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Save the Forests : Save the Planet
A PLAN FOR ACTION

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Cover: Land cleared for cocoa planting in Sabah. (Photo: John Payne/ICCE. Layout and Design: John McIntyre).

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Tropical Forests: A Plan for Action

The world's tropical forests are being destroyed at the rate of 100 acres every minute of the day. Their destruction has variously been described as "the greatest natural calamity since the Ice Age"¹, "the greatest biological disaster ever perpetrated by man"² and "a threat to civilisation second only to thermonuclear war".³

The consequences of our continued destruction of the world's tropical forests are devastating. Thus, deforestation spells cultural death for the millions of tribal peoples who depend on the forests for their livelihood. It threatens to condemn to extinction 50 to 90 per cent of the world's species of plants, animals and insects. It is causing widespread erosion and transforming huge areas of the world into desert or scrub. It is causing springs and streams to dry up, depriving tens of millions of people of drinking water. It will further increase the massive damage caused every year through floods in the Third World. It is already altering local climate, causing the dessication of lands downwind of deforested areas. And, in the words of five of the world's leading climatologists, it will cause "a global climatic catastrophe", rendering a considerable proportion of our planet uninhabitable for complex forms of life.

Moreover the time available to prevent an irreversible disaster at a global level is minimal. Within 30 years, there will be few areas of undamaged forest left, and within 50 years all the world's tropical forests will have disappeared. Already the signs of global climatic destabilisation are apparent and they are becoming more so every day.

The official proposals put forward for dealing with the problem are above all designed to accommodate present political and economic priorities. As a result, they are grossly inadequate. Indeed, if implemented, they would simply exacerbate the problem.

In this issue of *The Ecologist*, we propose the outline of a more realistic plan. What is more, in view of the extreme gravity and urgency of the problem, we are launching a campaign calling for an Emergency Meeting of the United Nations General Assembly to adopt the plan, to work out its details, and to persuade the specialised UN agencies and member nations to implement it.

The Rate of Destruction

According to the United Nations Food and Agriculture Organisation (FAO), 100,000 square kilometres of tropical forests are lost every year. That figure, however, does not take into account those forests which have been cleared and have regrown into degraded forests. In a report to the US National Academy of Sciences, Norman Myers, author of *The Primary Source: Tropical Forests and Our Future*, puts the total figure for the amount of primary forest cleared or degraded every year at 200,000 square kilometres. If the destruction continues unchecked, the world's virgin tropical forests will have been annihilated within 50 years—well within the lifetime of a child born today.

It is essential to realise that the great bulk of forest destruction has taken place since World War II, hence coinciding with the massive acceleration of economic development within the Third World. Indeed, many countries which are now almost stripped of their forests—Sri Lanka, for example—were 40 per cent or more forested prior to 1945.

In spite of the growing concern over the effects of deforestation, the rate of destruction is increasing in many parts of the world. In some regions of Brazil, for example, deforestation is accelerating at the rate of 33 per cent a year.

One of the worst affected regions is the State of Rondonia (see p.155). As Myers reports, "In 1975, only 460 square miles of forest had been cleared, but by 1985 the amount had grown to almost 11,000 square miles. Were this exponential rate of increase to be maintained (it reveals ever more momentum), it would lead to the elimination of half of Rondonia's forests by the early 1990s, and to the elimination of the whole lot by the year 2000."

Forest Destruction and Ethnocide

Forest destruction spells cultural death for the estimated 140 million people who at present live within the forest, either as hunter-gatherers or as swidden agriculturalists or, as with the rubber tappers of Brazil (see p.190), by extracting the produce of the forest on a sustainable basis. Many of these peoples rely on the forest for their entire livelihood. They derive from it the building materials for their houses; the wood for their agricultural implements; the herbs for their traditional medicines; the fibres and dyes for their clothes; and the materials for their traditional religious and cultural artefacts.

But the forest is not simply the source of material benefits, it is the foundation on which the very cultures of forest peoples are built, the resting place of their ancestors and the home of their deities. In effect, for the world's forest dwellers, the destruction of tropical forests amounts to nothing less than ethnocide.

For the most part (the rubber tappers are an obvious exception), these peoples belong to cultures which are thousands of years old, proof indeed of the sustainability of their lifestyles. Not only are they in possession of a vast storehouse of knowledge about forest plants and animals, but their methods of farming, hunting and gathering are increasingly recognised to be the only sustainable means of exploiting the forest.

Nonetheless, forest dwellers worldwide continue to be deprived of their land and to be resettled, generally forcibly, under government sponsored schemes aimed at incorporating tribal peoples "into mainstream society". Inevitably, the majority end up in the burgeoning slums of the cities of the Third World, where they live in grinding poverty, more often than not falling prey to prostitution and alcoholism.

In effect, the very people who have most to teach us about how to live in harmony with the forests are being systematically destroyed.

The Extinction of Species

Although tropical moist forests only cover some six per cent of the total land surface of the globe, they contain at least 50 per cent of the species on earth and, possibly, 90 per cent.

Indeed, the importance of tropical forests as a habitat for wildlife cannot be understated. Ninety per cent of the world's non-human primates are found only in tropical rainforests, along with two-thirds of all known plants, 40 per cent of birds of prey and 80 per cent of the world's insects. The Amazon basin alone contains an estimated 1 million animal and plant species, including 2,500 species of tree, 1,800 species of birds and 2,000 species of fish. A single hectare may contain 400 trees, every other one a different species. By contrast a typical temperate forest contains a mere 10 to 15 trees per hectare. One river in Brazil has been found to contain more species of fish than all the rivers in the United States.

As a result of tropical deforestation, at least one species is being condemned to extinction every day. In all likelihood, as Norman Myers points out, the true figure is even higher,

amounting to "several species per day". Within another ten years, he predicts, the rate of extinction will have risen "to several species an hour". This view is endorsed by such eminent scientists as Paul Ehrlich, Edward O. Wilson and Peter Raven.

Not only are species now being lost at an unprecedented rate—some 400 times faster than at any other period during recent geological time—but the range of species affected is far wider than ever before. As Edward O. Wilson points out: "In at least one respect, this human-made hecatomb is worse than any time in the geological past. In earlier mass extinctions . . . most of the plant diversity survived: now, for the first time, it is being mostly destroyed."

Although nature undoubtedly has considerable resilience—ensured in part by the sheer number of species on earth—there is a limit to how far that resilience can be stretched. To illustrate the point, the biologists Paul and Anne Ehrlich have compared individual species, whether they be "bacteria, herbaceous plants, worms, mites, insects, frogs, lizards, or small mammals" to the rivets that hold together an airplane. Although we know that each species plays a crucial role in maintaining ecological systems, "in most cases, an ecologist can no more predict the consequences of the extinction of a given species than an airline passenger can assess the loss of a single rivet. But both can easily foresee the long-term results of continually forcing species to extinction or removing rivet after rivet."

Indeed, if the present mass extinctions are permitted to continue, "the end result will be as predictable as that of popping rivets from any flying machine—disaster". The Ehrlichs go on to warn: "Sooner or later, the vital functions of earth's ecosystems will be sufficiently impaired that the planet's carrying capacity for human beings will plummet, perhaps over a period of decades, perhaps within a single year. Then humanity will be faced with extinction."

Loss of Genetic Resources

In agriculture, as in medicine, the importance of preserving genetic diversity is of utmost importance. Modern farming practices have systematically reduced the number of crops used in farming; indeed, we now rely on just eight crops to provide 75 per cent of our food. That lack of genetic diversity renders modern agriculture extremely vulnerable not only to pests and disease, but also to climatic change, current crop varieties being finely tuned to present climatic conditions. In future, therefore, wild species of plants may prove vital in order to fortify modern varieties against disease or a less propitious climate.

Droughts, Floods, Deserts and Degradation

Undegraded forests perform numerous irreplaceable ecological services for free, and those services are now being widely disrupted by deforestation. As a result, droughts and floods are increasing and thousands of hectares are being transformed into degraded scrub or desert every year.

One of the most vital functions fulfilled by forests is the control of water run-off to rivers. Typically, in a well-forested watershed, 95 per cent of the annual rainfall is trapped in the elaborate sponge-like network of roots that underlies the forest floor. That water is then released slowly over the year, replenishing groundwaters and keeping streams and rivers flowing during the dry season. When the forest is removed, however, there is no longer any "sponge" to absorb the water. As a result, the rains rush down the denuded slopes, straight into the local streams and rivers, only 5 per cent of the rainwater being absorbed in what remains of the soil.

The consequence is massive flooding, which in the densely populated regions of the tropics can prove disastrous. According to the Independent Commission on International Humanitarian Issues, the number of people affected by flooding trebled between 1960 and 1980, with over 15 million people suffering flood damage in the late 1970s. In India alone, the Government estimates that one in 20 people are now at risk from flooding.

Moreover, because the rainwater is no longer stored in the soil, the local streams and rivers are not replenished and thus quickly dry up once the rains are over. The result is the so-called "drought-flood cycle", with massive floods during the monsoon periods alternating with devastating droughts during the dry season. In the Indian State of Maharashtra alone, deforestation is largely responsible for the drying up of water supplies in 23,000 villages, an increase of 6,000 in just five years.

Once stripped of their forest cover, the soils of the tropics are also increasingly vulnerable to erosion. Scientists working in the Ivory Coast have recorded massive differences between the rates of erosion in forested and deforested areas: they report that, even in mountainous areas, soil erosion in secondary forest is as low as 0.03 ton per hectare a year. Once deforested, the rate rises to 90 tons per hectare.

The amount of soil now being lost as a result of deforestation is staggering. In Nepal, which has lost 90 per cent of its trees since the 1940s, billions of tons are washed into the rivers of the Himalayas every year, whilst in India 6,000 million tonnes of topsoil are lost annually. In Africa, the Ethiopian Highlands, which have long suffered from the effects of deforestation are losing some 269 tonnes of topsoil per hectare—over 1,600 million tonnes a year. In Amazonia, the threat of erosion is such that Harald Sioli warns (p.134), "There is a danger that the region may develop into a new dust-bowl."

In that respect, the lushness of the world's rainforests is amazingly deceptive. For despite the profusion of plants and trees, the underlying soils are incredibly poor, almost all the nutrients being bound up in the vegetation. Once the forests have been cut down, those few nutrients that remain in the soil are quickly washed away, effectively transforming the land into a barren wasteland. Indeed, one of the greatest tragedies of tropical rainforest destruction is that it is all for nought: almost all the areas that are now being cleared for agriculture or ranching cannot support these activities for more than a few years at the most. In Brazil, for example, virtually all the cattle ranches established prior to 1978 had been abandoned by 1985. Similarly, as José Lutzenberger points out (p.155), attempts to open up Amazonia to agriculture have proved ecologically disastrous: almost all of the Brazilian colonists settled in Rondonia, for example, have been forced to abandon their new farms after the soils proved too infertile to make a living for more than a year or two. Some settlers have moved two or more times. In Indonesia, too, many of those settled under the country's massive Transmigration Scheme (see *The Ecologist* Vol. 16, Nos 2/3, 1986) have abandoned their now degraded and infertile settlement sites and returned home to Java.

Climatic Change

As Peter Bunyard documents in his article (p.139), tropical forests play a critical role in regulating climate, both at the regional and the global level. Their destruction not only threatens to disrupt world rainfall patterns but, more seriously perhaps, to destabilise the delicate chemistry of the earth's inner atmosphere.

At the regional level, deforestation is already disrupting the subtle hydrological cycles that control rainfall. At least half of the rainwater that falls on moist tropical forests is returned back into the atmosphere through evapotranspiration, hence the perpetual cloud that hangs over the world's great rainforests. That evaporated moisture is then carried by the wind to fall as rain in areas often thousands of miles away. Where the forests have been destroyed or degraded, however, there is no moisture for the winds to pick up; hence areas downwind of deforested areas no longer receive as much rain as previously, causing them to dry out. The destruction of West Africa's forests may well be largely responsible for the droughts that are now such a common feature of the belt from the Sahel to Ethiopia. It is also claimed that the Sahara itself was created by cutting down the forests of North Africa.

The climatic consequences of deforestation will undoubtedly extend beyond the regional level however. As Bunyard notes,

much of the rain evaporated from the forests of Amazonia is carried by the trade winds towards the higher latitudes. In the process, "heat is transferred from the Tropics to the higher latitudes, thus contributing significantly to a more equitable climate in temperate areas." Without the rainforests of the tropical countries, and in particular with the destruction of the forests of Amazonia, "the Tropics would tend to be hotter and drier and the temperate regions both sides of the equator colder". Indeed, "the moist tropical forests of the world can be considered as a vital component in the process of pumping heat from the hot regions of the globe to the cooler regions."

In addition to disrupting regional and global hydrological cycles, deforestation is adding as much carbon dioxide into the atmosphere as that added by the burning of fossil fuels. The carbon dioxide results both from the burning of forest (and hence the oxidation of the carbon locked up in the vegetation) and through the rotting of cleared vegetation. It is now generally accepted that rising levels of atmospheric carbon dioxide will bring about a global warming via the so-called "greenhouse effect", the carbon dioxide "trapping" the sun's solar energy, thus causing the temperature of the earth's atmosphere to rise.

Climatologists now predict that the combined effect of deforestation and the burning of fossil fuels will cause levels of carbon dioxide in the atmosphere to double, bringing about a 2 to 3 degree centigrade rise in global temperatures.

Scientists are agreed that rising global temperatures could completely alter the face of the earth. Many of the world's most fertile regions (notably the grain belts of North America and Russia) are likely to become drier and less productive, whilst regions such as India and the Middle East are expected to become wetter and more fertile. Tropical storms are predicted to become more violent and sea levels are predicted to rise as a result of the thermal expansion of sea water. A rise in global temperatures of 5 degrees centigrade (by no means an impossibility) would melt the West Antarctica ice sheet, causing a 5 metre rise in sea levels and drowning many coastal regions of the eastern United States and elsewhere. Even a modest rise in temperatures could have a dramatic effect on sea levels: a recent paper in *Nature* (12 November 1987) predicts that by 2025 the earth's temperature will have risen by 0.6–1.0 degrees centigrade, causing sea levels to rise by 4 to 8 centimetres and directly threatening such cities as London, Bangkok and Venice.

There are already worrying signs that the greenhouse effect is indeed becoming a reality. Scientists measuring the amount of solar radiation entering and leaving the earth's atmosphere, for example, have found that 0.1 per cent more radiation is now retained than twelve years ago. Other worrying portents include the breaking off of a giant iceberg (measuring 100 miles by 25 miles) from the Ross Ice Shelf along the Bay of Whales in Antarctica.

Indeed it is clear that man's activities are destabilising the world's climate, and that deforestation is one of the major causes of that destabilisation.

The World Resources Institute Report

The World Resources Institute (WRI), in conjunction with the World Bank and the United Nations Development Programme, has produced a lengthy report calling for action to end deforestation.*

The report was written by an international taskforce with the brief of drawing up "a priority action programme to address deforestation issues on a broad front". The report outlines a five-year action programme—to cost \$8,000 million—aimed at providing fuelwood, promoting agroforestry, reafforesting upland watersheds, conserving tropical forest ecosystems, and strengthening institutions for research, training and extension.

The taskforce consisted of government ministers, directors of state forestry agencies, representatives of logging companies

and paper manufacturers, together with a representative of the World Bank. No conservationist or ecologist or member of an independent (that is, non-government funded) environmental organisation was included, nor were any tribal peoples from those areas most directly affected by tropical deforestation. Significantly, the plan was rejected outright by Non-Governmental Organisations from 10 countries at a meeting in Delhi this Autumn. Nor should this surprise us, for, as Vandana Shiva (p.142) and Magda Renner (p.150) point out, the WRI report, is deeply flawed.

Firstly, the WRI report is based on the premise that poverty, over-population and ignorance are the prime causes of forest destruction. Blaming the poor for deforestation, however, is a gross and evil charge. As James Nations and Daniel I. Komer point out with reference to Central America (p.161), "To blame colonising peasants for burning the rainforests is tantamount to blaming soldiers for causing wars. Peasant colonists carry out much of the work of deforestation in Central America, but they are mere pawns in a general's game."

Making scapegoats of the poor and dispossessed not only obscures the reasons for their poverty but detracts from the real causes of deforestation—namely, the massive commercial development schemes being promoted in the Third World.

Plantations and ranching projects, for example, have laid waste to millions of hectares of forest. In Ethiopia, the Awash Valley has been stripped of its trees to make way for plantations, 60 per cent of the land now being under cotton with another 22 per cent devoted to sugar. In Central America, cattle ranching is responsible for the clearance of almost two-thirds of the forests. In Brazil official government statistics reveal that 60 per cent of forest destruction between 1966 and 1975 was caused by large-scale ranching schemes (3,865,271 hectares) and road building (3,075,000 hectares).

Dams too are a cause of massive and irreversible deforestation. In Brazil, the Tucuruí project, has flooded some 216,000 hectares of virgin forest. Near Manaus, in north-western Amazonia, the Balbina dam will flood 2,346 square kilometres. All told, the dams planned for Amazonia are expected to flood an area the size of Montana, much of it forest.

Blaming the poor for deforestation also overlooks the fact that millions of peasant colonists have been actively encouraged to invade the forests under government-sponsored colonisation schemes. In Indonesia, more than 3,600,000 peasants from Java have already been moved into the densely forested outer islands of the archipelago under the country's Transmigration Programme. At a conservative estimate, more than 3,300,000 hectares of rainforest are threatened by the project. In Brazil, colonisation schemes are held directly responsible for 17 per cent of forest destruction between 1966 and 1975.

Moreover, the problem of peasant settlers cannot be separated from the problem of landlessness in the Third World. At present, land holdings are concentrated in the hands of very few people—93 per cent of arable lands in Latin America being held by a mere 7 per cent of land owners. Much of that land is used for plantation agriculture or ranching—thus denying its use to poor farmers, many of whom have been ruthlessly disposed of their own lands, often at the point of a gun. In the absence of land reforms, those farmers then have little choice but to invade the forests. Significantly, almost all those peasants who have invaded Rondonia in Amazonia have done so because their lands in the fertile state of Rio Grande do Sul have been taken over for large-scale export oriented plantations and ranches (see p.155).

Blaming poverty for deforestation also ignores the fact that the best protected forests of the world are inhabited by those very tribal peoples who, by the standards of industrialised man, are among the world's poorest. Indeed, most lack all but the simplest material possessions and have no access to the creature comforts, such as piped water, that we equate with a minimum standard of living. Yet it is these very peoples who are fighting hardest to protect the forest. Thus in Sarawak (p.186), the local tribes have been waging a desperate campaign to stop the

*The UN Food and Agriculture Organisation (FAO) has produced a similar plan, proposing similar conclusions.

logging of their forests. The response of the Malaysian Government has been brutal, many of the tribesmen having been recently arrested in an attempt to break their blockade of the logging roads. Yet, the government still insists, contrary to all evidence, that the tribesmen are to blame for the deforestation.

Blaming the poor for deforestation also serves to rationalise, and hence legitimise, the view that current development policies can (and should) continue unabated, and that deforestation can be halted without any need for politico-economic sacrifices of any kind. Indeed, the WRI plan goes further than this. It interprets the problem in such a way as to justify further schemes which, though politically and economically expedient, are socially and ecologically destructive: in this case, the setting up of vast plantations of fast-growing exotics, such as eucalyptus which not only fail to fulfil most of the ecological functions of natural forests, but which actually have a serious adverse impact on the environment. What is more, as the Environmental Defense Fund points out (p.151), little of the wood grown under India's World Bank funded "social forestry" programme, which is held up as a model by the WRI, is available to the poor: instead it almost all goes for pulp and rayon manufacture.

Finally, the plan does not even mention the rights of those indigenous peoples who inhabit the world's tropical forests and who depend on them for their livelihood.

A Plan for Action

Clearly, a radically new approach is required if deforestation is to be halted and a global catastrophe averted. The forests cannot possibly be saved if we continue to see them as but another resource to be cashed in. They are indeed a resource, but not because they can be transformed into commodities to be sold on the open market. They are a resource in the sense in which the planet itself, the sun and the atmosphere are resources; they make life possible and must therefore be preserved in that state which enables them to do so.

Any plan aimed at preserving the world's tropical forests must thereby rest on the fundamental premise that the forests are an international patrimony. To achieve our goal will require an elaborate plan made up of a number of carefully coordinated steps. Its implementation will span many decades and will require the close cooperation of international institutions, national governments, non-governmental organisations, action groups and millions of committed individuals. The stages of the plan are as follows:

1. Debts for Forests

The first step in the plan involves taking advantage of the present impasse created by the Third World's massive debt to the western banking system. This debt now stands at approximately a trillion dollars, interest payments are so high that Third World countries are now paying more money to the West than they are receiving in aid—in 1986, by a margin of about \$29 billion.

There is of course no way in which such payments can be sustained for very long. Already several countries, notably Peru and Brazil have come close to defaulting on their interest payments, many more look like following suit. At the July 1987 Annual Meeting of the Organisation for African Unity, 50 member states requested an amnesty on \$200 billion worth of debts, admitting quite openly that "the problem is not one of liquidity but rather of a complete inability to pay".

In order to service the interest on their debts, Third World countries have drastically increased the rate at which they are plundering their natural resources, including their forests, thus adding to the environmental and social costs of the debt crisis. In particular, the amount of land under cash crops has been increased at the expense of the forests and at the expense of growing food for local consumption.

Several western banks, led by Citicorp, have now made provisions against countries defaulting on their debts. The acceptance that many loans will never be repaid has opened up

the possibility of turning the debt crisis to ecological good. Indeed, as Barbara Bramble points out (p.192), there are numerous means by which foreign debts can be written off in exchange for policy changes which would benefit the environment.

Already two "Debt-for-Nature" swaps have been carried out by environmental groups. Thus in the US, Conservation International negotiated to buy \$650,000 worth of Bolivia's debt at a discounted rate of \$100,000. The debt was then written off in exchange for the Bolivian Government undertaking to set aside 3.7 million acres of rainforest in an area adjacent to the existing Beni Biosphere Reserve in Amazonia. A similar agreement has been reached between the World Wildlife Fund and the Costa Rican Government leading to the setting aside of a substantial area of forest as a national park (see p.200).

It is not suggested that these Debt-for-Nature swaps are the ultimate solution to the problem of forest preservation. They are not. It is possible to criticise them on a number of counts. One obvious problem is the possibility that, having set aside small areas of forest under debt-swap agreements, there will be a temptation to exploit what forests remain. However, debt swaps undoubtedly have a role to play as part of a holding action, one that will enable us to gain invaluable time which can be used for creating the conditions in which sounder and more lasting policies can be implemented.

To have any real impact, however, Debt-for-Nature swaps must be generalised and coordinated so that the bulk of tropical forests within debtor countries can be safeguarded and debts correspondingly reduced. For this to be possible, governments, international agencies and industrial corporations must together raise the requisite funds, however massive these might be, since clearly the small private foundations that have so far been involved cannot be expected to finance this operation except in a small and piecemeal manner. In the UK, the Ecological Foundation (Lower Bosnieves, Withiel, Bodmin, Cornwall) has undertaken to help raise the funds required to publicise this scheme and persuade the appropriate institutions to finance it on the scale required.

2. Redeveloping the Biosphere

The main causes of poverty and famine in the Third World are deforestation, erosion and desertification—in other words, environmental or biospheric degradation. Of this there can be no doubt. For this reason, the development programmes that should have the highest priority must be those which aim to rehabilitate the natural environment, on which we must ultimately depend for our welfare and, indeed, for our very survival.

The need for a massive programme of ecological rehabilitation was only too clear to the highly respected Indian civil servant, B.B. Vohra, at present Energy Consultant to the Indian Government, when he wrote his now famous *A Charter for the Land* in September 1972. A similar plan was also put forward by the United Nations Environment Programme (UNEP) at its Desertification Conference in Nairobi in 1977, but member Governments were largely indifferent to the issue and the funds UNEP asked for were never provided.

The first priority in any programme of ecological recovery must be a worldwide programme of reafforestation. With sensitivity and skill, even the most degraded lands in the dry tropics can be restored to forest, successful reforestation schemes having been implemented in Costa Rica (see p.200) and at Auroville in India (see p.203). Unlike officially-funded reforestation programmes, however, the goal of these schemes, and of those we are proposing, is to restore degraded land to ecological health so that it can fulfil ecological, social and climatic functions rather than merely to make a commercial profit. The trees must therefore be selected for their ecological rather than economic value, the emphasis being on trees which restore the soil, which retain water and which provide fodder and foodcrops.

To carry out reforestation on the scale required will necessitate the mobilisation of young people. Shankar Ranganathan suggests that we take as our model President Roosevelt's Civilian Conservation Corps (CCC) which was set up in the US during the New Deal, partly as a means of healing the wounds caused by a century of thoughtless industrialization, partly as a means of employing the millions of idle and depressed young people who had lost their jobs during the great depression.

President Roosevelt's plan was "to create a Civilian Conservation Corps to be used in simple work, not interfering with normal employment, and confining itself to forestry, the prevention of soil erosion, flood control and similar projects." More important than the material gains would be "the moral and spiritual value of such work." It was not a panacea for all the unemployment, but "an essential step" in the emergency.

It was also a remarkable success. Forty million acres of farmland benefited from erosion control, drainage and other conservation measures. The value of the work completed was, at the time, estimated at more than \$200 million. As Ranganathan argues, "an organisation on the lines of the CCC needs to be set up soon in India. If it succeeds, it could become the biggest project of its kind the world has ever seen. It could provide jobs for millions and increase the nation's wealth through improving its land. Through disciplined training, it could create a large and effective workforce, based in the villages where they are needed and geared to the development of rural India."

It is not India alone that requires such an operation but the tropics as a whole—that vast densely populated area that is at present being systematically desertified with consequences that are too horrible to imagine.

3. The Phasing Out of Destructive Development Schemes

More important than even reforestation is the phasing out of development policies which threaten the forests. There are several reasons for this. Firstly, whilst reforestation is possible in the dry tropics, it is virtually impossible in the moist tropics. Tropical rainforests are the product of over a hundred million years of evolutionary research and development: once destroyed, they can never be completely reconstituted. A reforestation scheme, however massive, can at best give rise to a crude approximation of the climax forest, one that cannot fulfil essential ecological services with the same degree of sophistication.

Secondly, the Civilian Conservation Corps would be fighting a losing battle if deforestation were still proceeding at the present rate and on the present scale.

Thirdly, the task of assuring the protection of the forests set aside under Debt-for-Nature arrangements would be very difficult indeed if the custodians of the forests were subjected to continual pressure from powerful interests to release forested areas to accommodate development projects.

For those reasons, an essential component of the plan must be to phase out all development projects that involve the destruction of forested areas. This means that timber will eventually have to be derived from limited areas planted for the purpose of providing it. We will simply have to learn to live without many tropical hardwoods. Livestock rearing schemes which involve clearing the forests must also cease: Americans will simply have to pay more for their hamburgers or eat less meat and more vegetables as do people in many parts of the world. Moreover, peasants must no longer be displaced from their lands and settled in forested areas. Land reform is thus of critical importance: the land which has been taken over from peasants for large plantations and livestock rearing schemes geared to the export trade must be returned to the peasants. There is no other option if the pressure of colonists on the forest is to be relieved.

These are some of the economic sacrifices that will have to be made if the forests are to be protected. To suppose that their

protection is possible without making such sacrifices is an illusion we can no longer afford to entertain.

4. Reforming Development Strategies

The destructive development schemes that are directly and indirectly responsible for deforestation are an essential part of present development strategies as reflected in IMF policies. These consist in encouraging Third World countries to buy our manufactured goods and technological devices, and to finance those purchases by exporting their raw materials, including forest products and the produce of their land.

It is unquestionably the case that Third World countries have become increasingly 'hooked' on imported manufactured goods and technological devices, so much so that the pressure to cash in their resources, including their forests, is irresistible—a pressure that can only increase as their debts escalate, which under present development strategies they must inevitably do.

Our official development strategy has thereby caused Third World countries systematically to export the indispensable, without which their survival is impossible, in exchange for totally superfluous items such as armaments, domestic appliances, automobiles and tinned and packaged foods. This process cannot, by any stretch of the imagination, be considered to be in the interests of the bulk of the increasingly impoverished and underfed peoples of the Third World.

If deforestation, and indeed environmental degradation in general and its associated impoverishment and malnutrition, is to be brought to a halt, then current development policies must be radically revised. Third World countries must only import those manufactured goods which they can pay for without selling off their forests, without eroding and desertifying their agricultural land, and without exporting food crops which should be used to feed their increasingly malnourished populations.

The bilateral aid agencies and the multilateral development banks, and indeed commercial banks in general, must be prevented, by law if needs be, from lending money to finance any non-essential imports and expenditure on infrastructure over and above that which Third World countries can really afford financially, socially and ecologically. This will undoubtedly involve major politico-economic sacrifices on the part of western institutions, and industrial and financial corporations. But, once again, it would be totally illusory to suppose that, without such sacrifices, the forests can conceivably be preserved.

An Emergency Meeting of the United Nations

The measures required to save the world's tropical rainforests and bring a halt to the biological holocaust which is occurring before our very eyes, and which can only lead to global catastrophe in the very near future, requires that immediate and very difficult decisions be taken at an international level. *For this reason we call for an Emergency Meeting of the United Nations*, to study the problem and consider our plan for action. To that end, we therefore call on those national governments that are conscious of their responsibility to mankind, and indeed to life in general, to sponsor this request, so that it may be formally presented to the United Nations as soon as possible. We also call on all those individuals who share our deep concerns to join with us (a form is enclosed) in requesting this emergency meeting.

The Editors

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The Effects of Deforestation in Amazonia

by Harald Sioli

Despite the lushness of the forest canopy, a basic characteristic of Amazonian soils and waters is their chemical poverty. Almost all the nutrients are bound up in the forest vegetation, being recycled through the ecosystem through a variety of highly complex mechanisms. Once the forests have been cut down, the nutrients are quickly washed away and the soil is rendered infertile. Deforestation is thus threatening to turn Amazonia into a giant dustbowl. At the heart of the problem lies the quest to develop the region.

An exposé of the effects of deforestation in Amazonia has to start with an introduction into the most important peculiarities or principles of the ecology of the region. I shall restrict myself to the high-forest-covered *terra firme* of the Amazonia lowlands.

The first scientist to recognise and outline the most striking basic ecological characteristics of that area was the Swiss Hans Bluntschli who stated that "... wind and plain, forest and water act intrinsically together. We perceive that everything in Amazonia must come under their influence, from the smallest living being to the activity and behaviour of mankind ...".¹ As a comparative anatomist, Bluntschli observed with eyes schooled in structural interrelations that the forest and water 'act intrinsically together', depend on each other and are mutual expressions of one another.

Chemical poverty

Bluntschli, however, did not make any chemical analysis of water and evidently did not know that Katzer had already discovered the surprising chemical pureness and weakness of most Amazonian waters.² Otherwise, that keen observer would have discovered deeper and more revealing interrelationships.

Systematic research on Amazonian water chemistry started only after 1945 and still continues. It confirmed Katzer's early discovery and extended it to by far the largest areas of the whole forest-covered Amazonian region: the 'hylaëa' of Alexander von Humboldt.³

The only exceptions to that general rule are a few small local zones with peculiar geology and lithology.⁴ It is especially true of the strip of land of the Andean foothills with its projections along the whitewater rivers and the alluvial lands of their 'várzeas'. Here we find chemically richer waters, signs of richer, more fertile soils, and conditions completely different from those of the *terra firme*. Most Amazonian waters, however, prove to be so pure and poor in electrolytic content that they are best compared to distilled water of low quality and almost equal to rainwater.

In a climate as humid as that of the Amazonian hylaëa, and under a mature forest cover—that is, with a biomass constant over a long period of time—all soluble substances are liberated from the soil by weather processes and are washed out. Since they are nowhere retained or accumulated, as would happen with an increasing mass of vegetation, they must appear in the ground, spring and creek waters. But since these waters are chemically as pure and poor as I have described, we must conclude that the soils are correspondingly poor and do not contain appreciable quantities of substances, including nutrients for plant growth, that could be mobilised by weathering. By implication this means that those soils are extremely infertile.

Chemical analyses of soils⁵ has confirmed the conclusion drawn from the water chemistry.

These results enable us to understand one fact or principle which is basic for the forest ecosystem of by far the greatest part of the Amazonian hylaëa: the pooriness in nutrients of its soils, or in other words their infertility.

Recycling of nutrients

Despite their infertility, an exuberant forest stands on the Amazonian soils. At first glance this seems a paradox and must be clarified. The answer is that the living part of that forest ecosystem, the forest vegetation itself, responds to that challenge by strictly closed circulation of nutrients within the living biomass.⁶ This constant recycling of the same nutrient molecules through generations of forest organisms must be understood as one of the basic principles in the functioning of the Amazonian forest system.

This principle alone does not, however, explain how the forest manages to realise and maintain its closed nutrient cycle. Studying it in detail, we find that nature has applied all possible means to achieve that aim: to reduce to a minimum the loss of nutrients by leaks from the cycle. There is no appreciable humus layer on top of the Amazonian forest soil. Instead, the root system of the trees is shallow, usually restricted to the uppermost 20-30 cm, and on average three times as dense as that of a temperate forest.⁷ This indicates that the nutrients are never temporarily retained or stored in dead matter on top of this soil (from which they might easily be leached by the high rainfall) but are rapidly reabsorbed from the forest litter—and from the droppings and remains of animals—which rapidly decompose in the hot humid climatic conditions. Stark⁸ was the first researcher to discover that the decomposition of dead forest litter, and hence the recycling of nutrients within the forest system, is performed by fungi. Herrera *et al.*⁹ were even able to show fungi with one end of their hyphae inside a decomposing litter leaf and the other end inside a

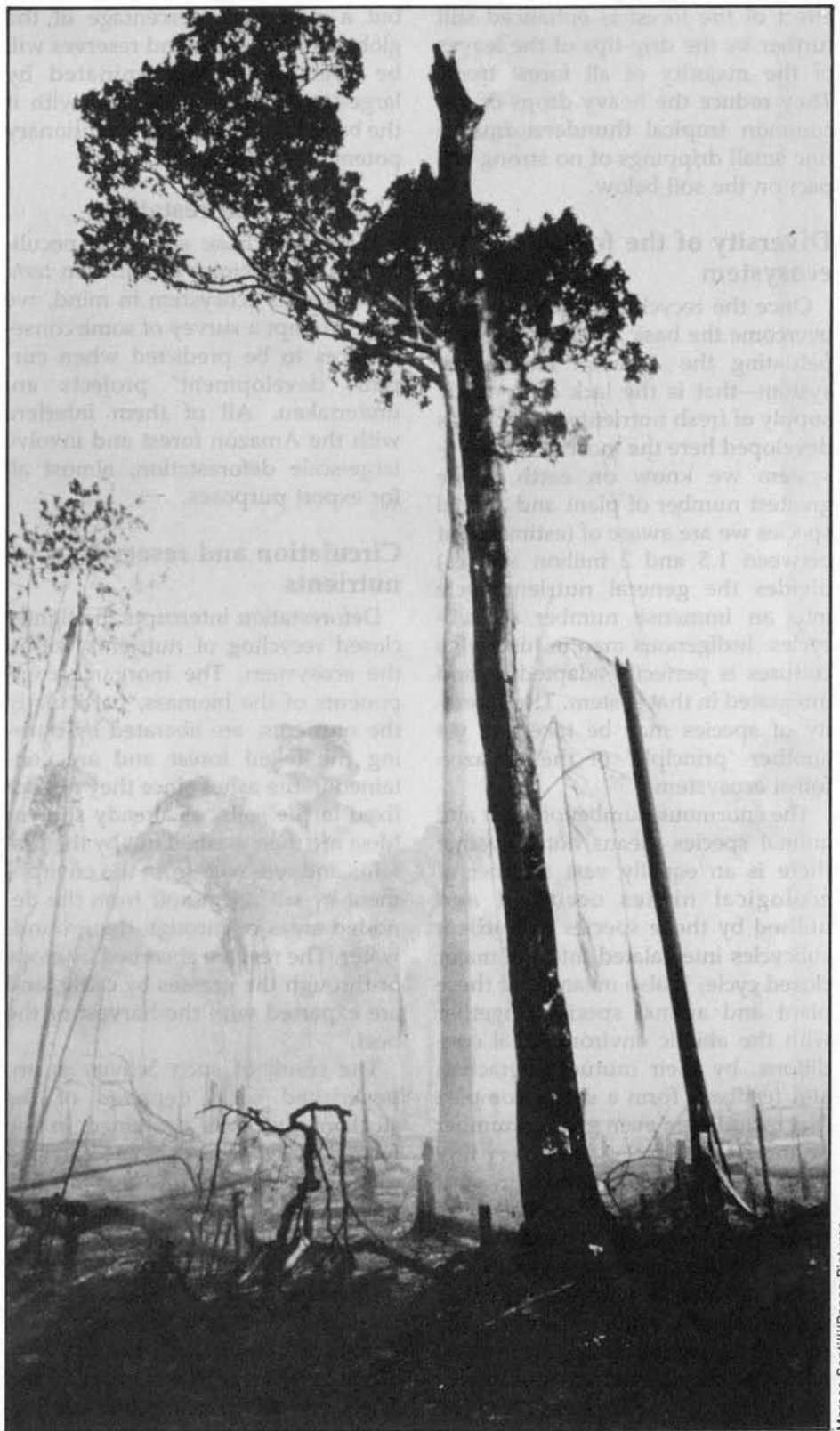
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living root. And Singer¹⁰ recently found specific details and conditions of the mycorrhiza.

The intensity of nutrient recycling in the Amazon forest has also been shown by W. Franken¹¹ by comparing the chemical compositions of rainwater, of water falling from the canopies, of stem runoff, and of groundwater in a forest near Manaus. While the rainwater was chemically as poor as would be expected in an area far from industrial civilisation, the canopy water and the stem runoff were very rich in dissolved matter including nutrients, whereas the groundwater was practically as poor as the rainwater. This means that the dense mat of roots of the forest trees acts as a highly effective filter. It retains all dissolved substances from the canopy water and the stem runoff, and immediately recycles them back into the living trees without losing any into the groundwater, creeks and rivers which would finally carry them into the ocean to be lost forever from the forest ecosystem.¹²

The chemical richness of the sub-canopy water and the stem runoff is explained, not only by the leaching effect of rainwater on the leaves and epiphytic and epiphyllic plants of the forest trees, but far more importantly by the fact that probably the greatest part of Amazon forest fauna lives in or on the canopies of the trees: insects, birds and up to the coatis and monkeys. They not only feed but also defaecate there and their 'manure' is washed down by the rains. The fauna is thus perfectly integrated into the general nutrient recycling process within the life of the forest as a whole: it simply adds a lateral extension to it, as does all the fauna of the forest ecosystem. In addition the epiphytes (bromelias, orchids, ferns, and so on) and parts of the epiphyllic flora do not live from dust, as had formerly been assumed, since dust does not occur in tropical high rainforest, but from the nutrients contained in the 'flushing' of the canopy habitat. These plants, thus, represent a lateral extension of the general recycling, too.

Tightly closed and rapid recycling is all the more essential for the forest's existence, since *terra firme* soils consist of up to 80 per cent or even more of fine quartz, the rest



Burning liberates the nutrients bound up in the forest biomass and concentrates them in the ashes. But the nutrients are generally washed out by the first rains, rendering the soil barren and infertile.

being kaolinite as the only clay mineral present.¹³ Because of the low absorption capacity of kaolinite, the soil would never retain nutrients, even those liberated by decomposition of inorganic and organic matter. The first rains would extract such nutrients from the soil and carry them beyond the forest ecosystem into the

groundwater, creeks and finally into the sea.

Protection against soil erosion

Good percolation capacity of the soil under high forest cover reduces surface runoff to practically zero, and the dense canopies of high forest inhibit surface erosion. That protecting

effect of the forest is enhanced still further by the drip-tips of the leaves of the majority of all forest trees. They reduce the heavy drops of the common tropical thunderstorms to fine small drippings of no strong impact on the soil below.

Diversity of the forest ecosystem

Once the recycling processes have overcome the basic difficulty for perpetuating the Amazon forest ecosystem—that is the lack of a steady supply of fresh nutrients—nature has developed here the most diverse ecosystem we know on earth.¹⁴ The greatest number of plant and animal species we are aware of (estimated at between 1.5 and 2 million species) divides the general nutrient cycle into an immense number of sub-cycles. Indigenous man in his native cultures is perfectly adapted to and integrated in that system. The diversity of species may be taken as yet another 'principle' of the Amazon forest ecosystem.

