Pulping the South

Industrial Tree Plantations in the World Paper Economy

Ricardo Carrere and Larry Lohmann

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Contents

PART ONE: PLANTATIONS, PULP AND PAPER

1. Introduction

2. Introducing Pulp and Paper

3. Emergence of a Global System

Dynamics of globalization: the Japanese role

4. Social and Environmental Effects

Unfair to tree plantations?

The two libraries

Impacts on water

Impacts on biodiversity

Impacts on the soil

Industrial pollution

Other socioeconomic impacts

Conclusons

5. Actors behind the Scenes

Pulp and paper firms

Consultancy companies

Technology suppliers

Industry associations and alliances

Bilateral agencies

State investment and export credit agencies

Multilateral agencies

State governments

Research institutes and NGOs

Conclusion

6. Managing Resistance

Non-threatening resistance

More difficult forms of resistance

9. Uruguay: 'Forests' in the Grasslands

From tree plantings to industrial plantations

Domestic conditions encouraging the industrial moedel

External conditions

Voluntary blindness

A bad investment for the nation

Conclusions

10. South Africa: A Fibre Exporter with Few Forests

From a country without forests to a wood exporter

A lack of firewood in a sea of trees

More power to the powerful

Jobs, work and migration

Changes in lifestyle

Water: a scarce and disputed resource

Biodiversity in danger

Grasslands, wetlands and indigenous forests

Conclusion

11. Indonesia: Deforestation, Plantations and Repression

Concentration

Export focus

Foreign involvement

Plantations and deforestation

Further subsidies

Disintegration and resistance

List of Tables

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This book, commissioned by the World Rainforest Movement at its meeting in Delhi in April 1994, has its origins in increasing concern among non-governmental organizations in the South over the spread of monoculture tree plantations. It is intended as a tool for all movements alarmed at the social, political and environmental effects of these plantations.

The authors, both of whom have been long involved in the plantations issue, divided their work on this book equally and were in constant consultation with each other across the Atlantic throughout its writing. Ricardo Carrere, based at the Instituto del Tercer Mundo in Uruguay, was responsible for drafting Chapters 4, 7, 8, 9 and 10; Larry Lohmann, based in the UK, for Chapters 2, 3, 5, 11 and 12. Chapters 1, 6 and 13 were jointly written.

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Introduction

To millions of people across the world today, the pulp and paper industry is a growing problem. The chipping of native forests to provide raw material for the industry is being opposed bitterly by local people and environ-mentalists from Australia to Finland, and from Chile to Canada (WALHI and YLBHI 1992, Hamilton 1995, PRS 1994, MacIsaac and Champagne 1994, WCWC 1994, Olsson 1995). No less widespread are protests at pollution from giant pulp mills which has sucked oxygen from rivers, ruined fisheries and drinking water supplies, and increased the burden of highly-toxic chlorinated organic compounds in animal and human bodies (BP 12.7.95, EBY 13.3, Greenpeace International 1994).

This book is concerned with a third activity of the pulp and paper industry _ one which is often less well-publicized and which, at first glance, might seem more benign: planting trees. To help feed pulp and paper mills, vast monocultures of conifers, eucalyptus, acacia, and other species are being established both in the North and, increasingly, in the South, where fast tree growth, inexpensive land and labour, and lavish subsidies combine to make wood especially cheap. As swatches of exotic trees invade native woodlands, grasslands, farmlands and pastures, the results, in country after country, have been impoverishment, environmental degradation, and rural strife.

In documenting the often-hidden record of industrial pulpwood plantations in the South and what lies behind them, this book hopes to contribute to new ways of thinking about one of the world's most important industries as it undergoes rapid globalization.

Commercial plantations and forests

Plantations, like forests, are full of trees. But the two are usually radically different. A forest is a complex, self-regenerating system, encompassing soil, water, microclimate, energy, and a wide variety of plants and animals in mutual relation. A commercial plantation, on the other hand, is a cultivated area whose species and structure have been simplified dramatically to produce only a few goods, whether lumber, fuel, resin, oil, or fruit. A plantation's trees, unlike those of a forest, tend to be of a small range of species and ages, and to require extensive and continuing human intervention.

The distinction, of course, is not always hard and fast. A 'native forest' where economically unimportant species have been eliminated may wind up as simplified, and as in need of constant human maintenance to stay that way, as any plantation. Much of Europe's 'forest' falls into this category. On the other hand, some diverse, seemingly 'natural' forests either began their existence as plantations, having then been abandoned, or continue to be carefully 'cultivated' by local people, as is the case in areas inhabited by the Kayapo in Brazil (Posey 1985, 1990).

The industrial monocrops with which this book is concerned, however, have a much less ambiguous status. Resulting from an aggressive and thoroughgoing transformation of a landscape, they are much closer to an industrial agricultural crop than to either a forest as usually understood or a traditional agricultural field. Usually consisting of thousands or even millions of trees of the same species, bred for rapid growth, uniformity and high yield of raw material and planted in even-aged stands, they require intensive preparation of the soil, fertilisation, planting with regular spacing, selection of seedlings, weeding using machines or herbicides, use of pesticides, thinning, mechanised harvesting, and in some cases pruning. Such plantations may be established either on large parcels of land owned or rented by a company or on a large collection of smallholdings.

