economics in it. Diagram 1 shows the relationship of economics to society and culture within traditional societies in which economics is largely subsumed under the social system. Diagram 2 shows the present situation in which economics has subverted culture, in a sense eaten it up, and became itself the cultural paradigm. Within the cultural paradigm controlled by economic rationality, culture and rationality (cum efficiency) are often considered antithetical to each other. This is not so in traditional societies. Aristotle's concept of man as the rational animal was one side of the coin, of which the other was man the political animal. Together they made man the socio-cultural animal.

Now, judged by the standards of traditional cultures the present situation cannot be described otherwise but as myopic, for in making itself the core of our culture, economics has succeeded in transforming and narrowing rationality, in atomising society, and in undermining intrinsic and religious value.

One correction should be made at this point, for this myopic economic paradigm describes not so much the present-day situation, which is obviously changing, and sometimes in a profound way, but rather the state of the western economic world, until roughly mid-1960s. With the crop of books by Mishan, Galbraith, Schumacher, Henderson, Hirsch and others, an alternative economic paradigm has been clearly in the making. And the public awareness has been alerted to the fact that economics is not the magic wand that will effortlessly give us prosperity and happiness.

We must clearly bear in mind that economics conceived as maximisation of profit could not be elevated

to the paramount importance but in a society which seeks its fulfilment and salvation in the consumption of material goods. Put otherwise: in order to elevate market economy to the supreme element of our culture, our eschatology had to be reduced to the ideology of consumerism. (Eschatology is the realm of reflection concerned with ultimate goals and ends.) Now, if the consumerist society is described as the dictatorship of the masses, then the present West is in the grip of this dictatorship. Our politicians and economists are dancing to the tune of the mass music of consumption.

In order to understand economics, one has to go beyond economics. Economics is but a practical translation of those larger views and ideals which a given society entertains at the time: concerning the nature of man, the nature of power and politics, the nature of the outside world, the nature of rationality and last, but not least, the nature of our eschatologies. Ultimately, economics can be viewed as a camouflaged expression of our eschatology, as the tangible and practical expression of our vision concerning goals and ends of human life.

The Assumptions of Economics

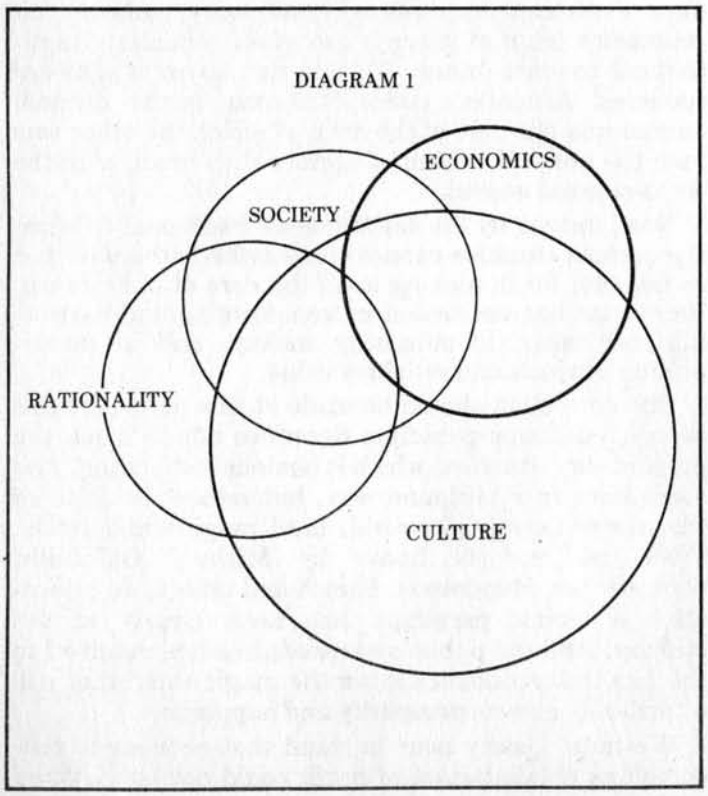
Let me now briefly reconstruct some of the basic assumptions and premises which led to the present economic paradigm; which in other words, were a part of this larger process of the articulation of man the manipulator.

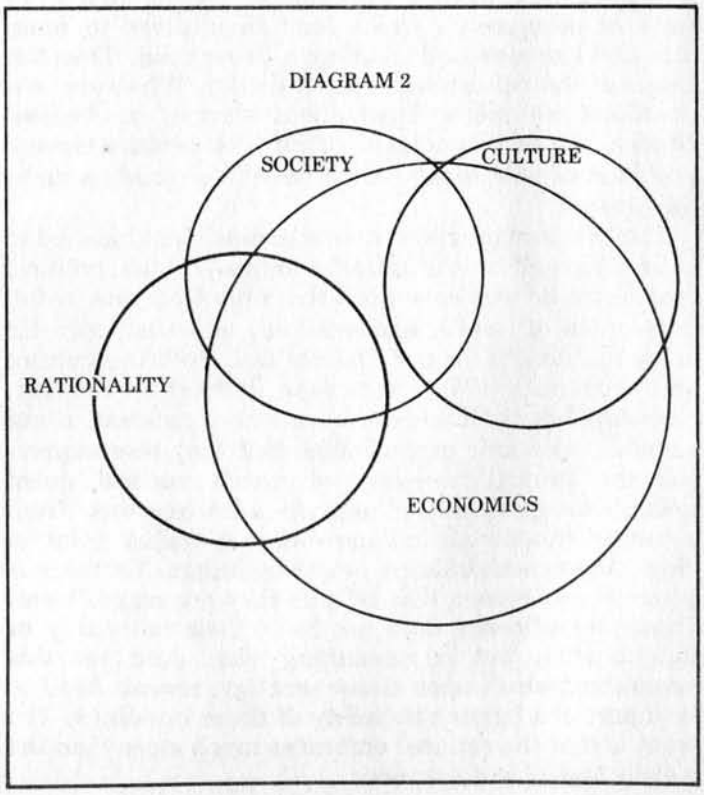
- The first one is **the aggressive concept of man**, conceived as *homo homini lupus*, which directly and indirectly led to the justification of selfishness under the cloak of individuality. Selfish individualism is indeed a peculiarly Western ideal. Hobbes' concept of man (*Homo homini lupus*) has led to a variety of assertions justifying the aggressive nature of man. Of late, this trend has found a new expression in the discipline called socio-biology. *Homo Economicus is only an outgrowth of the Hobbesean ideal of man as being a wolf to a man*; and so is utilitarianism; and so are such concept as the territorial imperative. How we conceive of human nature may be decisive for our concept of society. A specific ideal of man may mould and condition our views on society and on the nature of individuals in this society. And such is the case with the Western capitalist society.

- **The mechanistic view of nature** is the second important premise on which the economics of the free enterprise system is based. The domination of nature by man is a part of Western post-Renaissance heritage, which means that nature is out there, an object to be exploited, a slave to our will while we are its masters. Nature is assumed to be an inexhaustible quarry of raw materials. Moreover, nature is conceived as a mechanical aggregate of things to be manipulated by our science and technology. There are no mysteries, but only things to be 'technicised'. Nature is thus reduced to a clock-like mechanism and we hold the key to this clock.

- The third important premise concerns **the predominance of quantitative science and exploitative technology** which are elevated to a supreme intellectual and moral position. As science gradually increases its importance, so it does gradually decrease the intellectual importance of other realms of man's mind. After a time science not only becomes the unchallenged arbiter of all knowledge but it also becomes a repository of moral virtues as some (Jacob Bronowski, for instance) see in the values of science the highest human values. Science and technology combined provide the chief vehicle of progress.

- **The ideal of material progress** is the fourth premise of market economy. The physical amelioration of mankind is all that matters. Hence *material progress is elevated to the condition of a deity*. Fulfilment here and now, in material terms, becomes the implicit Utopia. And hence it follows





that the ideology of consumerism is not an aberration of the technological society, but its innermost expression.

The enshrining of the concept of efficiency is another consequence of the present economic paradigm. The idea of efficiency is drastically narrowed to become the criterion of profit which is assessed on monetary terms. Efficiency is thus defined in the framework of gainful employment to be assessed in quantitative terms and ultimately with the view of the maximisation of profit. Now I have nothing against efficiency in the pursuit of excellence. Let us remember that saints, great artists and great spiritual leaders were efficient too. However, their enterprise entailed a rather different concept of efficiency.

The narrowing of the concept of rationality is another consequence or premise of present economics. Thus rationality has been so re-defined that the overall faculty to govern reason in the pursuit of wisdom (the Greek ideal) became constrained to signify a set of strategies aiming at the maximisation of efficiency and indirectly, of profit. It should be born in mind that many of the processes and redefinitions I have touched upon occurred outside the sphere of economics *per se*. But these changes and redefinitions were a condition *sine qua non* to allow market economy to become the supreme arbiter regulating the multitude of human affairs; and of late the shape of the world. One might suggest that the *zeitgeist* has been working quietly and diligently in all those corollary fields to mould them in the image of the emerging economic paradigm. In my opinion it makes more sense to see all these transformations and redefinitions as specific articulations of the ideal of man the manipulator. Among the many specific articulations, needless to say, the economic one turned out to be more forceful and more far-reaching than others.

The atomistic concept of society is a further consequence of the market economy. In addition to the changes already discussed, some further and more subtle ones have occurred, specifically of society, of culture, and of eschatology. Thus society becomes increasingly viewed as a conglomerate of atomistic individuals in the pursuit of gainful employment. Society is increasingly remoulded in the image of materialist economics. Basic clashes, divisions and societal wars are fought on economic grounds. Even when the abolishment of the free enterprise system is intended or accomplished, it is in the name of economic equality. Which is to say the alternative Marxist model of society is as obsessed with economics (if not more so) as the capitalist system.

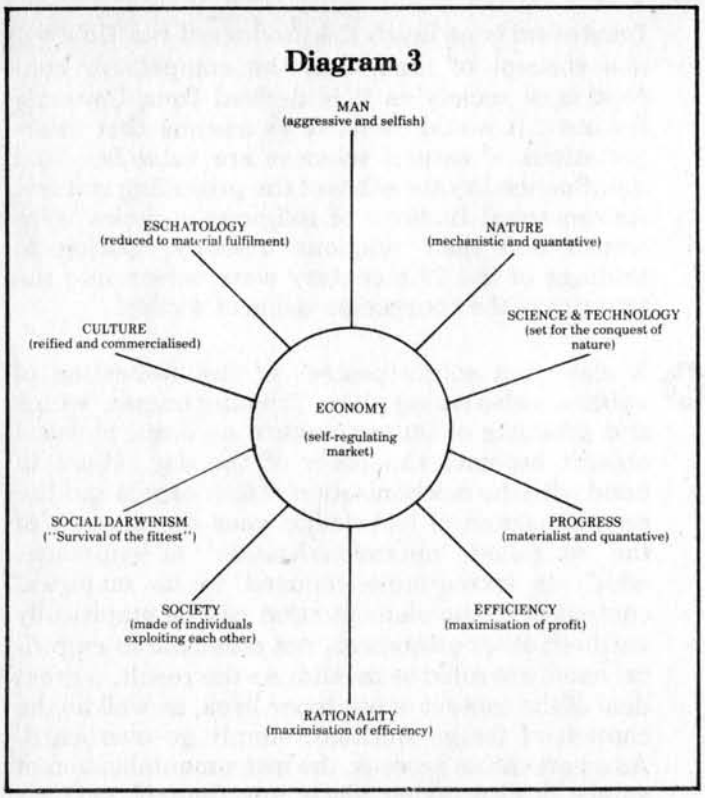
Social Darwinism is another component of the free enterprise paradigm. The regularities governing mutation and adaptation of the species were interpreted in a ruthlessly competitive fashion as 'the survival of the fittest' — the precept which was elevated to the law of life. In nature all systems are interlocked in symbiotic cycles. *Western economic systems may be the only examples of pure social Darwinism in action.* Although purportedly derived from the findings of natural science, social Darwinism is as much the product of the Hobbesean concept of man, and the competitive conception of society as it is derived from Darwin's theories. It would be naive to assume that interpretations of natural sciences are value-free and uninfluenced by the ethos of the prevailing culture. Astronomical findings of religious societies were woven into their religious tapestry. Zoological findings of the 19th century were woven into the tapestry of the bourgeoise vision of society.

A slow, but subtle process of the **reification of culture** is also taking place. Treating human beings and products of human culture as mere physical objects becomes the order of the day. Hand in hand with the mechanisation of the cosmos and the physicalisation of knowledge goes the process of the so called 'operationalisation' of language, which is increasingly reduced to its empirical content or to the elements that can be empirically verified; other utterances, not reducible to empirical ones, are ruled as invalid. As the result, a great deal of the content of our inner lives, as well as the content of things spiritual, simply go overboard. As a part of this process, the instrumentalisation of values is also taking place: cost/benefit analysis often assumes the position of the dominant criterion of values. In this process of the 'thingification' or reification of culture, art is reduced to business-art as distinguished from art-art; the homogenisation of human experience through mass media is taking place on an enormous scale; the result of which is smothering of the distinguished and the elimination of the excellent.

The domain of **eschatology is also redefined**, although the term is hardly ever used. The underlying eschatological premise is that there is no salvation or meaning to life except economic fulfilment. Now, which of these subtle changes preceded the articulation of self-regulating market economy and which were induced by it, does not really matter. What does matter, however, is that in making the economic paradigm the supreme moral and intellectual force of Western society, we had to re-define the multitude of our views that make up our world view or cosmosology. It is interesting to observe that the compulsion in this direction was already clearly visible in the 18th century, not only with Adam Smith and British empiricists, but also with the French physiocrats. The very idea of physiocracy (power to things physical) explains the compulsion best. The very term was introduced and the movement was initiated by Francois Quesnay, the court physician to Louis XV and Madame de Pompadour. When the physicians of debauched kings are beginning to define the nature of things, we should watch out!

Let me put all the points discussed together by means of a diagram (Diagram 3), in which the various assumptions built into the ideal of self-regulating market economy are simplified to the extreme.

This skeletal way of presenting the conceptual backbone of free enterprise economics allows us to perceive at once the strength and weaknesses of Karl Marx and the Marxist approach to economics. It is quite obvious that although the Marxists have challenged some of the basic assumptions, particularly regarding the structure



of society and the place of private property in it, they accepted *most* of the other assumptions that make up the backbone of the Western post-Renaissance world view: thus they accepted the concept of science and technology, the concept of nature as a thing for exploitation, the concept of instrumental rationality, of progress and efficiency exactly as they are conceived within the free enterprise system. True enough, they attempted to alter the selfish ideal of man and bring about a more altruistic ideal of society. However, in the absence of some transcendental scheme, in which man can measure himself up against things which are greater than himself, the alternative concepts of society and of man do not amount to very much, particularly as the eschatological assumption remains the same — namely, that there is no salvation or meaning to life beyond economic fulfilment.

Of course this analysis is so ridiculously simplified that one might feel that no justice at all was done to the Marxist approach. But even if one were to write a volume spelling out all these propositions, some basic facts would remain the same: namely, that *both Capitalism and Marxism see reality in basically economic and physical terms;* both treat nature and reason in a mechanistic fashion; both deny any transcendental destiny to man; and paradoxically end up competing with each other in terms of industrial efficiency — the pursuit of which abysmally narrows man's stature and tragically impoverishes his existential universe. Thus Diagram 3 clearly shows that although Marxism has attempted to change so much, yet it aimed at so little: by not challenging other basic assumptions of the Western materialistic world view of which market economy is an intrinsic part, Marxism has gone aground and is now absolutely stuck.

The Self-regulating Market Economy

A few words should be said about those specifically economic changes and transformations which led to the idea of self-regulating market economy. In this respect I shall follow Karl Polanyi's book *The Great Transformation,* in which he convincingly and forcefully argues that we make a mistake in reading into older economic systems, particularly of primitive societies, the economic *modus operandi* of our system based on gain and profit. Polanyi and others have shown that throughout human history "as a rule, the economic system was absorbed in the social system, and whatever principle of behaviour predominated in the economy, the presence of the market pattern was found to be compatible with it" (p.68). Thus, looking at the situation panoramically, gain and profit made on exchange never played an important part in human economy, except in modern Western society. It is still amazing to us, at least to many of us conditioned by the blinkers of market economy, to realise that so many societies known to anthropologists valued material goods *only insofar* as they secured other symbolic and social transactions, of which social status, reciprocity and generosity were among the most important. Polanyi furthermore argues secured other sumbolic and social transactions, of which social status, reciprocity and generosity were among the most important. Polany furthermore argues that the self-regulating market was indeed an *innovation* on an unprecedented scale and that it "gave rise to a specific civilisation". He further remarks, almost ominously, that "the idea of a self-adjusting market implied a stark Utopia"; I shall return to this point at the very end.

