

The Ecologist

Journal of the Post Industrial Age Vol 15 No1/2 1985 £4.00



The World Bank

Global Financing of Impoverishment and Famine



including: *Amory Lovins, Building a Secure Society. Joseph Weinstock, Getting the Right Feel for Soil. Alwyn Jones, Alternative Medicine—Alternative Society. Bryan Waites, The Search for Britain's Regions. Kirkpatrick Sale, Bioregionalism—A new way to treat the land.*



including: *Peter Bunyard, Can self-sufficient Communities survive the onslaught of Development? E. B. Vermeer, Agriculture in China, David Cusack, Quinoa, Grain of the Incas. Harry Walters, Nitrate and Cancer. Daniel Stiles, Stopping the Desert spread with a Camel.*

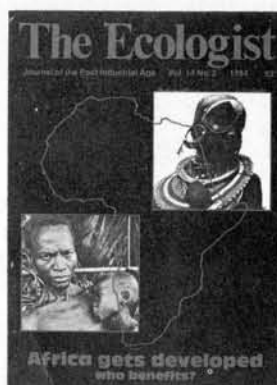
including:
Val Plumwood and Richard Routley, World Rainforest Destruction—The Social Factors Carl H. Moneyhon, The Environmental Crisis and American Politics 1860-1920. Denys Trussell, History in an Antipodean Garden.



including: *Jim Harding, The French Nuclear Debacle. Brian Martin, Environmentalism and Electoralism. Wes Jackson, The Genetic Manipulators—A new threat to agriculture. Nigel Pollard, The Israelites and their Environment.*



including: *Edward Goldsmith and Nicholas Hildyard, Large-scale Dams: A special report. James Krohe, Illinois, The US Bread Basket. Warwick Fox, Deep Ecology: A New Philosophy of our time? Henryk Skolimowski, Information—yes, but where has all the wisdom gone.*



including: *Randall Baker, Protecting the Environment against the Poor. Barbara Dinham and Colin Hines, Can Agribusiness feed Africa? Ellen Grant, Cancer and the Pill. Jose A. Lutzenberger, How Agrochemicals feed the Pests that destroy the Crops. A. Sibatani, Molecular Biology: A Scientific Critique*

The Ecologist

Journal of the Wadebridge Ecological Centre

Published by: Ecosystems Ltd., Edward Goldsmith.

Editors: Edward Goldsmith, Nicholas Hildyard, Managing Editor: Maria Parsons.

Associate Editors: Robert Prescott-Allen, Jimo Omo-Fadaka, Andrew Mackillop, Jerry Moles, Robert Waller, Lawrence Hills, John Papworth, Nicholas Gould. Raymond Dasmann, Richard Wilson, John Milton (USA), Henryk Skolimowski (USA), Sigmund Kvaloy (Norway), Wouter Van Dieren (Holland), Peter Bunyard.

Editorial Department: Whitehay, Withiel, Bodmin, Cornwall, UK. Tel: Bodmin (0208) 831237.

Subscription Department: Worthyvale Manor Farm, Camelford, Cornwall. PL32 9TT. Tel (0840) 212711.

Annual Subscriptions:

Ordinary Rate: £12.50 (US \$28.00) (Students £11.50)
Institutional Rate (excluding schools): £18.00 (US \$36.00)

Airmail Rate: £6.00 (US \$12.00) extra
Special Rates available for people who need *The Ecologist* for their work, but have difficulty in paying the full rate, please don't hesitate to write to us.

Subscriptions are payable to *The Ecologist* and sent to *The Ecologist*, Subscription Department.

The Ecologist Bankers: National Westminster Bank Ltd.,
26 Molesworth Street,
Wadebridge, Cornwall, UK.

Advertisements:

Display Rates:

Full page (261x185mm) £180.
Half page (131x185mm) £100
Third page (131x121mm or 261x58mm) £60
Quarter page (131x121mm) £50
Sixth page (131x58mm) £40

Inserts:

Up to 261x185mm and not more than 10g £25 per thousand.

Enquiries to:

The Ecologist, Advertisement Department,
Worthyvale Manor Farm,
Camelford, Cornwall
PL32 9TT. UK. Tel:
(0840) 212711.

Contributions:

The editor welcomes contributions, which should be typed, double spaced, on one side of the paper only, and with generous margins. Contributions should be accompanied by black and white photographs, line drawings, and tables where appropriate.

While every care is taken with manuscripts submitted for publication, the Editors cannot guarantee to return those not accepted. Articles published in the *Ecologist* do not necessarily express the views of the Editors.

The *Ecologist's* International Serial Number is ISSN 0261-3131.

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

Obituary

Peter Jackson

- Dr Nart Tuntawiroon** 2
Indefatigable fighter against the dam builders in Thailand was murdered in 1984.

Editorial

Edward Goldsmith

- Open letter to Mr Clausen, President of the World Bank** 4
Mr Clausen is accused of financing escalating poverty and famine in the Third World.

Feature Articles

Anders Wijkman and
Lloyd Timberlake

- Is the African Drought an Act of God or of Man?** 9
The drought to which the widespread famine in Africa is attributed is man made, the result of deforestation and soil erosion.

E. Pushparajah

- Development and Induced Soil Erosion and Flash Floods in Malaysia** 19
Economic development is causing serious soil erosion and other forms of environmental degradation in Malaysia.

N. D. Jayal

- Destruction of Water Resources** 21
Development is leading to a widespread drying up of rivers and springs throughout East Asia with dramatic consequences for the rural population.

Marcus Linear

- The Tsetse War** 27
The FAO is promoting massive spraying programmes over seven million square kilometres in Africa to make possible the setting up of vast ranches to produce beef for export. The environmental consequences will be disastrous.

John Madeley

- Does Economic Development Feed People?** 36
Contrary to what we would expect it seems that rural Africans eat better when their country's economy is depressed.

Bharat Dogra

- Forcing the Starving to Export their Food** 42
Though the rural masses are starving, the government encourages increased food exports.

Bharat Dogra

- The World Bank vs the People of Bastar** 44
Such people derive all their requirements from their forests. When these are removed by World Bank development schemes they are physically and culturally impoverished and drift to the urban slums.

Anil Agarwal

- Deforestation means an End to India's Traditional Crafts** 49
Most of the raw materials required are derived from the vanishing forests.

B. B. Vohra

- Why India's Forests have been cut down** 50
There are no votes in forest conservation and corrupt politicians and forestry officials have found that, by allying themselves with the loggers, massive personal fortunes can be built up. Against such an alliance the law is ineffective.

James Lovelock

- Are We Destabilising World Climate? The Lessons of Geophysics** 52
The evolution of world forests was part of Gaia's strategy for achieving and maintaining its long term climatic stability. To remove these forests is to reverse this process and destabilise climate.

Bruce M. Rich

- Multi-Lateral Development Banks. Their Role in Destroying the Global Environment** 56
MDBs, in financing massive development projects in the Third World show little concern for their social and environmental destructiveness. The Polonoroeste project in Brazil is an important step in the annihilation of the Amazonian rain forests.

Jose Lutzenberger

- The World Bank's Polonoroeste Project — A Social and Environmental Catastrophe** 69
The rain forests of Rondonia are being cleared by peasants from the south whose much more fertile lands have been taken away from them to make way for export oriented plantations.

David Price

- The World Bank vs Native Peoples — A Consultant's View** 73
An ex-World Bank Consultant questions the sincerity of that institution's concern for the native peoples whose very survival is threatened by development projects.

- Correspondence with Dr Clausen, President of the World Bank** 78

- Books** 82

DR NART TUNTAWIROON: Thailand's leading Anti-Dam Campaigner

The recent murder of the Dean of a University in Bangkok did not make world news, but, in Thailand, Dr Nart Tuntawiroon was no obscure academic—he was a fierce fighter against destruction of the natural environment by dam builders and had managed to stave off construction of a major dam on the Mae Klong River—the River Kwai of world fame.

There is no evidence to connect the murder of Dr Tuntawiroon and his wife in his office at Mahidol University on 20 November 1984 with the dam controversy, but his passing is a great blow to the conservation movement.

Dr Tuntawiroon had only just returned home from attending the General Assembly of the International Union for Conservation of Nature and Natural Resources (IUCN) in Madrid. Leading world scientists and conservationists were impressed by his cogent indictment of his country's dam building programme. This indictment, which has world-wide relevance, is Dr Tuntawiroon's testament as it appears in a contribution to a book which is being published by *The Ecologist*. In it he recounts his detailed criticisms of the Nam Choan dam project on the Mae Klong in Kanchanburi Province at a special Cabinet meeting in 1982, which resulted in postponing a decision on proceeding with the dam.

Dr Tuntawiroon accused the Electricity Generating Authority of Thailand (EGAT) of "major errors" in its report to the Cabinet. Rainfall data could be 400% wrong and the amount of potential energy exaggerated. He added that no account was taken of opportunity, social and environmental costs of impounding large areas of land and forest, loss of land fertility downstream and loss of marine productivity in the Gulf of



Dr Nart Tuntawiroon

Thailand because of reduced nutrient flow, which would be borne by the whole country, of potential loss of archaeological and anthropological wealth, as well as mineral resources, indicated by recent exploration, of damage to the forest and wildlife of the Tung Yai and Huai Kha Khaeng wildlife sanctuaries—the largest contiguous block of forest land set aside for wildlife conservation in Thailand, and of siting the dam in an earthquake prone area.

Dr Tuntawiroon was able to convince the Cabinet to postpone approval of the Nam Choan dam for an initial 90 days, and today, just over two years later, a decision is still pending.

His standing as an opponent of the Nam Choan dam and other dam projects was strongly reinforced by

the fact that he was an electrical engineer, and initially a supporter of damming Thailand's rivers to produce energy, control floods and irrigate agricultural land. He was disillusioned. The frequency and magnitude of floods appeared to increase after dams were built, and to the authorities' claim that the floods would have been even worse and more dams were needed he replied: "We might as well build a roof to cover the total area of Thailand."

Dr Tuntawiroon drew pointed attention to the failure of the dams to produce the steady flow of hydro-electricity predicted. In 1966, when there were two dams, hydro-energy accounted for 64 per cent of electricity generated, but in 1980, when there were 10 dams, it accounted for only 8.4 per cent. Instead of providing the basic source of electricity, the projects were only intermittently supplying peak load.

He declared that multi-purpose dams in the tropics were not buffers against weather fluctuation, but were at the mercy of the weather. On 3 November 1984 the *Bangkok Post* frontpaged reports of severe floods in many parts of Thailand alongside a report about critically low levels in the power dams. To the layman there might appear to be large amounts of impounded water, but it was "dead storage" because it was below the power intake level.

Hydro authorities, Dr Tuntawiroon said, were "very possessive" of the "dead storage" because of the time it takes to accumulate and they release water for irrigation only from "live storage", which fluctuates widely both in a year and over the years. The result is that farmers fail to get irrigation water when they need it, and, ironically, it is released when they are enjoying natural supplies.

"A hydro-electric power dam is

unable to perform its task of irrigation and flood prevention effectively. It can be concluded that the label multipurpose assigned to a hydroelectric power dam is largely cosmetic," Dr Tuntawiroon declared.

Dealing with the environmental impact of dams, Dr Tuntawiroon said that dam construction was one of the main culprits in forest destruction. Poachers and shifting cultivators moved in, and people evacuated from impounded areas, who were resettled on relatively infertile land, pushed further into the watershed areas in an uncontrollable chain reaction. The watershed destruction played havoc with the water regime, and accelerated soil erosion and the rate of sedimentation in the reservoir in a vicious circle. Meanwhile, the productivity of the Gulf of Thailand deteriorated because nutrients were trapped by the dams. The giant fresh water prawn declined considerably because its life cycle was interrupted by the dams. These facts, Dr Tuntawiroon stated, led to public anti-dam sentiment reaching such a level that it forced the shelving of a project in Khao Yai National Park in 1970.

The Mae Klong river, where the Nam Choan dam has been proposed, is one of the four main rivers of Thailand, and flows from the mountains on the Burmese border to the Gulf of Thailand. The name "Kwai", which has become so famous, comes from the word for tributary, and the Kwai Yai (big tributary) and Kwai Noy (small tributary) join in Kanchanburi Province. There was strong public opposition to the Chao Nane dam (now Srinagarind dam), first of a proposed string of dams on the rivers, but it went ahead. However, the prolonged period of accumulating the dead storage water starved downstream areas allowing saline water intrusion and wiping out coconut and lychee plantations. A second dam, the Kao Laem, has been built, according to Dr Nart, in a geological fault zone on structurally weak breccia rock. The authorities claimed that it was one of the most difficult to construct in the world—a tribute to ingenuity or stupidity, asked Dr Tuntawiroon?

The authorities quietly went ahead with preliminaries to the Nam

Choan dam on the Upper Kwai Yai, but work on building an access road came to light because it passed without permission through the Tung Yai Naresuan Wildlife Sanctuary, whose director was Phairot Suvanakorn, an official who had earlier publicised and blocked a dam in Khao Yai National Park. There was an outcry led by students, whose power had been demonstrated earlier when they launched agitation which brought down the government in the mid-seventies following the discovery that high officials were poaching in Tung Yai. It was this outcry, joined by environmentalists, archaeologists, geologists, lawyers and the mass media, that led to the cabinet meeting at which Dr Tuntawiroon successfully persuaded the government to review the project. Meanwhile, the opponents of the dam took their case to the President of the World Bank, which was offering loans, and declared that they would "*absolutely not be subject to any debt incurred.*"

Nature itself appears to have come to the support of Dr Tuntawiroon's case, for in 1983 a series of earthquakes shook the originally non-seismic area of Kanchanburi, with their epicentres within the Srinagarind dam reservoir, not far from the Nam Chaon dam site.

The frequency and magnitude of floods appeared to increase after dams were built, and to the authorities' claim that the floods would have been even worse and more dams were needed he replied: "We might as well build a roof to cover the total area of Thailand."

Stone age artifacts and lignite deposits were discovered in the area which would be submerged by a team led by Dr Tuntawiroon. This confirmed the potential archaeological wealth of the Kanchanburi area, which had first come to light when a Dutch prisoner of the Japanese working on the "Death Railway" in World War Two found

pebble tools similar to those at the *Pithecanthropus pekinensis* site near Beijing and the *Pithecanthropus erectus* site in Java. This led to speculation that there was a Pleistocene migration route through Thailand.

In his attack on the dam builders, Dr Tuntawiroon recalled that Thailand could claim to be the most advanced country in southeast Asia in water resource management, with a long history of canal digging and the art of living in a flood plain near sea level. But the Royal Irrigation Department, which had established a canal network beneficial to agriculture, had had to hand over responsibility for water storage to EGAT, which is dedicated to using water for electrical power.

Dr Tuntawiroon declared that it was false to argue that hydroelectricity dams were cheaper to run than thermal stations, despite high construction costs, because water is free. The water, he said, was obtained in exchange for land, which could be used for agriculture, forestry, or even firewood production, apart from its intrinsic values, such as ecological equilibrium and wildlife habitat, which were difficult to quantify. These values were discounted by EGAT, thus allowing the organisation to claim that its projects were financially sound.

Concluding his case against the dams Dr Tuntawiroon said: "Whether EGAT will eventually succeed in manipulating its way to build Nam Chaon dam or not, it seems that there will be no more place for a large hydro-electric power dam in Thailand, not only because of rising public opposition, but also because it is simply too expensive in terms of land loss as against increasing pressure of rising population."

It is sad to think that Dr Tuntawiroon will not be around to ensure and savour ultimate victory, but others will surely take up the challenge.

Peter Jackson

Peter Jackson is Environmental Journalist and Consultant and was chairman of the Cat Specialist Group, International Union for Conservation of Nature Resources (IUCN).

Open letter to Mr Clausen, President of the World Bank

Dear Mr Clausen

This double issue of *The Ecologist* has been prepared in order to expose to world leaders the role played by your bank and the other international agencies with which you work, in particular the Food and Agricultural Organisation of the United Nations (FAO), in creating the present escalation of human misery, malnutrition and famine in the Third World.

The coming population crash

It has been clear for at least ten years that a massive population crash in Africa and South Asia was inevitable. When I worked for Environment Canada in 1975, documents were already being circulated which suggested that half a billion people would starve to death before the end of the century. Professor Paul Ehrlich of Stanford University was pointing out at that time that population projections to the end of the century, established by governments and international agencies, were simply absurd. Indeed the world will never support a population of 6½ or 7 billion, let alone 30 billion which the FAO still has the gall to tell us it can support—so long of course as that iniquitous organisation is provided with sufficient funds to carry out its programme.

At the Second International Conference on the Environmental Future held in Reykjavik in 1977, 120 participants—many of whom were men of the greatest possible eminence in their respective fields—declared that *the death by starvation of a thousand million people could well be the final tragedy of this century.* (See *The Ecologist*, Vol 7 No 6)

Since then events have given ever greater credence to this dismal prospect. Today the people of more than twenty African countries are threatened with famine, hundreds of thousands if not millions have already died and the prospects for the survivors are very grim. There is even terrible starvation today in the Sudan, which country the FAO was telling us only a few years ago, had the greatest agricultural potential in Africa and could be turned into the breadbasket of the Arab world.

Why is this happening? You and your colleagues tell us that people are hungry because they are poor—from which it must follow that the cure for famine must be to make them rich, hence the need for economic development.

In other words you interpret the incidence of hunger in such a way as to rationalise the solutions you wish to apply—those which the World Bank has been set up to finance and which most favour various short-term political and economic interests.

Your faith in economic development

Your quasi-religious commitment to economic

development is clearly reflected in your Fairfield Osborn Memorial Lecture (1982). In it, you not only insist that development is essential to combat poverty and malnutrition but you actually pretend that it also provides the only means of protecting our natural environment. Thus you tell us that “a better environment more often than not depends on continued economic growth”, and that if we are to have a sustainable world then it must “include economic growth”. You even go further and tell us that “all development can enhance the conditions in which we live”, and further on in your talk that “all economic development should, on balance, improve people's environment . . .”

These are shocking statements to make. Do you really believe that the vast areas devastated by open-cast mining have been improved by these ventures? Do you really believe that the 100 million or so hectares of water logged and salinised land created by perennial irrigation schemes, many of which were financed by the World Bank, have enhanced the conditions in which the local people live? Do you really believe that the vast development schemes that have forced tens of millions of villagers and tribesmen from their homes to eke out a miserable existence in the ever growing and ever more squalid slums of the large Third World conurbations have actually “enhanced the conditions in which those people live?” If you do, then you can believe anything.

Worse still you are guilty of a most callous confidence trick in pretending to the inhabitants of the Third World that the economic development you finance can really enable them to achieve the material prosperity that we know, temporarily at least, in the West today.

You know yourself that in order to develop, Third World countries have eventually to achieve an economic surplus—for they cannot go on borrowing from you indefinitely. But how are they to do this? In most cases their present foreign earnings are insufficient to pay even their oil bills let alone the interest on the loans they have already contracted—in some cases by a very wide margin. If you continue to lend them more money, such interest payments must still further increase.

What is more, their foreign earnings are, in nearly every case, almost entirely derived from the land, and this land, under the impact of the intensive methods of production required to make its produce economic on the world market, is being rapidly degraded. Under such conditions, those foreign earnings can only fall from year to year until they are eventually non-existent.

Basil Rossi, who manages large agricultural estates in the Philippines, recently sent me a letter which I circulated among the banking community of

the UK. In it, he pointed out, that bankers were lending sugar-cane plantations large sums of money for which their land, valued at several thousand dollars an acre, served as security. But once this land has been used for intensive sugar-cane production every year for a decade or so, it must become so degraded as to be worth little more than the land which borders the Sahara desert.

Under such conditions, how can Third World countries, whose costs can only go up and whose earnings can only fall, conceivably develop? You know, and everybody in the development business knows too (though he may not admit it) *that it is impossible*, and that the Third World is being made to destroy its environment and sacrifice its cultural patterns and social structures for nothing.

In any case, what reason have you for supposing that development can make the poor rich and enable them to eat? Has development eliminated poverty and malnutrition in America, the most highly developed country in the world? The answer is most surely no. The inhabitants of the black ghettos of America are very poor indeed if this term is to be used in a sensible manner. Among these people, the family and community have largely disintegrated, households are run by single women who have no men to help them. Crime, delinquency, alcoholism, drug addiction are rife and there is a general distrust, if not hatred, for any form of authority. This is what Oscar Lewis calls the 'Culture of Poverty'. What is more, it can co-exist with great material affluence. Its victims may possess colour television sets, video-tape recorders and expensive automobiles.

Karl Marx was wrong when he said that religion was the opium of the people. It is materialism that is the opium of the people for when the alienated play with these toys they are temporarily transported into a surrogate world and forget the real one which we have made so intolerable to them. But this surrogate world cannot satisfy their basic spiritual, aesthetic and social needs. Indeed, as Ivan Illich puts it, "development has not eliminated poverty it has modernised it."

Nor has uncontrolled development in the USA eliminated malnutrition. Perhaps as many as twenty million people in America suffer in one way or another from a lack of nutritious food. It is not that food is unavailable, only that they have become too psychologically disturbed and too socially alienated to spend their money on the food they need rather than on junk food, worthless consumer goods, alcohol and drugs. Development has in fact not eliminated malnutrition either. It has also modernised it.

Are primitive people really poor?

If you wish to find a society where there is no poverty or malnutrition, you should not look towards the industrialised world. There are a few so called primitive peoples left today. Some live in what remains of that area of Amazonia where you plan to set up the Polonoroeste project, others in the Bastar area of Madhya Pradesh whose destruction you also plan to finance. Their societies and their environments are still intact and, as a result, their members do not suffer from the social alienation or the malnutrition so prevalent in the slums of the USA. In fact, they possess what one should regard as the

most valuable possible forms of wealth: *social and ecological capital* which provide them with great security and all sorts of other important physical and psychological satisfactions. Once the members of such societies are dispersed, however, by some vast development scheme and are forced to seek refuge in the slums of some large conurbation, they are deprived of these sources of wealth which economic development can never replace.

There is no reason to suppose that Third World people actually have anything to gain by economic development. Indeed, contrary to what we are made to believe, while their societies and environment are still intact, they are not short of the technology required to grow ample food. Over the years, we have described in the pages of *The Ecologist* the traditional agricultural practices of 'primitive' people and shown just how well they satisfy nutritional, social and ecological requirements.

In our book *The Social and Environmental Effects of Large Dams* we devote a whole section to traditional methods of irrigation which we show to be the only ones that are sustainable and do not cause the terrible social and environmental problems associated with modern methods. Even, at the UNEP Conference on Desertification, it was concluded that the only method of preventing further degradation of the marginal lands of Sahelia was to return to some form of nomadic pastoralism similar to that which has been practised there for thousands of years.

Nor do primitive peoples suffer from malnutrition, let alone starvation, which as William Dando in his excellent book *The Geography of Famine* points out, is a largely-man-made phenomenon, whose incidence and severity have increased with the development of the market system.

Significantly, John Madeley, in his article on page 36 suggests that villagers in Tanzania may well be better fed when the formal economy is depressed than when it is flourishing.

What is particularly important is that these people create none of the problems which today are threatening the very survival of our species on this planet. They do not cut down their trees, desertify their soil nor contaminate the air they breathe and the water they drink. They do not, as we are doing, change the very chemical composition of the atmosphere nor threaten to destabilise world climate. Nor, for that matter, do they build atom bombs. Yet, as irony would have it, you are intent in financing the annihilation of their way of life—even more ironically, so as to rescue them from their 'poverty'.

Selling their food

Perhaps the most obvious reason why development cannot provide a cure for malnutrition and famine is that the Third World must earn vast amounts of foreign exchange in order to finance it, and to earn this they must first of all sell off their forests. This is how the Indonesian 'economic miracle' was financed. This is largely, too, how Malaysia financed its economic development and how Papua New Guinea now proposes to finance its development. We shall see later on what are the consequences of destroying forests in the Third World. What we must note here, is, that once their forests have gone, Third World governments must

then turn to plantation crops and cattle-ranching as a source of foreign exchange. Indeed, in many countries of the Third World well over fifty per cent of the good agricultural land is used in this way to produce cash crops for export, and as these countries run ever shorter of foreign exchange, largely as a result of the high cost of their oil imports and ever growing interest payments, more and more land is being diverted from producing food for their already undernourished population—to producing food for export.

The Chilean economist Manfred A. Max-Neef points this out very eloquently. "The developed countries" he writes "force the Third World to pay back their debts. The only way they can do that is producing cash crops. Cash cropping prevents subsistence farming, the alternative to paying unpayable debts is committing suicide. "What" he goes on to ask "is more important, our banking system or the human beings . . . ?" This is indeed the crux of the matter.

You will see in Marcus Linear's article on page 27 how the FAO plans to annihilate the tsetse fly in a partly forested area of seven m sq km in Central Africa so as to turn it into rangelands for producing beef for export to the USA. Perhaps the EDF may be persuaded to turn down the FAO's request to finance this project, though a decision is still to be made.

In Bharat Dogra's article on page 42 you will see that, though no more than fifteen per cent of the children born each year in India are adequately fed, the Indian government is doing everything it can to encourage more and more food exports. Can you really believe that such a policy is in the best interests of the people of that country? Can you really believe that it is even remotely conceivable to feed the hundreds of millions of starving people in the world by forcing them to sell an ever greater proportion of their food?

What is particularly depressing is that your agricultural policies continue to be influenced by the FAO which has been, for many years, under the complete domination of the agro-chemical industry, whose representatives, the GIFAP, until recently occupied spacious offices at the FAO headquarters in Rome and were instrumental in organising the 1974 World Food Conference.

FAO's policies only make sense at all when seen in their true light as providing a means of maximising the sales of agro-chemicals and the availability of cheap food imports, in particular beef, to the food-processing industries of the West. By financing FAO-inspired projects, this is what you are helping to achieve at the cost of creating the poverty and the famine we are only beginning to witness today.

Destroying the Third World environment

There is another way in which your policies are giving rise to this poverty and famine, it is by causing the most terrible environmental degradation. We are generally made to believe that environmental degradation is the concern of the rich, the poor, we are told being only interested in the material benefits and the jobs provided by the enterprises that give rise to it. This is, of course, sheer nonsense. The truth is that environmental degradation is the main cause of poverty and famine in the world today.

Indeed the tragedy we are witnessing in Africa

today, rather than being the result of an inevitable and unpredictable drought, in other words an Act of God is, as Anders Wijkman and Lloyd Timberlake demonstrate on pages 9 and 18 but the result of environmental degradation most of which has occurred since the war and much of which (though they do not say so) has been financed by development banks such as yours.

In many areas where the drought is said to have occurred *there has not even been a reduction in rainfall*. It is the water-retaining capacity of the soil that has been reduced and this has been caused by its over-exploitation for intensive agriculture and by deforestation. At the same time, where there has really been a reduction in rainfall this has had a far more severe effect than such an event would have given rise to in the past, again because of environmental degradation, and because much of the land once used by nomadic pastoralists, to feed their cattle, has been taken away from them for the production of cash crops, in Sahelia, for instance, for the intensive cultivation of peanuts for export to France. (See *The Ecologist* Vol 11 No 4)

The consequences of deforestation

Deforestation in the Third World is another reason for this devastation, and you do not seem to realise its full implications. Traditional forest-dwelling peoples who once made up the bulk of humanity, are totally dependent on the forests for the maintenance of their cultural pattern and indeed for their physical survival. This means that the removal of their forests condemns them to terrible biological and cultural impoverishment. This should be made clear to you by Bharat Dogra's article on page 44, as well as by the small excerpt we have published on page 49 from Anil Agarwal's recent seminal article 'Beyond Pretty Trees and Tigers'.

Another reason why you may not understand the terrible effects of deforestation in the tropics is that, in the temperate areas in which we live, deforestation can occur with relative impunity. In the tropics, however, conditions are totally different, a fact that cannot be over-emphasised.

Indeed, in such areas, deforestation inevitably leads to the transformation of rivers into torrents, the drying up of streams and springs and the erosion and desertification of the soil which becomes deprived of all protection against the winds and the heavy monsoon rains. What is more, whereas in temperate areas, forests, even when clear cut, can often recover (though perhaps in a slightly degraded form), in the tropics, once they are removed, they are—at least on a historical time-scale—gone for good.

The US Department of State, as you undoubtedly know, has at last understood this, and indeed the USAID leadership has now undertaken not to finance any projects which lead to the destruction of tropical forests.

In your Fairfield Osborn Memorial Lecture, you tell us that "as a matter of policy, we won't finance a project that seriously compromises public health or safety; that causes severe or irreversible environmental deterioration".

Unfortunately, this is not true. The Polonoroeste Project, the Bastar Project, worse still in India the vast Narmada Project, which we shall describe in

detail in volume 2 of our study *The Social and Environmental Effects of Large Dams*, do all these things and worse, yet you still insist on financing them.

You may indeed impose conditions on national governments as part of the loan agreements you make them sign, but these are invariably insufficient and, as you know only too well, are rarely implemented and rarely will be.

Besides, if you really observed this policy, it would not have been necessary for Robert O Blake, Chairman of The Tropical Forestry Working Group, Washington D.C., to have written you the letter we publish on page 78 asking you so earnestly to desist from financing projects that can only lead to the destruction of the world's remaining rainforests.

There is another reason of course why you do not understand the importance of forests in the tropics. It is that your organisation, as I learnt to my horror some years ago when I spent an afternoon in Washington with your Director of Forestry, Mr Spears, refuses to distinguish between a forest and a man-made plantation of quick growing exotics. A plantation may alone be able to yield the financial return that enables its owners to pay back the money they have borrowed from you for setting it up, but as you will understand when you read Bharat Dogra's article on page 44, it can provide almost none of those subtle benefits which a natural forest provides its traditional inhabitants and on which they are so *totally dependent for their survival*.

A natural forest, as Sunderlal Bahuguna, the great Chipko leader of the Himalayas always says, provides "soil, water and pure air"—the very source of life—a plantation provides but "timber, resin and foreign exchange"—a source of commercial wealth to but a tiny minority.

Deforestation and climatic change

Furthermore, deforestation must ultimately lead to climatic change. It has already done so in many areas on a local level. But there is now every chance that further deforestation could lead to a global and irreversible climatic catastrophe. Already at the 1977 conference at Reykjavik, four of the world's leading climatologists (Kenneth Hare of Canada, Hermann Flohn of West Germany, Tom Malone and Reid Bryson of the USA) declared that, if we continued burning fossil fuels and cutting down forests at the present rate, a *global climatic catastrophe* was inevitable, a view which is now shared by most serious climatologists.

Since then, much has been learned of the global mechanisms which have evolved over the last 3,000 million years to assure world climatic stability, and in the absence of which, life on this planet would become extremely difficult. It has in particular become reasonably clear that if we tamper sufficiently with the structure and functioning of the biosphere, above all by destroying any more of the forests which once practically covered this planet and replacing them with endless stretches of monoculture and cement, a point must eventually be reached when these mechanisms can no longer function.

The well known atmospheric chemist, Dr Jim Lovelock, who has possibly looked at this question more closely than anyone else, describes on page 52

just why this must be so, and how the destruction of the Amazonian rainforest which you are helping to finance, could trigger off a climate 'flip'.

Let us not forget that the heavy rainfall in Amazonia over an area of something like seven million square kilometres is largely derived from evapo-transpiration from the Amazonian forests themselves. This means that a massive volume of water is continuously moving upwards and downwards over an enormous area. This, it seems, provides a very effective global cooling system, and to destroy it is to court disaster. Indeed a tentative model recently published in *Science* suggests that the mean temperature of the tropics, could, as a result, shift to something like 50° centigrade which would be sufficient to render a considerable part of our planet uninhabitable.

Who destroys the environment?

Needless to say, you pretend that it is the poor who destroy their environment. In your Fairfield Osborn Memorial Lecture you tell us that "poverty puts . . . severe—and often irreversible—strains on the natural environment." You also tell us that "at survival levels people are sometimes compelled to exploit their environment too intensively", and that "poverty has often resulted in long years of mismanagement of our natural resources, evidencing itself in over-grazing, erosion, denuded forests, and surface water pollution." You know that this is very misleading.

Of course the peasants have a greater impact on their forests today than they did thirty years ago. This is partly because their numbers have increased, but very much more because the vast bulk of their forests have been cut down by logging companies, which means that their activities which were quite tolerable when their forests were intact, have now become very destructive.

The same is true of the impact of peasant agriculture and of pastoralism. If the Masai, for instance, are over-grazing their land, it is that their cattle are confined to a quarter of the area that was once available to them, the rest having been confiscated by the former colonial government to satisfy commercial requirements. As already mentioned the same is true of the impact of pastoralists on the marginal lands of Sahel (see *The Ecologist* Vol II No 4).

Indeed, rather than destroy their environment, the villagers and tribesmen of India, for instance, are the only people in their country who are seriously engaged in protecting what remains of their forest. In Bihar, hundreds of Santal tribesmen have been killed in clashes with the army, when they tried to protect their sal forests from being transformed into eucalyptus plantations.

In the Himalayas the Chipko movement has been organised by the peasants themselves under the leadership of Sunderlal Bahuguna and Chandi Prasad Bhatt and is spreading throughout the area. The village women, when they see the commercial loggers approach, stream out of their villages to hug the trees, which they thereby protect with their own bodies from the depredations of government contractors (see *The Ecologist* Vol 13 No 5).

Environmental degradation in the Third World is thus but the inevitable consequence of present development policies, and Third World people are

poor, not as you would like to think, because they are 'underdeveloped' but because they have been impoverished by previous development, because, they have been robbed by developers of their means of sustenance, and are now condemned to scratching an ever more marginal existence from land that resembles ever more closely the surface of the moon.

They are poor, in fact, Mr Clausen, because you and your colleagues have made them poor, and, at the rate you are going, the poor and the starving will, in but a matter of decades, make up the bulk of humanity on this planet.

The irresponsibility of FAO

Consider what would in fact happen if you were to finance in its entirety, the plan for feeding the world described in the October 1971 issue of the FAO journal *Ceres*. "First", this journal tells us, "we would open up for intensive arable farming some seven million square kilometres in the Amazon basin and a smaller area in equatorial Africa. Second, we would make it possible to turn the warm deserts of the world into a sea of waving green, with some twelve million square kilometres in the Sahara alone, an area almost equal to the total cultivated land in the world at present. An unlimited supply of fresh water would also make it possible to provide perennial irrigation to the existing cultivated lands, to the vast areas under permanent pasture, and to the lands now under tropical forest."

This sounds like the LSD-inspired dream of some technology-obsessed adolescent. No serious person could really believe that it is a serious statement from a United Nations agency which received some 500 million dollars a year for research on strategies for feeding the hungry millions.

The sheer folly of such a plan should be evident to all. The great bulk of the seven million sq km of the Amazonian basin is, of course, unuseable for agriculture, the soil being largely lateritic and yielding two or three harvests at most before becoming desertified (see Jose Lutzenberger's article on pages 69 to 72). To clear it of its forests, as pointed out by Jim Lovelock, (see pages 52 to 55) might well trigger off a climatic catastrophe that could make agriculture impossible over a vast part of our planet.

Significantly, fourteen years after this plan was published, the twelve million sq km of the Sahara Desert, rather than being transformed into "a sea of waving green" is on the contrary rapidly expanding and threatening to engulf a major part of Africa, and this in spite of, or perhaps more realistically, because of, the money spent on FAO-inspired development schemes in this area.

Even the United Nations Environment Programme (UNEP) admitted at its 1977 Conference on Desertification that at least a third of the world's remaining agricultural land was, at current trends, being turned into a desert.

As for the unlimited supply of fresh water, this is also but a dream. Water shortages are likely to be one of the most serious problems facing the world in the next decades and they are caused precisely by those strategies which you and the FAO recommend for solving the world food problem: economic development which necessarily involves deforestation and intensive export-oriented agriculture.

As for the perennial irrigation which is supposed

to provide this water (see our book *The Social and Environmental Effects of Large Dams* and *The Ecologist* issue Vol 14 Nos 5/6), this can only result in large-scale water-logging and salinisation and hence in the creation of wet and salt encrusted deserts. Indeed even the FAO admits that more than fifty per cent of the land under perennial irrigation today is already suffering, in varying degrees, from these associated and eventually fatal evils, though none of these considerations have led Mr Saouma to modify his lunatic policies, as is clear from his insistence on turning Central Africa into a seven million sq km cattle-ranch (see Marcus Linear's article page 27).

Finally, when you finance these massive projects, you are more often than not allying yourself with criminal elements in Third World governments, in their bureaucracies and in the business community, both here and over there.

When doing the research for our book on *The Social and Environmental Effects of Large Dams* we found that an enormous proportion of the money you provide for large development schemes is simply syphoned off by crooked politicians. With regard to the Mahaweli scheme in Sri Lanka, for instance, we were assured, though of course no one can prove it, that at least thirty per cent of the funds provided by aid agencies for its construction, were diverted in this way. It is well known that the same is true of the funds provided for putting up the large Brazilian Dams that are being built today.

In many countries—Indonesia for instance—it is also generally conceded that each minister has his own private forest concession. In India, B B Vohra, one of the most respected authorities on forestry and agriculture in the country, and for many years a top civil servant, admits himself (see "How India's forests have been cut down" page 50) that the forests of that country have been cut down by what he refers to as "formidable mafias based on a triangular alliance between the corrupt bureaucrat, the corrupt politician and the corrupt businessman."

Do you realise that by financing such enterprises you are in effect becoming a member of this alliance? You are financing "institutionalised crime" on an unparalleled scale, what is more, crime that will not simply lead to a diversion of funds from a few rich individuals but to a diversion of essential resources from the rural masses you are supposed to be serving and without which they are condemned to irreversible impoverishment and starvation.

It may be a shock to you, Mr Clausen, to be brought down to earth in so rude a manner, but I strongly suggest you do not ignore this letter. You cannot be allowed to continue financing the destruction of the tropical world, the devastation of its remaining forests, the extermination of its wildlife nor the impoverishment and starvation of its human inhabitants.

Yours sincerely

Edward Goldsmith
Publisher of *The Ecologist*

Is the African Drought an Act of God or of Man?

by Anders Wijkman and Lloyd Timberlake



PHOTO: F. BOTTS/FAO

Drought-killed livestock beside the camp of Mali nomads.

It is taken for granted that the tens of millions who are already starving or threatened with starvation in Africa today are the victims of a drought, caused by an unpredictable and unpreventable reduction in rainfall. This is a convenient myth. In reality in many drought stricken areas the rainfall today is much the same as it always was. However the soil's water-retaining capacity has been reduced by massive deforestation and by the over-exploitation of land and water resources. Also the traditional knowledge and the will to co-operate, which previously enabled people to cope, have been eroded by economic development. The famine we are witnessing today is thus not an act of God, but the inevitable result of present development policies.

Ari Toubo Eibrahim, Niger's Minister of Agriculture, told an audience of foreign journalists in 1982 that his ministry had done away with all Western scientific definitions of drought which depended on measuring quantities of rainfall. It now uses another definition: "Not as much water as the people need".

This may be somewhat imprecise, but in fact it represents a new way of

looking at drought which could be helpful to agricultural and soil scientists. To a farmer, a drought is not necessarily about rainfall.

In the Caribbean, earthquakes, volcanoes and hurricanes are the most dramatic natural hazards. But drought and wind erosion cause more damage and economic loss. The Windward Islands—Dominica, Grenada, St Lucia and St Vincent—tend to slope steeply from the tops of peaks to the beaches. Bananas are the most important export, accounting for more than

seventy per cent of St Lucia's total agricultural exports.

The bananas are cultivated on lower hillslopes, which have variable rainfall. The unprotected topsoil beneath the trees is washed away by rain erosion and blown away by the wind. There is little topsoil to retain rainwater, so the rain which falls immediately moves down the slopes and away from the crops. In some areas, old channels built to remove water from former sugarcane fields help carry the water away from the bananas.

Anders Wijkman is Secretary General of the Swedish Red Cross and Lloyd Timberlake is Editorial Director of Earthscan, London, UK.

The Ecologist, Vol. 15, No. 1/2, 1985

In such conditions, the only meaningful measure of rainfall is on a day by day basis. Between 1970 and 1975, over twenty million dollars in banana producer revenues was lost due to "daily" drought conditions, even in the middle of the rainy season. Thus a crop can be damaged by "drought" in the midst of a better than average rainy season¹.

Scientists have observed the same effect in Haiti, where deforestation has led to catastrophic erosion. Rains may come, but the water runs quickly down the bare slopes, and the crops do not get the benefit. The plants have all the symptoms of drought affliction². Botanist Jack Ewel of the University of Florida has called this condition "pseudo-drought", but the only way to tell it from a "real" drought is by measuring the rainfall. To the farmer, the effect is exactly the same.

The Cagayan river valley in the north of Luzon island in the Philippines has undergone thorough study by the International Rice Research Institute (IRRI) of the Philippines, which is trying to develop a successful rice variety to flourish without irrigation there. The government started a large-scale irrigation project in the area, but abandoned it because it proved too expensive to keep up flows of water. The local people practise slash-and-burn agriculture, but do not allow time for adequate regeneration. This has led to erosion and loss of topsoil.

Lack of vegetation and topsoil means that the land cannot retain the water. The old irrigation channels actually take water away from the crops. So normal rains become "floods", and these are followed quickly by "droughts". And all of this can happen in years of normal average rainfall. After several years work, the IRRI has been unable to produce a rice strain that can flourish when drought follows quickly on the heels of total submersion.

These "droughts" during plentiful rainfall—with the damage to crops associated with seasons of little rain—make nonsense of the three types of drought defined by geographers:

- precipitation drought due to lack of rainfall;
- runoff drought due to low levels of river flow; and
- aquifer drought due to a lack of groundwater.

In fact, US disaster expert I. Burton defines drought in Tanzania not in terms of rainfall, but in terms of crop production³. A "major" drought is one that diminishes crop yields by as much as thirty per cent and a "severe" drought would "cause a loss of crop and animal production of about eight per cent". This definition not only removes drought from a measurement of rain but emphasises how narrow the margins are in Third World agriculture.

Rain, soil, drought and climate

When US climatologist C. W. Thornthwaite measured average monthly rainfall for Lagos, Sokoto (in northern Nigeria on the southern border of the Sahel region) and London, he found that Sokoto receives 100mm (4 inches) more rain a year than London⁴. But most of Sokoto's rain comes in July, August and September. There are five months during which Sokoto receives no rain at all. London's rain is evenly spread throughout the year.

The Sahel's rains come during a few months—when they come at all—and during those months it often comes in downpours. Most of the tropics, whether rainy or arid, gets its rain in seasons of intense rainfall between dry seasons. For these rains to do crops any good, the soil must retain water.

Yet most of Africa's soil is infertile sand and laterite soils (with a high content of iron and aluminium compounds, which become hard on exposure to sun and air). Sand and laterite not only erode easily, but hold little water compared to the clayey and humus-rich soils of the temperate zones. Laterite soils, when devegetated and exposed to sun and rain, can bake into a hard, concrete-like texture which is almost impossible to cultivate and absorbs virtually no rainfall. Soils throughout the tropics generally tend to be poorer than temperate soils. There are, however, many exceptions, such as the volcanic soils of Indonesia and Burundi, the

deep clays of the northeast coast of Brazil, the Gezira area of Sudan and south of Lake Chad.

In the tropics, soils naturally prone to erosion receive a harder buffeting by rainstorms. At a rainfall rate of 35mm (1.4ins) per hour, there is a sharp rise in rain's ability to cause "splash erosion": to knock crumbs of soil loose, beginning the process of wash erosion that cuts deep into the soil.

Vegetation helps fragile tropical soils to retain water. When this vegetation is removed, topsoil rapidly erodes, according to Dr W. E. Ormerod of the London School of Hygiene and Tropical Medicine (who assembled most of the above data on Sahel rainfall and soil).

Areas with widespread erosion are more prone to drought—because the soils can retain less and less water—and more prone to floods for the same reason.

The big droughts

But surely the major droughts of several years affecting several nations are due plainly and simply to lack of rain?

In early 1984, more than 150 million people in twenty-four western, eastern and southern African nations were "on the brink of starvation" because of droughts, and "famine has already caused deaths in some countries", according to a UN Food and Agriculture Organisation (FAO) report. In October 1983, FAO had launched a general alert concerning the food situation in Africa.

Rains in 1983-84 either did not come, or came too little, too early or too late. Countries outside the Sahel were also affected:

- Ethiopia: in four northern regions five million people were suffering after several consecutive years of drought. Eritrea had little rain except on the coast. Civil war also disrupted agriculture and food distribution schemes.
- Sudan: Eastern Sudan had a poor harvest, but refugees from Ethiopia continued to pour in. The British relief organisation OXFAM reported that in one camp the new arrivals were not fleeing war, but were drought refugees—farmers from Tigre and Wollo regions who were malnourished upon arrival.



PHOTO: Y. MULLER/FAO

A Gambian farmer in his millet field, destroyed by the 1984 droughts.

■ **Mozambique:** Central and southern areas had had little or no rain since 1979, and with drought affecting the entire region many of the rivers normally flowing into the country had dried up. The government reported in late 1983 that "for the rural population in many areas the only food supply during the last months were some fruits and leaves growing in the savannah forest". A UN report in early 1984 said 10,000 people had already died in three of the worst hit provinces and at least 750,000 people were in need of urgent aid.

■ **Zimbabwe:** All eight districts got some rain in late 1983, but the water supply remained critical, with cattle dying in some areas. Living cattle were weak, so in some areas there was no draught power, causing people to use hoes to plough, reducing the area they could plant and so affecting future harvests.

The weather was clearly to blame. But in each nation human activity made the disaster worse:

■ **Ethiopia:** Robert Lamb of UNEP reported that "the highlands, especially the regions of Wollo, Tigre and Gondor have been so over-farmed, overgrazed and deforested that efforts to scrape a bare living from this land threaten to destroy it permanently. The erosion resulting from overuse causes the Ethiopian highlands to lose one billion tonnes of topsoil

each year, according to UN estimates." The situation is so desperate that the government has begun a major resettlement scheme to transfer farmers from the highlands to underpopulated lowlands. Government officials have referred to the people to be moved as "environmental refugees"⁵

■ **Sudan:** For some time the Sahara has been encroaching upon the Sudan across a broad front at a rate of about five kilometres (3 miles) a year, claimed Sudanese President Jaafar Mohamed Al Nimeri in late 1983 at the FAO annual conference. In fact, scientists say that the process of desertification is less like the advance of a wall of sand than the outbreak of a blotchy skin disease, here and there over an area of 100-200sq km (60-125sq miles). Yet the Sudanese government continues to allow, even to encourage, over-cultivation and overgrazing in the afflicted areas. President Nimeri told the FAO meeting that the nation's motto was "agriculture and more agriculture".

■ **Mozambique:** Some 8,000-10,000 Mozambique National Resistance Movement fighters, widely reported to be backed by South Africa, destroyed homes, state-run shops, health centres and crops in late 1983 and early 1984, according to OXFAM. They prevented government delivery of relief supplies, frightened people out

of planting their crops and caused many to flee to safer areas, especially in the two southernmost provinces, Gaza and Inhambane. Mozambique has suffered both drought and destabilisation.

■ **Zimbabwe:** As Zimbabwe approached independence in 1980, the whites five per cent of the population—controlled fifty per cent of the land. Economic and security problems have meant that land redistribution since then has been slow. African families crowded onto poor quality "tribal lands" have been forced to overcultivate and deforest these fragile areas. Poor rainfall has been the final blow. The cattle-herding Ndebele people do not feel they are getting their fair share of the redistributed land under the Shona-dominated government of premier Mugabe. Their own land has been overgrazed by their herds, and the Ndebele appeared to be suffering the worst from the drought.

An FAO report released in July 1984 listed six African countries which would face severe food shortages right through 1985, due to the failures of three successive harvests. Zimbabwe and Mozambique were joined on the list by Angola, Botswana, Lesotho and Zambia.

The Sahel: 1968-1973

The 1968-73 Sahel drought, which most directly affected Chad, Mali, Mauritania, Niger, Senegal and Upper Volta (now called Burkina-Faso), was made worse by human action and inaction. According to a report to the 1977 UN Conference on Desertification (UNCOD), between 100,000 and 150,000 died in the region. And in a report by the Club du Sahel (an informal collection of countries giving aid to the region) and the Permanent Interstate Committee for Drought Control in the Region (CILSS—an organisation of Sahelian governments) the toll was 50,000-100,000⁶.

But the death toll tells little of the story. Jean Copans of the Centre for African Studies in Paris, claims that by 1974 there were 200,000 people in Niger (5 per cent of the population) completely dependent on food distribution; 250,000 people in Mauritania (20 per cent of the population) had moved to towns and were completely destitute; and in

Mali another 250,000 people (5 per cent) were totally dependent on aid in towns⁷.

The drought focused scientific and public attention on the Sahel in particular, and on the climate in general. Scientists checked to see if climatic change was to blame.

"No serious analysis of the available data is known to show a falling trend of rainfall in the zone over the period for which records are available", concluded E G Davy in a report for the UN World Meteorological Organisation; his findings also covered arid zones in India and the Middle East. Other climatologists agreed. Rainfall has been lower over the past 15-20 years than during the 1950s and early 1960s, but there is no evidence that this represents a major climate change. Scientists also looked at the historical record and found that rains have often failed in the Sahel. The nomadic Tuareg tribespeople have given earlier droughts names like "Forget your wife" and "The sale of children".

Alan Grainger of Oxford University, UK wrote in a 1982 Earthscan report: "Drought triggers a crisis, but does not cause it. Overcultivation and overgrazing weaken the land, allowing no margin when drought arrives. The high human pressure will continue during the drought, leading ultimately to even greater and more visible damage to the land and the deaths of large numbers of animals⁶."

After the drought, both the Club du Sahel and CILSS agreed that good self-sufficiency was the main goal of national and regional development. Over 1975-80, donor countries committed 7.5 billion dollars in aid. Yet only 24 per cent of this was actually directed toward agriculture, and less than 40 per cent of all agriculture and forestry projects were rural. The rest went to urban-based support projects. Of the 7.5 billion dollars only 8 per cent went for cropping which depends on rain rather than irrigation. (Some 28 per cent of all agricultural aid went to cash crops, most of which were exported. In 1960-70, almost all aid to "rainfed" cropping went to cotton and peanut projects.) Only 5 per cent of the 7.5 billion dollars went to livestock raising, a major

**Drought triggers a crisis,
but does not cause it.
Overcultivation and
overgrazing
weaken
the land, allowing
no margin when drought
arrives.**

activity in the region. Only 1.4 per cent of aid went to forestry/ecology in 1980, up from 0.35 per cent in 1975. Writing in 1983 of the ways in which both aid-giving and aid-receiving nations had been spending money to combat desertification, Dr Harold Dregne of Texas Tech University (US), noted: "Governments do not see desertification as a high-priority item. Rangeland deterioration, accelerated soil erosion and salinisation and waterlogging do not command attention until they become crisis items. Lip service is paid to combating desertification, but the political will is directed elsewhere. There seems to be little appreciation that a major goal of many developing nations, that of food self-sufficiency, cannot be attained if soil and plant resources are allowed to deteriorate⁸."

Each year the region falls further and further behind its goal of food self-sufficiency. Population is increasing at the rate of 2.5 per cent a year and cereal production rises at one per cent a year. Between 1955 and 1979, the land area under millet and sorghum increased at an average rate of 3.4 per cent per year, but production rose only 2.5 per cent, per year. Thus yields per hectare are falling. Food aid to the region never falls below 100,000 tonnes a year.

Why, when everyone seems agreed that food self-sufficiency is of utmost importance for the Sahel, does so little money go to agriculture?

First, the peasants who live in arid lands have little political power. The governments—civil servants, police, army—are in the capitals. So leaders like to keep aid in the capitals—whether it be food aid or the construction of buildings and other

projects which generate employment.

Second, for the same political reasons, Sahelian governments have a policy of providing cheap food to urban centres. So subsistence farmers rarely produce extra food to sell in the market—because the selling price does not pay for the fertiliser or better seed they need to increase production.