The enormous number of plant and animal species means not only that there is an equally vast number of ecological niches occupied and utilised by those species or nutrient subcycles intercalated into the major closed cycle. It also means that these plant and animal species, together with the abiotic environmental conditions, by their mutual interaction and feedback form a single complex that includes an even greater number of homeostatic cycles, from very tiny to large ones, all of which interact and influence one another. At the same time, they all depend on the fact that the greatest homeostatic cycle of that system—that of the tightly closed cycle which results from the cooperation of the smaller ones—functions with a minimum of loss. The whole system may be loosely compared to the circulation of an organism in which there are blood vessels of the most diverse sizes, from capillaries to the main arteries.

This extremely complex, diverse and rich Amazon biota has developed over millions of years, uninterrupted by glacial periods or general aridification. Its annihilation will probably have a most incisive effect on all life on earth and its future. Not only will its present diversity, richness and beauty be impoverished,

but a very high percentage of the global genetic stock and reserves will be irretrievably exterminated by large-scale deforestation and with it the basis for their future evolutionary potential will be cut off.

Effects of deforestation

With these basic ecological peculiarities or principles of Amazon *terra firme* and its ecosystem in mind, we may attempt a survey of some consequences to be predicted when current 'development' projects are undertaken. All of them interfere with the Amazon forest and involve large-scale deforestation, almost all for export purposes.

Circulation and reserves of nutrients

Deforestation interrupts the tightly closed recycling of nutrients within the ecosystem. The inorganic components of the biomass, particularly the nutrients, are liberated by burning the felled forest and are contained in the ashes since they are not fixed in the soils, as already shown. Most are then washed out by the first rains and removed from the environment by surface runoff from the denuded areas or through the groundwater. The rest are absorbed by crops or through the grasses by cattle, and are exported with the harvest or the beef.

The result of such activity is impoverished soils, deprived of the stock of nutrients contained in the former living biomass. The carrying capacity of artificial pastures in a former hylaeon section of the Belém-Brasília highway decreased from 0.9-1 head of cattle on young pastures to only 0.3 head after some six years.¹⁵ Nutrients are one basis of constant biological productivity. Their irreplaceable loss reduces and limits not only harvests but also biological production.

Surface erosion and compaction of the soil

The soils, sediments and thick weathering layers of the Amazon *terra firme* are easily eroded. With deforestation, these soils and layers are deprived of the protection of the dense forest canopy and exposed to the direct impact of heavy rains and tropical thunderstorms. The substitution of forest by short-cycle crops

or by planted grasses removes the former protection. In the case of planted pasture, we must also consider that there is no tropical grass perfectly resistant to trampling by cattle. Besides, during the dry seasons, pasture grasses dry up, the sod is exposed still more, and the bare soil is strongly heated, destroying its microflora. There is a danger that the region may develop into a new 'dust-bowl'—dust, formerly unknown in Amazonia, is already common on the new roads during the dry season.

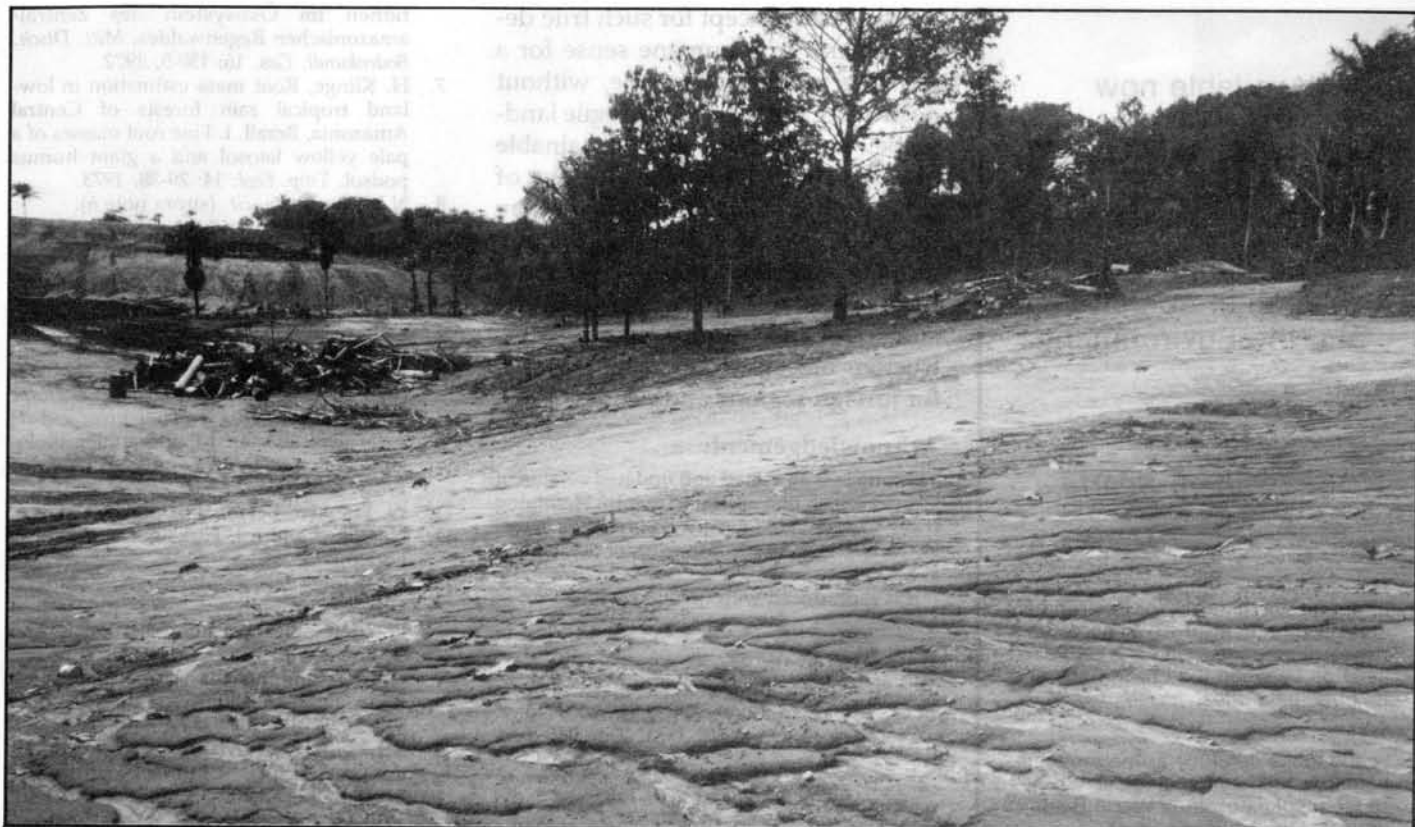
Also, formerly porous forest soil is compacted by deforestation.¹⁶ Through general and especially slope clearing, deforestation increases surface runoff. With the onset of the first heavy rains of the next rainy season, the unprotected dust-dry soil will be eroded with unprecedented violence and washed away into the creeks and rivers.

Sandification

Sandification on the bare surface layer of the soil is another effect of deforestation. The direct impact of heavy raindrops causes what can be called 'selective erosion', washing away the finer clay particles while the coarser and heavier sand is left behind. This effect can also be observed on small areas left without protective vegetation for a longer time. The most striking example of that type of selective erosion is the famous 'sandy campos' behind Santarém which the celebrated British naturalist Henry Walter Bates¹⁷ described in the last century. With time, 'sandification' proceeds deeper into the soil, thereby reducing its water-retention capacity. This new edaphic condition is especially hostile to young seedlings of forest trees and finally prevents the regrowth of a forest.

Floods and Silt

More intensive surface runoff and soil erosion, and seasonal changes in rainfall patterns, will have obvious effects on the sediment load and sedimentation processes of the rivers. We must certainly expect more sudden and higher floods, lower water levels during the dry season, greater turbidity and increased bottom freight, and partial silting of the river beds in unpredictable places.



Cleared rainforest near Manaus, Brazil. The soils of Amazonia are easily eroded. Compaction is also a problem. In areas where the soils contain laterite, exposure to the sun turns the earth brick-hard.

Aesthetic Loss

'Life' on earth does not consist of the metabolic processes occurring in the organisms or in the flux rates of matter and energy through the ecosystems. Perhaps the most striking essentials of life are its diversity and polychromy. That peculiarity ranges from the number of possible combinations of amino acids in protein molecules (compared to which the mass of the whole universe expressed in the lightest hydrogen atoms is infinitely small)¹⁸ to the insight that 'the purpose of the world is not the best possible general welfare but richness in fates'.¹⁹

With this statement we leave the realm of pure classic natural sciences and enter another spiritual dimension of such qualities as beauty and, more essentially, ethics. In this context let me quote the American anthropologist Roy Rappaport who said 'knowledge will never replace respect in the attitude of men vis-à-vis ecological systems, since the latter are so complex that sufficient understanding of their content and structure may never be at hand to permit predictions about results of their actions'.²⁰

These words are clearcut, but they are not observed by modern 'de-

velopment' schemes. These envisage and take for granted only hoped-for quantitative production, mostly of export goods. They fail to consider the losses which will occur when the Amazon forest ecosystem, evolved over millions of years and maintained by its native peoples in their adapted cultures, is destroyed within a few decades.

Development for whom?

The question thus arises: what is behind the risky projects whose proponents show no 'respect' for that ecosystem, but aim only to exploit Amazonia?

It is only too obvious that the 'development' ideas come from non-Amazonian people, be they in Europe, North America, Japan, or in the modern centres of southern Brazil. They come from a mentality evolved in temperate climates and under different geographical, historical and social conditions, culminating in the present 'highly developed' industrial-commercial civilisation.²¹ The plans are conceived and elaborated solely to serve that civilisation all over the world. They are not for the local population of

Amazonia (whether Indians, *caboclos* or other Amazonised inhabitants), and are not intended to safeguard the basis of these people's future. This is nothing but a new wave of conquests now sweeping over the last vast tract of land spared by the original and subsequent European conquests.

What is needed is to care about the local population, which is also multiplying, and about its needs and its future. Current projects of giant enterprises for export, and of megacolonisation by foreign settlers, are obnoxious to the people of Amazonia and to future generations.

Instead, a really rational and lasting utilisation of Amazonia must benefit her true inhabitants and must be based on strict observance of the well-known ecological peculiarities of that country. That means the reverse of the present policies. The diverse Amazonian forest must be maintained as a continuum, in space and time. Inside it, population centres of limited size and number should be built as 'islands' of human civilisation separated from each other by the forest. As much as possible should be recycled, with just enough produced for export to enable the people to purchase necessary goods.²²

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MAJOR WORLD BANK PROJECTS

Their impact on
People, Society
and the Environment

by *Graham Searle*

This study was commissioned by the International Institute for Environment and Development (IIED) to serve as a background document for a proposed meeting between the World Bank and its principal critics.

Searle looks carefully at the probable human, social and ecological consequences of three World Bank projects, the **Narmada River Development Project** in India, the **Polonoroeste Project** in Brazil and the **Indonesian Transmigration Programme**, which were to be discussed at the meeting.

The material on which the study is based was largely obtained from the World Bank itself and the study was conducted with the full co-operation of the Bank's project staff.

Unfortunately, the meeting, originally scheduled for June 1986, was postponed to October 1986 and eventually cancelled while the IIED decided against publishing the study.

The Wadebridge Ecological Centre, however, decided that this document must be published because of its value to those concerned about the role played by the World Bank in determining the present course of Third World development. This has been made possible by a generous grant from the Rowntree Social Services Trust, to whom all thanks are due.

Maps, tables and diagrams as well as references to the World Bank documents used to compile the study are included.

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As a basic concept for such true development, in a humane sense for a growing number of people, without destroying the extremely fragile landscape, its diversity and sustainable bio-productivity, the ideas of Schumacher's *Small is Beautiful*²³ may be taken as a guideline. Some groping experiments in that direction have already started. May they be successful and triumph over the destructive objectives of instant profits for foreign regions and peoples.

Acknowledgement:

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The Significance of the Amazon Basin for Global Climatic Equilibrium

by Peter Bunyard

Tropical forests play a vital role in regulating the world's climate. Not only will their loss reduce evapotranspiration, thus disrupting the global hydrological cycle, but it will also alter the chemistry of the atmosphere, adding appreciably to the amount of CO₂ and other gases in the atmosphere. Although the precise long-term outcome is unpredictable, the destabilisation of the climate seems a certainty.

Like other stars, the sun is getting hotter as it ages, the main reason being the formation of a helium layer which acts as a blanket keeping in the heat and thereby speeding up the thermonuclear process. Atmospheric carbon dioxide concentrations were hundreds of times greater early on in the earth's history. Such high concentrations at a time when the sun had a solar constant 70 per cent of the present day may have been vital for keeping the Earth warm enough to have enabled the evolution and development of life. The dumping of carbon dioxide by photosynthesising organisms, initially the cyanobacteria, may well have been a crucial process in the maintenance of a planet with a tolerable climate for life to continue.

Our disturbance of that natural process is likely to have profound effect on global climate. The burning of fossil fuels leads to the annual release of approximately 5 billion (10⁹) tonnes of carbon each year into the atmosphere, some 60 billion tonnes overall having been released between 1850 and 1950. Calculations¹ indicate that worldwide deforestation injects between 5 and 10 billion tonnes of carbon into the atmosphere each year, with 3 to 6 billion tonnes coming from the destruction of tropical forests alone. Such estimates are contingent on the forest biomass being converted into gases through burning and other oxidation processes. The oxidation of forest humus releases in the region of 2 billion more tonnes of carbon each year.

Of all the carbon dioxide injected into the atmosphere, some 50 per cent remains in the atmosphere, the rest having been absorbed into the oceans or actively taken up by marine algae (coccolithophorids for example) and converted into calcium carbonate. Moreover, the increase in pri-

mary photosynthetic production stimulated through the accumulation of carbon dioxide in the atmosphere is far from compensating for the quantities discharged each year through fossil fuel burning and deforestation. Thus the increased photosynthetic productivity worldwide brought about through the one part per million per annum increase in atmospheric CO₂ is likely to give a maximum of 0.24 billion tonnes of carbon—hence less than one-tenth of the quantities released through clearance of tropical forests.

CO₂ and the Greenhouse Effect

The importance of CO₂ as a greenhouse gas is now generally accepted. Today, with a warmer sun compared with previous aeons, the equilibrium temperature at the top of the earth's atmosphere is found to be approximately 267 K or -16°C. Yet the average temperature at the earth's surface is 288 K or 15°C, therefore more than 30°C hotter, thus enabling the survival of much of life on earth. Climatologists expect atmospheric carbon dioxide levels to double in the next century compared to the 260 ppmv* of the early 1800s. A doubling of the CO₂ leads to an extra 1.5 per cent of solar radiation being trapped—hence equivalent to placing a 15 watt light bulb every four square metres over the surface of the earth. Equally significant, the effect of doubling CO₂ on the global energy balance is some 80 times greater than the heat generated by the burning of fossil fuels or of the forest that gave rise to the CO₂ in the first place. The general consensus is that a doubling of the CO₂ content in the atmosphere will lead to a 2 to 3°C increase in the globally averaged surface air temperature. There may be some compensation in

terms of greater cloud cover through enhanced evaporation, the cloud cover raising the albedo and hence the reflectivity of the earth's surface. On the other hand, as I shall show, the loss of forest, particularly in the Tropics, may lead to a considerable diminution of evapotranspiration. A significant drying out of the moist Tropics may therefore be one consequence of deforestation.

Evapotranspiration and Deforestation

Research in the Amazon in particular has revealed the remarkable efficacy of the intact forest in returning moisture to the atmosphere. According to E. Salati and his colleagues,² approximately 50 per cent on average of the rain falling over the Amazon Basin is both evaporated and transpired: in some regions, for instance close to Manaus, the amount being returned through evapotranspiration may be as high as 75 per cent. Since the rainfall over the equatorial region tends to be high, the total amounts of water being returned to the atmosphere are considerable. Estimates indicate that 12 trillion (10¹²) cubic metres of rain fall over the Amazon Basin each year, of which 6.5 x 10¹² is evapotranspired.

The vaporisation of such large quantities of water absorbs very large quantities of energy in terms of solar heat. According to Luiz Molion, on dry days 75 per cent of the absorbed radiative energy is consumed in evapotranspiration and the remaining 25 per cent in heating the air. Hence the vapour returned to the atmosphere exerts a considerable cooling effect, equivalent to perspiration, on the total surface environment.

A number of crucial questions follow such discoveries. How much re-

*part per million volumetric.



Mark Edwards—Still Pictures/Panos Pictures

Deforestation is already having a significant effect on local climate, causing forests downwind of encroachments to dry out.

cycling of water goes on over the Amazon Basin, and how essential is the forest upwind for the watering and integrity of the forest downwind? Will massive deforestation in one part of the Amazon Basin lead to a drying out and decimation of that in other parts? Salati and his co-workers have found through investigation of the movement of the oxygen isotopes 16, 17 and 18 (mass number) that recycling of water from east to west across the Amazon Basin plays a significant role in the watering of the forest. Salati is concerned that this recycling mechanism will be perturbed if not jeopardised through the wholesale destruction of the forest. And because of poor soils of Amazonia, regeneration of adequate forest may take one thousand years or more.

Experiments carried out by Judy Rankin in the Amazon Basin indicate that isolated patches of forest of even up to 1000 hectares cannot be self sustaining, in marked contrast to patches of forest in temperate zones. Thus Rankin found that within a couple of years of the forest being cleared around the intact patches degradation sets in starting at the edges and moving in. Winds penetrating the forest and uprooting trees are one factor; drying out is another. Disturbance of flowering and fruiting through disruption of the co-existence of animals and plants may well be another destructive force.

The climatic consequences of the loss of tropical forest are consider-

able. A substantial proportion of the evapotranspired vapour is carried either side of the intertropical convergence zone high into the troposphere and then towards higher latitudes where it gets caught up in the Hadley Cell circulation of winds that move first eastwards—the westerlies—and then return to the Americas as the trade winds. On precipitation, the latent heat bound up in vaporisation is released, some 560 calories per gram. In that way heat is transferred from the Tropics to the higher latitudes thus contributing significantly to a more equitable climate in temperate areas. In effect, without the tropical forest, and that of the Amazon Basin in particular, the Tropics would tend to be hotter and drier and the temperate regions both sides of the equator colder. The moist tropical forests of the world can therefore be considered as a vital component in the process of pumping heat from the hot regions of the globe to the cooler regions.

The transfer of heat through vaporisation followed by precipitation is considerable. Professor Jan Peagle points out that 2 centimetres of rain is sufficient to heat the entire troposphere by some 6°C. During peak rainfalls exceeding 6 cm, the heat released is sufficient to warm the tropospheric column of air above the earth by as much as 20°C. Meanwhile sensible, direct heat from the sun over the course of a day can only warm up the air column by less than 2°C.

Changing Atmospheric Chemistry

Deforestation is likely to lead to subtle though consequential changes in the chemistry of the atmosphere. As Paul Crutzen³ points out, the tropical atmosphere generates a highly reactive chemical radical, produced through the photolysis of ozone by means of ultraviolet radiation. That radical, known as hydroxyl, is present in minute quantities, its mixing ratio being 2×10^{-14} , yet it is responsible for the removal of many trace gases from the atmosphere, in particular methane and carbon monoxide, but including hydrogen sulphide, the nitrogen oxides and almost all organic gases. All these, after reacting with hydroxyl form highly soluble products that are efficiently scavenged by rain fall.

Man's activities in the tropics are having a significant effect on atmospheric chemistry. In particular the chopping down of trees and their burning is increasing the burden of both carbon monoxide and carbon dioxide in the atmosphere, while increased rice production is adding substantially to the amount of methane being liberated from the soil. Cattle ranching as well as termite activity, enhanced through razing the forest, are also responsible for methane production, cattle adding to atmospheric methane through belching.

Around 2-3 million hectares per year are now cleared in the Amazon Basin alone for annual crops and pastures, well over 100,000 square kilometres having been cleared in that region for cattle between 1966 and 1983. In terms of methane releases into the atmosphere, estimates indicate that they amount to 380Tg (teragrams or 10^{12} g) per year, divided into the following categories: domestic ruminants 80Tg; biomass burning 45/60Tg; natural gas leaks 33Tg; coal mining 34Tg; rice paddies 120Tg; and natural wetlands 70/50Tg.

The annual growth rate in worldwide cattle population in the decade between 1970 and 1980 was approximately 1 per cent; in coal and natural gas production 2.2 per cent and in rice paddy area about 0.7 per cent. According to Crutzen, methane is increasing in the atmosphere by about 1.2 per cent per year suggesting an annual growth of 4.6Tg, and there-

fore 1.6 per cent of the total anthropogenic source. The annual increase in methane emissions as a result of rice paddy, cattle production and fossil fuel use amounts to some 2.9Tg, leaving 1.7Tg unaccounted for. Biomass burning will account for some of that difference, but Crutzen suggests that increased methane in the tropical atmosphere is reducing the concentration of hydroxyl and therefore effectively reducing the oxidative and cleansing powers of the atmosphere in that part of the globe.

Laboratory experiments indicate that for each methane molecule oxidised in environments which are poor in nitric oxide (NO) 3.5 hydroxyl radicals are consumed as well as 1.7 ozone molecules. Equally, when carbon monoxide, largely produced from biomass burning in the Tropics, is oxidised by hydroxyl in an NO_x-poor atmosphere, such as one finds over the equatorial region, both hydroxyl and ozone are consumed.

The net result of these oxidations in the tropical environment is that the oxidative powers appear to be constantly diminishing. The overall effect of that change remains to be seen.

The situation has become markedly different over the industrial areas of the northern latitudes. There fossil fuel burning has led to the release of NO_x, particularly nitric oxide, as well as of unburnt hydrocarbons. Where NO levels are high the oxidation pathway takes a different turn, the nitric oxide effectively catalysing the production of both hydroxyl and ozone. Thus when methane is oxidised in a NO-rich atmosphere via carbon monoxide half an odd hydroxyl radical is generated as well as 3.7 ozone molecules. The atmosphere over industrial areas has therefore become more powerfully oxidising, one consequence being an acceleration in the oxidation and deposition of acid oxides such as sulphur dioxide and nitrogen oxides.

Increasing Instability

Overall, what are the implications of increasing hydrocarbons such as methane in the atmosphere? First, a loss of oxidative powers over the Tropics is leading to the gradual build-up of various gases such as methyl chloride and methyl chloro-

form which would otherwise swiftly get oxidised and scavenged. These gases will now increasingly pass into the stratosphere where they serve as precursors for chlorine production, the chlorine being able to interact with ozone.

Moreover, because methane is increasing by more than one per cent each year, the imbalance between hydroxyl production and its destruction will increase, further diminishing the oxidative powers of the atmosphere. On the other hand, methane destruction may increasingly take place in higher latitudes where the NO concentration is greater because of man's industrial activities. Thus, there may be an increasing tendency to lose ozone in clean, tropical atmospheres and to generate it in polluted areas. The loss of ozone in tropical areas will be accentuated by the production of chlorine and water vapour, whereas its production over industrial areas will accelerate acid

Man's activities in the tropics are having a significant effect on atmospheric chemistry.

deposition, whether the source of the acid precursors is bio- or anthropogenic.

In conclusion, deforestation in the Amazon Basin may well lead to significant changes to global climate through perturbing the hydrological cycle, while equally altering atmospheric chemistry and contributing to enhanced oxidation processes in the atmosphere over industrial areas.

Notes:

1. Ramade, R. *The Ecology of Natural Resources*, (Wiley) 1984.
2. Salati, E. *The Geophysics of Amazonian Vegetation and Climate Interaction*, Chapter 15, pp 273-296, (Wiley) 1987.
3. Crutzen, Paul, supra note 2, Chapter 8, pp 108-130.

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Forestry Myths and the World Bank

A critical review of Tropical Forests: A Call for Action

by Vandana Shiva

The World Resources Institute's Call for Action blames the poor for deforestation and proposes commercial forestry as the solution. If implemented, it can only further the exploitation of the world's tropical forests.

There are four pervasive myths behind current international forestry programmes which militate against their becoming strategies for the ecological and economic recovery of marginalised communities.

The four myths are:

- (a) That people, not profits, are the primary cause of tropical deforestation;
- (b) That the "developed" world has protected its forests and must teach conservation to the Third World;
- (c) That commercial forestry, based on private ownership, can solve the fuelwood crisis for the poor; and
- (d) That commercial afforestation can guarantee ecological recovery.

These myths are revived in the recently published World Resources Institute (WRI) report *Tropical Forests: A Call for Action*, published for the World Bank and UNDP. We in the Third World in general, and India in particular are familiar with these myths. They were the political tools used for the colonisation of common forest resources by the British. The centres of exploitation and planned destruction might have shifted from the East India Company and the Crown in London a century ago to the World Bank in Washington in contemporary times, but the logic of colonisation has not changed. The British, too, talked of "forest conservation" while creating a policy for deforestation. The World Bank, in the same vein, is talking of conservation of tropical ecosystems while financing projects that will destroy tropical ecosystems.

The World Bank's *Call for Action* is inconsistent with the socio-ecological imperatives of sustainability and survival in the tropics. It threatens to create new forms of poverty for the poor, and new forms of ecological destabilisation, even though the World Bank attempts to legitimise its forestry projects on environmental grounds and grounds of poverty alleviation. But legitimisation and packaging are not the same as content. In reality, all forestry programmes, all the tropical forestry action plans, reflect World Bank's commitment to the market economy in which neither the poor nor nature have a role—except as victims.

The market economy cannot solve the tropical forestry crisis. On the contrary, the tropical forestry crisis has emerged from the increased commercial exploitation of tropical forests and resources. It is important to keep the

history of forest management in mind to ensure that the new prescriptions of afforestation are not worse than the disease of deforestation.

What destroyed Tropical Forests—Profits or People?

The WRI report revives the myth that it is local people who destroy tropical forests. It states that

"it is the rural poor themselves who are the primary agents of destruction as they clear forests for agricultural land, fuelwood and other necessities. Lacking other means to meet their daily survival needs, rural people are forced to steadily erode the capacity of the natural environment to support them."¹

The reality of deforestation is however quite different. The tribals of Bastar in India, for example, have protected their forests over centuries. By contrast, a World Bank project for "forest development" has proved a major cause for deforestation in the region. This project, the Madhya Pradesh Forestry Technical Assistance Project (Credit 608-IN, December 1975), was the Bank's first intervention in forestry in India, and was directed primarily towards the development of plantations for the pulp and paper industry.

Similarly, the WRI report cites the worldwide distribution of tropical pine as a "success" story, an example of the scientific excellence of the forestry research undertaken by the Commonwealth Institute.² Yet, under the Bastar Tropical Pine Project, 8,000 hectares (ha) of natural forests in the Bastar Hills were to be converted to pine plantations, at a cost of Rs 96 million, in order to feed the paper and pulp industry. The project was finally shelved as a result of serious resistance by local tribals for whom this was an example of a forestry disaster, not a "success". The project was based not on scientific knowledge but on ecological ignorance, both of the forest ecosystem and of the tribals integration with that ecosystem. It was a prescription for the destruction of tropical forests, not their development, it was a project aimed at changing the character of the forests in such a manner that they exclusively serve commercial interests, and not the indigenous peoples.³

The truth is that the commercialisation of forests is the primary cause for most largescale and rapid deforestation. Forest dwellers are the victims, not the agents, of deforestation—be it in Bastar in Central India, in the Andaman and Nicobar Islands, in the North East or in the Himalayas. Blaming the people has been an old

strategy used by commercially oriented bureaucracies to usurp control and management of forests from local communities.

The Lessons of History

While the destruction of forests throughout the nineteenth century in India was rooted in British commercial interest, the reservation of forests through the Forest Acts was legitimised by blaming local people for forest destruction and by denying their ancient forest rights. As Pant observed for the Himalayas; "The tale about the denudation of forests by the hillman was repeated *ad nauseam* in season and out of season by those in power so much so that it came to be regarded as an article of faith . . ."⁴

In the Kumaon region, there is evidence that it was the needs of the empire, not of the local people, that led to rapid forest denudation. According to Athinson's *Gazeteer*:

"The forests were denuded of good trees in all places. The destruction of trees of all species appears to have continued steadily and reached its climax between 1855 and 1861 when the demands of the Railway authorities induced numerous speculators to enter into contracts for sleepers, and these men were allowed, unchecked, to cut down old trees very far in excess of what they could possibly export, so that for some years after the regular forest operations commenced the department was chiefly busy cutting up and bringing to the depot the timber left behind by the contractors."⁵

By contrast the local people had conserved their forests over generations:

"A natural system of conservancy was in vogue, almost every hill top is dedicated to some local deity and the trees on or about the spot are regarded with great respect so that nobody dare touch them. There is also a general impression among the people that every one cutting a tree should plant another in its place."⁶

Legitimising Experts

The new wave of blaming the people for environmental destruction in general, and deforestation in particular, arises from the desire of agencies like the WRI, the World Bank and the UN Food and Agriculture Organisation (FAO) to legitimise and facilitate the transfer of resource control and forest management from local people to the state, from Third World countries to pseudo-experts in international aid agencies in the North. As Lloyd Timberlake has pointed out, Africa is not dying because Africans are ignorant, on the contrary, "Africa is dying because in its ill planned, ill advised attempt to 'modernise' itself it has cut itself to pieces."⁷

The WRI report, however, prefers to perpetuate the myth that Africa's crises are created by the poor in Africa. Referring to the degradation of the Ethiopian Highlands, it states:

"The Central Highlands Plateau in Ethiopia supports 22 million farmers (70 per cent of the population) and contains 59 per cent of the country's cultivable land. Exhaustive farming practices, overgrazing, and fuel-wood collection have severely eroded the plateau and destroyed most forest. Loss of soil fertility is widespread and the use of fertiliser is so limited that food

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FINANCE AS IF PEOPLE MATTERED



The report blames the poor for deforestation but fails to mention the devastation caused by large development projects.

production has not kept pace with population growth. Drought has precipitated a major famine."⁸

What the WRI report fails to mention is that it is profits, not people, that are ultimately responsible for the degradation of the Ethiopian highlands. Under the Third Five Year Plan (1968-73), Ethiopia spent only one per cent of the total expenditures on peasant agriculture and instead emphasised the rapid development of large-scale commercial farms producing crops for export. Tractors, pesticides, fertilisers were exempted from import duty. Multinationals making agrarian investments of \$200,000 or more were given a 3 to 5 year income tax holiday. Commercial development of the Awash Valley was part of the plan. By 1970, 60 per cent of the land brought under cultivation in the Awash Valley had been devoted to cotton production, while sugar plantations claimed another 22 per cent of the cultivated area. To make way for these multinational-managed commercial farms, the government had forcibly evicted Afar pastoralists from their traditional lowland pastures. The Afars were thus pushed into the fragile uplands which were rapidly overgrazed and degraded.⁹ The degradation of the Ethiopian highlands thus needs to be viewed in the context of the introduction of commercial export agriculture in the lowlands, and the consequent displacement of nomads and peasants. It is not local ignorance but the exploitation of land and forests by commercial companies that is responsible for the tropical forest crisis.

The Impact of Large-Scale Projects

It is not just World Bank forestry projects which have destroyed tropical forests. In India, the World Bank has financed the destruction of tropical forests through the dams on the Narmada River (see *The Ecologist*, vol.17, No 2/3) and through mining and energy and generation at Singrauli in Central India. In Brazil, the World Bank has financed the destruction of the Amazonian rainforests through the Grande Carajas project (see *The Ecologist*, vol. 17, No 2/3) which takes up 10 per cent of the Amazon region. The project involves mining and about 30 large dams like the Tucuruí and Balbina. Friends of the Earth (Brazil) have strongly criticised the WRI's *Call for Action* for ignoring the effects of these projects (see article, p 150).¹⁰

Who will Conserve Tropical Forests?

The WRI report states that "developed and developing countries differ sharply in the conditions of their forests and the status of forest conservation and management. The forest area of many developed countries has stabilised and, in some cases, has increased during this century."¹¹ The report suggests that this was achieved exclusively through the scientific and technical superiority of the developed countries. What it fails to highlight is that the regeneration of forest resources in the North was made possible by shifting the burden of deforestation to the tropics through colonialism. The myth that "experts" from Washington are needed to save tropical forests is a renewal of an old myth that the British would "conserve" India's forests when in fact they were busy depleting them.

As Stebbing reports, in 1805 a despatch was received from the Court of Directors of the East India Company enquiring to what extent the King's Navy might, in view of the growing deficiency of oak in England, depend on a permanent supply of teak timber from Malabar. Thus the first real interest in the forests of India originated not in India but from the colonial centre—London. The consequences were devastating. As Stebbing notes:

"When the British started exploiting Indian timber for military purposes, they did it rapaciously, because the great continent appeared to hold inexhaustible tracts covered with dense jungles."¹²

To the British Government and its officials, the vital role which forests play in nature's economy and the great influence they exercise on the physical well being of a country went unrecognised.

The military needs for Indian teak led to an immediate proclamation usurping the traditional rights over teak trees from the former government in the South and vesting it in the East India Company. Under further pressure from the British Government to ensure the future strength of the King's Navy, the decision was taken to appoint a special officer to supervise the forest exploitation. Since this was a policing job, Captain Watson of the police was the officer selected, and he was appointed the first Conservator of Forests in India on 10th November 1806. Under the proclamation of April 1807, he wielded great powers, and interfered seriously in the rights of local people. From the outset, therefore, the "conservation" of forests, as practised by the British, was totally divorced from any notion of ecological conservation: rather it had to do with "conserving" the resource for exploitation by the British.

The Conservator soon established a timber monopoly throughout Malabar and Travancore and furnished the government with a plentiful supply of cheap timber, as did his immediate successors. But the methods by which this was done gave rise to seething discontent which rose to such a point that the Conservatorship was abolished in 1823.

The introduction of colonial forestry was therefore not associated with superior forestry knowledge or scientific management, but with a dominant military need and with the usurpation of traditional rights. It was only after more than half a century of uncontrolled destruction of forests by British commercial interests that an

attempt was made to control the exploitation. In 1865, the first Indian Forest Act (VII of 1865) was passed by the supreme Legislative Council, which authorised the Government to declare forests and wastelands ("benap" or unmeasured lands) as reserved forests. This was repealed later by the Forest Act of 1878.

Scientific Forestry?

The introduction of this legislation marks the beginning of what has been called "scientific management", but which actually amounts to the erosion of the traditional rights of access to forests and the erosion of the rich tradition of forest conservation in the subcontinent. The new "scientific" tradition of commercial forestry that was developed by the British a century later became, in effect, a policy for deforestation.

The WRI report is a contemporary example of Orwellian double-speak in which ecological destruction is called environmental protection. It is a revival of the myth that destroyers of tropical forests would protect them, that peoples alienated from and ignorant of tropical forests would prescribe to those who have generations of forestry knowledge about local forest ecosystems. The arrogant ignorance of Washington experts becomes evident when the report states that "solutions are known" and fails to accept that project after project which has originated in Washington has been shown to be socially and ecologically flawed. The World Bank's definition of "productivity" and "development" have been systematically found to be in direct contradiction with concepts of "productivity" and "development" from the perspective of local needs and sustainability.

The goal of the market economy is the commercialisation of forestry and land use. Commercial interests

have the primary objective of maximising profitability through the extraction of commercially valuable species. Forest ecosystems are therefore reduced to the timber mines of commercially valuable species.

"Scientific forestry" in its present form is a reductionist system of knowledge which ignores the complex relationships within the forest community and between plant life and other resource like soil and water. Its pattern of resource utilisation is based simply on increasing "productivity". By ignoring the linkages within the forest ecosystem, this pattern of resource use generates instabilities in the ecosystem and leads to counter-productive use of natural resources at the ecosystem level. The destruction of the forest ecosystem and its multiple natural benefits in turn hurts the economic interest of those groups of society which depend on the diverse functions of the forests for their survival. These functions include soil and water stabilisation and the provision of food, fodder, fuel and fertiliser. Forest movements like Chipko (see *The Ecologist*, vol.17, No.1) are simultaneously a critique of reductionist "scientific" forestry and an articulation of an alternative forestry science which is ecological and which can safeguard the people's interest. In this alternative forestry science, forest resources are not viewed as isolated from other resources of the ecosystem. Nor is the economic value of a forest reduced to the commercial value of timber. "Productivity", "yield" and "economic value" are defined for the integrated ecosystem and for multipurpose utilisation. Their meaning and measure is therefore entirely different from the meaning and measure employed in reductionist forestry. Thus while for tribals and other forest communities a complex ecosystem is productive in terms of herbs, tubers, fibre and the gene-

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pool, for the forester, these components of the forest ecosystem are useless, unproductive, dispensable. Different economic perspectives thus lead to two different notions of "productivity" and "value".

As far as overall productivity goes, the natural tropical forest is a highly productive ecosystem. Examining the forests of the humid tropics from the ecological view, Golley has noted:

"A large biomass is generally characteristic of tropical forests. The quantities of wood especially are large in tropical forests and average about 300 tons per hectare compared with about 150 tons per hectare for temperate forests."¹³

However, from the viewpoint of modern 'scientific' forestry, the overall productivity is not important. Such forestry looks only for the industrially useful species and measures productivity in terms of industrial biomass alone. As Bethel states, referring to the large biomass typical of the forests of the humid tropics,

"It must be said that from a standpoint of industrial material supply, this is relatively unimportant. The important question is how much of this biomass represents trees and parts of trees of preferred species that can be profitably marketed. . . . By today's utilisation standards, most of the trees, in these humid tropical forests are, from an industrial materials standpoint, clearly weeds."¹⁴

These assumptions, which wed 'scientific' forestry to the forest industry, have resulted in large tracts of natural tropical forests being destroyed across the Third World. The justification is increased 'productivity' but the productivity is actually decreased because genetic wealth is destroyed as "weeds". The replacement of natural forests in India for eucalyptus plantations has been justified on the grounds of improving the productivity of the site. However, it is a one-sided view of productivity. Indeed, what has been called the 'eucalyptus controversy' is in reality a paradigmatic conflict between an ecological "peoples" forestry and a reductionist "industries" forestry which only responds to commercial requirements. While natural forests and many indigenous tree species are more productive than eucalyptus in the ecological paradigm, the reverse is true in the reductionist paradigm of forestry. The scientific conflict is an economic conflict over which needs and whose needs are more important. It is time to reverse the domination of Third World development by the North so that peoples' needs and their knowledge of local ecosystems can become the basis of a sustainable development.

Can Commercialisation satisfy Basic Needs?

The World Resources Institute cites World Bank 'Social Forestry' projects in India as success stories.¹⁵ These projects have been launched ostensibly primarily for social objectives, to correct the one-dimensional commercial forestry that has made forest resources more scarce for the poor. The aim has supposedly been to enhance the availability of organic fertiliser, food, fodder and fuel for local populations. The result, however, is further erosion of rights and resources. More than 90 per cent of tree planting under social forestry has been of eucalyptus.¹⁶ Nearly all of it has been on fertile agricultural land, and all of it has been

marketed to urban industrial centres, especially for the pulp industry. New enterprises have emerged to produce "green gold" on farmlands with the promise that "money grows on trees". The result has been a serious reduction of food availability, a decline in agricultural employment, and an increasing scarcity of fuel, fodder and fertiliser in rural areas.

Two Economies

It is critical to remember the distinction between two kinds of biomass economies:

- (a) the *survival or sustenance economy*
- (b) the *commercial or market economy*

Production and distribution in the first is based on the organisation of rights and entitlements that ensure that forest and tree produce reaches Gandhi's proverbial last man. Production and distribution in the second is based on the strength of purchasing power, which more than 70 per cent of Indians, living below the poverty line, do not have. Commercial forestry cannot provide justice to the 70 per cent of peasants and forest dwellers who depend on rights and entitlements, not on purchasing power, to satisfy their basic sustenance needs.

At the root of current afforestation projects is the assumption that different management structures are organisationally equivalent. It is assumed that the outcome is the same whether a resource is managed collectively or whether it is privatised, whether it is managed by multinational corporations or by local tribals. This assumption of "organisational equivalence" then allows the growth of organisations which lend themselves more easily to serving the interests of more powerful economic groups.

However, as the ecological audit of different afforestation programmes has shown, the organisational structures which are effective tools in a *market economy* can actually be inconsistent with the needs of the *survival economy*. Large-scale, even-aged



Lack of firewood has led Indian peasants to burn cow dung, a precious source of fertiliser. India's social forestry programme has done little to relieve the problem. Yet it is hailed as a success story in the World Resources Institute report.

monocultures match the needs of the pulpwood or the plantation industry. However, for local needs, multi-purpose tree planting is needed for food, fuel, fibre, fodder, fertiliser, oilseeds and medicines.