Market economy and the free enterprise system were neither an outcome of the inevitable laws of nature nor an Act of God, but a specific human invention, which required not so much an understanding of the laws of celestial mechanics, but specific pieces of legislation, which were pushed step by step quite bloody-mindedly in the second half of the 18th century and the first part of the 19th century Britain. Now, the specific economic concepts of the free enterprise system such as a self-regulating market, translating everything into a commodity (especially human labour), defining wealth in terms of gainfulness instead of use, turning rationality into the instrument of the maximisation of efficiency and indirectly, of profit, have been voluminously written about. All those concepts were developed slowly and so naturally, or should we say logically, that the outcome appears inevitable. However, above and beyond those more internal economic developments, the whole modus of culture and civilisation has been changing. Somehow we have been increasingly possessed by the Faustian mythos: of power, of gambling with our destiny, and with the destiny of future generations.

Economics and Eschatology

As it is evident, our economic system is not a thing in itself, but always a part of a larger structure. Eschatology is the invisible but all determining part of this structure; while rationality is a visible and articulated part of a given economic system. But rationality is only a *posteriori* rationalisation of what our eschatology assumes. The three component parts: eschatology, economics and rationality are all woven into the tapestry of culture of a given time. In brief, *tell me what your eschatology is and I will tell you what your economics is.*

Marx was dead wrong about one thing: namely, that relationships of productions determine it all. No, they do not. Our fundamental values determine the variety of things material. No society has ever been determined by the relationships of production; least of all the communist societies, which adopted Marxism as their

creed. The truth is that societies are much too subtle, much too cunning and much too complicated as systems to be governed by or determined through relationships of production. What are the relationships of production anyway? Are they not peculiar fictions of the abstract (economic) mind? Now, I am not saying that the whole Marxist system is a lot of thin air; it has proved to be rather 'thick' and distinctly tangible in its manifestations. I am only saying that its fundamental premise is mistaken, namely that things material determine all things social and spiritual.

Hahblle's vision of the adoration of the Golden Calf (wealth)

Economics: A British Creation

Let me observe in closing that the design and construction of market economy happened in Britain and was, in fact, the product of the British mind. One therefore wonders how much the shape of the present industrial civilisation, ergo, the shape of the present world has been determined by the peculiar propensities of some British thinkers of the 17th and 18th centuries who insisted on seeing the world as a rather uninteresting conglomerate of physical things which are to be exploited to man's material advantage. For it is these very thinkers who invented empiricism (Locke, Hume), who invented the pragmatic concept of knowledge (Bacon: *knowledge is power*); who worked out the mathematical blueprint of the mechanistic universe (Newton): who invented the selfish concept of man (Hobbes: *homo homini lupus*); who invented self-regulating market economy (Adam Smith), which later led to the conception of Homo Economicus, and still later in the 19th century to utilitarianism in ethics (Bentham, Mill). And of course Charles Darwin happened to be another English gentleman; so social Darwinism has the English origin as well.

It has been said that empiricism was a typically British invention; also that the idea of self-regulating market was a typically British product; as well as its particular embodiment and consequence — the Industrial Revolution. And it has also been said that in economic terms the 19th century was the British century. If so, then we can clearly see that the entire ideology leading to the free enterprise system was a product of the peculiar genius of the British. This ideology, let it be noticed, was not limited to economics but also included a profound reformulation of the physical feature of the world as well as a reformulation of the concept of human nature. Thus the edifice of the 20th century Western world (and this includes the Soviet Union and its satellites and also the heritage of the Marxist ideology) is based not so much on *Western* mind, but really on the articulation of the mentality of half a dozen British thinkers of the 17th and 18th centuries. For this very reason the economic way of looking at the world has often been felt alien to the spirit of the people in Latin and Slav countries, while it made such a spectacular career in North America — a predominantly Anglo-Saxon colony.

Now, if the present socio-economic system is deemed diseased, it is not so much the Western disease but the British (empiricist) disease. For it was the peculiar British genius which, on the one hand, brought about all those sweeping external changes to the world, and on the other, so drastically limited our visions of the world. If one wanted to exaggerate a little, one could say that the shopkeepers' mentality was blown to cosmic proportions, to become the civilisation's *modus operandi*. But this might be unkind. However, it is not far-fetched to suggest that our socio-intellectual history of the last three centuries may be seen as an inexorable unfolding of idiosyncratic views of obscure islanders which came to dominate our entire vision of the world and in the pursuit of which we brough about an unprecedented material progress and also an unprecedented pillage of the environment. The result is a Utopia realised. But alas, unlivable for human beings. Let no-one say that the British character is anti-Utopian, for clearly the technological society is a Utopia realised. It is a pity that it is such a dreary Utopia.

Our economic theory is as good as is our cosmology — which originates our economics. Our cosmology is about the gods we are prepared to worship. We have worshipped the God Economos; and it has given us the material plenty. But he is unable to give us the meaning of life. Hence our existential drama. And hence the drama of our rationality which, in the cause of a mistaken logos, has shrunk our being. However, our reason is not all defunct. It is the peculiar quality of reason that it always transcends itself. It has already done so with regard to the economic boundaries. When our eschatology becomes transcendental again, when we re-establish intrinsic values, we shall put economics in its proper place, and our reason will flourish again, guiding us on the path of enlightenment and wisdom.

Let me add a postscript: Adam Smith did not express human nature. He only articulated, in economic terms, those characteristics of the individual which are most congruent with the unfolding secular, materialist world view based on the idea of the domination of nature. Smithian economics (and Marxian economics for that matter) is a child of a specific civilisation. It disappears, or at least is fundamentally transformed, once basic premises of this civilisation are transformed.

Professor Henryk Skolimowski is Philosopher in Residence at Dartington Hall, Totnes, Devon, where he is establishing a centre for eco-philosophy, which is to be a focus for the new conceptual thinking along ecological lines.

NATO Conference Series, Series I: Ecology

Volume 4

Effects of Acid Precipitation on Terrestrial Ecosystems

edited by **T. C. Hutchinson** and **M. Havas**

This volume presents a thorough overview of normal functioning of terrestrial ecosystems and up-to-date documentation of effects of acid precipitation. It also describes the major monitoring programs and experimental programs in Europe and North America. 666 pp., 1980, $49.50 ($59.40/£31.19 outside US)

Volume 3

The Breakdown and Restoration of Ecosystems

edited by **M. W. Holdgate** and **M. J. Woodman**

". . . rich in information and well documented with literature citations. Open discussions after each paper make this a vigorous and incisive commentary . . . a valuable source book as well as a guide . . ." —*Choice*

508 pp., 1978, $30.00 ($36.00/£18.90 outside US)

Volume 2

Environmental Data Management

edited by **Carl H. Oppenheimer, Dorothy Oppenheimer,** and **William B. Brogden**

". . . contain[s] much information and philosophy concerning environmental data management . . . recommended . . ." —**Steven Gertz,** *The Journal of Environmental Sciences*

260 pp., illus., 1976, $29.50 ($35.40/£18.59 outside US)

Volume 1

Conservation of Threatened Plants

edited by **J. B. Simmons, R. I. Beyer, P. E. Brandham, G. Ll. Lucas,** and **V. T. H. Parry**

with a Foreword by **Sir Peter Scott**

"This book should be read by all who are involved in the conservation of the world's flora. Students will find it a rich source of ideas and advice . . ." —**D. Wells,** *Quarterly Review of Biology*

352 pp., 1976, $35.00 ($42.00/£22.05 outside US)

Environmental Science Research

Volume 16

Hydrocarbons and Halogenated Hydrocarbons in the Aquatic Environment

edited by **B. K. Afghan,** and **D. Mackay**

associate editors: **H. E. Braun, A. S. Y. Chau, J. Lawrence, D. R. S. Lean, O. Meresz, J. R. W. Miles, R. C. Pierce, G. A. V. Rees, R. E. White, D. N. Whittle,** and **D. T. Williams**

This book discusses the characterization, identification, and analysis of hydrocarbons and halogenated hydrocarbons in the aquatic environment. Advanced techniques for monitoring the distribution, incidence, biological effects, and environmental pathways of these pollutants are evaluated. 602 pp., 1980, $59.50 ($71.40/£37.49 outside US)

Volume 15

Application of Short-Term Bioassays in the Fractionation and Analysis of Complex Environmental Mixtures

edited by **Michael D. Waters, Stephen Nesnow, Joellen L. Huisingh, Shahbeg S. Sandhu,** and **Larry Claxton**

Reflecting advances in the field, this volume provides an excellent overview of the major short-term bioassay systems in current use and a review of methodologies for the collection of chemical analysis of environmental samples. 602 pp., 1979, $49.50 ($59.40/£31.19 outside US)

Volume 14

The Biosaline Concept

An Approach to the Utilization of Underexploited Resources

edited by **Alexander Hollaender, James C. Aller, Emanuel Epstein, Anthony San Pietro,** and **Oskar R. Zaborsky**

This volume explores the food and fuel production potential of various high saline concentration environments. The development of salt-tolerant crops is discussed with in-depth consideration given to naturally occurring halophytes, mutagenesis, and genetic engineering. 400 pp., 1979, $39.50 ($47.40/£24.89 outside US)

Volume 13

Environmental Pollutants

Detection and Measurement

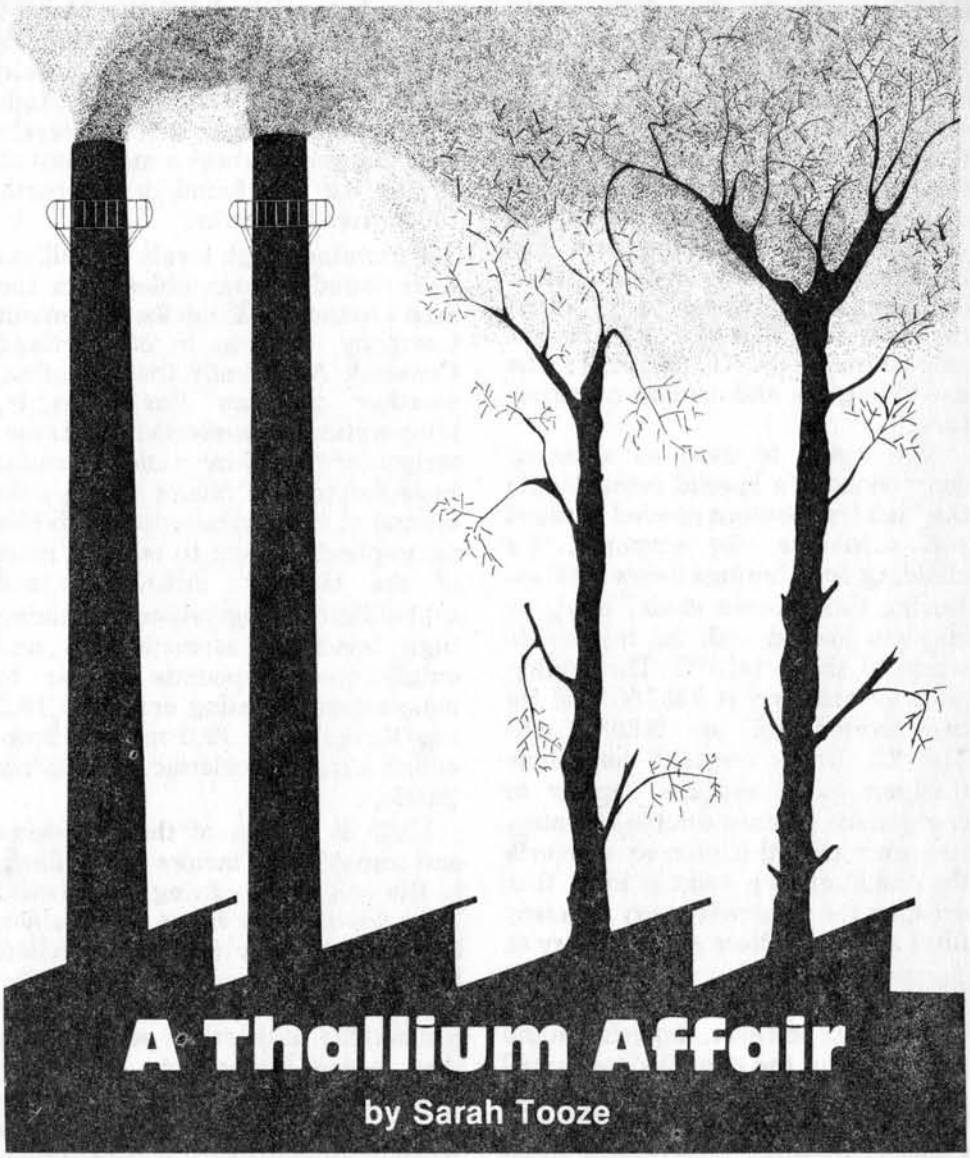
edited by **Taft Y. Toribara, James R. Coleman, Barton E. Dahneke,** and **Isaac Feldman**

"What pollutants, especially toxic ones, are 'out there'? This book sets forth . . . techniques for finding out, and lists both well-established and new, sophisticated, methods. . . . The aim is to determine what the most dangerous pollutants are, and the best ways to combat them." —*Environmental Science and Technology*

512 pp., 1978, $42.50 ($51.00/£26.78 outside US)

THE LANGUAGE OF SCIENCE
Plenum
PUBLISHING CORPORATION

227 West 17th Street, New York, N.Y. 10011
In United Kingdom: Black Arrow House
2 Chandos Road, London NW10 6NR, England



A Thallium Affair

by Sarah Tooze

Tons of vegetables and fruit from farms and allotments around cement works in Germany were destroyed in September and October 1979. Occasionally the owners did not cooperate "We've been eating them like that for six years, why stop now?" but most, however regretfully, have delivered the results of their hard and often loving labours to the awaiting skips. The cause — thallium.

Thallium is a rare and sinister element. Its immediate neighbours in the periodic table are mercury and lead and it belongs to the same chemical group as aluminium, gallium, and indium. After its discovery by William Crookes in 1861 the sulphate was prescribed for treatment of diseases ranging from syphilis and tuberculosis to ringworm, but distressing side effects resulted and the practice was dropped. Even its use as a pesticide is now largely superceded. Current applications include the production of optical glasses of high refractive index, photo cells highly sensitive to low light intensities, and thermometers for arctic conditions; as a chemical reagent it seems likely to find increasing application. Commercial production is minute compared with lead and mercury and where thallium has been available there have always been cases of deliberate or accidental poisoning. One of the most dramatic was that of Graham Young, an English boy who at the age of fourteen poisoned his entire family and then, when on release from Broadmoor, nine years later, poisoned eight workmates in a photographic instrument factory killing two of them. Thirty-one Mexican farm workers were poisoned in another incident in California when they ate tortillas made from barley treated with thallium as a rat poison.

From many such cases and from descriptions of effects on patients of sublethal doses of thallium administered for ringworm infections during the First World War the symptoms of poisoning are known in detail. Diagnosis is nevertheless difficult and requires chemical analysis. Living organisms mistake thallium for the essential element potassium and it is rapidly absorbed causing disruption of B vitamins, enzymes, calcium and iron metabolism, and producing distressing and irreversible effects on the brain and nervous system. Low doses produce cardiac symptoms, joint pains, excruciating sensitivity leading to numbness, and hair loss from most parts of the body: high doses cause initial gastric symptoms, followed by hallucinations, coma, convulsions, and after about a week, death from respiratory paralysis.

The lethal dose is around 1 gram (figures in the literature vary from 5 to 70 mg/Kg body weight). A daily intake of one ten thousandth of a gram (0.1 mg/Kg body weight) is thought to be harmless, but thallium is a cumulative poison only a certain percentage being excreted per day. (Half-life in the body is variously estimated between 14 and 35 days.)

In Germany responsibility for environmental control and standards lies mainly with the individual Länder. In Baden-Württenberg, from where I am writing, 0.25 mg/Kg is permitted for food stuffs, in Bayern and North Rhine-Westphalia the level is twice as high at 0.5 mg/Kg, a discrepancy that reflects the lack of knowledge about the effects of small doses of the metal. However, it was the discovery of levels up to 200 times above those permitted that has led to the current furore. So far no cases of acute poisoning have been found in the human population. The authorities have sometimes acted slowly and made unscientific pacificatory statements to dispel anxiety, but the situation is the result of a long and complicated story where responsibility is so fragmented that nobody is carrying the can, largely because, since the effects were not predicted, nobody knew there was a can to carry.