Third, the donor nations have few experts who can increase yields of sorghum and millet in arid lands, but do have experts at constructing roads and buildings, and they have companies manufacturing equipment for such purposes.

Yield per hectare of foods is falling because increasing populations tend to push farmers and herders onto marginal lands, and because plantations of cash crops get the best land along southern rivers, pushing subsistence farmers and nomads north towards the desert.

Fourth, livestock numbers are climbing toward their pre-drought (1968) levels. The contribution of domestic animals to desertification is a controversial issue, but overgrazing is certainly playing a role in degrading land in the Sahel. In 1980, the numbers of cows and sheep in the Sahel were at 70 per cent of their pre-drought levels; the numbers of goats, horses and donkeys, were equal to 1968 levels, according to a UNDP report.

"The situation has become extremely precarious in the Sudan, as in all countries in the region, and is today much more delicate than in the late 1960s. The next serious drought might well entail more severe consequences than the last one", predicted French rangeland expert Michel Baumer in 1982⁹.

"Whether you see the desert as advancing or the Sahel as losing ground, a real catastrophe is on the way", predicted Mamadou Mahamane, director of a Niger forestry aid project the same year⁶.

The Sahel today

In 1983, rains were either too late or too little across much of the Sahel, except in the south.

In Mauritania, the rains failed in 1982 and 1983. The Mauritanian government distributed food in late 1983, but this went to centres up to

100km (60 miles) away from some villages. There was a mass migration to the capital Nouakchott, which already contained half the country's population.

In Burkina-Faso (formerly called Upper Volta), there was almost no 1983 harvest in the north. Water-holes were only a quarter full. An aid worker in Oudalan reported that peasants there were as badly off as in 1972.

All the Sahelian countries except Niger were on the FAOs list of threatened African countries. Niger also suffered from late 1983 rains, but its government has perhaps done more than any other Sahelian government to promote food self-sufficiency, emphasising food rather than cash crops after the 1968-73 drought. Niger seems to be the lead country in the region in terms of extending advice and services to the countryside. Its leaders took quick action in 1983, selling off 5,000 head of cattle from government farms as a warning to pastoralists that grazing lands would not be sufficient for several months. It advised herders to move to better pastures and began to provide animal fodder to help get the herds through the 1983-84 dry season.

Latin America

Though current droughts may seem a uniquely African scourge, they also regularly hit Asia and Latin America.

Northeast Brazil, an area roughly the size of Europe, has a few very rich planters who own vast sugarcane plantations and many very poor peasants who own little or no land. It was in its fifth year of drought in 1983; some 20 million people were affected. In some areas, 90 per cent of the 1983 harvest was lost and people were reduced to eating lizards and cacti.

But here too, the problem was not only rain. "The drought in the Northeast is a creeping, not a sudden disaster", reported OXFAM. "Irregular and inadequate rainfall has been slowly and insidiously destroying peasant agriculture which has already been undermined by a grossly inequitable land tenure system."

In the high valleys of Bolivia and southern Peru, over two million

people had little food after the almost complete failure of the 1983 potato crop. It was Bolivia's worst natural disaster in more than a century. (The nation's eastern lowlands were flooded in March 1983, and some 40,500 hectares (100,000 acres) of prime agricultural land was destroyed.)

There was rain in the area toward the end of 1983. But as it came late, 1984 was also expected to be a bad year, and observers estimated it could take four years to overcome the effects of the 1983 drought.

Some 20 per cent of the land area of Latin America is either affected or likely to be affected by desertification, according to data prepared for a UN world map of desertification (1977). Maximum threats are in Chile, Argentina, Mexico and Peru. Among the Andes nations, according to the *Arid Lands Newsletter* (US): Bolivia is 15 per cent arid, 10 per cent semi-arid; Ecuador is 5 per cent semi-arid; Peru is 20 per cent arid; Venezuela is 5 per cent semi-arid.

Bolivia is one of the least developed nations in the region. Children have a life expectancy at birth of 49 years, compared to a tropical Latin American average of 62; 131 of every thousand infants die before their first birthday, compared to an average in tropical Latin America of 74 per thousand. The nation has a per capita GNP of 570 dollars, less than one third of the average of 1,890 dollars for tropical South America¹⁰.

The country is sparsely populated, but as only three per cent of the land is arable and as the rural people are especially poor, most peasants intensively farm small plots of poor soil. Fallow periods become shorter every year, according to OXFAM.

"No serious analysis of the available data is known to show a falling trend of rainfall in the zone over the period for which records are available"

"There are droughts in a few departments each year. But in 1983 drought stretched throughout the high valleys", they said.

In mid-1983, the Bolivian army announced that it would cultivate 607,000 hectares (1.5 million acres) of land it owned to offset potato shortages. But the fact that the army kept that much arable land out of circulation was regarded by some local relief workers as an indication of how lightly the government takes the plight of the rural smallholders.

Most of the cultivated soil in the Andes suffers erosion. Only 2.7 per cent of Peru is classified as "arable", but according to Peruvian forester Marc Dourojeannie, 30 per cent of that nation's territory is affected by water erosion, both on the arid western slopes, and on the humid eastern slopes, to which much of the agriculture is now moving.

The populations of the Andean countries of Bolivia, Ecuador and Peru are growing faster than the regional averages. As these populations seek more farmland, more land will become more prone to drought.

The Indian subcontinent

India has been more affected by drought and associated famine than any other country in the world. Floods in the heavily populated northern, eastern and coastal zones often make headlines, but over 80 per cent of the subcontinent is chronically drought-prone. In fact, 1983 was the first year that Africa had more drought victims than India. Even in that year, when drought affected 150 million Africans, 120 million Indians were suffering from less well publicised droughts.

The subcontinent has suffered at least a dozen great famines in which a million or more people have died in the past 1,000 years; there have been four major famines in the past 100 years.

L A Ramdas, an Indian geographer, reckoned in 1949 that the subcontinent was liable to a subcontinent-wide drought once every twenty years, but to drought in one or more provinces in one year out of every five. He estimated that widespread favourable conditions—

neither drought nor flood—could only be expected in one year out of every two.

The 1967-68 drought-related crop failures caused relatively little suffering, while the 1972-73 drought may have left as many as one million people dead of starvation, according to Canadian geographer Kenneth Hewitt, who wondered why the two very similar disasters should have had such different effects.

In 1967-68, the United States had good harvests and no major foreign bidders for its grain; there were no other major shortage disasters beside the one which occurred in India. India's grain production was down 19 per cent over the previous year in 1966-67, but in those two years approximately 20 per cent of the US wheat crop was shipped to India, on fairly favourable terms, according to Hewitt.

In 1972-73, drought again hit the southern and northwestern areas of the Indian subcontinent. But this time: both China and the Soviet Union had suffered bad harvests and put in bids for US grain; the Nixon administration, embattled by the Watergate scandal, was willing to sell to the highest bidder; industrialised nations had just recognised the seriousness of the Sahel drought, and were sending aid in that direction; India was hit by the sharply rising oil prices of the period, and could not afford grain; and India and Pakistan were embroiled in the Bangladesh secession.

"Human institutions that could have been used to avert famine were turning out to be no more reliable than the monsoon", wrote Hewitt. Political and other events outside India turned the drought into a major human disaster.

Induced "droughts": US and USSR

It is not only the peasants in poor tropical countries who can help cause drought conditions on land which previously provided thousands of people with a living. It can happen in both capitalist and communist societies of the North.

During the First World War, rapidly rising wheat prices encouraged US farmers to plough up the prairie grasses of the western Great Plains to plant wheat. The droughts of the early 1930s ruined many of



A Somali woman digs for water in a river bed. Even in the worst drought, some water is available.

these farmers and turned the area into what was then called "the Dust Bowl". Photos show mounds of sand and sandstorms which would never have occurred if the prairie grass and its tough root system had been left in place.

The US government responded with massive soil conservation and rehabilitation programmes, as many farmers migrated westwards to California. But as US environmentalist Erik Eckholm wrote "Tens of millions in the Third World today have no California to head for when the soils that sustain them blow away."¹¹ Few Third World governments have effective soil conservation programmes either.

In the 1950s, the Soviet Union began a "virgin land programme" as part of a national effort to increase grain production. Millions of hectares of the semi-arid Kazakh Steppes in Soviet Central Asia were ploughed and planted with cereals. Soviet soil scientists slowly realised that they were creating a desert by state decree. By 1965, most of the work had been halted; some of the

land was allowed to return to grass, and anti-erosion measures—wind-breaks, increased fallow periods and the use of machinery which leaves crop stubble in the fields—were taken on other stretches.

Yet at least three million hectares (7.4 million acres) still suffer severe erosion, and during dry spells sandstorms are a problem where there were none before¹².

US droughts: spreading the risk

While much of Africa and parts of Latin America and Asia were suffering droughts in 1983, the United States suffered a combination of heatwave and drought from the eastern states to Texas. The drought coincided with the Reagan administration's "payment-in-kind" (PIK) programme, which encouraged farmers not to plant and paid them in crops—corn, wheat, rice or cotton—for land not planted.

PIK was an effort to lower US grain reserves. In the late summer of 1983, officials were estimating that PIK had reduced the potential corn crop by 2.2 billion bushels and the

drought had done away with another one billion bushels. Farmers who bet on PIK did well; many of those who planted anyway suffered badly.

But US farmers suffer less in a drought than do Sahelian farmers, mainly because of the vast amounts of government help they get. In 1983, for the first time in US history, the government spent more supporting farmers (over 20 billion dollars), than the nation's total net farm income, according to US environmental writer David Sheridan.

Since the 1890s, there have been four major droughts in the US Great Plains, one about every 20 years: in the 1890s, 1910s, 1930s and 1950s, according to Richard Warrick of the Natural Hazards Information Centre, University of Colorado, US. There were less severe droughts in the 1870s and 1970s and during the summer of 1983¹³.

During the 1890s, there were widespread reports of starvation deaths and malnutrition in the drought-afflicted central and southern High Plains. There were similar reports during the 1910 drought from the Dakotas and eastern Montana. There was little relief effort or even the admission of a problem in either case, because the state governments were trying to lure in settlers by promoting the region as prosperous farmland.

Over the decades, human suffering has diminished from drought to drought in the US, largely because of state and federal programmes such as the Federal Crop Insurance Corporation, the Soil Conservation Service and the Agricultural Stabilization and Conservation Service.

These organisations, working with increasing numbers of highly educated farmers, introduced schemes to conserve water and protect its sources (evaporation control, seepage reduction); and to protect farmland (contouring, terracing, leaving fields fallow in summer, ploughing stubble back into the fields, drought-resistant crops and varieties, flexible cropping plans and land use regulations). Crop insurance, reserves of feed and grain and various types of financial reserves (including reasonable credit) add to security during drought.

The Ecologist, Vol. 15, No. 1/2, 1985

Between the 1930s and the late 1970s, the Great Plains also experienced a sixfold increase in irrigation.

According to Warrick, all of this has resulted in a shifting of the impact of droughts to higher levels. The harsh realities of starvation and migration facing the 1890s farmer, he says, were replaced locally during the 1950s "by the hardships of paying insurance premiums, by slightly premature retirements and by a lingering uneasiness over receiving government support. The national obligation to bail out the Plains farmer shifts much of the stress to the US citizen. This stress takes the form of increased taxation and of rising prices for scarce agricultural commodities."

But Warrick warns that the security of the US Great Plains farmer has been achieved through "an increasing commitment to greater social organisation and technological sophistication". It is a complex, very expensive structure. In a really severe drought, "the failure of these mechanisms under severe stress might result in far-ranging, unexpected disruptive consequences".

The Sahelian states are hardly in a position to mimic the details of the Great Plains agricultural system. But there are inexpensive technologies for water and cropland conservation and protection which are not getting to the Sahelian subsistence farmers because—as detailed above—little government and foreign aid ever reaches these

farmers. The basic concept of spreading the burden of disaster throughout the population has not yet been adopted in the Sahel or other drought-prone Third World areas. The Sahelian cities are artificially supported by food aid, most of which goes to governments and is used to keep urban elites content.

Instead of allowing the prices of agricultural products to rise to help pay for agricultural security and improvements, as in the US, Sahelian governments keep these artificially low to maintain stability and to buy loyalty in cities. Tax revenue does not get to the countryside, but stays in the cities, for the same reason.

Warrick's warning against dependency on technology sophistication and social organisation is even more important for such a delicate area as the Sahel. Many of the "big ideas" tried in the Sahel—massive irrigation projects, reorganisation of pastoral life and the settling of nomads—have failed.

The Sahelian nations lack the technology for big technical fixes, and do not know enough about how their rural societies operate to reorganise them effectively. Improvement in the Sahel will come, experts believe, only when the states find ways to make their farmers more secure and their efforts more profitable. This is also the way improvement began on the US Great Plains.

Brazil: the poor pay for disasters

The drought in northeastern Brazil, which entered its sixth year in early 1984, offers an example of a system



Africa — the region currently facing the greatest hardship as a result of widespread drought.

for coping with drought which places most of the burden on the poorest, and in some cases even makes the rich better off. (Much of the information in this section comes from relief workers in the area who did not wish to be quoted.)

The 19th century Brazilian Emperor Dom Pedro II pledged that no jewel would remain in his crown while the Northeast suffered drought. Today his crown is in a museum in southern Brazil, all its jewels in place.

This century the Northeast has suffered seventeen droughts, and in 1978 the Aerospace Centre in Sao Jose dos Campos warned the government of a seven-year drought (the basis of this prediction was not clear). There were some rains in late 1983, but residents still expected two more years of drought.

There are no reliable statistics on deaths and malnutrition in the nine states affected. In Pernambuco state alone some 45,000 people have died as the result of the five years of drought, according to the Federation of Rural Workers Unions of that state. One official estimate holds that three million poor people may die as direct and indirect results of the current drought.

"Foreign aid experts here are comparing the harm done to human life and nature with that caused by the current great drought in sub-Saharan Africa", said a report in the *New York Times* newspaper in late March 1984. It added that 25 million of the more than 30 million people in the area were affected, with 15 million suffering directly from hunger and thirst.

The *New York Times* quoted Valfrido Salmito, co-ordinator of the nation's relief effort, explaining why Brazil was not accepting major outside aid: "It is humiliating to ask for food. It's an embarrassing situation because Brazil is the fourth largest producer of grains in the world."

The hunger is the result of "a man-made drought, a fact which has been stressed by church and social agencies working with the poor", according to *Christian Aid Magazine*¹³ "Years of government mismanagement has seen large funds which should have gone to provide work and social reform for the poor allocated instead into bolstering the for-

tunes of large landowners and private industry."

The Brazilian government also tends toward either grand projects or schemes which attack symptoms but not the disease, according to local relief workers. Mario Andreazza, transport minister in the 1960s, advocated sending the poor "nordestinos" (northeasterners) to colonise the Amazon. This ended in disaster and extreme suffering among the colonists, and today large-scale ranching and logging industries have taken over in the Amazon. Andreazza, now interior minister, advocates a 2-3 billion dollar project to use the water of the Tocantins and Sao Francisco rivers to irrigate the Northeast.

Symptom-attacking schemes have enriched many people and given rise to what some locals call the "Industria da Seca" (drought industry). Among these was the building of a series of dams in Pernambuco despite warnings of flash floods by residents; floods washed away all of the dams.

Since 1979, the government has disbursed over 500 million dollars for "Emergency Work Fronts", reaching about two million drought victims by the end of 1983. These schemes pay unemployed rural workers or smallholders to help supplement lost income. Groups of 15-60 men work to deepen reservoirs, build earth barrages and clear land for when the rains finally come.

Yet most of this work—administered by the Brazilian national drought relief agency DNOCS, the army and the government agricultural extension agency EMATER—is done on the property of large landowners, helping the rich through the drought and making them better prepared for when it ends. The smallholders often find themselves

building earth barrages to hold water on the land of the rich and keep it away from their own small holdings.

Brazilian Vice-President Aureliano Chaves visited the Northeast in August 1983 and promised a further 18 million dollars. Yet much of this was to go to companies and "infrastructure" projects; only a third was for direct emergency relief. Meanwhile, the state government of Ceara was asking for nearly 3 million dollars just for one month's payments of the Emergency Work Fronts.

The government development agency for the Northeast, SUDENE, delivers water by tanker trucks; in the state of Rio Grande do Norte, water comes 130 km (80 miles) by train before 240 tankers take it to 130 cities and towns. Oil drums, tins and clay pots line the roads awaiting water trucks.

But truck routes are determined by local governments, often affected by local political interests. So large landowners may get daily deliveries. The fortunate poor along the routes to the big estates may get regular service, and those less fortunate may see a tanker every two weeks. Some landowners are conserving water by stopping their tenants and share-croppers from building their own wells and small dams, making them dependent on tanker deliveries to the landowners.

The Rural Workers Unions—while campaigning for simple things like time off for the Work Front workers to prepare their own land for when the drought ends—are also working for land reform. Hunger seems to be becoming a political issue in Brazil, especially among the prosperous middle class of the south. Media coverage of the 1983 floods in the south helped focus attention on the disaster in the Northeast. Magazines and television launched appeals for disaster victims, but the drought appeal raised less than the one for the flood victims of the prosperous south.

However, churches of the south were linking up with northeastern churches to channel money and materials, and such organisations as Rotary and Lions Clubs and the Red Cross were helping. These efforts might move Brazil toward spread-

Throughout the famine Ethiopia was a net exporter of food

ing the disaster burden more evenly, and not letting the poor bear the brunt.

Drought and famine

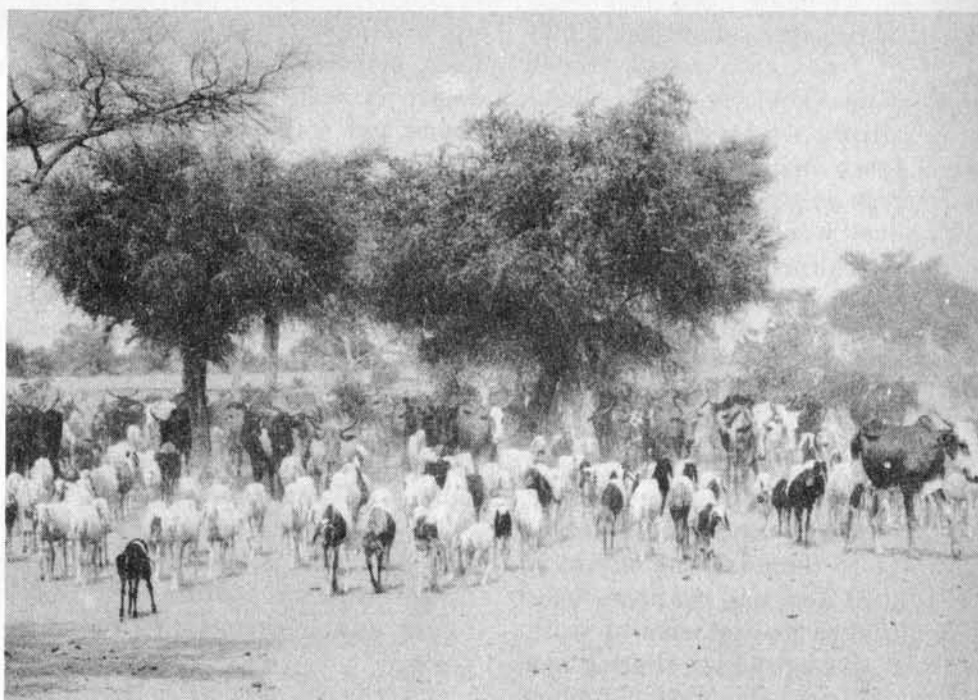
Just as poor rainfall is not the single and direct cause of drought, drought is not the single and direct cause of famine.

People do not starve in a drought-related famine simply because there is no food. No relief worker has starved to death during a drought; no journalist has died of hunger while covering a drought. Because of a complex set of economic, cultural and political factors, these people are "entitled" to food, to borrow a concept from economist Amartya Sen. Due to economic, cultural and political reasons, the "victims" of the famine are not entitled to food¹⁴.

Critics of this analysis point out that just because there is enough food available for journalists and relief workers to buy, does not necessarily mean there would be enough for all the hungry to buy if they had money.

The International Labour Organisation (ILO) studied the famines in Bengal in 1943, in Ethiopia in 1973 and in Bangladesh in 1974. It found that famine "chose" its victims by class and occupation, and there were many other factors at work besides food scarcity. In Bengal, food stocks were below the level of 1942 but were within the normal range of fluctuation. But wartime inflation had destroyed the Bengal currency. In Ethiopia, the lack of food was a highly localised phenomenon. But richer farmers had dismissed labourers and household staff because of low yields, so there were no wages to buy food. Dr John Rivers of the International Disaster Institute maintains that throughout the famine Ethiopia was a net exporter of food. In Bangladesh, there was actually more food available on a per person basis than in some recent non-famine years. But floods had disrupted industry and thus cut other employment opportunities¹⁵.

In each case people's options were diminished. Those who suffered most were the landless labourers and the pastoralists who had to sell their livelihood—their cattle—to survive, at a time when there was no market for cattle.



A mixed herd of cattle and sheep in Niger. Surrounded by drought-stricken nations in 1984, Niger produced a food surplus, partly by encouraging herders to sell excess animals.

B.M. Bhatia, in his 1967 study of Indian famines, also concluded that famine is not an imbalance between populations and natural resources, but that "instead of absolute want, famine under modern conditions has come to signify a sharp and abrupt rise in food prices which renders food beyond the reach of the poor who suffer starvation"¹⁶.

Flexibility and drought

Up to fairly recent times, people have relied on flexible responses to avoid the effects of droughts and other disasters.

The most basic form of flexibility is mobility, notes Canadian geographer Eric Waddell, who quotes an old Chinese proverb, "Of thirty ways to escape danger, running away is best"¹⁷.

Many of the coping mechanisms of the nomadic herdsman of the Sahel depend on movement to another area, but there are also other ways of increasing flexibility. The Wodaabe Fulani people of Niger not only move seasonally (transhumance) from the southern cropped fields during the dry season to the northern Sahelian pastures as the rains begin in June, but move out of camps in different directions daily to seek water and grass. They carefully diversify their herds, mixing camels, sheep and goats with cows. Different animals have different needs for water and pasture and

breed at different times, spreading risk. They trade their sheep, goats, hides, milk, butter and cheese with Hausa farmers for such staples as millet and sorghum. They rely on certain "fallback activities" such as short-term, spontaneous sedentarisation and wage labour. (The government has discouraged one traditional fallback activity: raiding other tribes.) They share animals in a very complex system of kinship duties and traditional exchanges. Animals may be given, loaned or rented out. A cow may be loaned until she has three calves; the borrower keeps the calves and returns the cow.

Flexibility can aid farmers as well as herders. New Guinea cultivators once moved into other areas during drought. But before doing so, they exhausted other possibilities. They typically planted gardens far apart and at different elevations, sowing crops resistant to various climate extremes—rain, drought, frost—in different gardens.

Recently, a number of factors have virtually eliminated the flexibility of response of many marginal people in drought-prone areas. Most governments discourage "mobility" as a response to an emergency, and have also tried to settle nomads. Yet through custom, the herders still keep large numbers of animals. Population pressure—especially the growing numbers of cultivators—

and government regulations such as grazing fees and range block systems also hinder mobility. Cultivators' flexibility is limited by their need to earn money to concentrating on perhaps only one cash crop. Also, their poverty and the lack of government agricultural extension means that they have little or no choice in the varieties of subsistence crops which they plant. Investing all one's efforts in one variety of one staple is dangerous, especially in drought-prone areas.

US geographer Ben Wisner, studying ways used by traditional societies to diminish the effects of drought in Kenya in the past, found 157 different mechanisms at work, most of them complex sharing systems among extended families. Looking at the same society recently, he found only two of these mechanisms still at work: leaving the countryside for urban jobs, and prayer¹⁸.

Flexibility today can cover a number of possibilities: the ability to move; a choice of types and varieties of cash and subsistence crops; a choice of markets for crops or livestock (in a drought, herders cannot sell their livestock locally because the bottom has dropped out of the market); alternative ways of making money, such as light industry; and government insurance schemes.

Flexibility is not only a defensive approach. Under the right conditions, it can even bring prosperity in drought-prone areas.

In the late 1920s a group of Mennonite Christians of German-Russian origin left Canada seeking cultural and religious freedom and settled in the remote "Chaco" region of Paraguay, some 750 km (465 miles) by small riverboat, rail and road from Asunción. Severe floods alternate with drought in this region of fine clayey and sandy soils.

Canadian geographers A. Hecht and J.W. Fretz, who studied three Mennonite settlements of almost 10,000 people, found that "in about one out of four years, major drought conditions exist in the Chaco". Yet after 50 years of hard struggle, these settlers, admittedly the offspring of immigrants with industrial and professional backgrounds, are flourishing¹⁹.

They appear to succeed by spread-

ing their options as widely as possible, planting cotton and castor beans as cash crops and peanuts, beans and sorghum as food crops. Harvests vary wildly from year to year; wheat proved so vulnerable to drought that the Mennonites ceased planting it in 1970. They have imported "buffalo grass" from Texas, which is an excellent cattle feed, does well on the Chaco soils and recovers quickly after a drought. Milk from their cattle is turned into cheese and butter at their own dairy, thus providing a market for their milk, which they would not be able to sell as milk. A local tree provides a resin which is sold for use in perfumes and various industrial purposes.

Other local industries include a tannery, a shoe factory, a metal foundry, tile and brick yards, a furniture factory, a blacksmith and tinsmiths. The Paraguayan Mennonites have even set up an agricultural experiment station.

Such industries help the settlements survive drought years such as 1975, when harvests were only 48 per cent of 1974 yields, in that the people can continue to produce things to sell. And today they also have supplies of saved capital upon which to draw.

Hecht and Fretz attribute the Mennonites' prosperity to "the ability to specialise in agricultural endeavours suitable to the environment" and the abandonment of unsuccessful crops attempted in the early years of the settlements. The authors draw from this the lesson that "environmentally sensitive regions are vulnerable when crop production strives to meet all needs", as in subsistence farming.

The Mennonites have moved beyond subsistence by overcoming great transport problems in getting products to markets, but more importantly by relying on a wide range of food and cash-producing options.

The cultivators of the Sahelian countryside lack agricultural options, markets which pay reasonable prices for any surpluses, and any manufacturing opportunities. The Mennonite experience offers the hope that well-considered tactics and economic development can offer at least the possibility of doing well amidst droughts.

References

1. O'Keefe, Phil, and Conway C., 1976 *Natural Hazards in the Windward Islands*. Disaster Research Unit Paper No. 13. Bradford, UK, University of Bradford.
2. Timberlake, L.F., 1983 *The Improbable Treaty: the Cartagena Convention and the Caribbean environment*. London, Earthscan.
3. Burton, I., Kates, R.W. and White, G.F., 1978 *The Environment as Hazard*. New York: Oxford University Press.
4. Thornthwaite cited in: Ormerod, W.E., 1978 "The relationship between economic development and ecological degradation: How degradation has occurred in West Africa and how its progress might be halted". In *Journal of Arid Environments* (1978) 1, 357-379. London, Academic Press Inc.
5. Lamb, Robert P., 1983 "Ethiopia's environmental refugees", in *Earthscan Feature Service*. London, Earthscan.
6. Grainger, Alan, 1982 *Desertification: how people make deserts, how people can stop, and why they don't*. London, Earthscan.
7. Copans, Jean, 1983 "The Sahelian drought: social sciences and the political economy of underdevelopment". In *Interpretations of Calamity*, K. Hewitt, ed., 83-97. Boston, Allen & Unwin.
8. Dregne, H.E., 1983 *Evaluation of the Implementation of the Plan of Action to Combat Desertification*. Nairobi, UNEP.
9. OXFAM, 1983 *Update on extreme weather conditions and the Third World*. Oxford, OXFAM.
10. Dourojeanni, M.J., 1982 *Renewable Natural Resources of Latin America and the Caribbean: Situation and trends*. Washington, World Wildlife Fund-US.
11. Eckholm, Erik, 1982 'Down to Earth', Pluto Press, Norton.
12. Hewitt, Kenneth, 1983 "Climatic hazards and agricultural development: some aspects of the problem in the Indo-Pakistan subcontinent". In *Interpretations of Calamity*, K. Hewitt, ed., 181-201. Boston, Allen & Unwin (original Ramdas reference Ramdas, L.A., 1949 "Rainfall in India: a brief review". In *Indian Journal of Agricultural Science* 29, 1-19.)
13. Warrick, R.A., 1983 "Drought in the US Great Plains: shifting social consequences?" In *Interpretations of Calamity*, K. Hewitt, ed., 67-82. Boston, Allen & Unwin.
14. Unsigned 1984 "Drought and food riots hit Brazil". London, *Christian Aid Magazine*, January/March 1984
15. Sen, Amartya, 1981 *Poverty and famines: an essay on entitlement and deprivation*. Oxford, Clarendon Press.
16. Rivers, John, 1983 pers comm.
17. Bhatia, B.M. 1967 *Famines in India, 1860-1965*, 2nd edn. New Delhi.
18. Waddell, Eric, 1983 "Coping with frosts, governments and disaster experts: some reflections based on a New Guinea experience and a perusal of the relevant literature". In *Interpretations of Calamity*, K. Hewitt, ed., 33-43. Boston, Allen & Unwin.
19. Wisner, Ben, 1983 pers comm.
20. Hecht, A. & Fretz, J.W., 1983 "Food productions under conditions of increased uncertainty: the settlement of the Paraguayan Chaco by Mennonite farmers". In *Interpretations of Calamity*, K. Hewitt, ed., 162-180. Boston, Allen & Unwin.

This article is an extract from the book by A. Wijkman and L. Timberlake, *Natural Disasters*, Earthscan, London, 1984.

Development induced Soil Erosion and Flash Floods in Malaysia

by E. Pushparajah

Economic development — in particular mining and logging operations — is causing serious erosion problems and increasing the sediment-load of rivers which in turn is causing ever worsening floods. Legislation has been passed to control such activities, but it is not enforced. These trends cannot be allowed to continue.

The problems associated with soil erosion have long been recognised all over the world. Malaysia too has her share of experiencing sedimentation of waterways, flash floods and other concomitant consequences. The effects of such erosion have been evident for a long time. However, the realisation of the need for soil conservation has not materialised in any concerted efforts; but the *ad hoc* actions taken in isolated instances seem to be a mere lip service to meeting the serious problems. The seriousness of the problem should have been accepted a long time ago, and is evidenced in a report by Daniel & Kulasingam (1974) where they state "excessive sediment from uncontrolled mining operations has buried the old township of Kuala Kubu under several feet of silt. Costly engineering work had to be carried out to save the township of Serendah and Betong from suffering a similar fate. Uncontrolled mining and logging practices together with clearing of jungle on steep slopes and undesirable cultural practices (clean weeding) adopted in the cultivation of rubber, gambier, pepper and pineapple have allowed vast quantities of sediments to be worked into the rivers. These have resulted in deterioration of many rivers in the country causing obstruction to navigation and increasing the tendency to flooding. The Klang and Kinta rivers are examples of these where large-scale flood mitigation work had to be carried out. It is on record that the Klang river was in the early days used for navigation by large rafts to transport tin ore. But excessive sedimentation over the years has caused this river to deteriorate so badly that even a small speedboat cannot be operated here today. Nearly all the major rivers in the country have naturally raised banks which have been formed by the deposition of silt when the rivers have been in flood. The banks of the Kelantan river in its lower reaches are as much as 6 metres higher than the surrounding country, whilst the banks of the Perak river are some 3–4.5 m higher than the surrounding country. The Pahang river has also built up high banks in its lower reaches".

Repeated occurrence of flash floods throughout the country and in particular in the Federal Territory even after heavy rains for a day, seem to be of common occurrence. Unless immediate measures are instituted

on a national basis, this situation may well deteriorate as massive agricultural and urban development, highway construction, logging and other infrastructural development activities continue. Such developmental activities are a necessity for progress. However, there is a need to reconcile such developments with the need for conservation of soil and environment and this can readily be achieved at economic costs with properly coordinated, planned and controlled development.

Impact of Land Clearing

The clearing of the land particularly through the opening of jungle leads to hydrological changes. It has been estimated (Daniel & Kulasingam, 1974) that during peak storms, runoff from land under plantation crops (rubber and oil palm) during a period of 13 months was twice that from a similar area under jungle, while on the other hand the low flows were halved. Similarly, Tang *et al* (1979) showed that increased activity in the forest would result in higher sedimentation. In an extensive study area in Kelantan, they found that sediment yield under undisturbed forest conditions was 100m³/km/year. This increased to 300m³ when 30-40 per cent of the catchment was under logging and dramatically rose to 2500m³ when the entire catchment was logged by mechanised logging. This, therefore, clearly shows that proper management of logging for example could minimise hydrological changes and hence erosion.

Erosion is the movement of soil away from the site, by water. The result would be an increase in the sediment load of waterways with the resulting silting up. A casual observation of some of the major rivers indicates that even as early as 1974-1975, a number of major waterways in the country were affected (Table 1).

The rivers in Selangor and Sg. Pari in Ipoh were relatively high in sediment load. In the case of Sg. Klang, the sediment load is derived mainly from urban development, particularly housing. A further study by Law and Mohsin (1982) carried out during the period October 1977 to 1978 (Table 2) gives the extent of the problem in some of the rivers in the Klang valley.

In fact, near Puchong Weir, there has been a steady and dramatic increase in the amount of suspended solids within a 4 year period of 1974-1977. The increase being fivefold (Table 2) is frightening.

E. Pushparajah is Assistant Director of Biology, RRIM, Kuala Lumpur.

TABLE 1. SEDIMENT LOAD OF SOME MAJOR RIVERS IN PENINSULAR MALAYSIA (1974/1975)*

River	Average suspended sediment (mg/litre)	Suspended load (tonnes/km ² /year)
<i>Kedah</i>		
Sg. Muda at Titi Syed Omar	57	98
<i>Perak</i>		
Sg. Pari at Ipoh	1740	5010
Sg. Bidor at M.S. 18	97	569
Sg. Ijok at Kg. Titi	27	142
Sg. Perak at Iskandar Bridge	19	53
<i>Selangor</i>		
Sg. Kelang at Puchong	1830	5068
Sg. Langat at Dengkil	459	1079
Sg. Selangor at Rantau Panjang	483	1772
<i>Johore</i>		
Sg. Muar at Buloh Kasap	32	65
Sg. Lenggong at M.S. 42	240	1052
<i>Pahang</i>		
Sg. Kuantan at Bukit Kerau	64	285
<i>Terengganu</i>		
Sg. Cherul at Ban Ho	9	41

*After Soong *et al* (1980) citing Tan (1976)

TABLE 2. SEDIMENT LOAD IN SOME RIVERS IN KLANG VALLEY*

Sampling Station	Suspended solids Range	(g/l) Mean
Sg. Kemansah (tributary of Sg. Kelang at Ulu Gombak)	0.01–0.04	0.024 ± 0.01
At confluence of Sg. Gombak and Sg. Kelang	0.08–0.25	0.118 ± 0.02
At 10 m from confluence in Sg. Gombak	0.58–2.52	1.60 ± 0.21
Near Puchong Weir (1977/78) i.	2.60–10.32	6.59 ± 0.92
(1976) ii.	neg.–6.24	2.09
(1974) iii.	0.14–2.73	1.18
5 km downstream from Puchong Weir	2.09–8.01	4.68 ± 0.68

*Values for all stations except Puchong Weir ii. and iii. are for period Oct. 1977 to Sept. 1978 and are from Law *et al*. The values for Puchong Weir ii. and iii. are for 1976 and 1974 respectively and are from DID reports.

TABLE 3. MEAN RUNOFF AND SOIL LOSS UNDER DIFFERENT COVERS

Treatment	Runoff (mm)	Runoff % Rain-fall	Soil Loss t/ha/yr
Bare	236	15	79
Legumes	70	5	11
Natural Covers	61	3	10

Conservation Practices

Agriculture is a major activity involving land clearing. On newly cleared areas without any vegetation, runoff and removal of sediment in the water could be large. Fortunately in Malaysia, agriculture, mainly plantation agriculture, there is a keen awareness of the need to conserve the soil. Hence generally within a reasonable period of time from clearing of land, conservation measures such as terraces, silt pits, and bunds are constructed. At the same time, in most of the areas particularly in commercial estates and large land development schemes, legume covers are established. Such practices of legume covers or maintenance of suitable covers result in rapid arrest of soil erosion.

In a new clearing, Ling *et al* (1979) showed that within a period of one year after land clearing, total soil losses was only 10-11 tons per hectare where some

cover was present, while under bare conditions, the losses were observed to be 79 tons per hectare (Table 3).

Such covers, particularly legume covers also reduce the surface runoff of water. The need for conservation measures even under mature rubber and oil palm has been demonstrated and such conservation measures are being increasingly implemented in the plantation sector.

In such developments as housing, highway construction, the common forms of conservation are turfing, use of wire-mesh protection, provision of concrete structures and use of sand bags. This may serve the purpose in the short run, but as they are expensive to maintain in the long run, they are often neglected. The amount of erosion taking place in new housing areas, highway construction, tin mines and destructive logging is readily evident in most parts of the country.

Need for Enforcement of Conservation

There are enough practices to counter soil erosion losses. Nevertheless, there is an apathy on implementing this. Appropriate legislation has been enacted over the years, including:-

- Land Conservation Act of 1960
- The Forest Enactment of 1934
- The Forest Rules of 1935
- The Water Enactment of 1935
- The Mining Enactment of 1935
- Environment Quality Act 1934
- Street, Drainage and Building (Amendment) Act 1978
- Provisions under Standard Logging Permit

Legislations lay down procedures and restrictions to ensure orderly exploitation of the natural resources of the country. They are all aimed at minimising the extent of soil erosion and thus conserving the conditions of natural rivers and streams. There are several deficiencies in some of these Acts. The need for revision or amendments cannot be denied. However, currently the deficiencies do not appear as important as enforcing the existing legislation. Reluctance to enforce is probably confounded by the lack of extension workers versed in conservation techniques. However, the need for an enforcement and extension body to be created on a national basis is critical.

References:

- Daniel, J.G. and Kulasingam, A. (1974) *Problems arising from large scale jungle clearing for agricultural use—The Malaysian Experience*. Preprint. International Expert Consultation on the use of improved technology for food production in rainfed areas of tropical Asia. Hyderabad, Khon Kaen, Kuala Lumpur, 24 Nov-13 Dec 1974. F.A.O.
- Law, A.L. and Mohammad Mohsin, A.K. (1982) Environmental studies of Kelang River. I Chemical, biological and microbiological parameters. *Malayan Nature Journal*, 33, part 3 & 4, 175-188.
- Ling, A.H., Tan, K.Y. and Syed Sofi Syed Omar (1979) Preliminary observations in some post clearing changes (in soil) properties: *Proc. Malaysian seminar on fertility and management of deforested land*. Soc. of Agr. Scientists, Sabah, Malaysia.
- Soong, N.K., Hamidas, G., Yeoh, C.S. and Tan, P.H. (1980) *Soil erosion and conservation in Peninsular Malaysia*. Monograph 69pp. Rubber Research Institute of Malaysia.
- Tang, T.H., Manokaran, N. and Blake, G.J. (1979) The status of hydrological studies at the Forest Research Institute Kepong. *Malayan Forester* Vol. 42, No. 2, 108-114.

DESTRUCTION OF WATER RESOURCES— The Most Critical Ecological Crisis of East Asia

by N.D. Jayal

The most critical ecological crisis of East Asia is the destruction of water resources which threatens the livelihood and indeed the survival of the rural population. This is the result of a number of factors including deforestation which leads to the drying up of rivers and springs, excessive withdrawals for large-scale irrigated agriculture, industry and urbanisation, and the pollution of rivers and groundwater with agricultural and industrial chemicals. An integrated water conservation policy is essential if large scale catastrophes are to be avoided.

The most serious ecological crises facing the countries in the East Asian region are also the most ignored in conservation research and action, partly because they arise from invisible processes of destruction or destabilisation of soil-water-vegetation systems, and partly because they affect the silent, overwhelmingly poor majority which directly depends on these resource systems for their livelihood and survival. The destruction of the life-support systems of the poor and marginal populations is the real cause of growing poverty and deprivation which is in turn related to a whole spectrum of related economic and social problems.

Probably the most important of the life-support system conservation problems deal with water resources. Water resources are central to life-support systems since water is a precondition for plant, animal and human life, and an essential input in all economic activity. The status of water resources, in turn, is related to the status of the soil and vegetation systems, and to the patterns of resource utilisation for economic activity. As the ancient Hindu text, the Chhandogya Upanishad, has stated "water is the essence of earth, plants are the essence of waters".

The destruction of water resources is increasingly becoming the most severe threat to survival in the countries of the South. This

destruction is arising in two ways:

- By the disruption of the hydrological cycle on which the renewability and sustained availability of water depends, and
- By the pollution of water systems with industrial and urban wastes.

Disruption of the Hydrological Cycle—Geographical Considerations

The tropical monsoon parts of East Asia have considerable similarity in overall ecological conditions. All the countries of this region are considered developing nations facing comparable economic, social and ecological problems.

This densely populated part of the world has agrarian rural populations where industrialisation and urbanisation are only beginning to make their impact felt. Practically all the countries in this region are mountainous or hilly and there are also archipelago nations. Many countries are littoral with extensive coastal regions. Major rivers are few and only those originating in the Himalaya are snow-fed, the others being dependent for perennial stream flow on water retentivity of soils in catchments. Being tropical countries, rainfall intensity is high and hence the water retaining soil layers are susceptible to erosion damage. Greater availability of solar radiation increases evaporation loss. Higher ambient temperatures and greater amount of rainfall accelerates weathering and soil formation by speeding up the mechanical, chemical and bacterial processes, but these factors result also in an extremely impoverished soil

due to continuous leaching. Most of the nutritive capital of the soil is actually locked up within the biomass and cycled rapidly, the balance of which can be maintained optimally only by the natural animal and plant communities. The water retentivity of the soils and its thermal and ionic balance are controlled by the organic content and particularly by the top humus layer. Steep slopes and thin soils which occur over extensive stretches of East Asia accelerate run-off. Ground water recharge is critically controlled by the top soil. Islands and coastal reaches of continental areas face the problems of saline water intrusion from the sea which can be countered only by adequate sub-surface fresh water flow. Since there is a seasonal abundance of fresh water during the monsoon, river channels have evolved to discharge and/or store the excess flow in lagoons, backwaters or extensive flood plains. Though in summer the backwater and estuarine regions become brackish due to sea-water ingress and are thus no longer potable, these regions have extremely rich and diverse biota including mangrove forests, prawn and other fishery grounds. Since the tropical days are uniform and more solar energy reaches the ground, evaporation loss can be very high unless the ground is well insulated. Where the multi-layered natural vegetation is destroyed, due to a series of physico-chemical changes tropical soils in many regions are transformed into laterite curtailing plant productivity drastically and reducing water retention.

Historical transformation in land-use

Most of the countries in this region have been part of colonial empires and resource management and exploitation were subjected to short-term profit motives of the colonial powers. Sustainability of the rate of exploitation of resources or even the long-term profitability were rarely taken into account. The science and technology of the West which evolved in a temperate system did not understand the tropical ecological conditions. Hence it rejected or transformed quickly the traditional subsistence life styles of the people which were integrated with the specific local conditions. This imposed change disrupted the balance between man and nature. Large-scale shifts in land-use favouring cash crops and surplus production in many cultivated crops for marketing destroyed soil resources. Exploitation of such renewable resources as forests through timber mining for export-oriented cash economies wiped out the resource capital rapidly affecting other inter-dependent basic resources like soil and water. Energy-intensive and centripetal patterns of development such as industrialisation and urbanisation quickly wiped out all local resources and siphoned off wastefully the resources from distant hinterlands. This process necessitated large-scale transfer of water, power, and biomass. The large hydro-electric and irrigation dams and inter-basin transfers of water, modify the natural drainage basins and disrupt the hydrological cycles, and thus not only destroy the land and its resources *in situ*, but also disrupt stabilised life styles elsewhere.

Drinking Water: A Vanishing Resource

During the current International Drinking Water Supply Decade fewer people in East Asia have access to clean and adequate water than they did in the 1970s. This has happened in spite of heavy financial outlays for drinking water schemes. Technological solutions for supplying scarce drinking water have failed to be adequate since the water crisis is the result of a failure to sustain water availability. This has resulted primarily from a rapid destruction in recent years of the

vegetation cover which earlier ensured the recharge of ground water. For example, in India, in the State of Maharashtra alone 17,112 villages were identified as facing drinking water problems at the beginning of the Sixth Plan. There are 15,302 villages likely to be covered in the ensuing Seventh Five-Year Plan. The rapid depletion of ground water resources has, however, increased the problem villages with no source of drinking water to a staggering 23,000 villages. This situation prevails in smaller or larger measure in almost all the states of the country, and is especially critical in the fragile Himalayan region. There is a serious water crisis in the northern hill districts of Uttar Pradesh where out of the 2,700 drinking water supply schemes provided by the State Government 2,300 have failed as a result of drying up of the sources of water.

In the neighbouring countries of Nepal, Thailand, and Malaysia, the situation is equally serious. A number of areas in Malaysia where water was previously available in abundance now face shortages. Water scarcity is a threat to human health and survival, particularly of vulnerable groups. Every day, about 25,000 people die worldwide either from shortage of water or due to the use of polluted water. Four out of five deaths of children in the developing countries are due to water-borne diseases. The death of more than 2,000 people in West Bengal early this year in a dysentery epidemic dramatises the ecological crisis leading to the drying up of ground water resources which forced people to resort to consuming contaminated pond water. It is the poor and marginal groups in these countries that are most vulnerable to this threat to survival that arises from the water crisis.

Floods and Drought—A Consequence of Deforestation and Mining in Vulnerable Catchments

India and its neighbouring countries, which have a seasonal tropical monsoon rainfall, have special problems in water management in catchments. Except for snow-fed rivers that rise from the Himalayas, all water sources in Peninsular and



PHOTO: MARK EDWARDS/EARTHSCAN

Deforestation in Nepal makes both homes and elaborately terraced fields vulnerable to floods when monsoon rains, unimpeded by vegetation, roar down the southern slopes of the Himalayas.

Eastern India depend on the capacity for retention of soils in catchment areas which are mostly on steep hill slopes dependent upon natural forests for protection. But it is in these vulnerable catchment areas that extensive deforestation is causing serious erosion which prevents controlled stream flow and causes recurring droughts and floods. As a consequence of the mismanagement of catchments, the flood-prone areas had doubled by 1980 to 40 million ha from 20 million ha in 1971. The disruption of the hydrological cycle in the tropical monsoon climate implies too much water in the rains, and too little the rest of the year. Thus, along with flood-prone areas the drought-prone areas are also expanding and now cover 59 million ha causing serious loss of productivity. In monetary terms the resulting losses are of staggering proportions. Nearly 50 per cent of the population live at the subsistence level lacking purchasing capacity to buy food, even if adequate food stocks were available for every citizen of the country. Studies indicate, however, that with proper land management and other inputs India can produce at least 300 million tonnes (mt) of foodgrains as against the present output in the US of 250-260 mt. The low level of food

production in India is not merely on account of lack of monetary or technological inputs, or even organisational weakness, but substantially on account of an overall lack of recognition of basic ecological principles for managing its critical resources of soil and water in a long-term viable and productive manner.

The Doon Valley in the Western Himalayan foothills is illustrative of how the lack of recognition of basic ecological principles can destroy the productive basis of an ecosystem. This valley is bountifully endowed with 2000m of rainfall, a large part of which has naturally percolated into the limestone belt running across the Himalayan range. Ecologically, the limestone belt has, therefore, had an essential function in conservation of water resources in the valley on which human survival and diverse economic activities such as agriculture, animal husbandry, and forestry, depend. In the last 20 years, however, a heavy demand has been made on the Doon Valley limestone for industrial raw material. The mining of the mineral has led to a 60 per cent decline in stream flow, and has dried up most springs which were recharged by water stored in the fissured limestone. As a result, a valley abundant in water faces water famine. Agricultural productivity has dropped by 50 per cent and livestock populations have similarly declined.

The Water Crisis Undermining Food Systems

Seventy per cent of Indian croplands are rain-fed. They have a fundamental role in producing high protein grains and fodder, oilseeds and pulses. Traditional rain-fed farming practices have evolved strategies to cope with the threat of drought. The central mechanism for

conservation of soil moisture in rain-fed food systems to maintain biological productivity has been the addition of organic matter to the soil to increase its water holding capacity. Genetic diversity in cropping systems has been a second insurance against drought.

Crop mixes and crop rotations have been chosen to minimise demands on soil moisture and to minimise risks of crop failure in case of soil moisture deficits. In the rain-fed red soils of the Deccan Plateau, a pulse crop like 'togare' or 'avare' is sown along with 'ragi'. By this practice, the best use is made of rainfall. If the rains are unfavourable for 'ragi', they often benefit the 'avare' or the 'togare' crop and vice versa so that at least one of the crops is obtained even with a poor or untimely rainfall, and a total crop failure is prevented. Ragi itself is one of the hardiest crops, well suited for dry farming. It can grow under conditions of very low rainfall and can withstand severe drought, reviving again with vigour after a good shower of rain. The crop is remarkably free from pests and diseases. Ragi straw is a valuable fodder, highly favoured both for draught and milch animals. Traditional dryland farming has often been called 'marginal', and dryland crops have been called inferior because they have not played a central role in cash crop farming. In cash crops, the productivity is defined on the basis of cash and income, not on the basis of food value and livelihoods, and water use efficiency of crops is rarely the guiding principle in the introduction of new crops.

Disruption of food systems through cash crops

The contemporary food crisis in Africa is in large part the result of the introduction of cash crops, such as groundnuts and cotton with nutrient and water requirements vastly different from the staple food crops. The traditional cropping patterns had, in contrast, strategies built into them to maintain productivity. "The crops that were cultivated were those that had demonstrated their genetic resilience and ecological adaptability so that they were less vulnerable to pests and

diseases. Intercropping too was a favourite strategy designed to maximise output within the environmental constraint and to keep at a minimum the risk of crop failure and concomitant starvation".¹

In India, the logic of replacing staple food crops by non-sustainable cropping patterns has been carried to the extreme by the shifting of large areas of rain-fed farmlands in states such as Gujarat and Karnataka for planting pulpwood species like *Eucalyptus* under so-called 'social forestry' schemes. *Eucalyptus* in rain-fed croplands invites desertification by undermining the biological productivity of these vulnerable ecosystems in the following three ways:

- The high water demand of the species depletes soil moisture and destroys ground water recharge, destabilising the hydrological cycle.
- The heavy nutrient demand creates a large annual deficit destabilising the nutrient cycle.
- The release of Allelo chemicals affects plant growth and soil organisms, thus further killing soil fertility.²

Inappropriate land use based on cropping patterns which demand higher withdrawals of moisture and nutrients from the soil are a major cause for the water crisis in drylands; aridisation results from not recognising that soil is a massive water resource and biological productivity depends entirely on conserving water resources available from this reservoir. In the absence of such awareness non-irrigated farming *per se*, is viewed as non-productive and this creates the demand for irrigation.

Conversion of forests to cash-crop plantations

The countries of South Asia produce a very significant portion of the cash crops available for the Western consumer market. Tea, rubber, coffee, cardamom, pepper, and oil palm, are cultivated extensively. This was a shift in land-use brought about during the colonial period which has continued subsequently. All these cash crops are extremely

During the past three decades India has spent over Rs. 100 billion on developing irrigation facilities and by the end of this year the total area covered by irrigation will be 40 mha.