Even many 'non-industrial' plantations are today being established on this industrial model. In some places, for instance, large-scale rapid-growth monocrops are being grown on the false assumption that they can 'protect' water catchment areas or soils in the way a native forest would. Other extensive monocrops, often of exotic species, are being established with the stated purpose of providing fuelwood to local people. Industrial-type plantations are also being promoted as a way of absorbing emissions of carbon dioxide which lead to global warming: companies or countries are held to have 'compensated' for their heavy CO2 emissions in one place if they plant swatches of fast-growing trees in another. This use of industrial-friendly trees in plantations promoted for purposes other than wood harvesting can have important impacts on industrial wood prices.

In contrast to such plantations _ which are organized to be highly responsive to one or two demands of large-scale manufacturing concerns or other powerful centralizing actors _ are attempts to plant trees in ways responsive to a wide variety of interlocked local concerns. In some agroforestry systems, for example, a diversity of trees are chosen and planted to provide protection, shade and food for livestock, fruit and wood for humans, and protection, nutrients and water for crops, thus helping to keep production diverse and in harmony with local landscapes and needs (Groome 1991, Shiva and Bandyopadhyay 1987, Shiva 1991b).

Another useful contrast to the industrial plantation model with which this book is concerned is offered by efforts to restore degraded forests or woodlands by planting trees of some or all of the original species. Here the objective is not to produce large quantities of whatever wood is suitable for industrial markets, but to restore diverse ecosystems using native species. Thus a eucalyptus tree, when planted in one of its native regions in Australia as a way of helping to regenerate an earlier ecosystem in ways approved by local people, may be considered to be a contribution to reforestation. The same tree, when planted as part of a large-scale pulpwood monocrop in India or Uruguay, is not only not a contribution to 'reforestation', but is likely to contribute to environmental degradation and social problems. Planting a tree, whether native or exotic, is in itself neither a positive or a negative process. It is the social and geographical structures within which that tree is planted which make it one or the other.

The advent of large-scale monocultures

Historically, tree plantations have most commonly consisted of fruit-bearing species such as olives, figs, date palms, and apples, as well as a wide variety of trees cultivated for fodder, shelter, medicine and resin, or for aesthetic or religious reasons. Although teak and eucalyptus began to be grown in Asia, Africa and Latin America in the 19th century, extensive plantations of trees suitable for industry are mainly a 20th-century phenomenon, having generally been established as a result of overexploitation of native forests for wood. Such plantations are expanding now as never before, nowhere more quickly than in the South. Between 1965 and 1980, tree plantation area in the tropics tripled (Evans 1991), and between 1980 and 1990 increased again between two and three times (Pandey 1992, World Bank 1994, Evans 1991).

Although plantations are promoted for a variety of reasons _ to hold back desertification, to feed sawmills, to provide fuelwood, to diversify agricultural production _ the trees most often planted today are fast-growing species favoured by industry for paper pulp or other low-grade wood products. In 1980, tropical plantations were estimated to consist of over 70 per cent eucalyptus and pines (see Table 1.1) (Evans 1991), and the proportion is almost certainly even higher today. Pine and eucalyptus are also widespread in the non-tropical regions of Argentina, Chile, Uruguay, China, South Africa, Australia, New Zealand, the southern United States, Spain, and Portugal. It is often the case that only one species will dominate a particular country's fast-growing tree

plantations _ for example, Pinus radiata in Chile and New Zealand, Eucalyptus grandis in Uruguay and Brazil, and E. camaldulensis in Thailand.

TABLE 1
Species used in tropical tree plantations

Genus/group	Species	Per cent
Eucalyptus	E. grandis, camaldulensis, globulus, saligna, tereticornis, robusta, citriodora, urophylla, deglupta, other	38
Pine	Pinus patula, caribaea, elliotti, merkusii, kesiya, oocarpa, other	34
Teak	Tectona grandis	14
Other hardwoods	Acacia, Gmelina, Leucaena, Grevillea, Meliacaea, Terminalia, Albizzia, Prosopis, Casuarina, Cordia, Triplochiton, other	12
Non-pine conifers	Araucaria cunninghami, A. angustifolia, Cupressus lusitanica, other	3

Source: Evans 1991
Source: Bazett 1993

Plantation extent

Due to different reporting methods and shortages of data, no reliable estimates exist of the global extent of tree plantations. Table 1.2 attempts to suggest the rough extent of tree plantations in tropical countries in 1990 by comparing the figures contained in two serious studies, those of Evans (1991) and Pandey (1992). Included are country estimates by Pandey of the extent of plantations of species often used for pulpwood. Evans calculates that tropical tree plantations covered 42.7 million hectares in 1990 and Pandey 43.9 million hectares by the end of that year. The World Bank's (1994) estimate for 1990, meanwhile, is 37.5 million hectares.