In nature thallium occurs widely in the sulphurous ores of iron (iron pyrites) and other metals, as well as in potassium-containing alkaline minerals such as feldspars and micas. Amounts are usually very small, but at Meggan and Altenhundem (NRW) it reaches an exceptional 5 per cent. Iron pyrites is used to make sulphuric acid; the sulphur is burnt off from the ore leaving an iron oxide waste that retains the thallium. This waste has been the main source of thallium, which was extracted by a process with many features in common with cement making. Some thirty years ago the firm of Sachtleben-Chemie Duisberg

-Homberg began depositing waste on a tip which finally contained some 800,000 tons of which 0.03 per cent was thallium. There are no signs of environmental damage in the neighbourhood of the tip suggesting that the thallium is in an inert form that makes it inaccessible to plants and animals. Since 1975 the firm has been selling this iron oxide, thallium-containing waste to 17 other firms, at least half of which are outside Germany (B, NL, CH, A, F) who use it in glass and cement manufacture.

The waste is used as a minor component of a special cement with the high iron content needed to resist soil sulphides, for example, for cladding deep borings below 1000 m. During the process chalk, marl, or clay are heated with the iron oxide waste to about 1470°C. The boiling point of thallium is 1457°C and its two oxides boil at 1080°C and 1169°C. Under normal conditions thallium metal oxidizes rapidly to compounds that are soluble in water. It seems that the process converts the thallium to a volatile form that escapes the otherwise very efficient filter system. Filters at the factory at Lengerich, which was the first implicated, caught some 99 per cent of the dust; however, deposits on the inner side of the chimney stack wall contained some 3 per cent thallium that presumably had left the filters in a gaseous form and then precipitated when it reached the cooler temperature of the chimney. Local regulations allowed 120 mg/cubic meter dust emission and in fact only 50 mg/cubic meter were let out, of which 1.5 mg was thallium. Nevertheless the amounts of flue gases are huge, so that this amounted to 137 grams of thallium per hour at Lengerich (enough to kill a similar number of people).

This emission continued for three years before the first signs that something was wrong appeared. The first casualty at Lengerich was a 100-year-old chestnut tree that lost all its leaves unexpectedly early. Leaf-fall was noticed in fruit trees, shrubs, and maize. Twenty hutch rabbits died. In 1978 the symptoms intensified and the chestnut died. Early in 1979 fruit trees died and in June 1979 several sheep had to be slaughtered. Finally in August 1979, thallium was detected in rabbits that had lost their hair. The cement works was found to be the source and all works using the Sachtleben waste were alerted.

In animals from the close vicinity of the Lengerich works the highest levels measured were in the kidneys of sheep (1.3 mg/Kg) and pig muscle (0.6 mg/Kg and 0.9 mg/Kg). High levels were also reported in cereals from Lengerich where a maximum of 35 mg/Kg was found in the earth 100 m from the works.

Particularly high levels of thallium were found in vegetables from the area around the Heidelberg Cement Company (a branch of Portland Cement). Apparently the prevailing weather patterns (for example, temperature inversions are a characteristic of the Rhine valley climate) have led to the 'fallout' being concentrated in particular areas. While some plants appear to take up none of the element, cruciferous and umbelliferous vegetables containing high levels of aromatic oils and sulphurous compounds appear to concentrate alarming amounts: 18.5 mg/Kg sprouts; 19.0 mg/Kg broccoli; 0.4 mg/Kg celeriac, 1.5 mg/Kg parsley.

Little is known of the pathways and transference factors for thallium in the soil and in living organisms. They depend on a range of variables that, though they can be controlled in the laboratory, must render the situation in the field only grossly predictable at best. It seems clear that, since the effects were not immediate, uptake was through the roots of plants after a process of accumulation in the soil, rather than through the leaves. This rather special and rare case of environmental pollution confirms once again that apparently trivial emissions of dangerous substances can accumulate to toxic levels. The capacity of the environment to act as a waste disposal resource, an oubliette for the dangerous products of human activity, cannot be taken for granted.

Many questions are raised: What are the long-term effects of ingesting small doses of thallium? On children? On pregnant women? Is it only certain plants that accumulate such large amounts? With the increasing need for special cements, how many other cement works are using this process? How can thallium be removed from the environment? Would the effort of removing it be worthwhile, or is the human population sufficiently protected if it refrains from homegrown cabbage and sticks to frozen peas? Is increasing pollution and its often unpredictable or unpredicted nature going to encourage the use of prepackaged 'controlled and inspected' food at the expense of living off the land? Without the answers to such questions correct management of human ecology is impossible.

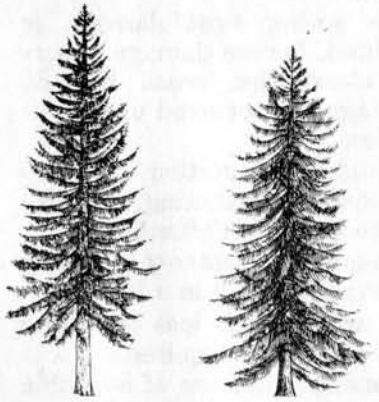
References:

Emsley, J. The trouble with thallium, *New Scientist*, 79, 1114 (1978)

Institut für Energie und Umweltforschung, Heidelberg (1979)

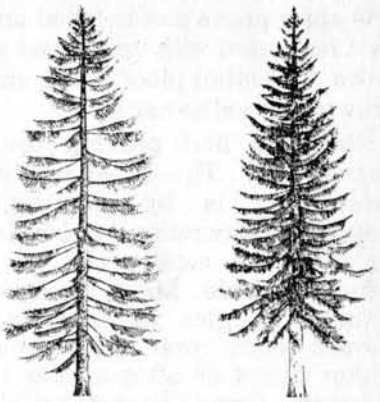
Lapedes, D.N., Ed. McGraw-Hill, *Encyclopedia of Environmental Science*, (1974)

Wade, K. and Banister, A.J., *Comprehensive Inorganic Chemistry* Vol. 1 Chapter 12, Pergamon (1973)



An Experiment in Sustainable Forestry

by The Rt. Hon. The Earl of Bradford



British professional foresters have deservedly gained international renown for their successes in plantation forestry. This term generally implies even-aged plantations, usually of a single species, eventually to be felled in large blocks, followed by blanket-replanting, often with the same species. So successful has this system been economically, despite some objections on visual and ecological grounds, especially in sensitive areas of high landscape importance, that the existence of alternative sylvicultural systems has tended to be overlooked. Recently however, an interest in 'sustainable forestry' has been revived but generally emulates some form of the continental 'check control selection forest system', which is still practised in some areas, though not so widely as before.

Continental foresters claim, or used to claim, significant advantages for selection forestry, especially in the fields of protection, conservation and ecological balance, but also for amenity, production and timber quality. Such potential advantages seemed to me so considerable that it appeared well worth while to conduct some experiments with a view to evolving a system suitable for this country, or at least for sensitive areas. In the U.K. a few examples of selection forestry were already in existence, but all seemed to suffer from certain disadvantages, particularly with regard to management and control. The experiments carried out on Nesscliff Hill on the Knockin Estate in Shropshire in the 1950s led us to the conclusion that Continental selection methods were inappropriate. It was necessary to evolve a new system using a geometrical pattern based on the minimum feasible area (which is the space occupied by the crown of a mature tree).

In 1959 I purchased the woodlands of the Endsleigh Estate from the Duke of Bedford, to try to ensure their survival and because of their enormous potential for timber production and landscape importance. These woodlands are situated in the Tamar valley north and south of Gunnislake, in the Tavy valley south of Tavistock and in the watershed between the two rivers. The area is of high rainfall, with soils of mostly medium to high fertility. The steep valley sides present an erosion danger and the risk of late spring frosts. When my forest manager in West Shropshire was transferred to these woodlands (now re-named the Tavistock Woodland Estate) we put into practise, lessons we had learned from earlier experiments. On the estate were numerous plantations of Douglas fir, 50-55 years old, measuring 20 inches quarter-girth at breast height, averaging four rings to the inch and providing high-quality saw timber. The crown area of each of these trees averaged about 400 sq. ft. The crown of a tree is of course irregular in shape but can be represented by a square. We therefore adopted a plot size 400 sq. ft. (20′ x 20′ or 6m x 6m) and a rotation of 54 years. This also proved to be suitable for the other large conifers growing on the estate, mainly *Thuja plicata* and *Tsuga heterophylla* and Norway and Sitka spruces, and subsequently for *Sequoia sempervirens,* Leyland cypress and *Nothofagus procera.*

Thus there came into existence the Bradford Continuous-cover System, perhaps more accurately described as 'A mixed-species uneven-aged selection forestry system, based on a geometrical pattern'. The woodland area is divided, along natural boundaries, into a number of compartments of suitable size. Each compartment consists of a number of small regular units of forest, each containing nine plots. Each plot should be large enough to grow a mature tree of the desired size and age and can be varied to suit the needs of any desired tree in any area. The unit area would vary accordingly. In the Tavistock Woodland Estate experiment, which has now been under way for 19 years, the plot size is 20ft x 20ft (6m x 6m), and the unit size 20 yards x 20 yards (18m x 18m). This has to date proved eminently satisfactory in practice. These dimensions give 12 units to the acre (30/ha).

The coupe cycle is arranged to give a suitable rotation, and in the existing experiment, a six-year cycle with nine plots gives a 54 year rotation. This is within the range of 50-55 years selected to give maximum mean annual increment. The cycle is designed to progress in a spiral, in order to make the best use of the available light (see diagram).

C 42	B 48	I 6
D 36	A 54	H 12
E 30	F 24	G 18

At the end of a rotation the ages of the trees or tree remaining in a plot will be as shown.

This pattern may appear rigid, as if imposing a straight-jacket on the forest, but in practice can be as flexible as desired; for example, two plots can be felled at a time, and replanted with species of a differing rate of growth. It is desirable however to plant the same species throughout a compartment in any period, in order to provide a harvest of saw-timber of one species throughout the compartment. Thinnings can generally be of mixed

species without disadvantage. Normally every six years the tree on the one appropriate plot is felled and the plot replanted with up to nine young trees. The other plots in the unit are crown-thinned as necessary.

Brashing and pruning are also carried out. The usual method of re-stocking is by planting, but natural regeneration, which is profuse on the estate, can be used where suitable. Many thousands of natural Douglas fir seedlings are moved each year and replanted either direct or after a year in the nursery. Great importance is attached to the provenance and type of all trees planted.

This system is of course not suitable for light-demanding species, but all of the trees that we wish to grow are shade-tolerant, especially in the West Country, where the light intensity is very high. The main conifer species used are Douglas fir, *Thuja plicata, Tsuga heterophylla,* Norway spruce, *Sequoia sempervirens; Nothofagus procera* provides the broad-leaved element. In the last few years, Tsuga has been found to be rather aggressive, (partly because of its extremely fast growth) and to be susceptible to drought conditions and honey fungus. It is being supplanted in part by Leyland cypress, a very high volume producer of quality timber, and apparently sufficiently shade-tolerant for our conditions. *Nothofagus procera* was selected as a broad-leaved tree showing sufficient shade tolerance and an ability to keep up with the fast-growing conifers. In fact, it easily outgrows them all, and is now being supplemented by the equally fast-growing and beautiful evergreen *Nothofagus dombeyi.* Only one Nothofagus is planted in a plot and can be nursed by Thuja or Tsuga. This kind of hardwood-softwood mixture is particularly satisfying to me, and appears ecologically sound.

Conversion from even-aged high forest to the multi-storey continuous-cover system can begin at any stage in the life of the existing crop, and has in fact been carried out in 50 year old Douglas fir. However, calculations based on Net Discounted Revenue have shown that conversion can most economically be started between the ages of 12 and 25. At this stage, the volume produced in cutting the initial plot together with thinning the other plots, produces the first economic harvest. Racks on each side of a unit enable felling and extraction to be done with minimum damage. A simple method of setting up the system on the ground was evolved and has proved effective.

As the experiment at Tavistock Woodlands Estate is still little more than one-third of the way through its first rotation, any assessment of its total viability must still be largely theoretical. However many practical advantages can already be recognised, and no unexpected difficulties have arisen. An interim balance sheet of advantage and disadvantage as against orthodox plantation forestry would at this stage run somewhat as follows:-

A. Disadvantages

1. Management, felling and extraction must be highly skilled. This is more of a challenge than a disadvantage, and has not proved to present any great difficulty in practice.
2. Woodland pests, especially rabbits and grey squirrels, must be strictly controlled. Repellents and guards have been tried, but in practice the most effective control is an experienced dedicated rabbit catcher, using legal methods.
3. Some additional expense in conversion. This has not proved to be large in practice.
4. The inability to grow light-demanding species. Fortunately the species we want to grow are all shade-tolerant.
5. Inability to use large machines of the 'combine-harvester' or 'feller-de-brancher' type, but our mainly steep slopes preclude their use anyhow, and they are not really suitable for any but large-scale forestry enterprises.

B. Advantages

1. The forest soil is protected and improved, using a wide variety of species.
2. With continuous cover the soil is never bared for more than a very short period, and only in very small areas.
3. Because of the high percentage of tree cover, erosion by water and wind is drastically reduced.
4. The cost of planting is lower; although the cost per tree may be slightly higher, fewer trees are used and wire-netting is unnecessary.
5. Sudden changes in the landscape are avoided, such as occur with clear-felling and blanket-replanting.
6. Open structure and varied heights make the forest more attractive and avoid the uniformity of even-aged young plantations.
7. Late spring frost damage is avoided. Severe damage occurs on clear-felled areas but no damage has occurred under our system.
8. A higher proportion of trees survive after planting, because of the protection afforded.
9. Costs of establishment are much lower, especially in a high rainfall area. Much less trimming and weeding is required.
10. By making full use of available space, above and below ground, a heavier stock of timber can be carried, and a high sustained yield achieved.
11. A stable ecological balance can be achieved with a very varied flora and fauna, and possibly a degree of biological pest and disease control.
12. A healthier forest.
13. Attractive to desirable wildlife, deer and a wide variety of birds.

There is no suggestion that this attempt to evolve a mixed species uneven-aged selection forest is the only answer to the forester's prayers and problems. It has been put into practice as one possible answer to these problems, especially for areas of high sensitivity, without reducing and perhaps even enhancing productivity, profitability and general amenity.

Tidal Barrages: Boon or Blight?

by
Gordon Rattray Taylor

The rising cost of generating electricity, whether by nuclear or fossil fuels, has redirected attention to the possibility of using tidal forces for this purpose — and, in particular, to the Severn Barrage scheme, first put forward in 1935 but held then and subsequently to be too costly in relation to the amount of power generated.

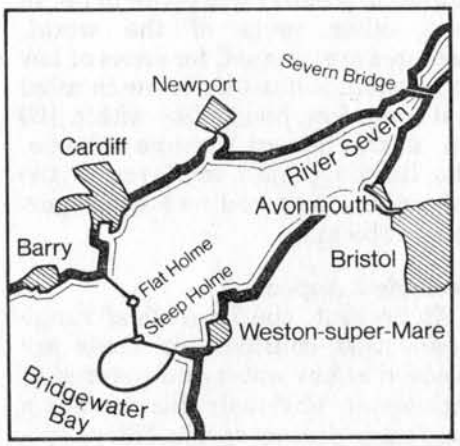
In 1976 a Tidal Energy Engineering Group was founded by engineers dissatisfied with the Department of Energy's methods of costing, claiming that its studies did not get down to the facts. In Bristol, the Sabrina project of some years back has given rise to a group led, appropriately enough, by Professor R.T. Severn, which is actively concerned to advance the proposal. Last year it organised a symposium at which speakers from Russia, Canada and elsewhere joined British experts in discussing various aspects of the concept. Recently the papers which were presented have been published as a book, from which some of the facts in this article are drawn.*

The concept is one of some interest to the ecologically-minded, for on the one hand, tidal power is a renewable, non-polluting source of energy and so, in principle, to be preferred to nuclear power or even fossil fuel; on the other, the vastness of such schemes means that considerable ecological and physical disturbance must be caused — especially during the construction period which could last as long as twenty years. It may therefore be of interest to make the essential facts more widely known.

Barrage schemes have also been proposed in Britain for the Firth of Clyde, Morecambe Bay and the Wash, among other places, but the Severn scheme heads the list since the tidal range in the estuary is one of the largest in the world. Britain, of course, is not alone in considering such projects: sites are now being considered in the Bay of Fundy (Canada) on the west coast of Korea (in the Inchon Gulf) off the Kimberley coast of Australia, while the Russians have plans for the White Sea, the Sea of Okhotsk and elsewhere. Some of these are immense: the White Sea scheme, for instance, calls for a barrage 50 km. in length, and the Sea of Okhotsk for one of 30 km. More than $3m. has already been spent studying 38 possible sites in the Bay of Fundy and a feasibility study costing $33m. has been recommended. In the U.S. ERDA (the Energy Research and Development Agency) has funded preliminary studies at several universities.

Nevertheless, the amount of power expected to be generated is not very impressive. If the 25 biggest projects were all realised, they would provide less than one per cent of world power needs.