Moreover, six mha of arable land have become unproductive through water-logging and another seven mha have been similarly affected by salinity.

sensitive to local micro-climatic conditions and all of them require humid tropical conditions. Extensive replacement of natural forests, particularly on hill slopes, has modified hydrological cycles, and modifications of original forest ecosystems have had consequences on the ecology of the region, ultimately detrimental to the cash crops also. The Nilgiri mountains of South India, the Darjeeling hills of East India, the Central Highlands of Sri Lanka are all examples where uncontrolled expansion of cash crops have marginalised previously productive regions. Disappearance of water resources has taken place in all these regions. Modernisation of cash crop cultivation by converting it into an industry consuming large amounts of pesticides and fertilisers have led to the poisoning of entire drainage basins and even coastal stretches since plantations are located in watersheds. With its large population dependent upon rice as the staple diet, East Asia is facing a serious shortage of land suitable for paddy cultivation. Rice, which requires a considerable amount of water for its cultivation, is normally grown in river valleys and low-lying areas. Pressures of population, on suitable areas have resulted in large-scale reclamation of shallow fresh water bodies, and swamps destroying water resources and the habitat for aquatic biota. In wet regions extension of rice cultivation upwards on hill slopes, where the people lack traditional expertise in land terracing and water management, has resulted in accelerated erosion and increased demand for water for irrigation. Loss of flood water storage areas coupled with greater silt load in the rivers have damaged stabilised river channels, accentuated flood damage, upset nutrient cycling pathways and groundwater recharge mechanisms. Such ramified adverse effects extend to coastal fisheries, estuarine mangroves and offshore coral reefs.

Ecological impact of large irrigation systems

Irrigation is as old as farming itself. What is new is the scale of projects. The traditional irrigation systems were mainly designed for protective irrigation and not adap-

ted to the modern intensive agriculture based on high-yielding crop varieties and multiple cropping techniques with increased fertiliser use requiring frequent irrigations.

The high water requirement of new cropping systems in turn creates large projects, which generate new instabilities in the ecosystem. The impounding of water in large dams often leads to deforestation in the catchment which changes the micro-climate and leads to soil erosion, thus decreasing the availability of water. In the command area, the transport of large volumes of water over large distances wastes water in seepage. The introduction of large volumes of water beyond the natural drainage capacity of the ecosystem disrupts the hydrological cycle and results in water-logging and salinity.

During the past three decades India has spent over Rs. 100 billion on developing irrigation facilities and by the end of this year the total

The contemporary food crisis in Africa is in large part the result of the introduction of cash crops, such as groundnuts and cotton whose nutrient and water requirements vastly differ from those of the staple food crops.

area covered by irrigation will be 40 mha. Moreover, six mha of arable lands has become unproductive through water-logging and another seven mha has been similarly affected by salinity.

The Kabini project is a good example of a water development project which became the cause of the disruption of the hydrological cycle in the basin. The Kabini project has a submersion area of 6,000 acres, but it led to the clear-felling of 30,000 acres of primeval forests in the catchments to rehabilitate displaced villages. As a consequence the local rainfall fell from 60 inches to 45 inches, and high siltation rates have already drastically reduced the life of the project. In the command area, large areas of well-developed coconut gardens and paddy fields have been laid waste through water-logging and salinity within two years of irrigation from the project. The story of the Kabini project is a classic case of how the water crisis is

being created by the very projects aimed at increasing water availability or stabilising water flows.

River valley projects are considered the usual solution to meeting the water needs of agriculture, or for controlling floods or mitigating drought. More than 1,554 large dams have been built in India during the past three decades. It is estimated that about 79 mha-metres of water can be used annually from the surface flow in Indian rivers but less than 25 mha-metres is actually utilised. The obvious answer so far has been to provide storage capacity in large reservoirs behind huge and costly dams. Between 1951 and 1980, India has spent Rs. 75,100 million on major or medium irrigation dams. Yet the return from this large investment has been far less than anticipated. In fact, where irrigated lands should yield at least 5 tonnes of grain per ha, in India it has remained at 1.7 tonnes per ha. The annual losses from irrigation projects caused by unexpectedly low water availability, heavy siltation reducing storage capacity, and water logging, now amount to Rs. 4,270 million. These large river valley projects on the one hand cause deforestation in catchments and on the other, cause water-logging in command areas. The option created for water use is therefore unsustainable. Non-sustainability is also built into the ecological impact of large irrigation works on cropping patterns. Large discharges demand uniformity, uniformity in discharge compels uniformity in cropping patterns which decreases genetic diversity and increases vulnerability to pests. Trees on farms are cut in the command area for land development, thus further destabilising soil moisture and disrupting the soil nutrient cycle and destroying the habitat of pest-predators.

Old irrigation systems have lasted for centuries because they were based on prudent use of water which saves catchments and prevents water-logging. The impounding was done by a series of small dams, or tanks. The distribution channels were lined with farm trees performing the dual function of preventing seepage and providing agricultural inputs in terms of fertiliser or fodder

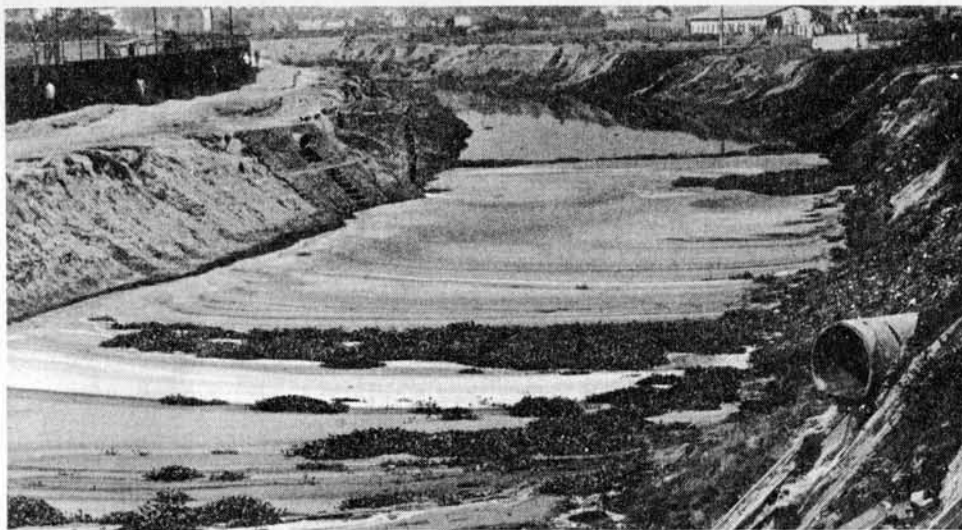


PHOTO: EARTHSCAN

Rivers and pools used for drinking are polluted by industrial activity.

which in turn improve soil structure and prevent water-logging or salinity.

The engineering interventions for water conservation have failed to view the central role of humus-forming trees as the most powerful means for water conservation in vulnerable catchments and in fragile tropical agricultural ecosystems. The integrity of the soil-vegetation-water system is crucial to water conservation both in forests and on farmlands. Water conservation strategies are therefore ultimately related to strategies for soil conservation and the conservation of genetic diversity in forests and croplands.

Poisoning by pollution

Development strategies based on resource and energy wasteful industrialisation patterns are a second major cause for the destruction of water resources. Such industrialisation first destroys water resources by putting heavy demands on raw materials which lead to excessive withdrawals of resources from ecosystems and destabilise the hydrological cycle. The four-fold increase of pulp and paper industries in India over the past decade has been associated with heavy negative externalities of deforestation and the destruction of natural forests and stable croplands for cultivation of pulpwood species like eucalyptus. Secondly, such resource intensive industries divert scarce water from vital needs such as drinking and irrigation. A pulp factory of Gwalior Rayon, at Nagda on the Chambal river, draws 114,000 cubic metres of water a day for which the company has built two reservoirs, 2km up-

stream of Nagda. Says Babulal Bharatiya, who has his farmlands adjacent to the reservoir: "During the summer, when water is very scarce, the factory does not allow the farmers to irrigate their land. Security guards, who keep a round the clock vigil, even assault the villagers".

Finally, the destruction of water resources is caused by the pollution of water systems by these industries. According to Umrao Singh, a peasant of Nagda village, the Gwalior Rayon factory management did not even bother to warn the villagers that they were discharging the effluents containing toxic chemicals. "Chambal, the life-giver, had undergone an overnight transformation into a killer".³ The experience of the villages along the Chambal river has also been the experience of villages along the Tungabhadra river in Karnataka where an associated polyfibre plant is seriously polluting the river. In Kerala, the rayon mill at Mavoor has destroyed the drinking water and fisheries potential of the Chaliyar river. In none of these cases have the hazards and costs of water pollution been identified by the official water pollution control agencies. Assessing and controlling water pollution has repeatedly been a task left to affected villagers and citizens groups. As a result, in spite of India being a water-rich country, 70 per cent of India's water resources are polluted.

The situation in other East Asian countries is similar. Sababat Alam Malaysia (Friends of the Earth Malaysia) reports that by the year

1979, the Malaysian river system was so polluted that 42 major rivers in Peninsular Malaysia were officially declared 'dead', the primary pollutants being oil palm and rubber effluents, sewage and industrial wastes. This meant that rivers no longer sustained fish, shell fish, shrimps or crabs and were also unfit for drinking or washing. Besides killing riverine and marine life, pollution of rivers also threatens the health of villagers who rely on water from such contaminated aquatic environs for purposes of drinking, washing, cooking and bathing.

At times this new pollution is brazenly transferred from a rich country to a poor country because of public pressure in the rich country. A spokesman for Kawasaki Steel had this to say about the recent move of a sintering plant from Chiba, Japan to Mindanao, Philippines: "Chiba citizens need not be afraid because we are moving the sintering plant to Mindanao". Another Kawasaki executive further explained, "People in the Philippines don't know anything about pollution".⁴

An Ecological approach to Water Conservation

Conventional meanings of water conservation reflect the engineering approach to handling natural resource crises. Water conservation in this approach is reduced to impounding river water in large dams, to building large networks of concrete lined canals. This water conservation strategy does not solve the water crisis of the marginal populations. A water conservation strategy that aims at being sustainable needs to be based on ecological principles. It has to recognise that water resources get destroyed either by excessive withdrawals of natural resources from an ecosystem (disruption of the hydrological cycle) or by excessive additions of wastes into an ecosystem (pollution). Conservation of water in Asian societies means avoiding the *destructive* and distorted use of resources. It means respecting essential ecological processes like the hydrological cycle. It means respecting the difference between vital and non-vital needs, and ensuring that the vital needs of the poor or the marginal are satis-

fied before essential resources like water are diverted to non-vital needs.

IUCN's role in Water Conservation

In spite of the water crisis being the most severe crisis in tropical countries of East Asia, none of these countries yet have a water-use policy. Such a policy would need to be based on scientific information about the status of water resources, the processes that are causing the destruction of these resources, the processes that will restore their sustained availability, a complete assessment of conflicting demands on water resources, and a rational water resource allocation plan for satisfying diverse water needs.

IUCN can fulfil an important role in focusing upon these emerging problems in the affected countries. It can provide technical expertise where necessary. It could assist in developing and funding research programmes and providing technical support for formulating policies and plans related to water conservation.

By way of illustration, in most East Asian countries there is still inadequate scientific data available on hydrological regimes under different vegetational conditions, both in forests and on croplands. Such data are essential for proper selection of species and species mixes for stabilising vulnerable catchments through afforestation and for determination of cropping patterns for sustainable food production, both under irrigated and under rain-fed conditions. Research in these areas would discover linkages of the soil-water-vegetation systems and would integrate components of the conservation strategy which have so far remained fragmented. The role of biological diversity in maintaining the essential ecological processes of soil and water conservation has not yet received the attention it merits. Such knowledge is essential for basing sustainable development on the Biosphere Reserve model the development of which diverges substantially from the engineering ap-

proach to development in favour of a policy, which conserves and carefully husband the basic resources of soil, water and biota with the total participation of the society for its collective well-being. The whole region must eventually become a Biosphere Reserve and the world a true Biosphere where man is once again an integral component of an intricate self-sustaining system, and not a self-destructive exploiter.⁵

References

- 1 Daddieh C, 1974. Self-sufficiency Destroyed. *Development Forum* July–August 1984.
- 2 Bandyopadhyay J, *et al*, 1984. Ecology of Eucalyptus and Farm Forestry Policy in Rainfed Areas, National Conference on Eucalyptus, Kerala Forest Research Institute, Peechi.
- 3 Padmanabhan V T, 1983. The Gas Chamber on the Chambal, People's Union for Civil Liberties, New Delhi, 21pp.
- 4 Smith D V, 1980. Management of Water Resources, UNAPDI, 7pp.
- 5 Jayal N D, 1983. The ecological and economic consequences of quarrying in Mussoorie hills—scientific imperatives for its termination based on ecosystem evaluation, Mimeograph.

African Journal of Ecology

Published for the East African Wildlife Society

African Journal of Ecology (formerly East African Wildlife Journal) was inaugurated to meet the growing need for an authoritative organ for the dissemination of the results of scientific research into East Africa's wildlife. Its scope has since been widened to include original research papers which make a significant contribution to the study of the plant and animal ecology of Africa, and comprehensive reviews and brief communications are now regular features.

Manuscripts for publication should be submitted to the Editor, Professor F.I.B. Kayanja, Department of Veterinary Anatomy and Histology, Makerere University, P.O. Box 7062, Kampala, Uganda

Subscriptions and free specimen copies are available from **Blackwell Scientific Publications Ltd, P.O. Box 88, Oxford, England**



Subscription Information

African Journal of Ecology is published quarterly.

Subscription rates for 1985 are:

£60.00 (U.K.), £72.00 (overseas),
\$126.00 (U.S.A. & Canada)
post free

BLACKWELL SCIENTIFIC PUBLICATIONS LTD

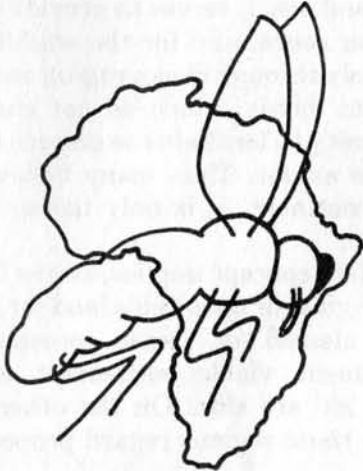
P.O. Box 88, Oxford, England.

THE TSETSE WAR

by Marcus Linear

A multi million dollar, 40-year UNO aid programme is threatening 40 African countries with ecological disaster and hence with massive poverty and famine. Headed by the FAO and with large contributions from the World Bank, and various bi-lateral aid bodies, as well as the Common Market's European Development Fund (EDF), the programme aims at eradicating tsetse flies by pesticide spraying over 7m sq. km. of land, which is, according to the agency, mostly tropical forest and woodland.

The scheme's critic's condemn it on four counts:



If tsetse are to be wiped out, why use 'hard' chemicals banned as too hazardous for use in the West instead of available safer chemicals?

If beef production is the aim, there are alternative methods of raising cattle which do not require exterminating the tsetse fly with the terrible pollution this involves.

If meat (as opposed to specifically beef) production is the aim then it would be ecologically and economically better to farm indigenous animals rather than cattle.

In any case, the rural poor cannot conceivably afford commercially produced meat, which must inevitably be exported to the West. At the same time they will have been deprived of their forests on which they now depend for free food and other essential resources. Also without the forests their streams and springs will dry up, their soil will blow away and they will be condemned to inevitable impoverishment and famine.

Why is the aid industry so keen on promoting this callous enterprise?

Many people today have accepted the agency's—and the whole aid industry's— inability to solve the problem of world hunger. Too few, however, are aware of a more disquieting reality: that it is precisely the operations of the FAO, and of the agribusiness food system which it fronts and promotes, which are a major root cause of worsening hunger in the world, and the poisoning of the poor.

To appreciate why this is so requires a systematic perspective, which is difficult enough to obtain even without the massive obfuscation practised by highly polished PR campaigns, such as are constantly maintained by the aid industry, and aiming to prove just the contrary.

However, an aid to understanding is to be found in the study of the FAO's 'Tsetse War'. This offers a paradigm of errors and of false directions which have trapped the agency, and its supporters, on the treadmill of addictive, inappropriate and destructive tech-

nology called by critics the 'technological fix'. A multi-billion dollar campaign, already under way for a decade and planned to continue for thirty years or more, and affecting about forty African countries, it is one of the FAO's most extensive, most enduring and most heatedly criticised field operations; and while undoubtedly bringing vast benefits to its pesticide-pushing promoters, it is—as will become clear—a dangerously damaging and cynical exercise in futility, at the cost of impoverishment and empoisonment of the defenceless poor of the vast regions under attack.

The aim of the campaign was initially to eradicate—though later, in the light of realities on the ground, this was reduced to 'control'—tsetse flies over seventy per cent of their African habitat, encompassing in all ten million square kilometres. This vast area, greater in size than the United States or, for the total infested area, than China or Canada, was according to FAO's publicity at the time "almost all rainforest or woodland".¹

The declared object of the exercise is to clear this land in order to introduce 120 million additional head of cattle, to produce some 1.5 million tonnes of low-grade beef a year at the end of this forty-year period. Who would actually produce this beef and who consume it, were unspecified in the initial publicity or programme.

Marcus Linear is a free-lance writer concerned with environmental problems and the ecological impacts of western technology, especially in the Third World. He has written for various English and European newspapers and technical journals. His latest book, on the destruction of Third World environments by large-scale agricultural and industrial schemes, often financed by multilateral development banks will be published in spring 1985 by Pluto Press under the title *Zapping the Third World*.

Tsetse—Keeping Africa Green

Tsetse flies are small brown insects, roughly the size and shape of the common housefly. Their innocuous appearance is belied by their vicious bite and vampirical life-style, for they feed exclusively on the blood of other living creatures. They are only known in Africa south of the Sahara, apart from an insignificant pocket in Arabia, which probably migrated across the Red Sea, and which may well be extinct today.² There is, however, some fossil evidence that they may once have lived in North America, millions of years ago.³

Some twenty different species or subspecies of tsetse flies are classified under the generic name *Glossina*. Of these, although all can become infected with and are capable of transmitting the sleeping sickness trypanosomes, ecological considerations limit this transmission to about six species. Other insects can also transmit this disease.

The trypanosomes—gimlet-shaped microbes for most of their lives—are protozoa comprising about 100 different species or varieties. African trypanosomiasis, as the disease is called, only involves four species: *T. vivax*, *T. congolense*, *T. simiae* and *T. brucei*. A fifth trypanosome, *T. evansi* (which is world-wide in distribution), will probably turn out to be a form of *T. brucei*.⁴ This last, *T. brucei*, is the cause of sleeping sickness in man, although not all forms of it are infective for humans, while the others are involved in animal trypanosomiasis, often called by the Zulu word 'nagana', after the name this people used for the disease they recognised in their cattle.

The animal version, nagana, takes its heaviest toll among domestic animals, none of which are among the original fauna of Africa, but 'exotic' imports over the last few thousand years. In contrast, local or 'indigenous' animals are largely resistant to the disease if not completely immune. If they were not, they would obviously have been wiped out by it long since.

Tsetse is mainly to be found in areas which scientists call the *Grenzwildnis*, the intermediate or frontier wilderness zones, or 'interface' zones between conflicting tribes or peoples. These are often poorly watered uplands or watersheds between natural drainage systems, which form in themselves the limits of geographically defined ecological units. Such areas, thus, as are less suitable or desirable as human habitats, separating ecologically-based ethnic communities which Edward Goldsmith has described as 'ethnocracies'.⁵

Human settlement and activity tend to drive out the tsetse, by destroying the bush or forest cover the fly needs as resting or breeding places. People settle in the better land, and clear the bush as first step in the system of traditional shifting or rotational agriculture—a system which was practiced for millenia until the arrival of the slave-traders, colonists and developers.

Under this traditional system, the bush is chopped down flush with the soil and burnt; but many of the roots remain alive in the cropland, each year's regrowth being chopped back during planting and cultivation as it appears. Rotational cycles are short (and under the pressure of development becoming ever

shorter) so that when agriculture of the area again ceases, the bush regenerates.

When, as so often happens today, crop growing is disturbed by wars and other forms of civil unrest, frequently leading to mass migration, the same regrowth occurs throughout the abandoned farming areas, followed by rapid recolonisation by the tsetse fly. Indeed, the fly appears to lurk in marginal, uninhabited areas awaiting opportunities to move into more favoured regions, whenever bush cover reappears to offer it a habitat and wild animals return to ensure its food supply. With the constant turmoil of wars and insurgency blighting the stability of rural Africa today, this is a common, widespread occurrence.

But in less troubled times, while the fly is kept at bay in its *Grenzwildnis* realm by established, intensive human activity in land use, it serves to provide protection for these border zones, and for the wildlife they contain. This is mainly through discouraging encroachment by pastoralists' herds, which do not share the wild animals' immunity to tsetse-borne disease to anything like the same extent. Thus many believe that over much of the continent, it is only tsetse that is keeping Africa green.

As the *Grenzwildnis* concept implies, tsetse habitat is agriculturally marginal or unsuitable land for human habitat. Even if cleared of tsetse, prospects of maintaining permanent viable settlement without permanent outside aid are slim. On the other hand, those familiar with these regions regard proposals to

Two few are aware of a more disquieting reality; that it is precisely the operations of the FAO, and of the agribusiness food system which it fronts and promotes, which are a major root cause of worsening hunger in the world, and the poisoning of the poor.

introduce what would, in effect, be uncontrollable numbers of livestock with dismay. The primary cause of spreading desertification in such ecologically fragile areas is overstocking with cattle.

The only management systems possible for running cattle in such uninhabited areas are either that of the nomadic (or seminomadic) pastoralists, or imported 'high-tech' systems on the western model. The former—the nomads—are renowned for their tendency to disappear over the distant hills with their herds whenever the census taker or taxman appears on his annual rounds; they are invariably deaf to suggestions that they limit the size of their cattle herds, or that they cease cutting down trees to feed them in times of fodder shortage. In the case of the latter, with expensive imported management and other inputs, such 'high tech' systems on the western model. The former out marketing their produce in the richer areas. And they would be equally subject to the danger of overstocking and consequent environmental damage, in that the marginal economics of such undertakings would inevitably place tremendous pressure on them

to maximise returns in any profit-motivated enterprise.

Lines of Attack

Eradication of the tsetse fly has long been the dream of Africa's colonial settlers and developers, even from the time of the early explorers. In 1858, David Livingstone was asked, when leaving Britain to explore the Zambezi, to carefully note the number of tsetse bites needed to kill an ox—a familiar inconvenience as tsetse flies killed off his riding animals, and reduced the intrepid doctor to crossing Africa on foot.⁶

Two years later Sir Richard Burton, who knew the pest from his explorations further north, around the sources of the Nile, wrote: "It is difficult to conceive the purpose for which this plague was placed in a land so eminently fitted for breeding cattle . . . Possibly at some future date, when the land becomes valuable, the tsetse may be exterminated by the introduction of some insectivorous bird, which will be the greatest benefactor that Central Africa ever knew".⁷

Burton's bird has not yet been discovered; but his idea, well over a century ago, had perhaps more ecological virtue than later methods when attempts at tsetse eradication actually began. They commenced under various colonial regimes, but notably the British, in the early years of this century. Their initial attack was aimed at the fly's habitat and wild animal hosts, destruction of which was undertaken at considerable ecological and financial cost, but with little if any long term effect on the size or distribution of tsetse populations. Wide scale spraying only came into vogue after the Second World War, with its introduction of cheap, man-made insecticides.

The weaponry overwhelmingly deployed in this attack⁸ consists of the 'hard' pesticides—DDT, lindane (BHC gamma isomer) and the deadly range of 'drins' (dieldrin, aldrin, endrin etc.), or the more recently developed Thiodan (endosulfan)—known collectively as chlorinated hydrocarbons, or organochlorines. The more lethal organophosphates—malathion, parathion and dichlorvos—are also employed, although not on a wide scale, and often for testing or comparative research purposes.

All of these poisons are manufactured in the West. Although use of the most notorious of them, DDT, was first banned or severely restricted following the 1962 publication of Rachel Carson's *Silent Spring*, the Second International Conference on Environmental Futures in Reykjavik learnt in 1977 that more DDT was then being manufactured in the West than before the prohibitions were imposed.

Today, however, the biggest world producer of DDT—as well as its biggest consumer—is India, where hard pesticides are produced in almost unlimited quantities. Another important non-western producer of this and many other highly toxic agrichemicals is Israel. Both of these countries are predominantly dependent on agricultural exports for their foreign currency earnings; the cash crop agriculture of both depends utterly upon a massive blanket of pesticides.

They are both also large-scale exporters of such hazardous chemicals. Indeed, so complex are the rami-

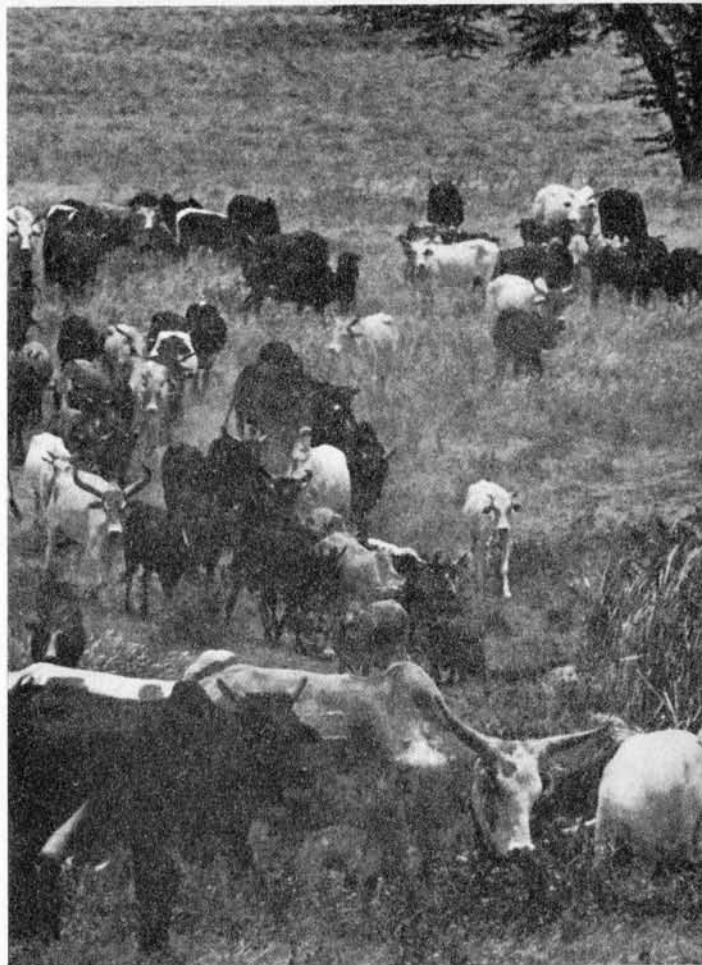


PHOTO: FAO

Some cattle in Africa have a degree of tolerance to nagana almost as developed as that of indigenous wild animals.

fications and pathways of the poison pushers' trade today that it is wellnigh impossible to trace with any certainty the original source of many such products, which are imported in bulk as 'active ingredients', mixed or 'formulated' with others into lethal cocktails, and used locally or—where banned—re-exported for use in more 'permissive' areas under various, and often changing, brand names.

The 'drins' on the other hand are easier to trace back to their origin. They are produced exclusively in the West, at the Royal Dutch Shell Company's plant at Pernis, on the outskirts of Rotterdam, apart from small quantities of endrin produced at Velsicol's plant at Memphis, Tennessee. Royal Dutch Shell's entire production is marketed by the London-based Shell International.

Use of all these organochlorines, which we manufacture in thousands of tonnes per year, is now totally banned throughout the advanced countries for all practical purposes, with the notable exception of endosulfan, produced under the trade name Thiodan by the Hoechst AG's West German plant near Frankfurt, and by ICI in the UK. They are all dumped in the poorer tropical countries which have not yet instituted such bans, the sales most often being paid for with money loaned under the title of 'aid'. In this way, western chemical producers have been able to overcome the embarrassment of surplus production capacity and, together with the application specialists and aid agencies with whom they closely work, to make considerable profits from this dubious trade.

In the early days, spraying was carried out mainly by locally trained semi-skilled African 'control assistants', using back-pack tanks of pesticide and hand pumps with manually operated spray nozzles. The method works well. Insecticide dosage can be accurately controlled, and the spray directed precisely at the fly's resting places.

The method has one great advantage, in countries suffering—as tsetse areas almost invariably do—from chronic mass unemployment; that of being extremely labour-intensive. Another is that, with proper control of the spray teams' activities, pollution of human and 'non-target' animal environments can be strictly limited. And lastly, it is not only the most economical method of applying chemical insecticides to accessible tsetse habitat (costs per unit of area treated generally being reckoned at one quarter to one third of those incurred in aerial spraying), but perhaps more importantly, the largest part of the money spent on such 'hand-held' operations goes into the local economy in the form of wages and allowances.

Its disadvantage however, is that the workers are constantly exposed to the chemicals, although it should be added that this is rarely admitted either by the authorities concerned or, perhaps for obvious reasons, by the pesticide companies supplying the poisons and promoting alternative 'high tech' methods of application. While spray operatives can be largely protected against such risks by impervious clothing, boots and filtering face-masks—as they are by law in the rich countries—wearing such equipment in the humid heat of tropical bush areas causes intolerable discomfort, even involving the risk of fungal skin complaints or heat-exhaustion which can lead to collapse. This, coupled with the general hardship and discomforts of living for months in remote, bush areas—which makes up the tsetse *Grenzwildnis* habitat—makes the job unattractive to any but the most highly motivated (or desperate) candidates.

Such difficulties, plus the refinement of aerial spraying techniques and aircraft, created an opening for the technology-minded developers, to the obvious delight of the pesticide manufacturers and their salesmen. Thus at the time of the FAO's "Declaration of War" on the tsetse in 1974, the first campaigns were under way using slow flying fixed-wing aircraft, deluging huge concentrations of 'active ingredient'—then usually DDT or dieldrin—dissolved in petroleum-based solvents, over thousands of kilometres of Africa.

The object was to leave residues of sprayed droplets, after the solvent had evaporated, on the vegetation where the tsetse rests after feeding or sleeps at night. Spectacular kills of fish, birds and many other animals (referred to by the sprayers as 'non-target' organisms) occurred, and led to refinements of the method to reduce the quantities of poison distributed. These are now down to the point where operators refer to the technique as 'Ultra-Low-Volume' (ULV) spraying.

To get enough pesticide down onto the fly's resting places however still involves distributing between 800 grammes and one kilogramme of potent poison per hectare ($\frac{1}{100}$ th of a square kilometre or 10,000 square metres). The areas involved in aerial spraying normally

If the object of the campaign is to increase meat supplies to those in the region who most need them, why should FAO and agribusiness go to such expensive lengths to produce beef which the poor will not be able to afford, while wiping out, in the process, the local population's meat supplies in the form of wildlife, which these areas still contain?

run to thousands of square kilometres for each operation.

Many areas need to be ULV sprayed several times to achieve eradication of the tsetse, and as much as twenty-five per cent of the total region being cleared is covered at least once. The prime targets in any area are streams and rivers, and the banks of these and any other bodies of water the area contains, these being the preferred habitat of the most dangerous species of flies.

According to an estimate by one expert within the FAO "Task Force" (who has demanded anonymity, for his own protection, as the price for discussing the problem at all), between 150,000 and 175,000 tonnes of active ingredient have already been nonchalantly rained down upon Africa's tsetse areas during the decade since this programme began. And this, we must bear in mind, means tonnes (one million grammes) of stable, accumulative poisons so deadly that a healthy adult directly consuming as little as three grammes of any one of them—say a small teaspoonful—would suffer a gruesome death within hours.

Dieldrin is notorious for its effect on fish and other aquatic creatures, as well as those who live on them. Endosulfan, the still widely permitted Thiodan of West Germany, is reputed—also by its manufacturers—to be even worse. But these and other such chemicals do not eliminate the tsetse entirely by this ULV method, for a number of reasons. To appreciate one source of the difficulties confronting the FAO's attack force, it is necessary to look more closely at the tsetse fly's life style, and in particular its breeding habits.

These are fairly unusual even by insect standards. Unlike most other flies, the female lays no eggs, but gives birth to single larva; she only needs to mate once in her eight-to-ten-week life-time, storing the sperm in internal storage organs known as spermathecae. She produces on average less than one larva per week, depositing them carefully on the ground, in suitable places under fallen logs or other protective vegetable litter. They then burrow immediately into the soil and litter, there to pupate and metamorphosize into adult flies.

This last process can take from three weeks to three months, depending on the weather and particularly the temperature. For the whole of its 'subterranean' life, the immature insect lives entirely on food reserves absorbed from its mother, so that it remains safely buried and out of reach of most predators—and of its tsetse-exterminating human enemies.

The implications of this life-cycle for the sprayers are obvious; a single application of insecticide cannot wipe out the fly completely unless a sufficiently large proportion of the poison remains active over the area for several months. The 'hard' persistent chemicals (having a 'half-life' measured in years) will do this, if applied in large enough doses, but at vast environmental cost which their opponents today find totally unacceptable. The alternative is repeated spraying with smaller doses.

The latter is fundamental to the latest refinement in the field of application techniques. Known as 'aerosol' or 'mist' spraying, this idea is to create a cloud or fog of molecular-sized droplets to completely envelope the vegetation and the flies, catching the latter in effect on the wing. But here again, major problems rapidly appeared.

Today, much aerial spraying—both ULV and aerosol—is done by helicopter, and the early experiments with mist spraying involved injecting the sprayed pesticide into the helicopter's exhaust gases. Pesticide mixtures are highly inflammable, however, and it was found to be more practical to produce the mist by an electrically powered atomiser. The main problem, as against ULV spraying, is to get such microscopically fine droplets to fall onto the ground—or at least to the bush growing on it.

The Shell Company (and later, Hoechst AG) hired a British meteorologist, Peter Coutts, to solve this problem, which is essentially one of atmospheric movements. In good weather in the daytime, the sun-heated ground produces upward air currents which, even on the stillest day, are sufficient to overcome the gravitational force on such minute droplets, to the point of preventing the poisonous cloud from reaching the ground, even if discharged at barely more than treetop height. This effect not only foils the sprayers, but also results in traces of the poison being picked up more than forty km away from the point of discharge; while Coutts says that more than fifty per cent of the pesticide simply disappears, no one having the least idea where it gets to.⁹

He solved this problem through the idea of using one of nature's own tricks. This is known as a 'temperature inversion', when a reverse of normal air movements occurs as the lower warm layer is trapped by an overlying cooler layer. This frequently occurs in Africa just around dawn, and at sunset. Thus by spraying with an aerosol in the approaching dusk, the operators are able to get their deadly cloud to settle around the flies as they bedded down for the night.

Flying at treetop-height across broken, featureless bush is a hazardous enough business at best of times; doing so at sundown or before dawn, while looking for down-draughts and under pressure to cover as much ground as possible while the light lasts, or before the sun's heat starts its effects can only appeal to the true 'kamikaze' spirit. Nor can it be said to add much to the accuracy of navigation, or the in-flight adjustment of dosage levels (especially where contractors' payments are based on quantities of chemicals distributed). This is equally the case in the latest development of aerial spraying, by large twin-engined aircraft

flying at night.

Relevant on this point is a recent study¹⁰ financed with almost a quarter of a million pounds by the ODA, of test spraying the Okavango Delta and Swamp—one of southern Africa's few remaining wildlife areas still to contain any appreciable numbers of indigenous animals—with endosulfan. The developers seek to turn the area into cattle pasture.

In this carefully controlled experiment, endosulfan aerosol spraying was carried out by fixed-wing aircraft flying in pairs, equipped with the latest Global 300 VLF guidance systems, and with further guidance provided by tracks previously cut for the purpose through the bush of the zone to be sprayed. It should be noted that fixed-wing aircraft are easier to navigate than helicopters; and that the aircraft flew at fifteen metres above treetop height, the Okavango Swamp being essentially a flat area offering few of the hazards of more broken hilly country.

These are untypical advantages, in that commercially run field operations, which include the vast majority of spraying contracts are generally run on a much more *ad hoc* basis, and subject to little or no real control from any independent body. Despite this the report—which the ODA still treats as 'Top Secret', although copies are available in Holland and Germany—speaks frankly of observing "the results of large navigational errors". It states for instance:

"In each of the first three spray cycles in 1978 the aircraft repeatedly missed a monitoring experiment that had been set up at Moremi North Gate. The aircraft passed approximately one km (estimated visually) either side of the experiment and on one side were observed to pass over the same point (Khwai Lodge) on three consecutive runs. On that occasion there were fish kills around Khwai Lodge and it is also relevant to note that tsetse were found surviving near North Gate after the spraying season."

Spraying rates at each run were nominally between six to twenty five grammes of active ingredient per hectare, the dosage being repeated up to six times for

It is pointless to exterminate an unknown number of 'non-target' organisms when it is now obvious that the real target (the trypanosome) is certain to escape extermination.

each area. The report notes, further, that complete eradication of the tsetse has never been achieved under this programme. And indeed, most independent experts refuse to believe that contractors will ever reduce the amount of insecticide actually applied in field operations to this low level.¹¹ The report also states that the average concentration of endosulfan shown on sheets of aluminium foil laid out at ground level to check the amount reaching the ground "represents forty-six per cent of the sprayed dosage", largely confirming Peter Coutts's figure given earlier of more than fifty per cent simply disappearing.

Wrong on all Counts

Today, ten years after its declaration, and with expenditures already amounting to around 1 billion dollars, the FAO's 'Tsetse War' is arousing widespread and vociferous criticism from an ever-growing spectrum of people—experts and non-experts alike. Its overall impact on the tsetse and the diseases it vectors is judged by many who know Africa not merely to be insignificant, but as positively harmful. And this not to mention the damage done either to human habitats or to the national economies indebted as a result.

Many specialists today claim that tsetse now infest more territory than was the case before the eradication or control campaign began. Despite some small successes in clearing limited areas—among which can be noted an area of some thousands of square kilometres of Northern Nigeria, a densely populated country where the necessary intensity of subsequent land-use may well maintain the clearance, although perhaps at the cost of ultimate desertification—other larger areas have been reinvaded by the fly. And sadly, this expansion is likely to continue until Africa achieves a considerably greater degree of stability. For the best weapons in fighting the tsetse fly and its diseases are peace and prosperity.

The FAO's 'hard-line' tsetse eradication campaign is criticised on several main levels; and at each of these, according to such critics, the agency and its sponsors and supporters in the aid industry have got it wrong.

For instance, they ask, why use 'hard' chemicals? Even if it is agreed that chemical spraying must be used to wipe out tsetse flies, why should this be done with such banned or restricted insecticides as dieldrin, DDT or dichlorvos—or even 'permitted' organochlorines like endosulfan—when alternatives exist? The British-developed synthetic pyrethrins are widely available, and many 'chemical warfare' advocates agree that these are many degrees safer in terms of their effects of enduring environmental damage, if not in terms of immediate impact on 'non-target' species.

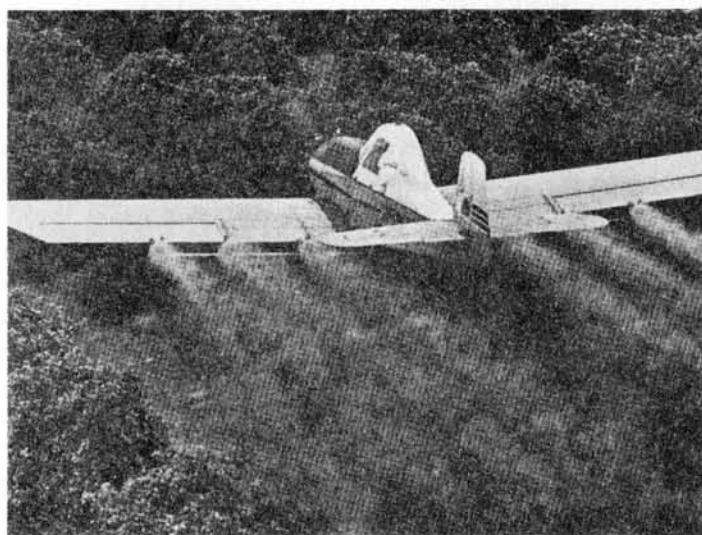
Hard chemical advocates, on the other hand, say bluntly: "We in the rich countries can afford the luxury of banning such cheap and effective crop-protection compounds. The developing countries cannot afford to do so."¹²

But the danger to man and environment of such broad-spectrum insecticides lies not only in the fact that, given the right dosage, they can kill any living creature apart from the technician's target species; nor that many of them cause serious and usually fatal illness such as cancer and birth defects; but they are also generally known to cause sterility in both men and women, as well as commonly causing impotence in men exposed to them—which has much the same ultimate effect.¹³

Discussing such issues, a senior member of the FAO's Information Division claimed that a less diplomatic—not to say more brutal—version of the opinion of developing country priorities given above is frequently expressed privately by the more cynical development aiders who advocate hard pesticides. In this view—obviously unattributable, although claimed to be commonplace—most of the poor countries

affected are said by the aid authorities to suffer from an overgrowth of population. Thus any side effects which help to reduce the fertility of Africans can only be beneficial; while any carcinogenic or mutagenic effects there may be would constitute a rather long-term hazard. This, such cynics declare, although regrettable, is unimportant in view of the short life-expectancy of the poorer inhabitants of these lands—who are of course those most intensively exposed to such spraying—which makes it likely that they will die of something else before any such long-term effects can appear.

Such double morality standards epitomise the insouciant malevolence motivating much of the development aid industry and its allied agribusiness. And the fallacies behind such misanthropic 'double think' are also emphasised by a second group of critics, who are more concerned with the social and environmental aspects of such ill-conceived campaigns.



By spraying in the approaching dusk the operators are able to get their deadly cloud to settle around the flies as they bed down for the night.

Levels of Doubt

Thus far we have discussed the errors of the FAO's chosen method of fighting the tsetse. The declared objective of the campaign is increased beef production. But at another level some experts, while accepting the aim of beef production as the solution to the African poor's hunger, consider that we should not be trying to wipe out tsetse at all, but rather should try to live with it. This thinking is based on the fact that some ten different breeds of dwarf shorthorn cattle in Africa have a degree of tolerance to nagana almost as developed as that of indigenous wild animals.

Even within the UN agency, many experts believe that this would be a more fruitful, and less damaging method of producing beef in tsetse infested regions. Jan Rendel, the Swedish chief of the FAO's Animal Production Service, advocates this approach.

One such breed, which is hardly bigger than a Shetland pony and is often to be seen in European zoos, is known as the Dahomey dwarf shorthorn strain. As Rendel explains, such 'expatriate' animals will have lost their 'trypanotolerance'—as indeed will any other African animals, of whatever species, which have been kept for long or bred in zoos away from the tsetse

areas. For maintenance of this desirable characteristic requires that the animal is subjected to constant heavy exposure to the disease. If the disease challenge is removed—either by relocating the animal, or by eliminating it along with the fly—then any tolerance will rapidly disappear. Animals born and bred in non-infected areas never acquire it.

On the other hand, the characteristic can be fostered, as the early explorers soon discovered by studying native pastoralists' methods. This is done by 'salting' their livestock, in a limited exposure at the fringes of the tsetse belt, and then allowing the animals to recover from the disease which appeared. According to Rendel, selective breeding also helps to promote such tolerance, which he claims can also be passed on to some extent to crossbred offspring, under conditions of constant exposure.

This implies, of course, letting the cattle live with the fly instead of trying to eradicate it. If the idea were to be adopted generally, it might conceivably lead to tsetse conservation programmes instead of the campaign to exterminate them.

The last method worth mentioning of enabling cattle to live with tsetse involves chemical prophylaxis. The effectiveness of this was demonstrated, among others, by Frank Teubner, a Bavarian veterinarian working in the Webi Shebeli area of Somalia over fourteen years ago. During a period of extreme fodder shortage on the Afgoi dairy farm following several years of drought, Teubner found that the farm's herd could be safely pastured on a nearby tract of tsetse-infested bush—the last remaining strip of greenery within hundreds of miles of that arid country's capital Mogadishu—after injecting them with May and Baker's drug 'Samorin'. This gave complete protection against two of the three trypanosomes present in the area—*T. congolense* and *T. vivax*. The third, *T. brucei*, was not affected by this drug-induced immunity, but could be cured if infection showed up in the herd's weekly blood tests by Hoechst AG's 'Berenil'.

As a general solution, however, prophylaxis suffers from two main limitations. The first is that trypanosome resistance to the few available drugs rapidly appears; and profit-motivated pharmaceutical companies are unwilling to invest in research for products purely for the poor country markets—especially those whose inhabitants are growing daily poorer despite, or more likely because of development aid. Secondly, this solution—like the tsetse eradication methods described above—depends permanently upon high technology (properly equipped blood-testing laboratories and the personnel to run them), and the expensive, addictive products of the western pharmaceutical industry.

Wildlife Alternative

There are other ways of producing meat from these tsetse-infested areas. This touches on the third level of criticism of the FAO's misbegotten tsetse eradication campaign. At the first there are those who question, assuming that tsetse must be eradicated, why it must be done with hard pesticides or high technology; at the second, those who ask, assuming that beef production

is the answer, why the beef producers cannot live with the fly; at the third, critics wonder, if the object of the campaign is to increase meat supplies to those in the region who most need them, why the FAO and agribusiness should go to such expensive lengths to produce beef which the poor will not be able to afford, while wiping out, in the process, the local population's meat supplies in the form of wildlife which these areas still contain?

Many studies—some commissioned by the FAO itself, in the days when its Forestry Division had a functioning Wildlife Section—have shown the importance of wildlife (including aquatic creatures) as the preponderant or even sole source of animal protein for the rural poor. Confronted with these however, tsetse eradication and cattle breeding advocates invariably claim that the regions concerned no longer contain any significant numbers of game animals, and that this factor is thus unworthy of consideration.

Such reasoning demonstrates its proponent's ignorance of African diet and tastes, and is based on western prejudice in the definition of edible 'game' animals. For, in Africa, taboos and similar prohibitions aside (and these can apply equally to imported domestic animals), all kinds of animals are eaten in most areas, from insects, snakes and snails to bats, birds, baboons and beyond. The subject is a large and important one, and will be treated in detail in a later article; but one point is worth noting in the present context.

The small number of studies already undertaken of side effects of tsetse and similar spraying campaigns on natural animal populations, almost invariably show

Between 150,000 and 175,000 tonnes of active ingredients have already been nonchalantly rained down upon Africa's tsetse areas during the decade since this programme began. And this, we must bear in mind, means tonnes (one million grammes) of stable, accumulative poisons so deadly that a healthy adult directly consuming as little as three grammes of any one of them—say a small teaspoonful—would suffer a gruesome death within hours.

(in their later, published versions at any rate) that little long-term negative effect can be demonstrated—often mainly due to a dearth of evidence of animals poisoned after spraying operations. All these reports fall into the same trap.

Based on comparisons of animals caught or killed before and after the spraying, and collecting dead animals found after it (the latter cadavers usually being analysed later at the researcher's home base), none of them has yet taken into account the fact that rural people, even in the remotest bush area, have long-since discovered that the poison spray is one of the most effective short-term hunting aids yet introduced. Collecting sick and dying animals is far easier than

actively hunting healthy ones; so that the news of the spray plane's passage is greeted with joy by the local hunters, for the easy booty they know will follow.

By the time the researchers arrive on the scene, most of the poisoned animals they seek have already ended up in the bellies of the local population—poison and all. There are even frequent reports of pesticides being stolen or otherwise illegally acquired for use as aids to hunting or fishing, occasionally with disastrous results for the ultimate consumers.

To quote one example of such prejudiced western expert's findings—which are frequently quoted in justification of further spraying programmes—a German study in Cameroon discovered fruit bats (*Micropteropus pusillus*) containing from 133 to 175 parts per million of dieldrin after spraying.¹⁴ Nor did these animals, being purely vegetarian, amass such doses by bioaccumulation, as could have been the case with insectivorous bats. The researchers, however, glibly reassured their contracting authority (the GTZ—a West German government agency) that this contamination was of no practical significance since bats do not form part of the local diet—a mis-statement illustrating a frightening degree of ignorance about the affected people, their habits and their needs.

Such 'findings' are commonplace. But aside from such wanton expert ignorance—for the FAO, like every other such agency or authority, only employs those experts who can be guaranteed to produce the reports and opinions it desires—a much more conspicuous and reprehensible 'Nelsonian blind-spot' is evident to anyone studying the agency's 'Tsetse War' objectively.

Ultimate Futility

The campaign's aim is ostensibly, by wiping out the tsetse fly, to eliminate African trypanosomiasis. But all the experts involved are aware—although they remain diplomatically tight lipped about it—that while the tsetse exists solely in some parts of Africa, trypanosomiasis is endemic world-wide. It is pandemic, often in non-pathogenic forms, from Timbuctu to Tahiti, and from Norway to New Zealand—and even exists in parts of Africa where the tsetse does not.

While the South American Chagas Disease, from which millions suffer today and which possibly numbers Charles Darwin amongst its past victims, is also a form of human trypanosomiasis, it is caused by an entirely different group of trypanosomes—*T. cruzi*—with its own vector in the shape of the reduviid bug, which does not vector African 'tryps'. This unpleasant creature, a soft-shelled bed-bug, is locally known as the 'kissing bug' from its habit of leaving 'love-bite' swellings on the faces of its sleeping victims.

Nevertheless, African trypanosomiasis or nagana is also widespread in Latin America, having been introduced into that tsetse-free continent in earlier centuries with the importation of infected cattle from Africa and the conquistadores horses from Spain, and is transmitted by various other vectors, including the vampire bat. A further, much rarer form today of the disease, which has also occasionally been found in Europe, is a venereal disease in horses caused by *T.*

equiperdum and transmitted simply by sexual contact, without the intervention of any vector at all. The latter, incidentally is thought probably to be a derivative of *T. evansi*/*T. brucei*.

Walter Ormerod of London's School of Hygiene and Tropical Medicine, the leading expert on trypanosome infections—and among such perhaps the most outspoken, least 'tight-lipped' and most studiously ignored by the FAO and its allies—explains the situation thus:

"*T. vivax* which is transmitted to cattle in Africa by tsetse is transmitted in South America (Brazil, Colombia and Venezuela) and also in Mauritius in the absence of tsetse. *T. evansi* is also present in South America; this is transmitted elsewhere without tsetse. In the Sahelian and Sudanian zones of Africa, where *T. brucei* (transmitted by tsetse) and *T. evansi* (transmitted by other flies) meet in the one place, it is quite impossible to tell them apart. It is gradually dawning that they are actually the same species.

"Thus the evidence is accumulating that exterminating tsetse will not exterminate trypanosomiasis. Certainly it will greatly decrease the prevalence, but it is clearly not going to be the final solution for trypanosomiasis: *T. vivax* infection in South America is now of commercial importance, and 'mal de caderas' in horses has been important since the days of the conquistadores.

"I agree . . . that it is pointless to exterminate an unknown number of 'non-target' organisms when it is now obvious that the real target (the trypanosome) is certain to escape the extermination."

Confronted with such clear and authoritative scepticism about the FAO's programme, many will justly wonder how its sponsors can ever manage to continue it, let alone expand it massively as they are presently planning to do. In their latest move, following the Okavango spraying trials, and in extension of a Dutch sponsored campaign currently being carried out in western Zambia, the common market's European Development Fund (EDF) is actually putting together, within the general framework of and in co-ordination with FAO's overall campaign, a programme to spray a vast belt of southern Africa with organochlorine pesticides. This is to include part of Zambia, Zimbabwe, Malawi and Mozambique.

The first phase having been finally approved in March this year, appears to be first fruit of a massive sales campaign mounted over recent years by Germany's Hoechst AG. This company has been offering a 'package deal' to many African governments—with all the customary blandishments—under which, working with their own aerial spraying sub-contractors, they guarantee eradication of tsetse over a given area at a fixed price per square kilometre of area freed. To achieve this, the company alone decides which of their chemicals and what quantities are to be employed. The EDF's participation in this will be limited to loaning the necessary funds to the countries affected.

This highly dubious operation is in many ways reminiscent of the notorious Gezira cotton spraying contracts given to the Ciba-Geigy Company of

Switzerland, which have practically reduced Sudanese cotton growing to the verge of bankruptcy. The whole of this complex of vested interests, administrative inertia and the noxious pressure of the 'development imperative' forms a major topic in itself, but constraints of space do not permit it to be dealt with here.