In biomass production, as in any other form of production, the relations of production determine the relations of distribution. How production is organised determines how the produce is distributed. If production is organised in accordance with the logic of the market economy, it will be distributed according to that logic. Purchasing power, not need, will determine access and entitlement. The poor who have no purchasing power, but whose needs are the greatest, cannot register their demands through the organisational structures of the market.¹⁷ The success of tree planting in the commercial economy does not automatically translate into successful tree-planting for the survival economy.

Competition with Food Crops

The World Bank model of forestry results in undermining food production not just at the site of the plantations, but throughout the country. A forestry investment of \$1,200 million as outlined in the WRI report involves borrowing—and debt repayment involves higher and higher production of primary commodities for exports, so that land everywhere is diverted from basic food production for local consumption to cash crops for the global market. The WRI's investment is, moreover, based on a failure to recognise that peasants, everywhere, have always planted and protected trees under economic and legal conditions that allow them to do so. The social imperative in forestry is not higher foreign debts for tree planting but a revival of people's rights so that they are not alienated from their life support base.

Can Commercial Tree Planting ensure Ecological Recovery?

In recognition of the ecological crisis generated by deforestation, India has launched massive afforestation projects. Besides the social forestry projects in each state the World Bank has financed watershed projects in the Himalayas and a national wasteland development project has also been launched.

The World Bank Watershed projects are not projects for the ecological recovery of watersheds, however. They are instead projects for transforming the survival economy and nature's economy in watershed regions into a market economy. The Nayer Watershed project with funding of \$6,912 million is an example. While the stated aim of the project is to reverse ecological decline—in effect to strengthen nature's economy and the survival economy—the project itself is largely a prescription for introducing commercial activities in the watershed. The sophistication of traditional agricultural practices in hill areas, including ancient techniques of soil conservation through terracing and mulching, are not even acknowledged in the project. Instead, the introduction of intensive chemical farming is recommended with total indifference as to how chemical farming is a significant cause of soil and

Two Views of the Forest Crisis

	The view from Washington	The view from the people
Who destroys the Forests?	People Destroy Forests	Profits Destroy Forests
Who is a tropical Forest Expert?	Scientific knowledge of tropical forestry exists only with experts in the aid-giving countries of the North	Women, peasants, forest dwellers are the best experts in tropical forestry and ecology. Expatriate experts are trained only in a particular forestry science which caters to markets and works against people and nature.
What is the most effective means for solving the biomass crisis of the poor?	Privatisation is the most efficient mechanism for providing biomass to the poor.	Privatisation erodes the access and entitlements of the poorest to land and biomass.
What is the most effective mechanism for ecological recovery?	Profitability criteria can be an exclusive and effective guide to ecological rehabilitation.	Exclusive concern with profitability has caused ecological destruction and therefore cannot reverse it. Afforestation programmes based on profitability alone can become ecological hazards in themselves.

water degradation. There is also a policy prescription for genetic erosion in agricultural crops.

It is an established fact that indigenous mixed and rotation cropping systems are the best mechanisms for soil and water conservation. While flood control and catchment stability is the main objective of watershed development, the success of the project is measured only in terms of increased cash flows. From being a project for ecological rehabilitation for the benefit of the survival economy, the watershed development is reduced exclusively to an activity in the commercial economy. The World Bank appraisal makes explicit this shift in evaluation criteria:

"The direct production effects generated by project actions provide sufficient economic justification for the project. The project is a pilot scheme leading to a long term programme for control of erosion within upper watersheds of the Himalayas, aimed at reducing run-off and decreasing the silt load of the rivers. Little data is, however, at present available to evaluate the economic effects of controlling erosion and flooding".

A project aimed primarily at conservation and rebuilding nature's economy in degraded catchments is not even being evaluated in accordance with conservation criteria. On the contrary, by interpreting watershed development merely as the development of the market economy in the watershed, land use shifts are introduced which further threaten to destabilise soil and water systems. Such impacts, moreover, are not even anticipated or monitored, leaving the further erosion of ecological stability as an invisible factor in catchment degradation.

The World Bank's Panar Watershed project in Almora district similarly threatens to be an ecological and

economic disaster. Eighty per cent of the finances of the project are for planting pine, converting the watershed into a "mine" for timber and resin, not a stable source of water. The local population is seriously resisting the pine plantations on the grounds that they will destroy water resources and fodder resources. The people want mixed planting of indigenous species like oak, bhimal, timil, buras, which conserve soil and water and provide rich fodder. The strengthening of nature's economy and the survival economy is however not in accordance with the World Bank's development policy which equates progress with commercialisation.

The WRI report also ignores ecological criteria for measuring success in the afforestation of upland watersheds. Ignoring the role of profits from cash-crop farming in Ethiopia's ecological destruction, the WRI report cites the largest soil conservation programme in Africa in the Ethiopian Highlands as a successful upland watershed project.¹⁸ Most tree planting in Ethiopia involved eucalyptus. After a decade, there has been no building up of ecological insurance despite large-scale planting of eucalyptus. In India, the district in Karnataka which tops the list in "successful" social forestry projects (see article p.151) also tops the list in water scarcity and in food—and fodder—scarcity. Planting on commercial criteria and in ecological ignorance has often worsened ecological conditions instead of improving them, because there is a distinction between:

- (a) nature's economy of sustainable production through the maintenance of essential ecological processes; and;
- (b) the market economy of non-sustainable production and exploitation.

In the former, successful development is a strengthening of nature's processes. In the latter, evaluation is based on financial resource flows. What might look "unproductive" from the perspective of the market can be very "productive" in terms of nature's productivity. This explains why so called primitive societies have often been, in terms of natural resources and basic needs, the "original affluent society". On the other hand, highly productive commercial projects can be unproductive and destructive at the level of nature's economy.

The ecological ignorance and indifference of agencies like the World Bank and the WRI becomes apparent in the investment profiles for the *Tropical Forest Action Plan*. Firstly, India is shown as needing a total of \$1,222 million for 5 years, which is far in excess of the investment for all of Africa, suggesting that it is not ecological survival, but market growth, that the Bank is interested in. For while survival might be more at stake in Africa, India's markets for wood products are far more promising. Secondly, in India \$500 million is for fuelwood and agroforestry, \$500 million for upland watersheds, \$190 million for industrial forestry and only \$32 million for ecosystem conservation. The problem with this categorisation is that:

- (a) It does *not* reveal that most "agroforestry", "watershed development" or "social forestry" consist of commercial industrial plantations;
- (b) It *does* reveal that the World Bank sees

agroforestry and upland watershed management as *not* being ecosystem conservation.

It is therefore natural that these projects fail to meet ecological criteria.

Deepening Nature's Exploitation

The World Bank's plan for tropical forests is not a plan for the conservation of tropical forests—it is a plan to expand and deepen nature's exploitation for the production of industrial/commercial wood. The report is misleading in its categorisation of forestry projects under the three heads of "Fuelwood and agroforestry", "Landuse on upland watersheds" and "Forest Management for Industrial Uses". All three categories of afforestation include large-scale, capital-intensive planting of commercial species like pines and eucalyptus which make no positive contribution to the local ecology and economy. There is no organisational or ecological difference in the successful case studies of "farm and community forestry" in India and industrial forestry in the Philippines. Only the names are different. Whilst the World Bank has financed production of industrial pulpwood by farmers as "social forestry" projects in Karnataka, India, it calls the same project "industrial" forestry in Mindanao in the Philippines. Since May 1974, the World Bank has provided US \$2 million to the Development Bank of the Philippines to supply 284,000 cubic metres of pulpwood to the Paper Industries Corporation of the Philippines (PICOP) which was formed within the Sorrono group of companies for manufacturing pulp and paper. The loan is used to finance farmers to shift from food production to production of fast-growing pulpwood trees on an 8-year rotation on 80 per cent of their land holdings. PICOP supplies seedlings at cost in exchange for first rights to the mature pulpwood.¹⁹ The World Bank is thus subsidising the rich industrialists of the Third World, while the poor lose livelihoods on land and are further burdened with the social and economic costs of paying back debts and interests on World Bank loans. The Third World poor are thus bearing a double burden of costs while the World Bank makes it easier for the rich to get new access to forest lands, village commons and even farmlands—all for the production of commercial wood. The names of projects vary from country to country, but the pattern is the same—more land for increased production of commercial wood, through the destruction of natural forests, through the destruction of watersheds, through the destruction of cropland.

The *Tropical Forest Action Plan* is a recommendation for the expansion of these destructive activities. In India it recommends the expansion of World Bank's "Social" Forestry Programme for commercial wood production which has desertified farmlands and displaced peasants at the rate of 200 man days per hectare per year at the cost of US \$500 million. At the cost of another US \$190 million, the WRI plan recommends the exploitation of 30 million hectares of natural forest and the establishment of industrial plantations at the rate of 240,000 hectares per year. In Brazil, it recommends an investment of US \$400 million to convert natural forests into plantations as a "Fuelwood and Agroforestry" project and another US \$325 million for managing 5

million hectares of Amazon forests for industrial wood production, and establishing 320,000 hectares of industrial plantations over a five year period. If the Action Plan is ever put into practice in India and Brazil alone, the people will have to bear the burden of US \$1,415 million of loans to destroy millions of hectares of natural forests and prime farmlands. This does not include destruction of watersheds through commercial tree planting (US \$500 million for India). The *Tropical Forest Action Plan* should more appropriately be called the *Action Plan for Tropical Forest Destruction*.

Why the Plan Must Fail

The new afforestation programmes of watershed development, social forestry and wasteland development have had primarily social and ecological objectives. However, an ecological audit of the tree planting strategies reveals that they have not been successful in either ecological recovery, or the recovery of the marginal communities for whom they were aimed. Success in tree planting has not been consonant with success in rehabilitating destabilised hydrological cycles and nutrient cycles or with success in enhancing the access and entitlement of the poor to biomass for their everyday needs.

The systemic inability of forestry projects to meet ecological and social needs arises, in our view, from wrong scientific and organisational assumptions. Scientifically, it is assumed that all trees and all forest ecosystems are ecologically equivalent. This assumption of the *ecological equivalence* of different tree species and silvicultural systems misses the difference between the imperatives of temperate zone and tropical zone forest management between commercial and conservation forestry and also the difference in the ecology of different tree species. The assumptions that temperate zone practices are suitable for tropical eco-zones have been identified as a significant cause of the erosion of forest resources even when "scientifically" managed. It also misses the physiological, and architectural, diversity in tree species which is matched to local ecosystem diversity. Trees have their own water requirements, nutrient requirements and patterns for partitioning organic matter, which are determined by their native habitat. The wrong species in the wrong place can undermine essential ecological processes and the satisfaction of basic needs. Different species have different ecological and social impacts, and different silviculture practices have different ecological and social impacts. Not all treeplanting helps to rebuild nature's economy. Some plantations cause major dislocations in nature's processes like other "development" activities. To subsume all tree planting under a uniform category of "green cover", using a false assumption of ecological equivalence, is to ignore the diversity in nature and the diverse human needs that nature's diversity supports.

Reversing the Process of Destruction

The socio-ecological crisis arising from deforestation can be solved only if the processes from which it arises are reversed. The spread of commercialisation of forestry and the logic of the market in forest

management have been the main causes of the deprivation of forest dwellers and rural communities, and for the destabilisation of the water cycle and the nutrient cycle, the two essential cycles of life. The further spread of the market ethic cannot but deepen social deprivation and ecological destabilisation. The protection of nature, and of the poor who depend critically on it for sustenance, needs new thinking and action which puts the imperatives of nature's economy and people's sustenance above the imperatives of the market.

The WRI action plan, based as it is on market imperatives, is a plan for the increased destruction of tropical ecosystems and the increased destitution of local communities. It is inherent to the logic of centralisation to destroy diversity, and hence the ecological stability to which diversity gives rise. The contemporary crisis in food production, and the attendant problem of famine, arises from the modernisation of agriculture through the green revolution. The increased ecological destruction in the Tropics will arise from the second green revolution—the total commercialisation of forestry including its genetic base.

Conservation presupposes maintenance of diversity, and diversity can only be maintained locally. The people's action plan for saving tropical forests and tropical people has to be based not on the rule of the market, but on respect for nature, and respect for peoples' survival needs. It has to be based not on viewing trees as "green gold" to be exploited and felled, but as life support systems which must be protected. In particular, it has to build on little traditions of little people which ensure the protection of nature and local communities and do not allow them to become victims of global markets and global plans originating in Washington.

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A Critical Review of Tropical Forests: A Call for Action

by Magda Renner

The WRI plan will not help conserve Amazonia. Rather it will promote the industrialisation of the rainforest. It has nothing to offer Brazil and should be rejected.

The Plan—as far as Brazil is concerned—does not go to the roots of the problem: namely, the ruthless exploitation by transnational corporations and powerful national groups and the terribly destructive “development” projects co-financed by international aid agencies. Both are carried out with the collaboration of the Brazilian government. The plan makes almost no reference to these major factors. We read instead that “tragically it is the rural poor themselves who are the major agents of destruction”.

In fact the poor very often are cited as the instruments of destruction, be it in Brazil, Indonesia, or wherever, but, as stated in a recent study undertaken in Indonesia (*A Review of Policies Affecting the Sustainable Development of Forest Lands in Indonesia*), the Transmigration and road construction programmes launched by development agencies are in themselves destructive. And there the rural poor never participated in the decision-making.

We would expect that a plan to save tropical forests around the globe, would press for a halt of such projects, that it would establish limits to present uncontrolled exploitation and that it would spread the new ethical values that our civilisation so badly needs. Reverence of nature and life—the miracles no human being is able to recreate—will have to be the basis of the new political ethics capable not only of saving the forests but mankind too, today and tomorrow.

Eucalyptus in Brazil

The *Call for Action* foresees for Brazil investments of US\$400 million

for Fuelwood and Agroforestry, US\$325 million for Forest Management for Industrial Uses and US\$50 million for the Conservation of Tropical Forest Ecosystems. The bulk of the money will be spent on more industrial development and on strengthening government departments, which until now have not even been interested in protecting nature.

There is a special emphasis on fuelwood and energy plantations, which we need and which we certainly want to implement in the many already deforested areas. But the success story the plan describes—the Aracruz Florestal project—should not be taken as a model. This project has been strongly criticised from the ecological point of view. It occupies a continuous area of 85,000 ha, including some valuable agricultural land, together with the remnants of natural forest and local vegetation, which should have been spared. Converted into a sea of highly productive Eucalyptus, the project yielded gains for the Aracruz pulp mill. The plantation employs 6 professionals and 70 technicians, providing less than one job for every thousand hectares of land. It is typical of the type of capital-intensive and capital-concentrating projects which much too often are at the origin of social injustice and ecological imbalances. We recognise the importance of fast-growing Eucalyptus but the fuelwood or energy plantations have to allow sufficient space for native vegetation in healthy ecosystems.

The Myth of Management

In the chapter entitled “Forest Management for Industrial Uses”, proposal 4 states “Bring under control and manage 5 million ha of Amazon Forest”. What does this

mean? Who knows how to manage this forest? and who will be able to control this management of 5 million ha? The Brazilian government has proved to be unable to control even its national parks and biological reserves, so well established in the plans and studies elaborated by government departments.

What we have to learn is that the only way to protect this forest (and its inhabitants) is to leave it in peace to complete its biological evolution and to fulfil its ecological functions as a world climate stabiliser, equally important for the North and the South, besides being the natural gene-banks on which future generations may have to rely for survival.

The *Call for Action* makes many valuable recommendations to the Brazilian government. It stresses the need for small-scale, environmentally sound and socially sensible projects. It also emphasises the importance of NGOs, grass-roots organisations and local populations being involved in the development process. But there are no provisions to enable such cooperation.

Reasons for Rejecting the Plan

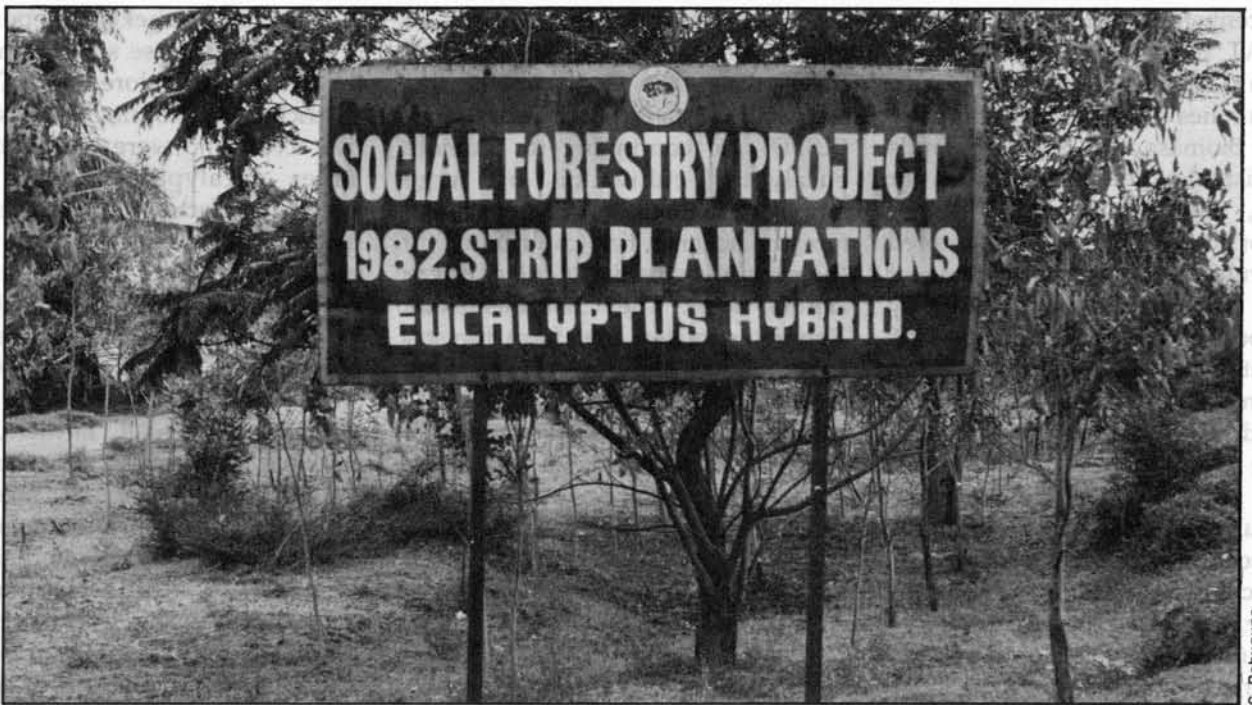
The underlying principles of this plan clearly reflect and, what is more, reinforce the present dominating “Weltanschauung”: high economic returns are allowed to overrule social and long-term ecological imperatives. What is technically feasible and economically rewarding *today* is propagated as progress and development.

As far as Brazil is concerned, this plan is rejected because:

1. It is too big to be controlled (and it will add significantly to our already unbearable foreign debt);
2. It strengthens official departments which until now have proved to be incompetent or unwilling to protect any forest;
3. It ignores local inhabitants. Neither the National Union of Rubber-Tappers nor the Federation of Indian Nations have been consulted;
4. Its principal aim is economic/industrial growth today rather than the conservation of the Amazon forest.

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S. Bahuguna

Eucalyptus plantations have proved hugely unpopular in Karnataka. Small farmers in many areas have expressed their anger by uprooting saplings.

The Failure of Social Forestry in Karnataka

by The Environmental Defense Fund

Karnataka's social forestry programme was intended to increase the availability of food, fodder, fertiliser and fuel for the rural poor through a massive reafforestation scheme. It has done none of these things. The bulk of the trees have gone for pulp and rayon manufacture. The ecological costs of the project have been ruinous.

Plagued by controversy since its inception, the World Bank/UK Overseas Development Agency (ODA) funded social forestry project in the State of Karnataka, India, is a prime example of the problems occurring in Bank funded social forestry projects. The World Bank's own *Midterm Review of Karnataka* in January 1986 revealed many of the project's problems, but few of these shortcomings have been adequately addressed, and many suggested reforms have not been implemented.

The problems in the project are the result not only of deficiencies in its implementation, but are also the consequence of fundamental contradictions between its stated objectives and principles and its design. Paragraph 3.01 of the *Karnataka Social Forestry Appraisal Report* states that the primary objective of the project is to increase supplies of fuelwood for

rural and semi-urban areas and that secondary objectives include provision of fodder, small timber, fruit, bamboo for cottage industry, and other minor forest and agricultural products.

Similarly, paragraph 3.03 sets out a number of principles to guide the implementation of the project, including avoiding planting of trees on lands with a potential for subsistence foodcrops; encouraging intercropping trees with food crops; an emphasis on communal participation and employment opportunities for the rural poor; and a commitment to making project output available first to local people, with a priority on distribution to the rural landless and other disadvantaged sectors of local populations. But 81 per cent of the planting in the original project design was targeted for private farm forestry, of which in turn the *Appraisal Report* estimated 92 per cent would consist of eucalyptus.

At the time of the project appraisal

there was already abundant evidence that this predominant focus on encouraging private eucalyptus plantations directly contradicted many of the project objectives and principles. In fact, the *Appraisal Report* explicitly acknowledged this contradiction in paragraph 3.30, noting that eucalyptus trees "do not lend themselves well to intercropping, are competitive, consume large volumes of water, have no value as fodder, and, because of its value as an industrial raw material, part of the produce may not reach the firewood market."

Traditionally, India's rural population has relied on the biomass from indigenous trees and shrubs and crop residues to satisfy their requirements for fodder, fuel, fibre (for thatching and cottage handicrafts), food and fertiliser.¹ Today, the village woodlots and common lands, from which the poor derived these products free, are being replaced by eucalyptus.

The Environmental Defense Fund, 1616 P. St. N.W. Washington, DC 20036, is actively involved in campaigning for sustainable development policies.

A recent study by Dr N. S. Jodha of ICRISAT in Hyderabad, concluded that in Karnataka, 100 per cent of poor families depended substantially on the biomass from common lands for satisfying their requirements for fodder, fuel and fibre, and 84 per cent for food.² The study attempted to calculate the monetary value of only a part of the biomass used by the poor from common lands and calculated values ranging between 530 and 830 rupees per family, depending on the district. According to the study, even these figures, which greatly understate the probable full valuation of the unmone-
tised economic services provided by rural ecosystems, are higher than the income generated by a number of government supported anti-poverty programme in similar areas.

Adverse Impacts

Predictably, the widespread cultivation of eucalyptus in the Karnataka Social Forestry Project has resulted in a number of adverse environmental and social impacts (some of which were recognised in the Midterm Review) that profoundly undermine its stated objectives and principles. These impacts include:

- The destruction of valuable agricultural land, through the widespread conversion of subsistence foodcrop lands to treecrop plantations for industrial uses, with little produce being sold or used for fuelwood, and even less for fodder, timber and other local uses;
- Increasing hardship for small farmers, whose lands and food productivity are adversely affected by surrounding larger eucalyptus farms;
- Increasing hardship for the rural poor and landless, whose needs for fodder and fuel have not been satisfied and whose access to land is diminishing through the transfer of C and D class agricultural lands and grazing lands (known as gomal lands) to the paper and rayon industries;
- Destruction of existing ecosystems, including loss of fertility of agricultural lands;
- Increasing pressure on existing forests.

The Chandrashekhhar Report

A February 1987 Report, entitled *Social Forestry in Karnataka, An Impact Analysis* by D. M. Chandrashekhhar,

B. V. Krishna Murti and S. R. Ramaswamy, has revealed that the Karnataka State Government and Karnataka State Forestry Department (KSFD) are continuing to promote eucalyptus cultivation by large farmers and that the Karnataka social forestry scheme has contributed to the *massive destruction of valuable agricultural lands*. The Chandrashekhhar Report estimated that farm forestry (planting of trees on private farm lands) in Karnataka from 1976-81 converted over 100,000 hectares of farmers foodcrop land to dense eucalyptus plantations, even before

**Eighty-one per cent of
plantings are on private land;
92 per cent consist of
eucalyptus.**

the World Bank/ODA project began. The report indicated that if the World Bank/ODA Project (1983-88) continues without reform, then by 1988, the Karnataka Government and KSFD will have been instrumental in destroying over 220,000 hectares of foodcrop land. This is in addition to the 500,000 hectares of government land already destroyed through eucalyptus monoculture.

Although the World Bank Midterm Review recognised the need to reduce the emphasis on eucalyptus and the Karnataka Government has recently announced that it will "considerably reduce" the percentage of eucalyptus planted under the Bank-financed social forestry project, there is evidence that even marginal farmers are now being encouraged by the KSFD to convert their lands. Small and marginal farmers who were meant to be beneficiaries of the project are instead facing increasing hardship as a result of eucalyptus cultivation. This is particularly disturbing in the light of the fact that in its Appraisal Report, recognising the drawbacks of eucalyptus in farm forestry, the Bank recommended that the KSFD: 1.) adequately publicise the drawbacks of conversion to eucalyptus; 2.) research more suitable alternatives for farm forestry, and 3.) closely monitor the social, economic, and agronomic effects of large scale afforestation with eucalyptus.

The Chandrashekhhar Report also revealed that those small farmers in the Kolar, Bangalore, and Tumkur Districts with holdings of less than five acres who were surrounded by larger eucalyptus farmers were adversely affected through the lateral spreading of eucalyptus roots which sucked the surface moisture and soil nutrients, ultimately diminishing the yield of neighbouring crops. The reduction of already low levels of crop yields has caused severe hardship to small farmers, who cultivate foodcrops under rainfed conditions, usually to meet the requirements of their own families. Because of the affect on their food productivity, these farmers are increasingly driven to abandon foodcrop cultivation and plant eucalyptus. The report revealed that small farmers are not converting to eucalyptus out of choice, but out of helplessness.

At a recent symposium on the Forestry Policy of the Karnataka Government, organised by the Karnataka Farmers Association, over 400 farmer delegates from all over Karnataka unanimously rejected the further systematic promotion of eucalyptus and other fast growing species by the KSFD which, they maintain, only serves the interests of the paper and pulp industries. The delegates also concluded that eucalyptus is especially useless to small and marginal farmers.

The Bank's Review

The Bank's Mid-Term Review acknowledged that addressing the needs of the rural poor and landless for fodder, fuel and small timber should have received more priority as an equally important objective in the Karnataka project. In the original project design, this objective was to be accomplished mainly through establishing Block Plantations (plantations on gomal and C and D class lands) which comprised 15 per cent of the total planting programme. This component of the project was also seen as a way to involve local communities. The *Midterm Review* revealed that these objectives had not been satisfactorily achieved.

The *Review* stated:

"Too much emphasis was placed on physical planting targets. These should have been balanced

by recognising two equally important objectives:

(a) that the planting programme had to be directed at meeting the forestry needs of the rural and semi-urban poor;

(b) that the capability of the KSFD, in collaboration with other agencies, had to be built up to enable it to meet the above needs."

To date, neither of these recommendations have been adequately implemented. *Concerning the first objective, the success of block plantations is still questionable due to the fact that the poor and landless have little access to or control of land.* Many communities have not been adequately consulted in the design of block plantations, and information about implementation of this component of the project is not available to them. While we realise that some advances have been made in the planting of more varied tree species which would provide fodder and fuel, the poor and landless cannot benefit because they have no direct control over the trees, and cannot harvest the produce. Oxfam has been recommending the concept of a *Tree Tenure System* whereby the poor would be given title to the trees grown on "wasteland". The Bank's *Midterm Review* also listed tree tenure and group farm forestry as viable options for involving the poor and landless. In addition to these reforms, the Federation of Voluntary Organizations for Rural Development in Karnataka (FEVORD) has recommended wastelands being leased to groups of the landless poor. We support the above recommendations, and suggest that the Bank promote consultation with FEVORD and other local organisations on their design and implementation.

Moreover, with regard to farm forestry, there is still a need for greater involvement of the rural poor in decentralised peoples' nurseries ("Kisan Nurseries"), preferably through local organisations. We realise that some positive advances have been made in allowing the poor to set up small nurseries and earn income through raising saplings for farm forestry, but all aspects of the programme should be more oriented toward allowing the poor to raise their own saplings of varied species. This could be accomplished by decentralising all nurseries, by promoting

smaller nurseries of 5,000 saplings (the current size is 25,000), and by *establishing a link between the raising of saplings and access to wasteland.* Instead of raising saplings for farm forestry, the poor should be able to raise their own saplings and later plant them on wastelands where they have tree tenure or land tenure.

The number and type of saplings distributed is also a matter of concern to local NGOs in Karnataka. According to two member organisations of FEVORD—Gram Vikas in Kolar and the Indian Development Service in Dharwad—the number of saplings given to the poor has been drastically reduced this year. Also, women's groups in Kolar are concerned that the KSFD requires that a certain percentage (40 per cent last year) of saplings in decentralised nurseries under the World Bank/ODA project have to be eucalyptus. Since the poor are willing to raise saplings, distribution to them should be increased. FEVORD has requested that five million saplings of varied species be made available, but the KSFD has been slow to respond.

Annexing Wasteland

If the forestry needs of the poor and landless are to be met, it is essential that wastelands be made available to them and that their usufruct rights to the wasteland be established through land tenure and/or tree tenure. Instead, waste-

lands (C and D class lands) all over Karnataka are being transferred by the Government and KSFD to pulp-based industries for cultivation of eucalyptus and other fast growing, non-browsable species. The predicament of the poor and landless has been tragically exacerbated through the transfer of government-owned C and D class lands, which have traditionally been used by villagers for their needs, to the KSFD which has favoured pulp-based industries. Ironically, many of the lands which are being classified as "unfit for agriculture" and "wastelands" and thereafter transferred to KSFD, are lands which are actually rich in native tree species and have provided fodder and fuel for the poor.

Community organisations in Karnataka recently filed a law suit to stop the transfer of 75,000 acres of government-owned C and D class lands to Karnataka Pulpwood Limited. On March 25, 1987, The Indian Supreme Court issued a stay order to prevent the Karnataka Government from transferring the land. This stay order prevented further action by the Government for three weeks until an assessment of the social and environmental costs in Shimoga, Chickmagalur, Dharwad and Belgaum districts could be made. To date, the assessment has not been made.

Grazing lands which have been used for years by communities for draft animals, milch cows, buffalo,



By 1988, almost 750,000 hectares of valuable agricultural land will have been destroyed through eucalyptus plantations.

sheep and goats are also gradually becoming unavailable because of transfers to pulp and paper industries for eucalyptus plantations. According to the Chandrashekar Report, these lands are labelled as unfit for agriculture and classified as C and D lands, then handed over to the KSFD to increase land under vegetation. Inevitably, KSFD land transfers are always to industry. In 1986, it was reported that 60 per cent of dryland in the Kolar district and 40 per cent in Bangalore district had been converted to eucalyptus plantations, replacing traditional millet (ragi) growing. The conversion of grazing lands has contributed greatly to the decreasing availability of

fodder, one of the shortages the Bank-financed project was intended to overcome. These transfers are major factors in increasing poverty and in undermining the ecological stability and carrying capacity of large areas of rural Karnataka. The Bank's project, rather than ameliorating this situation, is worsening it still further through its financing and reinforcement of the pro-eucalyptus, industrial bias of the KSFD.

Ecological Disaster

The World Bank and the Karnataka Government have systematically and gravely underestimated the adverse environmental and social consequences of expansive eucalyptus cultivation. There is increasing evidence that the widespread conversion of agricultural lands, grazing lands and forested C and D class lands to eucalyptus plantations is ecologically unsound and contributes to pressure on existing forests. Research indicates that eucalyptus is not a self-sustaining system of vegetation in a rainfed farm ecosystem, because eucalyptus acts as a drain and not a source of moisture and nutrients: over the long term it will thus leave the soil incapable of supporting foodcrops. In a dryland ecosystem, it is also ecologically destabilising, and some reports indicate it contributes to desertification.

In the Bank's *Appraisal*, one of the environmental benefits of the project was that the increased availability of forest produce generated by the project would relieve pressure on "traditional forests" and help to reduce their depletion. In reality, there is evidence that the Bank's project is contributing to increasing pressure on natural forests. If the poor and landless are continually deprived of the use of community land, and their needs are not being satisfied through Bank-funded social forestry, as originally planned, then pressure to collect firewood from existing forests can only continue. Moreover, the conversion of agricultural lands to eucalyptus plantations may eventually lead to pressure to release more forests for foodcrop cultivation.

Economically Unsound

The Bank has used an economic justification to support its financing

of eucalyptus plantations. We question the completeness of this economic analysis; it appears to be short term and excludes critically important ecological, social and temporal cost externalities as well as the true cost of government subsidies for eucalyptus through the free distribution of seedlings and the extension of farm credit to the exclusion of other species and crops. Experience has shown that environmental problems will surface over the long term, and when corrective measures become unavoidable, their cost is often many times what the original investment would have been to avoid them. In a recent letter to a Washington-based NGO, John Spears, Senior Forestry Advisor at the Bank, acknowledged that

"It is undeniable that in some situations the tree (eucalyptus) is planted in the wrong place, with obviously negative results. The key to its more effective use lies in greater awareness of its advantages and disadvantages, better planning and supervision of projects which use eucalyptus."

Gravely flawed planning and inadequate supervision have plagued the Bank-financed Karnataka Social Forestry Project. The Bank's loan of more than \$25 million will bear adverse economic, social and ecological impacts unless the Bank implements substantial reforms. The problems in this project also raise disturbing questions about other ongoing and planned Bank-financed forestry projects in India and elsewhere, which in many instances have similarities in species choice and design. If the Bank plans to double its forestry lending, it will be a tragedy if a substantial number of projects promote ecological and social deterioration, rather than environmental enhancement and sustainable growth.

This article is an edited version of a submission by the Environmental Defense Fund to the World Bank. The submission was originally entitled *Environmental and Social Problems in the Karnataka Social Forestry Project*.

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Marcos Santilli/Panos Pictures

Burning forest in Rondonia, Brazil. If current rates of clearing continue, the State of Rondonia will have lost all its forests within the decade.

Who is destroying the Amazon Rainforest?

by José A. Lutzenberger

The forests of Amazonia are being systematically destroyed in the name of "progress". Plantations, large dams, mining operations, and colonisation schemes are the major causes of the destruction. Unless action is taken immediately, the forests will all be destroyed within the lifetime of our children. A first priority is land reform.

We are witnessing today in Brazil and in much of Latin America the biggest holocaust in the history of life. Never in the course of three and a half thousand million years, since the first stirrings of life on this planet, has there been such a wholesale, accelerated, violent and irreversible demolition of all living systems as today. We have passed the point where we only desecrate this or that scenic landscape, this or that ecosystem. We are now in the process of demolishing whole biomes. Now we are getting ready to finish off the last large, more or less intact and contiguous jungle on Earth, the Hylaea, or tropical rainforest in Amazonia.

Nobody seems to know exactly how fast the forest is being demolished. No statistics are published and Landsat images are not easily accessible to and interpreted by those who really care, while the powerful have an interest in downplaying the extent of the devastation. In a recent interview on TV, the Governor of the State of Amazonas, who is now pleading for free, large-scale export of raw timber logs and animal hides, stated categorically that less than 2 per cent of the forest

had been cleared until now. On the other hand, serious scientists who know Amazonia very well, Harald Sioli, for instance, (see article p.134) state that close to 100,000km² of forest are felled every year. That would be about 2 per cent a year and this has been going on for at least a decade.

Assuming exponential trends, Philip M. Fearnside at INPA (Instituto Nacional de Pesquisa da Amazônia)¹ shows that the states of Pará, Maranhão, Goiás, Rondônia and Mato Grosso would be cleared by the year 1990. Acre would be totally deforested before the year 2000, Roraima and Amazonas shortly after the year 2000. Only Amapa would survive into the 22nd century. Averaging out these trends, the total forest would be gone well before the year 2000. We must not let this happen.

This systematic destruction is being carried out in the name of 'progress'. The Brazilian Government, the military dictatorship which set itself up in 1964, set course for "development" at any cost. Its definition of development is a technocratic one—an economic model geared to fast industrialisation, where the highest aim is megatechnological concentration and a cash crop agriculture, with vast monocultures, to feed industry and the export market.

José Lutzenberger is one of Brazil's best known environmentalists. He is President of AGAPAN, the State of Porto Alegre's Association for the Protection of the National Environment.

New colonies are springing up throughout Amazonia as the area is opened up to settlers. Many of the colonists are displaced peasants whose own land has been taken over for plantations and other development programmes.

Sean Spraguel/Panos Pictures



The Role of the Multinationals

Large-scale devastation of the tropical rainforest and its surrounding transitional forests takes several forms. At one extreme we have gigantic projects. Multinational or Brazilian corporations or powerful individuals go to Amazonia to make large sums of money. Among them are such giants as Anderson Clayton, Goodyear, Volkswagen, Nixdorf Computer, Nestlé, Liquigás, Borden, Kennecott Copper, and the American multibillionaire Daniel Ludwig, or even farmers cooperatives from the south of Brazil, such as Cotrijui. This is a very small fraction of the list which runs into hundreds. These organisations set up enormous projects—cattle ranches, paper mills, single species monocultures of exotic trees for pulp, immense rice plantations, sugar cane plantations for the "gasohol" programme,* timber mills, mining operations.

More often than not, these operations are financed with state subsidies—tax rebates. That is why they are extremely wasteful and can accept scandalously low rates of productivity. On the extensive cattle ranches, the production of meat hardly reaches 50kg per hectare per year and it rapidly declines after a couple of years as the soils are leached of the scarce nutrients remaining after deforestation. The grasses and legumes sowed for pasture give way to scrub unpalatable to cattle. The scrub is then kept down with heavy machinery, annual burning or herbicides. This contributes still more to the destruction of the soil and to still lower production. In northern Europe, on organic farms not using imported feed, meat production is closer to 600kg/ha per year plus between 4000 and 6000 litres of milk per hectare. No milk is produced on the Amazonian cattle ranches. We must remind ourselves that the intact forest, obliterated to give way to pasture, can produce at least ten times as much food in the form of tropical fruit, game and fish. Every single adult Brazil nut tree left standing can produce hundreds of kilos of precious food, every pupunha palm tree or many of the innumerable other species of palm trees occurring in the forest can produce dozens of kilos of food, feed and construction material. For the inhabitants of the forest there also is no

shortage of firewood, a problem that is becoming extremely serious in other parts of the world.

A devastating social effect of those schemes is that they employ an average of one worker per two thousand cattle, that is, one person on at least 3000 hectares! The same area of forest could easily feed and house several hundred people if left intact. The traditional life style of the Indian, the caboclo and the seringueiro (rubber tapper) is also much more pleasant, easier, independent and secure than the life style of the ranch worker. The irony is that the little meat produced is meat for export. The Amazonian caboclo wisely says, "Where cattle move in, we move out, cattle mean hunger." The only beneficiaries are the corporations who do not even spend money in the areas they devastate. But they keep saying that they are in the business of feeding starving humanity.

The social devastation caused by the other schemes—the extensive monoculture of trees, open pit mining, gigantic dams, timber mills, logging on an industrial scale, commercial fishing for export—are just as bad. They are all geared to the enrichment of the powerful groups outside the region. There is no concern for the needs of the local population, much less for their life style and culture. The local people are uprooted, marginalised, alienated and they go either to the slums or escape even deeper into the jungle, as long as there is jungle. The Indians are already reaching the end of the line.

The Brazilian Government is now selling off whole mountains, as in the Caraja Project (see *The Ecologist* vol 17, No 2/3). Recently the Minister of Planning boasted of having received the first down payment of a few hundred million dollars from Japan for ore to be mined in the Caraja mountains. What will future generations say?

Colonisation Schemes

At the other extreme we have large-scale demolition of the forest by small settlers, but this is also due to outside forces. The State of Rondonia, in the west of Brazilian Amazonia, about the size of Great Britain, is being systematically cleared by settlers at a rate that, if continued, will leave it without forest within but a few years.

*The production of fuel through the fermentation of vegetation.

The small settlers are more efficient destroyers of the forest than the big companies, who usually abide by the law that requires them to leave half the forest intact. The settler cannot stop, he must go on clearing until nothing is left. Rondonia was chosen as an escape valve. Brazil's colonisation agency, INCRA (Instituto Nacional de Colonização e Reforma Agrária) circulates whole page ads showing aerial views of forest being cleared by settlers. The legend says, "Brazil is making the largest agrarian reform in the world." But these settlement schemes are conceived precisely in order not to have to face agrarian reform in other regions. The settlers come from the North East where landlords have always prevented a healthy peasant culture from developing and from the South, where soybean monoculture, producing feed for the cows that produce the "butter mountain" of the Common Market, also drives thousands of people off their land. Farther north, in Central Brazil, the "gasahol" programme is also displacing masses of people.