ONE RESERVOIR SYSTEM



TWO RESERVOIR SYSTEMS

Stewart Lowdon

The Severn Barrages

There have been several proposals for Severn barrages. The one usually regarded as most workable, known as the Wilson scheme, calls for a barrage from a point near Weston-super-Mare to Steep Holme (a bird sanctuary) thence to Flat Holme and so to Lavernock in S. Wales. This involves a barrage 15 km. in length, impounding 120 sq. km. of water. The turbines would only be generating when the water was flowing in one direction, and would provide 4,560 MW. This figure must be adjusted for 'equipment unavailability' i.e. for breakdowns, servicing and inspection. Roughly, the output would be the equivalent to two conventional stations on base load, with the disadvantage that current would not necessarily be available to the grid at the times when it was most needed.

A more ambitious scheme proposed by Tom Shaw of Bristol University envisages a primary basin of 410 sq. km. and downstream from this, a secondary basin of 46 sq. km. (see map) Thee would be two sets of generating plants, pumping while the flow was in one direction and generating in the other: the water pumped up into the smaller basin would be available to generate electricity as it flowed out again, thus filling in blank spots in the schedule. This arrangement would produce, he estimates, an annual output of 15,300 GWh. However, this figure must also be adjusted for equipment unavailability.

The first of these schemes would take (it has been calculated) from 13 to 17 years to construct; the second from 14-20 years. When the capital costs were calculated in 1975, the smaller project was expected to cost £3,000 m. the more ambitious, about £4,000 m. However, the method of construction to be used remains unsettled, and it may be that modern methods of towing prefabricated caissons into position and sinking them accurately would be cheaper than the older coffer dam technique.

At the seminar in 1979, Mr. F.P. Jenkins of the Central Electricity

*Severn, R.T. et al. [eds] Tidal power and Estuary Management. *Bristol University Press, 1979 (296 pp.)*

Generating Board (CEGB) gave it as his opinion that capital costs would have to fall to 30 per cent and 55 per cent, respectively, assuming a five per cent discount rate, to make the proposals economic. "Very large improvements in cost and performance must be sought before such a scheme becomes economic," he said. However, he did not consider how far the rising price of oil and the zooming capital costs of nuclear energy (both of which have risen sharply since 1975 and are likely to rise further) might alter these calculations. And, as I shall show later, there are other factors to consider.

Incidentally, it is envisaged that a four-lane carriageway would run along the top of the barrage, shortening by about 35 miles the route from the west of England to Cardiff and South Wales. Some experts suggest that this new facility would generate so much additional traffic that the energy consumed as fuel would approach or exceed the amount generated by the power plants!

Biological Impact

The secondary effects of a huge barrage are more complex than might be imagined. To start with, there is a 'reflected wave' of water which would otherwise have entered the estuary, which could increase the tidal range outside the barrage by as much as 1.4 m. (4½ feet), possibly causing flooding, and which would be detectable as far away as the coast of Eire.

There are considerable masses of muddy sediment within the estuary which, at present, are stirred up and resuspended by each spring tide. After the installation of a barrage, not only might silting occur, necessitating continuous dredging, but these sediments contain unknown quantities of sewage and rotting material. If resuspension did not occur, it is thought probable that disagreeable smells would be generated within a matter of days, while the effect on the purification of sewage is incalculable. (Research shows that sediment is moving slowly *into* the estuary at present: rivers add only negligible amounts.)

In the estuary, at the moment, the coliform bacteria count is alarmingly high. Few of the beaches used by visitors/and bathers meet the *minimum* EEC standard of not more than 10,000 organisms per 100 millilitres, and none meet the 'preferred standard' of not more than 500 organisms/100 ml.; thus any deterioration in natural processes would be intolerable.

Again, the waters of the Severn estuary contain relatively high concentrations of zinc, cadmium, copper, lead and possibly other metals. A team from Bristol university has measured these levels at several sites and has found (for instance) 200 ppm (parts per million) of lead at Aust and Severn Beach and more than 400 ppm of zinc near Avonmouth. Copper is also detectable at these sites and cadmium has been identified at Aust, Severn Beach and Lavernock Point in Wales. "If larger quantities of these sediments are allowed to settle out within the estuary," says the team, "then there is the potential danger of heavy metals being recycled back into the water column via the various biological, chemical and physical processes which occur within such brackish water systems."

In an attempt to foresee such possible dangers, computer models of tidal flow are being devised, but there is obviously no way of knowing how accurate they will prove to be. In most other parts of the world, barrages are planned for areas of low population; it must be borne in mind that some 5 m. people live within 100 km. of the Severn Barrage scheme. The Inchon project in Korea is the only other one faced with a comparable problem.

Ecological Aspects

At present, the large tidal range means that considerable areas are exposed at low water and covered at high water; obviously this reaches a maximum during spring tides. If a barrage is built, the tidal range inside the barrage will be halved, or so it is thought. Moreover, some 20 sq. km. of salt water may become fresh. Consequently the salt marshes will shrink and salt tolerant species will be replaced, as ecologist John Corlett observed at the symposium. Many algae will dessicate. As there will be less sediment, the phytoplankton will increase. The feeding and roosting areas of waders and wildfowl will be reduced. Furthermore the tides, instead of rising and falling daily will become diurnal, the consequences of which are hard to foresee.

Moreover, the increased tidal range outside the barrage could affect the major colony of wading birds in Bridgewater Bay — This would be especially so if the ambitious barrage scheme were adopted which would bring this bay within the barrage. John Corlett expects that migratory fish and eels will be impeded in their movement upstream, so that fish ladders will have to be provided. (The Severn was so rich in salmon a century ago that servants used to make it a condition of their employment that they should not be given salmon more than four times a week.) Tom Shaw, however, claims that fish ladders will not be needed, as fish can pass unscathed through the slowly rotating turbines.

The most serious threat comes from the periods of 'no tides' during construction and subsequently during periods when the generating plant is being inspected or repaired. Birds and fish would die on a scale impossible to predict but dependent on the duration of the shutdown.

There remains for consideration the effects on the human community; of which the most obvious is the effect on fishing and the obstruction to the passage of ships of various kinds — from oil tankers to pleasure vessels — bound for Bristol, Avonmouth, Penarth, Cardiff, Newport and elsewhere. Presumably extensive lock systems would have to be provided, but the matter seems to have received minimal attention. As Messrs. Hoare and Haggett of Bristol University's Geography Department commented, such a scheme "must perforce have an immediate and generally disruptive effect on the locality." Disruption will be worse during the fifteen or twenty years of the construction period.

Schemes of this kind are not lightly abandoned; once started, the decision becomes vitually irreversible. And they are designed to last for thirty years or more. What happens after that? Sadly, in calculating their desirability "the interests of future generations are either ignored or given very little weight."

Controversy

It is difficult to avoid sympathising with the C.E.G.B.'s F.P. Jenkins when he says that tidal power does not have the attractions of solar energy or wave power. The report prepared by Harwell's Freddy Clarke the DoE's chief scientist, for Walter Marshall, *Energy R & D in the U.K.* (1976) and sponsored by ACORD, the Advisory Council on Research and Development for Fuel and Power, was even more outspoken: "Tidal power does not seem economically attractive, despite the fact that the U.K. has one of the world's most favourable sites ..." A full feasibility study, it concluded, would cost £500,000 and would not be worth it.

But the figures on which these conclusions are based are challenged by the pro-tidal energy lobby which says that for a cost of only £1.1 billion a 4,500 MW generating plant could be installed which would generate 12,000 GWh per year and save five million tons of coal. This calculation appears in a memorandum submitted by Engineering and Power Development Consultants, Ltd. Prof. E.M. Wilson of Salford University, who is a consultant to EPD Ltd., calculates that tidal power is in principle thirty times as efficient as the wave power which official opinion favours, and criticises the ACORD report. "It is unlikely that more than about one eighth of wave energy available will ever find itself transformed to electricity ... Tidal schemes on the other hand are land-based, static, shielded from the worst weather, use proved technology, and have a power output density per metre of generating length about thirty times those of wave absorbing devices." (Electrical *Review 199*(6):16)

In 1977 the Department of Energy backtracked a little, in a report published by HMSO, saying that perhaps a Severn Barrage was feasible after all.

Other Approaches

It may be that the large scale approach is the wrong one. Two consulting engineers, Bill Bull and Tom Rogers, have sketched a 20 MW scheme for Little Loch Broom, on the north-west coast of Scotland, involving a barrage only 1100 metres long and incorporating two 15 MW generators, which could supply the surrounding region. They throw in the suggestion that this could also serve as a New Energy Research Centre for investigating wind, wave, solar and other power possibilities. There are of course countless sites throughout the world where small-scale projects of this kind would be feasible.

A second possibility is the abandonment of turbines and the substitution of the so-called 'river mill', which may be thought of as a windmill situated under water. Unlike a turbine, the mill turns very slowly — the main technical problems arise from the need to gear up the movement to a speed suitable for an electric generator. Peter Musgrove of Reading University, who has tested models in the Thames, reckons that for an expenditure of £5 m. 10 MW can be generated in a four-knot current. However, such river mills need not be confined to rivers but can be placed wherever there is a 'race' or steady one-way flow, e.g. in the Pentland Firth, where 6.1 GW are available, between the Mull of Kintyre and Torr, in the Irish Sea, where 3.6 GW are available, or between the Isle of Wight and Cherbourg, where 3.3 GW are available — to name but three places. If only ten per cent of this energy were harnessed, it would supply (Musgrove claims) six per cent of the UK's electricity needs.

In the U.S. the National Oceanic and Atmospheric Administration has considered placing river mills in the Gulf Stream, between Bimini and Florida, moored at a depth of 30 to 120 m. It reckons that such mills could extract four per cent of the 25 GW available in the top 100 metres of the stream: that is, a handsome 250 MW, equivalent to more than a hundred conventional stations of average size.

A third possibility is to place turbines on the ocean floor. Reg Hawes, of Energy Systems Ltd., has designed 'energy conversion blocks' measuring 15 m. by 15 m. and containing a 9-metre rotor — but these remain, as far as I know, untried.

Meanwhile the practicability of large barrage schemes has been thrown in grave doubt by the news that the French system on the river Rance, the only source of practical experience, is showing premature wear. Installed in 1966, it was expected to last for thirty years but now a life of fifteen years is being contemplated and French plans for a much bigger scheme have been suspended. The Rance scheme, in any case, cost three times as much to build as a conventional system generating the same power.

In sum, it seems fair to conclude that the British government, instead of pinning its faith on these vast schemes (so attractive to heavy industry) should put very much more effort into supporting smaller, more flexible conceptions, which are also ecologically kinder, and avoid the risk of another Concorde-type disaster.

Birthday Message

The July/August edition of 'The Ecologist' will be a special tenth anniversary issue. We would be most grateful if those of our readers who have derived something of value from our work over the years would write to us, telling us what they think we have achieved or where we have failed.

Victims of Ecological Ruin

Barnaby's Picture Library

Ecological damage in a region is inevitably followed by increased distress for the people living in this region, as history has time and again shown. This report profiles the sad plights of villagers living in the hills of Uttar Pradesh, India.

In the Punsora village near Tehri in India, seven women set out of their homes to collect fuel and fodder from a distant forest. Oblivious of the early morning sun that was rising in the distant horizon and making the dew drops glisten like so many pearls these women walked on in grim silence.

Instead of heading for the forest where they generally went they took the path leading to the nearest peak. After reaching their destination, they took a long look at the river flowing peacefully in the valley below, said their prayers, and then jumped together into the river.

Several other cases of hill women committing suicide when they cannot bear the back-bearing labour to which they are exposed every day of their miserable lives have also occurred in the Uttar Khand region (the hills of Uttar Pradesh, in Western Himalayas). The recession of forests resulting in shortages of such basic needs of their life as fuel, fodder and water is directly responsible for the increasing problem of the hill women.

Due to the depletion of broad-leafed species of trees such as the oak which conserve rain water and then release it gradually throughout the year in the form of natural springs, natural sources of water which had served the villagers for so many years now do not exist or have thinned considerably. Drinking water schemes costing *lakhs of rupees* have come to nought as the very source from which water was to be taken have dried up. In several villages during summer months the women cannot sleep restfully at night due to their anxiety to reach the springs early enough to collect the few drops that trickle in. As forests have receded, village women also have to trudge long distances, sometimes as much as 10 miles or more on difficult hill terrain for getting their essential supplies of fuel and fodder. In the salt region of Almora district the distance which has to be traversed is so great that these women have to spend their night in the open on their way back to their houses after collecting fuel and fodder. For most other women, fodder and fuel gathering has become a full day's job, in addition to their onerous duties at home and in the fields; on the days they go out for fuel and fodder, they have to leave their home early in the morning and return in the evening, to the joyous cries of their children who have waited long hours for mother to return.

However, not on all occasions is the homecoming so joyous. When there is no one else in the family to look after the children while the mother is away, for the sake of their safety she has to lock them into a room or even tie them to a cot. If the small child dirties himself there is no one to wash him and he can only wait until his mother returns.

Travelling in these hill regions one can see the village women panting as they climb steep slopes, their shoulders bent with the weight on their heads, their legs tottering beneath them on the long trek to the forests which is a daily drudgery for them for the greater part of the year. Sometimes I have seen them precariously perched on such steep slopes that I have wondered how they could get there in the first place, how they are managing to cut grass there without slipping and how they will finally emerge out of the dangerously sloping grassland with the heavy loads on their heads. Occasionally these women slip and fall tumbling into the valley below and on such occasions it is very rare that they survive.

It is said that about a hundred years ago animal husbandry used to be the mainstay of the people of this region, but thanks to the extreme shortage of fodder now some families cannot even keep a single bullock and occasionally men and women can be seen ploughing the parched fields on their own. The milk yield of malnourished cows and buffalos has gone down drastically, and it is common to find skimmed milk powder being used in those village houses which can afford it.

The shortage of fodder has been caused not only by deforestation as such, but also by the steady replacement of the broad-leafed species of trees such as the oak which provide fodder by coniferous species of trees such as the pine whose needle-like leaves cannot be eaten by cattle. Further, the acidic properties of these leaves reduce the fertility of agricultural fields.

With the loss of forest cover the surface run-off of water has rapidly ripped off the fertile top layers of soil. "Peeled off the skin of mother earth", said a farmer of Rampur village in the Hemvalghati region. "At places where my plough just felt the stones hidden beneath the soil during my young days, now boulders stand upright," said 64-year old Jagat Singh Kaki of Syakri village in Pithoragrarh district.

Understandably, the fertility of land, where it can still be cultivated, has declined greatly with the use of chemical fertilizers offering only a temporary reprieve, that too, only for the better-off cultivators. Gopāl Singh of Birchula village in the Nainital district lamented, "when I first brought this land under cultivation about twenty years back, the

potatoes I harvested were huge and healthy, a single potato weighing as much as 450 grams; now all that I get are these tiny, scorny looking potatoes."

Thanks to the reduced potential of traditional occupations like animal husbandry and agriculture and shortages of such essentials of life as water and firewood, there has been a heavy drain of able-bodied young men, mostly to menial jobs in cities and also in the army. It is on remittances sent by these migrants that their families here largely depend for their livelihood resulting in the creation of a money-order economy. This has also meant that family life in these hill villages has been disrupted, the father having migrated to earn a livelihood, the mother engaged in back-breaking labour from dawn to dusk to cultivate fields and obtain daily necessities like fuel, fodder and water, the children getting neglected.

Recently three women of Jakh village in the Jakholi Block of Tehri Garhwal whose husbands had migrated to Bombay several years back got together and committed suicide.

All these factors have combined to make life in hill villages a constant struggle for sheer subsistence and clearly the most burden has fallen on the women. But even this subsistance — in fact the very survival of more and more hill villages — is threatened by the increasing fury of landslides and floods which have been causing untold destruction in recent years.

Moreover the floods in the hills are quite different from the floods in the plains. In the plains flood-waters generally recede after a few days or weeks at the most, but in the hills flash floods wash away elaborately terraced fields, the product of several generations of hard labour, in one go, and this damage cannot be replaced. With the spread of horticulture, orchards have been planted at more and more places requiring long-term investment. But if these are destroyed by landslides or floods before they start yielding fruits, the borrower is left saddled with long-term indebtedness. Due to climatic reasons most homes here are built of better material and with higher investment than in the plains and it may take years to build another home. As 35-year old Bhavan Singh of Simar Village said after the 1978 Kosi floods in Almora district, "The river has taken away all that I had."

Bharat Dogra

Help for Remote Rural Areas — Dartington's New Trust in Devon

Dartmoor to the south, Exmoor to the east, a wild Atlantic coast, marvellous beaches, tourist towns such as Bideford and Ilfracombe, tiny remote villages in the almost empty hinterland — and the nearest motorway 40 miles distant. North Devon is a wonderful part of Britain for a holiday. But the tourist season only runs from June to mid-September and even then leaves much of the area relatively untouched. How does the economy of a rural region face up in 1980 — and is there any way in which it can be given a boost? These were some of the questions which led to the founding of the Dartington North Devon Trust earlier this year.