In conclusion, however, it may be worth touching upon a final possible danger of the 'Tsetse War's' outcome which—although certainly more speculative in the present state of our knowledge of the complex factors involved—could in the event prove even more disastrous than the widespread poisoning and impoverishment of the African populations under attack, on the scale at which these are already certainties.

This recent thinking derives largely from the work of J G Charney and others, who believe to have identified a 'biographical feedback mechanism' in the dynamics of desert formation and Sahelian drought. It relates largely to a factor known as the 'albedo effect', and the annual movements of the Inter-Tropical Convergence Zone (ITCZ)—the massive meeting of air flows under the zenith of the sun, which moves north or south within the tropics according to season and the position of the sun. The albedo is an index of reflectivity of a planet's surface; in the case of earth, the general rule (over land) is that the denser the vegetation cover, the lower the reflectivity.¹⁵

What this means in practical terms is that forest or bush cover absorb and retain far more impinging solar energy than bare ground or desert, which simply reflect the radiation back into space. This energy goes into fuelling the wind system and the evaporation of water. Both of these, together with the annual northward swing of the ITCZ, have considerable influence on the monsoon rainfall reaching the Sahel. In brief, the reduction of the forest cover to the south of the latter is likely to have the direct effect of reducing the amount and duration of rainfall reaching the drier northern zone.

But since the Sahel is already a major traditional producer and exporter of large quantities of beef, any tendency to further reduce forest cover further south—and this, sadly, would be the inevitable result of any large-scale introduction of beef production there—would reduce the Sahel's potential as a productive area, and lead to further spread of the desert which it fringes. And since, as will be clear from the foregoing, trypanosomes are unlikely to have been eliminated from these southern zones, an eventual failure of cattle raising there is also a fairly safe prediction. Thus the ultimate folly of the FAO's project could possibly be not only to destroy the rich resource that the forest represents in itself but also to run the risk of destroying cattle breeding in the present producing areas to the north. All this to the profit of no one other than the pesticide manufacturers.

In conclusion, the words of George McRobie, Chairman of the Intermediate Technology Development group seem most apposite. In 1981 he wrote:¹⁶

"Inappropriate technologies take many forms. The

most obtrusive are large and expensive items of hardware—factories, processing plants, huge dam complexes—foisted on developing countries under the guise of aid and development programmes. But a far greater threat to the people of developing countries—and to all of us—is presented by the less spectacular but more pervasive products of the chemicals industry, in the form of herbicides, pesticides and other poisons.

"Farming systems and practices that promote monoculture, and depend heavily on oil and inorganic chemicals are the most inappropriate package of technologies that could possibly be devised for the use of very small farmers in the Third World.

"Even the current rate of loss of African forest is calamitous. . . . There is nothing inevitable about this kind of ecological destruction. It is a direct result of violent technologies, especially agrochemicals. For more and more people, the ability to exercise choice in the matter of technology, and to opt for technologies that are non-violent, is rapidly becoming a condition of survival."

References

1. FAO Information Division, Press Releases 75/5, 76/15, 79/160, 80/34, etc, and many personal communications; asked to refute some controversial aspects of these documents, Reginald B Griffiths, director of FAO's Animal Production and Health Division stated that "such documents have a tendency to become sacrosanct in an organisation such as ours".
2. Walter Ormerod (personal communication).
3. John Ford; *The Role of African Trypanosomiasis in: "African Ecology"*, Clarendon Press, Oxford, 1971.
4. Walter Ormerod, *Op cit*, 2.
5. Edward Goldsmith; *Ethnocracy: The lesson from Africa*, *The Ecologist*, Vol 10 No 4, 1980.
6. David Livingstone; *The Zambezi expedition of David Livingstone 1858-63* (2 vols), Chatto and Windus, London, 1956.
7. Richard Burton; *The Lake Regions of Central Africa*, (2 vols), Longmans, London, 1860.
8. The belligerent terminology used here is in deference to that chosen by the FAO; its Press Release announcing the anti-tsetse campaign is headlined: WAR DECLARED ON TSETSE FLY, and outlines plans of campaign drawn up by a "task force" to "mount a drive" to "battle the fly . . ."
9. H H Coutts (personal communication); also unpublished report. Aerial applications for the control and eradication of tsetse flies, for Shell Research Limited, Sittingbourne, undated.
10. R J Douthwaite et al; Environmental impact of endosulfan, applied for tsetse fly control in the Okavango Delta, Botswana, Overseas Development Administration, Crown copyright 1981.
11. Jaap van Etten et al, (personal communications, 1984).
12. D L Gunn, *The Athenaeum*, London, unpublished letter to *The Times*, May 1977.
13. Patrick Marnham, in: "Fantastic Invasion", Johnathon Cape, London, 1980, reports that an epidemic of impotence in the intensively sprayed region of northern Nigeria was rumoured to be the work of a secret society; within two weeks, fourteen people suspected of inflicting strangers in public places with this witchcraft were severely beaten to death. Order was only restored by ordering the army to shoot on sight anyone thus taking the law into his own hands, while a booming trade in antidotes to the malady grew up.
14. Paul Müller and Peter Nagel, Saarbrücken, West Germany; unpublished report to the GTZ, Ökosystemare Wirkungen von Insectiziden im Hochland von Adamaoua, (Kameroun).
15. J G Charney et al, Drought in the Sahara; a Biographical Feedback Mechanism, *Science* Vol 187, February 1975.
16. George McRobie, The Inappropriate Pesticide, editorial in *VOLE*, March 1981.

DOES ECONOMIC DEVELOPMENT FEED PEOPLE?

by John Madeley

Economic development, by forcing peasants to export their food, is causing poverty and malnutrition. Significantly, it has been found both in Tanzania and in Uganda that it is when the economy is most depressed that villagers eat best. The reason is that they can no longer sell their food and must now eat it. It is by non-institutionalised self-help schemes such as those the author describes in India and Ethiopia rather than by Government-sponsored economic development that the rural poor are most likely to feed themselves.

The efforts of developing countries to transform their societies and economies, overcome poverty and enjoy self-reliant development, are generally failing to come up to expectations. As each year passes, it seems to be crisis rather than development that is the lot of a growing number of countries. On major issues such as food, energy, trade, debt, aid, the environment, the problems seem to be mounting.

"After years of political independence, after so called development decades; all the efforts of UN agencies, hundreds of pious declarations on aid, trade and development" points out Mohamed Idris, the President of an enterprising Malaysian non-government organisation, the Consumers Association of Penang, "most of the people in the Third World continue to be poor, unemployed and homeless and millions of children are starving to death".

But is there something seriously wrong with the way that the Third World is trying to develop? Has the Third World fallen into the trap of being over-dependent on the west to buy their export crops, lend them money and give advice through

bodies like the World Bank? If so, what practical and workable alternative paths to development could be taken?

The crisis in Ethiopia and across the Sahel belt of Africa has served to sharpen such questions. For it was *not* drought on an unprecedented scale that caused the 1984 Sahelian famine; 1984 was a dry year as was 1983. But two dry years together are not unexpected in the Sahel—history shows they have occurred quite often. No government can claim they were caught unawares. A new study of rainfall patterns in the area by University of Reading agroclimatologist Dr Michael Dennett had found that rainfall in the Sahel during the ten years from 1974 to 1983 was only around five per cent less than in the 1931-60 period. The real problem is not less rain, but official development policies—these are at least partly responsible for turning drought into famine.

Most countries in the Sahel region—Niger is an exception—have pursued a policy of planting out large areas of their land to cash crops for export to affluent westerners; far less attention has been given to food crops for local people. Donor aid agencies have financed the policy, and Chad, one of the worst affected countries, has just enjoyed a record cotton harvest. Mali has increased its cotton output by over 150 per cent in the last five years and

stepped up its peanut output by almost 100 per cent in that time. World Bank estimates suggest that most people in the countries of the Sahel region are eating perhaps a fifth less food than they were a decade ago.

This is understandable in view of the very limited attention that has been given to helping the people of Sahel to grow more food for their own use, rather than for western dinner tables. The figures tell a grim story. Between 1974 and 1983 the Sahel countries received around 7,500 million dollars in aid for agriculture. Less than one-fifth of the money went to rain-fed crops. Yet almost all the region's cereal production comes from rain fed agriculture.

The amount of research being done into local foods is so small as to be a disgrace. There are estimated to be some 250,000 flowering plants in the world, many of which could grow and possibly grow well in very dry Sahelian type weather. Yet only a tiny amount of research is going into developing these plants—even though their development stands to make a substantial contribution to overcoming hunger in some of the world's poorest countries. Neither research institutions in developing or western countries seem particularly interested.

Poor countries have given scant priority to helping communities

grow more food for themselves. Instead, aided and abetted by the World Bank and other international development organisations, they have sought assistance for prestigious large scale projects—including the ever-popular big dam schemes—and are paying a heavy price. As the cost of irrigating land from their dam(ned) schemes has soared so many countries have been left with less money to implement alternatives.

Yet throughout the developing world, alternatives are being implemented. Sometimes communities are stumbling across the right path almost by accident. Always it is a deep commitment by local peoples to overcome often huge problems that is at the root of whatever success is being achieved. In the alternatives lies proof that existing government policies are by no means the only ones there are—and hope of something better beyond the present crisis.

Tanzania

Tanzania rarely fails to make anyone's list of developing countries that are badly affected by crisis. Included in the United Nations Food and Agriculture Organisation list of twenty-four African countries "facing emergency situations" over food supplies, Tanzania is desperately short of foreign exchange, having been hit by global economic recession and the resultant lower prices for Tanzania's commodity exports.

Foreign exchange shortages mean that the government cannot provide all the support services for agriculture that it would like. There are difficulties in importing the spare parts, for vehicles for example, that are crucial if food is to be delivered from villages to markets. Yet behind Tanzania's crisis, something quite surprising seems to be going on.

To get an accurate picture of what is happening in Tanzania we must distinguish, says Mr Urban Jonsson, the United Nations Children's Fund (UNICEF) country representative in Dar es Salaam, between the state economy and the village economies. As nine out of ten Tanzanians live in the villages, it is the village economies that might, he says, be called the natural economy.



The Sahel region of Africa is suffering both drought and misdirected foreign aid.

"When the world economy and Tanzania's state economy are doing well," says Urban Jonsson, "the villagers sell much of their maize and other staple foods. But when the state economy is in a bad way, the distribution system tends to break down—there are fewer vehicles to transport goods to market; prices for food drop and give the farmer less incentive to sell."

So the villagers cannot get the food to market nor do they particularly want to because prices are so low and they would get a poor return. The villagers then do the only thing possible—they keep the food and eat it themselves. Not only do they keep the food they grow, the villagers start to use land that grows coffee, and other cash crops, to grow food, insofar as there is little point in farmers growing cash crops if they cannot be sure of getting them to market.

Since the beginning of the 1980s, and the onset of acute difficulties for Tanzania's state economy, there has been a switch from cash to food crops. Overall, the crisis in the state economy has meant that many

villagers in Tanzania today have more to eat. The natural economy, the one in which most Tanzanians operate, is faring better ironically *because* the state economy is depressed.

Urban Jonsson takes issue with those who describe Tanzania as a country in crisis. "This country does not have a crisis," he believes, "walk through the villages and you certainly do not sense crisis. There are periodic food shortages—every year before the harvest, Dar es Salaam is short of food, but this is a distribution problem—the failure of the transport system to deliver food to the capital."

But although there may be no crisis, it is still the case that many Tanzanians are malnourished because they do not get enough food to eat. With the improvement in the natural economy, there is just a glimmer of hope this may be changing, particularly for children.

The 1970s witnessed a disturbing decline in the health of Tanzania's children. Whereas in 1970, only about one child in five was under 80 per cent of normal weight for age, by

1980, *every other child* was below this weight. In a brief ten years the number of children below 80 per cent of normal weight for age had therefore more than doubled. During the last four years coinciding with the economic depression, with more food staying in the villages, this deteriorating situation appears to have been halted. "At least malnutrition does not seem to be getting worse," believes Jonsson.

The most serious crisis facing many villages, believes Jonsson, is 'the insect attack'. Coffee berry disease has damaged tens of thousands of bushes and is seriously affecting coffee yields. Ironically the disease is leading some growers to question whether coffee is worth it, although because of the contribution that coffee exports make to Tanzania's economy, it is illegal for coffee bushes to be uprooted.

A further aspect of the state economy being in crisis is that men have less opportunity to exploit women. For when food leaves the village, it is men who normally collect the cash and are prone to spend it on beer and other luxuries. A survey of Tanzania's Kilimanjaro district found that the exploitation of women by men was a bigger factor in mother and children malnutrition than is sometimes recognised, and that almost a third of men in the villages had a drink problem. When food stays in the village, mothers eat better and their husbands are more likely to stay sober.

There have been other unexpected, and as yet not fully understood, spin-off benefits—on housing for example. "Housing in the villages has never improved so fast as in the recession" says Urban Jonsson. One reason for this appears to be that men now have more time. They no longer have to transport their goods to market and no longer have the money to spend in beer houses.

Despite Tanzania's ujamaa (fellowship) ideals, very little land in the country's villages is farmed cooperatively—only around five per cent of total cultivated area (a lower proportion than in the United States!). Villagers have their own plots and in some regions farm a comparatively small plot together.

Tanzania is not the first country where villages are thriving at a time of a depressed state economy. A similar phenomenon was noticed in Uganda, after Amin. But what are the implications for policy?

If villages fare better when they are, to some extent, separate from the state economy, then it would appear to make sense to develop that separation. Economists point out however that if villages become self-sufficient units they will not produce export crops and a country's foreign earnings will decline. They argue the villagers must produce a surplus both in cash crops to yield foreign exchange and in food crops to feed the growing populations of the towns. However if the quality of life in the villages was higher, fewer people would drift to the towns and less 'surplus' food would be needed—and possibly also less foreign exchange.

Millions of people in "grain self-sufficient" India are today exposed, in Sheth's words, "to a kind of doom, a state of destitution, semi-starvation and chronic malnutrition, a long period of physical and psychological stunting, and slow death."

Whilst other voluntary agencies besides UNICEF have noticed successful village economies in a depressed state economy, the implications have still to percolate through to most agriculturalists, economists and administrators.

The Tanzanian village of Manushi Ndoo in the predominantly banana and coffee growing region of Kilimanjaro has shown what can be achieved. With its rich soils and good climate the region has for years been home to wealthy coffee farmers. It has also tended to have a higher proportion of malnourished people than most other regions in Tanzania. In 1974, Manushi Ndoo, which has a population of around 4,000, had a high incidence of malnutrition. Today, village officials claim that malnutrition is a thing of the past. Health workers from outside the village back their claim. How has it been done?

Committed leadership appears to have played the most important part. The Secretary of the village committee, Alloyce Mmassy, is also head teacher of the school. Five years ago the committee decided to give priority to ensuring that adequate supplies of vegetables and milk were available to people, at normal prices if they could afford it, but otherwise free.

A women's group persuaded a wealthy family in the village to give up part of their land for vegetable production; the group has now successfully organised the growing of onions, tomatoes, cabbage and spinach. Oxfam was asked to supply three dairy cows, (also rabbits and seeds) so that the villagers could have milk on the same basis as vegetables. Together with an agricultural extension officer the women's group has made it their task to see that every family has the vegetables and milk they need. Today, the healthy children at Manushi Ndoo's school bear witness to the success of the village efforts.

Not all crisis hit African countries have villages which are necessarily suited for developing along the lines of this village. And problems with self-sufficient villages need to be recognised—one of the biggest problems may be that the government will not be able to extract as much revenue from them to pay for the services that it offers them—health and education for example. In Tanzania, quite substantial advances have been seen in education; seven times more children are in school today compared with twenty years ago—some three and a half million instead of half a million.

In practice most villages in Tanzania are likely to continue producing some food for the market so that people can earn money to buy goods which are not available locally.

It is just possible that through the crisis that affects their country, Tanzania's villagers are finding their own route to development—one that owes little to western theories, but rather a route forged through the harsh jungle of experience. Should present trends continue, help from outside is still likely to be sought—the Oxfam contribution is considered vital by

the villagers of Manushi Ndoo. But it will be villagers themselves who carve out their future; Julius Nyerere's dream of self reliant villages may yet come true—if in a different way to how he imagined.

India

India is sometimes held up as a model of what African countries ought to strive to achieve. India's 'green revolution' has led to an increase in grain which has enabled the country to be grain self-sufficient (at what cost to the soil remains to be seen)—but that is a long way from saying that everyone has enough grain to eat. Estimates suggest that sixty per cent of India's population is below the poverty line, which is much the same proportion as it was *before* the green revolution started.

In India too there is an increased search for alternatives. "It is in the initiatives at the grass roots" says D L Sheth, director of the New Delhi based Centre for the Study of Developing Countries, "taking place generally outside governmental and bureaucratic structures, and away from the normal political processes of parties and elections, that another approach to rural development is becoming manifested".¹

Sheth points out that the people who are engaged in the search for an alternative, "all share a common perception about the nature and the sources of the misery of the 'left-out' as a consequence of the prevailing mood of development". He believes that the 'development establishment' and its beneficiaries—scientific, bureaucratic, managerial and military elites—"are busy inhibiting and even curbing grass roots initiatives, through the use of State power and bureaucratic subterfuge."

In India a group called 'Lokayan' has been formed to serve as a forum for grass roots activists and academics to evolve alternative approaches to rural development. "It is astounding" says Sheth, "that a programme of colonial type exploitation of the primary producers (the vast populations of tribals, artisans, small and marginal farmers and the landless) by a small urban industrial elite, and its client

class of dependent rural elite, has passed muster as a programme of rural development for so long".

Millions of people in 'grain self-sufficient' India are today exposed in Sheth's words "to a kind of doom, a state of destitution, semi-starvation and chronic malnutrition, a long period of physical and psychological stunting, and slow death. For them the problem is survival, not development . . . it has now become clear that the prevalent economic growth model has little to offer to the vast multitudes in the unorganised and informal sector".

It is in this context that new thinking about development is taking place. The new approach has at least six 'points of departure' from the conventional route. Firstly, poverty is viewed as a social and structural problem as well as an economic one. As caste is a powerful social reality in India, the new

"The villagers sell much of their maize and other staple foods. But when the state economy is in a bad way, the distribution system tends to break down . . . The villagers then do the only thing possible—they keep the food and eat it themselves."

thinking emphasises helping the backward castes, the Dalits ('untouchables') and other exploited groups to organise separately, and then later to evolve joint strategies. The approach is therefore one of targeting help to exploited groups and helping them to become aware of their potential and possibilities.

Secondly the Indian grass roots groups reject the 'inputs' view of rural development as 'partial and lopsided'. As a substantial majority of Indian people lack "any economic and organisational capacity to use inputs such as credit, seeds, fertiliser and irrigated water, these inputs are simply swallowed up by the upper castes". The new focus they believe should be on creating capabilities among the rural poor, rather than expecting them to rely on packages of inputs.

The new approach to development is seen, thirdly, not as a problem of efficient management and

implementation of certain schemes, but rather as a struggle for establishing the economic and political rights of the poorest, which are necessary for their very survival. Direct intervention by the State is needed, believes Sheth, "to protect the rights of the poor and ameliorate their situation, and at the same time, organise the people themselves for struggle".

Fourthly the Lokayan groups "resist the on-going attempts to depoliticise the development process". It is only through the politicisation of the poor, they believe, that development can reach the poor, and hence there is a need to help vulnerable groups to struggle and campaign on specific issues. "Through this process", says Sheth, "they (the poor) are building for themselves a new political credibility, bound to create a long term impact on Indian politics".

Because governments and political parties have largely failed to devise strategies which might help the poor, the scope for grass roots initiatives has increased. The fifth point of departure for the groups is that they are devising new forms of political action through "peaceful protests, sustained sensitisation, mutual learning and training of cadres . . ." They are creating a kind of non-electoral politics, with an economic and cultural content, which they describe as 'societics' rather than 'politics'.

Lastly, the groups emphasise the decentralisation of economic and political power. This they believe can make for "greater flexibility, experimentation, and innovation." In sum, the Lokayan groups believe that these six points can provide a basis for "a truly authentic and rooted development process."

Struggles

In a Third World hit by many problems, encouraging success stories are coming from local communities and groups in many countries, which show that people have managed to organise themselves, sometimes with outside help, increase the output of food for their own use, to exercise their own control over the development process, over the things which affect their lives. Many communities are strug-

gling hard to find type of development which is meaningful for them.

Many are finding that by organising themselves, they can step up their bargaining power and earn enough to enable their families to live decently. Sometimes this involves small but far-reaching changes in the way things are done. In the Sri Lankan village of Ranna, for example, some 130 miles from the capital, Colombo, twenty-five vegetable producers formed a group to analyse how they could break the cycle of poverty which afflicted them.

The producers decided that they could and must reduce the amount of money they spent in cultivation. They resolved to share their labour rather than bring it in from outside. With the savings that resulted, they started a small collective farm, which they cultivated as a group in their leisure time. Income from this collective enabled them to break free of the local moneylenders and their exorbitant rates of interest.

The twenty-five member group put itself in a sufficiently strong bargaining position to persuade the local bank to do something it had previously scorned—lend them money at normal rates of interest. The growers were able to earn for themselves a better deal for their produce at the local market centre. Vegetable growers in nearby villages have become interested in doing the same.

In the Sahelian country, Burkina Faso (formerly Upper Volta) some 500 cooperative and village groups have freed themselves from profiteers by buying their own grain at harvest time at a price laid down by the government. In battered Ethiopia, an organisation of peasant farmers and landless people have been active in the last decade in a project to improve the quality of their livelihoods by halting land degradation. Amidst all the grim news which has come from Ethiopia, it is worth noting that these peasant organisations are engaged in what the FAO describes as “one of the most successful soil conservation projects in the world”.

In Latin America too a growing number of people are searching for alternatives. One group of Latin-Americans, now exiled in Britain,



Head teacher and children of a village in Tanzania which has overcome malnutrition through its own efforts.

recently formed a project called the Latin American Cooperative Development Project to research into alternative ways of development for the continent and exchange information with organisations in the Third World and in Europe about the issues.²

The pressing need for alternatives surfaced at a non-government organisation (ngo) World Food Assembly, held in Rome during November 1984. The Assembly sponsors included over twenty People's Development Organisations from the Third World. The PDO's, among them church groups, cooperatives, consumer associations, village and landless groups, were largely in agreement with their northern counterparts that the policies of the World Bank and other international development organisations, such as the FAO, have very often not helped true development, but instead have made life harder for local people.

There was strong criticism of the way that cash rather than food crops have been encouraged and also of how people have been eased off their land for big development schemes that were ultimately supposed to help the displaced people—but have often not done so. Governments were urged to implement 'Food First' policies that help the hungry to grow and have access to more food—policies which might include

politically sensitive land reform. Unless people have sufficient land of their own, they lack the base to overcome poverty; a key part of the success of the Manushi Ndoo villagers in Tanzania concerned land re-distribution.

Growing fewer cash crops would not only release land for food crops, it would also help to remove the 'over-supply' that keeps down cash crop prices on world markets—it would therefore put developing countries in a stronger bargaining position vis-a-vis the west and help to lessen over-dependence.

One of the most important 'alternative' policies for development to be stressed at the Assembly was that people should have a genuine voice in the things which affect them, rather than having projects thrust on them from on high. It has become increasingly popular to talk about participation of local peoples. “Our experience over the last two decades” says UNICEF Executive Director James Grant, “lets us conclude that successful development for poor people could not be possible without substantial grass roots involvement”. But even a statement like this conveys a hint of seeing grass roots involvement as just another piece, albeit an important one, in the development jigsaw.

The message that is coming across for Third World communities is that

there can be no true development unless it revolves around and is preferably initiated by the people of local communities themselves.

It is vital to remember that the Third World peasant who seems to western eyes so ragged in appearance, and so much in need of 'education' is usually someone with an enormous experience and knowledge of agriculture in his area. Such people often have a profound feel for the best balance between man and nature, for what is likely to work. They will not turn away outside help, often they value it—they welcome being told about rights they have which they were not aware of, and about possibilities for improving their lot—but they do not want outsiders telling them what to do.

It grieves people like this when insensitive government extension workers and aid officials come into their villages with half-digested schemes, which have not been thought out, and which upset delicate relationships. They wonder why they were not asked in the first place.

Should the very concept of development be dropped? "It's an imported concept that is not suitable for the Third World", believes Indian writer Claude Alvares.³ "What the west did was

Poor countries have given scant priority to helping communities grow more food for themselves. Instead, aided and abetted by the World Bank and other international development organisations, they have sought assistance for prestigious large-scale projects—including the ever-popular big dam schemes—and are paying a heavy price. As the cost of irrigating land from their dam(ned) schemes has soared so many countries have been left with less money to implement alternatives.

assumed to be good and hence to be copied; the local situation was seen to be stagnant and in need of 'development'".

The problem here however is largely one of words, of semantics. Those who favour dropping the word 'development' usually also

want to see the poorest living decently, overcoming hunger and having at least the very basic necessities of life, realising their potential as people—which others might call 'development'!

Development as it has preceded is clearly in urgent need of widespread revision and change. It is arguably more important to concentrate efforts on those changes rather than spending time labelling what it is. An ambiguous and unfortunate word it may be, but development is the one in use and perhaps those 'pro' and 'anti' the word might rally round the concept of it being the process by which people move towards realising their potential.

References:

1. "Grass Roots Initiatives in India"; *Development* 1984:2. Journal of the Society for International Development (Palazzo della Civiltà del Lavoro, EUR, Rome 00144)
2. Enquiries to Jorge Mella, 300 Navestock Crescent, Woodford Green, Essex.
3. Paper given to Conference "Development or Crisis", organised by the Consumers Association of Penang, November 1984.

Published
1 May 1985

THE USER'S GUIDE TO THE ENVIRONMENT

John McCormick

This is a simple, clear and readable new conservation guide for the layman. It examines the current environmental crisis, explaining how the way we live as people causes or contributes to the detriment of the environment — *and it suggests what we can do to alleviate the situation either alone or through voluntary groups*. In fact, it shows what can be done *now* at little or no cost in time or money, and with no major sacrifices.

- * At home or at work — what you can do now to help
- * Organisations and societies you can join
- * Helping wildlife in the garden or in the countryside
- * Conserving energy, food and water

For those who want to read up on current conservation initiatives, the book also contains a detailed history of both British and international conservation movements and it provides a detailed look at the current state of the environment today — the oceans, the forest, the wildlife, the land and the atmosphere.

Published by  **KOGAN PAGE** £6.95 Paperback 0 85038 950 X 210 pages 216x138mm May 1985

Important — Please make all cheques/POs payable to Kogan Page but send to the address below

Order Form

CASH WITH ORDER PLEASE

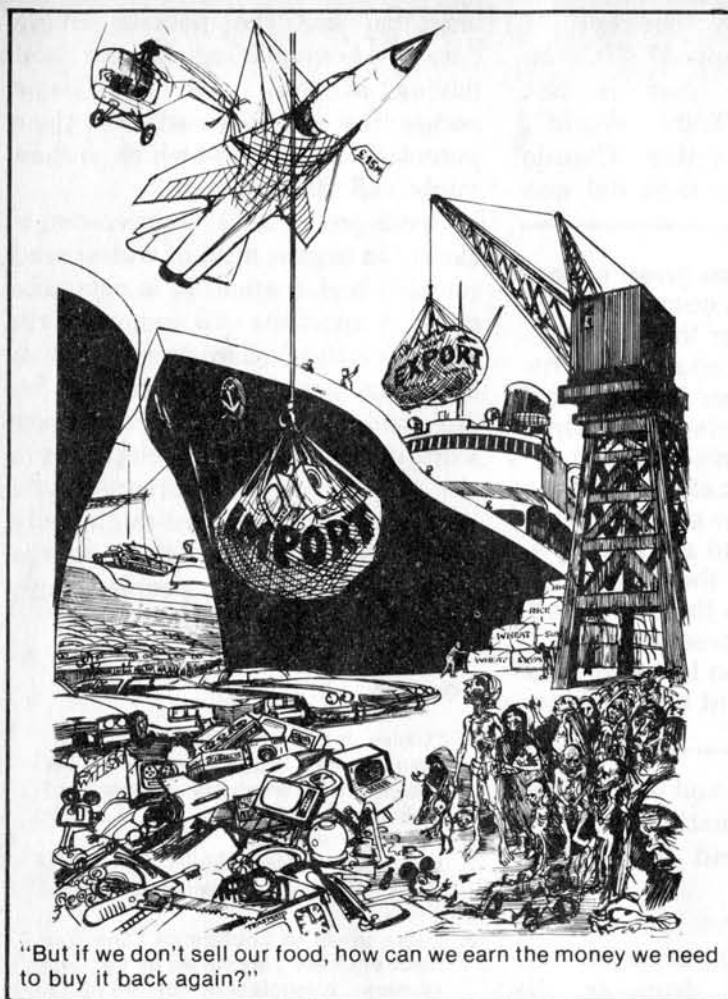
Send to: Dept. 1, The Ecologist, Worthyvale Manor Farm, Camelford, Cornwall PL32 9TT

Please send me copy/copies of *The User's Guide to the Environment* at £7.95 per copy (inc p&p). I enclose a cheque/PO (payable to Kogan Page) for £

Name

Address

Signature Date TE



How can you feed the starving by making them sell their food?

Mrs Indira Gandhi, when she was still Prime Minister, was congratulated by various Western dignitaries for having achieved food self-sufficiency for her country.

This was seen as providing the ultimate justification for the Green Revolution which had made possible this great triumph.

To have achieved food self-sufficiency, of course, conveys the impression—to the layman—that the proverbial malnutrition of the Indian masses has become a thing of the past.

This means, of course, that the country can now export its food 'surplus' so as to earn the foreign exchange required for development—with a clear conscience, since such a policy can no longer be construed as causing any hardships to the rural-masses in the interests of enriching the urban minority.

Needless to say nothing could be further from the truth. To say that a country is 'self-sufficient' in food does not mean that all its inhabitants have enough to eat. It simply means that the 'effective demand'—a purely economic concept—has been satisfied. This means that those who have enough money to spend on food have been satiated and that there is no remaining economic demand for any more food.

Unfortunately it so happens that the vast mass of the grossly underfed in India have no money. This means that their biological requirement for food is not reflected in 'effective demand'. This in turn means that food 'self-sufficiency' can co-exist with malnutrition and indeed famine on a very large and increasing scale.

Forcing the Starving to Export their Food

by Bharat Dogra

It is evident to all that one of the main causes of malnutrition and famine in India as elsewhere in the Third World is the systematic replacement of subsistence farming by large scale export oriented agriculture.

This still does not prevent the Indian Government (with encouragement from international agencies) to do everything in its power to further accelerate this fatal process in the interests of earning more foreign exchange for development.

Like most countries under colonial rule, India during the last two centuries has suffered from the systematic diversion of land from the production of staple food crops to that of export crops, a process which occurred even when serious food shortages existed in the country. But more unfortunate is the fact that today, nearly thirty-seven years after independence, a concerted drive to increase farm exports is being made at a time when serious hunger and malnutrition continue to exist in the country.

Statistics from country-wide diet surveys published by the National Nutrition Monitoring Bureau (NNMB) show that the diet of nearly half the households surveyed in different states of the country was deficient, even on the basis of the lowered criteria for the assessment of malnutrition by the NNMB since 1976. Again on the basis of the new (lowered) standards adopted by the NNMB, less than fifteen per cent of

the children below five years of age could be considered as being well-fed, the rest suffering from varying degrees of malnutrition. D Banerji's study of malnutrition and poverty in India comes to a similar conclusion. He undertook a long term study of these problems in nineteen villages located in eighteen different states. On the basis of this sample he concluded that almost half of the population is unable to satisfy its nutritional needs all-year round while more than a third is actually hungry for three months or more each year. This horrifying situation has not prevented the export of food abroad in order to earn foreign exchange required for development, in fact, farm exports during the last decade have increased very rapidly from 8,750 million rupees (1970-71) to 20,560 million rupees (1980-81). In other words it more than quadrupled during this period.

Items whose export is taken into account in these figures include coffee, tea, oilcake, tobacco, spices, raw cotton, rice, fish, fish preparations, meat, meat preparations, vegetable oils, fruits, vegetables and pulses. Particularly notable has been the increase in the export of

Recently, two reports have been published which give some idea of the scale of malnutrition in 'food self-sufficient' India.

The first was produced by UNICEF. It is entitled "The State of the World's Children 1985". According to this report "India has more children than all the 46 countries of Africa put together." What is more "the majority of those children are living in poverty: one in three is born underweight, one in seven dies before the age of five, and an estimated 3 million die each year from conditions which could be prevented by oral rehydration and immunization alone."

The second report was produced by India's National Nutrition Monitoring Bureau. Its findings appear to be similar. According to the *Statesman* (22 December 1984) "Of the 23 million infants born in the country every year, only 3 million may be truly healthy", the report says. Of the rest, 7 million are likely to suffer from minor forms of *malnutrition*. Three million are expected to die before they complete their first year and one million before they reach childhood. And 9 million would enter adulthood with impaired physical stamina and reduced mental ability because of *severe malnutrition*. Thus only 15% of the children would have full genetic potential of growth and physical and mental development."

What is more the report notes "The infants, who do survive bear permanent mental and physical scars of *malnutrition*."

How in such conditions can one conceivably justify the policy of systematically increasing agricultural exports? If this is necessary to achieve economic development, then how can one conceivably consider that economic development is a means of assuring the welfare of the Indian people? It goes without saying that India is not the only country to find itself in this situation. It is increasingly true of Third World countries throughout the tropics. In such countries the choice is either to eat or else to export food so as to develop. To do both is simply not possible.

Edward Goldsmith

some staple foods which the local population requires. Thus the export of rice increased during this period by nearly twenty times, (32,000 tons to 726,000 tons) while the export of fish which constitutes the main source of animal protein in coastal areas has more than doubled.

Exports of vegetables, fruit and pulses which are an essential part of the diet of the Indian people increased during this period by more than six times from 123 million to 797 million rupees. The increase in the export of meat was even more impressive from 30 million rupees to 554 million rupees. The massive increase in meat production has meant diverting vast amounts of cereals which are badly needed for feeding local people to provide feed-stuffs for intensively reared livestock. The export of soya beans has increased significantly and export of tobacco has doubled during this period. All this means that land has systematically been diverted from producing food for local people to producing beef and cash crops for export.

Recently a prominent nutrition expert* questioned the wisdom of

* Dr. K.T. Achayya

'extensive' lobbying and deliberate market support in respect of soya bean when there are desperate shortages of everyday feeds such as pulses and oilseeds. He said that two thirds of the land now under soya bean in Madhya Pradesh was once used to raise jawar, millets and several lentils and ground nuts.

However, our government encouraged by governments of industrial countries and by international agencies and multilateral development banks, wishes to divert more resources from feeding local people to exports that will bring in foreign exchange required for further development.

To this end a conference of Agricultural Ministers from all the states of India was recently called to find ways and means of boosting farm exports. At this conference the Union Ministers for Commerce and Agriculture sought to promote the idea of setting up a special export promotion corporation as well as cooperative societies whose role would be to accelerate the export of agricultural commodities. More recently the Union and Agricultural Ministry has announced a three-year cash-aid scheme. There would be a

statutory price support system, and fiscal incentives would be provided as well as other various encouragements. The object of all this, is to double the export of food products.

Various states have agreed to set up export promotion calls for farm products as part of a new 'farm yard to stock yard' strategy formulated by the Centre. A document prepared by the Commerce Ministry has called for the earmarking of a minimum quantum of production for exports regardless of the vagaries of weather—this means that even in serious drought years the country will be committed to supplying fruit and flowers, cattle feed and meat to other countries.

The Federation of Indian Chamber of Commerce and Industry has also proposed setting up large farms completely geared to exports. These would be run by industrialists exempt from all land-ceiling legislation which limits the amount of land that individuals are allowed to own. It is horrifying that such a proposal can be made at a time when there are so many millions of landless peasants in areas where only those who have their own land seem capable of sustaining themselves.

In today's exploitative system a large number of people in India do not have the purchasing power to meet their most basic food needs. Instead of taking those steps required to assure that the poor meet their minimum nutritional needs, the government seems to have decided to use the country's land resources for growing cash crops so as to earn the foreign exchange required to maintain a massive state bureaucracy and the well-to-do minority in the large cities.

This simply represents a systematic transfer of resources from the rural people who are thereby condemned to malnutrition and, at the current rate at which things are proceeding, to eventual starvation. What is truly depressing is that this should be the global policy of national governments, international agencies and multilateral development banks—those who at present determine agricultural and trade patterns throughout the world.

References will be available on request.

The World Bank vs the People of Bastar

by Bharat Dogra

Though it could not be better established that deforestation in the tropics is a major cause of impoverishment and malnutrition, the World Bank and national aid agencies are financing the deforestation of the remaining forested areas of India.

A recent report describes all the subtle ways in which villagers and tribals in the Bastar area depend on natural forests for their sustenance, and explains why their various needs cannot conceivably be met by the plantations of fast growing exotics with which the forests are being systematically replaced.

While the need for a massive re-afforestation programme to bring more land under tree cover is accepted by almost everyone in India, in recent years the main features of the afforestation work have become increasingly controversial. One of these is the official policy to replace natural forests with monocultures of commercially lucrative species such as the pine and the eucalyptus, another is the setting up of monocultures on good agricultural land required for feeding the usually already undernourished local population.

One of the arguments against the first of these practices is that the tribals or other villagers who live in or near the natural forests derive from them much of their food, fodder, humus for their fields, building materials, and other necessities of life, all of which cannot be obtained from the plantations.

The main argument against the second of these practices, is that it not only reduces food availability but also the availability of employment for the landless poor. These arguments are of course only part of the case against such projects but they are the ones most frequently voiced.

Broadly, what is being argued is that such projects will further deprive those who are already the poorest and the most deprived in India. In return, it is not at all certain how the poor will benefit from the

sale of the timber from the plantations, or the paper mills or the rayon factories whose products will be consumed in the cities or sold abroad.

It is interesting that both these types of projects are among those most encouraged by the World Bank and also by national and international aid agencies. In 1980, the Minister of Agriculture published a list of current forestry projects which were being implemented with the assistance of foreign aid agencies (bilateral and multilateral). The names of these projects and those of the donor countries and agencies are given in Table 1.

Let us consider a few of these projects:

Project No 1

This FAO-assisted project aims at modernising the plywood industry in India so as "to develop typical models of plywood and veneer mills so as to modernise the plywood mills and to enhance their capacity to utilise a wider range of species and sizes than today." It is clearly designed to make the destruction of natural forests even more economic and hence desirable.

Project No 2

Though several recent reports have warned against the terrible ecological disruption in the Andaman and Nicobar Islands, this has not prevented FAO from helping to set up a project designed to undertake a "preliminary assessment of utilisation of Andaman Hard Woods for manufacture of paper and pulp."

Project No 8

This World Bank-assisted

Madhya Pradesh Forestry Technical Assistance Project in Bastar, Madhya Pradesh is described as "an experimental research-oriented project which envisages the felling of existing sal forests, mixed forests in selected localities for raising trial pine plantations to study their growth and performance for undertaking regular pulp wood plantations of pines." This project is considered in greater detail further on in this article.

Project No 18

This project is assisted by the Swedish Aid organisation (SIDA). Its object is to establish an Indian Institute of Forest Management "with a view to develop expertise in the field of business and commercial aspects of forest management."

The titles of the other projects make it clear that they are all designed in some way to facilitate and indeed accelerate the process of further destruction of native forests and their replacement with more commercial plantations of fast growing exotics.

The reader must not, of course, be taken in by such euphemisms as 'community forestry' or 'social forestry'. What this has actually meant in India has been described in the pages of *The Ecologist* by Jayanta Bandyopadhyay*. Like other forms of modern forestry it often involves the destruction of natural forests and their replacement by plantations of fast growing exotic trees—as will be shown later on in this article.

This bias of the aid agencies in the

*See *The Ecologist* Vol 13, No 5, 1983.

Bharat Dogra has written many articles for *The Ecologist*. He is a Freelance writer, Researcher and Journalist, specialising in environmental issues in India.

selection of foreign projects in India should come as no surprise to anyone familiar with the world-wide role of foreign development aid in the area of forestry. That the World Bank is committed to this policy is made clear in one of its sector policy papers on forestry. This report states that the export of forest products from developing countries increased from 1500 million dollars in 1970 to over 3000 million dollars in 1975. This trend, they feel, will continue because of the continued demand for tropical hardwoods. They seem to regard it as perfectly legitimate that the Third World should continue exporting its hardwoods and thereby annihilating its remaining forests. Thus they tell us that "the developing countries contain the world's main reserves of tropical hardwood, they have, therefore, a major advantage in this area," and that "the extraction of this resource, however, provides valuable foreign exchange that can provide potential benefits to a much larger population." They show no concern whatsoever for the terrible social and ecological effects of such deforestation in particular the terrible poverty that this might give rise to in the newly deforested areas.

In a report on East Maharashtra, a Ford Foundation consultant expresses precisely the same irresponsible attitude. "Without the project" he writes "these forests would carry on the languid low (physical and economic) production regime of today with the project, they are to be replaced with a small cost, by high yielding plantations... In terms of the standard benefit cost parameters a situation like the one prevalent in East Maharashtra should put the project high in the economic ranking. And this is only a natural consequence of the very favourable (and relatively new) market possibilities that most forest products find in India today."

The aid provided by the World Bank, the Ford Foundation and other such organisations is seen to be justified in that it is supposed to "assist the poor". Not surprisingly official project reports pay lip-service to this—the supposed objective of all their activities. However it is increasingly difficult to maintain that this is their real goal. Consider a recent report in the *Indian Express*:

The Ecologist, Vol. 15, No. 1/2, 1985

TABLE 1: Indian Forestry Projects Receiving Foreign Aid, 1980

Name of the Donor Country/Agency	Name of the Project
1. FAO/TCP	Modernisation of plywood industry in India
2. TAO/TCP	Preliminary assessment of utilisation of Andaman Hardwoods for manufacture of paper and pulp
3. FAO/TCP	Transfer of Economic Model of FAO for use in India
4. UNDP	Integrated saw milling & wood working
5. UNFPA/FAO	Slash & Burn (Study on population in Asian Forestry Communities)
6. WFP	Social & Economic Development through Forestry Activities, Maharashtra
7. World Bank	Gujarat Community Forestry
8. World Bank	Madhya Pradesh Forestry Technical Assistance Project, Bastar, Madhya Pradesh (Pines in place of natural forests)
9. World Bank	Uttar Pradesh Social Forestry
10. Ford Foundation	Community Forest Project
11. Denmark/DANIDA	Development of seed Procurement and Tree Improvement Centre
12. FRG	Development of Conifers Research Centre, Simla
13. FRG	Project for Erosion Prevention, Dhahladhar Range, Himachal Pradesh
14. New Zealand	Establishment of Fire Fighting Depots
15. New Zealand	Seeding and Spacing trials of Conifers
16. Sweden/SIDA	Forestry Programme Co-ordinator
17. Sweden/SIDA	Support of the large scale afforestation of Giant Inil, by import of seed from the Philippines.
18. Sweden/SIDA	Support to the establishment of Indian Institute of Forest Management
19. Sweden/SIDA	Support to the Indian Logging Training Project
20. Sweden/SIDA	Support to West Bengal Forest Development Corporation

"Social forestry programmes designed to provide fuelwood and fodder for the poor are instead becoming a source of quick money for big farmers. The Uttar Pradesh Government's World Bank assisted social forestry programme has overshot its farm forestry targets by 3430 per cent, but fallen short of its targets for creation of community self help woodlot by 92 per cent. Judging by the World Bank's own mid-term review of the social forestry projects in UP and Gujarat, big farmers and the paper mills they supply with wood for pulp are emerging the primary beneficiaries of these multi-care schemes."

Another recent report in the *Indian Express* mainly quoting from a report prepared by the Madras Institute of Development Studies (MID) makes a damning indictment of the subservience of social forestry in Tamil Nadu to the requirements of the industry:

"Not only is the timber sold to the industrial sector, but it is sold at a price which is many times lower than its cost of production. The social forestry projects, are, in this way, subsidising the industrial sector in a very big way, which is totally contrary to the

principles which are supposed to under such projects. While the aim of the farm and social forestry projects is to meet the needs of the villagers as regards fuelwood, small timber, fire-wood, fodder and green manure, the forest department, for the past 13 years, has been selling the trees raised on the farms and in social forests to



Villagers depend on natural forests for firewood, a vital resource.

private paper and pulp industries at a price eight times lower than the expenditure incurred in raising a single hectare of eucalyptus wood. This alone has made the forest department incur a loss of several crores* of rupees. Apart from this there have been heavy losses owing to other things . . . While the price fetched per hectare (for selling the wood to paper and pulp industries) was Rs.244/—the percent cost of raising one hectare of social forest plantation (1981-82) is Rs.1946/—that is, the price was eight times lower than the cost of raising it."

To give a specific instance from the MID report, "the quantity of eucalyptus hybrid wood supplied from Chengalpattu district alone to a paper mill from 1975-76 to 1982-83 was 17,422 tonnes. Each tonne was sold to the mill as Rs.80 while the cost of raising the wood was more than Rs.540 per tonne. The Changalpattu forest division incurred a loss of Rs1.07 crore from 1956-76, its expenditure during that period was Rs1.90 crore and income a meagre Rs.83 lakhs. The loss that the other 30 forest divisions in Tamil Nadu would have suffered during the same period can be imagined."

Having seen the overall nature of forestry projects in India that are assisted by the World Bank and other International Agencies, let us now concentrate on a single area, the Bastar district of Madhya Pradesh. This area, because its forest resources have not yet been entirely destroyed, has been examined with interest by various Aid agencies wishing to further extend their sphere of activity.

An FAO/SIDA mission visited this area in 1973 at the request of the Government of India. It identified an area within a radius of 350 kms, from Jagdapur, called the 'Dome' area as exceptionally suited for the setting up of high-yielding tropical pine plantations. Its geographical situation, its soil and climatic condition, in fact made it one of the most suitable areas for large scale conifer plantations in the whole country.

Indeed, from among a number of projects submitted by the forest departments of various States, initially only the tropical pine plantations project of the forestry department of Madhya Pradesh re-

ceived favourable acceptance from the World Bank. Subsequently (in 1974) the World Bank sent an identification mission to Madhya Pradesh. This mission recommended the creation of tropical pine plantations, as also the setting up of an export-oriented pulp mill based on an intensive management plan prepared by the Forest Department. In addition, the setting up of an integrated saw-mill and the conduct of a comprehensibility study for industrialisation was also recommended by the mission. As a follow-up measure, the World Bank sent a preparatory mission in 1975. This mission, while agreeing with the recommendations of the earlier mission, suggested that for the first phase of five years it would be worthwhile to concentrate on pilot pine plantations, setting up a pilot logging project and carrying out a detailed feasibility study for industrialisation.

In those deforested areas that are now situated in the vicinity of eucalyptus and teak plantations, the downward slide towards poverty and malnutrition is beginning to make itself felt. Thus in Dhourai, a village situated near a teak plantation, construction material is already becoming scarce. Edible fruits, such as the Anwla and Tamarind are also very much less available than they used to be. Salt, which was previously obtained by barter against forest produce now has to be purchased for cash and is even less available to local people.

It was entirely on the basis of the suggestions made by the preparatory mission of the World Bank that the project was recast and given the title of Madhya Pradesh Forestry Technical Assistance Project (MPFTAP). It was accepted for financing by the International Development Agency (IDA) in December 1975 and hence became the first forestry project in India to receive credit from the World Bank.

Apart from its felling and pine-

planting work, this project also aims at carrying out feasibility studies for determining the location, size and configuration of the integrated forest industries that could be established by ensuring the complete utilisation of the forest resources of that region. This task was assigned to a foreign company, Sandwell Management Consultants Ltd of Canada. Earlier, between 1965 and 1975 a pre-investment Survey of the Forest Resources at Bastar was made in collaboration with UNDP in the course of which the whole of Bastar was surveyed.

This project has evoked a lot of protest partly on account of the adverse impact it would have on the large tribal population of the area. As the protests have grown, some confusing official statements have been issued. On one hand there are reports that the project has been given up, on the other hand, we are told that a programme for replacing natural forests with man-made plantations has been pushed ahead in several areas of Chattisgarh of which the Bastar is a part.

Importance of forests to local tribals and other villagers

Let us now see some of the reasons why the cutting down of natural forests in the Sal area must further impoverish the local inhabitants.

The existing natural forests of this region are extremely important to the villagers, especially the tribals. This fact is brought out clearly in a recent document entitled "The Impact of Bastar Forestry Project on the Tribal Economy" prepared by the tribal and Harijan Welfare Department of the Government of Madhya Pradesh. The report points out that the many benefits that the villagers derive from the forests cannot be expressed in monetary terms, which means that they are generally ignored by Economists and development experts. What is more, wage-labour in a plantation is not seen as providing a substitute for these benefits.

The first benefits are provided by the foodstuffs that the local people can obtain from the forests, in particular the sal forests. These are a source of all sorts of edible fruits, roots, and shoots, which are collected when required. What is more, the availability of this food is the maxi-

* A Crore of rupees is 10,000,000 rupees

mum during the lean period of the year from March/April to August/September when the people's need for an alternative to their diet of cereals is the greatest. In addition, this produce acts as a nutrient additive during the year as a whole.

The report lists 22 types of fruit, 8 flowers, 14 leaves, 29 roots and 11 seeds that are used as food by local people and which can only be obtained from these forests. They also harbour a variety of small game animals which are traditionally hunted by local people and provide an important source of animal protein. The forests also provide valuable grazing lands for domestic animals.

Many food products are collected from the forest for sale and for barter. These include five types of fruit and flowers, 4 types of roots, 4 types of seeds, and 3 types of leaves. Other commodities obtained from the forests for this purpose include fuelwood, kisa cocoons, gum, dheep, bamboo chips, silyari and many grasses.

This brings us to an essential aspect of this whole question which tends to be totally neglected by development experts. It is not only the able-bodied workers who collect all this valuable produce from the forest but also the old, the infirm and the children. All are thereby in a position to make a contribution, however, modest, to the needs of the household.

Indeed according to the report, an average household consisting of two adult members and at least one child and one old person can gather produce whose value (in so far as it can be valued in monetary terms,) is estimated on average at Rs 1500 a year, which is very significant in this part of the world.

Socially and psychologically, the contribution made by the old, the infirm and the very young is of greater importance than such figures would suggest. It means that they are all busily employed, contributing to their own keep and indeed to that of their families. This provides an in-built system of social security. It also provides them with considerable psychological satisfaction, and maintains their status within the village society.



PHOTO: BARNET SAIDMAN

It is not only the able-bodied workers who collect all this valuable produce from the forest but the old, the infirm and also the children. All are thereby in a position to make a contribution, however modest, to the needs of the household.

Once the forests are cut down of course, the produce is no longer available to gather. The young and the able may obtain jobs in the plantations, when these are available; but they are just as likely to be unemployed. The old, the infirm and the children, however, are no longer catered for. They can no longer make any contribution to the household, nor obtain the psychological and social satisfaction which they once had. Their status within the village community is thus seriously affected, and as a result its whole structure may be disrupted.

A further factor which tends to be neglected by economists and development experts, is that the forest provides an insurance against famine. Today famines in Africa and in Asia tend to be blamed on drought. Drought occurs more and more in areas where the rainfall has not changed for decades. In such conditions it is not due to a reduction in rainfall as one would expect, but to the degradation of the soil, which now has reduced capacity to retain water.

Forests, by storing water in their

elaborate root systems, and by providing shelter against the elements, conserve water. When an area is deforested, rivers, streams and springs tend to dry up, water ceases to be available to the local people. Soil also tends to be destroyed by wind and water erosion against which the forest previously provided considerable protection. In addition, the forest provides a source of food to local people which remains available even during a drought, at which time cultivated crops cease to be available. This is particularly so of the inhabitants of the sal forests, who could always subsist on the bamboo seed and pulp of the stem of the sago palm which are available there even when roots, shoots and leaves are not available.