The migrants from the South often form the third wave of migration in a century. German and Italian immigrants came to the old colonies in Rio Grande do Sul and Santa Catarina in the last century. Their descendants first moved to the Uruguay river valley. In the 1950s, they moved to West Paraná, then on to south Mato Grosso. The frequency of migration waves is becoming shorter. Some families are now moving for the second time. They will probably not stay long in Rondonia.

Hundreds of migrants arrive in Rondonia every day in addition to those unhappy people, much more numerous, who can only escape to the slums of the big cities. Some of the migrants try to settle on their own. They simply move to jungle areas as they become accessible through the new penetration roads that are constantly being opened by the road authorities. If they are lucky, they eventually get title to the land they settle on. For this they have to prove that they have made "improvements" on it. INCRA accepts as improvement the clearing of forest. Hence every wild settler cuts down as much forest as he can, often much more than the area he can cultivate. Some clear hundreds or thousands of hectares. Many of the settlers go from one clearing to another. As soon as they get title or sufficient proof of property they sell to the bigger estates and move on. We have met settlers who make a living out of such land speculation.

More generally, not so much in Rondonia, but in other remote regions of Brazil, the wild settler is soon displaced by someone who comes with "legal" title to enormous tracts of land. The settler is then considered a squatter and driven off by the "jagunco" or hired gunman. No records are kept of the names and numbers of those who disappear.

Where the migrants settle legally, they end up in the settlement schemes of INCRA. These schemes are another example of the total disregard for the Amazonian landscape and its people. The division of the land is conceived on the drawing board. A checkerboard-like pattern is imposed on the land without the slightest concern whatever for topography, steep slopes, rock outcroppings, little rivers or brooks,

much less ecosystems—a concept that does not exist in the heads of INCRA planners. The lots are 250 metres by 1000 metres or 500m by 2000m or even 4000m. Thus, the farmer actually gets a long strip of land. In some cases his strip cuts across the same waterway several times as it meanders through the forest. He will have to build several bridges. Another farmer may have no access whatever to water, or his land may cut across two steep slopes with two high plateaus and some lowland in between or vice versa. Inevitably he will cut down the forest on the slope. The soil will be eroded away after the first harvest, if there is a first harvest. Even the areas officially left as forest reserves are marked on the map as geometric shapes, somewhere in a corner of the project, without reference to landscape. There is absolutely no provision for the preservation of these areas. The INCRA people say it is the responsibility of IBDF (Instituto Brasileiro de Desenvolvimento Florestal—the forestry agency); IBDF says it has no means to take care of the reserves. In no time they are destroyed by wild settlers. It often seems as if the whole scheme is deliberately set up so as to guarantee maximum devastation.

The farmers are left to themselves. There is no agricultural extension service worthy of the name. Government extension agencies promote cash crops and the credit system is geared to monoculture. Most credit plans include a certain percentage of the money for pesticides and chemical fertiliser, regardless of need. Cash crop monoculture is controlled by specialised agencies such as CEPLAC for cocoa, IBC for coffee and SUDHEVEA for rubber tree plantations. Each agency

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insists on pure monoculture. Where farmers, out of their own wisdom, make mixed stands of coffee, cocoa, rubber and citrus trees, the agencies threaten to cut credit unless the farmers turn to pure monoculture of the respective crop. But practice has shown that mixed stands make for healthier plants, require less or no pesticides and produce more on a more sustainable basis.

Socially, too, the settlement schemes are very disruptive. Firstly, they help to prevent the necessary reforms in the regions where the migrants come from; secondly, they destroy the existing social fabric in the settlement areas; and thirdly, the new settlers soon run into serious trouble when their soils become degraded and there is no more virgin forest to move into. We have seen settlers on soil so poor that even in the ashes of the clearing, their harvests were not enough for survival.

Local Indians are pitilessly liquidated, the survivors being driven even deeper into the remaining jungle, until they meet colonists advancing in the other direction. Moreover, the rain forest Indians are extremely vulnerable to western diseases, such as common cold, measles and VD. As soon as a tribe makes contact with the "civilised" invaders, they face lethal epidemics. Often as many as 90 per cent of a group die within a few years. For the few survivors, it is the end of their culture. It is sad to see the total demoralisation of the so called "civilised Indian".

The disappearance of the rain forest Indian cultures is perhaps one of the greatest tragedies of our time. The rainforest Indian is a true ecologist. He knows the forest as no modern ecologist can possibly know it. He reveres it. Yet we are exterminating the Indians before we can even learn from them, just as we are exterminating tens of thousands of species every year even before we can catalogue them.

Our indecent lifestyle seems to be trying to make sure that, when it collapses, there will be no alternative lifestyles left to take its place.

Traditional Industries Destroyed

The new settlements also displace the caboclo and the seringueiro. The caboclo, the successor of the Indian, is usually of mixed stock, white and Indian, sometimes Negro. He lives in the forest, surviving on shifting agriculture and as a hunter/gatherer. His lifestyle is quite compatible with the survival of the forest, as long as his population does not increase too much. But we are still very far from that. He has no reverence for the forest and its animal life but he keeps much of Indian wisdom.

There is also the small logger. His lifestyle is compatible with the survival of the rainforest. He logs only on the flood plains from where he can take his logs out when the water is high, making rafts for transportation to small lumber-mills. Felling is selective with little harm to other trees. The flood plains represent the only really fertile soils in the rainforest, being fertilised every year by the annual flood, just as was the case in the Nile valley before the Aswan dam. Trees grow fast on the flood plains. Old loggers often resume logging where they started in their youth. In 20 to 30 years enormous trees grow back, of a size it would take two centuries to

grow in Europe.

Where the big multinational logging companies or the large timber companies from the south of Brazil move in, the situation is quite different. They do not limit their activities to the flood plains but operate mostly on the highlands, where soils are extremely poor and regeneration is therefore much more difficult. They also use heavy machinery, causing tremendous degradation, often destroying the whole ecosystem. They are required by law to "reforest". But reforestation consists only of commercial monocultures. This reforestation is often done by specialised companies. The law does not require reforestation to be made in the place where the forest was logged; it is often done somewhere else, even thousands of kilometres away. The reforestation companies often destroy natural ecosystems, other forests, for their plantations. This is so because it is easier to get large tracts of contiguous land in the remaining wilderness areas. The "reforested" area is also almost always much smaller than the area of forest destroyed by logging. There is no supervision and bribing is easy.

Local fishermen, who until recently provided 60 per cent of Amazonia's protein are also being driven off by commercial fishing boats. It is often said, even by those who want to save the forest, that the Amazon can feed the world with fish protein. That is another illusion. There is enough fish for a growing local population but not for a large-scale export business. The Amazonian rivers are incredibly rich in fish. There are more than one thousand different species. Many have not even been classified by zoologists. But there is very little primary production in most of the Amazonian rivers. Fish life is mostly dependent on the forest, especially the forest on the flood plains. Many species feed on fruit or forest residues only during the high water season when they leave the river bed and spread out into the plain. The rest of the year they live off their fat reserves. The destruction of the flood plain forests and of the forests along the smaller waterways in the highlands contributes directly to diminution of water fauna. Even today there is overfishing. Some important species such as the pirarucu and the tambaqui are nearing extinction and the manatee is very close to extinction. Commercial fishing is also extremely wasteful. It is now common practice for fishing boats to throw overboard whole loads of commercially less valuable fish when they hit upon a school of a more valuable species. The commercial fishing fleets have autonomy over thousands of kilometres. In many areas the local population already complains that it is becoming difficult to catch the fish it needs.

Finally, there is the seringueiro, or rubber tapper. Like the Indian, he has no sense of land ownership but he has a sense of territory! Each seringueiro has his "estrada", or road. He may walk as much as 30km a day collecting the latex. Today he is no more the slave labourer he was in the past. His transistor radio informs him of the rubber price in São Paulo or Chicago. He makes between five and seven hundred dollars a month, as much as a metal worker in São Paulo, but he has no expenses. He derives most of his food from the forest and the river. He also has no transportation costs.



Illegal settlers have massacred millions of Indians. Here a group of Kayapos walk defiantly through a stretch of forest they refuse to abandon, despite pressure from settlers.

Jean Pierre Dutilleul/Observer

Yet the colonisation programmes are displacing the *seringueiro* too. Another lifestyle compatible with the forest is being destroyed.

Brazil imports two thirds of its natural rubber consumption of approximately 90,000 tons a year. By helping the *seringueiro* and by increasing the density of the rubber trees in the forest, which has already been proved possible by some small private enterprises, Brazil could easily have enough natural rubber for export. The monocultures of rubber trees that are now being promoted by the government will probably not last long. The experiment carried out in the 1930s by Ford was a failure. In monoculture the rubber tree is subject to all kinds of pest attack.

The rubber tappers income, comes not only from rubber, he also collects Brazil nuts. He would be the ideal forest guard, requiring no pay from the government and although it is true that in the past he contributed to the slaughter of the Indians, today, in many areas, rubber tappers and Indians have learned to live together in harmony. During the second World War, the central government, which then called the *Seringueiro* "o soldado da borracha" (the soldier of rubber) promised title to the land on which they worked. This would have been very easy to implement. Each *seringueiro* needs no more than 200-500ha. If the density of rubber trees were increased he could make a living on a 100ha. Of course the promise was seldom fulfilled. We know of only one programme where some tappers were given 250ha. In general, when they are displaced by colonisation projects, they get no more than 25ha. Invariably they sell the land and end up in slums or as day labourers.

The federal government sees no difficulties in granting the rich title to tens of thousands or even hundreds of thousands of hectares, but it hardly ever gives useful tracts of land to the small operator. I visited one big

project in Rondonia; it belonged to a firm that grew powerful in the South by devastating the *Araucaria* forests. Some 20,000ha were being put to pasture and an area much bigger was being logged. On this project, the company closed the road via which the *seringueiros* not affected by the project used to bring out their rubber and forced them to sell all the rubber to the company at prices far below market prices.

The lifestyle of Indians, *caboclos* and *serigueiros* is 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. Almost nothing is being done in that direction, even though some very interesting research work already carried out at INPA has shown how permaculture with palm trees, bread fruit and others can produce up to 10 times as much food per acre as the shifting agriculture now practised by the *caboclo* and *seringueiro*. But official philosophy sees only backwardness in subsistence farming, even if it makes people happier. There is also no concern whatever for sustainability.

Poor Not to Blame

In Rondonia it is very easy to see how devastation, even when it is committed by small farmers, is always caused by the shortsightedness and greed of the powerful. The settlements now demolishing the forest in Rondonia are part of a classical colonialist structure of dependence and export. In the new towns of Rondonia, growing like mushrooms, it is almost impossible to find locally produced articles in the shops. Everything, even the broiler or the salad in the restaurant, comes from the industrial south. While enormous quantities of wood go up in smoke or rot in the fields people cook with bottled gas, brought in by truck over 2,500 kilometres. Local power stations also burn petroleum that comes by truck

after crossing the ocean on its way from the Persian Gulf. Where the Madeira River passes the capital of Rondonia, Porto Velho, one can see thousands of tons of wood, logs, branches, whole trees, floating downriver. No attempt is made to use that wood. When a region has to import everything it consumes, it must pay with exports. Hence the agricultural policy of promoting only cash crops.

While unsustainable forms of agriculture are destroying the tropical rainforest in Rondonia, the regions in the South, from where many of the migrants come, such as the fertile and deep red soils of Paraná, Santa Catarina and Rio Grande do Sul are also being raped. Soybean monoculture to feed cows in the Common Market, rather than people in Brazil, is causing erosion on a scale never seen before. All the rivers are dark brown or red with clay and silt. Monoculture is also destroying what is left of peasant culture. These soils could support a sustainable form of highly productive and diversified agriculture. Now, food production in the former peasant regions is going down drastically. In the more mountainous areas of Santa Catarina, farmers plant corn on steep slopes, at enormous costs in terms of erosion, in order to rear chickens for export to Saudi Arabia. The farmers themselves often buy their food in the supermarket, the eggs and vegetables being imported from São Paulo.

If the methods of organic farming were promoted on the good, fertile soils in the South, the North East and in central Brazil, and only in those areas already cleared,

without touching remaining wilderness, this would dramatically increase productivity with less pollution and erosion. Migration could cease, and could even be reversed. Today, with all the paraphernalia of heavy and sophisticated machinery, soluble fertilisers and pesticides, the regions with the most "advanced" agriculture have very low productivity. In the soybean-wheat monocultures (soybean in summer, wheat in winter), that now cover most of the good soils in the three southernmost states, average production is below 800kg/ha for wheat and around 1500kg/ha for soybeans. A small step in the direction of organic soil management would immediately lead to dramatic increases in production with equally significant increases in employment. Brazil need not give up its present exports and could still produce more food. We already have a few examples of farms attesting to that.

Amazonia should be left to the Amazonians. The growth of capital and power at the expense of the ecology and the people of Amazonia is classical imperialism. It makes no difference whether the benefits accrue to powers from overseas or from other parts of Brazil.

Brazil's politics towards Amazonia must change. And they must change within this decade—or it will be too late!

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Rainforests and the Hamburger Society

by James D. Nations and Daniel I. Komer

Almost two-thirds of Central America's lowland and lower montane forests have been cleared or severely degraded since 1950. Much of the land has been cleared to make way for ranching schemes to supply the United States and other western countries with cheap beef for hamburgers.

Few consumers associate fast food hamburgers or TV dinners with the eradication of Central America's tropical rainforests. But for more than 30 years, the United States' appetite for cheap, imported beef has been a critical factor in the future of those forests. Tropical rainforests throughout Central America (including southeastern Mexico and Panama) are being replaced by pasturelands to produce beef, much of which is consumed by U.S. citizens.

This cycle of destruction of rainforests and use of the land to produce beef for export involves international bank loans to support cattle industry development, U.S. Department of Agriculture inspections to control undesirable ingredients, and the continuation of a socioeconomic system that concentrates land holdings—and thus power—in the hands of the few.

The destruction of rainforests in other areas of the world is sometimes even more dramatic than in Central America—as in the Amazon Basin where bulldozing, burning, and chemical defoliation destroy immense tracts of forest each year. But nowhere is the loss of biological diversity more severe and nowhere is the United States' unwitting role in deforestation more apparent, than in the case of Central America.

Almost two-thirds of Central America's lowland and lower montane rainforest have been cleared or severely degraded since 1950.¹ At current rates of destruction, most of the remaining forest will be eradicated during the next 20 years, leaving only impoverished remnants in national parks and reserves. Des-

pite the grim ecological consequences of such a prospect, some hope remains to break this cycle. Because the causes of deforestation in Central America are so apparent, the measures required to halt it are also obvious.

Logging, then Colonisation

While some scientists and many Latin American politicians blame the slash-and-burn agriculture of Indian and peasant farmers for the destruction of Central America's tropical forests, in reality the problem results from a combination of local, regional, and international activities. In fact, forest conversion in Central America usually occurs in stages.

During the first stage, logging companies enter the forest to extract valuable hardwoods such as mahogany and tropical cedar. Because the trees of the rainforest are locked together in an intertangled web of leaves, vines, and lianas, felling these selected species damages many non-commercial trees that are left behind. Studies indicate that between 30 and 50 per cent of the forest canopy may be destroyed or damaged through this process of "creaming" or "high topping" the rainforest.²

But the damage wrought by commercial logging is not so much the result of what foresters remove from the forests as what they leave behind—namely, the roads they construct to enter and exploit the area. Road construction introduces the second stage of deforestation: colonisation. For down these roads, like leaf-cutter ants on a forest trail, come landless peasants from other areas of the country. Using agricultural traditions that are ill suited to the tropical rainforest, they clear and burn the vegetation to plant subsistence crops

—corn, beans, rice, and manioc—and small-scale cash crops such as coffee, chilies, bananas, and cacao.

This colonisation has a heavy impact on any indigenous people who live in the region. Indian groups who have survived the diseases and disruptions of timber exploitation may be overrun by colonising peasants who have little regard for the territory's aboriginal inhabitants and little ecological awareness of their new forest home.

Pawns in the Game

But to blame colonising peasants for uprooting tribal people and burning the rainforest is tantamount to blaming soldiers for causing wars. Peasant colonists carry out much of the work of deforestation in Central America, but they are mere pawns in a general's game. To understand the colonists' role in deforestation, one must ask why these families enter the rainforest in the first place. The answer is simple: because there is no land for them elsewhere.

Behind that answer are several underlying factors, among them inequitable land distribution and population growth. Central American government officials promote jungle colonisation projects or tolerate "spontaneous" colonisation partly because doing so temporarily relieves pressures for land reform in other areas of the country, thus reducing demands to break up and redistribute large estates and company holdings. According to the United Nations Food and Agriculture Organisation (FAO), in Latin America as a whole, 7 per cent of the landowners control a surprising 93 per cent of the arable land. In Guatemala, for example, 2.2 per cent of the population owns 70 per cent of the agricultural land, mostly in the

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form of coffee and banana plantations and cattle ranches. Until 1979, Anastasio Somoza and his family owned 23 per cent of Nicaragua's arable land. In sum, well over half of the rural families in Central America either own no land or own too little to support a family. Instead, they farm marginal plots and work as labourers on land that belongs to others, all the while waiting for the day when they can own adequate farms.³

Population growth is an equally important force behind rainforest colonisation in Central America. In mid-1981, almost 35 million people lived in rural Mexico and Central America. By the end of the century, they will be joined by 22 million more, the product of the region's astounding 2.7 per cent per year rate of natural increase. In Central America, as in the rest of the world, 90 per cent of the expected population growth during the next 20 years will take place in areas that are now covered, or formerly were covered, by tropical forests.⁴ The combination of inequitable land distribution and population growth can produce severe social strife and near-total deforestation, as the prime example of El Salvador demonstrates.

Export Beef Production

With colonisation comes the third stage of tropical deforestation in Central America. During this final stage, land cleared by Indian and immigrant farm families is absorbed by individuals or companies who use it to produce export crops—sugar cane, bananas, pineapples, coffee, oil palm, or beef cattle. In Central America, the most dominant and most destructive of these export crops is beef.

Peasant families who colonise rainforests in Central America usually intend to remain on the land indefinitely. But as geographer James J. Parsons has pointed out,

"After one or two crops of maize, rice, or manioc are harvested from the forest clearing, declining soil fertility, invasive weeds, and noxious insects combine to force the colonists to sell out to a second wave of settlers or speculators who follow behind, consolidating small holdings into larger ones for the exclusive purpose of raising beef cattle."⁵

Table 1: Lowland and Lower Montane Tropical Rainforest in Mexico, Central America, and Panama

COUNTRY	UNDEGRADED RAINFOREST IN MID-1982	CURRENT RATE OF LOSS PER YEAR
Nicaragua	28,000 km ²	1,000 km ²
Guatemala	26,300 km ²	600 km ²
Panama	22,000 km ²	500 km ²
Honduras	20,000 km ²	700 km ²
Costa Rica	16,000 km ²	600 km ²
Belize	9,800 km ²	32 km ²
Mexico	8,000 km ²	600 km ²
El Salvador	0 km ²	-- km ²
TOTAL	130,100 km ²	4,032 km ²

SOURCE: Field research and interviews by authors.

In this sense, Parsons continues, the crops planted by forest farmers serve as a transient stage between forest clearing and pastureland. Thus, the pioneer families receive a few years of crops in exchange for converting the rainforest to grassland for the benefit of someone else.

Cattlemen are not always so patient, however. In southeastern Mexico and Honduras, ranchers sometimes hire peasants or Indians to cut and burn the rainforest and plant pasture grasses.⁶ In the Darién rainforest of southeastern Panama, peasant families migrate into national forests, cut and burn the vegetation, then plant grass and sell the plots as "improved land" for \$80 per hectare to *hacienda* owners and weekend cattle ranchers from Panama City.⁷

Similar situations occur throughout Central America. Rather than recognising tropical rainforests as valuable natural resources, many Central American politicians view them as obstacles to national development. Not only do they fail to conserve nationally owned forest lands, but they also provide legal and financial incentives to peasant farmers and cattlemen to colonise and clear these forests. In many of the Central American countries, in order to gain title to a plot of federal forest land, the colonising individual must simply "improve" it by clearing it of vegetation. Because individuals can obtain generous loans from government and commercial banks

to raise beef cattle, they simply transform the rainforest into pastureland.

By any of these methods of converting forest to pasture, the end result is the same. After seven to ten years of beef cattle yields, the effects of overgrazing and torrential rains turn the rainforest's nutrient-poor soils into eroded wastelands.⁸ When this happens, the rancher must find new cropland or rainforest to transform into pasture. In these various ways, beef cattle producers are expanding their operations throughout the rainforests of Central America, destroying forests, wildlife, and agricultural production with equal disregard.

Lower Production

The tragic senselessness of converting Central America's rainforest into pastureland is evident on several levels. The stocking rate (the number of animals per unit of land) on newly cleared rainforest land is a mere one head per hectare during the first year. Within five to ten years, this rate drops to five to seven hectares per head as nutrient-leaching and erosion impoverish the soil. Studies of pasturelands cleared from rainforest in eastern Chiapas, Mexico—where the soils are better than most in the region—demonstrate that the average beef yield is 22 pounds of meat per hectare per year.⁹ By contrast, the traditional agricultural system of the Lacandon Maya, the

area's indigenous inhabitants, produces up to 13,000 pounds of shelled corn and 10,000 pounds of root and vegetable crops per hectare per year. Moreover, the Lacandones produce these yields for five to seven consecutive years on a single forest plot before they allow the areas to regrow for another cycle of food and forest five to ten years later. Even then, rather than abandon their harvested plots, Lacandon farmers plant these areas with three crops—citrus, rubber, cacao, avocado, papaya—in a system of traditional agroforestry that both conserves the rainforest biome and enhances its regeneration as a renewable resource.¹⁰

Clearly, if Central America's rainforests were being eradicated to produce food for a hungry world, as some researchers contend, then systems more productive than extensive cattle production could be utilised. Indeed, food production systems practised by traditional rainforest Indians are, without exception, more productive than the pasturelands that are replacing these systems.

No Local Benefit

Even the sad yield that pastures do produce in the Central American tropics carries no benefits for local populations, either Indians or immigrant colonists. The U.S. Department of Agriculture (USDA) has pointed out that as beef production increases in Central American countries, per capita beef consumption actually declines in the individual countries. Thus, in Costa Rica, where 71 per cent of all new farm land is planted in beef cattle pasture, beef production doubled between 1959 and 1972, but per capita beef consumption fell from 30 pounds to less than 19. In Honduras, between 1965 and 1975, beef production jumped by almost 300 per cent, but national per capita consumption dropped from 12 pounds to 10. By most estimates, at least two-thirds of Central America's arable land is now dedicated to cattle production, yet the region's per capita beef consumption continues to decline.¹¹

Behind this illogical situation lies a simple fact: the expansion of Central America's beef cattle production is largely a response to the lucrative

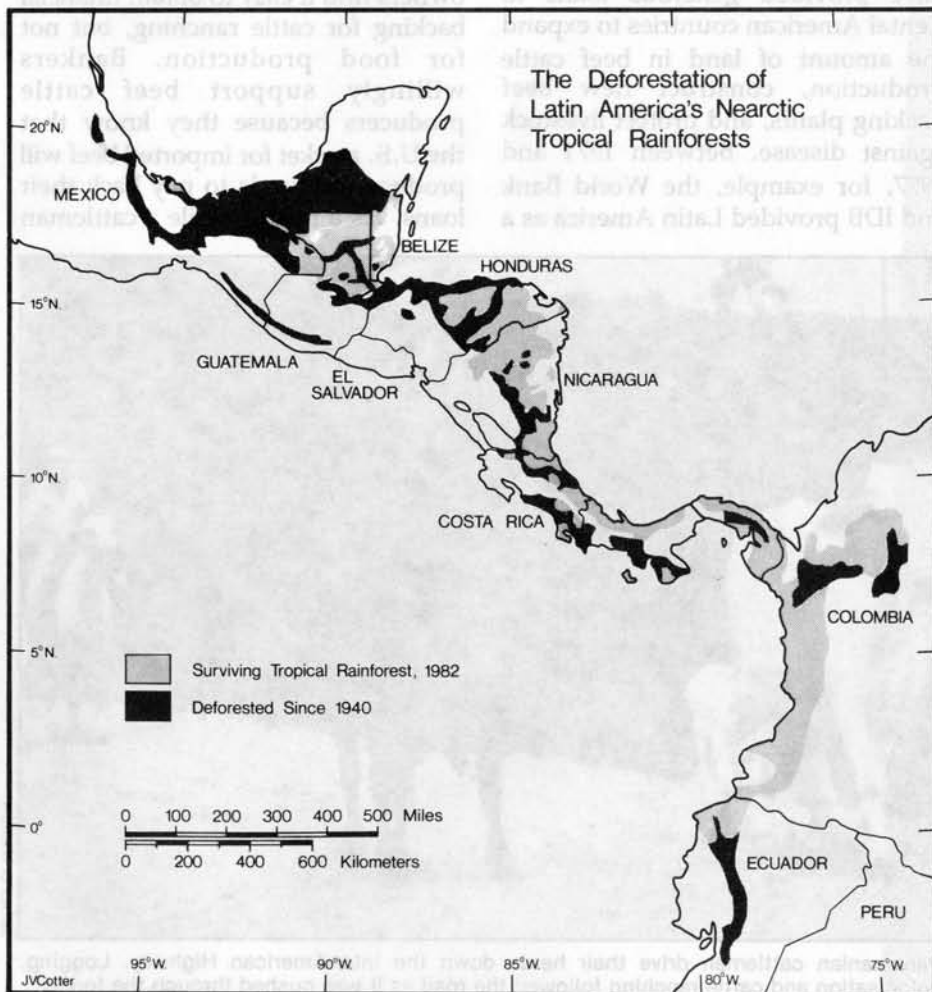
"To understand the colonists' role in deforestation, one must ask why these families enter the forest in the first place. The answer is simple because there is no land for them elsewhere."

beef import market in the United States. As beef cattle production expands in Central America, beef exports expand accordingly. Because foreign companies can pay higher prices for beef than can domestic consumers, local beef prices increase, leaving many Central American families unable to afford the luxury of beef. This problem is compounded by population growth, which means that, each year, more and more people are competing for the meat that does remain within the country.

U.S. companies annually import more than 330 million pounds of Central American beef (including live calves), an amount that represents 25 per cent of the region's annual beef production and 90 per cent of its beef

exports.¹² Until the 1979 revolution, Nicaragua was the major source of Central American beef. The country sold U.S. companies an average of 42 million pounds each year. Somoza himself owned interest in six beef importing companies in Miami; they annually purchased beef worth \$30 million, much of it produced on Somoza's own cattle ranches in Nicaragua. Today, Nicaragua ships beef both to the United States and Cuba, and Costa Rica has assumed first place in beef exports to the United States.¹³

In some years, Costa Rica exports up to two-thirds of its total beef production. Guatemala consistently sells U.S. companies between one-quarter and one-third of its beef production. Belize is still in the beginning stage of the beef exporting industry; it exports an average of only 155,000 pounds per year. Since they began in 1973, beef exports from El Salvador, where forest cover has been virtually eliminated, have averaged almost nine million pounds per year. Panama exports less, an average of just under four million pounds, although companies there



also sell beef to U.S. military bases in Panama and to ships passing through the canal. U.S. companies normally buy half of the beef produced in Honduras, a country with 25,000 km² of pastureland and the lowest per capita food production in Latin America. Only in Mexico, where domestic demands force periodic cut-offs, do government decrees hold beef exports to around five per cent of the nation's total production. Also, Mexico's involvement in rainforest destruction for beef exports is more indirect. Beef produced on cleared rainforest land in southeastern Mexico is shipped to the nation's rapidly growing urban centres to replace the beef and live calves produced in the northern Mexican states for export to the United States.¹⁴

Who Finances the Destruction?

The process of converting Central America's rainforests and agricultural land to grassland is largely financed by international credit. The Inter-American Development Bank (IDB), the World Bank, and the United Nations Development Fund have provided generous loans to Central American countries to expand the amount of land in beef cattle production, construct new beef packing plants, and protect livestock against disease. Between 1971 and 1977, for example, the World Bank and IDB provided Latin America as a

whole with over \$1 billion in loans to improve livestock production and meat processing. During this same period, loans and technical assistance from other international and bilateral agencies added another \$2.5 to \$3.5 billion to this sum. Since 1963, the World Bank has provided funds for cattle ranching activities to every Central American country except El Salvador.¹⁵

Latin American commercial banks and foreign commercial banks also are involved in export beef cattle production. In addition to serving as agents for international development loans to expand beef production, they provide capital for land purchases, road construction, packing plants, and new export ports. These organisations sometimes justify these investments with the rationalisation that they are helping to close the "nutrition gap" in Central America. But, in reality, they are compounding the problem of malnutrition by facilitating the export of high-quality food from the region and by helping to convert agricultural land to the production of export crops.¹⁶

Throughout Central America, land-owners find it easy to obtain financial backing for cattle ranching, but not for food production. Bankers willingly support beef cattle producers because they know that the U.S. market for imported beef will produce the funds to pay back their loans. As a result, while a cattleman

who produces beef for export will find an eager friend at the local bank, the peasant farmer who produces food for his family and for the local market will seek financial backing in vain.

Cattle producers in Central America also receive valuable technical assistance from U.S. and international health and development agencies. Groups such as the Pan American Health Organisation, the Organisation of American States, USDA, and the U.S. Agency for International Development (AID) assist in the export beef industry by supporting programmes to eradicate cattle pests like screwworms, vampire bats, and ticks. According to the USDA, without the technical assistance these organisations provide, cattle production in the American tropics would be unprofitable, if not impossible. As a response to this international financial and technical support, exports of de-boned, frozen beef were the most dynamic sector in Central American trade during the 1960s and 1970s, with a 400 per cent increase between 1961 and 1974 alone.¹⁷

The Hamburger Society

Overall, the beef that the United States purchases from Central America represents only 13.5 per cent of the amount that U.S. companies import from throughout the world, and less than two per cent of the nation's total beef consumption. Despite slight declines in recent years, annual per capita beef consumption in the United States in 1983 surpassed 105 pounds, and an American house cat eats more beef in a year than the average Central American.

It is important to point out that the majority of U.S. beef imports have always originated in Australia and New Zealand, with lesser amounts from Brazil, Argentina, Ireland, the Dominican Republic, and Haiti. Beef exports from Central America began in earnest in the 1960s, when the emphasis placed by U.S. cattlemen on higher profit grain-fed beef and the rise of the fast-food industry combined to create a shortage of the cheap cuts used in hamburgers and processed beef products. Beef importers turned to Central America



Panamanian cattlemen drive their herds down the Inter-American Highway. Logging, colonisation and cattle ranching followed the road as it was pushed through the forest.

James D. Nations

"Consumers must be made aware that when they bite into a hamburger, they may also be consuming toucans, tapirs and tropical forests."

because the region is free from foot-and-mouth disease. Only the fact that U.S. law prohibits imports of chilled or frozen beef from countries infected with this disease prevented the Amazon rainforest from also falling prey to America's love affair with beef. Still, the U.S. imports an average of 46 million pounds of cooked Brazilian beef each year, largely in the form of corned beef, sausages, and other canned beef products. Over 80 per cent of Brazil's beef exports go to other countries, mostly to Western Europe, which has no laws against imports from regions with foot-and-mouth disease.¹⁸

Central America's beef exports enter the United States in 60-pound boxes of frozen, de-boned cuts packed in USDA-inspected abattoirs in the Central American countries. Transported by refrigerated container ships to port cities in Florida and California, the meat is purchased by customhouse brokers and meat packers, then sold to fast-food chains and convenience food processors throughout the country. Most of it is transformed into luncheon meats, hamburgers, frankfurters, chili, soups, beef stew, hash, sausages, TV dinners, frozen pot pies, baby foods, and pet foods, although part is mixed with fatter, domestic beef to appear on the supermarket shelf as ground beef for hamburgers and meatloaf.¹⁹ Additionally, a small amount of refrigerated Central American beef is sold to restaurants that cater to immigrant Latin Americans—primarily in Miami. Many of these Spanish-speaking immigrants prefer the lean texture of grass-fed beef to the fatter, marbled cuts of U.S. grain-fed cattle.²⁰

All indications point to increased U.S. use of imported beef during the coming years. A few statistics: 45 per cent of the beef Americans eat is consumed in restaurants and fast food chains; by 1990, half of the nation's food budget will be spent on

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Table 2: US Imports of Mexican and Central American Beef & Veal 1981 (in pounds)*

COUNTRY	MANUFACTURING BEEF	CARCASSES & CUTS	HEAD MEAT TONGUE & EDIBLE ORGANS	AMT. REFUSED ENTRY INTO U.S. BY USDA
Belize	102,774	8,693	0	0
Costa Rica	46,196,621	20,805,375	4,410	1,430,974
El Salvador	271,739	133,514	0	0
Guatemala	7,602,871	3,291,119	0	74,416
Honduras	35,560,664	14,619,309	89,521	502,249
Mexico*	1,586,160	0	0	0
Nicaragua	13,846,056	7,969,341	0	338,727
Panama	2,847,988	1,535,697	0	90,902
TOTALS	108,014,873	48,363,048	93,931	2,437,268

*Not including imports of live cattle.

*SOURCE: US Department of Agriculture, *Meat and Poultry Inspection, 1981: Report of the Secretary of Agriculture to the US Congress*, Food Safety and Inspection Service, USDA (Washington, DC: US Government Printing Office, 1982). Slight declines in US imports of Central American beef during the past three years reflect a softer demand for manufacturing-type beef brought about by the economic recession in the US, as well as by social unrest, inspection problems, and toxic residue problems in Central America. Last year, for example, logistical and toxic residue problems led Guatemala to sell almost all of its export beef and live cattle to Mexico—a case of carrying coals to Newcastle. In reaction to this situation and to increased Australian slaughter rates forced by drought, US companies increased beef and veal imports from Australia.

Table 3: Total Beef Exports from Mexico and Central America, 1973-1982* (carcass weight: with bones, in pounds)*

COUNTRY	1973-78 AVERAGE	1979	1980	1981	1982
Belize	1,322	220,000	286,520	no data	no data
Costa Rica	92,568,000	103,588,000	70,528,000	88,160,000	92,568,000
El Salvador	11,020,000	11,020,000	4,408,000	2,204,000	2,204,000
Guatemala	44,080,000	50,692,000	28,652,000	44,080,000	26,448,000
Honduras	52,890,000	88,160,000	79,344,000	70,528,000	52,896,000
Mexico**	72,732,000	13,224,000	2,204,000	2,204,000	2,204,000
Nicaragua	74,936,000	101,384,000	50,692,000	26,448,000	33,060,000
Panama	4,408,000	2,204,000	4,408,000	6,612,000	8,816,000
TOTALS	352,635,322	370,492,000	240,522,520	240,236,000	218,196,000

*Includes exports to all countries, of which USA buys 90-95 per cent.

**Excluding live feeder calves, of which 468,00 in 1982.

*Source: US Department of Agriculture, "World Meat and Egg Production and Trade—1981 and Outlook for 1982," *Foreign Agriculture Circular, Livestock and Poultry*, FL&P 1-82 (Washington, DC: US Government Printing Office); US Department of Agriculture, *Foreign Agriculture Circular* FL&P 1-83 (Washington, DC: US Government Printing Office); "El Abasto de Carne de Res, Cerdo y Pollo, Garantizado," *Uno Mas Uno*, October 6 (1982), Mexico, DF, p. 9.

meals outside the home; the U.S. already sports more than 67,000 fast-food restaurants, and spends more than \$29 billion per year on fast food.²¹

The Search for Solutions

Despite its complexity, the multifaceted problem of rainforest destruction and undermined Central America food production, is a prob-

lem with simple solutions. At some point, the Central American governments will realise that transforming their rainforests and agricultural land into beef for export is a poor use of their nation's natural resources. During the last few decades, these governments have been led to believe that converting forests into export crops is an efficient way to earn the foreign ex-

change needed to pay for imported petroleum and manufactured products. But they are discovering that the result is the destruction of their renewable resources and economic dependence upon the vagaries of international markets. In time, these nations will find that rainforests are more valuable in their natural form—as sources of timber, raw materials, and new food and drug plants—than they are converted into a few years of profits from beef cattle production. But until these governments are able to break out of the forest-to-pasture syndrome, other solutions must be pursued.

One direct approach is for the U.S. Congress to pass legislation phasing out beef imports from the rainforest regions of Central America. While such laws would be resisted by Central America's cattle industry and by U.S. importers, they would have a definite impact on the survival of Central America's tropical rainforests. Unfortunately, recent U.S. administrations have taken the opposite tack.²² Importing beef to compete with U.S. produced beef is said to have held down the price of hamburger meat by five cents per pound. In fact, some U.S. officials have claimed that beef imports have done more to hold down food price inflation than any other single government initiative.²³ However, these

calculations do not take into account the social and environmental costs of beef production in the exporting nations.

An even more effective solution to the problem would be to redirect the international finances used to expand extensive beef cattle production in rainforest regions. This would mean halting the massive loans that are used to support Central America's export beef cattle industry and to expand its infrastructure—roads, fences, and beef packing plants. Instead, these funds should be funnelled into ecologically sound systems of food and fibre production, including *intensive* cattle production, in the Central American countries. High-yield, intensive agricultural systems like agroforestry, terracing, and tropical *chinampas* have already been tested and found viable by U.S. and Latin American scientists. These systems can simultaneously produce food for local populations and crops for export, all on land that has already been cleared. What the systems presently lack is political and financial support. By expanding these sustained-yield agricultural practices, the Central American countries could increase their populations' food production while at the same time conserving their nations' remaining forest resources.²⁴

All these changes will take time,

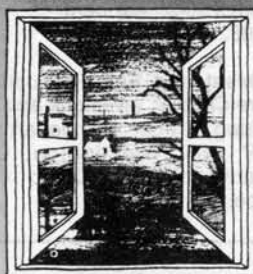
and that time will take its toll on Central America's remaining rainforests. Each year that current patterns persist means another 4,000 km² of tropical rainforest eradicated. Until the parties involved take definite action toward solving the problem of deforestation at its roots, one of the most important steps towards preserving the region's tropical rainforests is to educate the public about the social and ecological consequences of their eating habits. Consumers must be made aware that when they bite into a fast-food hamburger or feed their dogs, they may also be consuming toucans, tapirs and tropical rainforests.

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Bangladesh: How Forest Exploitation is Leading to Disaster

by Mohiuddin Ahmad

Bangladesh's forests are threatened by logging, fuelwood collection, agricultural expansion and grazing. Reafforestation projects have not proved successful. Unless action is taken soon, a disaster is in the making.

The forests in Bangladesh are broadly divided into two types: state-owned forests and privately owned village or homestead forests. The state-owned forests of 1.57 million hectares (11 per cent of the total land area of the country) are under the management of the Forest Department. These include among others 0.6 million hectares of hill forest, 0.58 million hectares of tidal or mangrove forest and 0.13 million hectares of plain land sal forest. The state-owned forests are mainly concentrated in the south and south-eastern parts of the country with very small areas in other parts.

The privately owned forests consist of multipurpose plants including fruit trees grown on small private homesteads scattered all over the country. The area under these forests is estimated to be 0.27 million hectares. In addition, there are forests of other categories, such as unclassified state forests, vested forests, khas land coastal forests, etc.

Official Figures Unreliable

Although the economic and environmental significance of forestry is emphasised in official literature, official figures show a steady decline in the area under forests in Bangladesh. The area has decreased by some 0.15 million hectares over the last 15 years (see, Table 1).

In fact, the situation is worse than even the official figures suggest. With the use of satellite and remote sensing techniques, more precise data on the actual extent of forests are now available. According to the UN Food and Agriculture Organisation (FAO), which has made a systematic analysis of the satellite data, the total area under all categories of forests in Bangladesh amounted to

only 1.24 million hectares in 1980—an estimate which includes 0.93 million hectares of Primary Closed Forests and 0.31 million hectares of Secondary Forests.¹ This is far below the official figure.

Even the official statistics show a grim situation, however. Table 1 shows annual average decrease of 2.5 per cent in the per capita availability of forest during the period 1968-69 to 1983-84. The problem is all the more serious because Bangladesh has been traditionally very poor in forest resources. Its area under forests is small compared to its neighbours, India, Nepal, Bhutan and Burma. Given this situation, coupled with a high rate of population growth (2.4 per cent per year), the country may be considered to be in an ecologically critical position.

Causes of Deforestation

Logging, fuelwood collection, agricultural expansion and grazing are the main reasons for deforestation. In a situation of growing demand for wood, trees are logged before they are mature. Traditionally village forests have been the principal source of wood. According to the Planning Commission source, these forests still cater for about 70 per cent of timber, 90 per cent of fuelwood and 90 per cent of bamboo consumption for the country as a whole.