Michael D. Bazett's estimate that specifically industrial plantations occupy 99.3 million hectares in both tropical and non-tropical regions is contained in Table 1.3. Table 1.4, finally, presents Bazett's rough figures for fast-growing industrial plantations _ those yielding 12 cubic metres or more per

year per hectare _ in the late 1980s. According to two sources, over 19 million hectares of fast-growing pine plantations and over six million hectares of eucalyptus are currently in existence (Bazett 1993, Wilson 1991); another claims that eucalyptus plantations total more than ten million hectares and acacia plantations 3.4 million hectares (Hagler 1995).While, according to Bazett, fast-growing plantations amount to only about a quarter of the total industrial plantation area, their importance to global wood supply, particularly pulpwood supply, is out of proportion to their size.

TABLE 1.2
Area covered by tree plantations in the tropics, 1990, thousand ha, selected countries

COUNTRY	EVANS PANDEY				
	Total	Total	euca.	pine	acacia
Africa					
Angola	195	172	135	20	-
Burkina Faso	46	28	7	-	2
Burundi	80	132	40	8	25
Congo	18	53	35	15	-
Ethiopia	270	270	95	15	-
Ghana	76	75	14	1	-
Kenya	190	168	17	75	-
Madagascar	295	310	130	150	-
Malawi	156	180	30	75	15
Mozambique	45	40	14	23	-
Nigeria	259	216	11	-	-
Rwanda	110	125	60	44	-
Senegal	145	60	40	-	18
Sudan	330	290	23	-	145
Tanzania	100	220	25	45	10
Zaire	56	60	20	2	4
Zambia	65	68	26	40	-

Zimbabwe	125	120	20	80	16
Asia and Oceania					
Bangladesh	380	335	-	-	-
Fiji	85	104	-	40	-
India	14,000	18,900	4,800	40	3,000
Indonesia	3,700	8,750	-	600	75
Malaysia	90	116	8	7	75
New Caledonia	23	10	-	10	-
PNG	44	43	10	8	-
Pakistan	102	240	-	-	-
Philippines	100	290	-	-	-
Sri Lanka	195	198	45	31	-
Thailand	560	776	62	92	-
Viet Nam	616	2,100	245	400	-
The Americas					
Bolivia	37	40	-	-	-
Brazil	7,150	7,000	3,617	2,090	-
Colombia	250	180	31	88	-
Costa Rica	40	40	10	15	-
Cuba	316	350	35	160	-
Ecuador	60	64	44	13	-
Mexico	263	155	38	62	-
Nicaragua	38	20	-	13	-
Peru	272	263	211	13	-
Venezuela	350	362	70	245	-

ten million hectares and acacia plantations 3.4 million hectares (Hagler 1995).While, according to Bazett, fast-growing plantations amount to only about a quarter of the total industrial plantation area, their importance to global wood supply, particularly pulpwood supply, is out of proportion to their size.

TABLE 1.3
Area under industrial plantations (million ha)

Region	Coniferous	Non-coniferous
Asia	31.6	8.2
Europe	15.7	3.3
Former USSR	16.9	-
North America	12.0	0.5
Latin America	3.5	2.9
Africa	1.3	1.2
Oceania	2.1	0.1
TOTAL	83.1	16.2

Source: Bazett 1993

Planting is expected to continue at a high rate. According to the World Bank (1994), an area of 10 to 12 million hectares is planted annually, half in China, although how much of this survives is unclear. India's eighth Five-Year Plan called for 17 million hectares of plantations, and Brazil has set out a programme for 12 million hectares of plantation by the year 2000. In Indonesia, some industrialists expect three to 4.6 million hectares of land to be under short-rotation pulpwood plantations by the year 2003 (Bazett 1993, Soetikno 1992), while Thai officials envisage over four million hectares being put under private-sector plantations by 2020. Ethiopia, meanwhile, has mooted plans to plant as much as 3.5 million hectares by 2000, Malaysia 500,000, and Burundi 300,000 (Evans 1991).

Plantation imperialism

The small range of genuses and species used in industrial plantations, as well as the nearly identical forestry development plans by which they are promoted, reflect a long-established and deeply-rooted forestry imperialism. By and large, plans for large-scale plantations do not arise in answer to the diversity of local needs. Nor, as this book attempts to show, do they often meet those needs. Rather, they function in a way which responds disproportionately to the needs of a Northern-dominated industrial economy while also serving bureaucratic ends.

TABLE 1.4
Area of fast-growing plantations at the end of the 1980s (thousands ha)

Location	Coniferous	Non-coniferous	Total
Southern U.S.A.	12,000*	500	12,500
Brazil	1,600	2,300**	3,900
Chile	1,140**	60	1,200
Argentina	460	180	640
Venezuela	180	20	200
Mexico	60	20	80
Other Latin America	80	350	430
Spain***	-	450	450
Portugal***	-	400	400
South Africa	500**	800**	1,300
Angola	20	50	70
Congo	-	40	40
Kenya	160	10	170
Zimbabwe	70	10	80
Other Africa	550	330	880
New Zealand	1,180	20	1,200
Australia	900	60	960
Other Oceania	50	30	80
Indonesia	****	100	100
China	-	400	400
Other Asia	-	170	170
WORLD	18,950	6,300	25,250

*Borderline fast-growing with 45-year rotations, largely for sawnwood. ** Very fast-growing, largely for paper pulp.
***Borderline fast-growing, pulp-oriented. Iberia also has 4m ha of slow-growing conifers. ****Indonesia also has about 0.7m ha of slow-growing conifers.