A further benefit provided by the forests as we have already mentioned, is building-material, indeed in the Bastar area, house construction is only possible for the tribal people with the help of material collected from the forests. A list of 21 types of timber, 10 types of grasses and 11 other types of forest produce used in house construction is given in

the report. Even for the purpose of binding or fixing the poles, creepers or the bark of certain trees are used as rope instead of the screws and nails used elsewhere. The importance of forest produce in house construction activity is evident from the fact that in Chandanpur, a village whose adjoining forests were cut down two decades ago, no new houses have been constructed since.

In addition 9 types of timber are used for agricultural tools while 8 types of grasses and 17 types of leaves serve other useful purposes in economic activities. Fuel used from forests is used for cooking, lighting and for heating purposes.

Natural forests also meet the many social and ritualistic needs of the villagers. Thus, the marriage 'mandap' has to be built from sal logs and it has to be covered with sal leaves. Dheep (a resinuous secretion of the sal tree) is burnt on almost all socio-religious occasions. The place of worship in the village is generally located beneath a Baja tree, which grows in the natural forests. The traditional musical instruments like drums are made from hollowed out logs of sal and khamar. The fact that the tribals perform some sort of puja (worship) before actually cutting down a tree is an indication of their sense of attachment to and reverence for their forests.

Unfortunately, most of the products we have considered in this article can only be obtained in the sal forests, and once these are converted into plantations of fast-growing exotic trees, they will cease to be available, and as we have seen this will not only deprive people of valuable foodstuffs but of their building materials required to put up their houses, of their traditional medicines and all sorts of other items required for the practice of their traditional way of life, while also changing the status of the older people and the infirm and eroding their social structure.

It is thus clear that tribal life and forests are intimately inter-related. Indeed, tribals cannot even visualise life without their forests, and even in areas where forests do not exist, they still visit the distant forests periodically and try to obtain their traditional requirements from them, however insignificant they may appear to

economists and development experts brought up in the affluent and materialistic society of the west. The economic consequences of present policies are already apparent in the Bastar area, as is pointed out in the report.

The method adopted by its authors was to examine a sample of 216 households, of which 187 were tribal, 29 were not. These households were taken from 11 villages which differ in terms of the extent and quality of forest cover. It noted, needless to say, that agriculture was the principle occupation of the great majority of the villagers. Looking into the question more deeply than most such reports, it fully established that the collection of forest produce is so much part of the daily life of the villagers that it cannot be considered to be a separate occupation. All agriculturalists in the area where there are still forests, practice it and, to all of them, forests provide a substantial source of sustenance.

Interestingly enough, in most of the villages studied, it was found that a decline in the income from forest activities does not result in an increased income from agriculture, but appears to force people to adopt other economic pursuits like working as labourers on construction sites and roads.

In villages/hamlets of Jangalpara of Mingachal and Gagrupara of Naimed of Bujapur Tehsil, which are near eucalyptus plantations, the income from agriculture is only at 27 per cent and 29 per cent respectively and this inspite of the fact that the average landholding per household in these villages is on the higher side. Agricultural production per acre in these two hamlets is less than that in other villages even of the same tehsil. The agricultural income per acre, both in Kashiras of Mundagarh which is situated in a sal forest and in Chipawand which is near one, is very much higher. This is very significant, it suggests that the income from agriculture in this area is dependent on such subsidiary activities as gathering forest produce. It also suggests that ordinary agricultural activities are dependent on the proximity of the forest. This is particularly so of animal husbandry. For instance, it was found that in a village situated on a main road, and near a town,

income from this source was negligible while income from animal husbandry in villages situated in or near forests was quite substantial.

Indeed many traditional agricultural operations and practices are to a great extent dependent on the existence of forests. The agricultural and forest work cycles are closely interwoven and any disturbances in either of the two activities is likely to have an adverse impact on the other, as well as on the economic life of the people involved.

The much touted ability of the new monocultures to provide employment for the local people is also largely illusory. On eucalyptus plantations (and probably on pine plantations too) work is available only when planting is in progress. Little is available once planting is over. On teak plantations, on the other hand, some work seems to remain after planting. Because of the temporary nature of the employment provided by these plantations, it would appear that, contrary to all the claims made in this respect, they cannot assure a reliable means of sustenance to the people living in this area.

Meanwhile in those deforested areas that are now situated in the vicinity of eucalyptus and teak plantations, the downward slide towards poverty and malnutrition is already beginning to make itself felt. Thus in Dhourai, a village situated near a teak plantation, construction material is becoming scarce. Edible fruit, such as the Anwla and Tamarind are also very much less available than they used to be. Salt, which was previously obtained by barter against forest produce now has to be purchased for cash and is even less available to local people.

All this information is readily available to those who seek it—including of course those development experts working for the World Bank and other such organisations. If they do not take it into account, it is not therefore because they are ignorant of the effect of their policies in increasing the poverty and the malnutrition of the Indian people, but because such considerations are of little concern to them, their objectives being of a very different order.

References will be made available on request.

Deforestation means an end to India's traditional crafts.

The Indian paper industry has ruthlessly destroyed the forests of India. Paper companies in Karnataka, having destroyed all the bamboo forests, are now getting their raw materials from the last major forested frontier of India: the Northeast. The government's own public sector paper companies are coming up in the Northeast itself. The Andhra Pradesh government has meanwhile set its sights on the forests of Andamans and Nicobar Islands for a paper mill that it wants to build in Kakinada. The shortage of raw materials for wood pulp has already forced the government to liberalise import of pulp for the country's paper industry, thus, adding to the pressure on the forests of other Third World countries

Forest resources not only meet crucial household needs but they also provide a range of raw materials for traditional occupations and crafts and are, hence, a major source of employment: firewood and cowdung are important sources of fuel for potters; bullock carts and catamarans are made from wood; bamboo is a vital raw material for basket weavers, and so on. Traditional crafts are not just being threatened by the introduction of modern products but also by the acute shortage of biomass-based raw materials. A study from the Indian Institute of Science—the first in India on the changing market of bullock carts—reports that people in Ungra village in Karnataka can now no longer afford to buy new bullock carts with the traditional wooden wheel because wood has become extremely expensive. A recent report from the Murugappa Chettiar Research Centre from Madras reports that traditional fisherfolk now find it very difficult to make new catamarans because the special wood they use is extremely scarce and expensive.

Several reports from all over the country—from MP, from Maharashtra, from Tamil Nadu—portray the extreme difficulty of hundreds of thousands of basket weavers in eking out a bare existence because of the acute shortage of bamboo. In the Bhandara and Chandrapur districts of Maharashtra, nearly 70,000 mat and basket weavers have been protesting against the discriminatory prices and small quota of bamboos given to them whereas big paper mills have been leased out large bamboo forests.

In Karnataka, Madhav Gadgil undertook a study of the use of the State's bamboo forests by paper mills, after a series of protests by basket weavers. Gadgil found that whereas bamboo was available to paper mills at Rs. 15 a tonne it was available to basket weavers and other small bamboo users in the market at Rs. 1200 a tonne. Social activists in Saharanpur have pointed out to the travails of the *baan* makers* who have now been deprived of their earlier sources of *bhabhar* grass. The UP Forest Development Corporation discriminates in favour of paper mills and this policy has turned thousands of these *baan* workers into destitutes, landless labourers and urban migrants. Wood is now difficult to get for making even agricultural implements like the plough, especially wood that has been traditionally used for these implements. Few people know that one of the things that led to the Chipko movement was the anger of the local people over the forest department's refusal to provide ash wood, wood that has been traditionally used for making ploughs, whereas the forest department happily allocated the same wood to sports goods manufacturers.

Even biomass resources like thatch have become so difficult that maintenance and repair cycles of mud and thatch huts have increased considerably. A government report from Bastar, of all places, as it is still one of the heavily forested districts in the country, points out to a village where no new hut has been built over the last two decades because the entire area around the village has been deforested. Traditional mud roofs have almost disappeared from many parts of the country because of the large quantities of timber needed by them. They are being replaced by tiled roofs, but baking of tiles still requires large quantities of firewood.

Fodder is another vital resource that is in acute shortage. With only 2.45 per cent of the world's land mass, India supports 15 per cent of its cattle, 52 per cent of its buffaloes, and 15 per cent of its goats, and these animals play an extremely important role in the integrated system of agriculture and animal husbandry that Indian farmers practise. Shortage of fodder, especially from public lands, means, as a study from the tribal areas of Gujarat shows, that poor landless households and marginal farmers do not benefit much from the milk co-operatives and animal improvement schemes in the region.

In such a situation where millions of people are heavily dependent on biomass sources for their daily existence, the destruction of the environment of any policy that reduces access to biomass resources will have an extremely adverse impact on the daily lives of the people.

**baan* makers are weavers of string.

Anil Agarwal

This is an extract from the fifth Vikram Sarabhai Memorial Lecture given by Anil Agarwal, Director of the Centre for Science and the Environment, in New Delhi in 1984.

Why India's forests have been cut down

by B. B. Vohra

This is an extract of B B Vohra's seminal article entitled *The Greening of India*. In it, a top Indian civil servant and one of the most respected, who was until recently chairman of the National Committee on Environmental Planning explains very frankly just what are the forces that, since independence, have brought about the catastrophic deforestation of his country.

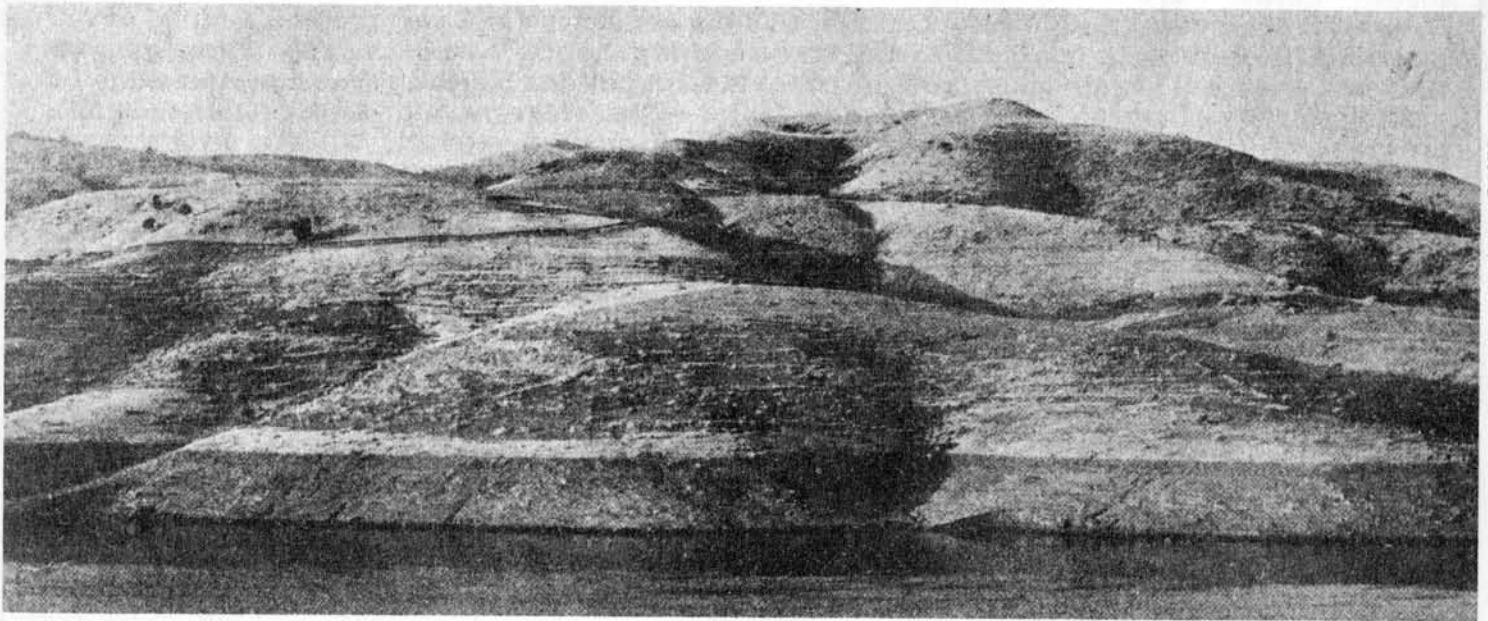


PHOTO: INDIA TODAY

Destruction of the forests has upset the delicate ecological balance between soil and vegetation, ushering in attendant dangers.

The depletion of the country's forest wealth can be attributed to a number of factors. The increasing pressure of human and cattle populations on the land naturally led to excessive felling and grazing in adjacent forest areas as well as to encroachments on forest lands and their conversion to agricultural use. Substantial areas of forest lands were also officially placed under the plough by Government in an effort to resettle refugees, oustees and landless farmers. Big industrial and irrigation projects along with their townships were often located on government-owned forest lands.

B B Vohra was a top civil servant at the Indian Ministry of Agriculture. In 1972 he produced his famous charter for the land which was an appeal for a massive campaign to protect India's remaining soils and restore those that had become degraded. More recently he has served as chairman of the National Committee on Environmental Planning and is now head of a commission involved in cleaning up the River Ganges. The Ecologist has already published an article by him in our special issue, "The Relevance of Gandhi", in October 1975.

However, there is no doubt that by far the greatest damage to forest resources has been caused by the inexorable pressures to satisfy the increasing demands which a developing economy creates for timber, pulpwood, firewood and other forestry products.

The satisfaction of these demands at continuously rising price levels by means of illegal and unauthorised fellings proved to be a highly lucrative affair and soon attracted political patronage in much the same way as smugglers and other economic offenders have done. By a fortunate circumstance, such over-exploitation was greatly facilitated by the construction of new roads which opened up hitherto inaccessible forests—particularly in the Himalayan region, for strategic purposes. Forest officials who tried to check illegal extractions soon found themselves rendered ineffective, in much the same way as other limbs of the bureaucracy were emasculated when they proved to be

a nuisance to predatory politicians. As a result, the more cynical and unscrupulous members of State forestry establishments soon came to terms with criminal elements and began to share in the loot of the very resources they were supposed to look after. Formidable mafias based on a triangular alliance between the corrupt bureaucrat, the corrupt politician and the corrupt businessman emerged in all States and became a most powerful threat to the conservation of the country's tree cover.

The question arises as to why the large-scale spoilation of forests that has taken place during the last three decades did not attract sufficient notice at an early enough stage so that it could be stopped before it could do much damage. There are several reasons for this. Illegal fellings and encroachments which took place on "protected" and "unclassified" forests—over which the forest departments do not have anything like the complete administrat-

ive and legal control which they exercise over "reserved forests"—proved difficult to detect and prevent and were often ignored. Local politicians also often protected such offenders for the sake of gaining their votes. For much the same reason it has been found impracticable to take serious notice of excessive grazing in forest lands and shifting cultivation, although both these practices cause great damage to forest wealth. The fact must also be acknowledged that since the illegal extraction of timber from forests is by its very nature a crime which does not affect the interests of any individual person, it is easy to be glossed over. Again, officials generally helped in keeping illegal fellings under wraps either because they had a share in them or because they were afraid to incur the displeasure of the powerful mafias behind them. It must be mentioned in this connection that the so-called "timber-kings" who often headed these mafias were men of great influence and political clout—they were known to be capable of getting Forest Ministers and Chief Ministers to take policy decisions according to their wishes, not to speak of getting individual officers transferred, promoted or side-tracked as it suited them.

What is a forest?

However, in spite of all these circumstances, the depletion of our forest resources could not perhaps have failed to attract public notice and raise a big stink had it not been for the most curious system of reporting which is followed by our forest departments. For, unbelievable as it may seem, this system includes under the description "area under forests" all those lands which stand notified as "forest lands" under one section or the other of the Indian Forest Act, quite regardless of whether or not they possess any tree cover. This system thus makes it possible for even denuded and waste lands to be counted as "area under forests". Since lands once notified under the Indian Forests Act continue to retain this status till such time as they are denotified (as a result of an official transfer to some other land use—which is a very rare circum-

stance indeed), their description remains unchanged even though they may have suffered extensive deforestation and denudation over the years. This is the reason why land use statistics show the "area under forests" to be constant at around 70 m.h. for the last 15 or 20 years, thus giving the impression that the country's forest wealth has not suffered any depletion.

It is indeed surprising that this system should have survived so long and has not yet been replaced by one which employs the more accurate description "area notified as forests", and also provides a break-up of this figure into three parts—"good forests", (with a density of over 30 per cent), "poor forests", (with a density of 10 to 30 per cent) and "other areas" (with a density of less than 10 per cent)—to reflect the actual extent of our forest wealth. The fact that no such reform has been attempted would show that our forestry establishments are quite happy to take shelter behind meaningless statistics. This would also explain why the Central Forestry Commission—which is the apex body for the State forestry establishments—persists in claiming that the "area under forests" is substantially higher than that reported in the official land use statistics published by the Ministry of Agriculture. It is interesting to note that this matter came to the attention of the National Commission on Agriculture as far back as 1976. While the NCA did not go into the reasons behind the discrepancy, it did advise that it should be reconciled. However, no such reconciliation has been carried out so far, with the result that while the latest available land use statistics mention the "area under forests" to be around 67 m.h., the Central Forestry Commission continues to claim that it is around 75 m.h.

Since neither of these figures bears any relation to reality, this long-standing discrepancy is by itself of little practical significance. What is, however, more than a little disturbing is the fact that our forest establishment should have taken so little interest in the most basic of all management functions—the drawing up of an accurate inventory of One's resources and assets and keep-

ing it up to date. This indifference to a matter of primary importance has cost us dearly because it has undoubtedly helped in hiding from the public and even the official view the fact that our forest resources have suffered heavy and sustained depletion over a long but unknown period of time. It has thus created an unjustified sense of complacency and prevented the forestry sector from receiving the kind of serious attention it actually deserved. For if, as the figures suggested, there was no serious depletion of the "area under forests" the question of creating man-made forests on a large scale simply did not arise. This, in turn, explains why no big allocations were made for the forestry sector all these years and why the rate of afforestation over the last 32 years has averaged only around 0.18 m.h. per annum.

Indifference of the forestry service

It is easy enough to appreciate, in the light of these circumstances, why forestry has been the subject of so much neglect and why there has been so little understanding of its problems. For, all said and done, no one can be more loyal than the King and our forestry establishments could have transmitted a sense of concern and urgency to the Government, the media and the public at large only if they had experienced it themselves. Their indifference towards the subject is indeed the basic reason why the 1952 policy has remained a dead letter and is today being blamed implicitly, if not explicitly, for its imperfections when the real blame lies with our failure to implement it. This also explains why forestry is so little regarded that in the 6th plan it has been allotted less than Rs. 700 crores* out of a total allocation of nearly Rs. 25,000 crores for the rural sector comprising of Agriculture, Irrigation and Flood Control, Rural Development and Special Areas Programmes. This is also the reason why forestry offences are still treated rather casually. Let us face it, in the eyes of those who count forestry is not yet a matter of consequence in the national scheme of things.

* A crore of rupees is 10,000,000 rupees.

ARE WE DESTABILISING WORLD CLIMATE?

The Lessons of Geophysiology

by James Lovelock

Few books have cast more light on the functioning of the living world than atmospheric chemist Jim Lovelock's *Gaia: A New Look at Life on Earth* (1979). Its main theme — now known as the Gaia hypothesis — is that the biosphere is a "quasi-living entity that has the capacity for global homeostasis". This means that it is capable by its own coordinated efforts to maintain the stability of its interrelationship with its environment — hence, among other things, the great climatic stability without which life would be very difficult if indeed possible.

It took 3,000 million years for Gaia and its atmospheric environment to develop those features that assure this great stability, but what happens when, with modern development, we systematically transform Gaia, in particular by cutting down the forests with which she was once covered? What happens too when, as a result of our agricultural and industrial activities, we systematically transform the chemical composition of the atmosphere? How far can we go in this direction without causing a climate 'flip' which might make life very difficult for us on this planet?

This is an extract from Jim Lovelock's lecture at the conference organised by the United Nations University on Climatic, Biotic and Human Interactions in the Humid Tropics: Vegetation and Climate Interactions in Amazonia, in Brazil, February 1985.

Notions that the Earth is some kind of living system have a long history, in the last century Dumas and Boussingault described the cycling of elements like carbon and nitrogen between life and the environment and laid the foundations for the science of biogeochemistry. The first scientific expression of the idea that the sum of the biota might be more than just a catalogue of species was that of Vernadsky who coined the term 'Biosphere' for the region of the earth where life could be found¹. This new science was extensively developed by Sillen, Redfield and Hutchinson and most recently by Bolin & Cook, McElroy, Garrels, Broecker, and Whitfield.^{2, 3, 4, 5, 6, 7, 8}

Geophysiology developed in the late 1960s as an unintentional by-product of the space exploration programme of NASA. It arose during attempts to design experiments to detect life on other planets particularly Mars. For the most part these experiments were geocentric and based on the notion of landing a miniaturised biological or biochemi-

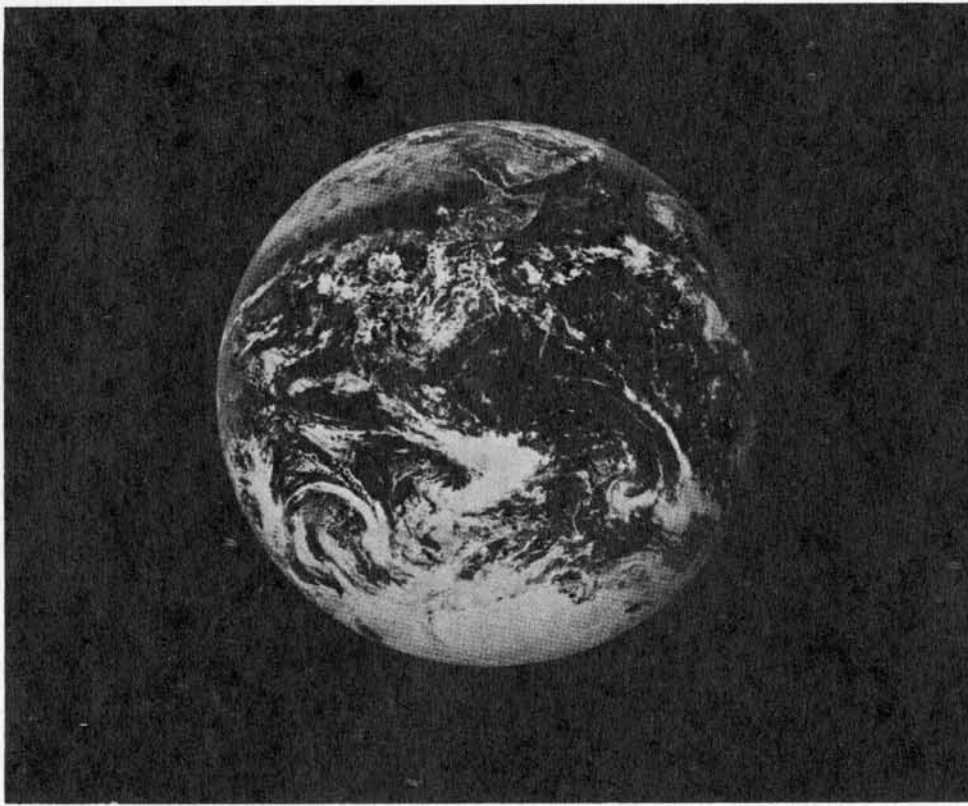
cal laboratory on the planet and using it to recognise life by the well known techniques available to life scientists on Earth. Hitchcock and Lovelock took the opposing view that not only were such experiments likely to fail because of their geocentricity but also that there was a more certain way of detecting planetary life whatever its form might be⁹. This alternative approach to life detection came from a systems view of planetary life. In particular if life can be taken to constitute a global entity it suggests that its presence would be revealed by a change in the chemical composition of the planet's atmosphere. The change in composition would be compared with that of the abiological steady state of a lifeless planet. The reasoning behind this idea was that the planetary biota would be obliged to use any mobile medium available to them as a source of essential nutrients and a sink for the disposal of the products of their metabolism. Such activity would render a planet with life as recognisably different from a lifeless one. At that time a fairly detailed compositional analysis was available for the Mars and Venus atmos-

pheres from infra red astronomy and it revealed both planets to have atmospheric compositions not far departed from chemical equilibrium and therefore they were probably lifeless. By contrast the Earth's atmosphere viewed in this way was seen to be vastly departed from equilibrium with oxidising and reducing gases coexisting in what was clearly an unstable state that was nevertheless maintained steady by life. In the infra red the Earth radiates its signature of life so clearly as to be recognisable from well outside the solar system. The success of this approach to life detection forced our attention back to the Earth and to the nature of the system that could hold so unstable an atmosphere in a steady state that was even more remarkably just right for life.

In the early 1970s Lynn Margulis and I¹⁰ introduced the Gaia hypothesis. It postulated the Earth to be a self regulating system comprising the biota and their environment and with the capacity to maintain the climate and chemical composition at a steady state favourable for life.

Most earth scientists today would accept that the atmosphere is a

James Lovelock is a well known atmospheric chemist and is author of the book "*Gaia, A New Look at Life on Earth*."



Gaia theory suggests that we inhabit and are part of a quasi-living entity that has the capacity for global homeostasis. This is the basis of geophysiology and if this theory is correct then we *cannot* model the consequences of perturbations, such as those caused by our own actions, as if the world were a passive system like the space ship earth.

biological product and this is a tribute to the success of biogeochemistry. But most would disagree that the biota in any way 'control' atmospheric composition, or any of the important variables (such as global temperature and surface redox potential) which depend on the atmosphere. The principal objection to Gaia or the geophysiological approach is that it is teleological. Namely that the regulation of climate or chemical composition on a planetary scale would require some kind of forecasting or clairvoyance on the part of the biota. Yet, I believe that this objection is wrong and that geophysiological regulation requires neither foresight nor planning. It is, in fact, a simple consequence of Darwinian natural selection. The evolution of the species is not independent of the evolution of the environment. The two evolutionary processes are in fact tightly coupled. Life and its environment evolve together as a single system so that not only does the species that leaves the most progeny tend to inherit the environment but also the environment that favours the most progeny is itself sustained. What then is the mechanism of geophysiological regulation?

Let us accept for the moment that the biota can profoundly influence its environment. The converse is also self-evidently true; that is, organisms are affected by the environment. To take atmospheric composition as an example, plants and animals are obviously dependent upon the oxygen, carbon dioxide and nitrogen of the air but they also produce all three of these gases. In other words life and its environment are two parts of a close coupled system where these two components are arranged in a feedback loop (figure 1a). Perturbations of one will affect the other and this in turn will feed back on the original change. The feedback may be negative so as to oppose the change or positive so as to enhance it but it will not in general be non-existent. It is important to distinguish between the amplified active feedbacks of a geophysiological system (figure 1a) and the passive feedback of the systems considered by the climatologist or biogeochemist (figure 1b). The geophysiological systems are much more powerful and can adjust their operating points as the system evolves. The latter are by comparison puny and the operating point is commonly set

at a fixed and immovable point by the chemical and physical constraints of the system.

What properties does this close coupling between life and its environment confer on the whole system? Does it explain the homeostasis that is observed?

Contemporary geophysiology and the humid tropics

Gaia theory suggests that we inhabit and are part of a quasi-living entity that has the capacity for global homeostasis. This is the basis of geophysiology and if this theory is correct then we cannot model the consequences of perturbations, such as those caused by our own actions, as if the world were a passive system like the space ship earth.

It has been said by politically inclined critics that the gaia hypothesis is a fabrication; an argument developed to allow industry to pollute at will, since mother Gaia will clean up the mess. It is true that a system in homeostasis is more forgiving about disturbances. But this is only when it is healthy and well within the bounds of its capacity to regulate. When such a system is stressed to near the limits of regulation even a small disturbance may cause it to jump to a new stable state or even fail entirely. In these circumstances pollution, changes in land use or in the ecology of the continental shelves, could be the recipes for disaster global in scale.

It could be that the regulation of the Earth's climate is not far from one of these limits¹¹. Thus if some part of climate regulation is connected with the natural level of CO₂ then clearly we are close to the limits of its regulation. This is because CO₂ cannot be reduced much below the level observed for the last glaciation, about 180 ppm, without seriously limiting the rate of growth of the more abundant C3 type plants. If we perturb the Earth's radiation balance by adding more CO₂ and other greenhouse gases to the atmosphere or reduce its capacity to regulate by decreasing the area of forests or both of these together then we could be surprised by a sudden jump of both CO₂ and temperature to a new and much warmer steady state; or by the

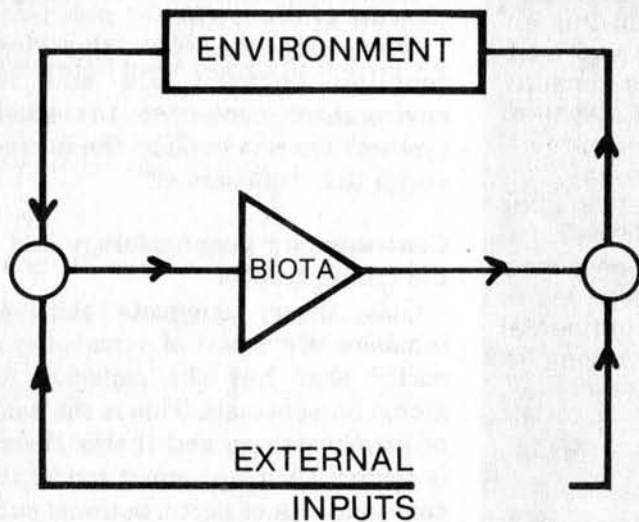


Figure 1a. A diagram drawn from control theory to illustrate as a single system the active feedback between the biota and its environment.

In the diagram the biota is represented as an amplifier connected to a sensor that recognises any departure from the operating point of the system. Physical or chemical variables, such as temperature or oxygen concentration, coming from the environment or from external inputs, such as the sun or pollution, are summed and compared with the operating point of the system. If there is a difference the biota responds by active feedback so as to oppose it and to keep the system in homeostasis. The system also has the capacity to evolve thus moving the operating point to a new steady value. This form of systems evolution is called homeorhesis.

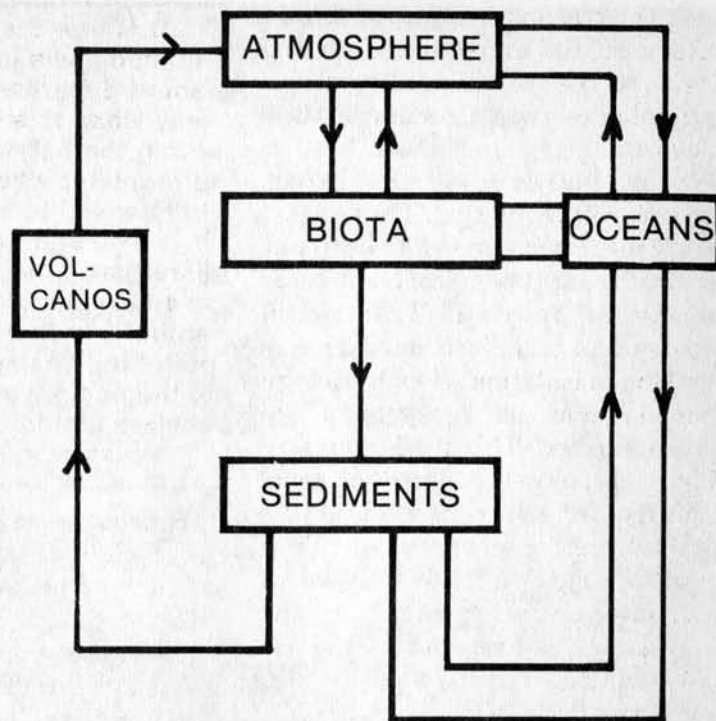


Figure 1b. A diagram taken from biogeochemistry to illustrate the mass and energy transfer between the biota and its environment. In biogeochemistry the system is treated as a set of linked but separate parts. A change in one part, say the atmosphere, can alter the conditions of another part, such as the biota or the oceans, but the feedback between them, whether negative or positive, is taken to be passive rather than active and responsive. In biogeochemical systems the evolution of the biota and the evolution of the environment are usually considered as separate and uncoupled processes.

initiation of periodic fluctuations between that state and our present climate.

The anomalously low abundance of CO₂ on Earth when compared with the other terrestrial planets and especially the fact that the mean temperature of the Earth is on the cool side of the optimum for regulation, suggests strongly that the biota is regulating the climate by pumping CO₂ from the air. The common feature of most of our pollutions and of our exploitation of the land surface seems to be unintentionally to thwart this natural process.

How then does all of this bear on our special interest in the humid tropics? I think that it does so in several ways: First of all it reinforces the general conviction from conventional modelling that large scale changes of land use in the tropics will not be limited in their effects to those regions only and geophysiologists reminds us that the climatic effects of forest clearance are likely at least to be additive to those of CO₂ and other greenhouse gases.¹² Even the most intricate

climate models of the present type can not predict the consequences of these changes unless the biota is included in the model in a way that recognises its very active presence and its preference for a narrow range of environmental variables. Putting the biota in a box with inputs and outputs as in a biogeochemical model does not do this. By analogy, the most detailed knowledge of the biochemistry of oxidative metabolism says nothing about how we sustain our personal thermostasis in the hot or cold environments that we encounter.

Most climatologists agree that forests tend to increase the cloudiness of the atmosphere above them and that the clouds alter the climate of forest regions both in terms of temperature and rainfall^{12, 13}. The geophysicist would see in addition that the active process of evapotranspiration by the forest trees could be coupled with the climatology so as to maintain the region in a state of homeostasis within that climate range preferred by the trees.

There is as yet no answer to the

question: What is the area of land of a region of the humid tropics that can be developed as open farm land or as silviculture without significantly perturbing both the regional and the global environment? It is a question like that of asking: What is the proportion of skin area that can be burnt without suffering a significant systems failure. This second question has been answered by the direct observations of the consequences of accidental burns; so far as I am aware it has not been modelled. It may be that detailed geophysiological modelling can answer the environmental question, certainly the simple models illustrated were very well behaved; but if human physiology is a guide, empirical conclusions drawn from a close study of the local climatic consequences of regional changes of land use are more likely to yield the information we seek.

In some ways the ecosystem of, for example, a forest in the humid tropics is like a human colony in Antarctica or on the Moon. It is only self supporting to a limited extent and its continued existence depends

upon the transport of nutrients and other essential ingredients from the world. At the same time ecosystems and colonies try to minimise their losses by conserving water, heat or essential nutrients; to this extent they are self regulating. The tropical rain forest is well known to keep wet by modifying its environment so as to favour rainfall. Traditional ecology had tended to consider ecosystems in isolation. Geophysiology reminds that all ecosystems are interconnected. This is like the way that in an animal the liver has some capacity for the regulation of its internal environment and its liver cells can be grown in the isolation of a tissue culture. But neither the animal nor its liver can live alone; they depend upon their interconnection.

We do not know if there are vital ecosystems on the Earth although it would be difficult to imagine life continuing without the anoxic ecosystems of the sediments. The forests of the humid tropics do not significantly add to the worlds oxygen budget not to the exchange of essential elements through the atmosphere. Their intensive biosynthesis is recycled inside their boundaries. Where they may be significant on a global scale is in their effects on climate through evapotranspiration and the effect of their presence on the regional albedo. The transfer of nutrients and the products of weathering down tropic rivers are obviously part of their interconnection and may also have a global significance.

If evapotranspiration or the additions of the tropical rivers to the oceans are vital to the maintenance of the present homeostasis, then their replacement with an agricultural surrogate or a desert not only would deny those regions to their surviving inhabitants but might threaten the rest of the system as well. We do not yet know whether the tropical forest systems are vital to the present planetary ecology. They might be like the temperate forests that seem to be expendable without serious harm to the system as a whole; temperate forests have suffered extensive destruction during glaciations as well as during the recent expansion of agriculture.

It is true that a system in homeostasis is more forgiving about disturbances. But this is only when it is healthy and well within the bounds of its capacity to regulate. When such a system is stressed to near the limits of regulation even a small disturbance may cause it to jump to a new stable state or even fail entirely. In these circumstances pollution, changes in land use or in the ecology of the continental shelves, could be the recipes for disaster, global in scale.

It would seem therefore that the traditional ecological approach of examining the forest ecosystem in isolation is as important to our understanding as is the consideration of its interdependence with the whole system. We are, so far as geophysiology is concerned, very much in the natural history phase of information gathering.

To a scientist familiar with the orderly disciplined conduct of investigation and research the empirical approach just described must seem messy if not gaudy. Insight into the potential value of physiology for the understanding of global problems can come from reading Riggs book "Control theory and physiological feedback mechanisms", particularly those sections concerned with temperature regulation and with systems failure.¹⁴ The recent paper by Holling relates the physiological approach to contemporary problems.¹⁵

If it turns out that Gaia theory provides a fair description of the Earth's operating system then most assuredly we have been visiting the wrong specialists for the diagnosis and cure of our global ills. If we want the answers to such questions as: How stable is the present system? What will perturb it? Can the effects of perturbation be reversed? And can the world maintain its present climate and composition without the humid tropics in their present form?

References

1. Vernadsky V (1945) The Biosphere and the Noosphere, *Amer. Sci.*, 33: 1-12.
2. Sillen L G (1966) *Tellus* 18: 198.
3. Redfield A C (1958) *Amer. Sci.*, 46: 205.
4. Hutchinson G E (1954) *Biochemistry of the Terrestrial Atmosphere in the Solar*

System (ed Kuiper), Chapter 8, The University of Chicago Press.

5. Bolin B & Cook R, eds (1983). The Major Biogeochemical Cycles and their Interactions. *Scope* 21 J Wiley, New York.
6. Garrels R M, Lerman A and McKenzie F T, (1976), *Amer. Sci.*, 64: 306.
7. Broecker W S, Peng T H and Engh R, (1980), *Radiocarbon* 22: 565-568.
8. Whitfield M, (1981) *Interdisciplinary Sci. Rev.*, 6: 12.
9. Hitchcock D R and Lovelock J E, (1966), *Icarus* 7: 149.
10. Lovelock J E and Margulis M (1974), *Tellus*, 26: 1.
11. Lovelock J E and Whitfield M (1982), *Nature*, 269: 561
12. Dickinson R E, Impact of Human Activities on Climate, in "Sustainable Development of the Biosphere" eds W Clark and R P Munn Laxenburg, Austria: IIASA, forthcoming.
13. Henderson-Sellers A and Hughes N A (1984) in "Satellite Sensing of a Cloudy Atmosphere" ed A Henderson-Sellers, Taylor and Francis, London.
14. Riggs D S, "Control Theory and Physiological Feedback Mechanisms", (1970), The Williams and Wilkins Co, Baltimore.
15. Holling C S, Resilience of Ecosystems; Local Surprise and Global Change in "Sustainable Development of the Biosphere", eds W Clark & R E Munn. Laxenburg, Austria: IIASA, forthcoming.



AN ADULT CENTRE OF TRAINING
& RESEARCH BASED ON THE WORK OF
RUDOLF STEINER

LIVING PEACE An International Summer Workshop at Emerson College (a centre of adult education based on the work of Rudolf Steiner), **JULY 21st to 27th**. How can we live at peace with ourselves, with each other and with the earth? We invite you to explore this with others to strengthen our experience of living peace. Evening speakers will include: **Jonathon Porritt**, Director of Friends of the Earth and **Brig Oubridge** of Rainbow Fields Village, Molesworth. **Morning workshops will include:** Inner Peace; Conflict and Community; Living with each other; Non-violent healing; Non-violent money; Living with the Earth. **Afternoon arts and craft** activities and farmwork. Accommodation and good food available; camping; creche facilities.

Details from: The Secretary, Peace Conference, Emerson College, Forest Row, East Sussex RH18 5JX, England. Tel: (034282) 2238.

MULTI-LATERAL DEVELOPMENT BANKS

Their role in destroying the global environment

by Bruce M. Rich



The World Bank and other MDBs have an enormous influence on Third World development policies, and unfortunately it has consistently used this influence to encourage the most socially and ecologically destructive projects which must inevitably contribute to the growing global impoverishment and famine.

Thus it finances highly capital-intensive projects which replace traditional work-intensive economic activities, forcing displaced local peasants onto marginal land in ecologically sensitive areas. It finances projects causing large-scale deforestation, projects involving the setting up of massive cattle ranches on poor soils in previously forested areas, in Rich's words "one of the worst and most wasteful of all conceivable development alternatives for tropical forest regions."

It finances projects involving the spraying of vast areas with massive amounts of hard pesticides that are often banned in western countries, projects involving the construction of big hydropower and perennial irrigation schemes which require the removal of large populations onto infertile land, with no proper compensation, and which must inevitably lead to widespread waterlogging and soil salinization and to the spread of waterborne diseases.

What is more, conditions imposed in loan agreements on national government to protect the inhabitants of the areas devastated by such schemes are never seriously implemented and are thus little more than window-dressing.

The Scale and Environmental Importance of Multilateral Development Banks' (MDB) Activities

No single international or bilateral institutions have more influence on development financing and policy in the Third World than the MDBs, especially the World Bank.¹ In 1983, the four MDBs lent out over 20 billion dollars to fund projects in developing countries, nearly three times the amount committed for economic development assistance by the largest bilateral aid agency, the US Agency for International Development.² In 1983 the World Bank alone made loan commitments of over 15.3 billion dollars to fund 301 projects in over 80 countries.^{3,4} Net disbursements from ongoing loan commitments in 1983 totalled 4.5 billion dollars for the World Bank and 1.73 billion dollars for the IDB.⁵ In the same year total net disbursements of development assistance to the Third World from all bilateral and multilateral sources was 34.34 billion dollars.⁶ The net disbursements of the four MDBs accounted for more than 20 per cent of all development assistance in 1983, and represented more than 12 per cent of the total financing of the 55.8 billion dollars current account deficit of the ninety principal developing countries.⁷ Within the US domestic foreign assistance programme, expenditures for the MDBs increased from 16 per cent of total US outlays in 1970 to 25 per cent in 1980 and have remained at approximately that level through 1983.⁸

Over half of MDB loans in recent years have gone to support projects in the environmentally sensitive areas of agriculture, rural development, dam and irrigation schemes and roadbuilding.⁹ For example, in 1983 25.5 per cent of World Bank lending was in the agriculture and rural development sector, 15.5 per cent for transportation projects, principally roads, and 12.2 per cent for power projects.¹⁰ In the same year 16.1 per cent of IDB lending was for the agriculture sector, 24 per cent for mining and industry, 5.6 per cent for transportation and 31.8 per cent for energy, mainly hydroelectric projects.¹¹

The projects and policies of the MDBs have a much greater impact on the ecological stability and environmental future of the Third World than even the huge dollar amounts of their annual loan commitments indicate. For one thing, funds lent by the MDBs are for the most part complemented by even greater sums provided by recipient countries. The funding of many projects is further supplemented by co-financing arrangements with other development agencies and with private banks.¹² For every dollar the World Bank lends for a project, more than two additional dollars are raised from other sources.¹³ The IDB attracts three extra dollars through co-financing arrangements for every dollar it lends. The IDBs cumulative lending for all projects since 1960 was 25 billion dollars in 1983, but this represented a total project cost of over 91 billion dollars.¹⁴ The ratio of total project cost to lending is similar for the two other smaller MDBs.¹⁵ Thus, the total cost of MDB funded projects in 1983 was over 60 billion dollars.

The policy influence of MDB loans is also increased by increasing portions going for extension, research, training, technology transfer, planning and other

forms of institution building.¹⁶ Loan conditions and stipulations can be extremely specific and often have policy impacts that go far beyond the implementation of a single project.¹⁷

Many countries directly modify and orient their development policies and priorities for entire sectors in response to the suggestions and pressures of the MDBs.¹⁸ An important element in this policy influence is the 'country and sector work' of the Banks¹⁹, that is, the general policy documents which the MDBs produce as background material to help identify priorities in lending.²⁰ The influence of the World Bank is particularly important in this regard, and the combination of Bank policy documents and high level dialogues with host country officials has a profound and increasingly important effect on the development priorities of numerous countries.^{21, 22}

This kind of direct policy leverage is becoming increasingly important in MDB operations, especially with regard to the World Bank, where so-called 'non-project' lending²³ has taken the form of structural adjustment and sector loans that seek to promote policy changes in whole sectors, such as agriculture.²⁴ Current and former Bank officials have commented on the superior leverage of structural adjustment lending, which enables the Bank to promote structural alteration of entire national economies.²⁵ Over the past two years, the Bank has committed ten per cent of its loans for structural adjustment and sector programmes.²⁶ This is the maximum amount of non-project lending currently allowed by the Bank's Articles of Agreement.²⁷

Adverse Environmental Impacts of MDB Projects

The adverse environmental impacts of development projects in the Third World, including those financed by the MDBs, have been documented for over a decade.²⁸ Environmental problems resulting from multilateral bank activities are often particularly severe because of the large scale, capital intense nature of many projects. Although much of the published data on MDB projects necessarily examines projects that were planned as long as a decade or more ago.²⁹ Congressional oversight hearings in 1983 and 1984 brought to light substantial evidence of serious ecological problems and damage associated with MDB projects that are currently being implemented.³⁰ Categories of projects with the most serious impacts also correspond to the most important lending sectors of the MDBs: agriculture and rural development, energy and transportation.

Agriculture in General

The single gravest global environmental impact of MDB projects may be the contribution of their agricultural policies and projects to accelerating deforestation of the tropics.³¹ This is occurring in two major ways. First, the MDBs are helping to promote and implement general agricultural policies which are capital rather than labour-intensive and which have

Bruce M. Rich is an Attorney with the International Programme, Natural Resources Defence Council, in Washington DC, USA.

displaced large masses of rural farmers and the poor in the Third World from better lands suitable for agriculture into agriculturally marginal areas such as tropical moist forests.³² Second, the MDBs are continuing to finance projects which directly contribute to deforestation, for example jungle colonisation schemes.³³

In September, 1984, a special oversight hearing by the House Science and Technology Subcommittee on Natural Resources, Agriculture Research and Environment on MDB agricultural projects and deforestation in Latin America, cast considerable light on the interconnections between 'Green Revolution' agricultural policies promoted by the Banks, individual projects, and deforestation.³⁴

Cattle Projects

Over the past twenty years the MDBs have financed cattle projects on a large scale, especially in Central and South America.³⁵ These projects have contributed markedly to accelerating deforestation, both indirectly and directly. In many areas, large, consolidated cattle ranches have replaced smaller, subsistence oriented farming on soils suitable for perennial agriculture, contributing greatly to land concentration and the migration of the uprooted rural population to tropical forest areas.³⁶ In other regions, pristine tropical forest has been converted on a massive scale to cattle pastures.³⁷ Ironically, even small farmer plots in cleared tropical forest areas are often converted to pasture after two or three years because of declining yields on the poor soils.³⁸

A substantial body of scientific literature has emphasised that livestock development is one of the worst and most wasteful of all conceivable development alternatives for tropical forest regions.³⁹ In Latin America pastures occupy huge areas of land with low or very low concentrations of cattle per hectare—in tropical forest areas as low as one or two cattle per hectare, as opposed to semi-arid, ecologically suitable natural pasture lands where concentrations of fifteen head per hectare are the norm.⁴⁰ Worse, pastures in former tropical forest areas often become wasteland after a few years because of declining soil nutrients, invasions of toxic weeds and soil compaction. Finally, livestock projects generate very little employment compared with most other investment alternatives.

In many countries in Central America and elsewhere MDB financed agricultural credit loans—often times only for cattle ranching—have been the decisive factor in furthering livestock development. In Costa Rica, for example, nearly half of all agricultural credit through the late 1970s went for livestock.⁴¹

According to one estimate, the total investments (including government matching funds) that World Bank and IDB projects channelled into livestock projects in Latin America in the period 1970-77 alone was on the order of 5-7 billion dollars, or about 10-14 billion in 1984 dollars. No single commodity in the Third World has ever received such extraordinary outside support as livestock in Latin America.⁴²

In spite of the by now preponderent evidence of the environmental unsoundness and economic waste-

fulness of cattle projects—especially in Latin America—the development Banks are continuing to finance them on a substantial scale.⁴³

Agricultural Settlement and Colonisation Projects

The environmental and economic justification for the forest colonisation projects the MDBs continue to finance is even more dubious. A decade ago, a study of twenty-four colonisation projects in Latin America noted that:

Few spheres of economic development have a history of, or a reputation for, failure to match that of government-sponsored colonisation in humid tropical zones (in Latin America). Horror stories abound about expensive ventures that resulted in colonies where few if any settlers remained after several years. The evidence is irrefutable, and failure can be attributed only to the institutions responsible for selecting the area and the colonists, planning and executing the development programme, and subsequently maintaining or abandoning the infrastructure and services in the region.⁴⁴

A survey conducted by USAID in 1980 of six settlement projects in the Peruvian Amazon revealed settler desertion and abandonment rates ranging from 26 per cent to 92 per cent; three of the six projects had been virtually abandoned by their intended 'beneficiaries'.⁴⁵ The major ecological factor in the abysmal performance of such jungle settlement schemes is the preponderantly poor quality of soils in tropical moist forests. Perhaps as much as 90 per cent of tropical moist forest soils are completely unsuited for any kind of permanent annual agriculture.⁴⁶ The only people that have evolved sustainable agro-ecosystems in these areas are the indigenous, tribal peoples that inhabit many of the still intact rainforests.⁴⁷ Regrettably, the MDBs are doing little to investigate, preserve and utilise this knowledge and much, through ill conceived agricultural projects, to accelerate its destruction and loss for all time.⁴⁸ In the words of one anthropologist,

with the extinction of each indigenous group, the world loses millenia of accumulated knowledge about life in, and adaptation to tropical ecosystems. This priceless information is forfeited with hardly a blink of the eye: the march of development cannot wait long enough to find out what it is destroying.⁴⁹

Since 1960 six per cent of IDB lending has gone for agricultural settlement schemes in tropical forest regions.⁵⁰ The World Bank and IDB are currently implementing a number of recently approved settlement schemes in tropical forest areas with generally poor soils. In 1982 the World Bank approved a 42.7

What is now occurring in the Polonoroeste region is an ecological, human and economic disaster of tremendous dimensions. Almost none of the environmental and Amerindian components have been implemented, and the rate of deforestation in the Polonoroeste Programme area is the highest in the Brazilian Amazon, and increasing explosively.