Fuelwood and Domestic Consumption

Per capita consumption of commercial energy is as low as 41 kilograms of oil equivalent—about only 15 per cent of the average of the low income countries. For domestic consumption, people overwhelmingly rely on cowdung, agricultural by-products and fuelwood. Average annual consumption of fuelwood during the 10-year period from 1975-76 to 1984-85 had been 0.7 million tonnes.

Bamboo is the main house-building material in the country, particularly in the rural area where 85 per cent of the population live. Besides homestead bamboo bushes, bamboo is available only in the Chittagong Hill Tract region. This resource is being over-exploited.

Commercial Exploitation

The exploitation of the country's main forest resources—timber, firewood and bamboo—has increased dramatically over the past few decades, (see Table 2).

The industrial use of forests as the source of raw materials is mainly limited to the manufacturing of paper products. Bamboo from the Chittagong Hill Tracts and gea wood from the mangrove forest of Sundarban supply the main raw materials for manufacturing white paper and newsprint respectively. There had

Table 1:
The Decline of Forestry in Bangladesh

Year	Total area ¹ (million ha)	Forest area (million ha)	%	Population (million)	Per Capita availability (ha)
1968-69	14.27	2.25	15.7	64.95	0.035
1971-72	14.27	2.23	15.6	69.77	0.032
1974-75	14.27	2.21	15.5	77.03	0.029
1977-78	14.27	2.20	15.4	82.68	0.027
1980-81	14.29	2.19	15.3	88.68	0.025
1983-84	14.45	2.10	14.5	94.39	0.022

1: Area increased mainly due to land accretion in coastal belt.

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been 31 per cent increase in the output of paper products during the period 1973-85, with a 71 per cent increase in newsprint production alone, which implies the extraction of increasing amounts of forest resources. Recently paper products, particularly newsprint, have been exported to earn foreign currency.

Development Projects and Deforestation

The forests of the Chittagong Hill Tracts have been subject to substantial deforestation. The process began with the commissioning of the country's only hydro-electricity plant in the early sixties. A vast area was completely submerged under water. Homestead and farm land belonging to several thousand people was transformed into the "Kaptai Lake". Although the lake ultimately became a tourist attraction, the affected people had to shift to the hills, where they had little option but to clear forest in order to build their homes and start farming again.

This was followed by fresh settlement from more densely populated areas, resulting in more deforestation and, secondly, conflict between the local tribals and the "outsiders". Now, in the name of "law and order" and the "infrastructural development" of this "neglected region", many roads and highways are being built, leading to more deforestation. The annual average net deforestation during the period 1975-84 had been about 13,000 hectares in the districts of Rangamati, Bandarban and Khagrachari.

Corruption

The Government of Bangladesh still conceives the forest only as a source of energy. Outlining the objectives, targets and strategies for the Third Five Year Plan for 1985-90, the government expressed its pious wishes to increase state and homestead forest production and to "exploit optimally" the forest resource without disturbing the ecological balance.

In fact, the country's forest resources are not exploited "optimally", rather they are being "plundered". Forest resources are periodically sold to private parties through permits. Illegal extraction takes place to an alarming extent,

both by a section of permit-holders, as well as by others having no permit, in collaboration with a section of Forest Department officials. This has been threatening the maintenance and growth of state-owned forests. Illegal extraction and trespassing is dealt with by a decades-old Forest Act of 1927 which has become inadequate and to some extent redundant. Besides, the corrupt practices of a section of officials of the concerned Department has made the enforcement of the Act quite impossible.

The Failure of Social Forestry

Recently, the concept of "social forestry" has been put forward in various quarters. The concept emphasises forestry for the people and by the people. In Bangladesh, the programme has been addressed to the poorer sections of the rural population by concerned government agencies and local government bodies. It has been stated in the Third Five Year Plan that the "development of social forestry programmes will be given special attention".

The programme aims to encourage the poorer sections to grow trees on homesteads and road-sides. But it has not proved a success. Saplings are distributed free of charge. People are asked to provide voluntary labour. People do the work without knowing who will receive the benefit when the trees mature. Contractors make profits by supplying fences for the saplings. Most of the saplings die within a short period of time due to the absence of proper plant care and maintenance. Many of these programmes are "implemented" through international financial assistance under "technical cooperation agreements". Every such programme goes through ceremonial inauguration. Ministers or other dignitaries plant the first sapling amidst claps and photoflashes. The programme is thus "successfully launched". The very next day the plant is taken care of by the cattle.

It is true that trees are grown in homesteads. People grow them on their own initiative and get most of their fruit, timber and fuelwood from these trees. For the poorest sections, the situation is different. In rural Bangladesh, 30 per cent of the households do not own any homestead. The question is how to bring these millions under the fold of a social forestry programme. They can be motivated to grow trees in community holdings and on the roadside. For reafforestation to succeed, however, it needs to be decided who will receive the benefit. Even if people are assured of the prospective benefit, this may not be enough since the long gestation period may prove a disincentive. Hence an integrated approach is needed for the successful implementation of reafforestation programmes. Presently this is lacking.

Conclusion

There is a growing concern and awareness among the citizens of many countries of the need to protect the environment from abuses. Ecology, in those countries, has become an important force in national policy formulations, and forestry is treated as a key component in the environmental field. Bangladesh is far behind. There is no organisation of citizens' groups to work exclusively in this field, to make people and the official agencies aware of the imminent disaster, and to mobilise appropriate programmes and action among the people. Yet we must protect the environment if we are to survive. The immediate task is to reach that level of critical consciousness. Otherwise we shall proceed towards a disaster.

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Poore/ICCE

Ravaged rainforest in Malaysia.

Forest Destruction in South East Asia

by Philip Hurst

There is no one single cause of forest destruction in South East Asia. Rather it is the direct result of the type of "development" model that has been promoted in the Third World.

South East Asia houses 31 per cent of the world's tropical forests—forests that, according to many, are the oldest and most diverse on earth. At present, a minimum of 25,000 square kilometres (sq. km.) of these forests are cleared each year, with an equally large area heavily degraded by the timber industry.

The result of such destruction has been catastrophic for the countries concerned. Thailand has more than 130,000 sq. km. of land suffering "severe" or "serious" erosion,¹ with much of the North East becoming a semi-arid region. Seventy-five per cent of the Philippines has soil loss problems,² with more than 33 per cent of the total land area classified as suffering "serious" erosion.³ Indonesia has more than 86,000 square kilometres of "critical lands"—areas which the government describe as "generally unable to fulfil any of the normal soil functions, including water absorption and the production of even a meagre subsistence crop."⁴ The climate is changing throughout the region, with prolonged droughts becoming more frequent and flash flooding on the in-

crease. Meanwhile, the loss of genetic resources from the forests is a concern for all mankind.

For the peoples of South East Asia, deforestation is not an academic problem: it is often quite literally a matter of life and death. Those societies most at risk are agricultural and the degradation of the environment threatens their immediate survival. The effect upon forest-based tribal societies has also been catastrophic and many groups have resorted to arms in an attempt to defend their basic land rights and cultural identity. Indeed, at both the governmental and the grass roots level, awareness of the problem has grown to the point where there is little need for discussion on the results of forest loss; it is now a question of who is responsible and what can be done about it.

The Problem of Land Rights

The destruction of tropical forests has its roots as far back as the colonial period. Until then, the concept of land ownership as a sign of wealth was very limited in South East Asia. The land was considered a gift from God or from the divine creator: both individuals and the community as a whole had rights of use but the land

itself could not be "owned". This did not mean that these were classless societies, far from it, but unlike Europe, land ownership was not the major criterion for wealth. The colonial authorities changed that. Natural resources and cash crops such as sugar, rubber and bananas became the economic backbone of many of these countries. These crops were all grown on cleared forest land, and control over large areas of land became a source of considerable wealth. In agricultural societies, control over land, particularly the most fertile areas, effectively means control over access to food.

The colonial administrations in the region, whether American, British, or Dutch, regarded the forests as an "unproductive" liability; but the land they stood on was seen as having great economic potential. Consequently all forested land was placed under state "ownership". The Philippines provide a classic example. Under the 1902 "Land Registration Act", introduced by the US administration, ownership of land was only recognised where an individual had registered the plot with the authorities in Manila.⁵ The 1905 "Public Lands Act" then classified all land not registered under the 1902 act

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as "public land". There was no recognition of traditional systems of communal rights over land. Another act, the 1905 "Mining law" gave the colonial administration power to sell "public land" to any citizen of the United States or the Philippines. The authorities could thus sell off land to their allies, effectively removing any legal claims small farmers or tribal groups might make.

In Malaysia, the "1934 Malay State Forest Enactments" classified all forested land as "Stateland" unless otherwise registered, in much the same way as in the Philippines. Communal land ownership was never recognised. The enactments went as far as to state that "No right to practice *ladang* (traditional slash and burn) cultivation should be recorded as such right is not recognised by the government".⁶ Thus once again small farmers and tribal groups could make no claims over land while the state had complete power to distribute titles to whom it pleased.

In each country a new land owning elite emerged, generally consisting of people who were in good favour with the colonial authorities. With fortunes to be made in estate production, the most fertile areas were soon "owned" by the colonial administrators and their allies. Independence brought little change. In most South East Asian countries, the colonial system of land ownership remained in force after Independence or, as in the case of the Philippines, was even extended. There, all forested land is state owned, but to gain access to larger areas, President Marcos declared, in 1975, all land with a slope of more than 18 per cent to be "forest land" regardless of its tree cover.⁷ More than 60 per cent of the land area of the Philippines is classified as mountainous, so Marcos and his cronies could claim "ownership" over a considerable area.

In effect, throughout the region, the colonial powers have been replaced with a new land-owning elite, nearly all of whom were educated in western-orientated schools and who share the same concepts of "development" through industrialisation as their teachers. But industrialisation costs money and the only way to obtain capital has been to sell produce on the world markets. In essence, the post-colonial economics are just as

dependent on western markets as before, but with the new goal of "development for all", there has been even more pressure to produce for export. Only through large-scale centralised production can the agricultural produce be marketed at competitive prices. The highest quality and most productive land was therefore taken over for growing export crops but lower quality land, in fact almost any lowland areas, were increasingly cleared.

The Cash Crop Economy

Despite the legal back-up that politicians and the like can call upon to make land claims, the methods of land accrual in South East Asia are often carried out with little regard for basic human rights. The Philippines under the Marcos regime provides perhaps the best example of this neo-colonial system. The process of "hamleting" has been widely used to "gather" scattered farmers together in remote areas for "security" reasons. The gathering, by the armed forces, was usually preceded by one or two shootings that the authorities claimed were due to communist groups, such as the New Peoples Army. Once gathered into "hamlets", the population was usually subjected to a curfew and had restricted access to their farm lands. Hamlets, once established, are frequently moved under the guise of security, with the result that the local population is herded from location to location. Fields fall into disuse and the social fabric disintegrates as the communities become more and more disorientated.

The end result is little resistance to land owners making claims over vast areas. As one farmer from the Davao del Norte province on the island of Mindanao who has gone through this process claimed: "Many of us entertain the idea that it is not only the New Peoples Army they (the military) are interested in, but also the land we have occupied and tilled. We are aware that big foreign corporations practically surround us. Is it remote that they want our farms for expansion for more falcatta, banana and oil palm plantations?"⁸ The area of Davao del Norte has probably the best quality soils on the island of Mindanao but also has more than 25,000 hectares of banana plantations

alone.⁹ Some of the better known companies that control more than 80 per cent of these plantations by area are Del Monte, DOLE and United Fruits.¹⁰ In the Philippines as a whole more than 30 per cent of the total cultivated land area was given over to cash crop production for export by 1980,¹¹ mainly bananas, pineapples and sugar cane.

Working conditions on large cash-crop estates are often appalling and frequently result in lower living standards than those experienced by subsistence farmers. On the island of Negros, a sugar estate worker may get 180 days work per year. Malnutrition and actual starvation are common among landless peasants, who are kept almost permanently in debt. The sugar cane plantations take up almost all of the fertile land in the lowlands. In 1986, almost two-thirds of the sugar cane area was left unplanted, but as one landless farmer explained to a Japanese delegation "If you plant food to eat anywhere on the estate owner's property—and everything is his property—he takes it out with his bulldozer . . . Some of the big estate owners have private armies . . . dozens of union organisers have been found floating in the river, or in shallow graves."¹² Small wonder that many choose to eke out a living in the uplands of Negros, currently losing their forests at more than 20,000 hectares per year.¹³

In Thailand, it is the military elite rather than multinational companies who are the major cause of landlessness. Senior officers own the majority of the country's "rice bowl", an area that supplies rice even to the United States and Japan. Here more than 50 per cent of the land is worked by tenant farmers.¹⁴ Their income and living standards are often very low. As a Ministry of Agriculture and Co-operatives report noted in 1980: "On average . . . upland farmers growing commodities for export have higher incomes than the rainfed rice farmers in the valleys."¹⁵ Much of Thailand's most fertile soils are also taken up by large cassava estates, all for export to feed the cattle of the European Economic Community.¹⁶

In Thailand, individual or communal claims over forested land are severely restricted. However, the estate owners have circumvented the legislation. In the South, the large

sugar cane landlords actually hire landless farmers to cut the forests and grow subsistence crops for three to five years.¹⁷ That gives the tree stumps time to rot and does not implicate the landowners too closely with the deforestation process. The landlord will then claim the cleared land and plead ignorance over why the previous forest was cut and by whom. At the same time he will be paying the farmers to move into new forest areas.

Not surprisingly, the "slash and burn" farmer has been blamed for the majority of forest destruction. In fact, over much of the country, the reality is very different. As Dr Ramitanondh, writing for the FAO, notes: "(We) do not claim that the rural poor have nothing to do with deforestation, in fact they do, but the people who have done far more harm to the forests of northern Thailand were, and continue to be, those who occupy the medium to high economic strata."¹⁸

Landless farmers in Thailand are not totally blameless for forest destruction, but they are not always from the lowest income groups. Involvement in the world commodity markets provides enough incentive to make the short term production of cash crops preferable to long term, less environmentally destructive farming methods.

The government has encouraged landless squatters to move into the jungle for several reasons; cash crop production in the squatter area has significantly contributed to the country's exports; squatting alleviates pressure to change land ownership distribution in the fertile areas; and it has also been a major component in opening up rebel controlled areas. The rather weak Royal Forestry Department has thus had to compete against the land use policies of the military and the trade departments who have considerably more influence over government policy in Thailand. The fact that the area where the majority of small farmers have planted their cash crops—the North East—is rapidly becoming a semi-arid region with prolonged dry seasons followed by devastating flash floods shows that present farming methods are clearly unsustainable. There might be a small cash income for many farmers today, but

the bottom could drop out of the cassava market (as it has done for sugar, oil palm and rubber) and at present erosion rates these lands are unlikely to be able to support any kind of agriculture for very long.

Transmigration Programmes

Not all shifted farmers have moved spontaneously into the forests; each country in the region has a government-run migration policy of some kind. By far the largest is Indonesia's Transmigration Programme which has come in for much criticism (see *The Ecologist*, Vol. 16, No. 2/3, 1986), although Malaysia and the Philippines also have considerable programmes. Government sponsored migration into forest areas in Indonesia was originally justified as a means of relieving population pressure in Java. But the programme is not significantly alleviating this problem: Java's population is expected to grow by more than ten million between 1985-89, the transmigration programme hopes to move three million people at the most in the same period.¹⁹ Poor site choice and clearing methods, unsustainable farming models, and chronic corruption at all levels have brought a catalogue of failures and caused widespread environmental degradation. On Kalimantan, the Indonesian half of the island of Borneo, it has been estimated that only 75,000 hectares of forest land are suitable for any form of settled agriculture. Yet the transmigration department aims to open up 17 times that area.²⁰ On Irian Jaya, a similar situation prevails with 20 of the proposed 46 sites considered unsuitable for settled agriculture.²¹

Malaysia also has a government migration programme, carried out principally by the Federal Land Development Agency (FELDA). Poverty alleviation was always the major criterion; unlike neighbouring Indonesia, Malaysia actually has a positive population expansion programme. In the decade 1980 to 1990, more than 700,000 hectares of forest land are scheduled to be cleared for smallholding rubber and oil palm plantations.²² The costs in 1985 were between M\$53,000 and M\$76,000 per family.²³ But the whole future of the programme is currently threatened since the palm oil and rubber markets have collapsed and the younger gen-

eration are now moving into the cities rather than staying on the estates.²⁴ Emergency food supplies have had to be flown into FELDA sites on several occasions. The government is also running short of suitable forest land and is looking increasingly towards East Malaysia for future sites.

The Threat to Tribal Peoples

Migration into the forests has threatened many tribal groups with cultural oblivion. Such societies are as much a part of the forest as the trees or birds. One cannot cut down a forest and maintain a forest culture. Most forest dwelling communities are semi-nomadic, practising traditional forms of shifting cultivation. Although claimed by many to be environmentally destructive (usually by people who have done little or no research into the subject), in most cases traditional shifting cultivation, is possibly the only form of ecologically sustainable agriculture for these forest areas. There are of course considerable variations in the methods used, but generally crops are grown in a complex rotation system where ground is rarely left uncovered and fields are left fallow for a number of years. The systems can support relatively high population densities if reasonably fertile land is available (up to 500 people per square kilometre in parts of Papua New Guinea).²⁵ Where the land is of poor quality, larger areas and longer fallow periods are preferred.

Tribal societies have been almost universally blamed for forest destruction. The reasoning is often blatantly political, since many groups show little political allegiance to the centralised governments. In certain areas, such as Burma and Northern Thailand, some of the larger tribes are now calling for an independent state and here a few do fell timber illegally in order to buy arms. Most, however, have not formed themselves into full scale armies and their lifestyles do very little damage to the forests. As noted earlier, these groups rarely have any land rights even though they may well have lived in the area for hundreds or thousands of years. Today they find their hunting grounds and fields encroached upon not only by settlers but also the timber industry. Al-

"At present rates of erosion, these lands are unlikely to be able to support any kind of agriculture for very long."

though transmigration sites have infringed on tribal lands, the activities of the timber industry have affected a far larger number of groups.

The Timber Industry

During the 1950s and 1960s exports of tropical timber were identified as a major potential source of foreign revenue. A rapid expansion of the industry throughout the region was promoted by the major development agencies such as the World Bank. Tropical timber was to be the oil well that would never run dry. Although the colonial powers had exploited some of the region's timber resources, logging was generally carried out on a small scale. The expansion was now spectacular. In West Malaysia, 60,000 ha. of forest were handed out as concessions in 1970, an annual figure that jumped to 424,000 ha. just two years later. By 1976, West Malaysia was selectively logging 411,000 ha. each year, but the boom is now over, with a maximum annual cut of 149,000 ha.²⁶ Indonesia expanded its industry at the same time, new legislation under the Foreign Capital Investment Laws of 1967 encouraging the large multinational corporations of the US and Japan to move in. As a recent report written jointly by the Government of Indonesia and the International Institute for Environment and Development (IIED) notes, the companies drawn to Indonesia came "looking for the quickest return on their investment."²⁷

Logging occurs almost exclusively in the hills of the more remote regions of South East Asia, since the lowland forests have all been over-exploited. The tropical timber trade has perhaps been the largest single factor in forest destruction in the region. In the East Malaysian state of Sabah, one politician recently stated: "Timber companies in Sabah have been raping thousands of acres of forest".²⁸ In the Philippines, the Marcos regime actually planned for



Cleared forest in Indonesia. Thousands of acres of rainforest have been destroyed in order to make way for settlers under Indonesia's Transmigration Programme. Poor site selection and clearing methods and chronic corruption have caused widespread environmental degradation.

the complete annihilation of the country's virgin forests. The 1978 five year plan noted:

"By the early 1990s, when the virgin forests in Mindanao are completely logged off, production will reach the limits of the allowable annual cut . . . This will decline further . . . by mid-1990 when all Luzon virgin forests are also completely logged off."²⁹

In Thailand, a recent article in *The Bangkok Post* summed up the views of many; "Forest destruction by the hilltribes and landless farmers has been rampant, it is true, but these are no match to the destruction by illegal loggers."³⁰ Indonesia has 640,000 sq. km. of forest concessions with just 521 companies having almost total control over more than 25 per cent of the countries total land area.³¹

Logging in most of the region has been based upon the assumption that tropical forests will recover naturally after logging. All forest development policies, until very recently, relied upon this theory but it simply does not work. As Mr Cassels of North Borneo Timbers (the oldest company in Sabah) and general manager of Sabah Softwoods recently put it: "Tropical forests just aren't sustainable economically. I don't care what anybody says, no one can wait 100 years for trees to grow. Natural regeneration is just nonsense."³² Indonesia, Malaysia and the Philippines now all have laws that encourage companies to replant, but these

are on paper only. No logging companies are geared towards replanting or post-logging forest management. This attitude is summed up well in a letter sent by the director of Japanese New Guinea Timber Company (part of the giant Honshu corporation) to the Director of Forests in Papua New Guinea: "Your assumption that reforestation is a normal part of logging operations and should be costed to the logging is totally unacceptable."³³

Not only does the industry in general consider replanting and forest management as a job of the government, it aggravates the situation with the logging methods used. Tropical timber extraction is one of the most environmentally destructive industries in the region. Nearly all contractors use bulldozers and other heavy machinery to drag logs out. Numerous studies indicate that on average 50-70 per cent of the forest cover is destroyed and 40 per cent of the land area may be left bare after extraction. The destruction of the surrounding forest is so great that up to 70 per cent of the remaining trees may die from their injuries. Soils are compacted by the bulldozers and the forest loses much of its ability to prevent floods and droughts. Secondary or logged over forests are also much more susceptible to fire since there is plentiful dead wood and they are generally drier than virgin areas. The cumulative effect of this damage is that these forests will take many dec-

ades to recover even if only to produce wood for the timber industry. If one wants genetic diversity to return, one may have to wait centuries.

In South East Asia, the logging industry has to work at high speed since concessions are usually granted to political allies and can be withdrawn if one falls out of favour. Speed is preferred to maximum long term production, so it is inevitable that they use heavy machinery and pay workers according to how much they produce. Extraction rates in all these countries increase greatly just before elections. Less environmentally destructive logging methods do exist, such as using elephants instead of bulldozers, but they are slower.

Being so capital-intensive, relatively few jobs are created by modern logging operators. As a recent report to the Government of Indonesia noted: "In 1982, the logging industry employed only 70,000 people; it is probably one of the least labour-intensive of all the major productive sectors."³⁴ In fact rubber tappers and other minor forest product industries, providing a small cash income for tens of thousands of Indonesians, have all suffered greatly as the forests are taken over by the timber giants. For Indonesia as a whole, Robin Hanbury-Tenison has commented:

"If an attempt is made to assess the cultural costs (of the logging industry), the lost potential for development and for secondary industries once the timber has been removed, and the cost of rehabilitating and maintaining the resident population, it may well be found that far from bringing benefits to the people, the eventual effect of the lumber business has been to lower the standard of living and remove their ability to be self-supporting."³⁵

A similar situation prevails in most logging areas of South East Asia. Government attempts to halt forest destruction in the region as a whole have been clumsy and largely ineffective. One of the major problems has been the emphasis placed on replanting rather than attempting to protect what is left. Hence the logging industry is allowed to run rampant until supplies are threatened, when a log export ban is enacted. The reforestation programmes are then employed to create future supplies for this industry rather than meeting the needs of the rural poor.

Misguided Development

There is no one single cause of forest destruction. Rather, it is the direct result of the type of "development" model that has been promoted in the Third World. This development model is the only major common factor that cuts across the considerable cultural, as well as geographical, boundaries of the region. Whether one is in Buddhist Thailand, Muslim Indonesia or the Catholic Philippines, the direction taken by the development process is exactly the same.

"Development" is supposed to help improve the living conditions of people in the Third World. However, the reality is very different: the incidence of absolute poverty continues to increase, as does the disparity of wealth and land ownership between the majority of the population and the social elite. For example, agricultural production in the Philippines grew by 5 per cent per year on average between 1971-1975: yet the number of families living below the official poverty line grew from 47.8 per cent to 54.8 per cent in the same period, according to the World Bank.³⁶

Attempts to combat the environmental problems of the Third World while maintaining the present world economic structure have consistently failed. Radical change is long overdue; with the current rates of environmental degradation in the Third World, it is needed more than ever before.

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A logging site in Sarawak. Timber is a major source of revenue for Malaysia but the damage caused is devastating.

Malaysian Timber: Exploitation for Whom?

Harrison Ngau, Thomas Jalong Apoi and
Chee Yoke Ling

Government policies which seek economic development regardless of ecological costs lie at the roots of the current forest crisis in Malaysia.

At the turn of the century, the inhabited area of Peninsular Malaysia was infinitesimal compared with the extent of the forest that remained untouched. Today, four and a half decades later only 13.7 per cent of the peninsula is primary forest. Pressures to clear this small area continues. To date, there is only one national park (Taman Negara) in Peninsular Malaysia which itself has been threatened with a possible hydro-electricity power project.

This rapid and large-scale deforestation has taken place as a result of intense development policies implemented by the government. Such policies have called for extensive areas to be turned into cash crop plantations, urban and industrial centres, large dams and infrastructure such as airports and highways.

The wealth of timber from the rainforest has also been an impetus towards massive clearance of the forest. The remaining timber reserves have been estimated to last only until the 1990s.

Meanwhile, the East Malaysian states of Sabah and Sarawak, which have a total land area exceeding that of the peninsula, are still largely covered with forest. In Sarawak, for instance, about 76 per cent is forested, out of which more than one third is primary forest. Six national parks have been declared.

As for Sabah, more than 50 per cent is primary forest. However, the rate of forest destruction is 590 square kilometres per annum, as compared to 410 square

kilometres per annum in Sarawak. This is due to the more aggressive timber industry in Sabah.

While the clearance rate of 810 square kilometres per annum in Peninsular Malaysia has plunged that part of the country into a crisis already, the lessons have not been learnt. The timber industry in East Malaysia is being stepped up. At the same time, cash crop plantation schemes are on the increase and a number of large hydro-electricity projects have been proposed for Sarawak in particular.

This continuing destruction of the tropical rainforest has resulted in severe adverse impacts not only on the natural environment, but also on the socio-economic and political development of the people, especially the indigenous population of East Malaysia.

Logging

Timber is a major source of foreign revenue for Malaysia. In 1960, timber exports from Peninsular Malaysia brought in M\$55.28 million. By 1982 this had risen to M\$1,013.92 million.

Sarawak alone earned M\$1,093.3 million by exporting logs in 1983. In the same year, sawn timber fetched M\$84.97 million; finished timber products such as mouldings, woodchips, plywood and laminated board together earned M\$67.22 million. Export of minor forest produce fetched M\$2.52 million. All of this accounted for about 20 per cent of the state's total earnings with 65 per cent from petroleum and its products, whilst the agricultural sector accounted for only 5 per cent.

The logging industry in the country has been so

massive that, in 1981 alone, about 240,000 hectares of forest were logged in Malaysia. According to the 1979-1980 Economic Report of the Ministry of Finance Malaysia "in Sabah, where about 86 per cent of the land mass is under forests, at the present rate and practice of harvesting of approximately 12.9 million cubic metres, the resources of eight most popular species may be exhausted in about 24 years and for other species, in 31 years."

The same report also stated that, "in Peninsular Malaysia, it has been estimated that with the present rate of annual forest harvesting of 922,000 acres, forest resources will be depleted by the year 1990." As a result of such uncontrolled rate of harvesting in the past, Peninsular Malaysia has already faced a shortage of a number of popular species. In fact, in the first half of 1980, a total of 18,047 cubic metres of logs had been imported by Peninsular Malaysia from Indonesia, Sabah and Sarawak.

In trying to conserve Malaysian forest and restrict the export of logs, the government in 1976 implemented an export quota of 41,000 cubic metres or about 0.5 per cent of the total annual log production in Peninsular Malaysia. In 1985, a total ban was imposed. Thus, since 1976, 85 per cent of the logs extracted in the peninsular are processed into sawn timber and other wood products.

However, the ban on export of logs applies only to Peninsular Malaysia. In 1975, as timber processing in East Malaysia was still relatively undeveloped, about 95 per cent of the logs produced were exported. There has only been a very insignificant improvement to the situation as documented in *The Economic Report, Malaysia, 1982/83* which stated that the production of sawn timber from Sabah and Sarawak was estimated at one million cubic metres compared to 5.4 million from Peninsular Malaysia, despite the fact that the two states were producing 67.8 per cent of the total national sawn log production of 29.50 million cubic metres in 1982.

In 1984, the then Deputy Minister for Primary Industries of Sarawak, Haji Bujang Ulis stated that "from this year (1986) to the year 2000, the government has set a limit of 149,000 hectares of timber felling annually compared with the current rate of 240,000 hectares".¹

Apart from the volume of logging, the nature of timber felling is also a matter of concern. The amount of timber extracted per hectare in Malaysia is among the highest in the world. This means that there is excessive destruction of non-commercial trees in the logged area. Studies from Sarawak confirm that for every 26 trees cut down, 33 others are damaged. This comprises 40 per cent of the growing stock. Then there is the "skidding" effect which further bares more soil. Thus selective logging as practised at present is not ecological at all.

Development Projects

Timber extraction is very often the first operation to enter primary rainforest. Once valuable timber and other forest products have been removed, the bulldozers and cranes move in.

Extensive forest cover has been cleared for industrial sites and urban development. The mushrooming of

housing estates throughout the country has contributed to forest depletion. While such basic needs as housing are undeniably essential, the indiscriminate clearance of forest without ecological considerations has led to adverse environmental impacts. These include "heat islands" in urban/housing areas, and flash floods in the downstream areas.

Mining industries such as the goldmines in Bau (First Division), the proposed coal mining project in the Seventh Division and Bintulu area of Sarawak, the mining of copper in Mamut in Sabah and quarry activities at various sites in the country, all account for a certain degree of destruction to our forest.

The greatest threat at present, however, is the number of large dam projects on the government drawing board. Since hydro-electricity has been hailed as the answer to Malaysia's future energy needs, massive areas of primary forest have been earmarked for drowning.

The implementation of the M\$525 million Batang Ai dam in the Second Division in Sarawak, for instance, flooded 42,000 acres of land, a considerable portion of which was also tropical primary forest. The resettlement of the 500 families in 20 longhouse communities also necessitated the clearing and usage of additional forest land area.

Had the proposed M\$10 billion Bakun dam in Ulu Rejang, Seventh Division Sarawak been realised, it would have flooded 600 square kilometres of land, including about three-fifths of one of Malaysia's few remaining forest areas. The resettlement of the 5,000 natives in 15 longhouse communities in the Ulu Rejang area and the building of roads and other infrastructure associated with the dam would have further destroyed a huge area of our forest. The dam was shelved in 1987, but could still be reactivated.

The construction of the Kenyir dam in Trengganu has also similarly and greatly contributed to more losses and destruction of the forest and wildlife.

Apart from dams, other projects which threaten the forest include the Sipitang paper mill project on the west coast of Sabah. The mill has been attacked as being "unrealistic, uneconomical and a drain on the state funds".² The present state government hoped to scrap the project which had been started by the former government. However, the state was already so heavily committed that it would have been too costly to cancel the various contracts and pay the necessary penalties. One of the many obstacles is that the type of logs needed for the project are found on the east coast of Sabah. Transporting these logs to Sipitang would not be viable. The state government is therefore proposing that neighbouring Sarawak jointly participate in the project. Since the required logs can be found across the border from Sipitang, Sabah also hopes that supplies may be met by Sarawak.

Presently, there is public pressure that Sarawak should not become involved in a "suspect project simply to bail the Sabah government out of a tight spot". Certainly, the exploitation of forest and the commitment of millions of dollars in such an unthinking fashion as shown by the previous Sabah Government is totally against any notion of genuine development.

CONFLICT OF INTEREST?

Kuala Lumpur, September 5th, 1987: Sarawak Environment and Tourism Minister Datuk Amar James Wong said today there was no conflict of interest in him owning 100,000ha of timber concession in Limbang.

"Logging is my bread and butter since I was a pioneer in the industry in 1949. I can be held responsible for damage caused by logging but my conscience is clear.

"And I am not a hypocrite," he told a Press conference after discussions with Federal Ministers on matters related to Sarawak.

Datuk Amar Wong had called for the Press conference to rebut a claim by Sahabat Alam Malaysia which provided statistics to prove that logging caused more damage than shifting cultivation.

SAM president S.M. Mohamed Idris had also called on Datuk Amar Wong to resign because of conflict of interest.

SAM said Datuk Amar Wong's timber company had taken legal action against natives who set up blockades to stop logging operations.

Datuk Amar Wong said today that although he had been a State Minister

for only five months, he was doing a good job for the Penans.

"I am building roads for them. I have built a 3½ mile road right to their doorsteps.

"Why should I step down? I was merely exercising my right as a citizen in a democratic country when I took out an injunction against the natives for setting up blockades," he said.

Datuk Amar Wong said SAM had distorted facts and did not give a correct picture of logging and shifting cultivation.

He said: "SAM is biased and I am not. I challenge anyone to discredit me about my observation that logging is harvesting the forest and nothing more. The forest can regenerate itself as mother trees and seedlings will never run out.

"Nature is very resilient and five years after an area is logged, one would not be able to tell the difference between it and a primary forest.

"But in shifting cultivation, which causes irreparable destruction to the forest, we lose everything. The natives use chainsaws to cut the trees, destroying everything in the process.

"It is a fact of life that the biggest curse to the Sarawak forest is shifting cultivation which eats into the forest.

"About 100,000 to 150,000 acres a year are destroyed by shifting cultivation."

Asked for the rate of logging and the amount of land logged, he said: "It is not important to compare them because the logged forest will remain forever green if there is no shifting cultivation."

Datuk Amar Wong claimed that the natives had personal interest in their request for a communal forest.

"It is a ploy to get the forest for themselves and later give out their own timber concessions," he said.

"If every long house wants a communal forest, we might as well stop logging.

"They should give way to the needs of the country.

"Logging is important, without it Sarawak cannot have the revenue to improve the standard of living of the people," he added.

Reproduced from: The Star, September 5th, 1987.

Cash Crop Plantation Schemes

Since the days of colonial administration in Malaysia and continuing today, extensive cash crop plantation schemes such as rubber and oil palm estates form a vital part of the economy. This has involved massive clearings of forest by such multinational companies as Guthrie, Harrison and Crosfield, Sime Darby and the like. These schemes have been extensively expanded since independence, following governmental control of most of the owner-companies via stock buying.

For example, the total land area cultivated with oil palm in Malaysia increased by 18 per cent or 510,000 hectares in 1974 to about 600,000 hectares in 1975. By 1982 it had increased to 1,170,700 hectares.

As for rubber, in 1977, the total acreage cultivated was about 2,000,000 hectares of which 640,000 hectares (32 per cent) were under estates and 1,360,000 hectares (68 per cent) under smallholder cultivation.

The establishment of oil palm and rubber plantations in Sabah and Sarawak is more recent. Yet in 1982, the total acreage under cultivation for rubber in the two states was already 309,435 hectares.

This also applies to cocoa which recorded an increase of 6.8 per cent or from 118,000 hectares in 1981 to 126,000 hectares in 1982.

The marked increase in the cultivation of these crops also necessitates a corresponding increment in clearings or cutting of the remaining but fast declining tropical forest.

Corruption

As Japan, South Korea, Taiwan, the United States and the EEC provide ready markets for our timber, and our

forests provide ready easy wealth for those in power, huge forest concessions have been issued to timber companies often owned by Malaysian politicians or those related by blood or money to them.

These concessions are usually farmed out to contractors and sub-contractors who are actually the ones who work the concessions for the licensees. In most cases, the licensees would not even appear at the site of their concessions. They just sit back to collect commissions from the contractors, who themselves are also people closely related to the licensees either by virtue of business or political interests.

In Malaysia as in most Third World countries, the forest being an extremely easy and potential source of wealth, has great influence not only in the socio-economic development but also the political course and direction of the country. Forest wealth can even be used to buy support and neutralise political opponents.

The resultant plundering of our forest has also been aggravated by the "opportunistic" attitude of political leaders and their cronies whose enthusiasm is only to seize the opportunity "to get rich quick and as much as possible" while they or their friends are in power.

In Sarawak, the commercial exploitation of forests on a large scale started in 1946 by the British colonial administration. By 1960, it had proven its value as the largest earner of revenue and foreign exchange, surpassing even rubber. In 1984, there were already a total of 367 logging licences issued to various individuals and companies in the state.³

In Sabah, where the change of political leadership has taken place several times since independence, the situation has been even worse with "scarcely any timber land left in the state for distribution". According to the



Many tribal groups have no legal title to their lands and thus no defense when they find their lands licenced out to logging companies.

state's new Chief Minister, Datuk Joseph Pairin, "the leaders of the previous ruling party (Berjaya) were so thorough in carving up timber land for the ultimate benefit of their associates and themselves that there is hardly any forest land left in the state."⁴

Impact on Indigenous Peoples

About 70 per cent of Malaysia's population is rural, living in longhouses or kampongs often situated along rivers and streams within or near forest land areas. Their main economic activities include farming, hunting, fishing and collecting jungle produce. As such, they are greatly dependent on the forest and its resources for their continued survival and development.

Traditionally, farm land, forest, rivers and their resources are the common property of the community, with each member having equal right to use these resources for their well being. However, with the establishment of the colonial administration in the early 19th century, various laws governing the usage or cultivation and ownership of land were passed, denying these traditional rights and introducing the concept of private ownership. As a result, many tribal groups, particularly those which are nomadic, have no legal title to their lands, and thus no defence when they find their land licenced out to logging companies. Indeed, where

native peoples have attempted to defend themselves and their property from the destruction caused by logging activities, many of them have been arrested and prosecuted, (see articles, pp.186-189).

The destruction of forest also means the destruction of wildlife habitat causing the extinction of some species. The removal of forest cover leads to erosion, siltation and pollution of rivers which in turn affect or deplete the fish resources of the rivers. All of these have greatly contributed to the mounting problems of indigenous communities.

A "serious decline" in local fish stocks is reported by 88 per cent of 65 longhouses on the Apoh, Lenei, Tutoh, Teru, Kerap, Middle Baram, Katibas, Limbang, Tinjar, Peking, Kanowit and Mujok rivers. By far the most common reason given for this is the muddying of rivers as a result of soil erosion from slopes under logged forest, with diesel-oil pollution accompanying the timber extraction also prominent.

In recent years, as more and more forest land in the interior has been licenced out to logging companies, the problems and impacts on the livelihood of the rural population have become more acute. Furthermore, the influx of workers from various parts of the country brought by the companies have created several social problems, including an increase in gambling, alcoholism, and petty crimes.

The Ecological Impact

The impact of deforestation on local ecology has also become critical. There have been increasing occurrences of floods, droughts, and reports of growing lists of endangered species of plants and wildlife, some of which are on the verge of extinction.

In the Baram District, Fourth Division, the most heavily logged area in Sarawak, floods frequently occur, some of which are severe. In 1979, a flood inundated the Baram basin as far as Long Akah, which is around 180 miles from the river mouth. Three to four towns were badly affected. In 1981, a massive flood also occurred and it affected almost the whole of the Fourth Division. In the Baram area, it inundated interior areas as far as Long Lama. Damage in terms of livestock, ricefields, crops and property was estimated to be about M\$12 million.⁵ Then in January 1984, another massive flood occurred and affected almost all the major towns of Sarawak. Four people drowned when their house was swept away and hundreds were left homeless.⁶ Again, in 1985, Baram was hit by a flood, inundating some parts of the town areas.

Apart from the frequency of floods, Sarawak also suffers from prolonged drought. One very severe drought occurred in 1981, in the First, Second and Sixth Divisions. It lasted for more than a month and was said to be the worst drought since 1973. The Chief Minister of Sarawak advised the people to treat it as an emergency. Millions of gallons of water had to be delivered to the affected areas as they had already run out of water supply.⁷ Severe drought is also increasingly experienced in other parts of the state. In the Fourth Division, in 1983, many farmers complained of very poor harvests. Then in 1986, we experienced two droughts; both lasted for more than a month.

The other obvious consequence of extensive removal of forest cover is increased soil erosion. Studies in the Cameron Highlands indicate that conversion from forest to tea plantations increased soil loss by 20 times.

Since the tropical topsoil is extremely vulnerable, the forest canopy is essential in preserving soil fertility. Clearance, even for agriculture, leads to loss of valuable topsoil. Increasingly higher costs will have to be incurred to fertilise the soil artificially.