Source: Bazett 1993

Most native forests in the US, Japan and Europe were destroyed long ago and replaced by agriculture, pasture or tree plantations (Westoby 1989). While industrial wood remains physically available in all three regions, access to that wood is often blocked for economic or political reasons. In the South, meanwhile, forests are disappearing at a dizzying rate due to complex causes in which Northern imperialism is deeply implicated (Myers 1989, Colchester and Lohmann 1993, Vandermeer and Perfecto 1995). For dominant Northern interests and their allies among Southern elites, the threats created by deforestation are threefold: shortages of the industrial timber needed to support indefinitely-increasing rates of per capita consumption; loss of other resources, including genetic materials, entailed by tropical deforestation; and loss of climatic stability due to rising levels of carbon dioxide.

Large-scale monoculture plantations are one way of responding to these crises of the prevailing economic model without addressing their underlying causes. They promise, for example, a way of meeting largely-Northern timber demand while putting off the question of how to stabilize or reduce that demand. Hence such statements as 'the predicted gap between wood demand and supply in many regions is so huge that only plantations will fill it quickly enough' (Bass 1992). Such views are descendants of others prevalent in early 19th-century England, when depletion of domestic oak forests led to teak logging and teak plantations in Asia.

Industrial plantation programmes promise, as well, in the words of a study done for Shell International, to 'counter the greenhouse effect, either by serving as carbon sinks, or by alleviating pressure on native forests, helping to preserve them as carbon depots' (Shell/WWF 1993). As Chapter 6 indicates, this promise is false in both particulars. Nevertheless, it has enough superficial plausibility to distract uninformed audiences from the more interesting topic of how to find alternatives to a system whose logic dictates a never-ending spiral in which ever-greater carbon emissions necessitate an ever more desperate search for carbon sinks.

Accompanying the rise of industrial plantations _ and of radically simplified forests _ has been the development of a modern forestry science which functions in a way which adds to their credibility. This science, silviculture, arose in the North mainly as a consequence of industrial development, with its huge needs for timber and agricultural raw materials. The resultant deforestation forced industrializing countries fairly early on into finding new ways of managing forests and reestablishing woodlands.

The new forestry science separated forest management strictly from agriculture, and focused almost exclusively on production of uniform quantities and qualities of timber. The multiple functions of native forests and diverse community woodlands were reconceptualized as symptoms of 'untidiness', 'disorder', and 'weediness'. Non-wood uses of forests were recast as 'minor products'. Trees whose growth rates had ceased in economic terms to justify their continued existence were dismissed as 'overmature'. Flora and fauna which lacked market value, or which reduced timber output, were classified as 'unproductive' and became candidates for eradication. Forests were to be replaced by a factory-like 'order' of stands of single varieties of commercially-valuable trees, of which plantations became the best examples. Seeds, plants, nutrients, growth rates and dates of

harvest all became candidates for human control. Negative social and environmental consequences were played down as problems which could be 'mitigated'.

The problems modern forestry science sets and solves, in short, are those thrown up by a politics of centralized control of land aimed at extracting a very few types of raw material in industrial quantities. Working exclusively within mainstream forestry science means not asking questions about, and thus tacitly supporting, that politics. Forestry science is thus not a 'neutral tool' which can be detached from its social surroundings and adapted to any political purpose. It comes complete with a strong set of political biases, no less when it is practiced in a professional manner than when it is not. To appeal to it alone for an answer to the question of whether any particular industrial plantation is an appropriate use of land is therefore to guarantee social as well as intellectual conflict.

About this book

This book, too, is not a 'neutral tool'. (No such tools exist.) Unlike most forestry science and mainstream economics, however, it strives to be self-aware and straightforward about its origins, orientation, and audience. Growing out of a widespread concern over the expansion of pulpwood plantations in the South, it attempts to organize the information and analyses it draws on in a way which will be of practical interest to those who are alarmed at plantations' deleterious and anti-democratic effects and who are seeking alternatives.

Thus Chapter 2, which sketches the political dynamics associated with a particularly large-scale, capital-intensive, cyclic industry, attempts to shed light on several questions often suppressed in mainstream discussions of pulp and paper. For example, why did destructive, extensive, highly-centralized plantations arise in the first place? Why do these plantations grow wood? And what are some of the dynamics lying behind rocketing per capita paper demand? In attempting to account for the recent shift toward monoculture plantations in the South, Chapter 3 goes on to look at the pulp and paper industry's tendency toward increased centralization and globalization. The social and environmental consequences of large-scale industrial plantations are then spelled out in Chapter 4.