PHOTO: DEFENDERS



The Amazonian Rainforest supports an incredibly diverse range of living things and cultural forms.

million dollar loan (total project cost: 122.9 million dollars) to Brazil for rural development and agricultural settlement in Maranhao state in the northeast Amazon; this project risks worsening the deforestation and ecological destruction caused by a previous Bank-financed project in the same region, the Alto Turi Settlement Project. The IDB approved two loans totalling 46 million dollars in 1982 for a jungle road building and agricultural settlement project in the Pichis Valley in the Peruvian Amazon. The soils in this region are so bad that the World Bank itself refused to fund any agricultural development in the area.⁵¹

The World Bank is imbroiled in controversy concerning its ongoing financing of two mammoth settlement programmes in Indonesia and Brazil which have been characterized as ecological debacles.⁵² The Bank is providing 350 million dollars in loans to help finance the Indonesia transmigration programme.⁵³ The goal is to move millions of people from the densely populated inner islands, mainly Java, to the mostly still forested outer islands such as Borneo and Sumatra. It is no accident that Java is so densely populated, since its volcanic soils are extremely rich, whereas the outer islands have soils typical of tropical moist forests: infertile, and generally unsuited for small farmer annual cropping.⁵⁴ The adverse environmental impacts of transmigration of settlers onto such poor soils have been enormous, including large scale deforestation, erosion, silted reservoirs and flooding.⁵⁵ Although the World Bank has justified its role by claiming that it is trying to make transmigration environmentally more

sound⁵⁶, the programme is ecologically disastrous in its very conception. Critics have pointed out that the main reason that governments promote such settlement schemes are political⁵⁷; moreover, "the (Transmigration) Programme, like the lesser schemes of other rainforest countries, could not exist or continue without outside funding."⁵⁸

The World Bank's biggest, most recent, and most disastrous involvement in forest colonisation in the tropics is its financing of the Brazil Northwest Development Programme (Polonoroeste), for which the Bank has approved six loans since 1981 totalling 443.4 million dollars. The total cost of this mammoth Amazon colonisation, settlement consolidation and road construction scheme approaches 1.6 billion dollars. Polonoroeste exemplifies all of the uncertainties and failures of previous tropical forest colonisation schemes in the Amazon.⁵⁹

The Bank's Polonoroeste investment involves the paving of a 1500 kilometer highway through the heart of the southwestern Amazon basin, construction of feeder and access roads, and construction of 39 rural settlement centres to consolidate and attract tens of thousands of settlers in an area of Amazon forest three quarters the size of France.⁶⁰ The Polonoroeste Programme area encompasses the entire Brazilian state of Rondonia and a part of Mato Grosso. Over 6500 Amerindians belonging to about 34 tribal groups are thought to live in the area. The exact number of Indians is unknown, since some parts of the Polonoroeste region are still so untouched that there are



PHOTO: DEFENDERS

A typical scene of destruction as development advances in the Amazon.

thought to be tribes who have had no contact with the outside world and human history.⁶¹

Partly in response to international controversy and pressure⁶², the World Bank conditioned its participation in the programme on adequate demarcation and protection of over 15 Indian Reserves, and implementation of health measures to protect the Indians. The Bank also provided for setting aside two Biological Reserves, a National Park, four Ecological Stations (which would also be protected natural areas), and national forest areas. In addition, one of the loan agreements between the Bank and the Brazilian government contained specific provisions in which the Brazilian government pledged that Polonoroeste settlements would not occur on unsuitable soils or soils of unknown quality, or menace the numerous areas to be protected.⁶³

The Bank justified its role as primarily one of consolidating and stabilising existing settlements in an area already open for colonisation, as well as ensuring protection of the environment and of the thousands of indigenous people inhabiting the region.⁶⁴ However, 54 per cent of the World Bank's total investment of 443.4 million dollars went for paving the 1500 kilometer highway leading to the region, which, given the promotion of colonisation by the Brazilian government, many predicted would lead to the accelerated migration and deforestation that is now occurring.^{65, 66}

What is now occurring in the Polonoroeste region is an ecological, human and economic disaster of tremendous dimensions.⁶⁷ Almost none of the environmental and Amerindian components have been implemented, and the rate of deforestation in the Polonoroeste Programme area is the highest in the Brazilian Amazon, and increasing explosively.⁶⁸ If present trends continue, the entire Brazilian state of Rondonia, an area the size of Great Britain, will be deforested by 1990.⁶⁹ Rather than being 'consolidated,' as was the intention of the Bank, settlers are abandoning their cleared land since it cannot support perennial agriculture; in many instances they are selling it to large landowners for cattle ranching, a use which numerous past experiences in the Amazon have shown will also be unsustainable.⁷⁰ Intended protected natural areas and Indian reserves have been invaded by spontaneous settlement, now out of control, and in one such area, the Lourdes Indian Reserve, the threatened tribe recently took a dozen settlers hostage in a desperate attempt to force the government to protect its lands.⁷¹

A recent article in the journal *Foreign Affairs* described the scenes of massive ecological devastation in the Indonesia Transmigration and Polonoroeste projects:

Visiting such areas it is hard to view without emotion the miles of devastated trees, of felled, broken and burned trunks, of branches, mud, and

bark crisscrossed with tractor trails—especially when one realises that in most cases nothing of comparable value will grow again on the area. Such sights are reminiscent of photographs of Hiroshima, and Brazil and Indonesia might be regarded as waging the equivalent of thermo-nuclear war upon their territories.⁷²

Pesticides

The MDBs play an important role in the financing of pesticide production and use in the Third World, mainly through loans for agricultural credit and agro-industry development. In addition, many MDB rural development projects have an 'agricultural inputs' component, under which both fertilisers and pesticides are financed. The World Bank, which has the most detailed and systematic statistics of the four MDBs, keeps no separate figures on how much it actually lends for pesticides; one rough estimate is about ten per cent of total agricultural lending.^{73, 74} For the Bank's Fiscal Year 1984, this would amount to 346.4 million dollars.

Over the past decade the World Bank has lent India 955 million dollars to create a pesticide and fertiliser industry.⁷⁵ The World Bank financed Indian pesticide industry has concentrated on production of substances which are banned or heavily restricted for use in developed countries such as DDT and BHC.⁷⁶ Most of this production is for domestic use, often in MDB financed agricultural projects.^{77, 78} As a consequence, "Indian farmers and health officials use 77 per cent of all the DDT manufactured in the world, 94 per cent of all the BHC and 21 per cent of the other persistent organochlorines like lindane—as well as 64 per cent of the world's malathion".⁷⁹

The green revolution agricultural systems promoted by the World Bank and other MDBs in India and elsewhere have involved intensive use of pesticides, the price of which has been heavily and systematically subsidised in many MDB agricultural projects.⁸⁰ Besides undermining incentives for governments to pursue other, less pesticide intensive systems of pest management, in project after project farmers and governments have been caught in the classic pesticide 'treadmill,' whereby increasingly heavy doses of chemicals are used in futile attempts to cope with declining crop yields caused by pesticide resistant blights and infestations.⁸¹

is an area where the World Bank has poured in hundreds of millions of dollars over the past decade to promote increased agricultural production.⁸² The consequences of ecologically unsound pest management now threaten the economy of the entire country:

Agricultural experts are not optimistic about the future of Gezira cotton. Many believe that the cotton industry is at the brink of disaster and will collapse unless drastic measures are taken . . . A chief obstacle is failure of the existing pest control scheme that is based exclusively on chemical insecticides. The farmers are spending large amounts of money—25-30 per cent of the total production expenses—for chemical control of the insect pests but are getting very poor results . . . The profit margin (for sale of cotton) in 1979-80 was . . . considerably less than the foreign currency required for purchase of the imported insecticides. Costs of cotton insect control in the Gezira increased at the alarming rate of six-fold between the seasons of 1972-73 and 1980-81 yet, cotton yields declined (from 1970-1975 to 1975-81) by . . . 38 per cent . . . Unacceptable residues of DDT and other persistent, organochlorine insecticides now occur in water, mother's milk, livestock, fish and wildlife.⁸³

To deal with the threatened collapse of the Sudan's most important single export, the World Bank provided still another loan of 80 million dollars (total project cost: 262.7 million dollars) to increase production levels and improve agricultural services, as well as a loan of 50 million dollars (total cost: 146.3 million dollars) to finance purchase of agricultural inputs, mainly pesticides and herbicides.⁸⁴ The latter loan is mainly to finance still greater applications of pesticides for a single growing season in an attempt to keep the cotton sector from collapsing while research is undertaken to develop an Integrated Pest Management System for the area.⁸⁵

Some scientists maintain that the pesticide financing practices of the MDBs are also contributing to the accumulation of dangerous levels of pesticide residues in Third World countries. For example, "among Indian women, such residues (in breast milk) are now nearly the world's highest—for DDT, eleven times greater than in the US or Sweden; for BHC, the figure is 9.2 times."⁸⁶

Worse, there is growing evidence that the MDBs and other aid agencies have inadvertently contributed to a world wide resurgence in malaria through their agricultural projects and pesticide practices. Greatly increased use of pesticides associated with production of cotton and high yielding 'green revolution' food grains—crop systems promoted extensively by the MDBs—has had the effect, in the opinion of some researchers, of creating pesticide resistant breeds of mosquitos which are responsible for the massive resurgence of malaria which has occurred in India, Central America and other regions over the past decade.⁸⁷ In the Gezira, for example, "uses of DDT and malathion in cotton have increased the incidence of malaria . . . These materials, applied by aircraft, have drifted from cotton into mosquito breeding habitats, giving rise to genetically resistant strains of malaria mosquitos."⁸⁸

The adverse environmental impacts of transmigration of settlers onto such poor soils have been enormous, including large scale deforestation, erosion, silted reservoirs and flooding. Although the World Bank has justified its role by claiming that it is trying to make transmigration environmentally more sound, the programme is ecologically disastrous in its very conception.

A classic example of environmental and economic collapse resulting from heavy use of pesticides promoted by aid agencies is now occurring in the Sudan's main cotton producing area, the Gezira. This

Few spheres of economic development have a history of, or a reputation for, failure to match that of government-sponsored colonization in humid tropical zones (in Latin America). Horror stories abound about expensive ventures that resulted in colonies where few, if any, settler remained after several years. The evidence is irrefutable, and failure can be attributed only to the institutions responsible for selecting the area and the colonists, planning and executing the development programme, and subsequently maintaining or abandoning the infrastructure and services in the region.

Water Projects

Most of the energy lending of the MDBs has gone for large hydroelectric schemes, and a substantial part of agriculture lending has financed irrigation systems. The large scale ecological alterations that such water management programmes entail have had in many instances severe environmental and public health impacts.⁸⁹ The World Bank financed nearly six billion dollars worth of hydro projects in the period 1980-82 and nearly one billion dollars for irrigation and drainage in 1982 alone.⁹⁰ Large scale environmental problems caused by hydro and irrigation projects often can only partially be mitigated. Such impacts include: 1) displacement of large numbers of people through flooding, including vulnerable indigenous tribes; 2) inundation of areas, often tropical forests, of great biological and scientific significance; 3) salinisation and waterlogging of irrigated lands; 4) siltation and sedimentation of reservoirs and channels through deforestation of adjacent watersheds; 5) spread of water-borne disease vectors, including malaria, schistosomiasis and onchocerciasis (river blindness).⁹¹

Witnesses at the 1983 House hearings on the MDBs and the environment provided numerous examples of MDB projects where grave impacts in the above described categories were not taken adequately into account.⁹² In some instances information in the testimony of witnesses was inaccurate, but for the most part the Banks were forced to acknowledge their participation and inadequate planning in most of the projects discussed at the hearings and in the statements of the witness.⁹³ In October, 1984, a representative of the Treasury Department stated at still another hearing on the MDBs and the environment that the Treasury Department had found "substantial corroboration" of the testimony of environmental and indigenous peoples groups in 1983.⁹⁴

One of the gravest impacts not only of MDB water projects but of MDB projects in general concerns the forced resettlement of hundreds of thousands of people. Although all the MDBs finance projects that entail forced resettlement, the impacts of World Bank projects are the most significant in this regard. Projects approved by the World Bank in the period 1979-1983 resulted in the involuntary resettlement of at least 400,000 to 450,000 people on four continents.⁹⁵ The Bank has official internal policies concerning

incorporation of adequate resettlement and compensation plans in its projects, as well as a provision on involuntary resettlement in its publicly available Environmental Policies and Procedures.⁹⁶ However, an internal review prepared by the Bank revealed that these policies are not being implemented in a substantial number of projects.⁹⁷

The scale of the forced displacement caused by some World Bank projects can be truly mammoth. For example, the Subarnarekha Irrigation Project, for which the Bank approved a credit to India of 127 million dollars in 1982, will displace some 64,000 people, about half of whom are tribal minorities.⁹⁸ Irrigation projects the World Bank is planning to finance involve even larger numbers: the Pakistan-Kalabagh Irrigation project may cause the forced resettlement of over 120,000 people.⁹⁹

Environmental Policies and Procedures of the MDBs

The World Bank has been the leader among all multilateral organisations in making policy statements and commitments at the highest level to give adequate attention to environmental concerns. The Bank's public commitment to environment was reaffirmed by its current president, A W Clausen in 1981 shortly after he took office.¹⁰⁰ The Bank's environmental policies and procedures merit special attention, both because of the much larger scale of its operations, and because they are by far the most developed and complete of the MDBs.

The Bank was a pioneer among all multilateral and bilateral development agencies in setting up a post of Environmental Advisor in 1970, two years before the Stockholm Conference, and establishing an Office of Environmental Affairs (now the Office of Environmental and Scientific Affairs—OESA) in 1973.¹⁰¹ From the very beginning, the official mandate of the office was "to review every project for its consequences to the environment."¹⁰²

Currently OESA has five staff positions, but only one has responsibility for reviewing the prospective environmental impacts of most of the Bank's 315 new and hundreds of ongoing projects.¹⁰³ Among nearly 6000 employees, there is only one professionally trained ecologist.

The World Bank has prepared a series of environmental guidelines¹⁰⁴, but there are no procedures and regulations to ensure their systematic use and early

According to one estimate, the total investments (including government matching funds) that World Bank and IDB projects channelled into livestock projects in Latin America in the period 1970-77 alone was in the order of 5.7 billion dollars, or about 10-14 billion in 1984 dollars. No single commodity in the Third World has ever received such extraordinary outside support as livestock in Latin America.

Livestock development is one of the worst and most wasteful of all conceivable development alternatives for tropical forest regions.

integration into project design. Moreover, the existing guidelines deal almost entirely with the impacts of industrial and processing activities, whereas most of the Bank's lending is in agricultural development, and financing of infrastructure such as dams, irrigation systems and roads.

The Bank has continually claimed over the past decade that proposed projects are systematically reviewed by the OESA early in the project cycle for their prospective environmental impacts.¹⁰⁵ Most recently, in response to inquiries of the Treasury Department and the House Banking Subcommittee on International Development Institutions and Finance, it stated that "every project proposed for financing comes to the attention of OESA early in the project cycle . . . (and that) by the time that a proposed project loan reaches the stage of being negotiated with the borrower, the environmental assessment will have been largely completed."¹⁰⁶

There is no conceivable way, however, that the staff of the OESA could adequately review all projects with significant environmental impacts¹⁰⁷, especially given the fact that four of the five staff members are assigned to tasks which are peripheral to the main body of Bank lending. In reality, full, thorough environmental assessments are not performed by the Bank as a matter of course, even for projects with important environmental impacts.¹⁰⁸ In fact, before May, 1984 the Bank's sole mandatory environmental procedures called for review by the OESA of projects at the end of the appraisal stage, before loan negotiations—long after projects had been identified and prepared.¹⁰⁹ This is much too late a stage in the project cycle to change environmentally destructive projects in any significant way. In fact, the lack of both staff and mandatory environmental procedures meant that in the early phases of the project cycle projects were reviewed on what amounted to a catch as catch can basis.¹¹⁰

In May, 1984 the Bank published a new set of environmental policies and procedures which for the first time were incorporated into the Bank's Operations Manual, the collection of internal regulations which is given to every staff member.¹¹¹ The procedures set forth blanket principles concerning projects such as

(a) (The Bank) endeavours to ensure that each project affecting renewable natural resources . . . does not exceed the regenerative capacities of the environment;

(b) will not finance projects that cause severe or irreversible environmental deterioration, including species extinctions without mitigatory measures acceptable to the Bank;

(c) . . .

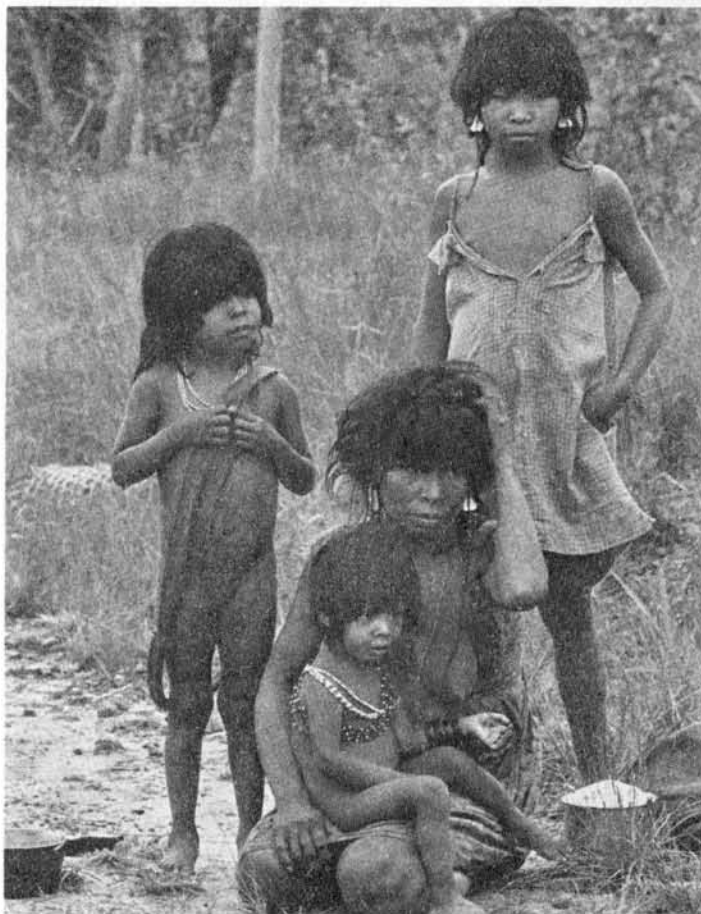
(d) will not finance projects that displace people

acceptable to the Bank as outlined in separate notes on involuntary resettlement, and on tribal peoples . . .¹¹²

The real significance of the new policy statement lies in the fact that it marks the first incorporation of environmental concerns into the Bank's operating procedures. The question remains of how the Bank with its current levels of environmental staffing can realistically implement these procedures.

The Bank's country, economic and sector policy work can have even greater environmental implications than single projects.¹¹³ This is because many of the basic decisions about the nature and kinds of projects the Bank will finance are made at the policy making phase in Bank operations and are embodied in strategy documents such as Country Program Papers (CPPs) and Country Economic Memoranda.¹¹⁴ The new environmental procedures of the Bank state that "where appropriate, country economic and sector work should assess the ability of environmental systems and the natural resource based to sustain present and proposed levels of economic development."¹¹⁵

Again, a major question is how the Bank can implement this general commitment to incorporate environmental concerns into country and sector work. In fact, this commitment already was stated in a somewhat weaker form in the Bank's previous environmental policies and procedures.¹¹⁶ Among the Bank's Sector Policy Papers, only the Forestry Paper addresses in detail environmental and resource management concerns¹¹. In fact, the Bank's Fishery



A mother and her children of the Nagarote Nambiquara tribe, one of dozens of tribes in the Polonoroeste area vulnerable to the influx of settlers. Pleas to Brazil's government for protection of Indian lands have gone virtually unheeded.

Sector Policy Paper was publically criticised by environmental groups for failing to address essential resource management concerns.¹¹⁸ Country Economic Memoranda have a macroeconomic focus and do not as a rule address sustainable stewardship of natural resources.¹¹⁹

The final phase of the Bank's project cycle involves project evaluation, which is performed by an independent Operations Evaluation Department (OED).¹²⁰ These evaluations are known as project performance audits, and the Bank currently reviews about 57 per cent of all completed projects.¹²¹ OED has no environmentally trained people on its staff.¹²² In fact, it sends drafts of project performance audits for environmental review to the already overburdened OESA.¹²³

The Inter-American Development Bank has no internal focus of environmental responsibility apart from an Environmental Management Committee formed in 1984 to discuss implementation of the 1980 New York Declaration.¹²⁴ Nor does it employ any professionally trained environmental staff, apart from a geographer hired in 1983 to work as a soils specialist.¹²⁵ Like the World Bank, the IDB has prepared a series of environmental checklists for various sectors¹²⁶, but no procedures or requirements exist to ensure they are integrated, used or even looked at by staff in designing and appraising projects.¹²⁷ In 1979, the IDB Board of Directors approved an Operational Policy on Environmental Management.¹²⁸ In very general terms this Environmental Policy document states that the IDB will finance general environmental projects, technical assistance and institution building activities in the environmental and natural resources area, and "seek to determine" if proposed projects fulfil criteria of environmental soundness and minimise adverse environmental impacts.¹²⁹ The lack of any procedures to ensure environmental planning and assessment, and the lack of an environmentally trained professional staff make this general policy commitment practically meaningless.¹³⁰

References

1. *Id.* In a survey by McKinsey and Company of the 900 largest development projects begun in the Third World during the decade of the 1970s, the World Bank was identified as the single most important participant, financing 93 "macroprojects." K J Murphy, *Macroproject Development in the Third World* 16 (1984.)
2. World Bank, Annual Report 1983 at 13; Inter-American Development Bank, Annual Report 1983 at 5; *Foreign Assistance and Related Programmes Appropriations for 1984: Hearings Before the Subcomm. on Foreign Operations and Related Agencies of the House Comm. on Appropriations, Part 4*, 98th Cong., 1st Sess. 70 (1983) (statement of M Peter McPherson).
3. The Bank's Fiscal Year 1984, which runs from July 1 to June 30.
4. World Bank, Annual Report 1983 at 13, 126-127 (1983) (hereinafter cited as World Bank 1983).
5. World Bank 1983, *supra* note 4 at 13; Inter-American Development Bank, Annual Report 1983 at 13 (1983) (hereinafter cited as IDB 1983).
6. World Bank, World Development Report 1984 at 252-253 (1984) (hereinafter cited WDR 1984).
7. WDR 1984, *supra* note 6, at 38-39.
8. Sanford, J E Multilateral Development Banks; Background Data about US Policy 7, 8 (1980) S. Rep No 98-245, 98th Cong., 1st Sess., 14, 18 (1983).
9. World Bank 1983, *supra* note 4, at 132; IDB 1983, *supra* note 5 at 33; Asian Development Bank Annual Report 1981 at 2-4 (1981); African Development Bank, African Development Fund Annual Report 1981 at 34 (1981).
10. World Bank 1983, *supra* note 4, at 132.
11. IDB 1983, *supra* note 5, at 33.
12. World Bank 1983 at 18; Stern, *Prospects of Development Financing in the 1980s*, 32 AM U Law Rev 146, 147 (1982).
13. World Bank 1983, *supra* note 4, at 13; World Bank, Annual Report 1984 at 18 (1984) (hereinafter cited as World Bank 1984).
14. IDB 1983, *supra* note 5, at 12-13.
15. African Development Bank, African Development Fund, *supra* note 9, at 29-30; Asian Development Bank, *supra* note 9, at 26.
16. A favourite tactic of the World Bank has been the establishment of autonomous government authorities such as national development finance banks, agricultural credit institutions, and energy and area development agencies to implement its projects. Fatouros, *The World Bank in The Impact of International Organisations on Legal and Institutional Change in the Developing Countries* 52-61 (J B Howard Ed 1977) (hereinafter cited as Howard Ed). In fact, one case study of the World Bank's involvement in Colombia revealed that in the period 1949-72 36 of the Bank's 51 loans went to autonomous agencies in several sectors that the Bank either established or was instrumental in strengthening. Howard Ed. 2-3. See Ulloa, *Colombia and the World Bank* in Howard Ed. 1977 at 81-150. This particular kind of institution building had profound impacts on the political and social evolution of the entire country, including weakening "the political party system and minimis(ing) the roles of the legislature and judiciary." Howard Ed 4. In fact, in the case of Colombia,

Given the unequal power of the Bank and the borrowing government and the Bank's technical expertise and technocratic bias, an international decision making process evolved which, at the international level, gave the Bank some of the powers of a surrogate government and, at the national level, built up a powerful segment of the administrative arm of government but bypassed non-technocratic governmental decision making, including the legislative and the judiciary branches.

Id. Although this particular case study is more than a decade old, if anything the role of the World Bank and other MDBs in institution building and other forms of policy leverage has increased over the past decade. See, eg, R L Ayres, *Banking on the Poor* 17-50 (1983); W Bello, D Kinley, E Elinson, *Development Debacle: The World Bank in the Phillipines* (1982) (hereinafter cited as Bello and Elinson); C Payer, *The World Bank: A Critical Analysis* (1982).
17. See Fatouros, in Howard, Ed, *supra* note 16, at 29-35. See generally Bello & Elinson, *supra*, note 16; C Payer, *supra*, note 16. For examples of World Bank loan stipulations in Kenya, see B S Hurni, *The Lending Policy of the World Bank in the 1970s* 36-39 (1980).
18. For a case study of the policy influence of the World Bank in the Phillipines, see Bello & Elinson, *supra* note 16; for a case study of the influence of the IDB in Costa Rica, see Dewitt, *The Inter-American Development Bank and Policy Making in Costa Rica*, 15 J of Developing areas 67-82 (1980); see generally C Payer, *supra* note 16, Sanford, *supra* note 8, at 3-15, Department of the Treasury, United States Participation in the Multilateral Development Banks in the 1980s (1982).
19. The African Development Bank is an exception in this instance; it does not systematically prepare country economic memoranda or sector papers. Department of the Treasury, *supra* note 18, at 130.
20. Department of the Treasury, *supra* note 18, at 130-132; C Payer, *supra* note 16, at 72-86; Fatouros, in Howard Ed, *supra* note 16, at 31-32; R L Ayres, *supra* note 16, at 31-41.
21. The most important of these documents include Country Economic Memoranda, which analyse macroeconomic concerns for each borrower, Sector Policy Papers, publically available documents which set out the Bank's policy and lending priorities in various aspects of economic activity, and Country Programming Papers, which are the Bank's long term plans for lending in a particular country.
22. Department of the Treasury, *supra* note 18, at 130-132; C Payer, *supra* note 16, at 72-87; R L Atres, *supra* note 16, at 31-41. In fact, the World Bank's 1983 Annual Report explicitly maintains that

(the Bank's) role as a partner in the dialogue with governments on overall economic policy and sectoral strategies, and as a source of technical assistance and

advice is as important as its role as a lender. The deterioration in the economic climate in many of the Bank's developing member countries has increased the importance, as well as the advisability, of this advisory function.

World Bank 1983, *supra* note 4, at 10. For a skeptical view of the efficacy of the World Bank's Country Programme Papers, see A Van De Laar, *The World Bank and the Poor* 223-231 (1980).

23. Article III. 4 (vii) of the World Bank's Articles of Agreement stipulates that loans made by the Bank "shall, except in special circumstances, be made for the purpose of specific projects..." Articles of Agreement of the International Bank for Reconstruction and Development, *opened for signature*, December 27, 1945, 60 Stat 1440 (1946 TIAS No 1502, 2 UNTS 134, *amended* Dec 16, 1965, 16 UST 1942, TIAS No 5929 (hereinafter cited as World Bank, *Articles of Agreement*). A 'project' is "a discrete investment programme specified as to character, location and time." Chadenet & King, *What is a World Bank Project?*, 9 Finance and Dev 4-5 (1972), cited in A Van De Laar, *supra* note 22, at 48.

24. Allen, *The Recent Shift in United States Policies Toward the International Monetary Fund and the World Bank*, 16 Vand J Of Transnat'l L 29-21 (1983) The policy leverage that the World Bank can exercise through structural adjustment lending (SAL) goes to the heart of a country's development priorities:

Sal is defined as a series of discrete lending operations (possibly three or four) over a period of approximately five or six years, to provide quick disbursing balance-of-payments support to a country that is prepared both to formulate and to reach agreement with the Bank on a structural adjustment programme. Sal is conceived as comprising three components: first, a statement of structural objectives to be achieved over an approximately five to ten year period—for instance, increasing non-traditional exports by a given percentage... second, a statement of the measures which will be taken over an approximately five year period to achieve the objectives... third, a monitorable set of actions to be taken by a government either before approval or the Sal operation by the Bank's Board or during the... disbursement period of the Sal operation.

S Please, *The Hobbled Giant: Essays on the World Bank* 29 (1984).

25. Stern, *Prospects of Development Financing in the 1980s*, 32 Am U L Rev 153 (1982); S Please, *supra* note 24, *passim*; Rowen, *World Bank at Crossroads*, Wash. Post, Sept 23, 1984, at G1, G5-G6.
26. S Please, *supra* note 24, at 36.
27. The Bank's Board of Executive Directors interpreted Article III 4 (vii) as setting an annual limit of ten per cent to non-project lending. *Id.*
28. See eg M T Farvar & J D Milton (Editors), *The Careless Technology* (1972) (this is a collection of fifty case studies of ecologically destructive development projects, many funded by the MDBs); Appelbaum, Comment, *Controlling the Environmental Hazards of International Development*, 5 Ecology L Q 321, 321-337.
29. Many of the adverse environmental impacts of a project may take years to appear; by the time data has been collected, analysed and published in a scholarly format it may be more than twenty years after the initial planning phases. Eg D Hart, *The Volta River Project* (1980) (This large World Bank hydroelectric scheme on Ghana's Volta River was planned in the late 1950s and implemented in the 60s and 70s. It displaced one per cent of the country's population, resulted in endemic onchocerciasis (River Blindness) and caused, by conservative estimates, the permanent disablement of at least 80,000 people through the spread of the parasitic water born disease schistosomiasis. *Id.*)
30. *Environmental Impact of Multilateral Development Bank-Funded Projects: Hearings before the Subcomm. on International Development Institutions and Finance of the House Comm. on Banking, Finance and Urban Affairs*, 98th Cong, 1st Sess. (1983) (hereinafter cited as 1983 *Environmental Hearings*); *The Multilateral Development Banks and Health; Hearing before the Subcomm. on International Development Institutions and Finance of the House Comm. on Banking, Finance and Urban Affairs* 98th Cong. 2nd Sess. (1984) (hereinafter cited as 1983 *Health Hearing*); *Draft Recommendations Regarding Environmental Concerns Associated with Multilateral Development Bank Activity: Hearings before the Subcomm. on International Development Institutions and Finance of the House Comm. on Banking,*

Finance and Urban Affairs 98th Cong. 2nd Sess. (1984) (hereinafter cited as 1984 *Draft Environmental Recommendations Hearings*); *Environmental Research and Agricultural Development Projects in Humid Tropical Forest Regions in Latin America: Hearing before the Subcomm. on Natural Resources, Agriculture Research and Environment of the House Science and Technology Comm.* 98th Cong. 2nd Sess. (1984) (hereinafter cited as 1984 *Agricultural Development Hearing*).

31. 1983 *Environmental Hearings*, *supra* note 30, at 88-89, 102-107 (statement of Barbara J Bramble); 1984 *Agricultural Development Hearing*, *supra* note 30, (statements of Bruce M Rich; Barbara J Bramble; Jorge E Ilueca; Jose Lutzenberger and Brent Millikan). See Guppy, *Tropical Deforestation*, 62 Foreign Aff 928-965 (1984).
32. 1984 *Agricultural Development Hearing*, *supra* note 30, (statements of Bruce M Rich; Jorge E Ilueca; Jose Lutzenberger and Brent Millikan). See Guppy, *supra* note 31, at 937-947. See also Bello & Elinson, *supra* note 16, at 88-99; S George, *How the other half dies* 220-227 (1977). For a discussion of Green Revolution social impacts in Mexico and World Bank projects, including increased landlessness of the rural population, see C Hewitt De Alcantara, *The Modernising Mexican Agriculture: Socioeconomic Implications of Technological Change* 1940-70 (1976).
33. For a scathing condemnation of the World Bank's funding of two gigantic jungle colonisation schemes in Indonesia and Brazil, see Guppy, *supra* note 31.
34. 1984 *Agricultural Development Hearings*, *supra* note 30.
35. See eg Feder, *Agricultural Resources in Underdeveloped Countries: Competition Between Man and Animal*, 14 Econ and Political Weekly 1345-1366 (1979)
36. *Id.*; Nations and Komer, *Rainforests and the Hamburger Society*, 25 Environment 12, 14, 16 (1983).
37. Parsons, *Forest to Pasture: Development or Destruction?* 24 Revista De Biologia Tropical 121-138 (1976)
38. *Id.*; Nations & Komer, *supra* note 36, at 14.
39. See eg Goodland, *Environmental Ranking of Development Projects in Brazil*, 7 Environmental Conservation 9-26 (1980); Fearnside, *Cattle Yield Prediction for the Transamazon Highway*, 4 Interciencia 220-225 (1979); Fearnside, *Development Alternatives in the Brazilian Amazon: An Ecological Evaluations* 8 Interciencia 65-78 (1983); Feder, *supra* note 35; Parsons, *supra* note 37.
40. Feder, *supra* note 35, at 1351, 1336n 26.
41. Parsons, *supra* note 37, at 126. Parsons goes on to state that

"such development oriented international organisations as... (the) IBD seem to foresee a kind of mixed farming as the optimal ultimate use... for (much of) the high rainfall Central American forests... There is a vision, it seems, of an isthmus converted to cropland and grass from the Pacific to the Atlantic. In Nicaragua a model for this is the 70,000 ha. Colonia Rigoberto Cabezas project on the La Gateada Nueva Guinea road south of the Rama road, recently funded by an 80 million dollar IBD loan. *Id.*, at 127.

42. Feder, *supra* note 35, at 1349.
43. A brief review of World Bank and IDB lending in Latin America over the past three years shows that these institutions are continuing to prepare and approve large livestock loans which can only contribute to the pressures to convert the remaining pristine tropical forest areas of the region. For example, in its past fiscal year the World Bank approved a loan of 9 million dollars (total project cost: 25.5 million dollars) to Panama for the third in a series of Bank financed livestock projects, and a loan of 25 million dollars (total project cost: 121.1 million dollars) to Paraguay for that country's seventh Bank financed livestock project. The Bank approved loans in 1983 and 1981 to Paraguay for 40 million dollars and 30 million dollars, respectively (total project costs: 72 million dollars and 60 million dollars), to provide agricultural credit, extension and technical assistance with a substantial emphasis on livestock development. It approved loans of 130 million dollars in 1983 (total project cost: 239 million dollars) and 40.6 million dollars in 1982 (total project cost: 83.9 million dollars) to Peru for agricultural credit, research and extension, again with significant livestock components. Agricultural credit loans to Mexico in 1982 for 175 million dollars and in 1981 for 325 million dollars also had significant livestock components. Total investment for these two projects alone was 1.69 billion dollars. In 1983, the Inter-American Development Bank approved loans of 35.8 million dollars and 5.3 million dollars to Costa Rica for livestock development and animal health projects, as well as

- a 130 million dollars farm and livestock credit loan to Mexico and a 30 million dollars agricultural research loan to Venezuela with a substantial livestock component. Loans of 32 million dollars to Bolivia for agricultural credit in 1982, and in 1981 of 24 million dollars to Costa Rica, 36.5 million dollars to the Dominican Republic, and 20 million dollars to Guatemala (for livestock health programmes), all had substantial or predominant livestock components.
44. M Nelson, *The Development of Tropical Lands: Policy Issues in Latin America* 265 (1973), quoted in A Van De Laar, *supra* note 22, at 178.
 45. N M Bunin, "Colonisation Systems Analysis: Review of Colonisation Projects in the Peruvian Selva," Annex C, Vol I, Project Synthesis Paper, Central Selva Natural Resources Management Projects, USAID Project No 527-0240 (1981).
 46. See eg Guppy, *supra* note 31, at 932-937; R J Goodland & H S Irwin, *Amazon Jungle: Green Hell to Red Desert?* 28-36 (1975).
 47. See eg R J Goodland & H S Irwin, *supra* note 46, at 36-48; Nations & Komer, *Central America's Tropical Forests: Positive Steps for Survival* 12 AMBIO 232-238 (1984).
 48. For adverse impacts of MDB projects on indigenous peoples, see 1983 *Environmental Hearings*, *supra* note 30, at 440-644; 1984 *Health Hearing*, *supra* note 30, 152-185 (Survival International (USA) statement with attachments entitled "The Impact of World Bank Policies on Indigenous Peoples").
 49. D A Posey, *Indigenous Ecological Knowledge and Development of the Amazon*, in E F Morgan Ed, *The Dilemma of Amazonian Development* 225-257 (1983).
 50. Inter-American Development Bank, response to request of US Executive Director for comments on statements presented at environmental hearings of the House Banking Subcommittee on International Development Institutions and Finance (See 1983 *Environmental Hearings*, *supra* note 30.) 8 (August 12, 1983) (hereinafter cited as IDB Response).
 51. A World Bank/FAO team visited the Pichis Valley and adjacent jungle areas in the Spring of 1981 and assessed the agricultural potential of the region as follows:

97 per cent of the area is at present under forest . . . The soils are mostly highly acid . . . and are low in nutrients . . . there is a high proportion of sloping land . . . Under the climatic and topographical conditions of the projects area (highway) maintenance costs are likely to be high . . . A forestry project in the area (would be) financially marginal . . . soils are of low fertility . . . and consequently limit the forest's natural regeneration capacity . . . An increased flow of spontaneous settlers would aggravate the conflict over land tenure with native communities and have a disastrous effect on the area's ecosystems . . . The mission debriefed with the Government of Peru and warned of the low potential of the area proposed for development.
 - FAO/World Bank Cooperative Programme Investment Centre, Report of the Peru Selva Central Reconnaissance Mission 3-4 (June 16 1981) (confidential FAO/World Bank document).
 - In spite of this highly negative assessment by FAO and the World Bank of the development prospects for the Pichis Valley, the IDB has cited its involvement there as a model and precedent in environmentally sound development. IDB Response, *supra* note 50, at 8. Of the total project costs, however, 65.3 per cent are for jungle road construction, 14.9 per cent for agricultural and forestry development, and only 0.3 per cent for an "Environmental Dimension Programme." Inter-American Development Bank, Loan . . .
 52. See eg Guppy, *supra* note 31, at 939-944.
 53. Caufield, *Indonesia's great exodus* New Scientist (May 17 1984) at 26.
 54. In the Island of Kalimantan—where the government plans to 'transmigrate' four million people—less than two per cent of the soils are thought to be permanently cultivable. Guppy, *supra* note 31, at 942-943.
 55. Caufield, *supra* note 53, at 25.
 56. World Bank, Response to Statements of Environmental Organisations sent by the US Executive Director 9-11 (January 11, 1984) (following the 1983 Hearings of the House Banking Subcommittee on the MDBs and the Environment (see 1983 *Environmental Hearings*, *supra* note 30.), the Subcommittee requested the Treasury Department to obtain detailed responses from the US MDB Executive Directors to the statements of environmental organisations presented at the hearings) (hereinafter cited as World Bank Response).
 57. In the case of the Transmigration Programme, for example, one of the government's main priorities is "Javanisation" of the ethnically diverse—and less politically reliable-outer islands; in addition, such settlement projects allow governments to avoid confronting potentially explosive social issues such as grossly unequal land tenure systems on a country's good agricultural land. See eg Guppy, *supra*, note 31, at 939-944; Caufield, *supra* note 53, at 27.
 58. Guppy, *supra* note 31, at 944. 70. US Treasury Department Office of Multilateral Development Banks, Personal Communication (September 5, 1984). The World Bank's Polonoroeste loan commitments represent nearly one half of one per cent of Brazil's titanic foreign debt, the largest of any country.
 59. World Bank, Brazil: Intergrated Development of the Northwest Frontier 5 (1981).
 60. *Id* at i-vi, 1-3.
 61. *Id* at 31; personal communication, Steven Schwartzman, anthropologist, October, 1984.
 62. See eg D Maybury-Lewis, J W Clay, D Price, D Moore, B Mindlan & C Junqueira, in the Path of Polonoroestes: Endangered Peoples of Western Brazil (1981).
 63. International Bank for Reconstruction and Development, Loan Agreement No. BR2060, Sections 4.05 & 3.13 (December, 1981)
 64. World Bank Response, *supra* note 56, at 7-9.
 65. US Treasury Department Office of Multilateral Development Banks, *supra* note 58.
 66. Fearnside, *Deforestation in the Brazilian Amazon: How Fast is it Occurring?*, 7 *Interiencia* 82-88 (1982).
 67. See eg Eckholm, *World Bank Urged to Halt Aid to Brazil for Amazon Development*, NY Times, Oct 17, 1984, at 9, col 1. In October, 1984 30 environmental and indigenous peoples' human rights groups in the US, Brazil and Europe sent a letter to the President of the World Bank protesting the threats to the environment and indigenous peoples created by Polonoroeste and requesting the Bank to regain some control of its enormous investment in the region. *Id* See also Guppy, *supra* note 31.
 68. See eg 1984 *Agricultural Development Hearings*, *supra* note 30 (statements of Jose Lutzenberger, Brent H Millikan and Bruce M Rich).
 69. Fearnside, *A Floresta Vai Acabar?*, 2 *Ciencia Hoje* 43-52.
 70. Millikan, *Relatorio Final: Diagnostico de dez Nucleos Urbanos de Apoio Rural (NUARs), Avalicao do PDRI-Ro/Polonoroeste Fundacao Instituto de Pesquisas Economicas (FIPE)* 88-89 (1984); 1984 *Agricultural Development Hearings*, *supra* note 30, statement of Brent H Millikan, 9 (1984).
 71. Steven Schwartzman, anthropologist, Washington, DC, personal communication (October 6, 1984).
 72. Guppy, *supra* note 31, at 943. In addition to the extraordinarily risky nature of tropical settlement projects, their cost per settler family, or 'beneficiary,' seems truly outlandish. The average investment per 'beneficiary family' for eight World Bank settlement projects implemented during the 1970s was, in 1975 dollars, 8901.25 dollars, or more than 18,000 dollars a family in current dollars. World Bank, *Agricultural Land Settlement* 56 (1978). Incentives and investment per settler in the Bank financed Brazil Polonoroeste settlement Programme are estimated to total over 12,000 dollars, and there is documentary evidence that many are poorer and worse off than before. Guppy, *supra* note 31, at 942; see Cowell, "The Decade of Destruction," parts II and III, Central Television UK (1984) (film in four parts). One cannot help but wonder if the families intended as beneficiaries of these schemes would have been better off in most instances if the World Bank had simply given them these thousands of dollars, which could have been used to purchase the good agricultural land they had no access to or to set up small business enterprises. At the same time, the tremendous ecological destruction that results from such projects would not have occurred.
 73. Personal communications, World Bank advisors for irrigated crops, procurement, and tree crops, Operations Policy Staff, Agriculture and Rural Development Division, 1983.
 74. Estimate of the author, based on personal communications, *supra* note 70, and on review of World Bank Annual Reports and Project Appraisal documents.
 75. 1983 *Health Hearings*, *supra* note 30, at 84 (statement of Robert F Wasserstrom).
 76. *Id*.
 77. *Id*: India is the single largest cumulative borrower of the Bank by far (19.8 billion dollars, as opposed to second place Brazil with 9.94 billion dollars), and was also the biggest borrower in 1984. Agriculture, in turn, accounted for about 40 per cent of Bank lending to India in 1984. World Bank, 1984 Annual Report, 210-212, 214-215, 220 (1984).
 78. *Id*.
 79. 1983 *Health Hearings*, *supra* note 39, at 84-85 (testimony of Robert F Wasserstrom).
 80. *Id*, at 85.



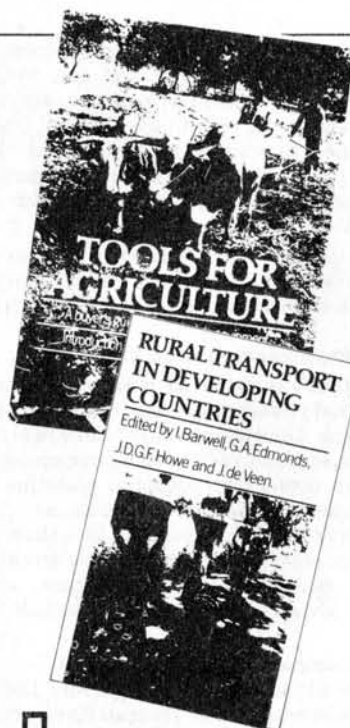
PHOTO: DEFENDERS

Manioc is transported by Indians of the Amazon basin. Some natives recognise 18 kinds of this staple food.

81. See eg Bello & Elinson, *supra* note 16, at 80-84; See generally D Bull, *A Growing Problem: Pesticides and the Third World Poor* (1982).
82. As of 1983, the Bank had made gross loan commitments to the Sudan of 792.1 million dollars, 54 per cent for the agriculture sector.
83. Consortium for International Crop Protection, Comments on Pest Control in the Gezira Scheme of Sudan with Special Reference to the Proposed Use of Temik, in 1983 *Environmental Hearings*, *supra* note 30, at 350-354.
84. World Bank 1983, *supra* note 4, at 108; World Bank, Report and Recommendations of the President of the International Development Association to the Executive Directors on a Proposed Credit of SDR 46.4 million to the Democratic Republic of the Sudan for the Agricultural Rehabilitation Programm-II at 19 (May 23 1983) (confidential document for official use only).
85. Personal communications, *supra* note 70. The report to the Executive Directors of the Bank succinctly understates the pesticide treadmill which billions of dollars of agricultural assistance have lead the Sudan into with the following words: "Although extensive use of chemicals would continue to pose long-term risks, it would not be commercially feasible to produce cotton without chemical pest control." World Bank, *supra* note 81, at 18.
86. 1984 *Health Impacts Hearing*, *supra* note 30, at 86-91 (statement of Robert F Wasserstrom). See also Chapin & Wasserstrom, *Agricultural production and malaria resurgence in Central America and India* 293 *Nature* 181-185 (1981).
87. Chapin & Wasserstrom, *supra* note 83.
88. Consortium for International Crop Protection, *supra* note 80, at 354.
89. See eg Hunter, Rey & Scott, *Man-Made Lakes and Man-Made Diseases*, 16 *Soc. Sci. Med.* 1127-1145 (1982); 1983 *Environmental Hearings*, *supra* note 30, at 35-50 (statement of Brent Blackwelder); Madely, *Big Dam Schemes-Value for Money or Non-sustainable Development?*, 7 *Mazingira* 16-25 (1983).
90. 1983 *Environmental Hearings*, *supra* note 30, at 100 (statement of Barbara J Bramble).
91. *Id.* at 40 (statement of Brent Blackwelder).
92. *Id.* at 44-46, 96-98, 504-512 (statements of Brent Blackwelder, Barbara J Bramble and Rudolph C Ryser).
93. See World Bank response, *supra* note 56, *passim*.
94. 1984 *Draft Environmental Recommendations Hearings*, *supra* note 30, statement of James B Conrow 1.
95. World Bank, Social Issues Associated with Involuntary Resettlement in Bank-Financed Projects 1 (1984) (internal document). Witnesses at the 1983 *Environmental Hearings* referred to a number of MDB projects with grave resettlement impacts, of which the most notorious was the planned Chico River hydroelectric scheme in the Philippines. 1983 *Environmental Hearings*, *supra* note 30, at 507-510 (statement of Rudolph C Ryser); Bello & Elinson, *supra* note 16, at 56-57. The original four dam complex, for which the World Bank was helping to prepare feasibility studies, would have displaced some 100,000 Bontoc and Kalinga tribespeople from their ancestral homelands. The tribespeople erupted in armed revolt against the proposed projects, turning the region into a battleground and forcing the Bank to withdraw most of its planned participation. Bello & Elinson, *supra* note 16, at 56-57.
96. The Bank's official internal operating procedures are known as the Operations Manual. The Operations Manual is not available to the general public. Sections of the Operations Manual are known as Operations Manual Statements (OMSs). In early 1980 the Bank promulgated an OMS 2.33 on Involuntary Resettlement. The Bank published in May, 1984 an update of its "Environmental Policies and Procedures" in which it stated that the Bank "will not finance projects that displace people or seriously disadvantage certain vulnerable groups without undertaking mitigatory measures acceptable to the Bank as outlined in separate notes on involuntary resettlement, and on tribal peoples." World Bank, *Environmental Policies and Procedures* 4 (May 1984).
97. World Bank, *supra* note 93, at 2.
98. *Id.* Annex 2, at 36.
99. *Id.* at 9.
100. He stated that "(s)ustainable development requires vigorous attention to resources management and the environment," "for sustainable development and wise conservation are, in the end, mutually, reinforcing—and absolutely inseparable—goals." A W Clausen, *Sustainable Development: The Global Imperative* 10, 19 (1981) (Fairfield Osborn Memorial Lecture, 1981); text available from World Bank Office of Environmental and Scientific Affairs.
101. Lee, *Environment in the World Bank—Policies and Practices*, 16 *Water Science Technology* 337-346 (1984). The Office was known as the Office of Environmental and Health Affairs from 1975-1983.
102. World Bank Response, *supra* note 56 at 1.
103. The Director of OESA is involved mainly in administrative duties and in external relations; one staff member is on loan to the Bank's Economic Development Institute (which prepares training courses for administrators from developing countries), and the two others deal with industrial pollution and Bank financed Development Finance Corporations. These two categories of projects have accounted for less than 10 per cent of Bank lending in recent years. The most environmentally sensitive lending categories are agriculture, energy and transportation, which account for more than half the Bank's annual lending.
104. World Bank, *Environmental Guidelines* (1983).
105. Declaration on the Human Environment and Declaration of Principles. UN Conference on the Human Environment, 1972, Stockholm, Sweden, in *Defence of the Earth: The Basic Texts on Environment* (1981) (United Nations Environment Programme Executive Series).
106. World Bank Response, *supra* note 56 at 1. The project cycle has three main phases prior to loan negotiation: identification, preparation, and appraisal. After the loan agreement is signed

- the project enters the implementation phase. About 60 per cent of completed projects are subject to an independent evaluation by the Bank's Operations Evaluation Department. See W C Baum, *The Project Cycle* (1982) (a World Bank publication).
107. In the words of a special report prepared by the House Banking Subcommittee on International Development Institutions and Finance: "Given the magnitude of the World Bank's operations, an environmental office with a staff of five cannot possibly be expected to adequately provide for all aspects of environmental issues facing the Bank." House Comm. on Banking, Urban Affairs and Finance, Subcomm. on International Development Institutions and Finance, *Draft Recommendations Regarding Environmental Concerns Associated with Multilateral Bank Activity 1* (September 1984) (draft document to be published in late 1984 as special Committee Report).
 108. 1983 *Environmental Hearings*, *supra* note 30, at 68 (statement of Bruce M Rich)
 109. *Id.*
 110. *Id.*
 111. See discussion in *supra* note 94.
 112. World Bank, *supra* note 94, at 4.
 113. See notes 19-22.
 114. See notes 21 and 22.
 115. World Bank, *supra* note 94, at 5.
 116. Lee, *supra* note 101, at 340.
 117. Compare World Bank, *Forestry Sector Policy Paper* (1978) with World Bank, *Fishery Sector Paper* (1982), World Bank, *Agricultural Land Settlement Issues Paper* (1978) and World Bank *Rural Development Sector Policy Paper* (1975).
 118. See *Foreign Assistance and Related Programmes Appropriations for 1984: Hearings before the Senate Appropriations Comm. Subcomm. on Foreign Operations* 98th Cong. 2nd Sess. (1984) (statement of Bruce M Rich). High level Bank officials acknowledged in a meeting with environmental representatives that the Fishery Sector Policy Paper was seriously inadequate in its treatment of sustainable management of the resource. *Id.*
 119. See eg 1983 *Environmental Hearings*, *supra* note 30, at 69-70 (statement of Bruce M Rich). For example, the Bank's Country Economic Memorandum on Belize fails to mention or address any issues concerning the outstanding natural resource of the country: the earth's second largest barrier coral reef. *Id.*
 120. Lee, *supra* note 101 at 344.
 121. World Bank, *supra* note 13, at 56.
 122. 1983 *Environmental Hearings*, *supra* note 30, at 72 (statement of Bruce M Rich).