Dartington

The name of Dartington will be familiar to anyone interested in rural development. In the 1920's under the guiding genius of Leonard and Dorothy Elmhirst a start was made, in the village of Dartington, in South Devon, on experiments to prevent villages from declining with the drift of people towards cities and their suburbs, and with the drop in numbers of jobs available in the countryside. In the previous three quarters of a century many Devon villages had lost nearly half their population, and along with this, of course, much of the social fabric of the village.

The Elmhirsts set about creating whole new industries; over the years there sprung up a building contractor, a textile mill, sawmills, cider-making, printing, a joinery and agricultural scientific laboratories, alongside experimental farming and forestry. The emphasis was largely on experiment with new ideas and new techniques, and as is common with experiments, not all were successful. Dartington's activities were not restricted to industry — the Hall and its surrounding area were developed as a centre for the arts and further education; an experimental school was founded; housing associations were developed and so on.

In the 1960s the attention of the Dartington Hall Trustees turned increasingly to North Devon. Could the same devotion to the cause of rural revival that characterised Dartington have any impact on an area 1000 square miles in extent where rural decline had, arguably, progressed further?

Two steps of great importance were taken in 1966. First, a glassworks — Dartington Glass Ltd — was established in the small town of Great Torrington. Glassmaking is a labour-intensive activity and therefore attractive in an area short of employment. But North Devon had no glassmaking traditions, so a nucleus of Swedish glassblowers was brought in to give the factory its initial impetus. Dartington Glass now employs over 200, still including some of the original Swedes.

The second 1966 venture was the founding of the Beaford Centre. A large house in Beaford, a village geographically right in the middle of North Devon, was converted into an arts centre, providing a mixture of residential courses, for children and adults, and professional events (including theatre).

The Trust

In time, Dartington's North Devon interests and connections grew, until about a year ago the trustees decided the time had come when a separate trust for North Devon was needed, to take initiatives of its own and maybe

in time to acquire a degree of financial as well as administrative autonomy. As a result I found myself, after a hotch potch of a career comprising oceanography, seismology, arms control and science journalism, director of the new Dartington North Devon Trust with a secretary, an office in Barnstaple and Lord (Michael) Young as chairman.

The groundrules were unrestrictive, to say the least. The trust could do anything which would stimulate the growth of existing, or the starting of new activities in North Devon. Such activities could comprise small business and industry, housing, leisure or the arts. The emphasis would be on the rural areas — the half a dozen or so small towns would have less of our attention than the broad belt between Dartmoor and these towns, occupied mainly by very small villages that barely survive. The trust was not meant to be richly endowed and able to dispense large sums by way of grants. Rather, what little money it had at its disposal would support research into the area's needs, ventures aimed at putting people together, visits from outsiders with some special skill to offer and so on. In short, and to use a rather overworked word, the trust would largely fulfil a catalytic role.

Catalysis is all very fine, but people trying to start businesses or expand them need more than just other people to talk to and new sources of information; they need money. Thus it was particularly fortunate that at the time the trust was being established plans were also well advanced for Dartington to start a new banking institution — Dartington & Co. Ltd. This was planned as a new regional bank for the South-West as a whole, providing venture capital, loans, corporate financial advice, deposit facilities, pension fund management and other services that one normally had to go to merchant banks in the City of London for. Dartington & Co. Ltd. is meant to have its feet planted firmly in the South-West and re-cycle money within the region. One of its three branches is at Barnstaple, alongside the trust's office, so although the bank and the trust are formally separate institutions, there is a measure of sharing of experience.

Rural Decline

Is rural life in North Devon really in decline? Undoubtedly the simplest measure of decline is population. In big and growing communities, facilities expand; in small and shrinking communities they contract. But the contraction is generally rapid once it has been set in motion. Post office, petrol pump, primary school, public transport, even parish church and pub — each offering a little employment — can all go in quick succession. And then village life depends entirely on access to a car and ability to pay for the petrol. A few large villages in North Devon have as yet no concern on this score. In fact (as a recent survey on Hatherleigh showed) a century of population decline may have been reversed. But more are near to the critical point and many have passed it. Villages do not necessarily disintegrate entirely in the process. There are many local people who survive doggedly with a lot of mutual help over such things as shopping. And there are a growing number of people wanting to move to North Devon either for retirement or to lead a changed life style. Much of this is fine, but it does suggest that in a generation or two the stable tradition of centuries will be no more, and that the North Devon village will have lost what, for want of a better word I call its mutuality — its undefinable blend of interlocking skills and interests that allows it to survive. North Devon will not be the only area where this happens, but it will be at the forefront.

It may be reasonably asked how farming fits into this scheme. Perhaps the most important observation is that most farms are relatively small — the topography does not encourage large fields or superfarms. Some farmers make a handsome living and even offer employment — but a much greater number farm only what they can manage themselves and for some, farming can only be a part-time activity. Agriculture (and forestry) has just about reached rock-bottom as a source of employment and as yet shows no signs of change in the future.

Not surprisingly rural decline gets first to young people. For education beyond 16, they will have to travel great distances every day; for higher education they will have to leave the area altogether — and find few job opportunities to attract them back whence they came. Further, those who leave school at 16 to work may have to travel equally great distances to find a job, and may have little choice of work. Small wonder then that so many of those North Devonians with the initiative and drive that the area needs are now widely dispersed around Britain.

Action

What can a small trust do? The task, after all, is mammoth and there are much better financed central and local government agencies already at work in some areas. We have only been going three months, so any answer I give is bound to be a preliminary one; the question is really, what ought a small trust to do?

- —First it ought to take advantage of its smallness. A very small organisation without the burden of handling grant applications or the duty to be evenhanded to all constituencies ought to be able to move smartly in less conventional directions.
- —Second, it ought to be free to move much more easily across the sectoral boundaries: Agriculture/ Environment/ Transport/ Industry/ Education and so on. These divisions which those in central and local government must respect do not necessarily reflect individual problems on the ground.
- —Third, experiment ought to be central to the trust's thinking. The trust ought to be one means by which new ideas both from within the area and outside are tried — with a full understanding that there will be failures.
- —Fourth, it ought to try and understand the true needs of local people, not just what bureaucrats, sociologists or politicians believe their needs to be. This can only be done by continuous discussions in the villages themselves, and by asking North Devonians to serve as trustees.

What, in practice, are we doing in North Devon? I list a handful of projects which are in the pipeline at present; I hasten to add, lest anyone believe I could have launched all these in three months, that planning was well advanced on many of these before I arrived.

■ One of the biggest problems for the man or woman trying to set up in business in a rural area is finding suitable premises. Many businesses start in garages, then get too big, or the neighbours complain. Yet the next step up, light industrial premises of 750 - 2000 square feet may simply be unavailable. In collaboration with the Development Commission and the local district council, the trust is putting up a set of six workshops in the fairly remote village of Bradworthy. Housing for any workers who have to move is also being built. We hope that those who occupy the premises will be of a

pretty co-operative frame of mind (indeed we will particularly welcome co-operatives), as we shall provide a small central office for shared secretarial and accounting facilities.

This collaboration between a private trust and public bodies, if it works well, could be reproduced elsewhere. It represents the sort of venture which a commercial property developer, seeking a profit, could not consider.

■ A large and growing fraction of even the simpler implements used on farms is imported, with consequent loss of manufacturing business to small agricultural engineers. Is there any way we can contain or even reverse this trend? The trust has just begun a research project in which Dr. Peter Payne, a distinguished agricultural engineer, is devoting six months to finding what sort of intermediary services engineers need. The manufacturing skills are there all right, but maybe the small business with its limited contacts needs marketing help, or access to inventors and designers. We hope that as Dr. Payne's research proceeds we shall see our way to starting the right supportive organisation.

■ Many of the difficulties of rural areas stem from inadequate or non-existent public transport. In the past few years a wide variety of experiments have been conducted around Britain — post buses, shared cars, community minibuses and so on. The results of these are now largely in. But in the long run a rural transport scheme cannot be imposed and run from outside — it must stem from local initiative and management. The trust is hoping to be able to assist the development of such schemes, by encouraging villages to come together and select the most suitable features from experiments all over the country.

■ From rural areas, central government in London can seem remote and mysterious, and the EEC in Brussels almost totally incomprehensible. And yet the EEC is one organisation that rural areas certainly ought to understand, as it is a potential ally on financial matters. To attempt some demystification, the trust is setting up a small EEC information service. This will be a modest affair, possibly run by recently retired people who have moved to the area after executive experience in business, commerce and government. The retired are often a marvellous untapped resource in rural areas, and we hope to find other ways to put their lifetimes of skills to work.

There is much besides — organising concerts, bringing speakers to the area, experimenting with farm food cooperatives, fish farming, looking at community service opportunities in rural areas and so on. But maybe this gives an impression of what the trust is trying to do. There is immense scope, and the people of North Devon have been very supportive. Now the responsibility is on us to convert ideas, hopes and plans into reality.

David Davies

After Bushell what?

The decision of the House of Lords in the M42/M40 case (Bushell v. Secretary of State for the Environment) is at first sight a thoroughly negative and retrogressive statement on public inquiries. The House of Lords held that 'policy' could not be discussed, and that 'policy' included not only the need for a motorway but also the forecasting methods adopted by the Department in order to assess need. Only Lord Gilmuir Davies, arguing with Lord Denning and L. J. Shaw in the Court of Appeal, took a different view. Thus the majority in the House of Lords has effectively limited the public inquiry into a motorway, to a discussion of the choice of route. The decision will clearly apply to other inquiries where need is the real issue such as those into test borehole applications for the disposal of nuclear waste.

In the leading judgement, Lord Diplock says that constitutional fictions (about the relationship between the Minister and his civil servants) must not conceal the practical realities as to the way administrative decisions are reached. Unfortunately he does not apply this practical approach when he comes to assess the role of Parliament, indeed, he appears to subscribe to that common fiction that Parliament determines policy and the house is the place for it to be discussed. Those interested in the realities of the constitution know that policy decisions are never really debated in Parliament — the decisions are taken in political caucus and passed through Parliament by virtue of the party whip or the threat of it. Parliament is not the place where policy is formed, let alone discussed (years went by without any debate at all on motorways).

What is to be hoped is that the Bushell decision will now focus attention on the need to develop institutions where real debate on policy matters in various fields of national life can take place. The attempt to use the public local inquiry for that purpose was always 'faute de mieux'. Now there must be properly organised 'project inquiries' into schemes of national importance such as motorways, nuclear projects, a Third London Airport, a Channel Tunnel etc. It is vital that a project inquiry should be held early enough in the development of policy for real participation in policy formulation to take place. It is too late to wait until an application for planning permission has been made. Also such a project inquiry should have the widest terms of reference. The framework of town and country planning is too narrow.

A procedure for project inquiries of this kind has been worked out in a study, *The Big Public Inquiry*, recently published jointly by the Outer Circle Policy Unit, the Council for Science and Society, and Justice. In essence this calls for a two stage process — the first stage fact-finding and investigatory and the second debating and adversary. Only when full information has been obtained and disclosed to all participants would the adversary stage begin. This would avoid the 'Windscale' situation where basic information about the project emerged in dribs and drabs as the inquiry went on.

One thing is surely clear. It is not possible to give everyone education up to secondary level for several generations and then deny them the right to participate in the decisions which affect their lives. Voting every four or five years may have been enough in the eighteenth century when Parliament developed as an institution, but it is not enough today. The constitution has to grow, and new institutions for participation in policy making have to be invented and brought into action.

David Widdicombe, Q.C.

(David Widdicombe, Q.C., very ably represented The Windscale Appeal at the Windscale Inquiry)

Goldfish Bowl or Murky Pond?

A farming friend of mine once got a nice letter from the Department of the Environment, asking whether they might bore some holes in his land to find out what the subsoil was like. He wasn't obliged to agree, but as a friendly chap and a good citizen he did, provided the Department made good any damage. When he came back from his next holiday, he heard that the drilling rig had been and gone, but that it had just followed a single strip diagonally across his fields. Intrigued, he wrote to the Department asking whether by any chance they were planning a motorway in that region. "We can't tell you," they said. "That would be an Official Secret." So he asked for a map of the boreholes, and what they had found out about the subsoil. It was, after all, *his* subsoil, and not only had he given permission for the research, but he had part-paid for it out of his taxes. "Sorry", said the Department. "Those are Official Secrets too." It was another two years before the motorway was announced, and four more before it was built — diagonally across the farm.

That tale illustrates one end of the spectrum of official attitudes to 'open government'. The other end can be found in Sweden, where the Press has a free run of almost all government documents: they sit in on the opening of the Prime Minister's official mail every morning, and see it even before he does. Everyone's tax assessments are officially published — if you want to know how much your neighbour earned last year, you pop across to the public library and look it up.

Which is the better system — the Swedish goldfish bowl, or our own murky pond? I can't honestly say I'm too happy with either of them. If I lived in Sweden, I would feel uncomfortably transparent. I would have to register my address with the appropriate authorities, and notify them every time I moved. Worse still, I would be allotted a Universal Personal Identification Number. (Last time I was there, they kindly offered me one as a souvenir of my trip, but I politely declined.) All records about me — at my doctor's, my bank, my employers, my credit card company, my tax inspector, my insurance company, my post office, my local authority, my church, and dozens of other places — would be filed under that one number.

On the other hand, in Great Britain

we seem to make a fetish of chesting our cards (though not, perhaps, as much as the French). Some things, of course, must be kept secret — even in Sweden, there are exceptions for national defence, law enforcement, medical records and the like. But we go to the other extreme: even though our Official Secrets Act is so sweeping that it's now virtually unusable in the criminal courts (because juries just take the bit between their teeth and acquit, unless the case is one of true espionage), it still serves to make most Government operations pretty opaque.

Sooner or later, we shall have to do something about our information laws. Currently, they are in a right mess. Official committees have recommended reforms of our tangled laws of libel, contempt of court, copyright, privacy, official secrets and data protection — but so far no one has got round to doing anything about them. The main reason, of course, is that there are many conflicting interests to be balanced in all those fields. (For instance, if I tell my doctor something about my health I don't want him spreading it to all and sundry. And yet, if he discovered that one of his patients was the Yorkshire Ripper, I can't help hoping he'd tip off the police...)

But just because the subject is difficult, that is no reason for not even trying to tackle it. Let me suggest at least some basic principles for making a start.

So long as we have a complex society like ours, all sorts of organisations have to be administered, both in the public and the private sector — companies; trade unions; nationalised industries; and governmental entities of all kinds, central, regional and local. In the nature of things, the people who manage these organisations will exercise power over other people.

To do that fairly and efficiently, they need *some* information about the doings of the people they 'govern'. But, to make sure that the administration *is* fair and efficient, the governed also need some information about their governors, and what *they* are doing.

Starting from there, what we should now try and do is to reorganise our information laws in such a way that those who govern us should know enough about us (but no more) to be able to do it properly, and that we in our turn should know enough about them (and no more) to be able to check that they *are* doing it properly.

Paul Sieghart

(Paul Sieghart is Chairman of the Executive Committee of JUSTICE, the British branch of the International Association of Jurists.)

After Doomsday: A Modest Proposal

Any realistic consideration of the future of Northern 'civilisation' — that is to say, the 'capitalist' and 'socialist' societies of the developed world — must face the probability that it hasn't one, and that we face a more or less total collapse within 15 to 20 years.

Even if the professional futurologists, with their inadequate premises and techniques for forecasting and their obstinate projection of already dying trends (continued economic growth, rising living standards etc) go on predicting the indefinite maintenance of the nuclear balance, the real odds are that that particular tightrope will snap, whether by the design of lunatic politicians (of whom there is no dearth in the contemporary world), or by mistake.

But even in the unlikely event that a nuclear holocaust is somehow avoided, there is still the probability that the 'developed' North will anyway be overwhelmed by one of the other Six Enemies: (Ronald Higgins: *The Seventh Enemy,* Pan Books 1980) population explosion, food crisis, resource shortage, environmental degradation or galloping technology — and will collapse into savagery or extinction.

Probably, the 'free' institutions which still survive in the few remaining so-called Democracies will collapse first, killed by the mechanisation, centralism, anachronism and unreality and by the dishonesty of contemporary politics — or, to put it bluntly, of most contemporary politicians the majority of whom appear to be living in the 1930s, fighting the pre-war economic battles of the Great Depression, while telling their electors a pack of lies about more wealth and less work, and pooh-poohing the nuclear threat.

So let us assume that Doomsday is due, say, in 1995. What should and can the individual do meanwhile?

That question can be answered at several levels starting with personal and religious behaviour and action, and going on through direct collective action (rejection of the consumer society, of built-in obsolescence, of ever newer and more wasteful luxuries, comforts and entertainments) to political activity and the promotion of Alternative Politics...which includes alternative parties and alternative politicians.