Chapters 5 and 6 move to the topic of how, in practical political terms, these plantations are becoming a reality. Describing the different players who promote plantations (Northern and Southern governments, multilateral and bilateral development agencies, Southern elites, transnational paper corporations, banks, machinery suppliers, consul-tancies, academics, and even NGOs), Chapter 5 probes the mechanisms by which, working in loose alliance, they reorganize landscapes, capture subsidies, and otherwise reshape social environments in ways friendly to themselves. Chapter 6 is devoted to investigating another aspect of the industry's expansion often neglected in economistically-oriented studies of corporate strategy: techniques for managing opposition.

The case studies of Part Two concentrate on the Southern countries which, so far, have had the most prominent roles in the international trade in plantation wood fibre _ Brazil (Chapter 7), Chile (Chapter 8), South Africa (Chapter 10) and Indonesia (Chapter 11). For contrast, the experience of two other countries with plantations is also examined. These are Uruguay (Chapter 9), where plantations degrade not forest, but sparsely-populated grasslands, and from which, astonishingly, plantation wood is being exported to the naturally heavily-forested Nordic region; and Thailand (Chapter 12), where popular rural resistance to plantations established in thickly-inhabited areas has been persistent and often effective in challenging industrial plantations' spread.

Chapter 13, finally, sketches a few of the many constructive ways forward being adopted by movements concerned with the spread of plantations. These include coordinated critiques of the enormous public handouts which make the plantation boom possible and which help it further redistribute wealth and security from poor to rich in an increasingly skewed world system; exposure of the political maneuverings of various industry alliances; serious approaches to the issue of demand creation; and promotion of alternative-fibre use in decentralized, less energy-intensive systems.

Looking beyond this book

It is important to emphasize, in closing, that the handful of wood-fibre exporters to which this book confines its examination are not the only, or even necessarily the most severely-affected, of the Southern countries undergoing a plantation boom. A more complete survey would have to examine the experience of a whole range of other nations.

India, for example, although not a significant exporter, has had an exceptionally long, extensive and painful encounter with pulpwood plantations. Following the nation's independence in 1947, the price of raw materials for paper was so heavily subsidized that the industry's profitability remained high even as selectively-logged forest stocks were depleted. In the 1950s, some mills were provided with bamboo at a cost of one rupee per tonne when the prevailing market price was over Rs 2000 per tonne. The explosive growth in capacity which this support enabled made the paper and rayon industry even hungrier for raw materials. Prodded by the United Nations Food and Agriculture Organization (FAO), India's forest department consequently authorized clearfelling of large tracts of natural forest which, with the help of more subsidies, were then replanted with eucalyptus, pine, and other monocultures. A wider range of species and ages of native trees over greater and greater geographical areas also began to be put to the blade, with previously-protected watershed areas being redesignated as selective-cutting and then as clearfelling/plantation areas.

Biological and social problems resulted which are now familiar in countries across the world. In Karnataka and Kerala, harvests from so-called fast-growing plantations were only 10-43 per cent of forest department predictions. Eucalyptus plantations in an area of the Western Ghats on which nearly 40,000 hectares of tropical evergreen forest had been clearfelled were wiped out when the Cortecium salmonicolor fungus took advantage of the concentration of so much of a single tree variety in a single high-rainfall location. Protests proliferated among villagers who were deprived of livelihood when the forests they had used for fodder, fuel and food were replaced with stands of commercially 'desirable' species.

Under misnamed 'social forestry' programmes bankrolled with state and foreign funds, trees were then planted on common lands, open government lands, and excess lands belonging to big and absentee landlords, mainly to the benefit of the pulp industry and other non-local actors. Millions of private farmers were also given free seedlings, technical help and soft loans to get them to plant eucalyptus for industry on their own land. In states such as Karnataka, Gujarat and Haryana, perhaps a million hectares of farmland were brought under eucalyptus. While the tree grew far better there than it had in the earlier plantations, and led to increased involvement on the part of 'social forestry' programmes in private farm forestry, it usurped land which would otherwise have been used for locally-useful food crops such as ragi and cash crops such as cotton. When the government opened the country to cheap imports of wood, moreover, eucalyptus's reputation as a profit-earner suffered, and pulpwood-planting became less popular among private tree farmers after 1986 (DTE [Delhi] 31.8.1995). In the last decade, pulp firms such as Karnataka Pulpwoods, Ltd. have taken control of village common lands for plantations, igniting protests from commoners who point to violations of customary rights to graze cattle and gather wood and food. Increased intra-

village and inter-class conflicts have been another result. A recent scheme to lease out 2.5 million hectares of forest land to the industry at subsidized rates has stirred further controversy (Guha 1988; Gadgil and Guha 1992; SPS 1989; Shiva 1991; Shiva and Bandyopadhyay 1987; Shiva, Sharatchandra and Bandyopadhyay 1982; Saxena 1992a, 1992b; DTE [Delhi] 31.8.1995).

China has also brought vast areas under plantations usable for pulpwood. There, the government has formulated stupendously ambitious plans to increase national tree cover from 12 to 20 per cent, while foreign investors hoping to stoke a potentially gigantic demand appear eager to transform the country's current rather decentralized, small-scale, agriculture-based pulp industry into a more centralized, wood-based one. In Viet Nam, another big new target for international pulpwood investment, plantations already cover, on some estimates, between 1.5 and six per cent of the country. In the Philippines, plantations are used as a means of colonizing indigenous groups as well as supplying a pulp and paper industry chronically short of raw materials.