The Reduction of Biological Diversity

The massive clearing of the forest, for logging in particular, has also taken a heavy toll on the plants and wildlife in the country. An official report recently stated that some mammals are now endangered and some are becoming rare and others are on the point of extinction. In Sarawak, those endangered are the Sumatran rhinoceros, proboscis monkey, silvered and banded langur and dugong. Two species are already extinct: the banteng and the bay cat. There is also another species of animal thought to be at the point of extinction: the wild cow. Those species that are becoming rare are the Hose's mongoose, Eurasian otter and Red-bellied sculptor squirrel. If the logging continues at the present rate, certain species of frogs (there are 110 known species) may be wiped out. The same may happen to some species of lizards, those which are not tolerant to clear felling.

As for plants, many species are also now endangered and/or have become rare. Six to seven types of the orchid family are now endangered, and so are one or two types of the pitcher plant and palms.

Efforts made to rehabilitate and replant the logged over, and/or cleared forests have not been satisfactory. In Sabah, the government started a programme for reforestation 3,000 acres per year in 1976. Most of the trees replanted are fast growing species. In any case, in Peninsular Malaysia, "the reforestation rate has been below target and achievement so far is limited when compared with the rate of forest harvesting."⁸ By the end of the Third Malaysia Plan (the end of 1980) the reforested and rehabilitated area was 98,900 acres. If we were to compare this to the then rate of annual forest harvested of 922,000 acres, it is insignificant. In Sarawak, very little effort has been made to reforest the logged-over areas. Much of the reforestation and rehabilitation is confined to the permanent forest estate only, which has been damaged by shifting cultivators. The total area reforested in 1983 and 1984 was only 964.3 hectares, compared to an annual harvesting rate of around 40,000 hectares. Again, this is minimal.

Conclusion

Government policies which give priority to the pursuit of economic growth to hasten the pace of development are the underlying cause of the extensive deforestation in Third World countries. Yet, contrary to official propaganda, those policies have not benefited the poor: on the contrary, the main beneficiaries have been those who hold the reins of power and their associates. In their name, the countries of the Third World have cut their forests, planted cash crops and

flooded huge areas of land. Can this really be justified as "development", let alone "progress"?

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The Harrowing of New Zealand

by Denys Trussell

Since the first white settlers arrived in New Zealand, the country's forests have suffered a relentless onslaught, which continues even today. Neither landless peasants nor population growth can be blamed for the onslaught: rather the responsibility lies with the ruthless subordination of ecological considerations to market forces. New Zealand's forests have simply been "cashed in" in pursuit of short-term profits.

In 1840, when the first big waves of settlement began washing over New Zealand there were thirty-four million acres under one or other of the major forest types (see box). This was 53 per cent of the land surface. Now only 23 per cent is so covered, and much of that is "second-growth", having already been heavily logged.¹ Pressure on what remains, be it owned privately or by the Crown, continues. Most of the major trees are slow-growing, taking three to five hundred years to reach full maturity. Their preservation depends therefore on their being logged only on a very modest scale, if at all. Yet large-scale timber schemes are still mooted, particularly in regard to beech forest, which is felt to be swift in regeneration. Given favourable conditions the beech species mature in 80 to 120 years, but knowledge about their regeneration as a complete eco-system is necessarily lacking. Simply not enough time has passed since European settlement to have made reliable observations.

The New "Economism"

It has always been sociological rather than botanical factors that determined what was cut, when and how much. At times, particularly in the 1870s, the destruction of rainforest was not all that different in kind from that now seen in Indonesia; the result of demographic upheaval, caused by "market forces", orchestrated by the rich and the powerful. Since the 1790s (when commercial logging began) New Zealand's forests have been involved in the web of market forces that now determines humanity's economic life. While the poor may have provided labour, the rich provided capital,

machinery and the drive for profit that ensured far more forest was destroyed than was necessary to provide for the new society in New Zealand. An insignificant portion of the timber extracted was for the needs of those in the country. The rest was exported or burned for the land that lay beneath the trees.

From the mid-eighteenth century, society in Britain and its colonial offspring had been becoming less "social" and more "economic"

"never before . . . were markets more than accessories to economic life. As a rule the economic system was absorbed in the social system."²

Now, according to theoreticians of the new "economism", such as Adam Smith, the market and its "invisible hand" must determine social relations. Hitherto a carefully controlled and limited aspect of society, the economy would now subsume all to itself:

"A market economy must comprise all the elements of industry, including labour, land and money . . . But labour and land are no other than the human beings themselves of which every society consists and the natural surroundings in which it exists. To include them in the market mechanism means to subordinate the substance of society itself to the laws of the market."³

This most terrifying aspect of "economism" man explains the insensate destruction of rainforest now happening throughout the world. It results from beliefs as unreasonable as any in history, which nonetheless claim the legitimacy of being somehow more "rational" than those of economic systems that are more properly socialised.

Victims of the Industrial Revolution

Initially destruction of the "sub-

stance" of Antipodean rainforest was untrammelled. Those most involved in felling the North Island's podocarp/hardwood and kauri/podocarp forests were some of the social "substance" being destroyed by the economism in England's heartlands. The 1870s immigrant wave was predominantly landless rural labourers, victims of a Poor Law system which had failed to provide a community to replace the one they had lost to the industrial and agricultural revolutions. Their passages were paid by the entrepreneurial Vogel government, and their chief option on arrival was to turn forest into productive pasture land.⁴

The defeat of the Maoris in a series of land-wars coincided with the arrival of these settlers, as did a series of "think big" development schemes by the economicist Vogel government. Because the Maoris had used the forest so skilfully as a guerilla base during their fight against encroaching settlement, it was felt that the diminution of area under forested land offered some military advantage, as well as enabling settlers to set up new farms. Prior to the 1870s, settlement had focused on easily cultivable land, and earlier settlers had little inclination to cut the forest for land.

"Neither in peace nor in war had they felt at home away from the open country."⁵

Now all that changed, and a massive onslaught began against the forests. Clearance was not limited by the need to create a subsistence farm: the bush farms were to become the basis of an export industry. This dictated their ultimate size and the extent of forest that had to be destroyed to make them "economic". The metamorphosis of subsistence holding into economic farm "unit" took some years.

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NEW ZEALAND'S TEMPERATE RAINFORESTS

"The energetic settler could expect to be providing a subsistence livelihood for himself and his family within a year or two, with a little cash income to meet the payments on his land and buy a few necessities that he could not produce. In the longer term the rise of the dairying and frozen meat industries was to bring increasing prosperity to these bush settlers."⁶

It was actually these industries that tied the bush settler into world market.

A Devastated Landscape

At times, land cleared was wholly inappropriate for farming. Since felling and burning bush was the usual way of exposing the land underneath, the nutrient cycle of the soil was often destroyed. After a year or two of grass crops fed on the ashes of the burnt trees land was often permanently depleted. It has since been fertilised artificially by inorganic phosphates in order that it can go on producing pasture. Frequently the ground was too steep, and, without roots holding the slopes together, it eroded dramatically. Incalculable tonnages of New Zealand's fragile ex-forest soils have been washed into waterways and out to sea leaving scarred, ruined hillsides and estuaries clogged with silt.

Huge areas were burnt without the magnificent timber even being salvaged. Sometimes the fires were accidental, but more often than not they were used simply as a tool for swift, complete clearance. In the one year of 1887 in Northland, bush fires destroyed an estimated 377 million board feet of timber.⁷ The landscape left by this was silent and mutant:

"great stretches of down land, literally covered with fallen, bleached trees, in many places so thick that they covered the whole ground. This is where the fire has been run through them, and is the preliminary process of making grazing land. I could not help thinking that it was a sinful waste of timber."⁸

Trees that were extracted were used to build New Zealand's wooden cities and towns, or was exported to Australia, North America and Britain. Milling became a major industry: by 1901 there were 423 mills working. That year they employed 7410 men and cut 414 million board feet of timber.⁹ Until very recently, this output of indigenous timber re-

New Zealand has four major classes of temperate rainforest. The first of these, made up of the variegated **southern beech** (*Nothofagus*), is the largest surviving remnant of native forest in the country. The four major species and one sub-species of *Nothofagus* are evergreen and grow to the snow-line in high rugged country. They also form major forest on lower ground, in montane valleys, on old river and glacial terrace and alluvial flats. Beech is mainly in the South Island. It is a fairly open forest, though its understorey is often a complex association of young beech, ferns, shrubs and smaller tree species. Deep beds of moss cover the roots and rocks of the forest floor.

Podocarp/hardwood forests are the next major class. These are as dense as any tropical jungle, but are not as rich in species. They tend to be dominated by one or more of the big native conifers, **rimu** (*Dacrydium cupressinum*), **totara** (*Podocarpus totara*) or **matai** (*Podocarpus spicatus*). This forest is established on the recent volcanic soils of the North Island and other deeply fertile hill and terrace soils. It has a dense understorey of ferns, shrubs, young trees, vines and creepers forming an intricate vegetative web beneath the virtually continuous canopy of the big trees. Sometimes dominance is shared by the extraordinary **epiphyte rata** (*Metrosideros robusta*) which metamorphoses into a major tree form through the host body of the tree it consumes.

The northern quarter of the country was once covered by a famous **Kauri/podocarp** forest, an association dominated usually by the giant kauri, (*Agathis australis*). These trees, so massive that their trunks seem sometimes to be megalithic, share their forest with their podocarp cousins and the northern rata.

In areas geophysically suited to beeches and podocarp, a combination forest has evolved, again, dense and including smaller native hardwoods as well. This forest is on the fringes and in the valleys of high country throughout the South Island and the southern North Island. They and the kauri forests both formed a continuous fabric of plant life on the largest possible scale.

None of these forests evolved with either herbivorous mammals or human cultures. Some of them are considered to be close in type to those that grew on the ancient continent of Gondwanaland. The only creature that might have made any impact on them was the giant flightless moa-bird, *Dinornis maximus*, who grazed on the savannahs and along the forest fringes of the South Island, possibly helping the tussock-grassland associations to intrude on originally forested areas. They are thus a unique record, still living, of botanical forms on a turbulent planetary surface at a time when the concept of the human was not even hinted at.

mained high. As late as 1967 247.4 million board feet were cut from the state indigenous forests in one year.¹⁰

All major forest types apart from pure beech bore the wrath of the settlers. The three million acres of kauri podocarp forest in Northland and Coromandel were virtually wiped out; a sad irony since it was subsequently discovered that the soil beneath them was often useless for agriculture. The podocarp hardwood class was also cut back to a fraction of its former size, in this case partly because soils beneath it were found to be of high quality.¹¹

Initially it was the North Island that underwent the biggest change. Its transformation from a largely forested to a largely pastoral land has taken just 100 years. Only the high ranges have significant forest areas, and this is now defined as "protection" growth, to be preserved in the interests of soil and water quality. The largest logging operations in state indigenous forests now occur in the Westland region of the South

Island where about four thousand acres a year are cut over, and where, for the last ten years, two and a half thousand acres have been converted to exotic pines.¹² The sheer extent of high country in the South Island gives some protection to the great beech forests, which themselves are now largely conceded to be essential "protection" forest.

Damage by Exotic Animals

Fire, the axe and the chainsaw have not been the only destructive agents introduced by Europeans into the forests. Herbivorous mammals arrived with the settlers, and their feeding inhibits new growth, destroys the understorey and damages already mature forest. Several deer species, opossums, goats, thar, chamois, rabbits, hares and pigs are all feral in New Zealand and thrive in the various native plant eco-systems. Limiting the populations of these now "noxious" animals is a continuing logistic problem. Also, those bird species native to the forest that sur-



Ian Macdonald

Rimu trees surrounded by tree ferns at Whirinaki National Park in North Island, New Zealand. Logging operations in the park destroyed large areas of native forest before they were finally halted in 1985 as a result of pressure from conservationists. Even now the future of native forests is by no means assured.

vived the drastic reduction of their habitat now have to contend with wildcats, rats and mustelids that feed on them, their young and their eggs.¹³

Conservation vs Exploitation

Such has been the waste that successive governments have attempted to "manage" native forest as a long-term timber reserve, as protection forest and, on a limited scale still, as production forest. Also a huge exotic forest estate has been planted, which, as it comes into production is meant to lessen the pressure on native forests as a timber resource. The business state, unable to enact a sacramental relationship with forests, will still attempt to preserve them for purely practical reasons. But in an economic age the role of the state is necessarily paradoxical. On the one hand it must act as a market and convert labour and land into commodities. On the other it has to preserve the remnants of the social contract in order that labour and land may survive for the economic mill to grind on.

So the state has a schizophrenic position in regard to forest. As a result its conservation efforts have been piecemeal and of limited effect, marred by the unresolvable conflict, evident right from the 1870s,

"between responsibilities for settlement and for reserving forests."¹⁴

By about 1900, market forces generally ensured that public lands had to be logged of merchantable timber before being burned for clearance and agriculture, but areas opened for mining were still able to be wastefully cleared under the supervision of Mining Wardens.¹⁵

State intervention began with the Land Act of 1877 and the State Forest Act of 1885. These had helped regulate the cutting of public forests but still enabled cutting to continue on an enormous scale. When the State Forest Service was founded in 1919, and the State Forest Act (which was the basis of native forest administration until 1987) was passed in 1921, the dualistic, Janus face of the state was incorporated into them. The Forest Service had to produce timber from native forests as well as preserve them. To the moment of its dissolution in 1987, the Forest Service never found an elegant or ecologically sound solution to this dilemma. The net effect of this is that native forest continues to diminish, sometimes in favour of exotic pines as in Westland. The principle that a forest ecosystem should be used sensitively for only high quality and vital purposes has never been allowed

here except by classical Maori culture. At this moment irreplaceable beech forest is being chipped and pulped for Japanese papers.

Profits First

That the state cannot reconcile the demands of the market system with the real needs of society has been shown in the fiasco of its indigenous forest "management" over the last six months. In line with the revival of naked economism by Britain and the USA, recently the New Zealand government has "corporatised" many functions of the state. State departments that were previously "socialised", including the Forest Service, are now cast adrift by the State Owned Enterprises Act of March 1987. This Act is supremely economic:

"The principal objective of every state enterprise shall be to operate as a successful business, and, to this end, to be—as profitable and efficient as comparable businesses that are not owned by the Crown."¹⁶

But it nods in the direction of community good as if the two can be reconciled. State enterprise is enjoined to be

"an organisation that exhibits a sense of social responsibility by having regard to the interests of the community in which it operates and by endeavouring to accommodate or encourage these when able to do so."

Huge areas of Crown (public) land were given over to the tender care of two of the new government corporations, the Land Corporation and the Forestry Corporation. Both these enterprises must make a profit, and the Forestry Corporation at least has close connections through its chairman with the most commercially minded private industries in the country. The theory was that the conflict between exploitation and preservation of native forests would be finally solved and that all state native forests worthy of preservation would be given to a non-corporatised state department—the Department of Conservation. Commercial state forestry would be able to get on with making money while protection forests would be safely conserved.

The result is nothing like this. Firstly, as a result of haste, ineptitude and secret dealings some 1,440,000 acres of land having high 'natural'

value has been made over to the new corporations. Amongst this is much of the 62,000 acres of steep-land forest on western Southland and several controversial forest areas in Westland.¹⁷ Secondly, the safety of forests under the Department of Conservation is by no means assured. Even special reserves might be exploited:

"Prospecting and mining investigation of other resources is permitted within all categories of reserve proposal with the consent of the responsible Minister. Where an economic project is identified, the reservation or part of it can be revoked if the economic values are considered to outweigh the reservation values."¹⁸

The Westland Controversy

The largest area of indigenous forest land, now under the Forestry Corporation and available for milling is 185,000 acres of beech and beech/podocarp in North Westland. Westland's native forests have already been extensively logged, a piecemeal exploitation by private mills under long term contracts with the old Forest Service. Theoretically, these mills will switch over the next two decades to logging exotic plantations. The sacrifice of 10,000 hectares of native forest to exotics in Westland is supposed to result in this "payoff" to ecological interests. A net area of 1,500 hectares per year is now cut in by the mills, and the exotic plantings will allow a large saw-milling industry to continue in perpetuity.

But for nearly twenty years, the forest service has had a love affair with the idea of a large beech "utilisation" scheme that would be in addition to the present cut:

"Beech forests as a class have suffered less impact from logging . . . Locally, extensive fires have decimated or destroyed important (beech) protection forests, as throughout the Marlborough Sounds, the Upper Wairau Valley, parts of North Canterbury and around the Central Otago basin."¹⁹

The degree to which the Westland mills should be allowed to devastate this great biota in their region has been subject to the greatest confrontation about forestry policy yet. Public pressure forced slow withdrawal of an unacceptable beech scheme planned twenty years ago, involving the destruction or modification of 839,000

acres of beech and beech/podocarp in Westland and western Southland.²⁰ And now there are even officials in the Forest Service/Corporation who would doubt that beech could be "managed" commercially.²¹ Indeed, it is doubtful whether the "management" of any native forests has been commercial. Timber cut from them has been sold to private industry at a cost significantly below the cost to the state in providing it. Here economism works directly even against the cash interests of the community, since both forests and hard cash are lost to the taxpayer. It works in favour however of the entrepreneur who acquires the low priced timber at the expense of the public interest.²²

The new beech scheme, sold as a "sustained-yield" scheme in a region long plundered on a short-term basis, is socially, economically and scientifically spurious:

"The theory is . . . that each year a fraction of the forest area is logged and then carefully regenerated,

thinned and pruned ready to be logged again when the rest of the first cut has been taken . . . each "rotation" is estimated to take 60-80 years.

However, this . . . falls apart in practice . . . to date the only experience of sustained yield production involves a few tiny experimental plots of red and silver beech on good, fertile sites . . . much of the beech scheme forests would be on difficult, steep, infertile sites where regeneration is slow and unreliable. Furthermore, while these trials have involved only the more manageable red and silver beech, the beech forests under consideration contain mainly hard beech."²³

Even treasury and forestry officials have cast doubts on the scheme's physical and economic viability, and, considering the time-scales involved, combined with the opportunism of the business most likely to gain the resource, the project looks positively ludicrous.

"Costs and markets would inevitably change over a 60-80 year

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period . . . company directors deciding to invest money in post-logging regeneration and tending of beech forests would have to wait until their great-grand children's time before any return on their investment. It is almost inconceivable that anyone in a private company would make a 60-80 year investment in an unproven forest management technique when the average planning horizon for modern companies is only 5-10 years . . .

The Government is so keen to get a vote-winning scheme established . . . that it has offered 10-20 year contracts for what should be a 60-80 year undertaking. This leaves a company free to rip through the best and most profitable forests, write off its capital and make a handsome profit, then abandon the whole idea of a beech scheme. The jobs would be gone and all that would be left for the West-Coasters, as several times before, would be more broken forest.²⁴

The State of Private Forests

Indigenous forest on private land in New Zealand is a small but significant portion of the forest estate. Some is on Maori land, or land held by Maori incorporations; some on private or corporate farms. Until the present Labour government, individuals and organisations were paid subsidies to clear their land of native forest so that it could be used profitably for exotic trees or agriculture. Fortunately these subsidies have been dropped, but the present rural hardship now poses a threat to private forest. Farmers, floundering in the wake of the withdrawal of other forms of subsidy are now tempted to convert stands of native trees into ready cash.

Forested Maori land often falls foul of the local county, who insist on it being rated conventionally, regardless of its intrinsic value to the Maoris and the community as a whole. This puts pressure on Maori owners to sell timber from the land so as to be able to pay the rates; a particularly painful dilemma for a people who evolved a great cosmology based on their forests. Legal change is necessary to give this kind of land general exemption from rates; a move that is long overdue in the unhappy relationship between white government and Maori land.

Although about 14 million acres of

native forest is left in a semi-protected condition, legal change, a change in public sentiment, or desperation for foreign exchange to service a now enormous foreign debt could result in the exploitation even of protection forest. The "third" political party in New Zealand recently voiced support for the idea of logging national parks! In the light of such rabid sentiment, and of the development of new forestry techniques such as helicopter logging (which would enable timber extraction in the most inaccessible country) it seems every generation will have to fight anew to preserve the forests that are left here. No ultimate legal safeguards exist and the pressure of economism on resources is by definition unceasing. The sacred grove, as Robert Graves noted succinctly, is no longer sacred. Nowadays the sacred grove belongs to the sawmill.²⁵

Conclusion

The destruction of New Zealand's forests now has a planned and rationalistic aspect. A plethora of regulatory commissions, scientific committees, water and soil conservation organisations, catchment boards, a ministry of the environment, a department of conservation; the enormous amounts of ink and paper spent on environmental impact reports, submissions, feasibility studies; the eagerness to consult with a now touchy public all might make an outsider, accustomed to the naked rape of Indonesian or Brazilian forests think that things were under control in New Zealand; that all was for the best in the best of all possible worlds. But the same market forces responsible for the destruction are at work in New Zealand as in other countries. And New Zealand's forests are now only a remnant of what they were. Their destruction was mainly in the late nineteenth and early twentieth centuries, so some of the raw ferocity of that process is not evident now to those who walk only the "scenic" tourist trails. Yet the sight of the smashed ground and forest of a modern logging site say, in the Oparara Basin of north Westland, quickly dispels the assurances of a "rational" administration.

The very rhetoric of "things being under control", of forests being "managed" is fraught with false-

hood. It is simply part of a new language invented to camouflage some very old misdemeanours. The angular jargon of resource management, the spurious rationality of computer analyses of labour, capital and wood resources, the one-dimensional arguments about the feasibility of forestry projects; this sinister and wholly unclear quantification of the lives of forests and people makes a mockery of their substance and actuality, impoverishing both the human community and the body of nature in which it is imbedded.

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The timber trade generally adopts a defensive attitude towards its responsibilities in the tropical forests. It likes to point out that only 5 or 6 per cent of the wood extracted from tropical forests is destined for the export trade and also that logging methods are 'selective' (that is, extracting only mature trees of commercially valuable species), implying that timber companies play a very limited role in overall forest destruction. Like many statistics, the actual figures are reasonably accurate, but their interpretation is heavily biased towards specific corporate interests.

There are two common ways used to assess the relative importance of different causes of deforestation measuring the forest surface area affected by each specific activity, or the total amount of wood extracted from the forest. There is no doubt that, in terms of affected area, the main direct causes of tropical deforestation are permanent and shifting cultivators, along with cattle ranching in parts of Latin America. Similarly most of the wood extracted is used locally for firewood and, to a lesser extent, construction and local wood industry.

However, these figures present a grossly oversimplified picture of why forests are being exploited. Firewood gathering first affects open forests and fallows located near centres of population and is not the main cause of tree losses in most CLOSED forests, which are usually those of the greatest ecological and environmental importance.

Similarly, blaming forest losses on shifting cultivators is a dangerously simplistic analysis. Today's forest farmers no longer belong to traditional aboriginal groupings, but are landless people who enter the forest as a last resort, or remain there after jobs which brought them to the area have finished. One of the main 'arterial routes' bringing these desperate and often unwilling settlers into the forests are the roads constructed by the logging companies themselves.

Opening up the Forests

It is also important to stress that commercial logging, even if taken in isolation, is by no

"Forests are simply being mined without any real concern for what happens afterwards."

means an innocuous or marginal cause of deforestation and forest degradation in tropical countries. Firstly, the timber trade is primarily dealing with mature trees of a limited number of tropical broadleaved species, which are slow growing and best found in previously undisturbed closed moist forests rather than areas that have already been logged out once or more. This being the case, loggers are often the first outsiders to penetrate into a particular forest, previously the sole preserve of indigenous forest societies. Therefore commercial logging is a primary cause of opening closed forests, previously inaccessible to slash and burn cultivation.

Selective Logging

Secondly, the so called 'selective' logging methods used by foresters are only selective in terms of the trees which are actually removed for trade; these are usually confined to a few species and to certain sizes and standards. In practice, selective felling means creaming off the most valuable species, with little concern for the remainder. However, modern logging methods are certainly not at all selective in total harm done, because they fell or damage a far higher proportion of trees than those removed. (The traditional methods using axes and ropes did not involve much damage beyond the trees which were really wanted.) Modern methods involve constructing roads and storage areas, clearing away unwanted trees with chainsaws and, in some cases, with bulldozers as well.

Environmental damage from mechanical logging is particularly important in South East Asia, where commercial yields are high due to a larger concentration of valuable species than Latin America or Africa. Some estimates indicate that up to 57 per cent of trees were left damaged or uprooted in Malaysian

logging concessions where only 3.3 per cent of the trees were removed for commercial uses. This admittedly extreme case shows that so-called selective logging is far more harmful to the ecosystem as a whole than a simple examination of total marketed timber would suggest.

Mining Forests

A third reason why commercial logging should not be lightly dismissed as a primary cause of forest destruction is that logging companies (and the timber trade) all-too-often see timber extraction as an operation in which wood is removed once and for all, at least for the concession holding company. In the words of one expert: 'Forests on the whole are simply being mined, taking out the easiest to get—and the most highly priced trees—without any real concern for what happens afterwards. Although most logging concession licenses contain rules about logging methods as well as replanting agreements for the largest areas, these are very rarely respected in practice.'

Companies have little incentive for long term replanting or management, partly because this would reduce the short term profitability of the logging operation and partly because logging concessions are short term (ten to twenty years) compared with the time needed for new trees to mature. They also sometimes subcontract the actual logging to smaller companies without expertise who are interested only in a quick financial return. They also use capital-intensive forestry methods developed in temperate Western forests which can be disastrous in the very different conditions occurring in the tropics. Forestry authorities or departments are often too small and powerless to enforce regulations and concession agreements, or to prevent illegal felling.

Francois Nectoux

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This box is extracted from *Timber! An Investigation of the UK Tropical Timber Industry*, by Francois Nectoux, Friends of the Earth, 26-28 Underwood Street, London N1 7JQ.

The Sarawak Timber Blockade

by Teresa Apin

In March 1987, several tribal groups in Sarawak set up barricades across logging roads to protest against damage to their land and forest caused by timber companies. This halted logging activities in many areas in Sarawak, which is the world's main supplier of tropical timber. In this article, written before the recent political clampdown, which effectively put an end to the blockade (see p.189), Teresa Apin describes the campaign and the determination of the local tribal group to protect their land.

In the deep interior of Borneo's tropical forests, thousands of indigenous people have formed human barricades across logging tracks in a bid to stop the destruction of their lands by timber companies. The blockades, which began in March 1987, have succeeded in halting logging activities in large parts of the East Malaysian state of Sarawak, which is the world's main exporter of tropical hardwood.

The indigenous people manning the blockades come mainly from the Penan community, one of the last groups of hunters and gatherers left anywhere in the world's tropical forests. Helped by other ethnic groups—the Kelabit and Kayan—the Penan have set up at least 12 blockade sites along a 150-kilometre swathe in Sarawak's timber-rich northern districts of Limbang and Baram.

The barricades are set up on logging roads located within the people's own lands. The tribals claim the timber companies have no right to build these roads and that the logging has destroyed their forest resources and polluted their water supplies.

Millions of dollars of logs are held up at about 20 timber camps because lorries are unable to pass through the barricades. In some areas food is also being prevented from being moved into the logging camps. Army troops and police have been sent to the affected areas to help the timber companies negotiate for a settlement with the tribal groups. In some parts, the blockades were temporarily lifted to allow logs already felled to pass. Nonetheless, the forest people seem

determined to continue their action until their demands are met. They want the state authorities to stop the companies from further logging in their area, as well as compensation for the destruction of their land and property, and recognition of their rights to use the land and forest. At present, the Penan and other tribal groups have minimal land rights under Sarawak state law.

The Destruction of the Forests

The plant, food and wildlife resources of the Penan have progressively disappeared and their water systems are clogged with silt, debris and chemicals from logging activities.

"Before anyone else, and long before the timber company came, we were already on this land," said Along Saga, an elderly Penan in his mid-fifties. "This is the land of our forefathers, and their forefathers before them. But now with just a few years of logging these centuries-old forests are almost finished." Along Saga had walked seven days through the forest from Long Adang to the blockade site at Long Napir, "because I don't want my children, my wife and grandchildren to continue suffering from the destruction of our forest."

Rosylin Nyagong, a spirited 29-year-old mother who brought her two-year-old child to the Long Napir blockade, described in moving detail how the timber companies have altered her community's life:

"They mowed down our forest and they levelled our hills. The sacred graves of our ancestors were desecrated. Our waters and streams are contaminated, our plant life destroyed. And the forest animals are killed or have run away.

The forest provides us with wild sago and fruits for food, 10 kinds of wood for our blowpipes, and many different types of plants as medicines for headaches, sprains, wounds and other ailments. We women collect *uwai* (rattan) and *daun* (leaves) to make our shelters and baskets.

The forest is our source of survival. Without the forest we'll all be dead and now there's hardly anything left. That's why we'll stay at this blockade till they listen to us. We want them to leave our land."

The Kayan

At Uma Bawang along the great Baram River, another ethnic group, the Kayan, had also set up a barricade after a timber company bulldozed their land to build a logging road, damaging fruit and rubber trees and the land itself.

Despite the Kayan community's personal appeals to the loggers, letters urgently despatched to the authorities and the lodging of a police report, the logging activities continued, until the people barricaded the road.

"The land is legally ours but the company didn't bother to get our permission to pass it," said Oyong Jok, aged 35. "We have every right to block the road to defend our land against thieves."

Friends of the Earth

In Marudi, the centre of Baram district, a small office of the Friends of the Earth Malaysia helps the indigenous groups to channel their appeals to the state and national governments.

"These people are very gentle and peaceful by nature," says Harrison Ngau, the young Kayan who heads

the office.* "They've resorted to the blockades through sheer desperation to defend their rights and property, since official assistance hasn't been forthcoming despite their crying for help for so many years."

The environmental group has sent a memorandum to the authorities on behalf of the indigenous people, calling for the cancellation of all timber concessions which have not started operations; for fair compensation to those whose lands and trees were damaged by logging; and for the recognition of their customary land rights. In particular, the people want a review of the land laws to increase the area of their protected communal forests and to safeguard their rights to customary lands and forests from the encroachment of loggers and other outside forces.

These demands are now, for the first time, backed up by the simultaneous blockades which have paralysed the timber trade in two major districts. But the indigenous people are up against formidable odds and powerful adversaries.

Logging in Sarawak

At the heart of the conflict is control and the use of the world's oldest, and richest, rainforests. The Borneo jungle contains the greatest diversity of plant and animal species existing anywhere on earth, holding as yet undiscovered scientific secrets and playing a vital role in balancing the world's natural ecology.

Nowhere in the world are the forests being chopped with such ferocity and speed as in Sarawak. In 1983, Malaysia accounted for 58 per cent of total world export of tropical logs and in 1985 Sarawak alone accounted for 39 per cent of the country's total log production.

To extract these logs, an estimated 670,000 hectares of forests were logged in Malaysia in 1985, 270,000 hectares of which were in Sarawak.

Although most timber companies are locally owned, the export trade is controlled by big foreign trading concerns, most of them Japanese. Most of the trees end up in the rich countries (61 per cent to Japan alone) to make furniture, house fittings, packing materials and even disposable chopsticks.

In 1986, timber was Malaysia's

*See article on page 175.

Stop the Logging

Below is the text of a statement signed by 61 tribal leaders on behalf of 27 communities.

We have used the land for generations. During the Brooke rule, the government decided that we should determine our land boundaries or *sempadan*. These boundaries remain till today. The law recognises our communal rights to the land and forest which we use. But in practice our rights are not recognised because timber companies were given licences to log our forest. Despite our protests they continue to log the forest. Our forests are almost gone, our rivers are polluted and our farming activities are disrupted.

We therefore request the state government to confirm our rights to our communal forest and our customary lands. We ask the government to co-ordinate an exercise to go to every longhouse in Sarawak to consult with the people and delineate the *sempadan* of the customary lands and communal forests of each community. The forest areas of those Penan communities without longhouses should also be officially marked out.

The customary lands and forests marked out in this exercise should be recognised as belonging to the Dayak communities. The lands marked out should be clearly put on detailed maps. Our communities should have absolute rights to use these lands and forests, according to ways which protect the environment and our forest resources.

The committee coordinating this exercise should include well-known scholars and anthropologists as well as officials who are knowledgeable about our customary laws and land matters.

Recently some people have said that the solution to our problem is to take us out of the forest and put us on land resettlement schemes. We think this is a very objectionable plan. Its aim is to remove us from our land so that timber companies can completely log what is left of the forest, thus destroying the forest and our land completely. We therefore object to this plan to take us away from our land and forest. This land scheme proposal is a denial of our rights to our own land and forest.

Some people say we are against "development" if we do not agree to move out of our land and forest. This completely misrepresents our position. "Development" does not mean stealing our land and forest away from us. This is not development but theft of our land, our rights and cultural identity. "Development" to us means:

a) recognising our land rights in practice

b) putting a stop to logging in our lands and forests so that we can continue to live

c) introducing clean water supply, proper health facilities, better schools for our children.

This kind of development we want. Why don't you give us this development and progress?

We also see from newspaper reports and government statements that the issue of logging and our land is portrayed as a "Penan issue". It is true that the Penan are badly affected since Penan live deeper in the forest. But all our Dayak communities are affected, too. It is equally a problem of Iban, Kenyah, Kayan, Kelabit, Lun Bawang, Berawan, Murut and other communities. So it is a problem affecting at least half a million natives in Sarawak. The government must solve this big problem and not only think of giving monetary aid and welfare to the Penan. The basic thing is for the government to recognise the land rights of all the native peoples.

There are people who say that our blockades are illegal. However, we wish to state that we are only defending our own land rights. The law permits people to defend their property. Until the question of our land rights is resolved by the government and courts, we appeal to the police not to just take the side of the timber companies. We are confident that the police acts to safeguard people who are weak and exploited. We appeal to the police not to arrest us who are safeguarding our land and forest in a peaceful manner.

Also to mislead the public, many politicians have said our actions are directed by outsiders, foreigners and politicians. This is not true and also insults our intelligence and our capacity to think and act for ourselves. Our actions and demands spring from the problems caused by logging. These problems have become so unbearable in the past few years that we are forced to act. But we also welcome and accept any support given to us by our friends, including lawyers who want to give us legal aid, Sahabat Alam Malaysia and other social groups, journalists, government officials and Ministers who have pledged to help us.

Signed or thumb-printed by 61 leaders and representatives from the Penan, Kelabit, Kenyah, Kayan, Berawan, Iban, Lun Bawang ethnic groups.

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Along Saga (above), a Penan tribesman, walked hundreds of miles to reach one of the timber blockades (below). The Penan, the original inhabitants of the 150 million-year old Bornean forests, are hunter-gatherers but have no rights to their land. (Bottom) Two of the Penan who have been charged with burning a logging bridge are arrested.



most important export earner, fetching US\$1.7 billion in foreign exchange. So, locked up in the forests of Sarawak's indigenous people lie many billions of dollars of hard cash, waiting to enlarge the profits of timber traders and fill the coffers of the state.

In the period 1963-85, 2.8 million hectares, or 30 per cent of Sarawak's total forest area, were logged. And at the end of 1984, another 5.8 million hectares (three-fifths the total forest area) were licensed out for logging.

Corruption

During the 1987 election campaign for the Sarawak state parliament, it was revealed that leading politicians and their families had been given millions of hectares of forest concessions. The Sarawak Chief Minister, Datuk Patinggi Taib Mahmud, froze 25 timber concessions with a total area of 1.2 million hectares worth US\$9 billion, which he claimed had been given to relatives and friends of his political rival, Tun Rahman, the former Chief Minister, during his term of office. In retaliation, Tun Rahman revealed the names of prominent politicians, their relatives and associates, with hundreds of thousands of hectares of timber concessions, which he claimed were connected to the present Chief Minister.

The web of economic and political interests enveloping the lucrative timber industry helps explain why the many requests of the indigenous communities for communal land to be allocated to them have been rejected, and why their appeals against encroachment of their forests by loggers have failed to elicit sympathetic official response.

Bottled up Anger

Meanwhile, as logging accelerated, bitterness and frustration have built up among the indigenous peoples whose forest resources have dwindled year by year, whose waters have been sullied, whose ancestral graves have been damaged and, to add salt to the wounds, whose womenfolk have been "disturbed" by the invading timber men. The bottled-up anger finally found organised expression in the present blockades, which have shaken the timber industry to its roots.

Native protests stifled in Malaysian Government crack-down

In late October, as part of a nation-wide crack-down by the Malaysian Government against all those critical of Government policy, some forty-two of the protesters involved in the Sarawak logging campaigns were arrested by the police and their barricades dismantled. The same day another native leader was arrested under the Internal Security Act. Unable to justify its exploitative forest policies, the Government has turned to repression to defend the privileges of the political elite.

Commencing on 27 October Malaysian Government security forces began a nation-wide crack-down on all opposition elements. At least 93 arrests have so far been reported, under the draconian Internal Security Act by which individuals may be held without trial for up to two years. Those arrested include churchleaders, trades-unionists and environmentalists, as well as MPs and other politicians from a number of parties.

The Government has sought to justify the arrests as necessary to prevent racial riots within the multi-ethnic state. Yet, while racial tensions have escalated in recent months in peninsular Malaysia, many view the Prime Minister's response as inappropriate and unduly harsh. Voices within Malaysia have been strongly critical. Amongst the most outspoken was Malaysia's former Prime Minister, Tunku Abdul Rahman, who has condemned the arrests as a step towards dictatorship.

Whatever the underlying causes, it is clear that the present Prime Minister, Dr. Mahathir Mohamad, whose hold on power has become precarious in recent months, has used the opportunity to try to rid himself of a whole host of opposition forces. Among those arrested are individuals active in fields remote from racial issues, who have opposed the Government's policies in matters such as civil rights, nuclear waste disposal, housing, labour relations, highway construction and native rights.

Simultaneous arrests in Sarawak

Taking advantage of the clamp-down on the mainland, on 29 October, the authorities in Sarawak also moved to arrest three people under the Internal Security Act. Among those held was Harrison Ngau, who runs the Sarawak branch of Sahabat Alam Malaysia (Friends of the Earth, Malaysia). Sahabat Alam has been actively supporting the various Dayak peoples of the upper Baram and Limbang rivers in their widely reported struggle to prevent the devastation of their

hunting and farming lands by timber companies.

Harrison Ngau, himself a member of the tribal Kayan people of the Baram region, has been a vociferous opponent of the present government policy of leasing out tribal lands as logging concessions. In June this year he arranged for a delegation of native leaders to visit Kuala Lumpur to explain their concerns to the Federal authorities and seek recognition of their rights to their lands.

A week after the arrest of Harrison Ngau, the police again raided the Sarawak office of Sahabat Alam and, after a long search, left with a lot of documents. According to the Malaysian High Commission in London, Harrison Ngau is presently being held in detention in the district centre, Marudi.

Mass arrests at the barricades

At the same time as Harrison Ngau was being arrested, police carried out a mass arrest of forty-two natives at the community of Uma Bawang, upstream on the Baram river. The arrests were made under the Penal Code, allegedly after the natives refused to heed warnings by the police that they must dismantle their barricades. Those held were mainly from the Kayan and Kenyah tribes but according to one report a number of Penan were also arrested. The Penan, a nomadic people who rely on hunting and gathering in Sarawak's ancient tropical rainforests, have been particularly hard hit by the destruction resulting from the logging.

The latest arrests bring the total number of natives arrested under the Penal Code for their involvement in the blockades to 48. Earlier six others were arrested for burning down a bridge, used by loggers to extract timber from their lands.

Police action has increased and apart from the actual arrests there have been reports of blockades being forcibly broken up with the security forces firing shots from their guns over the protesters' heads. Until now, the natives have responded by reconstructing their blockades as soon as the police have withdrawn. But, according to the latest accounts, 12 of the 16 barricades have now been particularly hard hit by the destruction place as they are already the subject of court actions being fought between the logging companies and the native communities.

*Marcus Colchester
Survival International*

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Brazil's Amazonian Alliance

by José Lutzenberger

The peoples of Amazonia—the Indians, the rubber tappers and others—have organised themselves into an Alliance to fight for their land rights and for an end to the exploitation of Amazonia.

The people of the Amazon forest, totally ignored until now and too humble to react, are beginning to realise that they can fight; that they are important. Prominent among these are the Uniao das Nacoes Indigeneas (the Union of Indigenous Nations) and the Conselho Nacional dos Seringueiros (National Council of Rubber Tappers). These two organisations have now formed an alliance, Alianca Amazonica dos Povos da Floresta (The Amazonian Alliance of the Peoples of the Forest).

This alliance should greatly strengthen our campaign to defend Amazonia:

1. As the people who live in the forest are those who suffer most directly from deforestation, all Brazilian environmental organisations, and many other citizens groups in Brazil, will follow the lead of the alliance in defence of Amazonia. This should produce greater unity and effectiveness.

2. As there are nearly 2,000,000 workers living sustainably off the forest in Amazonia, including rubber tappers, Indians, nut and fruit gatherers and part time extractivists, the Amazonian Alliance of the Peoples of the Forest will represent a large part of the electorate within most Amazonian states. For instance, in the state of Acre, Indians and rubber tappers are already candidates in our current elections.