But there is also one specific and practical move which is implied by the near certainty of a holocaust: the creation, on whatever part of the Globe stands the best chance, in the opinion of the appropriate experts, of remaining viable, or at least capable of protecting some representative records and objects from what is worth preserving of our civilisation: ranging from some of the work of, say, Plato and Michaelangelo to the wheel and, perhaps, the microchip.

A survival unit in Tasmania. A mad project? In the mad world in which we live, perhaps not so mad as all that.

It would have an intrinsic value as a Civilisation Bank for (neo-neolithic?) survivors (or visitors from space) who might find it; and a propaganda value meanwhile in alerting contemporary public opinion to the likelihood — if we go on as we are — of our own obliteration.

Francis Noel-Baker

At 11am on Saturday 24th May at Saint Martin's-in-the-Fields, London, a one day conference will discuss these matters.

Good, Clean Dirt

Colin Tudge asks what do health food diets have in common with diets of primitive people who have avoided nutritional diseases such as colonic cancer, heart disease and diabetes. From various observations, he suggests the answer may be bacteria, "the thing that links the diets of healthy people is not just fat or fibre or any other nutritional component but dirt".

Ken Heaton at Bristol University has information on the extent of which bile salts are broken down by bacteria in the colon. The composition of the body's next consignment of bile is influenced by fibre, which in turn presumably influences the bacteria which is directly related to the aetiology of gallstones, which form in the bile in the gall bladder. Denis Burkitt links gut flora (influenced by fibre) and colonic cancer. On the same note, John Cummings of Cambridge shows that most dietary fibre is "broken down by colonic bacteria and that the breakdown products of those bacteria include volatile fatty acids which may be absorbed from the colon and theoretically could be used as a source of energy".

"The small intestine also contain bacteria which produce vitamin B12. Vegetarian Indians develop vitamin B12 deficiencies when they leave their country and follow the same diet in 'hygienic' Britain. Fibre and bacteria that go with it, are part of the normal gut environment which we have evolved with living in a state of nature where 'dirt' is unavoidable. This is vastly reduced by hygienic conditions, refined and cellophaned foods fit for human consumption."

New Scientist, April 3rd 1980

A Sioux on Food

"The food you eat, you treat it like your bodies, take out all the nature part, the taste, the smell, the roughness, then put the artificial flavour in. Raw liver, raw kidney — thats what we old-fashioned full-bloods like to get our teeth into... those buffalo guts, full of half-fermented, half-digested grass and herbs, you didn't need any pills and vitamins when you swallowed those. Use the bitterness of gall for flavouring, not refined salt or sugar. Wasna — meat, kidneyfat and berries all pounded together — a lump of that sweet wasna kept a man going for a whole day. That was food, that had the power. Not the stuff you give us today; powdered milk, dehydrated eggs, pasteurized butter, chickens that are all drumsticks or all breasts; there's no bird left there... it all comes in a neat plastic bag, all cut up, ready to eat, with no taste and no guilt."

Lame Deer, Sioux Medicine Man

Energy Log

Energy consumption in the UK fell by 4.9 per cent according to the latest 'Energy Trends', the monthly statistical bulletin. Due to the mild winter December-February 1980, Britain's oil consumption fell 12.7 per cent. Petrol deliveries were up 6.2 per cent suggesting that the recent price rises have done little to force conservation on the motorist. Coal production of 35.1 million tonnes of the first three months of 1980 was 8.6 per cent higher than at the same time last year, yet coal consumption fell 2.9 per cent to 35.6 million tonnes.

Financial Times May 2nd 1980

Britain's Ecophobia

Another aspect of Britain's reticence to face the music....
European countries are expected to make investments totalling £32,000 million in the next decade in energy conservation. In addition, £20,000 million is planned for alternative energy sources, £23,000 million for non-nuclear generating technology and £68,000 million for improving the production market infrastructure of coal, oil and gas.

Britain is going in exactly the opposite direction; the UK expenditure on energy conservation is falling behind other countries of the European Community. Led by the National Consumer Council, ten consumer and environmental organisations attacked the Government's conservation policies in a letter to the House of Commons Select Committee on Energy pointing out (i) plans for energy saving advice centres have been scrapped, (ii) £25 million grant scheme to assist in insulation, and developing heat and power plants is not to be renewed this month, (iii) home insulation scheme has had its budget halved, (iv) no more funds will be available for the scheme whereby young people are employed to help the elderly insulate their homes.

ENDS Report 48, April 1980

Feeling the Pinch of Cobalt

Growing instability in mineral-rich countries will inevitably create OPEC-style embargoes, a powerful political weapon. Harry Gray, chairman of the United Technologies Corporation, which includes a jet engine company, has been hit by these implications. He writes in his company journal of the imminence of a 'materials OPEC particularly of chromium and cobalt which directly effects the aerospace industry. "We have been left at the mercy of foreign governments for our oil supplies... without a national minerals policy now, we will become increasingly vulnerable in this critical area too."

US sanctions against Zimbabwe-Rhodesia which have now been lifted, illustrated the fragility of chromium supplies, whilst the source of cobalt lies in unstable Zaire. The only alternative, if it can be called one is in Cuba and Russia. The company is desperately trying to reduce its dependence on overseas exports by developing cobalt-free nickel base alloy to reduce usuage of cobalt by 65,000 pounds every year.

Times, May 6th 1980

Arsenic for Africa

With new EPA regulations governing the disposal of toxic waste, industry is finding it difficult to dump their hazardous wastes. Exporting problems have been a speciality of the developed nations for decades. One recycling company which has had troubles at home, the Nedlog Technology Group, has made a generous offer, to the tune of $25 million, to President Stevens of Sierra Leone for permission to build their 'recycling' plant in his country. Sludge containing copper, zinc and cadmium plus arsenic and other toxic substances, would be shipped to Sierra Leone from America, the valuable elements extracted, and the remainder abandoned for the

officials in Sierra Leone to squabble over. Despite the generous offer, President Stevens has not been hoodwinked and has turned Nedlogs down. The US State Department admits its a dirty trick but there are no regulations to prevent such activities.

Elsewhere, private American companies are on the lookout to dump their wastes in West Africa, the Caribbean and Latin America, as local US communities refuse to have dumps nearby. Recently, Minnesota had to return $3.5 million it had received from the EPA for new dumps, because it could not find one single site that local people would allow to be used as a hazardous waste dump.

Environment, March 1980

Nuclear Slaughterhouse

We can all heave a tremendous sigh of relief; the chief executive of the National Nuclear Power Corporation has reassured an all-party select committee on energy that the UK's long-delayed and costly advanced gas-cooled reactor nuclear power programme is being turned from a 'shambles' into a reasonable success'. Now that the NPC company is in full control, the technical complexities, varying and opposing designs, awkward safety requirements and costly construction delays we can assume, have all been tidily swept under the carpet.

The Daily Telegraph May 1st 1980

Bellyful

Giving dietary supplements to breastfeeding mothers in Third World countries may unwittingly burden them with yet another mouth to feed.

The Dunn Nutrition Research Foundation studying in Gambia has observed that improving the diet of nursing mothers with high protein groundnut biscuits causes a sharp fall in prolactin levels in their bloodstream (prolactin is a ormone secreted by the pituitary in nursing mothers and drives the body to use more of its available food reserves to make milk). A high level of prolactin is thought to prevent ovulation. Prolactin levels increased amongst the Gambian women when they had little to eat in the rainy season but never effected their milk production.

It is not surprising that the Dunn researchers now claim that their results indicate that human reproduction adapts to the amount of food available; when food is restricted, higher levels of prolactin are produced thus preventing further ovulation and a possible pregnancy whilst ensuring a constant milk supply for the infant.

Thoughtfully, the Research Group suggests that the mothers given a richer diet should also receive contraceptive advice for their fecund vulnerability.

New Scientist, April 24th 1980

Pesticide Pirates

Farmers in the San Joaquin Valley have gone underground to lay their hands on the pesticide DBCP and are willing to pay anything up to $60 a gallon for the prohibited chemical. DBCP has been used for years in the valley to kill tiny soil pests which attack their plants and could be bought on the open market for a modest $8 dollars a gallon. The chemical was banned in 1977 in California and throughout the States in 1978, after it was proved to be a carcinogen. In the hands of racketeers after a quick buck, it has appeared on the black market in a multi-million dollar smuggling operation from Mexico.

Chemical Week, February 6th 1980

Plots of Lead

Allotment sites around London are being abandoned in favour of canned vegetables which might prove to be a blessing in disguise. London soil has become so contaminated with lead, amongst other heavy metals such as cadmium, as to make it unsuitable for allotments. B.E. Davies at the University of Aberystwyth has found high concentrations of lead in central London soil. In analyses of radish crops from the sites, he found levels of lead high enough to pose a health risk. He concludes that soils within a radius of 10km of Marble Arch are likely to be lead contaminated.

New Scientist, March 13th 1980

Lawther on Lead

The twelve man government working party which has submitted the Lawther report to the Department of Health with its conclusion that the use of lead as a petrol-octane booster is not a health risk, has been denounced by groups pressing for lead reduction in petrol. Firstly, the report ignores the expressed conclusion of authorities in the US, West Germany and other countries that lead levels in city children could impair intelligence. Secondly, it states that there are no dangers from lead in exhaust fumes despite the fact that the lead content in British fuel exceeds that in the US, Japan, West Germany and other countries. Even the air tested in Hampstead Heath St. is three times the level considered safe. The Lawther report 'has reservations' about the findings of Boston paediatrician, Herbert Needleman, who published a study confirming that even low levels of lead in city children produce learning and behavioural defects.

Disquieted by the Lawther report, he said that the report "rather compromised my work by selective quotation and ignored some important points" and that his conclusion was watered down.

Inevitably the government will not phase out the use of lead in petrol which will fuel the campaign being fought inside and outside parliament to reduce the lead pollution from cars; Camden Council is preparing to fight a test case, MPs are urging an early debate and FOE are planning street campaigns. Nicholas Albery and Eleanor Budden, whose legal actions against BP and Shell to force a reduction of lead in petrol were recently blocked by the Court of Appeal, hope to resume the costly battle against the giant companies and appeal to the House of Lords.

Sunday Times, May 11th 1980

"The implications of this case for the future would be harmful to all future litigants acting against polluting manufacturers and it would be well to have the position reversed in the House of Lords, but this requires a guarantee of a five-figure sum"

Nicholas Albery, May 16th 1980
Contact *David Pedley (Solicitor)*
Tel. 0535-33719

Response to WEAP Proposal

(see *The Ecologist* Jan/Feb 1980')

Dear Sir,

We would like to take issue with Alan Grainger's claim (The Ecologist, *January 1980, p.13*) *that the rainforest destruction situation in Papua New Guinea, described in our paper in the same issue, is unique in the destruction of rainforest by 'outsiders' against the wishes of local people. On the contrary, as we argued, the New Guinea forestry situation in many ways closely parallels that in Australia and New Zealand, where the basic problem is a social rather than purely ecological one and arises from the control of the forests by forest industries [both foreign and local] and their allies in the forestry profession, resulting in rainforest destruction, overcutting, simplification of forests, and the turning of natural forests to industrial monocultures, and so on. As in New Guinea the destruction of these forests is opposed by many people. Many of them feel very strongly on the issue, as witness the recent disruption of logging operations in rainforest in New Zealand and Northern N.S.W. by demonstrators prepared to risk their lives to stop the logging.*

A basically similar situation to that in Papua New Guinea also holds in other parts of Malesia, in West Irian, in Kalimantan and Sumatra, and in the Solomon Islands. In the Western Solomons rainforest destruction is being carried out by a subsidiary of Unilever, Lever's Pacific Timbers, with the intention as in New Guinea, of replanting some of the area with a monoculture of Eucalyptus deglupta, *and, as in New Guinea, depends upon overriding customary land tenure and the wishes and interests of local people' . In all these cases there is opposition from local people — often strong opposition — to forest destruction, which is largely promoted by and in the interests of small national elites and foreign corporations.*

In the case of Indonesia itself there are also illuminating parallels. The Indonesian government and its apologists are anxious to place the blame for forest destruction on the uncontrolled activities of shifting cultivators and the landless poor. Yet according to Dr. M. Jacobs, the rainforest destruction from this source is still relatively moderate compared to the destruction planned and carried out under licence.[2] This destruction is carried out mainly through logging by foreign corporations such as Weyerhaeuser and Georgia Pacific from the U.S.A. and others from Japan, Korea and Hong Kong, often in 'partnership' with members of the local military and governmental elite.

In such cases governments are indeed anxious to promote forest exploitation, but it would be naive to conclude therefore that such exploitation occurs at the behest of or in the interest of the bulk of the population concerned. 'National development', the needs of the poor and of expanding populations may be given as excuses, but in this area, as elsewhere, the impoverished millions are a useful screen for the grasping thousands.

In those cases where shifting cultivators and the landless poor are a major factor in rainforest destruction, one can often discern in a more advanced form the same social dynamics at work as in the Melanesian case. This familiar social pattern involves the squandering of a country's resources — its best agricultural land as well as its forests — to generate an export income largely to benefit foreign corporations and an associated national urban or governmental elite, thus forcing much of the forest and agricultural population to the cultivation of increasingly marginal lands and the destruction of remaining forest areas. This social pattern[3] cannot be overlooked in assessing the real causes of, and remedies for, the tragedy of world rainforest destruction.

Yours faithfully,
R. and V. Routley,
Research School of Social Sciences,
Australian National University,
Canberra ACT 2600.

1 *See R. Waddell,* The Effect of National Development Plans on the Village. *A Case Study of the Western Solomons, presented at ANZAAS, 1979.*

2 *M. Jacobs, Forests for the people .... Once?* Tigerpaper 5[4] [1978], 25-9.

3 *For details see especially F.M. Lappé and J. Collins,* Food First, *Boston, 1977.*

Dear Sir,

I read the World Ecological Areas Programme with great interest. In response to your request for suggestions, I would like to make one point: Implimentation of all or any part of this proposal at a practical [that is to say in the field] level will ultimately and absolutely depend on brigades or cadres of highly trained, highly dedicated aware men and women working and living in the affected rural areas, and working out of a devotion to and reverence for the life of the earth and the evolution of humanity.

Therefore, I suggest that a two-pronged approach as a first step towards implimentation consist of the establishment of a network of Training Centres to prepare people for work out of common understanding and following a common policy to re-establish the biological and social equilibrium of our plant. It must be clearly stated that there are no short-cuts to development, at least not for human development. Precious time has already been wasted trying to find quick solutions. There aren't any. It will take 10 years to build up an international network of training centres and a corps of trainers and leaders for the work of rural reconstruction. It will take that long to muster the international support and make the necessary governmental policy decisions for the implimentation of your proposals.

The work must be seen from an integrated point of view and must go on at all levels simultaneously. We must find ways to support each other in our work or it will come to nought. You may be assured of my co-operation and support in the furtherance of the proposal.

Yours faithfully,
Mark Feedman,
Director: Rural Development Program,
Forest Row, Sussex.

Dear Sir,

Thank you for your letter of November 20th, enclosing the proposal of the World Ecological Areas Programme.

As you are no doubt aware, this Agency is committed to helping meet basic human needs in the countries to which we provide development assistance, while at the same time designing our programs not only to minimize adverse environmental impacts, but also __ and more important __ to improve environmental conditions whenever possible. Thus we certainly are in sympathy with the general aims of your proposal.

Unfortunately, from our point of view, the approach outlined is not adequately focussed on the human problems and causes of deforestation, and the human consequences. Furthermore, it arrives at a time when AID, along with other concerned U.S. Government agencies, is involved in drafting a U.S. Policy, Strategy, and Program Framework on the World's Tropical Forests. This paper addresses most of the same issues with which you are concerned. Thus, I shall see that a copy of the U.S. policy paper is sent to you as soon as it is released. Perhaps you will find it useful in refining your own proposal.

Thank you for giving me the opportunity of reading your proposal.

Yours faithfully,
John H. Sullivan,
Agency for International Development,
Bureau for Asia,
Washington D.C.

P.S. I am enclosing a commentary prepared by my staff, in the hope that you may find it useful.

Comments on the World Ecological Areas Programme (WEAP) from the United States International Development Agency, Washington D.C.

Section 1. The Situation

The consequences of deforestation listed in the first paragraph are real and important, but they underemphasize the role of people, both as contributors to the deforestation and as sufferers from the consequences. The emphasis on logging — and its revenue — continues in the second paragraph, and yet logging is distinctly not a major cause of forest losses. The need for firewood for cooking fuel — the single greatest energy use in the developing world — and the need to clear new land for agriculture, arising from increasing population pressure and decreasing productivity of old crop lands, coupled with livestock grazing practices, are by far the most important causes of deforestation.