Other Southern countries where plantations are likely to lead to increasing destruction include Argentina, which in 1994 boasted 770,000 hectares of eucalyptus and pine plantations. There, tree plantations have received support from the state since 1940, but have only recently become geared to export (mostly as logs and sawnwood for pallets). As is the case elsewhere, the FAO has been a main plantation promoter, and further support is now flowing from the World Bank, which has recently approved a forestry development loan, and the European Community, particularly Italy and Spain (SAGP 1994). In 1991, moreover, the Italian government proposed a 'Green Development Plan' for Argentina _ fortunately, it was never implemented _ which was aimed at the plantation of six million hectares of fast-growing trees (mostly eucalyptus and pines), to be planted over 15 years to fill Italy's needs for wood.

Elsewhere in Latin America, US pulp and paper companies such as Simpson Investment and Stone Container are establishing pulpwood plantations in Mexico, Costa Rica and Venezuela to ensure supplies of raw material for their mills (Par 1992, Cheney 1992, Swann 1992), much to the concern of a growing environmentalist public. In the Dominican Republic, a public battle had to be fought by conservationists in 1990 to prevent eucalyptus from being planted in watersheds (Thomen 1990).

In the Congo, meanwhile, Shell is involved in a joint venture with the Unit d'Afforestation Industriel du Congo called Congolaise de Dveloppement Forestier. This firm owns 40,000 hectares of very fast-growth clonal euclayptus plantations at Pointe Noire, the wood from which, harvested every seven years, is exported to pulp mills in the North. While, according to Shell, the plantations 'are established as a mosaic fitting into the natural landscape' (Shell/WWF 1993), the firm's own environmental management plan observes that they are changing the open savanna into a 'veritable eucalyptus forest' (Geerling, N'Sosso and Kitemo 1991).

Plantations aimed at export production are also expanding in many warmer regions of the North, and for many of the same reasons that they are burgeoning in the South, including quick yields and cheap land. Social and environmental impacts, too, are similar, as are, often, styles of resistance.

In Iberia, for instance, a growing fibre-export region, plantations have moved onto both commons and private land, just as they have in India and Thailand, eroding customary forms of livelihood and security and widening class gaps. Between 1940 and 1983, over 273,000 hectares of eucalyptus and 2,668,000 hectares of pine were planted in Spain, coinciding with a decline in rural economies and migration from rural areas. Yields have often been lower than expected, local employment has suffered, water cycles have been disrupted and fires have increased sharply. As in India, the trees have tended to help non-local powers such as absentee landowners make profits out of poor soils

without having to be dependent on local communities. They have also degraded soils and wildlife refuges and replaced landscapes capable of sustained yields of products such as game, livestock, honey, herbs, firewood, cork, carving wood, and sheep (Bermejo 1995). In both Spain and Portugal, many of the same forms of protest against plantations are seen as in Asia, including the ripping out of seedlings and saplings by angry local villagers.

Nor do South-North parallels stop there. In Australia, just as in Indonesia and Papua New Guinea, both natural forest and plantations have been exploited for pulpwood for export, resulting in public outrage. In New Zealand, as in Chile, large temperate areas are being planted with pine. Even in the southeastern US, an old wood-producing area where more and more forests are being chopped down for export and converted to pine plantations, environmental opposition is having a strong impact. In the Nordic countries, finally, environmentalists are challenging the pulp and paper industry's approach to forest lands at home in what are often the same terms in which Southerners are criticizing the plantation model exported by Nordic consultants (Olsson 1995).

This book cannot tackle any of these topics in detail. It is hoped, however, that it will prove a useful resource not only to Southerners threatened by the advance of export pulpwood plantations, but also to others concerned with forest industries and their globalization generally.

Chapter 2

Introducing Pulp and Paper

The evolution of a wood-based industry

Paper consists of a web or mat of cellulose-based vegetable fibres which have b een refined and treated in water before being deposited on a screen and dried. First made in China around 2,000 years ago from vegetable waste materials, pape r reached India by the 600s, Turkestan by about 750, Damascus and Egypt by the 800s, Spain by the 1100s, and Northern Europe by the 1400s. The first raw mater ials included silk, hemp, cotton rags, old fish nets, mulberry bark, grasses, b amboo, flax, laurel and rattan. Early European papers were made mainly from lin en or cotton rags (Grant 1978, Western 1979, Wilson 1991).

With the advent of printing, paper use increased, but production remained limit ed by available technology. Demand, too, was constrained by the virtual absence of a paper packaging industry or a mass newspaper market. In the 19th century, however, French and English factory owners struggling to overcome the power pa per artisans held by virtue of their specialized knowledge began to develop, wi th the help of the industrial revolution's new machine tool industries, paper m achines which centralized paper-making technique in capitalist hands. Fitted wi th endless wire meshes which rotated like conveyor belts, modern paper machines began to appear around 1800 (Hills 1988, Hunter 1978, Clapperton 1967, Coleman 1958).