123. World Bank Response, *supra* note 56, at 4-5.
124. See 1983 *Environmental Hearings*, *supra* note 30, at 63-64 (statement of Bruce M Rich); 1984 *Draft Environmental Recommendations Hearings*, *supra* note 30, at —; (Draft Recommendations Regarding Environmental Concerns Associated with Multilateral Bank Activity); United Nations Environment Programme. *Draft Summary Record. The 5th session of the Committee on International Development Institutions on the Environment*, Luxembourg 1984. (Unpubl. document available at UNEP offices New York and Washington.) 125. 1983 *Environmental Hearings*, *supra* note 30, at 63 (statement of Bruce M Rich). In its response to the Treasury Department the IDB asserted that 63 professionals and specialists in "environment related areas" such as "water supply and sanitation; integrated urban development; education; electric energy; science and technology; forestation; fisheries; irrigation; watershed management; erosion sedimentation control; livestock activities and pasture management; agricultural and rural development..." etc. IDB Response, *supra* note 50, at 2. At issue, however, was not the number of staff working in environmentally sensitive fields, but the number of environmentally trained staff with specific responsibilities for ensuring the ecological soundness of projects in these environmentally sensitive areas. The IDBs position is the "staff members are directed by the Bank to take a 'holistic' approach and to introduce the environmental dimension into each project activity." *Id.*
126. These checklists concern the sectors of transportation, mining, industry, agriculture, and socio-cultural impacts. They are available from the IDBs Office of External Relations. The IDB checklists address in a more comprehensive fashion the prospective adverse impacts of IDB project lending than the checklists of the World Bank do with respect to that institution's activities; the World Bank's checklists, for example, virtually fail to address the impacts associated with agriculture projects. Since neither set of checklists appears to be used, a discussion of their respective merits is currently of purely theoretical interest. See discussion at the end of this section on the IIED Environmental Guidelines study.
127. 1983 *Environmental Hearings*, *supra* note 30, at 63-64 (statement of Bruce M Rich).
128. IDB Response, *supra* note 50, at 1; Inter-American Development Bank, *Operating Policy on Environmental Management* (1979) (internal IDB memorandum for official use only).
129. Inter-American Development Bank, *supra* note 128.
130. 1983 *Environmental Hearings*, *supra* note 30, at 63-66 (statement of Bruce M Rich). Compare



New from Publications

Tools For Agriculture *A buyer's guide to appropriate equipment*
Crop Production • Processing • Water • Transport • Livestock • Beekeeping

The **new edition** of this internationally established guide describes a wider range of tools and gives more guidance to the buyer, the chooser — and the user. The equipment comes from over 1,000 manufacturers and suppliers from more than 50 countries and covers 3,000 products. Illustrated with hundreds of clear line-drawings or photographs, this latest edition of the book first launched as *Tools for Progress* by Dr E.F. Schumacher ('Small is Beautiful'), is itself an invaluable tool for the small-scale farmer and his advisers.

£12.50 approx. c.200 pp. 210 x 297 mm. 1985. ISBN 0 946688 36 2

Rural Transport in Developing Countries

by I. Barwell, G.A. Edmonds, J.D. Howe and J. de Veen.

Development expenditure on transport has been massive, but has often ignored the true needs of the rural poor. The heart of this book lies in nine case studies, from widely different backgrounds, all of which put the small farmer and rural household transport needs at the centre of the planning process. The implications of this change of perspective for national transport policies are reviewed in the light of this experience.

£12.50. c.208pp. 1985. ISBN 0 946688 80 X.

 **intermediate
technology**

Intermediate Technology Publications is the publishing arm of the Intermediate Technology Development Group (ITDG) 9 King Street, London WC2E 8HW

THE WORLD BANK'S POLONOROESTE PROJECT:

A social and environmental catastrophe

by José Lutzenberger

The author is a leading agronomist and Brazil's most famous and most committed environmentalist. This is his testimony before the Subcommittee on Natural Resources, Agriculture Research and Environment of the House Committee on Science and Technology, September 19, 1984. In it he shows that the deforestation of Rondonia cannot, as is generally assumed, be attributed to the need for more land to feed the growing population. The colonists who are clearing the forests are there because their land in the South has been taken away from them in order to create vast government-backed plantations geared to the export of cash crops to earn foreign exchange for development. What is more, the land they left behind is very fertile while the land they obtain in Rondonia can yield but two or three crops at best before being turned into a desert.

Lutzenberger also insists that World Bank projects such as the proposed Polonoroeste project are highly destructive while conditions imposed to safeguard the Indians "are blatantly flouted".

The author calls on the World Bank, on behalf of the environmental groups of Brazil, to reconsider the Polonoroeste Project and in general its policy on Rondonia.

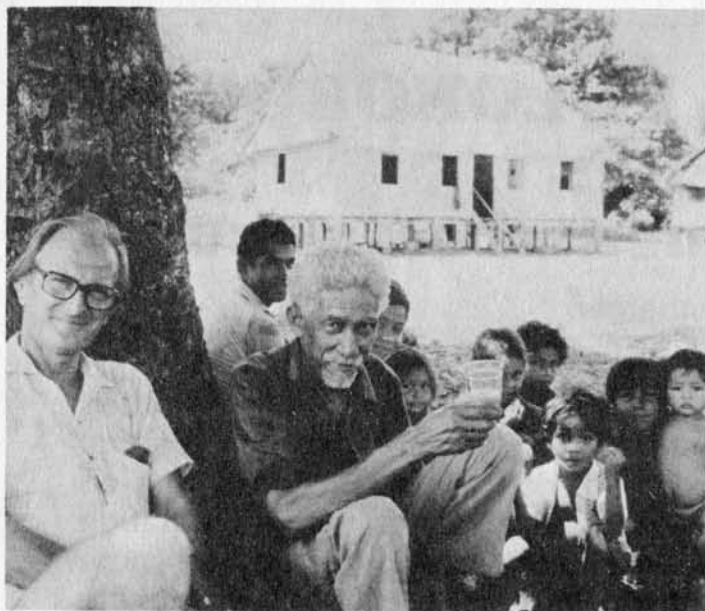
I have been asked to talk about the development programme in Western Amazonia called the Polonoroeste Project, which is partly funded by the World Bank. This is a \$1.6 billion project, of which the Bank's share is \$443 million. The main part of the loan is for a central highway and the rest is for feeder roads and the infrastructure for planting settlers in the forest. I will begin by describing very briefly its context—the social policy behind it.

Many development projects are publicised as dealing with great economic and social problems like famine, disease, lack of good water, and the Polonoroeste scheme is often projected as dealing with a similar sort of problem—the westward migration of Brazil's agricultural poor. What is seldom pointed out is that, unlike famine or disease, the migration into Amazonia is deliberately promoted and encouraged by our government. INCRA, our land agency, has been—and is at the moment—putting paid advertisements on television, enticing farmers from other parts of Brazil to go to Rondonia. Some of their newspaper and magazine advertisements show aerial views of primeval forest with captions saying, "We are making the largest agricultural reform in the world". But the settlement schemes are conceived precisely in order not to have to face social justice in other parts of Brazil, in order not to carry out agrarian reform and to change agricultural policies in other regions. I would now like to submit for the record a publicity brochure of the Rondonia State Government encouraging mig-

ration to Rondonia which says, "Good land, appropriate land . . . these lands offer excellent possibilities for the expansion of agricultural productivity."

In considering the Polonoroeste project, it is important to be aware that the principal social and political objective is to transfer our agricultural poor—mainly from the northeast and south of Brazil—to the Amazon. The largest block of migrants come from the South where I live. It is a region of good soil, originally settled by German, Italian and Polish immigrants, and it produced a relatively healthy, permanently sustainable peasant agriculture in the last century which flowered into the fifties of this century. It is now in total decline. Government policies for the last thirty years have deliberately gone against the interests of the peasants. The government has promoted only cash crops, monoculture for export, especially soybean plantations. It also promoted "modern inputs": heavy and sophisticated machinery, synthetic-mineral fertilisers, and pesticides. In many instances huge estates have bought up the small holdings and enormous soybean plantations were set up, some of them covering thousands of hectares.

José Lutzenberger is an agronomist and engineer who spent a number of years working for the large agrochemical company BASF, but who quit his job and began a vigorous and successful campaign against the activities of the agrochemical industry. In his own state of Porto Alegre in Brazil he was elected agronomist of the year by his fellow agronomists. He runs his own soft-technology landscaping company and is President of AGAPAN, the State association for the protection of the natural environment.



Dr José Lutzenberger (left), Brazil's best-known environmentalist, visits a rubber tapper village in Rondonia.

It is calculated that there are at least 2,500,000 landless poor in Brazil today, and the Polonoroeste project is designed as a safety valve for the political and social pressures caused by them. There is in fact no shortage of land in the South except the shortages created by the concentrations of land holdings. The Polonoroeste project is a method of decreasing the risks and increasing the security of the large landowners. And it does this by removing some of the rural poor from the regions where they were born and dumping them in the Amazon. What is worse, it transfers them from rich soils, in a subtropical climate, which can recuperate relatively quickly, to poor tropical soil where deforestation does permanent damage.

This is the social and agricultural context of the Polonoroeste project, which is thirty per cent funded by the World Bank. The project's stated aim is "to ensure growth of production in harmony with preoccupation for the preservation of ecosystems and natural resources." The exact opposite is happening. Devastation of the forest in Rondonia is uncontrolled, production is not being secured in the settlements.

It seems paradoxical, but the soils under the lush tropical rain forest are the poorest in the world. Permanently high temperatures and high rainfall leach away all the mineral nutrients. The clay fraction of the soil, where there is one, is also degraded to the point where it can hold almost no mineral nutrients. Therefore, the rain forest holds all its nutrients in its biomass. When the forest is cut down and burnt, and the heavy downpours wash away the ashes, most of the nutrient capital of the forest is gone. The rivers take it to the ocean. Since the soil has no holding capacity, conventional fertilisers are of little use, and high transportation costs also make them too expensive.

As depicted in Adrian Cowell's film "Decade of Destruction" (*The Ecologist* Vol 14, No 1), the land is cut up by straight roads and is divided by our land agency INCRA, according to checkerboard-like patterns blindly conceived on the drawing board. Some plots are on relatively good soil, others are on almost pure sand or on rock outcroppings. Some are totally or partially

on slopes too steep to plough, thus guaranteeing erosion from the start, others may be totally flat or rolling. One plot may cut across the meanders of the same brook several times, thus forcing the farmer to build several bridges. Another plot may have access to no water at all. This is a bad way to treat any terrain, but for tropical forests with fragile soils it can be disastrous.

It is quite common to see settlers give up their clearings after the first meagre harvest. They have to make new clearings every year. Then, when the whole plot is cleared, they move on again. The Polonoroeste project has only been operating for a few years, but there are already examples in Rondonia, where entrepreneurs have bought up half a dozen or a dozen plots, so the process of the concentration of agriculture and the building up of big estates, which drove the poor off the land in the South and Northeast, is already beginning in Rondonia. In many cases, the farmers are grandsons of colonists who cleared the forest in my home state of Rio Grande do Sul. A second wave moved on to clear the great forests in Paraná in the 1950s. Now the same is happening in Rondonia.

In addition, because cattle raising is the simplest method of holding land with a small labour force, the plots that are bought up are usually turned into poor pasture. The productivity of extensive cattle-raising on these pastures is ridiculously low—30 to 60 kg per hectare per year, as compared to ten times that much in temperate climates. The forest itself, before it was cut down, produced much more food per hectare in the form of tropical fruit, game, and the fish life it sustained in the streams.

A particularly sad aspect of what is happening in Rondonia is that ecological and social damage always go together. The forests that the settlers are cutting down are not empty. The humans already living in them, Indians, rubber tappers and caboclos—our word for jungle dweller—have an interest in the preservation of the forest. And the destruction of the forest uproots the only people who have learned to live in relative harmony with it.

The Indians are pitilessly destroyed culturally, if not physically. And yet there is so much we could learn from them. Their knowledge of the ecology of the forest, their skills in knowing how to use it are lost even before we can register them. The loss of these cultures is just as irreversible as the loss of a species. A species is the result of millions of years of irreversible organic evolution. An indigenous culture is the result of thousands of years of living in harmony with the ecosystem.

The caboclos—they are usually of mixed stock, Indian, and white—are the natural successors of the Indians. They live in the forest, surviving on shifting agriculture and as hunter-gatherers. Their lifestyle is quite compatible with the survival of the forest as long as their population does not increase too much. Their small clearings have cassava, some fruit trees, a few chickens or pigs, sometimes a cow, only to complement the diet they take out of the forest, tropical fruit, game, and fish. At the present population density they do not overexploit. Fish and game survive. (If they

were left alone, there would be plenty of time for the working out of methods of dealing with the forest on a level of more intensive, but sustainable productivity.)

Finally, there is the *seringueiro*, or rubber tapper, who bleeds rubber from the wild rubber trees in the jungle. He has an income equal or superior to that of the metal worker in the automobile industry in Sao Paulo. And he has almost no expenses, because most of his food is free. It comes from the forest and his small crops. During the last world war the Central Government, which then called the *seringueiro* "o soldado da borracha" (the soldier of rubber) promised him title to the land on which he worked. This would have been very easy to implement. Each *seringueiro* needs no more than 200-500 ha. Of course, the promise was seldom fulfilled. We know of only one programme where some tappers were given 250 ha. In general, when they are displaced by colonisation projects they get no more than 25 ha. Invariably, they sell the land and end up in slums or as day labourers.

Why can we not leave Amazonia to the Amazonians? Indians, *caboclos*, *seringueiros* are compatible with the survival of the forest. Their lifestyle could easily be improved socially and ecologically by teaching them better cropping and collecting or fishing methods, storage methods, and hygiene. But almost nothing is being done in that direction. The reason is that there is no financial advantage to be gained from leaving these people in the jungle, while immense political advantages are to be gained from transferring the agricultural poor from the south and northeast of Brazil to Amazonia.

On behalf of the Brazilian environmental movement, and on behalf of many cooperating citizen groups, I ask whether the World Bank should be providing thirty per cent of the money for a project which:

1. Makes it easier and socially safer for the powerful to maintain huge estates in the Northeast and to promote cash crop monocultures for export in the South.
2. Substitutes unsuitable forms of agriculture for the tropical forest.
3. Drives out of the forest the only people who have developed a sustainable way of using it.

If the World Bank wishes to help us with our problems, why does it not invest more in projects which help fix the agricultural poor on their own lands in the South and Northeast? And why does it not invest in research to improve the economy of the *caboclos* and *seringueiros* who already live in the forest?

Some very interesting research along that line is being done at INPA, the Amazonian Research Institute. Researchers there are showing that permaculture—trees such as breadfruit, jackfruit, and many other tropical fruit trees, coconut and numerous native palm trees—can produce up to ten times as much energy and protein per ha with less work, no new clearings, than can the traditional crops.

The life of the rubber tapper could also be made much easier and more productive by increasing the density of rubber trees in the forest. This requires no fertiliser, no herbicides, and the forest is not felled. There are a few successful examples of this type of

work, mainly through private initiative, but the government shows no interest in them. At present, Brazil imports two-thirds of its natural rubber needs. But by increasing the density of the trees we could easily have enough natural rubber to export.

What really needs to be done is not being done. In the Amazon we now need research on how to recuperate the soils already degraded, on how to do that with locally obtainable resources, organic soil management, insoluble mineral nutrients obtained from regional rocks or with raw phosphate from the Northeast. We must also set up schemes to protect the remaining Indian cultures and to help the already existing population. Not a single hectare of remaining forest need be cleared if we really decided to tackle these staggering problems. Why not finance this kind of meaningful work?

In the South, we must save our fertile soils, that could feed us and that can help feed the world, if we learn how to handle them on a sustainable basis. There is, in fact, no shortage of land in Brazil, but today's levels of productivity are extremely low and they are bought at the expense of future productivity. These soils respond extremely well to organic management. Productivity then goes up steeply and erosion goes down, so do pests and diseases.

In the Northeast, in Central Brazil, in the South, we face tremendous tasks, and Brazil has enough space to allow the big and the small to live side by side.

What is seldom pointed out is that, unlike famine or disease, the migration in Amazonia is deliberately promoted and encouraged by our government. INCRA, our land agency, has been —and is at the moment—putting paid advertisements on television, enticing farmers from other parts of Brazil to go to Rondonia.

We have a formidable job before us. If we learn to handle it we can bring back all the stranded migrants. Perhaps the World Bank can help us with a really rational job, instead of helping our government help the landlords who are strong enough to help themselves.

Finally, I would like to ask why the World Bank bothers to write conditions into its loan agreements, and then does nothing when those conditions are blatantly flouted, such as the clauses about Indian reserves, virtually none of which have been demarcated in the Polonoroeste region.

In the case of the more environmental conditions, it is obviously impossible to reverse the type of destruction already carried out in Rondonia. But at present, the last large area of untouched forest—the Guaporé Valley—is about to be opened up by the BR 429 road. According to Rondonia's Ministry of Transportation, the last 100 km of road should be through in November. And yet this road blatantly flouts two conditions in the World Bank's loan agreement. In section 3.13 of the Phase I loan agreement (for the "Agricultural Development and Environmental Protection Project"—loan number 2060 BR) it is agreed: "To discourage the agricultural exploitation of areas which have been determined to be

unsuitable for agricultural development or of areas whose suitability for agricultural development has not yet been determined." Why, therefore, does the Bank not object to the colonisation of Settlement Projects Bom Principio, Terra Firme, Conceicao, Porto Murinho, Surpresa, Cena Grande, Sao Domingos, Monte Cristo, and Sao Miguel when the soil survey maps describe most of this soil as unsuitable for small farmer agriculture?

Secondly, the loan agreement for the first phase, Agricultural Development and Environmental Protection Project (Loan No 2060 BR) states in section 4.05:

"The Borrower and the Bank agree that the strengthening of the measures to protect the indigenous Amerindian population in the programme area is essential to the successful carrying out of the project. To this end, the Borrower shall take all necessary measures to put into effect promptly the special project for protecting the interests of the Amerindian communities located in the programme area."

In the light of that clause, how can the Bank not object to a road which is going through an area regularly hunted by unknown Indians who have killed colonists and rubber tappers in the area in 1981 and 1983. The regional head of the government Indian agency, Apoena Meirelles, confirmed this in a recent press interview when he said that all new INCRA projects should first have a Certidao Negativo (a no objection agreement) from the Indian Agency confirming that there were no Indians in the area. When he was asked if this meant that the BR 429 road was—with reference to the Indians—proceeding blindly, he replied, "Completely blindly."

On behalf of the environmental groups of Brazil, I call on the Bank to stop the road and re-think its policy on Rondonia.



The main road opening up the forest of Rondonia in Western Brazil. Rondonia is the fastest developing part of the Amazon basin with 70-80,000 migrants arriving every year.

PHOTO: TELEVISION TRUST FOR THE ENVIRONMENT



ENVIRONMENTAL REVIEW

An international quarterly journal that seeks understanding of human ecology through the perspectives of history and the humanities. ER encourages dialogue between the disciplines on every aspect of the present and past relationship of humankind to the natural environment.

Recent issues have included articles on Mexico, the Netherlands, China, Japan, Iceland, Spain, Sweden, the U.K., and the U.S.S.R., as well as the U.S.A. ER's breadth across fields of environmental study is as wide as its geographic spread, including literature, the arts, the environmental sciences, philosophy, and an inclusive range of historical interests. It is the intention of the editors that anyone interested in environmental studies will want to read ER.

ER includes an ample book review section, and now incorporates Environmental History Newsletter, a section of notes and announcements.

Subscriptions are now available for the four issues of Volume VIII (1984). Membership in the American Society for Environmental History is included for individual subscribers to ER.

Published by the
American Society for Environmental History

Years:	One:	Two:	Three:
Individual:			
Anywher by surface mail:	\$18.00	\$33.00	\$45.00
Air mail outside U.S. & Canada	\$24.00	\$45.00	\$63.00
Student:	\$10.00		
Contributor:	\$50.00		
Patron:	\$100.00		
Institutional:			
Anywher by surface mail:	\$24.00	\$45.00	\$63.00
Air mail outside U.S. & Canada	\$30.00	\$57.00	\$81.00

Please include check or money order with your subscription. Remit in U.S. funds only. Institutions may request invoicing. Members who join or renew for 1984 will receive Volume VIII of ER.

Correspondence regarding subscriptions, sample copies, and the availability of back issues should be sent to:

Environmental Review
Robert C. Schultz, Managing Editor
University of Denver
Denver, CO 80208-0195

THE WORLD BANK vs NATIVE PEOPLES: A Consultant's View

by David Price

The author, an anthropologist, was consulted by the World Bank as to the likely effect of the Polonoroeste project on the local Indian population. In this, his testimony at the hearings on the environmental policies of multilateral development banks, held by the U.S. House of Representatives Subcommittee on International Development Institutions and Finance, June 29, 1983, he shows that the World Bank's concern for the welfare of the Indians is not a genuine one and that that institution is determined to implement its project regardless of its effects on the native population.

My experience as a consultant to The World Bank has led me to question the sincerity of that institution's commitment to safeguard the welfare of people affected by the projects it supports.

I was invited to advise the bank of the consequences that a large-scale development programme could be expected to have on a native population. The project, called *Polonoroeste*, was to be implemented in Western Brazil, in an area of more than 158,000 square miles—about the size of the state of California. It involved the building of a 1000-mile all-weather highway with feeder roads, and various measures designed to increase economic productivity in the region. The expected cost of the project was 1.25 billion US dollars, a third of which would be loaned by The World Bank. I was asked to apprise the bank of how such a project would affect Amerindians living in the area, and what might be done to ameliorate its negative impact.¹

My expertise was founded on several years of work in the region. I first went to western Mato Grosso as a doctoral candidate at the University of Chicago to conduct anthropological research among the Nambiquara Indians. I remained from 1967 through 1970, during which time I got to know Indians in various parts of the Nambiquara region, and became concerned with their welfare. After receiving my degree and teaching for two years in the United States, I spent a year as a visiting professor at the University of Brasilia, and went to the Nambiquara for further fieldwork during the summer intercession. The Brazilian federal organ responsible for Indians, called the National Indian Foundation (or FUNAI, for short), then contracted me to mount a programme to assist the Nambiquara. With the help of three young Indian agents whom I recruited, I organised health care, initiated a programme of education, and mediated disputes with Brazilian settlers. I also lobbied for the creation of reasonable and adequate reservations. After

two years, the FUNAI reversed its policy of hiring professional anthropologists and let me know that my contract would not be renewed. I spent another year teaching in Brazil, and then returned to the United States and took up residence in Ithaca, NY.

I was contacted by The World Bank in 1980, during the course of negotiations with the Brazilian government that eventually led to the funding of Project Polonoroeste. Several aspects of my relationship with the bank led me to question its motives.

First, the bank seemed reluctant to consult me at all. I was not asked to come to Washington until June 1980, eight months after the bank had been informed that there were native peoples in the area of the proposed project. During this time, four anthropologists with experience in other parts of Brazil informed the bank that I was more familiar with conditions in the project area.²

Second, the bank made important concessions to the Brazilian government concerning the treatment of indigenous peoples in the project area before receiving the benefit of my expertise. When I went to Washington on 11 June 1980, to explain the complexities of Brazilian Indian policy as it related to the peoples of western Mato Grosso, I found that the bank had already agreed that a) any programme of assistance to the Indians in the area would be conducted solely by the FUNAI; b) the FUNAI would accept no funding from The World Bank for such a programme; and c) the evaluation and monitoring of such a programme would be done by full-time staff members of The World Bank and the FUNAI, without the aid of outside authorities such as professional anthropologists.³

David Price is an Anthropologist and Consultant on Development and its effect on Native Peoples.

Third, the bank renegotiated the third condition and sent me to Brazil to assess the adequacy of the FUNAI's plan of assistance only after I had learned that it was ignoring the threat to native people and had begun working to mobilise public opinion.⁴

Fourth, the support provided during my trip to Brazil was inadequate for the investigation I had been asked to carry out. I offered to retain a missionary pilot with a thorough knowledge of the area to be surveyed, but was told that The World Bank would take care of all logistical matters. In fact, adequate transportation was only made available after I had demonstrated that I would—and could—survey the area without it.⁵

Fifth, circulation of my report was narrowly restricted. After returning from Brazil, I prepared and submitted a 48-page document detailing the results of my investigations and making recommendations.⁶ I was surprised to learn, several weeks later, that no one in The World Bank had seen this report except the two staff members who had accompanied me to Brazil and the chief of the Latin America and Caribbean Regional Office.⁷

Sixth, a report of the three-person mission in which I had participated,⁸ which was supposed to include my findings and recommendations, systematically suppressed and distorted them. I had been charged with evaluating a) the FUNAI's plan to safeguard the Indians of the Polonoroeste area⁹ and b) the agency's competence to carry out this plan. The FUNAI's proposal was completely divorced from reality—so puerile and fanciful that I could not help but wonder whether the agency really intended it to be taken seriously, or simply believed that The World Bank would not care whether it was realistic. As for the FUNAI's competence, available evidence suggested that it had recently been taken over by military men with a background in intelligence and security, and more than 50 staff members who were conscientiously committed to the welfare of the Indians had been systematically weeded out.

The official report of the three-person mission suppressed these strongly negative conclusions, and suggested that a few minor shortcomings should not impede the progress of negotiations. I vigorously protested what I saw as a deliberate distortion of my findings, but nevertheless, this document was made the basis of a section on "Amerindians" in The World Bank's comprehensive evaluation of the Polonoroeste project,¹⁰ which was published in June 1981.

Since this comprehensive evaluation is a public document, which presents The World Bank's position in the light of all the technical expertise at its disposal, it merits serious study. I have examined the section on "Amerindians" with particular care. I will not mention what appear to be honest errors, but in several respects it would appear that information has been purposely manipulated.

First and foremost, there is a constant confusion of *de jure* and *de facto* levels of analysis. To the uncritical reader, the section would appear to be a descriptive account, dealing with the present condition of the Indians and the FUNAI. But the information pre-

sented frequently describes *what is supposed to be the case*, and completely ignores *what is really the case*. Selected aspects of Brazilian Indian law are summarised, but there is no comment on how the law is applied in practice.¹¹ The FUNAI's Mobile Health Teams are described as *they are supposed to be* (para 4.11, 4.40), but there is only a brief note on the actual inadequacy of FUNAI health care in another part of the report (para vii).¹² A paragraph describes how landowners are supposed to get certification from the FUNAI stating that there are no Indians on their property before initiating development activities (para 4.19), but not a word of the scandalous way in which such certification has been given out.¹³ There is a description of the procedure by which reservations are supposed to be created (4.20-4.22), although I pointed out in my report that this procedure had never been used. A paragraph describes the legal position of squatters and the compensation they are supposed to receive when removed from reservations, but there is not a word about the prolonged struggle and low rate of success that has actually characterised attempts to remove them (2.24).¹⁴

An anthropologist who mixed up what the natives say *should be the case* with *what is the case in practice* would be scorned by professional colleagues. Yet here this error occurs again and again. It is hard to believe that World Bank analysts made this mistake through ignorance; but it is even more distressing to conclude that they made it intentionally.

One cannot help but feel that the World Bank is much more concerned with images than with the welfare of the native minorities. It admits that Project Polonoroeste will hurt the Indians and it supports a decentralization of the FUNAI while asserting that the success of a project in the Polonoroeste area will depend on "exceptionally strong central management".

Several other points in the "Amerindian" section deserve special mention:

■ The World Bank evaluation supports a recent FUNAI plan to decentralise.¹⁵ In my report, I had urged that information from people who actually work with Indians should be taken into account by policy makers in Brasilia. But "the delegation of more decision-making authority to the regional and local levels" (para 4.14) would not accomplish this end. On the contrary, it would leave policy makers more susceptible to local pressures and make it possible for specific atrocities to be seen as local miscarriages of justice, rather than the consequence of national policy.

■ It is pointed out that when the corrupt Indian Protection Service was disbanded and replaced by the FUNAI, 238 former employees were dismissed and 134 were "charged formally with crimes" (para 4.06). This makes it appear that Brazil has cleaned up its act. But so far as I know, none of the people charged was ever convicted.

■ To “minimise possible conflicts” between the FUNAI and sister agencies, a FUNAI representative is to sit on their boards (para 4.08, footnote 1). The welfare of the Indians does not require that conflicts with sister agencies be minimised, however, but that the FUNAI be made more immune from their pressure. ■ The training of new Indian agents is said to have been discontinued “for lack of funds” (para 4.10). It is more likely that the programme was dropped because it was selecting for and producing a class of competent, informed, and committed Indian agents which the blasé and self-interested administrative staff found hard to deal with.¹⁶

■ Many FUNAI problems are attributed to a “chronic shortage of funds” (para 4.13). One could, no doubt, find beneficial uses for more money. But the real problem is not so much a shortage of funds as the ways in which existing funds are used.¹⁷

■ One of the FUNAI’s problems is said to be a “lack of continuity in management” (para 4.15). Shortly after The World Bank expressed interest in the welfare of the Indians, a duly appointed president of the FUNAI, who was considered moderate and pro-Indian, was forced out of office and replaced with a strong-arm reactionary.¹⁸

■ It is suggested that the boundaries between the FUNAI’s administrative districts should be redrawn so as to conform more closely to Brazilian political divisions (para 4.16). The needs of the Indians would be better served if they were redrawn so as to conform to the divisions between native ethnic groups.¹⁹

■ The phrase “some (tribal groups) may be related as evidenced by certain language affinities” (para 4.27) is a confusion of language and polity. To assume that Indians who speak the same language are politically affiliated is somewhat like assuming that all Spanish speakers belong to the same nation.

■ The World Bank favours the rapid “pacification” of the Uru-eu-wau-wau, an independent Indian group in Rondônia, since settlement projects are slated for areas near their lands (para 4.30). But since we do not know which lands the Uru-eu-wau-wau actually use, the settlement projects may, in fact, be *within* them, in violation of Brazilian and international law.

■ It is asserted that most of the Indians in Mato Grosso near the Cuiabá-Porto Velho road are at “relatively advanced states of acculturation,” as evidenced by the fact that they “engage in mechanised agriculture” (para 4.35). I think no competent anthropologist would agree with the general conclusion, nor with the use of “mechanised agriculture” as a criterion of acculturation. Many mission villages and model Indian posts have taught an Indian to drive a tractor, and he is customarily put through his paces for visitors. This is not evidence that the Indians “engage in mechanised agriculture,” however.

■ In my report, I made detailed criticisms of FUNAI plans for education, agriculture, and infrastructure. The World Bank report makes no use of my analysis, and summarises the FUNAI plans without comment (para 4.41, 4.42, 4.44).

■ I included in my report an allegation that one of the top men in the FUNAI had been positively identified



Uru Eu Wau Wau Indians. In the foreground is the wife and child of the chief who figured in Adrian Cowell’s film ‘Decade of Destruction’.

as a former political torturer. In response, The World Bank suggests that the FUNAI needs to improve its image (para 4.46).

One cannot help but feel that The World Bank is much more concerned with images than with the welfare of the native minorities. It admits that Project Polonoroeste will hurt the Indians (para xx), and it supports a decentralisation of the FUNAI while asserting that the success of a project in the Polonoroeste area will depend on “exceptionally strong central management” (para 1.04). The statement that reforms in the FUNAI “would most likely need to be implemented gradually over the long-term” (para 4.46) makes it clear that it does not expect the FUNAI to clean up its act before it will fund the project.

Apart from the shortcomings of the section on “Amerindians,” The World Bank’s evaluation of the Polonoroeste project contains serious internal contradictions;²⁰ numerous statements suggest that the data used for feasibility studies were inadequate;²¹ Brazilian agencies responsible for implementing the project are repeatedly said to be lacking in competence;²² and while it is admitted that the project will entail very serious risks, a carefully phrased paragraph makes it clear that any negative consequences are the responsibility of the Brazilian government, and not The World Bank.²³

Since the bank understands that the Polonoroeste project is based on inadequate information and is to be conducted by incompetent agencies, at considerable risk to the population and the environment, one might

wonder why it would consider funding the project. A clue may be found in an introductory paragraph which points out that the expected return would aid in "improving the national balance of payments" (para 2.01).

A comparison of the official version of the document with a preliminary version prepared in December 1980 reveals several changes in figures relating to expected profits, although the reasons for these changes are not explained in the text. For example, the expected average annual growth rate for the region is raised from 12 per cent to 13 per cent (para xvii); and the total value of coffee, rice, timber, cocoa, and rubber to be produced in the region by 1989 is raised from 1.2 billion US dollars to 1.6 billion US dollars (para 7.63). The effect of these unexplained changes is to make the project seem more worth the risk.

On 3 December 1981, the World Bank announced that it had agreed to fund the Polonoroeste project. A year and a half later, no rational system of reservations had yet been established, and health care was still inadequate, despite the continuing efforts of the three Indian agents.

In January 1982, Brazilian newspapers announced that the FUNAI would demarcate reservations in the area I had studied for The World Bank. Designed in accordance with my recommendations, the proposed reservations would include a part of the traditional territory of every native group in the area, but would displace very few Brazilian settlers. One of the reservations was positioned so as to protect the watershed, by preventing massive deforestation on the steep slopes where the region's streams rise. The state of Mato Grosso vigorously opposed the creation of these reservations, and the press announced that the plan had been abandoned. Under pressure from pro-Indian activists, the president of the FUNAI denied that the agency had backed off, but demarcation has yet to begin.²⁴

In order to give the Indians of the Polonoroeste region better health care, the FUNAI opened a new regional office in the little town of Vilhena. Such an office had been part of the plan I evaluated for The World Bank. I suggested in my report that other measures would be more effective, and I wrote that a regional office "would create jobs and provide a market for products manufactured by Brazilian industry, (but) it is not at all clear that it would benefit the Indians." According to a letter from an acquaintance who lives in the area, "rivers of money" are being "thrown away" on a gratuitous building programme, but the employees of a clinic attached to the regional office rendered little assistance during a recent malaria epidemic. The writer asserts that they "think of nothing but their paychecks" and "don't give a damn about the Indians." At that time, the clinic housed "four nurses, a doctor, a medical technician, a cook, a chambermaid, a doorman, a chauffeur, and TWO PATIENTS!"

So long as the major objective of development projects is financial gain, little can be done to protect the environment or the people they affect. If, on the other hand, development projects were undertaken to

Thus, there is a tendency for the World Bank to become hermetic and monolithic—a law unto itself. If the rest of the world could see what goes on inside the World Bank, it might conduct its business more scrupulously.

improve people's living conditions in a sustainable manner, neither environmental degradation nor an abridgement of human rights would result.

Perhaps this suggestion is utopian. But even under present conditions, the damage caused by economic development projects could be held in check. In July 1981 The World Bank's Office of Environmental Affairs published a set of guidelines that spell out, in meticulous detail, measures that could be implemented to safeguard the rights of indigenous people.²⁵ These guidelines have now been adopted as bank policy, and this should enable staff members charged with evaluating future projects to view relevant evidence in a more enlightened way.

The World Bank might be more cautious about the consequences of its initiatives if it could be held more closely accountable. Since it is a multinational organisation funded from a variety of sources, no one country can control it. Staff members, who are drawn from an international technocratic elite and travel on United Nations passports, may feel a greater loyalty to the institution that permits them a luxurious lifestyle than to their countries of origin. Thus, there is a tendency for The World Bank to become hermetic and monolithic—a law unto itself. If the rest of the world could see what goes on inside The World Bank, it might conduct its business more scrupulously.

Finally, World Bank personnel would be better able to evaluate proposed projects if fact-finding missions were longer, less luxurious, and brought them closer to their object of study. Under current practice, staff members and consultants visit countries where projects are to be implemented for very short periods, during which they stay in the best hotels and consult with members of the local elite. If the World Bank really wants to help "the poorest of the poor", its staff members should go to where the poor people live, stay long enough to gain their confidence, and ask them what they need.

Notes

- 1 A detailed discussion of Project Polonoroeste and its consequences for the native population may be found in *Cultural Survival Newsletter* 4(4): 1-6, and *In the Path of Polonoroeste: Endangered Peoples of Western Brazil*, Occasional Paper No 6. Cambridge, MA: Cultural Survival, Inc, 1981.
- 2 The four anthropologists are David Maybury-Lewis, then chairman of the Department of Anthropology at Harvard University and president of the board of directors of Cultural Survival, Inc; Anthony Seeger, then professor of anthropology at the Museu Nacional, Rio de Janeiro (now at Indiana University); and Waud Kracke, professor of anthropology at the University of Illinois, Chicago Circle Campus.
- 3 I also found that I had been invited to present my evidence at a time when the chief of the Latin America and Caribbean Regional Office was away on vacation.

- 4 I learned in a telephone conversation with a World Bank staff member that nothing was being done to protect the native people from the threat of Polonoroeste. I then attempted to initiate a letter-writing campaign and drew up a petition to the president of the bank that was signed by several Native Americans.
- 5 When the promised transportation failed to materialise, I persuaded a rancher to fly my travelling companion from the FUNAI and myself to the next ranch; from there we were taken to an Indian village by pick-up truck; when it got stuck in the sand, I walked through the night to get help. My companion, who was dressed inappropriately for such conditions, then returned to civilisation. Later in the day a pick-up truck caught up with me whose driver had instructions to take me wherever I wanted to go.
- 6 "The Brazilian Capability for Protecting the Native Population in the Guaporé Valley from the Effects of Project Polonoroeste."
- 7 I wrote a letter to the president of The World Bank strenuously objecting to the suppression of my report. The letter was referred to the Latin America and Caribbean Regional Office.
- 8 "Protecting Indian Interests in the Guaporé Valley of Mato Grosso," drafted by D Mahar, dated 18 November 1980.
- 9 "Projeto de Apoio às Comunidades Indígenas de Área de Influência da Rodovia Cuiabá-Porto Velho."
- 10 *Brazil: Integrated Development of the Northwest Frontier*. Washington, DC: Latin America and Caribbean Regional Office, The World Bank, 1981.
- 11 Indian law (inadequately summarised in paragraphs 4.02-4.05) contains so many ambiguities and internal contradictions that it can be used to support a very broad range of pragmatic decisions.
- 12 I found that Mobile Health Teams had a propensity to vaccinate only those Indians who happened to live near the highway, and records were so poorly kept that it was often difficult to know who had been vaccinated. A published account describes pseudo-vaccinations given with ineffectual serums. (Jean Chiappino, *The Brazilian Indigenous Problem and Policy: The Aripuana Park*, AMAZIND/IWGIA Document No 19. Copenhagen: International Work Group for Indigenous Affairs, 1975).
- 13 The FUNAI had given more than 20 Negative Certificates to landowners with property in the Guaporé Valley, which is the homeland of the Nambiquara Indians. This information had been widely publicised, and the bank could not possibly be ignorant of it.
- 14 The FUNAI has found it extremely difficult to remove squatters from Indian posts in the south of Brazil. It took nine years of struggle to remove one settler from a Nambiquara reservation. The removal of settlers from the Surui reservation was agonisingly slow, despite repeated threats of violence.
- 15 Decentralisation was a major initiative of the repressive and anti-Indian directorate of the FUNAI which had recently come to power. The World Bank supports this policy in paragraphs 4.14, 4.17 and 4.46.
- 16 Adhemar Ribeiro da Silva, whom partisans of the Indian cause considered to be one of the better presidents of the FUNAI, attempted to reinstate the training programme. This supports the contention that the reasons for its discontinuance were more political than economic. I discussed this matter in the seminar I presented at The World Bank on June 11.
- 17 Money is often spent in ways that benefit members of Brazilian society more than Indians, and funding is discontinuous, so that no consistent programme (such as health care) can be maintained. These points were discussed in my report.
- 18 On November 1, 1979, Adhemar Ribeiro da Silva was forced to resign and was replaced by Colonel Joao Carlos Nobre da Veiga.
- 19 As a result of present disregard for the boundaries between ethnic groups, a Nambiquara village called Mameleto was administered from Porto Velho, rather than Cuiabá, as are the rest of the Nambiquara. The Indian agent in charge of allied villages was refused permission to care for the Mameleto. Only four years after establishing permanent contact with Brazilian society, they were nearly extinct.
- 20 "Further research (is) needed before sustained annual cropping can be recommended as an appropriate form of land use" (para. ii), but "The principal conclusion of the present report is that the Northwest has the potential to become an important agricultural and timber-producing region . . ." (para. xviii). The bank admits a "rudimentary knowledge of (the area's) soils, forests, and population" (para. 1.04), but calls it "an area with . . . considerable agricultural potential" (para. 2.10). "Because the Indian groups are thought to be aggressive, squatters have avoided entering the interdicted lands" (para. 4.31), but "squatters remain within Indian reserves. The most visible case is the Sete de Setembro reserve, where approximately 90 squatter families (who arrived after the reserve was demarcated) have been identified" (para. 4.32).
- 21 "The available statistical information on the Northwest is limited, often outdated, and of questionable quality" (para. 1.05).
 "The available information (on rural education) is sketchy" (para. 3.24)
 "The dearth of health statistics for the Northwest makes it virtually impossible to evaluate current conditions precisely" (para. 3.26).
 "It is . . . difficult to describe accurately the situation of the Indians in the Northwest . . . Information sources . . . disagree in their presentation of the facts" (para. 4.26).
 "At present, the nature and extent of the various soils occurring in the Northwest is not precisely known" (para. 7.03).
 "Little is known about the distribution of land tenure arrangements by type" (para. 7.25).
- 22 "INCRA (National Institute for Colonization and Agrarian Reform) has been unable to fully accommodate the huge flow of migrants entering Rondônia" (para. iv).
 "The National Indian Foundation (FUNAI) has . . . been unable to prevent invasions of Indian lands or to provide adequate medical care" (para. vii).
 Success of Polonoroeste may be affected by "the weak managerial capacities of some potentially important executing agencies" (para. 1.04).
 "Regional health manpower and infrastructure is (sic) inadequate" (para. 3.30).
 "IBDF (Brazilian Institute of Forestry Development) is presently considered to be a weak institution, lacking in funds and human resources to carry out its broad responsibilities in the forest use area" (para. 5.19).
 "INCRA has yet to meet the minimum requirements for establishing an effective settlement system in the territory" (para. 6.14).
 "INCRA performance in road building has been erratic" (para. 6.22).
 "Extension staff often have to wait for farmers to come to them, rather than vice versa" (para. 7.41).
- 23 The prevention of serious environmental degradation "will require the development of comprehensive land-use zoning and the rigorous enforcement of environmental legislation" (para. 5.09), but "IBDF is presently considered to be a weak institution, lacking in the funds and human resources to carry out its broad responsibilities in the forest use area" (para. 5.19).
 "Polonoroeste is directed . . . at increasing the productivity . . . of the region's . . . population" (para. viii), but "it is too early yet to know whether soil correctives can permit annual crops to be grown indefinitely on an economically viable basis" (para. 7.08).
 "There is a substantial risk of replicating in the Northwest the highly skewed distribution of income and wealth, chronic migration, and environmental degradation observed elsewhere in Brazil" (para. 1.02).
 "Failure to institute measures dealing with the regularisation of land ownership, environmental protection, Indian rights, and land-use planning could very well jeopardise the future development of the region" (para. 7.61).
 "The execution of this programme will entail a higher-than-normal degree of risks" (para. xix).
 "Perhaps the greatest risk is that the administration of Polonoroeste, and those of the executing agencies, may be unable to fully control and monitor the future occupation and development of the Northwest. Thus the government (of Brazil) should be prepared to accept some of the negative effects frequently associated with accelerated development in frontier areas. Included among these negative effects are likely to be: (i) continued conflicts over land-related issues, including some invasion of Indian lands; (ii) some indiscriminate deforestation and unsound farming practices; and (iii) instances of general lawlessness" (para. xx).
- 24 See "Reserves for the Nambiquara," *Cultural Survival Quarterly* 6(1): 28-29.
- 25 *Economic Development and Tribal Peoples: Human Ecologic Considerations*. Washington, DC: The World Bank Office of Environmental Affairs, 1981.

CORRESPONDENCE WITH DR CLAUSEN PRESIDENT OF THE WORLD BANK WASHINGTON DC, USA



The leaders of a number of key environmental organisations have sent letters to Mr Clausen pointing out how terribly destructive are many of the projects that he continues to finance.

In the following pages, we are reproducing two such letters, the first on the Polonoroeste project in Brazil, the second on large-scale forestry projects in general.

We are also publishing the answer received to the former letter. As our readers will see for themselves, Mr Clausen did not regard the letter of sufficient importance to answer it himself, but delegated the task to one of his assistants.

The tone and content of the letter reflect only too tragically the total indifference of the President of the World Bank to the social and ecological disruption and the terrible human misery caused by the projects that he insists in financing.

The Polonoroeste Project

Dear Mr Clausen,

We are writing to express our grave concern over disturbing evidence of the consequences of the continued neglect of sound management of natural resources and protection of indigenous peoples in the design and implementation of World Bank projects.

Several independent sources in Brazil have called our attention to the accelerating and uncontrolled ecological and human destruction occurring in the World Bank financed Brazil Northwest Development Programme (Polonoroeste). There is considerable evidence that the Brazilian agencies responsible for the programme lack either the will or the institutional means to provide minimum protection to ensure the physical survival of the ecology of the Northwest region and over 6,700 Amerindians belonging to at least 34 tribal groups. Although Bank support for the Programme was strictly predicated in the first Loan Agreement (No. 2060 BR) on the prompt implementation of

measures to protect the environment and Amerindian population of the Programme area, there are strong indications that the Bank has lost control over—or will not take effective measures to control—the destruction being unleashed in the region. Information we have received strongly indicates that the Bank's \$443.4 million investment has so far contributed to uncontrolled migration, accelerated deforestation, conversion of land to unsustainable cattle ranching, land speculation, and increased encroachment on Indian land areas. The Northwest Region's thousands of Amerindian inhabitants and irreplaceable biological diversity are threatened as never before.

In spite of this evidence—and in disregard of the terms of the Loan Agreement for Phase I of the Programme—the Bank actually accelerated lending late last year for the third phase of Polonoroeste, which will settle 15,000 more families in the region. Although the purpose of this accelerated loan disbursement (part of the Bank's Special Action Programme) was to help Brazil maintain development momentum in the face of the lingering

world recession, it violated basic principles of sound management by accelerating funding for a programme which was already encountering grave difficulties in managing the resources at hand.

The Bank's \$443,400,000 loan commitments to the three phases of the Programme account for nearly one-half of one percent of Brazil's enormous foreign debt. It will be a tragedy for Brazil if this huge investment leads to the destruction of the natural resource base of Rondonia and western Mato Grosso—and of the thousands of indigenous people and non-Indian settlers dependent on these resources—rather than to development that is sustainable in the long term.

We urge and request the Bank to undertake effective measures to regain control over its enormous investment. In particular, we wish to know what immediate actions the Bank plans to undertake to:

1. Secure, through immediate discussions with the federal government of Brazil and the state of Rondonia, a halt to on-going plans to settle 8,000-10,000 settlers in the Guapore Valley along the soon

STOP PRESS . . . The World Bank has just announced that they are reconsidering their financial commitment to the Polonoroeste Project on environmental grounds.

to be completed BR-429 (Presidente Medici-Costa Marques) highway. These planned settlements are on soils largely unsuitable for sustained cultivation by small farmers and threaten invasions of the Guapore Biological Reserve, the Pacaas Novos National Park, the Rio Branco Indian Reserve, and the still undemarcated lands of the Uru-Eu-Wau-Wau Indians. Such plans appear to be in clear violation of Section 3.13 of the Bank's Agreement with Brazil and the state of Rondonia for loan 2060 BR.

2. Provide for the immediate demarcation and protection of the extensive Indian lands in the Programme area, as well as for the provision of health and other services. This is an aspect of Polonoroeste which the Bank and the Brazilian government agreed in Section 4.05 of Loan Agreement BR-2060 would be implemented by the Brazilian Indian Agency, FUNAI, but which is largely unimplemented. Numerous Indian areas are being occupied by squatters. In at least one reported case—the Lourdes Reserve—armed confrontations have occurred between Indians and settlers.
3. Promote concrete measures to deal with accelerating, indiscriminate deforestation, land speculation, and conversion to cattle pasture in areas where the Bank is financing new colonisation or attempting to consolidate existing settlements; to this end, the Bank should immediately begin to improve the support and extension services available to the settlers.
4. Ensure adequate protection and management of the two Biological Reserves, the National Park, the four Ecological Stations, and the National Forests which were to be set up with Bank funding in the Polonoroeste Programme Area; the National Forests have not been established or demarcated, and the other protected areas are either occupied by squatters or lack management plans and the means to implement them.
5. Ensure that the state of Rondonia redesign or cancel three planned roads—state highways 370, 377, 383—which will criss-cross the Guapore Biological Reserve and the Rio Branco

Indian Reserve. These roads will link the reserves with two major federal highways and existing and planned settlements and remove all remaining hope of conserving these protected areas.

6. To implement measures 1-5 above, consider the renegotiation of the Polonoroeste loan agreements and the funding of special projects to strengthen FUNAI, the Brazilian Indian Agency, IBDF, the Brazilian Forestry Development Institute, and the government agencies charged with providing services to the settlers.
7. Insist that the Brazilian government land agency (INCRA) and the State of Rondonia halt nationwide advertising promoting further migration to the Polonoroeste region.
8. Increase the Bank's professional environmental staff and systematically implement more rigorous procedures to ensure improved environmental design so that the Bank does not repeat the costly mistakes in resource management that are occurring in Polonoroeste; a key element in improved design should be the early inclusion and participation in project planning of representatives of the local groups that are affected: indigenous peoples, farmers and settlers, environmental conservation organisations, and members of the church working in rural areas.

The prompt implementation of these measures would help to forestall increasing concern in the US Congress and the West German Bundestag over evidence of the Bank's inadequate attention to sustainable management of natural resources and to the indigenous people who depend on those resources. In particular, as you may be aware, the House Banking Subcommittee on International Development Institutions and Finance has held five hearings in the past sixteen months on the multilateral banks and the environment, culminating with hearings last month on specific recommendations on measures to improve the environmental performance of the World Bank and other MDBs. In addition, the Senate Appropriations Committee has expressed its agreement with the concern of a number of US environ-

mental organisations "over the lack of environmental consideration given by the World Bank in the formulation of its projects," and has directed the US Treasury Department "to press the issue of the environment with the Bank". Recently, the House Science and Technology Subcommittee on Natural Resources, Agriculture Research and Environment held the first of a series of hearings on the environmental impacts of World Bank and other MDB agricultural projects which resulted in Chairman of that Subcommittee sending a letter of concern to the US Treasury Department and Executive Director requesting that the Bank take measures similar to the ones we have outlined to deal with the urgent and disturbing problems relating to the Bank's involvement in Polonoroeste.

In the future, we urge the Bank to seriously reconsider the implications of funding programmes such as Polonoroeste. These programmes which serve as "escape valves" for the human consequences of government economic policies and gross inequalities in land tenure in other parts of the country, which have resulted in the migration of millions of rural farmers over the past decade and a half. The financing of the settlement of tens of thousands of families in ecologically dubious and unsuitable areas of the Amazon is clearly not a viable solution to these complex problems. In particular, by financing the construction of roads and other infrastructure in such areas (in the case of Polonoroeste, over half the Bank's financial commitment), the Bank contributes to untenable migration rates which result, as in the case of Polonoroeste, in accelerated, rampant deforestation, invasion of Indian lands, and destruction of natural areas unsuited for agriculture but possessing tremendous biological significance.

We have enclosed two memoranda that outline some of the major deficiencies in the implementation of the environmental and Amerindian components of Polonoroeste.

We wish to underscore the urgency of the situation in Polonoroeste and the need for the Bank to implement immediately the measures we have outlined and the measures which the Chairman of the House Science and Tech-

nology Subcommittee on Natural Resources, Agriculture Research and Environment is requesting the Bank to act upon. To ensure that Bank loan conditions are respected in the future, the Bank must exercise its maximum leverage in this situation, including reconsideration of planned funding for other agricultural projects in Brazil. At stake is the ecological survival of an area larger than Great Britain and the very lives of its thousands of indigenous inhabitants, as well as the credibility and image of the World Bank.

The profoundly disturbing situation in Polonoroeste underscores all the more the urgent need of the World Bank to undertake concrete measures and commit real resources, such as more professionally trained staff, to improve the ecological design and review of its projects. Further neglect and delay of the Bank in addressing these environmental management issues will not only inflict grave long-term damage on the Bank's image, but could ultimately undermine public and legislative support for funding of the Bank in its most important donor countries.