An interagency task force is currently preparing a U.S. Policy, Strategy, and Program Framework on *The World's Tropical Forests.* That draft document states:

> "The principal direct causes of tropical forest loss are clearing for agriculture, fuelwood gathering, and poorly managed industrial logging. But behind these direct causes are more fundamental problems — rapidly increasing population, great inequalities of land tenure, lack of advancement in agricultural technology, and lack of opportunities for employment on proven agricultural land or outside agriculture. With changing world conditions and rapid loss of forests, the relative importance of the causes of deforestation may be changing, but agricultural development is still considered the major immediate cause."

The consequences of tropical deforestation, therefore, are most immediately felt by the poor, mostly landless peasants who, in their search for means to sustain their lives, are contributing to their own long-term problems by the very means they employ.

Section II WEAP

There is an implication in this section that deforestation is the result of policy positions taken by decision makers; this leads to the statement that incentives are needed to encourage reversal of these policies. Our experience indicates that the major causes of deforestation, as outlined above, are really not related to positive decisions, but are the consequence of a way of life and the lack of either knowledge, or more likely financing, to assist people to modify their customs while still improving their immediate living conditions.

Section III The Plan

The comment on incentives leads to some questions about the approach outlined in this section.

1. With the timber industry accounting for only about one-fifth of the wood removed from tropical forests, and — more important — only about 6 per cent of the wood exported, what economic impact would the proposal have?
2. Countries that possess the least reserves of tropical hardwoods are often those in most need of assistance in conserving and enhancing their forest resources. Nepal is a case in point. Under this plan, Nepal would receive smaller loans than other countries in less dire straits, although in the future, some other collateral might be identified. This would not help Nepal solve its immediate problems.
3. Does the plan include a system for computing the bioshperic and social values of forests and other natural resources, to use as a basis for setting a value to the collateral?
4. Would not developing countries regard the requirement that they "lock-up" their natural resources as collateral for loans as an undesirable restriction on their flexibility to make development decisions?
5. How would the plan respond to default on a loan? Taking possession of the collateral would not seem a practical response.

Section IV Components

1. The first item is based on the assumption that timber extraction is a significant factor in tropica deforestation — an assumption that does not seem to be borne out by the data. Nevertheless, improvement in current logging practices — which at present yield only about 10 per cent of the extracted volume in final wood products — would help.
2. The second item raises the very good point of value added to the wood exported. However, the energy costs of wood processing plants becomes a serious issue in developing countries, particularly since they are having growing difficulty in purchasing the oil needed to run existing industry. Japan, for example, is importing more processed wood to save the energy cost of processing. This sounds like a "Catch-22" situation, and indeed it is. It is nonetheless real.
   The idea of there being an interest on the part of the LDCs in achieving a "given export income" that, once achieved, will meet their needs and thereby eliminate or reduce the urge to export more, does not seem realistic.
3. It is not clear that increasing the rate of afforestation in temperate-zone industrialized countries would have a significant impact on the rate of tropical deforestation. Tropical hardwoods cannot be grown in temperate zones, nor can the temperate-zone hardwoods necessarily substitute for the tropical hardwoods in industrial uses.
4. This final item discusses the most serious cause of tropical deforestation, albeit in terms of "destruction caused by encroaching cultivators". This approach loses sight of the fact that the "encroaching cultivators" are poor, landless people who are trying to grow food to feed their families. They are seeking to meet immediate survival needs, and until and unless their needs can be met in more ecologically "suitable" ways, no plans, projects, programs, or other efforts will have any effect on the "encroachment."

This section begins to address these issues and the proposal would be strengthened considerably if it were moved forward to the beginning, amplified, and made the centerpiece.

Dear Sir,

I wish to send you the enclosed article [see box], mainly in response to the Jan/Feb. issue of The Ecologist, *particularly to the W.E.A.P. proposal to save the world's tropical rainforests.*

I was involved in this type of work on the Finca Sonador during the months of July to November 1979, that is from the beginning of the project, following the arrival of Ernst Götsch.

I only recently returned to this country. As a response to The Ecologists *excellent issue on how to save the tropical rainforests, this letter may be a little late. For this I apologise.*

Yours faithfully,
Brigit Wright,
Leicester.

Dear Sir,

I have read with great interest the Proposal as contained in your periodical The Ecologist, *nos. 1/2 of Jan-Feb-1980. I think it has been made quite clear, as it also follows from the contents of the periodical's subsequent article on "The Sate of the World's Tropical Forests" by Alan Grainger, that no scheme for nature and environmental conservation is going to be successful in economically depressed and populated tropical areas, as long as the [financial] circumstances of life are not significantly improved for the rural poor. I personally believe, the necessary added cash circulation in relatively shorter term of the current decade, or two decades, will have to come from smaller scale industrialization in rural areas rather than from agricultural development [which will also be necessary, just to keep the population fed].*

Therefore the basic incentive in the plan of the proposal: "Within the framework of a [wider development] project, the forest could provide collateral for loans to be advanced by international agencies involved in development ...." could possibly become a breakthrough from the vicious circle which has operated the [rural] development over past decades in many places. This basic incentive certainly deserves most serious consideration and enthusiastic support for vigorous but careful *exploration of practical possibilities for soonest possible implementation.*

As this proposal might be discussed at the UNEP Tropical Deforestation Meeting, Gabon, I am hopefully awaiting further developments for positive action. I would very much appreciate being kept informed by WEAP Secretariat of progress on the proposals and express my willingness to further contribute, if I can, to this valuable effort.

Yours faithfully,
Stephan Andel,
Wageningen.
[till recently FAO Forester in S.Korea, Malaysia and Indonesia].

Ernst Gotsch is an agronomist from Switzerland, who is establishing the Institute for Applied Research of 'Tropical Agroforestry'. At his disposal is an experimental terrain of approx. 50ha.

A Plan for Tropical Agroforestry

In the tropical regions of the world agriculture has always been practised in an extensive and wasteful manner. In their day the indigenous people of the tropical rainforests exploited their surroundings for the cultivation of manioc (tropical potato), maize, and beans, by cutting down and setting fire to part of the jungle, in the traditional pattern of 'slash and burn'. They cultivated these mainly flat lands for two or three years until the nutrients in the soil were exhausted or the jungle vegetation had become re-established.

This system worked for thousands of years without upsetting the natural equilibrium because it was applied only to small areas at a time. These areas were surrounded by jungle and in due course the humus was carried back to the forests by wind or in the small rivers that traversed them. It was not transported away, as it is now, carried on wide rivers or by floods across the eroded land to the lakes or the sea. Today the jungle has been largely destroyed over thousands of miles.

So long as the native population remained stable none of the land was brought back into cultivation until a period of fifty or even a hundred years had elapsed, by which time the topsoil was once again deep and fertile. The natives worked the land with a hoe and pursued a mixed culture, thus they were able to get a high yield from a relatively small area.

With the arrival of the Europeans and especially with the introduction of modern techniques during the last fifty years (mechanisation, monocultures) the situation has changed drastically. Modern agricultural practices appropriated all the flat lands, destroyed the virgin forests, and cultivated the most fertile soils with soya, rice and maize. As pasture for intensive stockbreeding, they used hilly and rocky terrain and areas of so-called 'poor soil'. Their harmful methods have severely eroded and impoverished these lands.

At the same time the peasants were pushed out towards the less favourable, rainy regions, or onto the steep slopes of hills or mountains. There they continued to exploit the forests by burning. As the population increased, the land was burnt more and more frequently, so that yield diminished, and the land was no longer able to renew its reserves.

Today, the peasant population has increased so much that nearly everywhere they have been forced to become settled. Their methods of cultivation are ill-adapted to the agricultural and climatic conditions they now face: severe erosion, increasing acidity and impoverishment of the soil are the consequences.

In this way, though for different reasons, the small peasants, as well as the large agricultural enterprises contribute to the destruction of what once was the most fertile part of the world: the tropical rainforests. Today, this all too often means malnutrition and famine. The only way out of this dilemma is a fundamental re-orientation in methods of tropical cultivation.

In future at Finca Sonodor we shall be working predominantly with non-annual plants: trees, shrubs, plants with large leaves (for example banana) growing together as they do in a forest; that is to say, first a canopy of very tall trees and palms, some of which produce nuts (up to 40—60m high). Below them fruit-trees and nut-trees (up to 30m high). Then at the lower level large-leaved trees, shrubs and grasses (up to 10m high). Climbing plants (*lianas*) in abundance will bind it all together.

Tree roots push deep in the earth to find essential minerals, which are later returned to the soil as leaves and branches fall. Thus through the natural decomposition of immense quantities of organic substances, all the nutrient components of plants, vitamins, as well as enzymes and fermenting agents are produced in superabundance. All this is absorbed by a dense network of feeder-roots (which collect nitrogen) and are linked to innumerable bacteria and fungi. Herein lies the secret of the tremendous fertility, the luxuriance and health of these tropical rainforests (virgin forests). If we understand their laws and if we respect them when we decide on methods of cultivation, and on what to plant and how, we shall one day have the same luxuriance and health in our plantations.

We will no longer have the problems of acid soil, to which we must add nitrogen, phosphorus, potassium, calcium and trace-elements. In such plantations there will be no more disease! There will be neither erosion, nor drought, nor weather which is too hot or too cold: none of the phenomena from which our agriculture suffers today.

Ernst Gotsch

Books

World Savers

GROWTH WITHOUT ECODISASTERS? edited by Nicholas Polunin. Macmillan Press, £22.50. HOW TO SAVE THE WORLD by Robert Allen. Kogan Page, £2.95.

A few years ago Peter Hall proposed that recent history demonstrates the emergence of what he called a "new rationality". In every historical period people have a general picture of the world, and over the years this picture changes. The religious view of the world was undermined by the Enlightenment and people came to believe in the power of rigorous logic and disciplined study. This led to a mechanistic view of the world which was refined into an optimistic faith in science and technology. Industrial expansion in the nineteenth and twentieth centuries produced an imperialist picture which led directly to intense nationalism, while the economic difficulties of the 1930s encouraged people to see the world almost exclusively in economic terms. After 1945 a reaction against nationalism and the crude injustices that result from the untrammelled pursuit of private gain generated the new rationality, which is essentially political. Today the majority of people accept that the principal concern of society should be the welfare of all its members, and for many young people society itself is seen in global terms.

This is the world view into which the environmental movement erupted. Although for a short time it seemed to encourage a private escapism through introversion in remote rural retreats, its more global interests eventually asserted themselves.

This new attitude can be seen developing if these two books are read together. Although they were published almost simultaneously, in fact they represent a gap of three years in the maturation of ecological ideas. *Growth Without Ecodisasters?* is the proceedings of the Second International Conference on Environmental Future that was held in Reykjavik in 1977. *How to Save the World* is the popular version of the *Strategy for World Conservation* released in March, 1980 by the UN Environment Programme (UNEP) and the International Union for Conservation of Nature and Natural Resources (IUCN), supported by the World Wildlife Fund (WWF). In his preface to Robert Allen's book, David Munro, IUCN Director General, complains that "conservation progress has been lamentably slow". Measured in terms of projects completed, perhaps he is right; measured in terms of the growth in perception, he is wrong. In 1977 the Conference was able to produce nothing more than a vague general statement calling on people to behave better. It contains nothing that a politician could seek to implement. In 1980 the *Strategy* appears as a comprehensive, specific, well argued, politically practicable document.

The Reykjavik Conference covered almost the full range of environmental issues. There were papers on climate, terrestrial habitats, fresh waters, the oceans population growth, agriculture and urbanization, together with others of a more theoretical nature. Desertification was not allotted a session to itself, and indeed received scant attention, and although alternative energy sources were the subject of a paper, nuclear power was not.

As broad reviews of their subject many of the papers were excellent, although they contributed nothing new, but there were some eccentrics. Perhaps the most curious paper of all was that in which Claire and W.M.S. Russell appeared to explain the whole of human history in terms of the pressure of populations upon resources. They based their splendid reductionism on demographic data acquired from regions and times for which no census figures exist, but in the discussion that followed no one seemed to mind. Nor did anyone point out to Professor Borgstrom his inconsistency in objecting to the "numbers games" played by statisticians and economists while he himself was presenting a theory of world agriculture based on a prodigious feat of largely meaningless numbers crunching and simply ignoring the everyday economics of farming. In the discussion of climate change it might have helped had someone pointed out that the most important climatic mechanism, the thermocouple effect between atmosphere and oceans, is understood so poorly that it cannot be modelled, so that long range predictions are unreliable to say the least. The same person might have suggested to Prof. Bryson that the reason his scientific colleagues are reluctant to agree with him is that in fact they disagree.

The trouble with conferences of this kind is that participants tend to select themselves so there is no real difference of opinion and no debate. The atmosphere becomes self-congratulatory. At the same time the extraordinary breadth of the subject matter ensures that the more specialist speakers cannot be challenged or encouraged to qualify or expand their ideas for lack of competence in the audience. There were arguments at Reykjavik, however, and on at least one occasion a learned professor was told, very politely, that his gloomy prognostications were rubbish.

There can be no doubt that the *Strategy for World Conservation* is by far the most important document ever produced by environmentalists. No one who feels concern, or even interest, about the future of the global environment can afford not to read either the full *Strategy* or Robert Allen's more popular version of it. Like the Reykjavik Conference it deals with agriculture, forests and oceans, and, briefly, with desertification. Its importance lies not in its analysis of the problems but on the assumption that underlies the entire exercise and consequently in the conclusions that flow from it.

It recognises that human beings have a right to try to feed, clothe and house themselves and that regardless of what others may think of them they will seek to exercise this right.

Problems arise because unless the use of land and water is informed by wise planning desperation may lead people to destroy the very resources on which they depend. The need, therefore, is to accept that definition of "conservation" which equates it with the subtlest and most economical use of resources and, from this, to devise strategies that aim to assure people of the best possible return from the exploitation of their resources, spread over the longest possible time. Almost incidentally the adverse ecological effects of such exploitation are minimised and it becomes possible to protect adequately the areas of greatest scientific or aesthetic value. Because the *Strategy* is as much developmental as it is environmental it provides politicians with ideas they can implement.

The *Strategy* was prepared by a small team of workers supported by more than 700 specialist advisers from more than 100 countries. Every sentence has been debated, every idea checked. You would not know this from Mr. Allen's popularisation, which flows smoothly and reads like a book, not an official memorandum, but the fact remains that it expresses a consensus of opinion from those most qualified to comment. It is highly authoritative. This does not mean it is uncontroversial, at least in detail. I found statements I thought over-emphatic and parts of the argument that seemed based on questionable premisses. Yet I cannot quarrel with the central theme and I applaud its cheerful vigour.

Will it be implemented? No one can tell, but the auguries are good. The *Strategy* was launched simultaneously in many countries and, world wide, launch ceremonies were attended by at least six members of the royal families, three presidents or vice presidents, four prime ministers and many cabinet ministers. New Zealand and the USSR have embarked already on programmes recommended in the *Strategy*, Malaysia plans to do so, and Brazil, India and Norway are very likely to do so. Clearly, governments have welcomed the document and it is reasonable to hope that the next few years will see the culmination of many years of work as the nations of the world adopt policies devised with the help of environmentalists. *How to Save the World* may well mark a turning point in history.

Mr. Allen's book is inexpensive and deserves wide circulation. The report of the Reykjavik Conference is very expensive, and I cannot recommend it for your private shelf. If you can obtain a copy from a library, however, you may find it stimulating to read it in conjunction with the book you purchased, in order to watch the new rationality as it emerges.

Michael Allaby

Fishy Tales and Barren Seas

FOOD FROM THE SEA by James Nicolson. Cassell, £6.95
SALMON: THE WORLD'S MOST HARASSED FISH by Anthony Netboy. Deutsch, £7.95
PACIFIC SALMON Douglas & Macintyre, (available through Canongate Imports in the U.K. £14.95)

Just as man is creating deserts on dry land, he is creating marine deserts in the oceans. The sad story of overfishing throughout the world is told by James Nicolson, a Shetland Islander who, after a spell working in Sierra Leone, has returned to Shetland to fulfil his lifelong ambition of becoming a fisherman. No chairborne expert, he has practical experience in the latest purse seiners as well as in inshore creel-and-line boats.

The shattering decline of the herring industry is well illustrated by the fact that Iceland took 274,000 tons of herring in 1962 but only 4,000 tons in 1969. The story is always the same: overfishing followed by the use of more intensive methods which, for a time, maintain the tonnage landed, only to provoke a worse crash. Thus just before purse seining was introduced in 1965 the total herring catch in the North Sea was 600,000 tons. That year Norway alone took 615,000 tons. By 1977 no summer herring fishing remained.

The maximum permissible herring take from the North Sea has been put at 850,000 tons, a figure exceeded almost every year since 1951. The Danes come out of the story particularly badly; thus the catch on the Bloden grounds, which used to be 5,000 tons a year, was pushed up to an incredible 100,000 tons.