Prevailing non-wood raw materials were not ideally suited to the large, central ized plants such machines eventually made possible. Rags were too scarce and ex pensive to keep large mills running at capacity. Straw, which began to be widel y used in agricultural countries such as Germany and France, and esparto grass, which was imported from Spain and North Africa into Britain in large quantitie s from 1880 up until the Second World War, were available in greater volume. Th ese materials, however, had drawbacks. For one thing, they could be supplied on ly seasonally, were vulnerable to crop failures and, if they were to be supplie d in large quantities, required extensive catchment areas. They were thus far f rom perfect raw materials for big, capital-intensive mills which had to be run year-round. Agricultural raw materials were also bulky and had to be baled in t he field if they were to be transported to distant mills. It was not until the 1860s, when pulps made from wood finally began to become commercially feasible, particularly in North America and the Nordic countries, where old-growth and o ther forests provided relatively compact, contiguous, large-scale 'mines' of ra w material, that the modern Western paper industry really took off. The price o f newsprint and other types of paper, measured in conventional economic terms, dropped by about 85 per cent. Demand was spurred, and the newspaper and other p aper-dependent industries grew quickly. Today paper production represents one p er cent of the world's total economic output (Ionides 1994, Nation 22.2.1995, C haudhuri 1995, Grant 1978).

The use of wood has only reinforced reliance on large, highly-mechanized mills. Chipping equipment and stone grinders used to process logs, for one thing, pro duce too much for small mills to absorb. The more pulp-mill technology becomes geared to wood, in addition, the less inclined industry becomes to adapt to oth er raw materials, preferring to seek alternative wood sources in times of crisi s. Today, wood is used for around 90 per cent of world paper pulp production, w hich comes to over 170 million tonnes per year. Some 640 million cubic metres i s consumed annually in the process, or nearly 13 per cent of total world wood u se, the rough equivalent of the mature timber that would cover over two million hectares, an area half the size of Switzerland. Each issue of a mass circulati on daily in Britain would consume about 10,000 trees if its newsprint contained no recycled fibre; the lifetime newspaper reading of an average citizen in the US or Japan requires

the pulp equivalent of several hundred trees, most of whi ch go toward advertisements. In order to maintain such levels of consumption wi thout cutting fully-grown natural forests, about ten million hectares of land w orldwide would have to be planted with trees each year (Ayres 1993, PPI 10.1994 , Shell/WWF 1993, Judt 1994, Grant 1978, Gauthier 1991, IIED 1995, Durning and Ayres 1994, Wright 1995).

The first woods used for paper were poplar and willow _ largely because they th en had few other commercial uses. Softwoods such as pine, spruce and fir, howev er, soon became the raw material of choice, since their cellulose fibres were l onger (two to five millimetres) and produced stronger, higher-quality pulps. In 1987, some 46 per cent of pulpwood consumption was derived from coniferous rou ndwood, 27 per cent from coniferous industrial residues, 22 per cent from hardw ood roundwood, and five per cent from hardwood residues (Cardellechio et al. 19 89).

Following the Second World War, Japan revived and advanced commercial technolog y for using hardwood trees, such as birch, beech, alder and mangrove species, w hich yield fibres only 0.5 to two millimetres long. This enabled the country's paper industry to exploit not only domestic broadleaved trees, but also Southea st Asian mangroves, Australian native eucalyptus, South African and US plantati on hardwoods, and Chilean beeches and the mixed hardwood forests of Papua New G uinea. Australian improvements in technology for pulping eucalyptus assisted in the process of converting many of that country's native forests to paper, and added impetus to the spread of eucalyptus plantations in Asia, Latin America an d Africa. As the industry shifts its quest for raw materials to the South, the proportion of hardwood to softwood pulps grows, with hardwood pulp now comprisi ng over 40 per cent of total pulp trade. Eucalyptus in particular is increasing ly attractive as a raw material for computer, copy, fax, high grade printing, t issue and other papers, and trade in eucalyptus pulp is increasing considerably faster than that in other varieties (JATAN 1993, Wright 1993, Marchak 1992, Sc hreuder 1988, Kroesa 1990).

The reliance on wood and on large mills which is characteristic of the industry 's mainstream today, however, is the result of historical momentum, not scienti fic or economic necessity. Even the exorbitant rates of consumption in the West and parts of East Asia do not necessarily entail a tree-based paper economy. I n some countries, non-wood raw materials such as straw, bagasse (from sugar can e), bamboo, cotton linters, sisal, seaweed, abaca, reeds, esparto and other gra sses predominate. Some 60-65 per cent of China's paper, for example, is produce d using straw, bagasse, cotton waste, and other vegetable fibres, while esparto grass provides the raw material for Tunisia's domestic pulp-making industry. M any observers also see the proportion of India's paper produced from agricultur al wastes, now between 30 and 45 per cent, rising in the future (Bayliss 1995). In 1991, 32 per cent of the pulp used in the South was derived from non-wood m aterials (Dudley, Stolton and Jeanrenaud 1995). Although the proportion of non- wood-based paper is far smaller in the North, there is no reason why this state of affairs should hold indefinitely. Indeed, evidence is now emerging that hem p would be more widely used as a raw material in the US today had not wood-fibr e businesses made an astute political alliance earlier in this century with ins titutions interested in promoting a drug panic over hemp cultivation (Hanson 19 95).