Sincerely,

Bruce M. Rich, Attorney
International Programme
Natural Resources Defence Council
Thomas B. Stoel, Jr, Director
International Programme
Natural Resources Defence Council
Barbara Brambe, Director
International Programme
National Wildlife Federation
Jack Lorenz, Director
Izaak Walton League of America
Michael Bean, Director
Wildlife Project
Environmental Defence Fund
Brent Blackwelder, Director
Water Resources Project
Environmental Policy Institute
Fran Lipscomb, Director of
International Issues
National Audubon Society
Liz Raisbeck, Legislative Director
Friends of the Earth
Shelton Davis, Executive Director
Anthropology Resource Centre
Kenneth I. Taylor,
Executive Director
Survival International, USA
David Maybury-Lewis
Executive Director
Cultural Survival, and Professor,
Department of Anthropology,
Harvard University
Dr Roberto Cardoso de Oliveira
President, Associacao Brasileira
de Anthropologia (Brazilian
Anthropological Association)
Deputado (Deputy) List Vieira
Lider do Partido dos Trabalhadores e

Presidente da Comissao Especial de
Estudos Ecologicos a Assembleia
Legislativa do Estado do Rio de Janeiro
(Leader of the Labour Party and President
of the Special Commission on Ecological
Studies, Legislative Assembly of the State
of Rio de Janeiro)
Nancy Oestreich Lurie, President
American Anthropological Association
Helio Saboya, President,
Ordem dos Advogados do Brasil (Brazilian
Bar Association) Seccional do Rio de
Janeiro
Willi Hoss
Gaby Gottwald
Julius Kriscan
Dr Erika Hickel
Gert Jansen
Marie-Louise Beck-Oberdorf
Antje Vollmer
Walter Schwenninger
Jurgen Reents
Roland Vogt
Hans Verheyen
(Members of the west German Bundestag)
Roque Sevilla Larrea, President
Fundacion Natura, Quito,
Ecuador
Anil Agarwal, Chairman
Environmental Liaison Centre, Nairobi,
Kenya; and Director, Centre for Science
and Environment, Delhi, India
Helena Norberg-Hodge, Co-Director,
Ladakh Ecological Development Group,
Leh, Ladakh, India
Georg Henriksen, Director
International Working Group for
Indigenous Affairs (IWGIA), Copenhagen,
Denmark
Gesellschaft fur Bedrohte Volker
Gottingen, West Germany
Ben Whittaker, Director
Minority Rights Group, London, United
Kingdom
Marcus Colchester, Survival International,
United Kingdom
Bruce Albert, Survival International, France
Beate Engelbrecht, Incom Indios, Basel,
Switzerland
Jeremy Swift, Chairman, The Anti Slavery
Society for the Protection of Human
Rights, London, United Kingdom
Henrik Persson, Chairman
Fourth World Association of Sweden,
Solna, Sweden
Flavio Lewgoy, President
Associacao Gaucha de Protecao ao
Ambiente Natural (AGAPAN) (Association
for the Protection of Nature of Rio Grande
do Sul), Porto Alegre, Brazil
Jose Lutzenberger, Ecologist
Associacao Gaucha de Protecao ao
Ambiente Natural (AGAPAN) (Association
for the Protection of Nature of Rio Grande
do Sul), Porto Alegre, Brazil
Julio M. G. Gaiger, President
Associacao Nacional de Apoio ao Indio
(ANAI) (National Indian Support
Association), Porto Alegre, Brazil
Ordep Serra, President
Associacao Nacional de Apoio ao Indio
(National Indian Support Association),
Bahia, Brazil
Aracy Lopes da Silva, Presidente
Comissao Pro Indio/Sao Paulo, Brazil
Magda Renner, President
Acao Democratica Feminina Gaucha
(Feminine Democratic Action of Rio
Grande do Sul), Porto Alegre, Brazil

Monitor the Destruction? Yes. Stop it? No.

Dear Mr Rich,

I am writing to thank you for your letter and attached document to Mr Clausen, dated 12 October 1984, regarding the Northwest Region Integrated Development Programme (Polonoroeste). As you are aware, Polonoroeste is a carefully planned regional development programme, which seeks to stabilise and maximise the economic development of the region, while minimising the risks to the regional ecology and Amerindian populations. We very much share the concerns you have noted in your letter. We have discussed them in detail with the Brazilian authorities and are encouraged by those discussions to believe that effective action will be taken. We recognise, however, that close monitoring will be necessary and we will therefore continue to follow the situation very carefully. If and when appropriate, and consistent with our ongoing reviews of programme implementation, we will recommend to the Government needed modifications to the design and implementation of the programme so that its long-term objectives can be achieved.

You can be sure that the Bank is continuing to monitor the situation closely, and that your concerns will be considered as Polonoroeste continues.

With best regards,
Sincerely yours,

Roberto Gonzalez Cofino
Chief, Brazil Division of The
World Bank. Latin America and
Caribbean Regional Office.
Washington, DC.

The Destruction of Tropical Forests

Dear Mr President,

I am writing you on behalf of the Tropical Forest Working Group about the World Bank's moist tropical forest policies and programmes. You may recall that the Tropical Forest Working Group is an organisation which joins together the principal global environmental and conservation organisations and some two hundred scientists, technicians, and resource specialists of several

nationalities dedicated to the good management of the world's tropical forests. The Working Group has, among other things, worked with international financial institutions and national aid giving organisations on matters concerning the world's tropical forests. For several years we have followed with sympathy and attention the World Bank's evolving forestry policies and programmes. We are writing to you because we believe that the point has been reached where the general principles set down in the Bank's "Environmental Policies and Procedures" should be spelled out as regard exactly what the Bank will do and will not do in moist tropical forest and rain forest areas (which for the purposes of this letter we are including under the phrase moist tropical forest).

Our decision to write to you about moist tropical forests does not mean we are less interested in other aspects of management of the forests of the tropics, notably the management of tropical watersheds and, most particularly, the fuelwood problem of the dry tropics. These are most important problems towards the solution of which the World Bank has assumed quite laudable leadership. Rather we chose to address moist tropical forest problems because we believe this is an area of rural development in which the Bank has been less successful. We would cite some of the Bank's recent experiences in the Amazon Basin in this regard.

As a matter of basic principle, we believe that the land under the remaining moist tropical forest must be treated as marginal land as far as sustained agriculture is concerned. Much of the world's tropical forests underlain by good volcanic or alluvial soils were cut long ago and the land put to agricultural uses. Today, most of the land under the remaining moist tropical forests on all three continents have acid, infertile soils which have proven largely unsuitable for sustained annual cropping and often difficult for planting of perennials. Under these conditions, achievement of sustainability in large scale colonisation projects concentrating in agricultural development becomes very difficult.

With this in mind, we believe that it is very important for the

guidance of Bank officials as well as for the officials of countries seeking Bank loans for the development of moist tropical forest areas that you spell out exactly what you mean with regard to moist tropical forest areas by paragraph nine of "Environmental Policies and Procedures of the World Bank". We particularly urge you to elaborate on the meaning of subparagraph B—"The Bank will not finance projects that cause severe or irreversible environmental deterioration, including species loss, without mitigating measures acceptable to the Bank."

We urge the Bank to:

1. Announce that it has stopped support for cattle ranching projects which require the clearing of moist tropical forests. Cattle raising on areas of acid, infertile forest soils has proved to be practically never sustainable, even with government subsidy. Even then it provides less employment for the poorest than other land uses. If governments want to destroy tropical forests for cattle raising programmes, let them finance such projects themselves. The Bank should not do this directly or indirectly, and should so state publicly and clearly. We recognise that the Bank is doing less of this kind of lending but believe that a declaration to this effect would be valuable.
2. Announce that it will not finance road building through prime tropical forest areas, except to provide access to areas of sustainable agriculture such as perennial tree crops, and then only if there is no practical alternative. This is the principal way that large forested areas are open to destructive slash-and-burn practices. Admittedly, at times the value of a project or programme accessible only by road through moist tropical forests may be so great that the presumption against paying for or actually building roads through prime tropical forest should be overcome. But there should be a presumption against Bank support for such programmes. And if undertaken, every effort should be made to design a system which avoids or mitigates damage to the forests and then to insist that these mitigating measures be put into place at an early stage and

before further elements of the project are financed by the Bank.

3. Announce that it will not finance hydro-electric projects which flood large areas of tropical forests. The Bank should have a presumption against financing projects which will flood large areas of prime tropical forest areas for hydro-electric projects. The benefits must very strongly lie in the direction of hydro-electric development before this presumption is abandoned, and careful watershed management must accompany any such project agreed upon.

We urge the World Bank to incorporate all these points in a new statement on tropical forests which will make clear the Bank's support for the preservation of the world's great tropical forests—and the reasons for this support, its opposition to careless destruction of these forests, its support for efforts, policies and programmes dedicating a vital minimum of such areas to preservation of unique genetic resources, and its view that tropical forest areas with weak soils should only be cleared when it is clear that agricultural production is sustainable without heavy use of artificial fertilisers. We also urge you to outline other types of projects the Bank is willing to finance which will result in better management of tropical forest areas.

Mr President, we recognise that the Bank faces difficult problems in refusing loans for development in tropical forest areas. Yet every time there is a failure of a project in tropical forest areas financed by one of the international financial institutions or bilateral aid agencies, this not only damages the rapidly deteriorating tropical forest ecosystem but also results in misery for the world's poor which the Bank is dedicated to helping. We urge you to give this problem renewed and urgent attention. We stand ready to support you in these efforts.

Knowing of his interest in this subject, we are taking the liberty of sending a copy of this letter to your Senior Vice President for Operations, Ernest Stern.

Very truly yours,
Robert O. Blake, Chairman
The Tropical Forestry Working
Group, Washington D.C.



Questioning Scientific Progress

THE DOUBLE-EDGED HELIX, SCIENCE AND THE REAL WORLD, Liebe F Cavalieri, Columbia University Press, New York, 1981. This book is part of the 'Convergence' series, edited by Ruth Nanda Anshen. 193 pages including index.

In the introduction to *The Double-Edged Helix*, Ruth Nanda Anshen tells us why she created the 'Convergence' series of which this title is a part. She realised how serious are the problems confronting our society today. "We are living", she writes, "in a period of extreme darkness. There is moral atrophy, destructive radiation within us, as we watch the collapse of values hitherto cherished—but now betrayed. We seem to be face to face with an apocalyptic destiny. Science now begins to question its premises and tells us not only what is, but what ought to be."

Anshen sees science and technology as being particularly implicated in the destructiveness of modern society—the division between science and ethics being clearly intolerable. Science must tell us "not only what is but what ought to be". The reductionist method is particularly at fault:

"The scientific method, the technique of analysing, explaining and classifying, has demonstrated its inherent limitations. They arise because, by its intervention, science presumes to alter and fashion the object of its investigation. In reality, method and object can no longer be separated. The outworn Cartesian, scientific world view has ceased to be scientific in the most profound sense of the word, for a common bond links us all—man, animal, plant, and galaxy—in the unitary principle of all reality. For the self

without the universe is empty."

The presumed objectivity of science which leads it to create "an unreconcilable dichotomy between the observer and the participant" is also intolerable. "For in the end we would know everything but understand nothing, not being motivated by concern for any question."

Cavalieri's book, the second in this series, very much reflects this philosophy. In its preface, Cavalieri notes the high social price that often has to be paid for scientific innovation. "We must ask ourselves whether a continuing process of scientific discoveries and technological applications is what we need for the advancement of mankind. We already have an abundance of goods (whether or not they are equitably distributed), yet evidence abounds that we are experiencing a generalised malaise throughout the industrialised nations of the world, which strongly suggests that we do not need more hardware but that we should utilise more humanely what is already at hand."

One of the problems of course is that science is the hand-maiden of government. "Science is, however, of necessity committed to its sources of support: government (including the military) and industry. They themselves are inextricably intertwined to form what some call the corporate state, the single most important determinant of modern industrialised society, characterised by a primary drive for self-perpetuation and expansion. The corporate state controls the economy, and in so doing it mandates, directly or indirectly, the direction and growth of science and technology. Economic necessity thus presses the public to accept indiscriminately the technological system as a whole, in spite of its antisocial tendencies."

As a result science has become "an affair of state, and the pursuit of science has become a political and ethically charged activity." It is for this reason that Jacob Bronowski proposed that science be 'disestablished'. This is unlikely to occur, however, since the public has been brainwashed into believing that science is benign. "Mass advertising has been used to submerge and camouflage the negative aspects of technology and create the illusion that we can have it both ways—endless benefits with negligible cost or risk. The technological dilemmas have been masked."

Cavalieri stresses this ethical

aspect of science and shows just how the principle of neutrality of science which is insisted on by most scientists—is quite untenable today. In particular, the development of recombinant DNA technology "presents scientists with a new and uniquely powerful means for altering living cells according to their design." The megalomaniac euphoria (Cavalieri doesn't use this term) of scientists involved in this field is reflected in a statement by the Nobel Laureate David Baltimore who supposedly once remarked, "We can outdo evolution". Cavalieri warns of a forthcoming backlash. "Someday, as the nuclear, ecological, and now genetic hazards and threats grow larger, this unease is likely to erupt with destructive force as a full-scale anti-scientific and anti-intellectual movement."

The Risks of Genetic Engineering

In the last decade anti-science movements have already been of concern to scientists and discussed at scientific meetings. Recombinant DNA technology can only lead to disasters. Of course scientists involved will always insist there is an infinitesimal chance that such a disaster will occur. This is the view, for instance, of Dr Holliday of the National Institute of Medical Research in London. According to his calculations, "the probability of one individual dying of cancer from recombinant DNA is one in 100 billion: the probability of a second individual dying is one in 10 trillion; and the probability of a cancer epidemic is one in 100 trillion."

Such calculations are meaningless. Incidents in other fields of high technology have occurred even though the possibility of their occurrence is considered to be miniscule. In that respect, it is worth quoting at length from Cavalieri:

"The case of the Oak Ridge Research Reactor accident is one example of how misleading probability calculations can be. In this accident there were seven sequential failures, each involving redundancy of three parallel elements, for a total of twenty-one failures, the absence of any one of which would have prevented the incident. Three of the seven were personnel failures: an experienced operator threw wrong switches in three separate rooms; another operator failed to report finding any of these errors; and so forth. The others were design or instal-

lation errors in a reactor with an outstanding performance record. The probability of the event was calculated to be 10^{-20} (that is, one in 100 billion billion). The event "was almost unbelievable," but it happened. Again, in the complex nuclear reactor accident that occurred in 1970 at Dresden II, the most generous assessment of the probabilities of the separate events could not raise the overall probability above something like 10^{-18} (one in a billion billion). Yet, here again, it happened . . ."

"... Dr Holliday's calculation that the probability of occurrence of a cancer epidemic is one in 100 trillion (10^{-14}) seems reassuring. He also calculated that "If 10 scientists in each of 100 laboratories carried out 100 experiments, the least serious accident would occur on the average once in a million years." This also seems reasonable in terms of acceptable risks, yet I hasten to add that the probabilities of the nuclear accidents were far, far smaller, and far more accurately determined; nevertheless, they occurred. And that is not reassuring."

Hooked to Technology: the problems of control

One of the reasons why accidents are bound to occur is that "familiarity breeds contempt from precautions." One researcher who spent 95 days in a laboratory engaged in recombinant DNA research reported all sorts of transgressions of good laboratory practice. But the major problem is that once a technology has been adopted it becomes very difficult to control for the economy becomes dependent on it. Today, it would be difficult, for instance, to get rid of the motor car or even to abolish the use of nitrogen fertiliser or synthetic organic pesticides. To do so would mean transforming our lifestyles and completely reorganising our society. We can no longer examine critically the technology on which we have become dependent; it is taken for granted, and we seek to rationalise its continued use no matter how strong the evidence as to its undesirability. "Herein," Cavalieri writes, "lies the most serious danger of recombinant DNA technology. Eventualities that seem too outrageous at the moment even to warrant discussion are liable to become accepted, as necessary evils, after the new technique has become an integral part of the system and thus an economic necessity. This

danger cannot be avoided unless we are willing to recognise the fundamental syndrome and anticipate, as best we can, the potential hazards and abuses of recombinant DNA. Only then can we hope to prevent this powerful new discovery from slipping out of our control."

The Road to Disaster

Cavalieri is concerned too with the minute fraction of the total budget for recombinant DNA research that has been devoted to an assessment of hazards and the development of safer procedures. "The implicit assumption has always been that recombinant DNA technology will proceed, using what ever methods are available, regardless of the outcome of any risk-assessment experiments."

He also describes the way in which the recombinant DNA lobby within the scientific community has been able to water down—and finally kill—any legislation proposed to control its activities. In the long run, says Cavalieri, this lobby will have the effect of discrediting the scientific community. The lobby has pleaded 'freedom of inquiry' but what is really at stake is "the freedom-of technology."

Already all sorts of projects are underway and many of them could lead to disasters. The point is well made by Cavalieri:

"Let us consider one imminent application of genetic engineering. There is a strong impetus to design a bacterium capable of consuming oil inadvertently spilled by faulty oil tankers on the oceans of the world; on the bacterium under way at General Electric. When an appropriate organism has been developed and high oil interests are clamoring for it, who will decide whether it is safe to pour carloads of these bacteria into the oceans? Is there sufficient knowledge to be able to predict all the consequences? Will the oil companies or General Electric be strongly motivated to preserve the ecology of the oceans, which belong to all of us?

"When released, the oil-eating bacteria will no doubt perform their task as designed, with great success. Any incentive to take precautions against oil spills will decline. Meanwhile, the release of vast quantities of one organism, and its petroleum and other breakdown products, will constitute an assault on ocean ecology. One need not know details about specific chemicals; the sheer mass

of material, repeatedly applied, will be enough to disturb the equilibrium of aquatic life. The oil pollution problem will not be eliminated; it will simply be transmitted into another kind of pollution, the consequences of which cannot be fully tested in advance because we do not know enough about the complex inter-relationships of life in the ocean to set up an adequate test system. But the unique aspect of the problem is this: if the newly-designed bacteria should find an unforeseen ecological niche, there could be long-range and almost certainly irreversible consequences, which might not become evident immediately. Thus the success of the oil-eating enterprise is inseparable from a number of monumental risks. In fact this is a fundamental characteristic of many modern technologies: their very success spawns new problems—the hazards of success. While this and other revolutionary new projects are gestating, we should be preparing a mechanism for independent review and assessment of proposed applications of recombinant DNA technology, particularly with respect to their future impact on human beings and their environment."

Accommodating Destruction

Cavalieri knows, however, that these arguments will not prevail. "Even if it could be proved in advance that the use of oil-eating or drug producing bacteria would have catastrophic consequences, this would very likely not prevent them from becoming a commercial reality—as long as the disaster was not expected to be instantaneous and massive." Most depressing is the fact that dangerous high technology is largely required to provide technological fixes to the problems created by the irresponsible use of other technologies which we are unwilling to forego:

"Thus we try to find a technique for curing lung cancer while we continue to manufacture and advertise cigarettes, and we develop oil-eating bacteria to clean up oil spills instead of redesigning oil tankers or re-examining our energy-intensive and wasteful economy or making a serious effort to shift to renewable and ubiquitous energy sources. Many of the benefits expected from recombinant DNA technology are similar to this. Technological fixes have become

such a familiar class of activities, such an integral part of everyday life, that they are hard to distinguish from solutions to problems arising from real human needs. The cancer problem is a stark case in point. The 1.2 billion dollars spent on cancer research in 1977 represents in large part a search for some means to patch up the damage caused by environmental factors, including industrial carcinogens and agents such as food additives. Members of Congress and the National Institute of Health feel justified in this approach; they think they are giving the taxpayer his due. The real solution—to eliminate or reduce environmental factors that cause cancer—is largely neglected. A leading cancer expert, Sir Richard Doll, has said that “most if not all cancers have environmental causes and can in principle be prevented.” But it seems to be taboo even to think about such a rational approach, because it implies an attack on our way of life. Because of the insidious assumption that environmentally caused cancer is an immutable fact of life, the search for a cancer cure is not recognised by most people as a technological fix but as a humanistic activity.”

Cavalieri considers that if the lack of responsibility shown by the chemical industry in other fields is anything to go by then the outlook is indeed grim. He provides a number of very convincing illustrations, especially in the field of pesticides. In one chapter, he describes in detail the way the recombinant DNA lobby actually succeeded in eroding proposed controls on its activities.

“The Guidelines now exist in name only. It is an open secret that the demise of the Guidelines was engineered by several influential members of the Recombinant DNA Advisory Committee, in spite of the new experimental evidence showing that several types of risk are considerably greater than had been supposed when the Guidelines were first drawn up. For example it has been shown that bacteria containing recombinant DNA remain alive in humans 500 times longer than had previously been estimated, and that a recombinant containing cancer virus DNA can produce tumors in mice. The British journal *Nature* published a commentary on the serious implications of these

experiments, which should have lead to an intensification of risk-assessment studies rather than a weakening of the Guidelines.”

DNA and Eugenics

Another worrying aspect of recombinant DNA is its potential in the field of eugenics. Its use for what may be apparently beneficial genetic procedures, as Cavalieri points out, “creates an atmosphere in which genetic procedures in general become an accepted solution to many sorts of problems”—problems which are basically social and political. To deal with them at a genetic level enables us to *accommodate* the social and political trends that give rise to the problems—but not to overcome them. Cavalieri provides an interesting case in point:

“In the United States over the last few years, approximately one million school children per year have been given drugs, usually amphetamines, by the school systems, in order to curb what is deemed disruptive behaviour in the classroom. It is claimed that these children are all suffering from a medical syndrome, minimal brain dysfunction, which has no basis in fact—no organic correlate. Now clearly there are some cases of children with organic problems where this treatment may well be important. But in the overwhelming majority of cases the problems are a reflection of the current state of our crowded schools, overburdened teachers and families, and other social problems rather than something wrong with the kids. Imagine, as biochemical psychiatry is providing more and more information on the biochemical basis of mental states, the construction of a gene that will help to produce a substance in human cells which will change the mental state of individuals. Then, instead of feeding the kids a drug every day, we just do some genetic surgery and it's over.”

Worse still is the use of recombinant DNA procedures for breeding people who can tolerate specific pollutants. This means seeking to accommodate industrial pollution rather than suppress it. It is apparently already argued in the scientific literature and elsewhere “that occupational diseases, caused by pollutants in the workplace can be ascribed not to the pollutants themselves, but to the fact that some individuals are genetically more

susceptible to the pollutants than other individuals.” It is then argued that the solution to the problem lies not in getting rid of the pollutants but, rather, in “simply not hiring those individuals who are thought to carry genetic susceptibility.” Already, a Dow Chemical plant in Texas has begun a large-scale genetic screening programme of its workers, whilst women of child-bearing age are required to be sterilised if they wish to be employed in General Motors plants. “It is a genetic cop-out to allow industries to blame the disease on the genetically different individual rather than on their massive pollution of the workplace and the atmosphere,” comments Cavalieri. “This is the epitome of ‘blaming the victim.’”

Apparently in the petro-chemical industry, genetic screening is on the increase and likely to become a standard means of detecting “defective genes in workers who are then labelled hypersusceptible.” It is this hyper susceptibility which is then blamed for diseases generated by the pollutants they are exposed to in the workplace. Presumably it will be practiced to employ only those who “have less defective genes”, which confer on them some sort of immunity to the pollutants in question.

Human ‘in vitro’ fertilisation, which produced the test tube baby in Britain, seems to be the first step in the direction of developing genetic engineering procedures which will permit the breeding of workmen with genetic resistance to industrial pollutants. “Who knows what new and useful human characteristics could be developed by research in this area?” asks Cavalieri. Perhaps that is a question it would be better not to ask.

Edward Goldsmith

Defending the World against the Nukes

SIZEWELL REPORT. Martin Ince. Pluto 1984. £3.95.

THE PLUTONIUM BUSINESS. Walter Patterson. Wildwood House, 1984. £11.50

With so much written on nuclear power I still find it amazing that a market apparently exists for more of such works—at least for public consumption. Having, like Ince and Patterson, traipsed off into the Suffolk countryside to attend the Sizewell B PWR Public Inquiry both as observer and witness I can report that in general the members of the public who attend the inquiry are so few as to be counted on the fingers of one hand.

Does that mean that the public's interest in nuclear power and the Sizewell issue is non-existent? In reality I can hardly believe that to be true; indeed many in Britain object to nuclear power generated by whatever species of reactor, as can be gleaned from various surveys and polls that have been carried out over the past few years. Even before the two-year long inquiry began, a door to door survey in the Leiston-cum Sizewell area, and hence among those most directly affected by the Sizewell B PWR project, indicated a vast majority opposed to any such development. Unfortunately the reams of evidence and transcripts emanating daily from the Sizewell Inquiry are virtually unintelligible to anyone but those who have made some aspect of the debate—whether economics, need, safety, health hazards, waste disposal, plutonium proliferation—their own particular area of study.

That is where Ince's book comes in. His purpose is to encapsulate the essence of the debate over Sizewell B into a manageable book, so that those who care to be informed can be so without tears. The question then is, does the book succeed? As Ince makes clear on many occasions when he refers to his own interventions in the debate, as a witness for the Town and Country Planning Association (TCPA), he is an objector to the proposal to build a PWR at Sizewell. He apparently objects less to a gas-cooled reactor, an AGR for instance, or to a heavy water reactor such as the CANDU reactor preferred by the Canadians, but in the main he remains opposed to nuclear power. Given his commitment, one could hardly expect Ince to have written a review of the inquiry that would have been favourable to the CEBG's case. Yet from my own experience of the inquiry, I would claim that Ince has been fair in presenting the objectors' arguments as standing up remarkably well in the face of ruthless cross-examination by some of Britain's top QCs, both in terms of ability and salary. My reservation about the book lies in Ince, perhaps because of his own involvement, having tended to concentrate on certain of the objectors' evidence, namely that of the TCPA, while wholly ignoring or dealing only cursorily with that of other groups who put in as much effort and time. As a consequence the book totally misses out a vital part of the debate on low dose radiation and the terribly important issue as to whether the leukemia clusters now coming to light around various nuclear installations are a consequence of radiation effects or are just part of some irritating statistical coincidence.

My other main problem with the book is its denseness; it requires a lot

of concentration to read through the economic section and retain a clear idea as to what the debate is about. I personally would have preferred a clear, concise laying out of the CEBG's economic and need case for Sizewell, as well as for a programme of PWRs, before interjecting various of the objectors' arguments. For instance, the essence of the CEBG economic case lay in the net effective cost of introducing new stations into the generating system, and the savings that would supposedly accrue from displacing one kind of fuel-burning power station, whether uranium- or fossil-fuel burning, with another. Presented in that way, it can be made clear as Professor Jeffery did, and he barely gets a mention, that the extent of the putative savings brought about through introducing the PWR depend critically on the cost of coal and oil during the early years of the PWR's expected lifetime. In effect, the CEBG has organised its evidence on future price increases in fossil fuels so that the heaviest and swiftest rises in price coincide with those early years—and that in the face of present understandings with the National Coal Board that, inflation adjusted, the price of NCB coal actually remains steady. The TCPA evidence on fossil fuel prices, that put so well by Professors Odell and Prior for instance, then follows on, adding sound fact to Jeffery's theoretical analysis.

On the other hand, Ince starts off his book well, the first three chapters, giving a sound introduction to the political background underlying the inquiry. It is perhaps inevitable too that the book should end a little abruptly insofar as it has been published well before the end of the inquiry, but it may be that Ince has a follow-up book in mind in which he tries to predict the outcome of the inquiry or at least give some idea as to which side really won the debate. If he doesn't write it, then somebody else should.

Walt Patterson's book is written with his usual competence, but in fairness to Ince, *The Plutonium Business* was probably a much easier book to put together, the issue being basically a single one and furthermore one that because of the weapon's connection is likely to arouse greater interest. In my mind the most important message coming out of Patterson's book is that reprocessing spent reactor fuel can have little commercial justification, and that the real justification lies in the business of weapon making. Indeed, Britain's magnox reactors were devised as dual purpose machines that would generate both plutonium and electricity, the electricity being used as a means to offset the costs of plutonium production. Critics of the French Super Phoenix fast reactor also point out

that a main reason for French commitment to the fast reactor lies in the production of excellent quality weapons-grade plutonium in the blanket region surrounding the reactor core.

In essence *The Plutonium Business* is a world history of that part of the nuclear fuel cycle which leads to the separation of plutonium from the spent fuel. Once it had been realised during World War 2 that plutonium made excellent fissile material and that the easiest and cheapest way to produce it was in a reactor, its future was determined. In fact the countries that first made and tested plutonium bombs, namely the USA, the USSR, Britain and France, were in something of a bind. Either they had to admit that plutonium served little purpose other than to provide explosive material for bombs, and hence to hope fruitlessly that other countries would not tumble to their secrets, or they had somehow to persuade the rest of the world that proliferation was a bad thing—better to leave weapon making among those who had responsibly started it—and that the alternative was to turn swords into ploughshares and plutonium into power.

Sure enough, with plenty of government prompting, the civilian use of nuclear power came into being from the early 1950s on. But countries such as Brazil, Argentina, Japan, South Africa, Pakistan, India, to name a few, all appeared keen to lay their hands on the entire fuel cycle technology, including uranium enrichment and reprocessing spent fuel, and suspicions could not help but be aroused that they had other, less civilian-minded uses of atomic energy in mind. India's plutonium device, exploded in 1974, was a salutary reminder that non-proliferation could not be expected to last whilst the nuclear arms race continued. Not that India described its plutonium device as a weapon—just an explosion for peaceful purposes.

As Patterson points out "The plutonium business is not a business. It is an obsession—perhaps the most dangerous obsession to which anyone has ever succumbed." He then adds, backed by substantial evidence, that despite the dangers and crippling economic losses—all swept under the carpet by adulating governments—the plutonium people are determined to get the world caught up in a plutonium economy, with batteries of fast reactors and their satellite reprocessing plants. With hundreds of tons of plutonium circulating through the system, the chances for theft, sabotage, and holding entire populations to ransom, will become legion. There is a madness there, but like the arms race, perpetuated by very sane, rational men. Patterson

never overstates the case, the facts speak for themselves. If we leave the plutonium people to their devices, it may well be a case of "stop the world, I wanna get off".

Peter Bunyard

The inevitability of Nuclear Accidents

CATASTROPHIC NUCLEAR ACCIDENT HAZARDS—A Warning for Europe. Report by Richard E. Webb. August 1984. Unpublished manuscript in search of a publisher.

Should a nuclear reactor burst apart and breach the containment then the effects of the fall-out could be devastating; far more so than that resulting from the fall-out of an atomic bomb. But what are the chances of such an event happening? Dr Webb is a nuclear reactor physicist who has spent the last few years as a member of a West German study group at the Max Planck Institute, looking at the safety of West Germany's SNR-300 fast reactor. He is convinced that government agencies such as the US National Regulatory Commission have missed out on all the potential causes of major accidents within reactors, and that the probabilities of a serious accident occurring and breaching the containment are considerably higher than accepted by the nuclear industry and its governmental watchdogs. Since hundreds of thousands of square miles of land could be at risk, then not even one major such accident could be tolerated. The risk is therefore not one that should even be contemplated, and to continue with nuclear power under such circumstances, is nothing short of folly.

"According to my research, analyses and calculations," says Webb, "severe reactor eruptions and explosions are potentially possible which could result in the release of absolutely enormous quantities of radioactive materials into the atmosphere in the form of smoke . . . For example, assuming a credible 75 per cent release of the radiation from one pressurised water reactor eruption, a land area of about 250,000 square kilometres—the size of West Germany—could have to be evacuated and abandoned for over 30 years, with serious living restrictions for 30 years over an additional 250,000 square kilometres . . .

"In the case of the plutonium-fuelled fast breeder reactor, such as the SNR-300 reactor nearing completion at Kalkar, West Germany, and the Super-Phoenix reactor in France, nuclear explosion accidents are potentially possible which could vapourise and release into the atmosphere virtually all of the radioactive materials in the reactor core, including tons of plutonium . . . A

nuclear eruption of the SNR-300 reactor potentially could force evacuation and abandonment of as much as 400,000 square kilometres of land just to plutonium fallout alone."

Much of Webb's report is given to describing the various ways in which loss of coolant accidents in light water reactors could unleash a concatenation of events—despite built-in safety devices—that would have the potential, in his own words, "to blow off the containment dome, which weighs about 3,000 tonnes, and propel it upwards to a height of 170 metres." Such an explosion could be brought about through the build-up of hydrogen from the interaction between the zirconium-alloy lining of over-heated fuel and steam. It should be remembered too that the TMI accident involved hydrogen release and an explosion, but insufficient to cause more than a heavy thump.

Webb believes that the nuclear industry is caught in a classic Catch-22 situation. In order to prove that its predictions were right concerning the consequences of major accidents to reactors, it would have to perform scaled-up meltdown experiments; yet the risks of carrying out such experiments would be unacceptable. No other major engineering system has remained so untested when it comes to determining ultimate safety. In fact, the only small-scale test conducted in 1954, in which molten fuel produced by a nuclear excursion reacted with water, resulted in an unexpectedly large explosion, steam mixed with nuclear material being flung high into the air. That experiment, never repeated on that scale, was called BORAX.

How much land would be considered uninhabitable, or unfarmable would clearly depend on what exposure to radiation would be acceptable. Webb gives good reasons why he selects 10 rems over 30 years; that level being about double background. When it comes to the potential to contaminate the countryside, nothing short of nuclear war, compares in Webb's opinion with the fast reactor. It is his opinion too, that certain mechanisms, such as neutron-streaming cut-off, have not been taken properly into account, by those in the business of predicting what safety precautions are necessary to meet the worst possible accident.

One scenario described in detail by Webb involves fuel melting and interaction of the molten fuel with sodium vapour to produce an explosion which compacts the fuel so that it itself undergoes an explosive nuclear excursion. The explosion would be sufficient to breach the containment completely with a release of much of the plutonium—there being some 5 tonnes in the core of a 1300 MW fast reactor such as Super Phoenix. Webb

estimates that the explosive force could be sufficiently great so as to propel the reactor vessel closure plug to a height of about two kilometres. That force would clearly be sufficient to breach any containment.

In his conclusion Webb stresses the importance of 'upper-bounding analyses', and suggests that once some sort of consensus is reached as to the 'fullness, accuracy and reasonableness of the analysis' then at least the public would know what it might be in for if it continues with nuclear power. The public may well prefer alternatives. Webb's report seems to me to be extremely important, and one I rather wish the inspector and his advisers, at the Sizewell Public Inquiry, would have had the chance to see.

Peter Bunyard

The atomic "brotherhood"

NUCLEAR INC. Mark Hertsgaard. Pantheon Books, New York. £14.05.

To the English reader, the most interesting insights of this book are perhaps those imparted unconsciously. Hertsgaard's portrait of the American nuclear commercial, industrial, governmental complex—the 'Atomic brotherhood'—is a portrait of the essence of American industrial society. In tracing the development of Nuclear Inc, he traces the changes in the US industrial structure that it typifies, the change from competitive to monopoly capitalism.

The history chapters are good, exclusively American. The military and naval beginnings of Westinghouse's and General Electric's interest, the rush to build Shippingport for prestige reasons, a PWR because it was immediately available (there are some parallels with the UK), the 'glory years' of the '60s and early '70s, the desperate competition that led to the turnkey contracts and the shambles over the Westinghouse uranium. Hertsgaard's approach to Carter's non-proliferation policy is to show that its roots lay in his concern to preserve US international military authority—not an altruistic interpretation. This was in direct conflict with the export interests of the nuclear industry: because of the author's access to first-hand accounts of meetings at the highest level, the frustrations and misunderstandings of those years are convincingly told.

The book's strength is in this access to the leaders of the industry, and their story is touching and disturbing in its simple convictions. "In the minds of nuclear executives, what is at stake in the struggle over nuclear power is not just the profitability of their own corporations, but the future of American capitalism, technological society and

indeed Western civilisation." The industry refused to acknowledge TMI as a serious setback, it continues to be subsidised from corporate profits (GE sells 600 million dollars worth of nuclear goods and services each year, which is two per cent of its business). At root it is driven by messianic faith, fundamentalist and simplistic in the American tradition. In no other way, than by nuclear power, can America obtain or retain an adequate degree of fuel invulnerability, in no other way can economic growth continue.

Faith in the continuance of economic growth is at the heart of American industrial society; nuclear power is the essence of that faith because it claims to be able to enable that growth. The nuclear industry is therefore not capable of recognising changes in the faith of society, or of understanding criticisms of it. By its nature, it must be conservative. *'Nuclear Inc'* deals with the industry as it is, spends little time on how it might be, even less on how it should be. The book's contribution is to clearly and dispassionately identify the values, preconceptions and aspirations which underpin the Atomic Brotherhood, and the considerable extent to which they are shared by American society as a whole. It is a very American book, written in the tradition of liberalism that we sometimes forget exists.

John Valentine

Green Politics

SEEING GREEN: THE POLITICS OF ECOLOGY EXPLAINED By Jonathon Porritt, Oxford: Basil Blackwell, 1984, 249 pages. £3.95

"I must ask why, oh why are you out there directly underwriting or indirectly condoning the perpetuation of soul-destroying, life-destroying industrialism?" This is the challenge of Jonathon Porritt, leading spokesman for the Ecology Party and recently named Director of Friends of the Earth in Britain. He sees his audience as "primarily those already working in politics or in the environmental movement", but it is really those interested in combining the two that he is most concerned with. What does it mean when ecology becomes politics? And what is the role of the Ecology Party in our current system? And why should ecology become a concern for all of us?

This last question is one that will be quite familiar to readers of this magazine. Porritt's review of the reasons is adequate, ripe with familiar quotations that have become slogans of the environmental movement. Our present system is symbolised by the cold words of J M

Keynes: "For at least a hundred years we must pretend that fair is foul and foul is fair, for foul is useful and fair is not." The foolhardiness of this is in turn exemplified in Nicholas Humphrey's parable of Ajax the tortoise, who sought refuge in a warm, ever growing pile of wood, only to be burned to a crisp on Guy Fawkes day. We hear again the ever-appropriate words of Chief Seattle: "What befalls the Earth befalls the children of the Earth," and the Earth-as-organism scientific conformation provided by Jim Lovelock's Gaia hypothesis. The book is a pastiche of brief bits of eco-wisdom, and if it is not common ground already, Porritt provides a list of essential reading to get newcomers onto the path toward greenhood.

As such an overview volume it is a good beginning, if a bit haphazard, but it is on the specifically political issues that the book stands out. No one has described the role of ecology in the sphere of conventional politics as simply or as clearly before. First, Porritt contradicts the common sentiment that eco-activists are uninterested in the alteration of power structures. "As far as the Ecology Party is concerned, that's just humbug." The business of the party is the usurpation of power from those "who hang on to that power only through the ruthless exploitation of people and planet." Such a goal is seen as being beyond both class and polarised party distinctions, and should be made the practical concern of every human being. Compared to conventional parties, the most radical assumption of the Ecology Party may be that the survival of the party itself is not a prime consideration: "It's obvious to us that within the next generation all politicians and all parties will have to become more or less ecological in their outlook . . . The Ecology Party in its present form should only have a limited lifespan." (Porritt). What better application of ecological values of change directed towards stability than this? Thus the party at present serves mainly as a pressure group, a means of spreading the message, taking advantage of the massive media coverage of elections rather than the hope of winning many votes. The party offers no encompassing ideology, but rather a direction in which to proceed. The apparent idealism of a maxim like "only connect" is not meant to be read as an answer, but merely a place to begin, a way of thinking that will lead to practical redirection of our society.

Still the book is a bit short on these practical suggestions and heavy on theory, a theory that is not without its inner contradictions. Part of the problem is the rigid dividing of viewpoints between "Politics of Industrialism" and "Politics of Ecology". Industrialism is said to be

"deterministic", ecology "flexible", but clearly there is a certain amount of determinism in this wisdom of the Earth. We are free to do as we please only if it is conducive to ecological harmony. And the new society is meant to be one that is "cooperatively based, communitarian", yet founded on "inner-directed motivation and personal growth". The notion of individualism within the ecological society emerges as a paradox which is never quite resolved by Porritt. "Each of us should find our own way of living and seeing green". By trying to appeal to everyone, Porritt sounds a bit like—dare I say it?—a politician. Who can be sure our own ways will be conducive to cooperation if our motivation is entirely inwardly directed? He quotes Theodore Roszak who suggests that "the needs of the planet and the needs of the person have become one". What does that mean exactly?

If we are to take the words "man and nature are one" as anything other than idle novelty, we must realise that "diversity" in nature does not often imply diversity in the habits and way of life of a single species. Can we be as individualistic as we would like and still be totally within nature? Perhaps.

Maybe this is why the World Conservation Strategy decided to postulate that man "is both apart from nature and a part of nature". Given the present state of world affairs as a guide, this is indeed true. This "sitting the fence on a crucial issue" as Porritt calls it may very well be an easy way out of having to make changes, but it may also be the result of thinking realistically. By his very goal of broadest appeal, Porritt will be quickly accused of sitting the fence between left and right, standing on the ladder between upper and lower. For green politics to prove to the world that it truly stands "in front of", not "above" politics, it must turn its attention to more practical and immediate matters as well as long-term ideals. This remains a step to be taken. This book is a fine beginning, for those who want an introduction to the movement or those who need a quick summary of the situation. It is interesting to note that Jonathon Porritt first became concerned with ecology when he read an article on education in a 1975 issue of *The Ecologist*. We are proud to count such an active and articulate individual among our readers.

David Rothenberg

We need an ecological metaphysics

ENVIRONMENTAL PHILOSOPHY, Edited by Robert Elliot and Arran Gare, Open University Press, 1983. £8.85.

This book brings together twelve essays written by philosophers from Australia, N. America and the United Kingdom. The essays represent a diversity of viewpoints, from Robin Attfield's cautious apologia of orthodoxy and defence of Western philosophical and religious traditions to J. Baird Callicott's dismissal of the latter and his somewhat wild advocacy of the animist view of nature adhered to by the American Indians. The twelve essays are grouped together under three main headings—practical suggestions for environmental policy, contributions to environmental ethics, and discussions of what changes are necessary in our attitudes to the natural environment.

One encouraging thing about the book is that it clearly shows how far environmental philosophy has come in the last decade—since 1974, when John Passmore's *Man's Responsibility for Nature* opened up the question of our relationship to nature as a serious area of philosophical concern. It is gratifying to see that Passmore's intellectual and political conservatism is echoed by none of the contributors, and is more than once subjected to detailed criticism. And yet, at the same time, there is no really cogent radicalism to be found in *Environmental Philosophy*. Almost all the contributors display an implicit deference towards many of the metaphysical assumptions that underpin mainstream philosophising. The otherwise excellent essay by Rolston, for example, on the objectivity of values in nature, loses much of its force through his trusting acceptance of the Popperian faith in the inevitability of scientific progress towards objective truth. Again, the sensitive and persuasive paper by Mary Anne Warren on 'The Rights of the Non-human World' is weakened by her non-critical adherence to the doctrine of ethical hedonism.

Of the two attempts to outline a radical metaphysical basis for a new environmental ethic, Callicott's spirited advocacy of animism fails to make the required transition from anthropology to a defensible and philosophically coherent thesis; while Stephen Clark's essay on 'Gaia and the Forms of Life' is a badly argued, unexceptional piece, remarkable only for its extremist statement of a quasi-panteistic eco-mysticism.

If environmental philosophy is to have the requisite impact, it must undertake the task of metaphysical reconstruction. In this book we see on the one hand some able thinkers who are tackling important questions but lack the boldness of thought these questions call for, and on the other hand thinkers who are bold to the point of recklessness and thus condemn themselves not to be taken seriously. The undoubted virtue of *Environmental Philosophy* is that it gives the reader a good idea of the current state of this new branch of philosophy, but the impression one has is of a discipline that hasn't yet found its feet. What do the environmental philosophers think they are doing? One answer—which inspires me with hope for the future of environmental philosophy—is indicated in the final essay by Richard Routley, on the 'Roles and Limits of Paradigms'. For him the task of environmental philosophy is to explain the old and to articulate and elaborate the new paradigms upon which our thought and action in relation to nature are modelled. In taking on this task, environmental philosophers would have to become metaphysicians first and foremost: only then will they become a force to be reckoned with.

Jeremy Naydler.

WADEBRIDGE ECOLOGICAL CENTRE

is pleased to announce the publication of

The Social and Environmental Effects of Large Dams by E. Goldsmith and N. Hildyard
Volume I: Overview (400 pages)

Included are chapters on: The overt reasons of building dams; dams and society—the problems of resettlement; social and cultural destruction; dams and disease; the effects of large-scale water projects on fisheries; the problems of salinisation; sedimentation; the politics of damming; traditional irrigation-learning from the past and recommendations.

Volume II containing 20 case studies and **Volume III**, an annotated bibliography containing 400 entries, are in preparation.

Volume I: £15 for individuals, environmental groups and Third World institutions
£25 for institutions

Complete set of all three volumes:
£35 for individuals, environmental groups and Third World institutions
£60 for institutions
(Airmail postage £5 extra for Volume I)

Please send your cheque/postal order to
Ecosystems Ltd., Worthyvale Manor Farm, Camelford, Cornwall, U.K. PL32 9TT

Where are your savings invested? Where is your pension fund invested?

Would you like to take positive steps to ensure that they are invested for the good of the community at home and abroad, avoiding areas of political and product controversy? If so, we may be able to help.

In addition, if we do business together we will make an agreed donation to the charity of your choice.

Contact us about your savings and pension planning.

Telephone, or write to
John Hose, Barry Gardner & Partners, Clock Tower Mews, 1 Exeter Road, Newmarket, Suffolk CB8 8LL.
Telephone 0638 668888.

BG&P
Barry Gardner & Partners
INSURANCES PENSIONS & MORTGAGES

Classified

MISCELLANEOUS

ECOLOGIST BACKNUMBERS available from Vol 1, SAE list. Write to Colin Evans, Batchcott, Richards Castle, Ludlow, Salop.

HERBAL TABLETS, Oils and Extracts. Over 400 listings. Free lists from Herb Royale, 19, Ollerton Green, Old Ford, London E3 2LB.

CAMPING HOLIDAY COLLECTIVE South France needs new members. Vegetarian Cafe with Scope. Arts, Organic Garden Centre, Cooperative Company Structure £1500 per member. Place a deposit and pay by instalments, or be an associate member, own pitch plus share interest. Single Associate £350, Family Associate £500, SAE Lavender Cottage, 2 Mersea Road, Peldon, Essex CO5 7QE.

DIARY DATES

MAN'S ROLE IN CHANGING THE GLOBAL ENVIRONMENT. International Conference, University of Venice, Fondazione Cini 21-26 October 1985. Details from Università Degli Studi Di Venezia, Ufficio Culturale, Dorsoduro 3246, 1-30123 Venezia, Italy.

The **BRIGHTON MIND, BODY, SPIRIT FESTIVAL**, Brighton Metropole, 25-27 May 1985. Details from New Life Designs Ltd, 159 George St, London W1H 5LB (Tel: 01-723 7256)

UNIQUE FARMING AND WILDLIFE EXPERIENCE. Stay on a farm and help with the milking etc. Open to anyone over the age of 18. Dates: 22-25 July at Cheshire College of Agriculture, Reaseheath, Nantwich, Cheshire.

RSPCA Mallydams Wood Field Study Centre and Wildlife Sanctuary will hold an **OPEN DAY** on 1 September. Further information from Nigel Ford, BA, Peter James Lane, Fairlight, Hastings, Sussex.

International Conference on **THE NATURE AND TEACHING** of Environmental Studies

and Science in Higher Education. The third in a series of international conferences on Environmental Education September 9-12, 1985. Details from Conference Secretary c/o Dept of Geography and History, Sunderland Polytechnic, Forster Building, Chester Road, Sunderland, Tyne and Wear, UK.

FOR SALE

KILKHAMPTON, CORNWALL. Retreat from the world to our cottage set in a sunny two acre glade at the end of a grassy track. Outbuildings, well water (unpolluted). Would convert to one dwellinghouse, providing complete privacy and opportunity for partial self-sufficiency. Inspection welcomed. All reasonable offers considered. Contact Mrs E. Masterman, Thuborough House, Sutcombe, Holsworthy, N. Devon (tel: 040 926 235), U.K.

HOLIDAYS AND COURSES

SOUTH FRANCE CAMPING, Cycling, Swimming, Lazing, Alternative Communities, Mediaeval Towns, Vegetarian Food, £197 inclusive. SAE Lavender Cottage, 2 Mersea Road, Peldon, Essex CO5 7QE.

CENTRE FOR ALTERNATIVE TECHNOLOGY, short residential courses through April and May on topics such as Windpower, Self-Build, Healing Herbs, Organic Gardening. For more details, also our Summer Courses, send an SAE to Lesley Bradnam, CAT, Machynlleth, Powys, Wales. Tel: 0654 2400.

Mountain Ventures Alpine ALPINE ACTIVITY HOLIDAYS 1985

For Summer **Walking, Adventure & Mountaineering** Holidays based in Chamonix and Zermatt or for details of our **High Level Alpine Trekking** including the famous Haute Route, write or phone for our brochure:

MOUNTAIN VENTURES LTD (E)
Brecon House, Greenhill Road,
Liverpool L18 7HQ
tel: 051-724 2732



A STUDY TOUR IN RURAL DEVELOPMENT. Students are invited to one week courses in July and September in the Reading/Oxford area to find answers to the question "Is famine relief enough?" Organised by Oxfam, Christian Aid and United Nations Association supporters. Details from D S Stafford, MA, 10, Highfield Close, Wokingham, Berks RG11 1DG. UK.

CONSERVATION WORKING HOLIDAYS at the Foothills of the Pyrenees. Summer: July and August. A project to create a Permaculture Hamlet—Farm and Training Centre. We can only offer you the site for camping (secluded in the forest, access by dirt roads) while participating in this ecological venture. Please write (SAE) to: Ass. Las Encantadas, Ferme La Garrigue, 11300 Festes jt Andre, France.

Third International Course on **ENVIRONMENTAL TOXICOLOGY AND ECO-TOXICOLOGY**, sponsored by The World Health Organisation and the International Programme for Chemical Safety. A residential course at Heriot-Watt University, Riccarton Campus, Edinburgh from 6-13 September 1985. Further details from Jim Neil, Unilink, Heriot-Watt University, Riccarton, Edinburgh, UK. EH14 4AS (031-449 5111, Ext 2330)

CALL FOR PAPERS

The 7th **WORLD CLEAN AIR CONGRESS**, Sydney, Australia 25-29 August 1986 invites individuals to submit abstracts in French or English, 200 words, by May 1985 to: The Secretary General, National Society for Clean Air, 136 North Street, Brighton BN1 1RG.

SITUATION VACANT

VOLUNTEER wanted as Gardener/ Horticulturalist for Ashram Acres Unlimited as member of a team. Interested? Please write to Ms Ute Jaekel, Sparkbrook Ashram Community Service Project, 23, 25, Grantham Road, Sparbrook, B11 1LU, UK.

CLASSIFIED ADVERTISEMENTS MUST BE PREPAID

To: The Ecologist Advertisement Dept., Worthyvale Manor Farm, Camelford, Cornwall PL32 9TT. Please insert the following advertisement in the next issues.
Cheque/P.O. to *The Ecologist* enclosed.

(Word rate 15p per word. Minimum charge £3.00. Box No. £1.00)

.....				
.....				
.....				
.....				

Name: (Block letters please)

Address:

Date: Signed:

The environment isn't committing suicide, it's being murdered.

**There's a lot of talk about saving nature.
Greenpeace does something about it.**

**Action by Greenpeace has led to a ban on
commercial whaling, effective 1986.**

**Action by Greenpeace has curbed the
brutal slaughter of seal pups.**

**Action by Greenpeace has thwarted the
dumping of radioactive waste at sea.**

**Action is needed now to stop millions of
gallons of toxic liquids from poisoning the seas.**

**To stop the slide towards environmental
genocide.**

**Greenpeace offers effective campaigning
against these threats to us all.**

**By initiatives that make sense. Through
peaceful but uncompromising direct action.**

**But we need money. We need people with
the guts to stand up and be counted.**

Join us. The returns are worth it.

Now and for the future.

**Send your donation and sae for member-
ship details. 36 Graham
Street, London N1 8LL.**

GREENPEACE