The mad folly of the ruination of the herring fishing industry is being followed by the ruination of mackerel fishing.

The doctrine of the 'freedom of the seas' propounded by the Dutch jurist Grotius in 1601, is still appealed to. But Grotius did not foresee huge fleets of trawlers sweeping round the globe, or factory fishing. Still less could he have envisaged fishing by the trawlers of Communist states which do not apply ordinary standards of profit and loss. As Nicholson puts it, since the fish belong to no one they are no one's responsibility.

Factory fishing is particularly objectionable for several reasons. These ships ruthlessly take high quality species, such as haddock and whiting, only to convert them into fish-meal — ordinary fishermen consider them too good for such a purpose.

The story of international attempts to regulate over-fishing is pathetic. Take the ludicrous Convention for Regulating Meshes, which came into operation in 1954, which excepted herring! The UN's International Convention on Fishing and Living Resources of the High Seas signed in 1958 was not applied until 1966. The failure of th Whaling Commission is well known. Only the Pacific Halibut Commission stands out as a success. For Britain the worst disaster of all was the EEC, which admitted all the EEC nations to Britain's traditional fishing grounds for no compensating advantage. Nicholson concludes that the idea of central regulation on a global scale has proved an illusion. Countries achieve more by managing their own fish-stocks — setting limits to mesh-size, catch-size or permitted number of days of fishing — than is ever achieved by international agreement.

What does the future hold? World fish catches rose steadily for many years, then levelled off at about 70 m. tonnes/yr, despite ever more intensive efforts with bigger ships, improved gear and sophisticated devices for locating and tracking shoals of fish. As stocks of familiar fish decline, fishing fleets turn their attention to deeper water and to species at present unexploited, such as giant squid. Instead of asking at the fishmonger for cod or turbot, we shall have to learn to ask for ratfish, grenadiers, black scabbard, rabbit fish and darkie charlies. The Food and Agriculture Organisation, which expects that by the year 2000 the world's population will demand a catch of 110m. tons/yr, is confident that the catch can at least be raised to 110m. tons by such methods. Attention is already being focussed

on the waters off the N.W. coast of Scotland, where such varieties abound in depths between 350 and 600 fathoms. The blue whiting is already being exploited for fishmeal. And in 1974 krill entered the pages of the FAO yearbook for the first time as an exploitable species.

But, as Nicolson concludes, there is another way to increase catches and to prevent the spread of marine deserts: a reduction in fishing effort to allow stocks to recover — as they dramatically did during the last war.

Gordon Rattray Taylor

A Confused Package

NORTH-SOUTH: Report of the independent commission on international development issues under the chairmanship of Willy Brandt. Pan, £1.95.

Written by eighteen luminaries, most of them apparently suffering from statistical diarrhoea, the 100,000 words of this "programme for survival" have been sympathetically received by politicians, international bodies and the media. How many of the respectful commentators have actually read Willy Brandt's almost unreadable report is another matter. One thing seems clear, the book will feed not a single mouth and have not the slightest effect on the history of mankind.

Which is just as well. If put into practice the good intentions of the Commission would hasten the way to hell for everyone on Earth. Many are already living there, of course — some in the affluent "North", more in the indigent "South" — but massive transfer of resources from rich to poor in order to promote growth and industrialisation in the Third World is a sure recipe for eco-catastrophe and social chaos. Admittedly the authors, trying to eat their cake and have it, do acknowledge the existence of certain ecological hazards. From the recommendations, however, it is obvious that this is mere lip service, and that mining, manufacturing, and mechanised, capital-intensive farming are their cures for poverty. Rather than new causes.

The book is trapped between a futile ambition to prescribe for all the world's ills (including the arms race) and a pathetic fear of any diagnosis which criticises existing persons, institutions, or countries. No one must be blamed, no one is doing anything wrong, but maybe... This editorial attitude reminds me of the student conductor — not Edward Heath, though he is one of the authors — who took the orchestra through an overture without comment and then said We'll play it again, and lets try to play it better this time".

The main premise is that world hunger is due to food scarcity. Not true. There is plenty of food. The overwhelming majority of poor countries already grow enough to feed themselves although only half the world's cultivable land is cropped and much of that woefully under-cropped. Equally naive is the assumption that increasing food production necessarily reduces hunger. No, hunger stems — as it always has — from social and economic policies, not from shortages. The Brandt commissioners do hint that just conceivably land reform might be part of the answer, but do not even mention the guns-before-butter and other politico-economic policies which are responsible for so much mass malnutrition.

But worse, the report blatantly advocates tractors, fertilisers, pesticides and the capital-intensive systems which throw peasants and farmers out of work, force land values up, and further transfer food production from the poor to the rich. Quite the opposite of land reform. Worse still, this Northern agriculture is dependant on a scarce, slow-growing luxury called oil. To get poor countries hooked on oil in the 1980s is like getting teenagers hooked on heroin.

This quotation typifies the level of thinking (as well as the prose style) of North-South: "Financially and economically viable projects in the modern productive sector, including sophisticated technology and large-scale economic infrastructural projects are an important element of the development process requiring international support".

Another major claim is that it's in the North's economic and security interest to help develop the South. Leaving aside the dubious morality of appealing to the self-interest of the rich, the argument itself is suspect. If it means anything "transfer of resources from North to South" must mean taking from the North and giving to the South so that the North is poorer and the South richer. Hence in the short and medium term unemployment and imports must go up in global equity, representing this as economic self-interest for the North (because of some possible long-term benefit) is like calling margarine butter. To be effective any transfer of resources must be on a scale so massive that it will inevitably hurt the rich. Why not admit it?

The security argument is equally spurious. Yes, in practice poor countries no doubt do threaten the security and well-being of the North, but not as much as they would if they were rich and powerful, and not

nearly as much as the North's constituent parts already threaten each other. It is fallacious to think that developing the South will make the world safer; it will merely alter — and intensify — the nature of global danger.

The humanitarian arguments for helping the South remain entirely valid; the self-interest line is rubbish, and immoral rubbish at that. Inter-dependence between countries is a reality but it still has plenty of limits. The authors would have us think it total.

One problem which is timidly overlooked is popular disinterest in aid. Rhetoric apart most people in the North care little about the South — unless their personal careers are bound up in the aid industry. No one cares, that is, enough to sacrifice his precious standard of living. Our bureaucrats, managers, unionists, even our unemployed are all enviably rich compared with the starving millions (or billions), but all of them insist each year on more money for themselves. Imagine Mr. Scargill and Mr. Sirs advising their union rank and file to accept less pay (or a smaller pay *rise*) and fewer jobs in order to transfer resources to the really poor in Upper Volta...

The authors also funk the problem of overpopulation. There are far too many human beings and we are killing off other forms of life hour by hour. None of us is innocent — each newborn child inherits and perpetuates the guilt of his species. Overpopulation is the worst crime in Earth's history and can only be expiated by drastic reduction in numbers. In this context death, especially early death, may still be a private tragedy but it is a public good and a planetary necessity. Halving the world population would not itself solve the poverty-hunger question, but would make it infinitely easier to solve, given the will.

Meanwhile can anything be done? North-South offers a confused package of possibilities, some of them interesting. A tax on the arms trade, a tax on all international commerce? Long-term agreement on oil prices? Maybe; the authors admit they cannot be sure what to do. Their shopping list is too long, lacks priorities, and has inherant contradictions. Here is a shorter, more pragmatic set of options:

1. Set up machinery to investigate, expose, and reduce exploitation of the South by the North (over raw materials, labour, resources etc.).
2. Evolve a code to regulate the conduct of transnational corporations so as to give the South a more generous deal.
3. Provide massive bribes (sic) for countries which agree not to exploit natural assets — like rain forests — which are vital to the Earth's ecosystem.
4. Move towards the rationing of certain scarce resources.
5. Pay for ecological necessities like reforestation out of international funds as of right.

A modest programme which, though no cure-all, would help the welfare of the South. But perhaps this quotation from page 25 should guide our conduct: "We take it for granted" writes Willy Brandt himself "that all cultures deserve equal respect, protection and promotion". The book is faithless to this admirable precept when it seeks to foist Northern culture, technology and values — from tractors to Womens Lib — onto the South. Yet non-interference ought to be the rule. Every country has the right to work out its own salvation, and that includes the right to copy or not to copy the North, the right to mind its own business.

The development process is painful. From Waterloo to, say, Mafeking about 80 per cent of the UK was, in effect the South (Disraeli's two nations). This was changed gradually by the conscience of the rich and the organisation of the poor, but it was changed internally, not from without. It is up to each country to make its own changes in its own time. That is what independence and national sovereignty are all about.

Victor Gordon

Preaching to the Converted?

THE BIG RISK by Michael Flood. Friends of the Earth, 95p.

Friends of the Earth have in the past been particularly careful not to adopt a political stance or show any left or right bias, consequently they have been cautious about developing any political strategy as a basis for any or all of their campaigns. Publication of *The Big Risk* however, signifies a shift in policy, coinciding as it does with the launching of a five-year campaign against nuclear power, in the course of which FOE will seek to establish a framework for opposition with particular emphasis on public arousal and education. They will put forward informed alternatives rather than defensive reactions to official announcements, culminating in making nuclear power the key issue in the 1984 election. "We've got to mobilise public opinion to such an extent that no government committed to nuclear power can get elected in 1984," Flood said recently. "That is a very clear target."

The success of this book must therefore be measured in terms of how far it is likely to initiate this brief, for its thirty-two pages contain straightforward stuff for already seasoned campaigners. It is divided into three parts in which Flood lists the major dangers of going nuclear, i.e. accidents, the risks to health, the manufacture of plutonium and the curtailment of civil liberties.

The most important question to be asked is therefore whether it will reach the grass roots aimed at in FOE's 1980 "arousal year" campaign. The problem is that the group's present distribution organisation relies on mail order and the few radical bookshops in the larger towns and cities. The sort of reader likely to utilise these avenues really has little need of what is essentially a basic primer (Ecologist readers will have absorbed all this in much greater depth long since). The author gives us odd bits of information laid between large black-and-white photographs, quotes and bold, almost tabloid headings. *The Big Risk* is a book designed to do a particular job — to alert as wide a public as possible — but until FOE improve their distribution methods and bring books such as this into local shops side by side with other paperbacks, they will fail in their objective and the grass roots will remain unaroused.

Peter Whitebrook

CLASSIFIED

BOOKS & PUBLICATIONS

INDUSTRIALISM, PATRIARCHY, MATERIALISM: You can't have one without the others. For the spiritual-feminist alternative, read *The Coming Age*, 45p. 40, St. John St., Oxford. A pre-industrial faith for the post-industrial age.

RECYCLED STATIONERY — letterheads-posters-jigsaws-papermaking kits-eco-books. Special offers for retailers. For details please send large SAE to: Conservation Books (E) 228 London Road, Reading, Berkshire, RG6 1AH England.

PERSONAL

MODERN DRUGS waste resources and pollute body and mind when used indiscriminately. Keep mind and body healthy with TAI-CHI and CHI-KUNG, the ancient and popular Taoist moving meditation. Not a cult. Based on "CHI", the body's own natural energy. Send stamp for free details: TAO (E9), 129 Lathom Road, London E6.

RAPPORT is the intelligent person's introduction service. Enjoy unlimited introductions, rewarding new friendships, informal gatherings, excursions, expeditions and exciting holidays - now. RAPPORT is for outstanding people of all ages, all inclinations, everywhere. RAPPORT is unique. Details: SAE to RAPPORT, Dept 3Q, P.O. Box 94, Oxford.

HAIR ANALYSIS, atomic spectrascopic reveals environmental toxic exposures and nutritional mineral deficiencies. Send two tablespoons of hair + £8.00 to Envirolabs, Box 38 Station B, Toronto, Canada.

P.I.P.P. (PERSONAL INTRODUCTIONS FOR PROFESSIONAL PEOPLE) offers a specialised and selective introduction service for professional and executive people. For details send S.A.E. to P.I.P.P., P.O. Box 1, West Kirby, Merseyside, L48 3LA

MISCELLANEOUS

PREDATORY MAN is destroying the world! Help pioneer aware and compassionate living the healthy sustainable VEGAN way. Send 65p for recipe book with self-sufficiency gardening hints and full supporting leaflet. Vegan Society, Dept. R. 47, Highlands Road, Leatherhead, Surrey.

WANTED, men to form Christian community based on liturgy, aiming at reasonable self-sufficiency. Advertiser's current businesses (metal, woodwork, textiles, books) can be used as foundation. State your abilities and interests. 'Zanzibarians', 45, Sandringham Road, Norwich.

REMOVE MENACE OF STRESS with relaxation fo every-day living. The cassette which guides you gently into deep relaxation, relieving day-to-day tensions recommended by London Cardiologist; Croydon AHA anti-smoking groups; migraine, phobics and relaxation for living societies. One user writes: 'Your wonderful cassette has helped me more than any other.' Obtainable from Mary Barfield (Box TE) 2 Toot Rock Coastguards, Pett Level, East Sussex TN35 4EW. Inclusive cost (UK) £3.50.

DO YOU CARE?

Join the International Ecologism Political Party. Contact: Toler Ecologism Party, 2900 Park Newport, Apt. 226, Newport Beach, California 92660, U.S.A.

BUSINESS FOR SALE:

WHOLEFOOD SHOP/CAFE/CRAFTS. Flat above. Pleasant, growing, Mid-Devon town. Many possibilities, good living. £16,000. For details phone Tiverton: 56164..

COURSES & EVENTS

NATURE IN THE CITY, a weekend workshop at Selly Oak, Birmingham on June 28/29. Lots of sessions to choose from, including churchyard nature reserves, school tree nurseries and planting derelict land for wildlife. SAE to Urban Wildlife, 54-57 Allison St., Digbeth, Birmingham 5 or phone 021-632-6909.

SUSTAINABLE LIFESTYLES — energy conservation, recycling, organic gardening, yoga etc. 24 - 30 August at Lower Shaw Farm, Shaw, Swindon, Wilts. Tel: 0793-771080. Other summer courses include crafts, movement, cycling, yoga, meditation and massage. SAE for details.

SELF-SUFFICIENCY COMMUNITY FESTIVAL June 28/29. 40 stalls over 30 lectures, demos, films, wholefood catering, concert, camping at the counties showground. SAE — 'Greenways', Malvern Wells, Worcs.

PRELIMINARY ANNOUNCEMENT: Seminar on Energy and Environment Education in Europe. March 1981, Monte Carlo, Monaco. The seminar will be limited to 100 participants. Invitations to participate will be based on replies to this announcement, having regard to representative geographical coverage from Europe and the Mediterranean region.
For further information write to Ms Sheila Hopkinson, c/o The British Council, 10 Spring Gardens, London SW1A 2BN, U.K.

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: .....

Date: ..... Signed: .....

WHO CARES?

Who cares enough to tackle the tough questions of how we can best protect and improve our environment?

There are no easy answers to these questions and ENVIRONMENT magazine does not offer any formulas or panaceas. It offers, instead, factual in-depth discussions of some of the most pressing problems of our day, possible solutions to these problems, and the difficulties and probable consequences of implementing these solutions.

For twenty years ENVIRONMENT has been at the forefront of the movement to make available to the public the scientific and technical information needed to create a more livable environment. It was ENVIRONMENT which first called public attention to the danger of PCBs and of mercury pollution as well as to the potential for steam explosions in nuclear reactors.

RECENT ISSUES OF ENVIRONMENT HAVE FEATURED:

- BARRY COMMONER on the economics of solar energy.
- GUS SPETH on environmental controls and inflation.
- LESTER BROWN on the use and abuse of the world's agricultural lands.
- DENIS HAYES on what we must do to have the energy we will need in 2025.
- SAMUEL EPSTEIN on the validity of animal tests for determining carcinogenicity.
- LOIS EMBER on the toxic effects of increasing use of diesel vehicles.
- ROBERT VAN DEN BOSCH on the pesticide problem.

PLUS IN EVERY ISSUE . . .

OVERVIEW offers a variety of opinions on matters of environmental concern, including regular columns on law, energy, and science policy.

SPECTRUM keeps readers abreast of developments affecting the environment in the United States and abroad.

ENVIRONMENT is the one magazine for those who care about the environment.

Heldref Publications, 4000 Albemarle St., N.W., Washington, D. C. 20016

Please enter my subscription for 10 issues—a year of ENVIRONMENT

☐ $14.00—Individual

☐ $22.00—Institution

Name _____
(please print)

Address _____

City and State _____ Zip _____

Visa/MC Number _____ Expires _____

Signature _____

☐ Check enclosed

☐ Charge my Visa/Bank Americard.

☐ Charge my Master Charge.

HELDREF PUBLICATIONS
4000 Albemarle St., N.W., Suite 500
Washington, D. C. 20016

All orders by individuals must be paid in advance. Add $4.00 for postage outside the U.S. Allow six weeks for delivery of first issue.