3. Under the Brazilian constitution, the Indians have very specific rights to their reserves. Under Brazil's "Legislation about Land Occupancy", the seringueiros or rubber tappers, have a right to the land they occupy. In the political climate of Brazil today, where there are millions of landless poor, it is an uphill battle to defend vast areas of forest on purely ecological or scientific grounds. It is much easier to defend it because it rightfully belongs to the people who

are already there, and because they are using it sustainably, and in a way which will become increasingly profitable for Brazil as research increases and the demand for forest products grows.

4. Obviously my own organisation, AGAPAN, and others, will continue to campaign for biological reserves and national forests, but these are constantly being invaded. The tremendous advantage of Indian and extractivist reserves is that a local population fighting to protect its own home is much better than any guard.

Reserves are not Enough

The rain forest can survive with a network of small clearings spread like dots over the map, with a forest population using it in a sustainable way. But the official view of the Brazilian Government and, implicitly, the World Bank is that the opposite should happen. To them, the dots on the map should be the forest reserves. Now this is impossible. The green dots would not survive the climate changes brought about by the wholesale demolition of the forest. They would not even survive as genetic banks. In this sense, the ecological and biological reserves are just a device to appease the critics of deforestation. The aim of the Amazonian Alliance is therefore to defend the rights of the peoples of the forest. If we succeed in this, we will have defended at least half of Amazonia. Nowhere can the fact that ecological sanity and social justice always go together be seen more clearly than in Amazonia.

The Campaign's Demands

The immediate steps in the Alliance's campaign will be:

a. To step up the fight to demarcate the Indian reserves. This has been going on for a number of years.

b. To fight for the creation of extractive reserves. What is completely new is

José Lutzenberger is one of Brazil's best known environmentalists. He is President of AGAPAN, the State of Porto Alegre's Association for the Protection of the National Environment.

that the Federal Government has accepted, in principle, but only verbally, the concept of extractive reserves. And the state government of Rondonia proposed, also verbally only, that a pilot reserve should be set up in the Guaporé Valley. When the big ranchers move into a forest area, they simply drive out or shoot the people. INCRA, the land agency, on the other hand, gives every rubber tapper family a plot the size of the colonists plots, 25 to 100 hectares. But a rubber tapper needs at least 300 hectares of forest to survive extracting rubber. So he sells his plot and moves to a city slum. His forest will be cleared. In an extractive reserve, the seringueiro would not be allowed to sell land. All land would be reserve land. The forest must be used sustainably as it always was in the past.

c. *To demand an immediate cessation of settlement projects and a reversal of propaganda encouraging migration to Amazonia.*

d. *To demand a reversal of present agricultural policies that drive agricultural workers and farmers off their land in the rest of Brazil.*

e. *To demand a government programme to teach existing settlers and ranchers how to use their land sustainably in order to take pressure off the forest.* Today, the settlers and ranchers can only survive by cutting down larger tracts of forest every year.

f. *Internationally, to stop the World Bank and other multi-lateral lending organisations from funding the infrastructure for the devastation of the forest and the uprooting of its inhabitants.* Had it not been for the free-flow of international money, most of the serious devastation in Amazonia would not have occurred.

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Resolution by the Amazonian Alliance of the Peoples of the Forest to the World Bank and the Inter-American Development Bank

Considering:

1. The disastrous effect of many World Bank and Inter-American Development Bank (IADB) loans in Amazonia; for example, the Polonoreste loan and the attached report from citizen's groups in Rondonia;
2. The constant failure of the Banks to consult population groups in areas affected by their loans; for example, the seringueiros of Acre, and their attached protest against the IADB loan for the paving of the BR 364 road from Porto Velho to Rio Branco;
3. The inadequate provisions for environmental protection in current loan agreements; for example, the World Bank's Electric Power Sector loan, criticised by the US Director in the World Bank in the attached speech "because major environmental questions to all appearances are being swept under the rug."

We the Amazonian Alliance of the Peoples of the Forest, representing hundreds of thousands of people currently suffering from projects financed by the World Bank and the Inter-American Development Bank, earnestly request the World Bank and the Inter-American Development Bank to carry out the following reforms:

1. To cease loans to all projects that in any way affect the Amazonian forest which do not:

- a. Positively promote the sustainable use of tropical forest.
- b. Clearly protect the rights of the people already living in the forest as defined, in the case of the Indians by the Brazilian Constitution and the Indian Statute, and in the case of the rubber tappers by the legislation of land occupancy.

2. To ensure that in all future loans to Amazonia, the measures for the protection of the environment and the peoples of the forest are completed before the first disbursement is made for the central part of the project, e.g. road or dam building.

3. To provide greater accountability of the Banks to both the taxpayers who provide their funds and to the populations affected by their loans, including:

- a. Mandatory consultation with all populations to be affected by loans.
- b. Mandatory visits by all Bank Directors to areas where loans produce major public protest.
- c. More open access to information on Bank loans for Press and citizen's groups of both donor and borrower countries.

4. To promote sweeping environmental reform within the IADB, and the World Bank, including:

- a. A shift in lending priorities to smaller scale environmentally beneficial projects using environmentally beneficial technologies.
- b. Greatly increased environmental training and staffing within the Banks.

We believe that these reforms would alleviate many of the negative effects in current IADB and World Bank loans on the people of the forest.

The Debt Crisis: The Opportunities

by Barbara J. Bramble

The Third World now owes over three trillion dollars. There is little prospect of that money being repaid. Both commercial banks and development agencies should look towards "debt swaps" and similar arrangements to ease the debt crisis and protect the environment.

Conventional wisdom relies on export-led growth to resolve the debt crisis. But emphasis on promoting exports, particularly cash crop monocultures, has forced many developing country borrowers to increase pressures on their already overstressed ecosystems. Many of these ecosystems, such as tropical rainforests, wetlands and watersheds, and grasslands, are being destroyed in the process. The need to increase short-term economic productivity is, in many cases, reducing the potential for long-term sustainable development in agriculture, forestry, and fisheries, and increasing the future costs of correcting the environmental destruction inflicted now.

This problem is magnified by a second dimension to the debt crisis: debtor governments are forced to make substantial cuts in their budgets in order to service debt. If environmental protection programmes were in place prior to the debt crisis, they have often been cut or dropped because of ensuing austerity. The debt crisis has simultaneously made environmental protection a more pressing issue while reducing government capacity to address it.

Criteria for a Successful Strategy

A successful strategy for linking environmental management to debt adjustment in the developing world must be based on an accurate, realistic assessment of the costs and benefits involved for each party in such an undertaking.

The Creditors

Commercial Banks. Bank creditors

perceive their benefits in terms of cost containment, given that they need to clear unwanted debt from their books at minimum cost. This opens opportunities to environmental groups who may not be able to present strategies for higher returns but can help minimise the losses that commercial banks will probably have to incur.

Banks are willing to explore innovative debt adjustment instruments but are hindered currently by regulation and accounting standards which make adjustment a more costly proposition. For example, banks fear the so-called *contamination effect*, where a sale of a portion of their loan portfolio at a discount could prompt auditors to ask the bank to value the remaining portion of the portfolio at the discounted price, rather than the original book value. Banks are likely to pursue innovative debt adjustment more vigorously when the regulatory and accounting environments become more supportive.

Governments. For government creditors, the most important criterion for undertaking debt restructuring is their perception of political gain or loss. Official creditors can lose financially through defaults and other problems, but such losses are judged in political terms (witness Congressional debates over whether certain countries are "worthy" of American aid). Governments would clearly gain politically through supporting environmental management efforts given the strength of popular support for such efforts in the US and western European countries.

Multilateral Institutions. Multilateral creditors are the primary source of credit for many poorer borrowers, who place a high premium on abiding by the terms and conditions of multilateral loans to ensure

future lending. Multilateral creditors are therefore in a unique position to include innovations related to environmental issues when extending new loans. They can link greater flexibility in the servicing of new loans with compliance to stricter environmental protection. The influence of multilateral institutions does not extend to adjusting existing loan obligations, however; the charters of these institutions do not allow debt restructurings or similar adjustments. Therefore, multilateral clout lies in the extension of new money. This is singularly important because poorer borrowers, with less access to commercial bank loans, rely on new money continuing to flow from the multilateral banks.

The recent shift to encouragement of growth instead of austerity to achieve economic adjustment marks a fundamental change by the multilateral institutions, particularly the International Monetary Fund (IMF) toward the debt crisis. This is not necessarily beneficial for environmental management, but it does increase borrower interest in innovative debt adjustment instruments and in foreign investment: borrowers will have more flexibility with which to pursue development options.

The Borrowers

All borrowing countries share one fundamental desire: to lower their national debt burdens, especially those denominated in hard currency. Borrowing countries cannot achieve balanced long-term growth without this alleviation. Every dollar spent on debt service is a dollar withdrawn from development investment. Concomitant with the desire for relief, however, is the equal need to retain access to foreign capital. Whatever a borrower's ideological slant, all gov-

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ernments interested in economic growth have implicitly accepted the vital role of capital in national economic development. Hence, borrowers have chosen to take the path of adjusting debt rather than repudiating it in order to retain access to foreign capital, from whatever source.

Benefits from improving environmental management are also tangible, but are not necessarily clear to government officials. Watershed conservation, improved agricultural output, recreational use, tourism, vital resource supplies (firewood for example), pharmaceutical products, and research in general are all benefits which bring money into national treasuries, but which may get short shrift in the scramble to produce debt service funds.

The rhetoric, if not the actions, of borrowers is increasingly confrontational towards the commercial banks. Peru has been unique to date in actually pursuing debt service policies which have cut it off from external credit flows. But other governments have stopped just short of this extreme. If they can achieve some relief of debt service obligations without jeopardising future capital flows to a significant extent, they will of course do so. Many informal debt adjustments offer this prospect. However, they are also signalling that they may be willing to jeopardise these capital flows, and, in fact, doubt whether these potential flows exist, regardless of their behaviour.

The Investors

Investors, primarily multinational corporations, can find at least four types of benefits from the strategies that we propose. They may be attracted by financial incentives, such as local currency funds purchased at a preferential rate, should they participate in environmental protection programmes. Investors can also count on more stable long-term productivity resulting from better environmental management. Last but not least, investors can improve their public image by active and well-publicised participation in programmes for environmental management.

Investors remain responsive to opportunities in developing countries, but the limits to increased investment



In order to service their debts, Third World countries have been forced to plunder their natural resources for all they are worth. The exploitation of forests and mineral resources has accelerated, whilst the area under cash crops increases daily.

result largely from host governments. Their hesitations, in turn, stem from the complicated political baggage long associated with a foreign presence in a host economy. Investors are wary of foreign commitments, but no more so than has been the case for decades.

The Options For Involvement

How can we bring these parties together in mutually profitable transactions or arrangements? To answer this, we turn to the market approaches the transactors themselves are generating to deal with problems associated with the debt crisis. These fall into two general categories: innovations in restructurings (formal methods of debt adjustment) and innovative "non-restructurings", or informal methods of adjustment, such as converting problem loans into other types of financial instruments that can be bought and sold more easily.

Restructuring: Conventional Solutions

In a series of steps beginning in the last quarter of 1984, creditor banks, in conjunction with the IMF, World Bank and Western governments, agreed with Mexico on a package of measures that has come to serve as a

new model for a comprehensive restructuring. This restructuring has several components which serve as useful indicators of what we can expect in future restructuring agreements.

The first component is a *reduction of interest rate charges and fees* from those required in the past (though it is important to note that the interest rate charged by the bank creditors still remains above the original terms of the loan, meaning that there has been no loss to the banks as compared with the original expectations of a rate of return for the loan).

The second component is a *multi-year restructuring* of amortisation payments (repayment of the original loan, as opposed to interest payments). Rather than rescheduling the loan repayments of a twelve-month period, as is typically done, multi-year restructurings deal with a repayment period (consolidation period, to use the proper jargon) of up to three or four years. This type of restructuring allows a country to better anticipate its debt service burden for a few years, rather than for only one year. It also reduces the frequency of meetings between debtor countries and creditor banks to restructure debt.

Longer maturities is the third element of the package. Longer maturities effectively reduce the annual

amount of amortisation, and therefore the amount that needs to be repaid by the borrower or, alternatively, the amount which needs to be restructured each year.

A fourth component is a *partial indexing of debt service expectations* to Mexico's capacity to pay. In general, indexing creates a direct relation between a country's debt service obligation and its debt service capacity by, for example, establishing that debt service shall never exceed a predetermined portion of export revenues. Parallel to the new money package offered by the banks, a separate fund was established from which the Mexicans could draw should the economy grow by less than three per cent per annum. (This is still far from the more direct indexation that many debtors want, whereby interest payments would total a predetermined proportion of export revenues.)

The most important aspect of the restructuring is the change in philosophy and method which the whole package implies. The restructuring's components are an acceptance of growth-oriented, as opposed to austerity, policies to achieve economic and debt adjustment. This is a victory for borrower governments, but it is not necessarily good for environmental management—the issue of short-term growth versus sustainable development is not resolved.

Some other options for restructurings have emerged recently as well.

Currency conversion became an option in 1984. It allows non-US banks the right to convert a portion of their credits (usually in US dollars) into their home currencies. One motive for these banks was a desire to reduce the difficulty of arranging foreign exchange availability over extended debt servicing periods. Conversion also allows banks to avoid the erratic impact on their capital and reserve requirements of fluctuations in the value of the dollar. For the borrower, conversion carries a risk because of the dollar's fluctuations.

Another option which the banks are pushing is *private insurance* (in addition to greater official insurance). One of the causes for concern during the present crisis is that the debt is concentrated in claims held primarily by the large banks. Major debt service problems could seriously affect a major bank and possibly the entire financial system. This vulnerability could be mitigated if the ownership of the debt were more widely dispersed. This would be the effective result of insured debt. Moreover, the availability of insurance against transfer risk¹ would tend to stimulate capital flows to developing countries by reducing the risk premium on interest rates.

The Philippines, in its most recent restructuring, has introduced a scheme that requires banks to take interest payments in either hard currency or Philippine Investment Notes (PINs). The Philippine government

agrees to pay interest at the loan's reference, or base, rate (usually the London Interbank Offered Rate, LIBOR) in hard currency. The additional margin over LIBOR is paid in either hard currency, in which case the banks earn a smaller margin, or PINs, in which case the banks earn a higher margin. The PINs can be traded on a secondary market and redeemed at the Philippines Central Bank for local currency, which is then invested locally.

Commercial banks and the World Bank are also experimenting with co-financing for investments. With private banks providing loans in parallel with the World Bank, commercial institutions receive the benefit of the Bank's expertise with project design and financing and the Bank's political sway with borrowers to insure debt servicing. The Bank, in turn, achieves one of its primary goals of attracting more private capital into developing areas.

Informal Adjustments

Given the conservative nature of creditors involved in restructuring, options for formal debt adjustments are unlikely to move much beyond these approaches in the medium term. Some actors have put forward other ideas for restructurings, but these involve some sort of break with precedent, or some sort of cost that banks find unacceptable for the moment.²

The conflict between the need for action felt by most actors in the debt crisis and this inflexibility of formal approaches has fed the rapidly expanding menu of informal debt adjustment options.

Four related trends are fuelling the general innovation process in financial markets:

- The first of these is *increased competition*. As boundaries between international and individual domestic markets become increasingly blurred and securities markets and the banking sector are globally integrated, alternative sources and methods of finance are universally available and marketable. This increases competition and the incentive to respond with new financial products.

The deregulation of the financial services industry fuels this intense wave of competition as non-bank financial institutions enter banking and as commercial and invest-



Greenpeace/Townsend

Many of the debts incurred by the Third World have been for projects which have proved environmentally destructive. The World Bank has been particularly at fault: the rescheduling of debts should now be linked to environmental rehabilitation.

ment banks compete more vigorously in the same markets. The pressure to allow financial institutions access to all national capital markets is intensifying. For example, the advent of the "Big Bang" in London—the opening of the London Stock Exchange to outside membership and the relaxation of rules governing capital markets—has put pressure on other European governments to continue opening their own markets.

●The second trend is the "disintermediation" of credit flows.³ The pendulum is swinging away from intermediated borrowing and lending because of the same factors pushing financial innovation. Disintermediation—the bypassing of intermediate institutions, such as commercial banks, in borrowing and lending money—is a growing phenomenon in the capital markets in the 1980s, and is extending to secondary markets as well. That is, highly sophisticated institutional savers, such as Japanese pension funds, are lending their money directly to the final user by purchasing various types of bonds and equity. Large investors, such as multinational corporations, are borrowing directly from savers, for example by selling commercial paper directly to the public, rather than borrowing money from banks.

Disintermediation has robbed banks of some traditional forms of business and inspired them to enter new domains and develop new products. It has become common practice now for bond issues to be made through multinational syndicates of commercial banks with well-developed placing power, though this was the traditional domain of investment banks (which differ from commercial banks in that they can underwrite securities and cannot take deposits).

●The third trend is "securitisation". Securities are financial instruments, be they stocks or bonds, created with specific characteristics that make them easily comparable to other securities. While two types of stocks listed on the stock exchange can easily be compared, two different sovereign loans are difficult to compare. Greater comparability means that investors can easily trade these securities. The shift in credit flows from bank lending to the purchase of marketable debt instruments (stocks, bonds, and similar items) is a major international financial market trend and an impetus for product innovation in the 1980s.

This shift in credit flows has provided broad and fertile ground in which product opportunities continue to flourish.

Maturing and increasingly efficient Eurobond markets (dollar-denominated bonds traded in Europe) with standardised trading practices have fostered securitisation. Debt instruments can be tailored in significant respects to the needs of the purchaser (lender) or the seller (borrower). At the same time, the debt instruments can be priced according to standardised formulas, such as fixed rate, floating rate, or "convertible". This standardisation allows purchasers (lenders) easily to compare debt instru-

Creditors are now looking for more innovative ways of dealing with the debt crisis.

ments and therefore buy and sell them to each other. Hence secondary markets emerge on which already created securities are bought and sold. Secondary markets are akin to the markets for used goods, although stocks and bonds do not necessarily depreciate the way cars do.

The reappearance of positive real interest rates has stimulated greater demand for long-term bonds and inclined investors to hold and trade inventories of securities. These investors now have attractive alternatives to depositing their money in commercial banks. At the same time, traditional commercial bank borrowers have found it cheaper to raise funds in the bond market. In both cases, conventional commercial bank lending is left out of the picture.

The impact of the debt crisis on commercial bank balance sheets has also stimulated securitisation. Because their assets, especially loans to developing countries, are of longer terms due to restructurings, banks have had to lengthen the terms of their liabilities as well. They have partially accomplished this by issuing long-term bonds. They have also sought to sell these long-term assets through techniques such as loan swaps and loan sales. The banks' own holdings of long-term marketable securities have surged.

●The fourth trend is *Off Balance-sheet Banking*. Off Balance-sheet activities are those in which a bank uses its assets to underwrite or otherwise guarantee other assets rather than lend its assets. Thus, the bank may not provide re-

sources directly to an investor, but rather guarantees that the investor will receive its funds even if the primary source of these funds, the capital markets, runs dry. An off balance-sheet item is not a direct liability but rather a contingent liability—a liability paid only if needed, not automatically.

A Note Issuance Facility (NIF) is an example of an Off Balance-sheet item. For a fee, a bank agrees to sell short-term debt instruments to investors, and purchase itself any debt that cannot be sold. Thus, the bank does not itself extend any credit, so long as all the debt is sold to investors.

Banks have become increasingly attracted by Off Balance-sheet business, for which they earn fees. This proclivity for off Balance-sheet activity is closely related to the trend in securitisation described above.

Using Informal Adjustments

This milieu of innovation in the financial industry has prodded creditors, and particularly commercial banks, toward more creative ways of dealing with the debt crisis, reflected in a miscellany of new informal debt adjustments. These new adjustments fall into two broad categories: manipulation of debt (swaps, conversions, sales) and the creation of entirely new "facilities" (institutions or market instruments) for use in debt markets.

A further variable in this process is the developing "Americanisation" of the present debt crisis. The depreciation of the US dollar has focused the debt problems on North and South America. Since most loans to developing countries are held in dollars, Japanese and European creditors have found their portfolios devalued in dollar terms by a third or more. *Their exposure in developing countries—and the consequent risk—has thus been reduced substantially without their having to do anything with their loans.* This has increased the pressures on US banks, the US government and Latin American borrowers. Many market innovations in debt adjustments are being developed in response to this increasing focus, and pressure. Other creditors, particularly the Japanese and Europeans, have now less need to support or participate in innovative debt adjustments.

This tension—coupled with general creditor conservatism and political

problems in host countries with foreign investment—has hindered expansion of the informal debt markets. But certain instruments are clearly emerging as leading approaches.

● **Debt swaps.** A secondary market for sovereign loans has been around for more than a century, but it has re-emerged with new vigour as institutions swap (through intricate trading arrangements) the debt of one country for another. Banks also sell loans outright at a discount in order to get them off their books.

● **Debt-for-equity conversions.** Conversions are generally a three-step process. First, company X acquires hard currency debt of some borrower in the selected country. Normally this will involve the purchase of hard currency debt at a discount in the secondary market. Second, company X trades its hard currency debt for an asset, denominated in local currency, of the same borrower (usually a government entity). If the borrower is a government entity, the local currency asset may be cash. Otherwise the investor will receive a local currency bond of some sort. This trade typically takes place at less than par (face value), but at a smaller discount than that which prevails in the secondary market for hard currency debt. Finally, the company X sells the new asset for local currency and uses these funds to capitalise its investment.

Mutual funds can be established to encourage debt-for-equity conversions. Although many equity investments in debtor countries offer the highest rate of return (often in excess of 25 per cent per annum) available to investors, the risks are also much higher. One of the functions of equity funds is to spread risk through a large pool of investors and thus catalyse investment that otherwise would not take place. Also, many of these funds are insured against certain types of "political" losses (such as expropriation). Such safeguards make investments in, say, the Bangkok stock market more attractive to non-Thai investors.

● **Debt-for-commodity conversions.** Some countries, notably Peru, are attempting to trade their exports for outstanding debt owed to international banks. Banks agree to retire the country's debt from their books, thereby eliminating the obligation, in return for a set value of exports which, in turn, the banks sell on the market for hard currency. The value of the ex-

ports is usually far below the face value of the debt.

● **"Factoring companies"** The Japanese have pioneered a plan that will establish a company solely devoted to purchasing problem loans from Japanese banks and trading or investing them via the secondary market. In return, the bank will receive equity shares in the factoring company roughly equal to the discounted value of the assets (loans) they have given up. Thus they sell the loan at a loss but continue to receive its earnings, now in the form of dividends from the company rather than interest payments.

● **Bonds.** Sovereign countries are once more issuing long-term bonds, and investors are increasingly interested in buying them. A variation focused on alleviating debt is called "exit bonds". Argentina is proposing the exchange of exit bonds for commercial loans

currently held by its international creditors. Banks holding exit bonds instead of traditional loans would not be obligated to participate in future restructurings. The exit bonds could only be traded on a secondary market or redeemed before their final maturity for domestic currency. When they mature, they are redeemable in hard currency. The proposal is intended to provide an exit for the large number of small banks that hold minute portions of Argentina's external debt.

Prototype Adjustments

The following prototype adjustments set out the components and incentives for each arrangement. Though many of these prototypes would necessitate some regulatory or other type of adjustment, we believe such changes are quite possible given the incentives available to transactors. Of course, some are more

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likely to participate than others. Regional banks are good prospects, since they are eager to rid themselves of their problem debt and have fewer worries about doing this than the large banks. The options below delineate specific financial and political incentives; the benefits of promoting sustainable development is an assumed gain for all concerned.

Option A:

Investment of corporate blocked funds in environmentally-supportive projects.

Example:

A multinational oil company invests blocked funds held in Nigerian naira in palm oil plantation rehabilitation. The company is allowed to remit dividends from the investment after two years and repatriate capital after 10 years.

Goal:

A multinational corporation (MNC) is allowed to take out of a host country dividends or capital investments currently held in unconvertible local-currency accounts through investment of those funds in environmentally-positive projects.

Source of Funds:

MNCs often find that a country will not allow the remittance of dividends or the repatriation of capital from their investment. Dividends are paid, but in local currency to the central bank, which does not allow conversion into hard currency. In some cases, MNCs may remit dividends from their investments but cannot repatriate invested capital. The central bank can release these blocked funds for government-approved reinvestment by the MNC. In return, the central bank allows the MNC to remit dividends and/or repatriate capital from this new investment (that is, convert them into hard currency).

Use of funds:

The blocked funds are reinvested in projects with a favourable environmental impact which also complements the operations of the MNC and potential local investors. The projects are identified, monitored and evaluated by the host government or an independent body. The MNC is allowed to (1) remit dividends or repatriate capital, or (2) do both. As the MNC repatriates capital from the new project, a local firm or the host government purchases shares in the project, ensuring that the project continues to yield positive environmental results.

Issues:

Governments are generally wary of schemes to free blocked funds, and rarely have an established programme for their use. Blocked funds tend to be released on a case-by-case

basis. Host governments must be given financial incentives above and beyond those apparent in positive environmental management.

Since many qualifying investments would be in the agricultural sector, governments may voice fears of excessive foreign control over a sensitive part of the economy. This is a recurring issue, but one that can be overcome with a proper understanding of local needs. One common method of allaying local fears of foreign control is to include local capital and management participation.

Incentives:

Investors:

- partial eventual remittance of blocked funds
- good will from the government

Host country:

- increased foreign investment
- gains in local employment
- probable gains in foreign exchange generation
- stimulus to local investment

Option B:

Conversion of debt into local currency by environmental organisation and investment in environmental projects.

Example:

In cooperation with the Nature Conservancy of the US, a local conservation organisation in Bolivia purchases Bolivian debt for 15 per cent of its book value. The group redeems the loan at the Bolivian Central Bank for local currency equivalent to almost 100 per cent of the loan's face value. It uses its new local currency funds to purchase high priority tropical forest in Bolivia, which it can either manage as a biological diversity reserve or cede to the government for the creation of a national park.

Goal:

Organisations support environmental management by purchasing debt, converting it into local currency, and investing it in environmentally-supportive projects.

Source of funds:

An organisation purchases problem debt from a creditor bank at a discount, using funds gained from contributors. The debt is redeemed at the borrowing country's central bank and converted into local currency worth close to 100 per cent of the original face value of the debt.

Use of funds:

The environmental concern uses the local currency funds for biotechnology research, land management, the purchase of land or land rights, or other kinds of environmental management.

Issues:

Organisations (usually environmental concerns) must raise money to make the original purchase of bad

debt from a bank. Since banks are reluctant to sell small portions of their exposure and still price much of their exposure at more than two-thirds its face value, this option can be very costly. Hence, the focus should be on loans to virtually insolvent countries. Such problem debt is cheaper and more likely to be sold in small pieces—for example, small individual loans or participations in syndicates. Purchase prices and availability of funding for purchase thus limit the number of countries to which this option can be applied.

There is a possibility that a bank could receive tax gains by calling the sale of debt at below face value to an environmental organisation a charitable contribution under US tax law. This procedure has not been clarified by the US Treasury.

Incentives:

Creditors:

- removal of bad debt from their portfolios
- tax credits equivalent to the loss
- possible tax credits for a charitable contribution
- positive public relations

Borrowers:

- less pressure from creditors, who are rid of debt
- funds for environmental management
- possible stimulus for increased investment

Option C:

Donation of debt to an environmental organisation and investment in environmental projects.

Example:

A US bank sells its Bolivian debt to the Nature Conservancy at the secondary market rate of 15 per cent of its book value. It receives tax credits equivalent to 85 per cent of the loan, and donates the proceeds of the sale to the Nature Conservancy. This contribution is also deducted from taxable income, such that the bank has received a tax deduction equivalent to the full reduction in its Bolivian exposure. Nature Conservancy redeems the loan at the Bolivian Central Bank for local currency equivalent to almost 100 per cent of the loan's face value. It uses its new funds to further conservation projects in Bolivia.

Goal:

A creditor "donates" problem debt to an environmental (charitable) organisation which, in turn, converts the debt and uses the funds to support local environmental management.

Source of funds:

A bank sells discounted LDC debt to a non-profit organisation, booking a pre-tax loss which reduces its tax bill. The proceeds of the sale are donated to the non-profit organisation. The

contribution is tax-deductible, further reducing the bank's tax bill. The non-profit organisation recovers its original outlay. It has also received, free of cost, a loan which can be redeemed at the borrower's central bank for local currency roughly equivalent to the loan's face value (although central banks rarely, if ever, redeem it for the full face value).

Use of funds:

The non-profit organisation uses the local currency funds for biotechnology research, land management, assisting a local group in the purchase of land or in establishing land rights, or other kinds of environmental management.

Issues:

Banks are not accustomed to selling loans for purposes other than improving their liquidity. They must be persuaded to draw a direct link between the sale of problem loans and contributions for environmental management. Hence, this option is

most feasible with debt to countries that are considered insolvent, for which there are few commercial buyers, therefore few opportunities to improve liquidity.

This option requires an initial stock of money at the disposal of the non-profit organisation to be used for the initial purchase. This fund is recovered at the end of the transaction.

Incentives:

Creditors:

- remove bad debt from their portfolios
- receive tax credits equivalent to the loss
- receive tax credits for the charitable contribution
- gain public relations benefits

Borrowers:

- less pressure from creditors, who are rid of debt
- funds for environmental management.

Option D:

Purchase of debt by environmental organisation and discounted sale to a multi-national corporation to support environmentally-sound corporate investments.

Example:

The National Wildlife Federation purchases Nigerian debt at a discount on the secondary market. It sells this debt to a company investing in palm oil in Nigeria, in return for corporate adherence to environmental guidelines for the investment.

Goal:

Environmental groups encourage environmentally-sound corporate investments by providing discounted local currency to corporations when they agree to environmental management standards.

Source of funds:

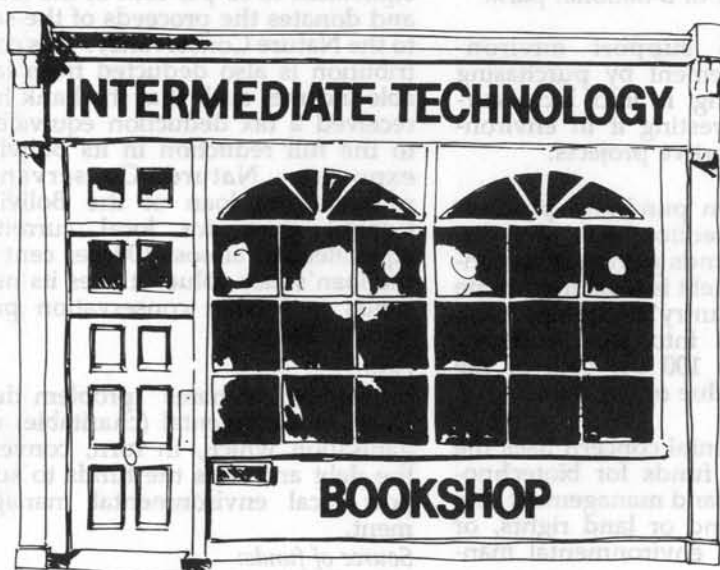
A non-profit organisation purchases discounted debt of a particular country and offers it at a further dis-

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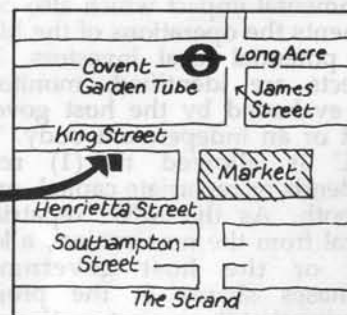
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count to a multinational corporation (MNC) operating in the same country.

Use of funds:

An MNC purchases the debt from the non-profit organisation on the condition that its investment in the debtor country abides by pre-established guidelines for environmental management.

Issues:

The purchase of large blocks of problem debt requires a considerable financial commitment by the non-profit organisation. Only a portion of this commitment will be recovered; the rest represents a subsidy to the MNC.

The goal is to encourage environmentally-sound investments that otherwise would not take place and not to subsidise investments which would have been made in any case.

This option requires strict monitoring of the investment to guarantee that the pre-established standards are upheld.

Incentives:

Creditors:

- removal of bad debt from their portfolios

Borrowers:

- less pressure from creditors, who are rid of debt
- increased investment
- additional employment
- probably additional foreign exchange earnings

Investors:

- local currency at a preferential subsidy

Option E:

Tax incentives for corporate investors who support environmental management.

Example:

A corporation with operations in Peru purchases Peruvian debt on the secondary market at 15 per cent of its face value. It redeems this debt at close to 100 per cent of its face value, in *intis*, the local currency. Part of this money is donated to the Peruvian Ministry of the Interior to be used for the management of a national park. A small portion of the tourist proceeds are turned over to the corporation.

Goal:

Governments provide incentives for corporate funding of environmental management in host countries.

Source of funds:

A multinational corporation (MNC) purchases problem debt on the secondary market. The debt is redeemed at the borrower's central bank for local currency. Part of the local currency is donated by the MNC to an environmental organisation in return for a host country tax benefit.

Use of funds:

The MNC donates local currency to a

local or international organisation responsible for environmental management. This organisation uses the local currency funds for biotechnology research, land management, the purchase of land or land rights, or other kinds of environmental management. Alternatively, the MNC makes its donation to supporting a national park, from which it may receive some of the revenues.

Issues:

Not all countries have a tax code which gives deductions for such contributions, although the necessary legal changes are possible.

A claim by an MNC on the proceeds of a national park could arouse domestic political animosities.

Incentives:

Creditors:

- removal of bad debt from their portfolios

Borrowers:

- less pressure from creditors, who are rid of debt
- additional resources for environmental management
- increased investment

Investors:

- local currency at a preferential subsidy
- tax credits
- public relations benefits
- potential revenues from tourist receipts

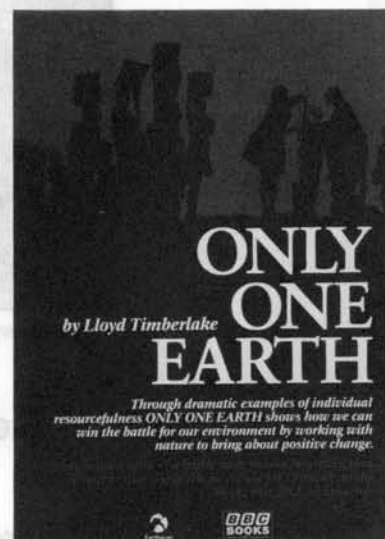
References:

1. Transfer risk refers to the risk that a government will not have sufficient foreign exchange to service debt even though it is producing sufficient resources (in terms of local currency) to pay its obligations.
2. These options can be grouped into two broad categories. The first links debt service to capacity to pay (based on fluctuations in interest rates on the loan, foreign exchange earnings, and similar variables in the process). This strategy, based on a debt service "cap", or maximum percentage of export earnings, has been implemented unilaterally by Peru and Nigeria. Peru does not even honour its own announced cap but services its debt willy-nilly. Nigeria restructured its debt soon after its announcement, so the cap had no real impact. The second category offers some sort of debt relief, at a real cost to creditors. Official creditors have provided debt relief for years (it becomes "foreign aid"), but the banks do not wish to take this radical approach if they can minimise losses or even make money from bad debt in other ways.
3. The "intermediation" of credit flows is a sophisticated way to describe a relatively simple phenomenon. Simply put, intermediation means that some sort of institution is acting as a middleman between someone with credit to spare (the saver) and someone long on investment ideas but short on money (the investor). Since it would be pure chance for the saver and investor to meet and reach an agreement by which the investor borrows the saver's spare cash, institutions such as banks have emerged to serve as intermediaries. Intermediaries are institutions that borrow from savers and lend the money to investors.

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Dan Janzen (left), the initiator of the project, talks to a cattle rancher whose land will be reforested.

Reclaiming a Natural Legacy

by Juliet A. McGhie

An ambitious project to reclaim 270 square miles of dry forest has been launched in Costa Rica. Much of the forest has been cleared for cattle ranching but it is to be replanted as a tropical forest, using birds and animals to disperse the seeds as well as human labour. The land will be protected from ranching, fires and hunting.

Though it is smaller in size than the state of West Virginia, the Central American country of Costa Rica boasts more than 12,000 species of plants, 850 kinds of birds, 237 species of mammals and more than 150 kinds of reptiles and amphibians. To preserve this impressive heritage, Costa Rica has been in the vanguard of conservation efforts in Latin America for almost two decades. Result: more than 20 per cent of its land is now protected in the form of national parks and reserves.

Outside these protected areas, though, huge chunks of tropical forest are being felled each year for pastures, farmland and timber. The flora and fauna being destroyed with the trees contain a vast, often unexplored pool of genetic resources which, in many cases, could hold the key to advances in medicine, science and agriculture.

Rain Forests and Dry Forests

The two principal ecosystems most affected by deforestation are rain

Juliet A. McGhie writes for *The Lamp*, the house magazine of Exxon Corporation, PO 101 Florham Park, New Jersey 07932, USA. Exxon is one of the sponsors of the Guanacaste National Parks scheme.

forests and dry forests—the main difference between the two being the amount of rainfall each receives. A tropical rain forest is subject to virtually year-round precipitation and has extremely high humidity. A dry forest, on the other hand, has a six-month season without rain, followed by six months when it is as wet as a rain forest. The latter's hardwood trees provide a luxuriant, year-round canopy of green, while the dry forest's counterparts are deciduous in the dry season. And once they lose their leaves, the lush greenery of the wet season disappears.

According to biologists, 500 years ago Central America's dry forests stretched in a continuous chain down the Pacific coast from Mexico to Panama, interrupted only by small patches of Indian agriculture. These dry forests covered considerably more acreage than rain forests. But since they enjoyed a combination of good soils and hospitable climate, the dry forests eventually gave way to pastures, farmlands and population centres. Today less than 2 per cent of the dry forests are relatively intact and a mere .08 per cent are protected in preserves.

Rebuilding the Forests

To prevent such ecosystems from dying out completely, an ambitious programme is now under way to rebuild a 270-square-mile park of dry forest just south of the Nicaraguan border, in the northwest corner of Costa Rica's Guanacaste province. It is called the Guanacaste National Park project, and if it is successful, the legacy for posterity will be a pristine dry forest similar to the one that greeted the Spanish conquistadors five centuries ago.

The plan is the brainchild of University of Pennsylvania biology professor Daniel H. Janzen, a dry forest specialist, whose students are more likely to attend classes on the side of a volcano in Costa Rica than in a campus laboratory. Janzen first discovered Costa Rica's biological wealth 24 years ago. Ever since, he has spent the greater part of each year there doing research, specifically in the Santa Rosa National Park, now an integral part of the Guanacaste project.

Currently in its second year, the Guanacaste project seeks to:

- add to the existing Santa Rosa and Murciélagos national parks

another 178 square miles of contiguous lands purchased with the proceeds from an international fund-raising campaign;

- transfer ownership of the resulting Guanacaste National Park to the Costa Rican National Parks Service;

- ban all fires and hunting in the park;

- gradually reforest areas given over in the past to grazing and farming;

- zone different segments of the park for purposes such as recreation, research and teaching;

- employ farmers already living on the lands to help maintain the park, while allowing them, on a reduced scale, to continue grazing livestock and operating farms for their own use;

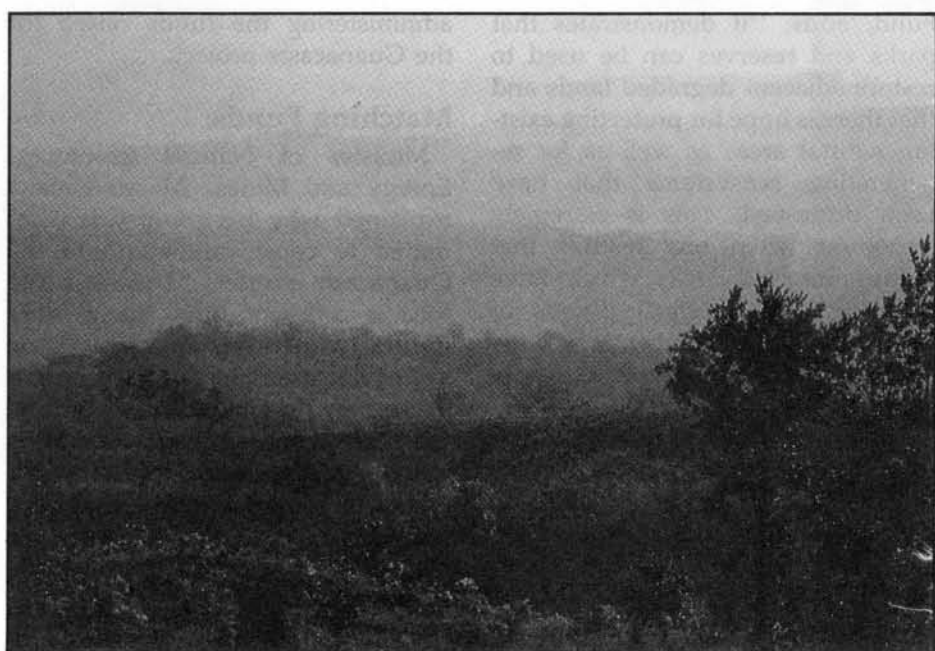
- educate local inhabitants about this delicate ecosystem so that "people would no more think of harming it then they would of stealing gold from a church," says Janzen.

A Refuge for Wildlife

In addition to savannahs, pastures, farmlands and denuded forests, the area pinpointed for the project includes two volcanoes, numerous beaches, both seasonal and year-round rivers, as well as a small rain forest region. Why did Janzen include a rain forest area in a dry forest park? "There's a very simple answer," he says. "Animals move around a lot and one way for them to survive the dry season is to go to the rain forest and remain there until the rains come. The rain forest provides an important refuge for them."

Since traces of all the original animal, tree and plant populations still exist in scattered pockets of the park, the rebuilding process will involve restoring the former biological mix rather than introducing new species of flora and fauna. For example, white-lipped peccaries—pig-like mammals now reduced to a few herds roaming the volcanoes—are expected to gradually return to their lowland habitats since the Guanacaste project will create an unbroken protected route for them.

Janzen estimates that the flora and fauna species within the Guanacaste National Park boundaries include between 3,000 and 4,000 trees and other plants, 5,000 moths and butterflies, 300 birds and 140 mammals, including howling, white-faced and spider monkeys, white-tailed deer, coyotes, jaguars, mountain lions and



Chernush/Lamp

Part of Guanacaste National Park. The park is home to over 3,000 species of trees and plants, 5,000 moths and butterflies, 300 birds and 140 mammals.

ocelots. "The park extends from the driest part of Costa Rica to the wettest," he says. "It is as if Arizona were on one side and the Florida Everglades on the other, with the whole spectrum of flora and fauna in between."

Replanting

Reforesting Guanacaste will be accomplished by bird and animal seed dispersal, as well as by human labour. Janzen explains that birds and animals consume large quantities of tree and plant seeds and subsequently disperse them in different locations. Some of these important seed-carrying agents, such as bats, monkeys and agoutis (rabbit-sized rodents), shun open pastures, so "It's essential to get the first forest out there, and that's where the human effort comes in," Janzen explains. "We know where the seeds are, and you plant them the way you plant corn—put a stick in the ground and make a hole, drop the seed in and close the hole with your boot."

Raising the Funds

After more than 24 years of living part time in Costa Rica and talking with everyone from government officials to local farmers, Janzen has become thoroughly familiar with the country's "long-established tradition of social stability and its interest in conservation." When he first proposed his plan, he was confident the

political and social climate in Costa Rica was ideal for the Guanacaste project. He also felt that the five major landowners involved would be willing to sell their properties to the government because the poor-soil conditions yielded few profits from ranching or agriculture. The government of Costa Rica, as well as local and US conservation groups, approved the plan. The next hurdle, then, became raising funds for the project: \$8.8 million for land purchase and \$3 million for an endowment to manage the project.

Early in 1986, Janzen organised an international fund-raising campaign which by year-end had raised \$1.4 million. By the end of last February, the project team had purchased 12.4 square miles of land, with another 15.4 square miles provided by an anonymous donor.

In the United States, donations for the Guanacaste National Park project have been handled by the World Wildlife Fund and the international programme of the Nature Conservancy, nonprofit conservation organizations which received Exxon funding.

Exxon Chemical Company president H. Eugene McBrayer, who is on the World Wildlife Fund's board of directors, notes that the Guanacaste project "puts the conservation movement in Central America on the offensive."

Dr Thomas E. Lovejoy, executive vice president of the World Wildlife

Fund, adds, "It demonstrates that parks and reserves can be used to restore adjacent degraded lands and that there is hope for protecting existing natural areas as well as for regenerating ecosystems that have been destroyed. This is extremely important when one realises that many protected areas which have been reduced to small islands of vegetation may not currently be large enough to ensure longterm species survival."

The Nature Conservancy's support for the project has been part of its broader campaign to build indigenous conservation capacity in Costa Rica by training local groups to raise funds, work alongside government agencies and fully utilise the various resources at their disposal.

This year may be a crucial one for the Guanacaste project, though. All the local owners of large properties have promised the Costa Rican government that they will withhold selling their lands until mid-year. But the project still needs an additional \$4 million to secure the core of the properties it needs.

In Costa Rica, the drive to raise the money to rebuild the dry forest is supported by the government and two private conservation groups—called the National Parks Foundation and the Neotropica Foundation. The latter groups are responsible for

administering the funds raised for the Guanacaste project.

Matching Funds

Minister of Natural Resources, Energy and Mines, Alvaro Umana explained why his country is committed to conservation and to the Guanacaste project. "I think Costa Rica is different from many other Central American countries," he said. "For example, we have been a democracy for almost a century, and we have had compulsory education for all children since 1869. Indeed, our infant mortality rates are on a par with those in the US. Moreover, we have about 60,000 students enrolled in universities. So, there's consciousness here of the value of our natural patrimony and a desire to preserve our unique natural habitats."

One sign of this commitment to conservation is that the Costa Rican government intends to subsidise private contributions with matching government funds for the Guanacaste project, which should enable the \$3 million endowment fund to be established.

"The Guanacaste National Park is very important to us," explained Umana, "because it will help determine our country's philosophy about creating national parks, determining how they should be managed and deciding what they

should include."

Raul Solorzano, technical director of the Neotropica Foundation, and Mario Boza, director of the National Parks Foundation, agreed with Umana. "It's the first project of this type in Latin America," said Solorzano, "but it's not a conservation project per se. It's actually an ecological restoration."

From the outset, Janzen wanted the Guanacaste National Park project to serve as a stimulus to the National Parks Service in its efforts to upgrade the entire Costa Rican parks system. To help achieve this, the project has hired a number of Costa Ricans to help run the park. They currently include a biologist who teaches groups of visiting schoolchildren, two government-supported game and forest wardens, an administrative coordinator, four resident farmers serving as park managers and two resident farmers training to be technicians.

Slowly the Guanacaste National Park project is transforming a remote sliver of Central America into a rare biological treasure. In the process, it is guaranteeing the survival of an ecosystem that otherwise might have vanished from the face of the earth.

Acknowledgement: This article first appeared in *The Lamp*, Spring 1987 and is reproduced with permission.

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monies from several native communities about their plight.

The book also analyses the social and environmental impact of logging activities, and provides suggestions on what can be done to resolve the natives' problems.

This book is essential reading for those interested in Sarawak, and its natives, the fate of the tropical forests and the rights of indigenous peoples in the Third World.

Available from *The Ecologist*, Worthyvale Manor Farm, Camel-ford, Cornwall PL32 2TT, United Kingdom. (Please send £1—for postage).

The Auroville Forest: Reclaiming a Desert

by Tom Reed

Supported by the Government of India, the project of Auroville was inaugurated in February 1968 with the aim of establishing an international community in which to try out new ways of living and working together. It was conceived that Auroville would grow into a city of perhaps 50,000 people, guided by a common sense of purpose and unity. The land where Auroville was founded was slowly but surely dying. It is now being reclaimed through a model reforestation programme, a grass roots approach to rescuing denuded and arid lands.

Auroville was founded on a semi-arid plateau in southern India, 120 miles south of Madras in Tamil Nadu State on the Coromandel coast. The 'city' of Auroville is no more evident today than it was 20 years ago; what is evident is a young, dynamic and beautiful forest covering approximately 2,500 acres. It is proposed that the Auroville forest and township will eventually extend to 12,000 acres. Yet, in 1970, the state Forestry Department declared this land incapable of sustaining human life for more than a further 25 years, such was the extent of deforestation and erosion. Only 70 years earlier, the land had been a mixed tropical hardwood forest of teak and other fine woods. The forest was destroyed not by the local villagers for firewood or farm land, the type of myth much loved by the IMF and other development agencies, but by the builders of the railways and the nearby town of Pondicherry—the French and the British. Pondicherry was a French colony and still maintains a close contact with France.

Subsequent farming methods led to the total decline of soil fertility and water retention capability. The land became minimally productive and, year by year, thousands of tons of topsoil found its way into the Bay of Bengal. What was left was a land riddled with gullies and ravines, a strangely beautiful but barren landscape of pitted laterite, a rust-coloured hardpan consisting almost entirely of oxides of iron and aluminium, solid as concrete and utterly useless for agriculture.

Restoring the Land

In Auroville more than a million

forest trees, hedge trees, fruit, nut and fuelwood trees have been planted on the 2,500 acres presently available for development. Before a sustainable society could be established, albeit in this case a small one, it was necessary to secure, stabilise and rebuild the chronically eroded and denuded land. In the first 15 years or so the emphasis was on reforestation, land, reclamation, water conservation and the development of renewable energy sources.

The afforestation programme has been achieved at a low technology level. There has never been enough money to do things otherwise, and given the state of development in India, appropriate methods are low level. A pick and a spade, tons of human energy and water, water, water; water transported in every conceivable way over the rugged terrain in the searing heat—carried on the head in clay pots (kujas), in buckets, by bullock cart, each drop a lifeline for a tiny sapling struggling for survival. A young tree needs to be nursed through at least its first year and three-quarters of the energy put into it goes to maintaining it after planting.

Out of necessity, Auroville has become a laboratory for research in ecological development and has, through trial and error, developed a strategy that can be applied to restoring health to the earth wherever the will to do so is actively present. Contrasted with the surrounding landscape, the results are an inspiration to others facing the same kinds of almost insurmountable odds. Ed Giordano of the Forest Group explains one of the elements of this remarkable success story:

"One must mention that we are no longer surprised at the incredible increasing number of uses and values of the indigenous trees here. Larger

trees like *Tectona Grandis*, *Dalbergia Latifolia* and *Pterocarpus Marsupium*, all economically very valuable, grow quite well here. Our main efforts are generally with the indigenous species which we slowly rediscover, along with a few tried and proven exotics, such as *Khaya Senegalensis* and some of the *Acacias* and *Cassias*. We are always trying out new species, but it becomes ever more apparent that the most interesting trees to propagate are those which grew here before the region became desertified and eroded."

Surprisingly, after a relatively short time in terms of forests, the community of Auroville, numbering about 600 at the moment, is able to provide all its own fuelwood requirements for the bakery, the kitchens and the potteries. Research in this field has found some very appropriate species for fuelwood, again a commodity in desperate short supply in the Third World. *Acacia Auriculiformis*, *Acacia Holosericea* and *Casuarina Equisetifolia* all grow fast and burn hot. *Auriculiformis* is also a good timber wood for construction.

Main Features of the Recovery Programme

The programme to restore the environment has been comprehensive, with several main features. David Wickenden, now living in New York, worked for many years on the forest programme. He describes what the main features are:

SOIL AND WATER CONSERVATION. The first phase of the regenerative process involves retaining soil and water and checking erosion. Like much of the sub-tropics, the Auroville area tends to alternate from deluge to drought; one or two months of torrential monsoon rains followed by long, dry months of scorching temperatures over 100 degrees

Tom Reed is an energy consultant attached to the Centre for Human Ecology at the University of Edinburgh. He lived at Auroville for 10 years.

Fahrenheit, and hot dry dust storms. This climatic pattern is symptomatic of imbalance—and one of the long-term aims of Auroville foresters is to create a microclimate extensive enough to change the rainfall pattern.

Both wind and rain contribute to heavy topsoil erosion. Work began from the top of the catchment areas to halt soil and water erosion through extensive contour bunding. This keeps the rain on the land where it falls, allowing it to percolate down to replenish the ground water table. As run-off is checked, gullies and ravines are blocked with a series of small checkdams, mostly constructed from the local laterite, such is its strength. Existing catchments ponds are excavated where necessary to improve water retention and new dams and ponds are constructed to create new bodies of water that enhance the flora and fauna necessary for a balanced ecological system.

REFORESTATION. The single most powerful factor in the land reclamation process is the planting of trees which protect and stabilise the soil, retain moisture and provide shade and nutrients necessary for life. Along with the bunding and the check-dams, a first mixed plantation of drought-resistant indigenous shrubs, grasses and trees were, and still are, planted on a large scale. On lands that have suffered from severe erosion and can be used only as a meagre source of grazing for local herds of cattle and goats, intensive, reforestation has been undertaken using a variety of tree species selected for drought resistance and rapid growth.

Seedlings are raised in plastic bags or seed neds and planted out with the monsoon rains in pits dug into the laterite and filled with enriched topsoils or silt. During their first dry season, the seedlings are watered where possible to ensure survival. Ideally, seedlings become sufficiently well established during the monsoon survive the dry season without watering.

Areas taken up for reforestation must be protected from grazing animals and foragers by live thorny hedges, which later provide shelter and food for the small animals and birds that finally return to the land. New seedlings are provided with individual protective baskets where needed, and 'watchpeople' patrol the areas until the trees are established.

After the first round of hardy, drought-resistant species have

been established, the trees are interspersed with other species from throughout India and the tropical world, chosen for qualities of soil enrichment, beauty, shade and for economic values such as the provision of firewood, building materials and food. After two decades, Auroville has grown to become a large botanical preserve containing several hundred rare or endangered species from various parts of the world.

BIOLOGICAL FARMING AND AGROFORESTRY. In the protected and inhabited areas where enough topsoil is available for ploughing and planting, experimental work is also underway to develop a poly-cultural, intensive land-use pattern incorporating windbreaks and hedges, fruit trees and annual or seasonal crops. The aim is to make maximum use of the land while increasing and sustaining soil fertility.

The first necessity for cultivation is obvious; the soil must be fertile. Before it can be made fertile, it must be protected and nurtured. Thus, all initial agricultural work in Auroville includes bunding, hedge plantation, and water conservation—not measures strictly related to food production but which begin to define cultivable areas and are the first steps towards recreating the biological balance necessary for a healthy, productive habitat.

Leguminous hedge plants such as *Sesbania*, *Leucaena*, *Gliricidia*, *Tephrosia* and *Prosopis* are cultivated in and around agricultural areas as windbreaks, soil-builders and for use in coppicing to produce compost. Because of the depleted condition of the soil, massive amounts of compost are required and considerable research into composting systems have been investigated. Cows, horses, chickens and ducks play an important part in this effort not only because they form a natural part of a balanced and productive environment—producing milk, eggs and transport among other things—but also for the manure essential for composting and rebuilding the soil base.

Soil is also rebuilt through sound cultivation methods. For Auroville farmers this means practice such as crop rotation which balances leguminous crops with heavy feeders; turning fields over periodically to leguminous ground covers; ploughing in the green manure; tillage which minimises erosion and wash-out; careful timing of planting; and inter-cropping leguminous and non-leguminous plants such as millet

or pulses with a fodder tree like *Leucaena*.

As fertility has begun to return to cultivated areas, food production in Auroville has increased dramatically. From being able to produce virtually none of the community's food in the early days, Auroville farms now yield over 75 different varieties of vegetables, fruit, grains and dairy products. Auroville has reached the point where its own land is for the most part stabilised.

Outreach Programmes

The next stage of the work will involve a comprehensive outreach programme in which Auroville foresters and farmers work more actively with Indian forestry and environmental agencies and local village projects. This effort, though now being intensified, has always been part of Auroville's own development since the beginning. The land held in stewardship by Auroville is spread out over about 20sq miles and is interspersed with village, government and temple-owned lands. Because the ecosystem is an indivisible whole, it has been impossible and undesirable to segregate the land. Surrounding fields have benefited immensely by the afforestation works, though for a long time the local people had little idea or appreciation of what was going on around them. Conflicts arose over grazing and access, dams, the chopping down of young trees, and protective fences disappearing for firewood. It has been a long uphill struggle, but the results are now clearly visible to all.

Conclusion

Through dedicated hard work, and its different land-use methods, but most importantly through simple human care, Auroville has restored a severely degraded environment. The more serious, endemic problems of the area may take a lifetime and more to resolve, but results so far indicate that transformation and productive use of near desertified soil is possible. If Auroville can share its acquired experience and knowledge, and show to the unknowing and unbelieving that results can be achieved in difficult situations, the efforts put in by those dedicated forest workers over the last twenty years will have been of inestimable value.

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(These are forests where new trees are planted after others are felled and logging damage is strictly controlled).

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Ask them about the many alternatives.

Or help by sending a donation to the address below.

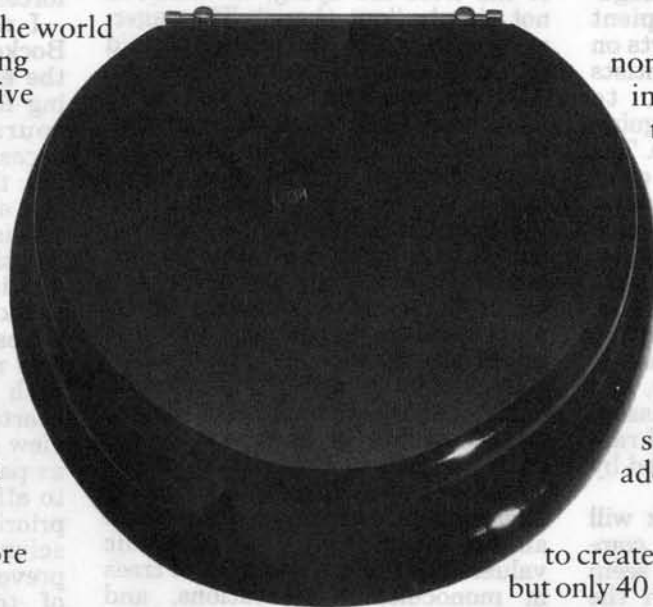
It took 100 million years to create the tropical rainforests but only 40 years to destroy half of them.

If we don't act now, there will be none left in another 40 years.

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Books

Reviving Forests

ACID RAIN by Fred Pearce, Penguin, 1987. £3.95
DYING FORESTS by Jochen Bockemühl, Hawthorn Press, Stroud, 1986, £8.95

Fred Pearce's *Acid Rain* is a wide-ranging survey of the effects of acid rain on soils and waters, forests, buildings and people. For the purpose of this review, I shall focus on the plight of the forests in order to contrast Pearce's approach to this problem with that of Bockemühl. Within the limitations which he sets himself, Pearce does an excellent job: the book explains the basic chemistry of acid rain, how it is caused, and what effects it has, all in clear, readable terms and in a journalistic style which ensures that we carry on turning the pages. We are led on by a breathless cataloguing of disasters and incipient disasters, interfused with reports on the strenuous efforts of scientists struggling, against time, to understand what exactly is going on, and so to avert catastrophe. The reader soon appreciates the enormity of this task. As Pearce says, "It is all a dreadful maze in which new pathways that may or may not lead to the exit are found with bewildering frequency." Indeed, there are currently 186 scientific hypotheses to account for what is happening to Germany's trees, and in Britain the Forestry Commission still refuses to accept that acid rain is a cause of the damage suffered by British trees.

The reader of Pearce's book will set it down assured of the complexity of its subject. It would seem to fall almost entirely within the province of the scientists on the one hand, to agree on a diagnosis, and governments on the other—to implement whatever measures the scientists recommend. There is little for us to do save to encourage the scientists in their efforts, and to exhort governments not to drag their feet. And yet, one can have the

disconcerting sense that the problem is far bigger than anything scientists and politicians can deal with. "Short of putting a plug in every chimney and exhaust pipe" says Pearce, "nobody can predict with certainty the effect of reducing one pollutant."

It is hard to imagine a greater contrast of approach between *Acid Rain* and Bockemühl's *Dying Forests*: large, half-empty pages carrying just a few sentences alternate, not with the clamour of scientists battling in their laboratories, but with the rich silence of beautiful watercolour pictures painted by Bockemühl himself. Each picture invites the reader to appreciate the subtle qualities of different landscapes which it is all too easy, in our haste to think causally, not to notice.

**If the trees are dying,
the crisis is not simply
"out there". It is a
crisis in consciousness.**

Bockemühl is a scientist in a new style. While acknowledging the importance of pinpointing the causal mechanisms surrounding the death of trees, he sees causal thinking itself as a major part of the problem. If the trees are dying, the crisis is not simply "out there". The eagerness with which we fall upon acid rain as the culprit, or if not acid rain then the recalcitrant CEEB, or if not the CEEB then the government—for failing to do anything—betrays a type of thinking that is a great temptation to us all. If we can find someone or something out there to hang the blame on, our anxiety is much alleviated; we once again feel secure in our view of the world—the problem is not essentially ours.

Bockemühl's book is subtitled "a crisis in consciousness". The decline in the vitality of Europe's forests must be seen in the context of our whole way of relating to the natural environment, which is determined almost exclusively by economic values. The regimented lines of trees in monocultural plantations, and likewise the monotony of huge single-crop fields with their straight-line boundaries and right-angled corners, are both equally an externalisation of a certain mode of consciousness. As business men, foresters and farmers are concerned to maximise production, not beauty. But are we right to assume that

there is no connection between the beauty of a place and its vitality? While the monocultural plantations are stricken by disease, and while farmers are only able to maintain yields by saturating their crops with artificial fertilisers and poisonous sprays, such a question is not as irrelevant as it might have seemed forty years ago.

Variety of species and habitats, individuality of landscape rather than monotonous anonymity, organic methods of cultivation together result in a healthy environment which also appeals to our sense of beauty. Their opposites give rise to sickness and ugliness. Bockemühl urges us to cultivate a consciousness attentive to what used to be called "the spirit of a place". The spirit of a place is the "whole" which permeates and unites the individual landscape features, habitats and species into a living community. By working more closely with this inner, aesthetic dimension of the "outer" world, through developing a sense of what a place itself needs rather than seeking to impose what we want upon it, we can create the foundations for the long term health of the landscape. In other words, a healthy landscape is one in which a correct balance is achieved, appropriate to the place itself, of the different living elements that compose it. In working towards the creation of such balanced and individuated landscapes, on no matter what scale—be it a huge estate or a small garden—we engender new healing forces in nature.

I would emphasise, though, that Bockemühl is not suggesting that the efforts of scientists investigating forest death are all in vain. Of course scientific research is necessary, political action is necessary: the government must legislate! But at the same time such a crisis as this is an opportunity missed, unless it stirs us to break out of the dualistic, mechanistic ways of thinking to which we are so prone. Unless we develop a more participative mode of knowing and working with nature, unless we wholeheartedly stand behind the holistic view of the world to which many of us pay lip-service, and take courage to affirm in practice the existential priority of the whole, no efforts of scientists and politicians will prevent the metaphysical wasteland of today becoming the environmental wasteland we walk in tomorrow. A new consciousness is needed, and I recommend Bockemühl's book to all who are striving to develop it.

Jeremy Naydler
Oxford



For Evidence read Evasion

Dear Sirs,

The letter from Professor Jackson (Vol 17, No 2/3,) reveals how a leading proponent of fluoridation evades the scientific evidence against his position and instead relies upon empty rhetoric. For example, on the health hazards of fluoridation:

- He ignores the papers cited by Dr Philip Sutton and me¹ which report skeletal fluorosis in India at 1.2–1.3ppm fluoride, in Qatar at 0.8–3.5ppm and in Japan at 1–5ppm;
- He ignores the published evidence we cited, which includes a double-blind trial in Holland and a blind study in the USA, reporting hypersensitivity, intolerance and allergy at 1ppm in water or 1mg per day fluoride in tablets;
- He confuses, dental mottling, which he must know can have many causes, with a specific type of dental mottling known as dental fluorosis, which is caused only by fluoride.

His argument that fluoridation is safe, which seems to be pitched at the level of primary schoolchildren, is that

"there has been no evidence of ill health due to fluoridation after over 40 years' experience in Grand Rapids, USA. If there had been, the health authorities would have vetoed fluoridation years ago."

But he omits to mention that there have been no published scientific studies to look specifically for skeletal fluorosis or intolerance/hypersensitivity in Grand Rapids.

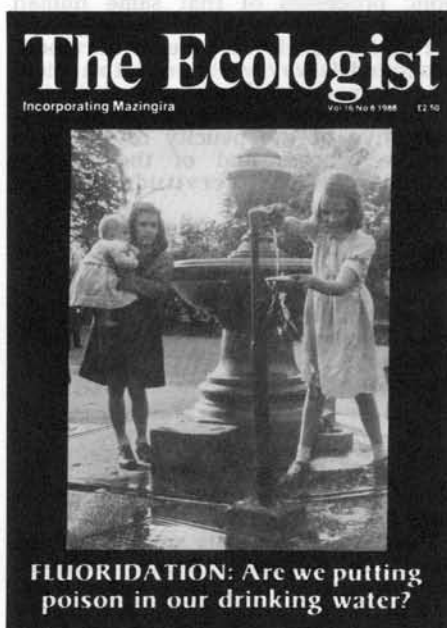
Health authorities in many countries have permitted and even encouraged the widespread use of many dangerous chemical and physical agents for decades after their danger has been widely revealed. Asbestos is just one notorious example. Chloroform, a known carcinogen, used to be added to toothpaste to give it that 'fresh tingle'. Did Professor Jackson utter any protest then? In Australia, fruit-flavoured fluoride toothpaste is still on sale. Concerned consumers are pointing out that, if a young child consumed a whole tube, he or she would receive about 100mg fluoride, a toxic dose by any standard. But the proponents of fluoridation and fluoride toothpaste remain silent.

On the alleged enormous benefits of fluoridation, Professor Jackson ignores the evidence² that there have been very large reductions in tooth decay, which cannot have been caused by fluoridation, in both unfluoridated and fluoridated parts of the developed world. He

does not deny that the early studies which led to the belief of enormous benefits were badly designed, but manages to create the impression, without actually citing a single paper, that there is now "a host of (better?) studies". "We do not have to rely on the researchers of yesteryear," he says. Unfortunately, I am still trying to find a single properly-controlled, blind fluoridation trial in which the test and control populations are similar and were chosen randomly.

Professor Jackson's own 1974 and 1983 studies of fluoridation at Anglesey, often cited by other proponents of fluoridation, are not good models of how to design a study. They have no genuine control population, since the unfluoridated group was:

- chosen non-randomly;
- chosen 19 years after fluoridation commenced in Anglesey;
- drawn from towns, while the fluoridated group was mainly rural. (Even when fluoride levels are the same, the prevalence of tooth decay can vary dramatically between populations with different geographic and socio-economic characteristics.)



In fact, the original study of fluoridation in Anglesey, published by the Department of Health and Social Security, Scottish Office, in 1969, was better designed than the more recent studies. The test and control areas were located on the same island, adjacent to each other, and both had the same rural character. Dental examinations commenced with fluoridation and a genuine longitudinal (ie, time-dependent) controlled trial was performed. The results after 11 years of fluoridation: children in the fluoridated area had on average only one less filling than their counterparts of the same age in the unfluoridated region.

Professor Jackson catalogues some of the alleged successes of the pro-fluoridationists. But these can be interpreted in terms of the dental-medical power structure in the UK, USA and Australia.³ Fluoridation is imposed in these countries by a small elites who sit at or near the top of the endorsing bodies: the dental and medical associations, the British Royal College of Physicians, the UK Public Health Service

and the Australian National Health & Medical Research Council.

These elites try to discourage public and scientific debate. If it does occur, they attempt to trivialise it, or to preempt it by weight of their own authority. As Professor Jackson demonstrates in his letter, the leading proponents make no genuine attempt to answer the scientific arguments of the opponents. No amount of evidence will change their minds. For decades they have advised governments that fluoridation is totally safe and enormously effective. What would happen to their power and influence if they conceded that they were mistaken? And then, they and the governments they advise might actually have to do something of substance about the tooth-rotting junk food which fills the shelves of our supermarkets.³

Ultimately, it is pressure from an informed public which will terminate fluoridation, as it has already done in Holland, and is beginning to do in New Zealand.

Yours faithfully,
Mark Diesendorf
Australian National University,
Canberra

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Commercially inspired Science

Dear Sir,

Hippocrates of Cos, (460 BC–377 BC) recognised the threat to humanity from lead intoxication.

Now two thousand years on, in June 1987, the self-styled "most prestigious medical research body in Australia", The National Health and Medical Research Council has reversed its previous opinion from "recommendations that low doses were harmless" to the belief that "there is no threshold level below which lead had no toxic effect".

Removal of lead additives from a number of common products, notably petrol, means that governments no longer have to massage the hip-pocket nerve of commerce and industry (oil industry particularly) and thus has permitted this sudden opportune display of scientific brilliance and civic integrity immediately prior to a general election.

It took a century of 'stirring' by those who opposed the prevalence of asbestos in our environment to have their argument and logic, disparaged by the industry and its political cronies, receive attention. Attention, if earlier afforded, would have saved untold anguish and death from, inter alia, asbestosis and mesothelioma. Attention was given, in the final analysis, only as a result of compendious, impending damage claims.

This writer warned the Royal Commissioner investigating the health effects of Agent Orange, on page 8 of his submission, as follows: "In this Commission, Your Honour will be confronted by the most prolific and expensive scientific truth that money can buy".

That this warning was terrifyingly accurate was evinced by

the Commission's ultimate findings but it was never contemplated, in issuing the 'warning', that the 'prolific and expensive scientific truth . . . ' as put to the Commission by the makers and advocates of Agent Orange and its 'chemical farming aid' ingredients, would find its way, errors and all, into the Commission's final Report.

Through each of your articles concerning fluorides and fluoridation (*The Ecologist*, vol 16, No 6, 1986) runs the same sinister thread of commercially inspired science. From Thomas Outerbridge's "Fluoride as Industrial Waste" (garbage into gold) through Diesendorf and Sutton's "Who profits from Fluoridation" and the "Science or Swindle?" question by Colquhoun and Mann to Doris Grant's erudite political analysis, the basic motivation of the fluoridationist and fluoride biased administrations seems to be the waste recycling dollar obtainable at any cost in human health terms, although in each instance, the authors have been magnanimously restrained in their commentaries on official and professional attitudes.

It is difficult to remain 'scientifically aloof' when a publicly funded inquiry into fluoridation by the Victorian (Australia) State government was publicly branded fraudulent and a widely distributed 500 page expose by Glen S.R. Walker has never been challenged as to the accuracy of its potent accusations.

Difficult to be generously impartial when a Federal Health body publishes, with public revenue, a book on Fluoridation of water supplies that contains 290 pages in fictional favour of the concept and ELEVEN LINES against.

Difficult to remain generous and unbiased when the New South Wales Cancer Registry announces a Commonwealth Scientific and Industrial Research Organisation 'study' that showed "no relationship between fluoridation of water supplies and any form of human cancer" when no such study was ever executed or contemplated by the organisation or by the scientists named.

Difficult to be generous when at public cost, six medical and dental professionals, consulting as a 'working party' for twelve months to review fluoridation, produce a 'Report' on the 'findings' yet not have ONE SINGLE DOCUMENT OF REFERENCED LITERATURE, NOT ONE MINUTE OR RECORD OF CONSULTATION available under the Freedom of Information Act, in support of the published 'findings'.

The subject Report of the last paragraph was entitled *Report of the Working Party on Fluorides in the Control of Dental Caries* published by the National Health and Medical Research Council.

This booklet is now widely distributed as the latest scientific 'bible' on fluoridation, both nationally and internationally. The flaws, omissions, lies, errors and plain idiocy contained in this grotesque work are too numerous to detail here but an example of the more unusually perilous claims may be found on page 9 headed "Mutagenicity" in which clause (a) is a blatant lie; clause (b) is self contradictory and so imprecise as to be irrelevant anyway, and clause (d) is both a warning that mutagenicity may be found elsewhere (by others) to be, in fact, a result of fluoride ingestion/exposure and a declaration of disinterest by the working party to seek that 'fact' elsewhere!

However it is clause (c) that is the

ultimate in scientific lunacy:- "Fluoride is an endogenous ion of the human organism" states this working party of eminent scientists.

As the majority of *The Ecologist* readers will know, the term 'endogenous' has but one meaning. It is a specific term meaning originating from within (the human body).

Although the august working party failed to nominate the dietary source/s from which this 'endogenous fluoride ion' is derived, one assumes that rice pudding, peanut butter and Vegemite sandwiches could serve equally as well as caviare and pate-de-fois-gras.

Similarly since the *element* fluoroide is scientifically found to be originate endogenously, can we perhaps manufacture internally some of the more exotic *elements*, gold, platinum, radium etc? Could unpleasant flatulence procure usefully valuable gases, such as argon and neon?

Most puzzling however is the need for fluoride supplementation, as is advocated in the same Report and as is represented by tablets, toothpaste and fluoridated water, when the stuff is manufactured within the 'human organism', and its levels systemically controlled by metabolic processes of that same human organism.

That this tawdry, erroneous document has found its way, verbatim, into a scientific journal described as a peer review without prior or subsequent challenge is indicative of the paucity of the peer review process and of the apathy, intelligence or servitude of the professional reader.

Congratulations on the societal and physiological value offered by *The Ecologist*.

Yours faithfully,
Ian E. Stephens
Mitcham
Australia

A distorted debate

Dear Sirs,

I would like to clarify some questions raised by Lachlan McCaw, Western Australia, on Nicholas Hildyard's review of a book by Shiva and Bandyopadhyay about eucalypts plantations in India (letter to *The Ecologist*, Vol 17, No 2/3, 1987). When I was in India, my friend Dakshina Murthy and myself did an article on the World Bank aided 'Social Forestry Programme' in Karnataka, India, for the Indian Express newspaper. We tried to show that the claims of social forestry were not being met by eucalypts and were in fact acting against it. We also pointed out some of the possible ecological hazards of encouraging eucalypts monoculture in an area where it is not a native species. The forest department hooked on to the 'ecological aspect' and tried to reduce the whole issue into a controversy between 'pro-eucalyptians' and 'anti-eucalyptians'; projecting us as people who hated the species of eucalypts. Thus the debate was distorted into a very narrow physical analysis of the benefits and drawbacks of eucalypts. But the real issues are much broader. Some of the socio-economic effects are outlined in *The Ecologist* itself (in the open letter to the World Bank President). The interesting aspect in Karnataka was that a major fibre industry was being supplied eucalypts at a very subsidised rate by the

State government. The idea of supplying free saplings of eucalypts might have been to bring down the open market price (which was quite high). Also, even though the policy was that it will be planted only in degraded land, we found that it was being encouraged in areas of high rainfall and was actively replacing food crops. Whatever benefits eucalypts had went to the nearby urban centre—Bangalore, and not the needs of the local people (undoubtedly the rich farmers benefited, though—they no longer had to hire agricultural labourers and pay minimum wages!). One of the local farmers told us very aptly that it was no social forestry but industrial forestry. So, even if it was conclusively proved that the particular species of eucalypts that was being promoted had no adverse effect on the physical environment, it still does not mean that it should be encouraged, especially at the cost of other native species.

Yours faithfully,
Anantha M.G. Prasad,
Miami University,
Ohio, USA

Support for Indian Communities

Dear Sirs,

Let me please make some comments on Dave Treece's article "Brazil's Greater Carajas Programme", published in *The Ecologist*, Vol 17, No 2/3, 1987.

First of all, it is very important not to confuse the Greater Carajas Programme (a vast project underway by the Brazilian government) with the Carajas Iron Ore Project (a huge mining undertaking which is being carried out by this company).

In fact, the Carajas Iron Ore Project has been recognised world-wide as a serious and carefully managed project, in terms of both human and natural environmental concerns, although it has been suffering from some externalities, many of them derived from the Greater Carajas Programme activities, such as charcoal-based pig iron industries, gold mining, and others.

On the other hand, in my position of manager of the CVRD/Funai agreement, I must assert that it is not true that the programme of "Support for the Indian Communities" has not spent any money for securing the Indians' lands also that it ended in June 1987. A supplementary agreement has been signed by CVRD and Funai (Brazilian government officers for Indian support) in order to keep on assisting the indigenous communities of the Carajas region, especially in land demarcation and health, which are its priorities from now on.

Yours faithfully,
Maria de Lourdes Davies de Freitas
Companhia Vale do Rio Doce,
Rio de Janeiro

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MILFORD HAVEN ENERGY PARK

A new company called Energy Parks (UK) Ltd has just been formed to build the UK's first renewable energy power station on a derelict oil refinery site on the shore of Milford Haven in Wales. The planned Energy Park will be self-contained and pollution-free, incorporating a wind-farm, a micro-CHP unit, a unique sea water pumped-storage scheme, photovoltaic arrays, wave-power devices, energy crop plantations and methane digesters.

Energy Parks (UK) Ltd has evolved a unique business structure involving the purchase of on-site electricity from seven "supplier companies" for resale to the grid. The project needs £1½ million, to be raised for the most part through share issues. For further information contact project coordinator Dr Brian John, Trefelin, Cilgwyn, Newport, Dyfed SA42 0QN (Tel: 0239-820470).

PUBLICATIONS

GREEN COUNCILLOR'S GAZETTE—a newsletter which aims to help local councillors who identify with Green political ideas. Further information can be obtained from: National Co-ordinator, Mrs Molly Stiles, 91, King Street, Norwich, Norfolk NR1 1PH.

Congratulations on the successful first six issues year of **GREEN TEACHER**. This periodical is available on subscriptions (£10) or details from Green Teacher, 22 Heol Pentrerhedy, Machynlleth, Powys, SY20 8DN.

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SITUATIONS VACANT

CORNWALL TRUST FOR NATURE CONSERVATION have the following vacancies: *Conservation Assistants*—to survey and record the semi-natural vegetation of the River Camel, liaise with landowners and inform them of the nature conservation value of the area, to conduct detailed habitat surveys. Report writing and mapping will be required. If you have a degree or equivalent in environmental science, ecology, geography or are a keen naturalist, then this could be the job for you. Own transport essential.

Data Management Assistants (Marine)—To collate information held at the Biological Records Unit and other sources, and then devise and implement a programme of intertidal survey work for the stretches of the coastline where existing information is scarce or non-existent. Applicants will have a degree or equivalent in environmental science coupled with a keen interest in the marine environment. Experience of inter-tidal survey work would be a distinct advantage. Must be able to work methodically and produce clear reports on field work. Own transport preferred.

All posts are part-time (24 hours) £64.32 per week. For further details please contact Andrew Brown, Dairy Cottage, Trelissick, Feock, Truro, Cornwall TR3 6QL.

DIARY DATES

THE INTERNATIONAL CHEMICAL INDUSTRY CONFERENCE—Managing into the Future—3-5 February 1988, Zurich, Switzerland. Details from The Customer Service Dept. Management Centre Europe, Postbus 95, NL-3417, ZH Montfoort, Netherlands.

ENVIROSOFT 88—2nd International Conference on Development and Application of Computer Techniques to Environmental Studies. Porto Carras, Greece, 27-29 September 1988. For further information please contact: Liz Newman, Computational Mechanics Institute, Ashurst Lodge, Ashurst, Southampton, SO4 2AA, Tel (042129) 3223.

Weekend Courses for 1987/88 at the Centre for Alternative Technology include Blacksmithing, Solar Collectors and Systems, Low Energy Buildings, Windpower, Organic Gardening, Healing Herbs and many more subjects. For information write to: Lesley Bradnam, Centre for Alternative Technology, Machynlleth, Powys, Wales SY20 9AZ or Tel. 0654 2400.

The Institution of Environmental Science has the following open evening meetings for environmental practitioners:

January 5th 1988, 'The Realities of Environmental Planning in a Commercial Organisation' by Pat Weatherill, Chief Environmental Planner British Gas Corporation. Are environmental planners constrained, are they subject to conflicts and tensions, are they seen as a help or a hindrance?

February 2nd 1988, 'The Workings of the Royal Commission on Environmental Pollution' by Graham Fuller, Secretary of the RCEP. How does the RECP work, how are data revealed, how are conclusions reached, who writes the reports?

March 1st 1988, 'Common Ground between Town Planners and Environmental Practitioners' a joint meeting with the RTPI. Representatives of the two organisations will introduce a discussion on improving the relationships between Planners and Environmental Practitioners (date and venue to be confirmed).

The VENUE for all meetings (courtesy of BGC) will be the Commercial Gas Centre, 139 Tottenham Court Road, London. The Centre is opposite Warren Street tube station. There will be a charge of £1 per head. From 18.00 hrs to 19.00 hrs there will be an informal gathering. The more formal sessions will start at 19.00 hrs and will finish not later than 20.30 hrs.

For further information contact Roy Waller, preferably by 'phone, on (01) 647 5015 (day or evening), or write to him at: 26, Salisbury Road, Carshalton, Surrey, SM5 3HD.

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