According to some observers, the ratio of non-wood to wood raw materials is inc reasing worldwide, with over 300 industrial-size mills now using non-wood fibre s (Paavilainen 1993). In the view of researcher Maureen Smith, there are no pur ely technical obstacles even to the US's exorbitant current paper demand being met entirely by a decentralized network of small- to medium-sized mills using r egionally-appropriate non-wood raw materials (Smith 1995, Smith forthcoming). Y ear by year, hemp or kenaf produce more fibre of good quality than wood, and us ing agricultural and other wastes as raw material is not only more efficient, b ut also more socially

productive and environmentally beneficial than using wood (Ayres 1993; Western 1979; Wright 1994; Bayliss 1995; Riddlestone, Desai, Rice and Solly 1995; DTE [Delhi] 31.8.95).

From wood to pulp

Once the water is taken away, a tree trunk is only about 50 per cent cellulose. The rest consists of about 30 per cent lignin (a tough, resinous adhesive that provides structural support to the tree) and 20 per cent oils and other substa nces. Making a tree's cellulose available in a form which can be used to make p aper can only be done either by grinding up the wood (to make mechanical pulp) or by chipping it and boiling the chips with chemicals before refining (to make chemical pulp).

Mechanical processes turn up to 95 per cent of the wood into pulp but tear the fibres, shortening them and weakening the resulting pulp. Mechanically-pulped f ibres can thus be recycled only three to four times, as opposed to chemically-p ulped fibres, which can be used five to ten times. Mechanical processes also le ave lignin in the paper, which causes it to turn yellow when exposed to light. As a result, mechanically-produced paper is used mainly for newsprint, telephon e books and other products where strength and quality is not at a premium.

Chemical processes _ which account for more than 75 per cent of world productio n _ produce a stronger pulp because they do not damage the wood fibres. In addi tion, the most important chemical processes used separate the lignin from the c ellulose, making possible the production of papers that do not yellow with age. (Although the industry calls these 'wood-free' papers, this term does not mean that they are not made with wood. A more proper term would be 'lignin-free'.) As a result, only between 45 and 65 per cent of the wood is turned into pulp. P roducing one tonne of bleached chemical pulp from fresh raw material requires 1 20,000 or more litres of water, over 20 plantation trees or 4.8 cubic metres of wood, and approximately 1.2 megawatt-hours of electricity. Overall, this is as much energy as is required for the production of a tonne of steel. Wood residu es are today typically burned to boil chips and generate electricity and steam for the pulping process. Thus although modern chemical mills need more water, e lectricity and heat than mechanical ones, they tend to require less energy from outside sources such as thermal plants or dams (Grant 1978; Oinn 1994; Smith f orthcoming; IIED 1995; Floegel 1994; Kroesa 1990; Dudley, Stolton and Jeanrenau d 1995). In terms of energy and water use per unit of paper manufactured, curre ntly-dominant chemical and mechanical wood-based pulping processes are without question both far less efficient and far less sustainable than traditional meth ods.

There are several ways of making chemical pulp:

* The sulphate, or kraft process, which involves boiling wood chips with caustic soda, produces 95 per cent of the pulp traded on the open market. This process produces a strong pulp which, although dark brown at first, remains whi te after it is bleached due to its low lignin content. Some 95 per cent or more of the chemicals used in the kraft process are recovered and reused, but betwe en one to three kilogrammes of sulphur dioxide are released to the air for each tonne of pulp produced, with potential effects on soil, water, and the health of humans and plants.

* The sulphite process boils wood chips in an acid solution, yielding a l ight brown, strong, soft pulp. The sulphite process also reuses chemicals, but emits more, around five kilogrammes of sulphur dioxide per tonne of pulp, and t he damage caused over the past century by the water pollution associated with t his process is inestimable. As with the sulphate process, cellulose fibres lost during processing are discharged into waste water, where they decompose, deple ting the oxygen dissolved in the water.

* The chemo-thermi-mechanical process vapour-heats and chemically pre-tre ats wood chips before grinding them to remove some lignin and resin, producing a fairly strong, soft, slightly yellow pulp often used to make tissues and some writing-grade and coated papers. This process can be used for both softwood an d hardwood, and usually discharges not only the wood chemicals removed from the pulp, but also the sulphur added in the pulping process, creating a highly-tox ic, persistent effluent.

Papers produced by either mechanical or chemical processes require bleaching. Y ellow mechanical pulps are usually bleached with hydrogen peroxide, while dark brown kraft pulp requires heavier bleaching, traditionally with chlorine or chl orine dioxide, but now, increasingly _ as a result of environmentalist campaign s and consumer pressure _ with oxygen, ozone or hydrogen peroxide. Chlorine and chlorine dioxide, while they are effective in removing lignin and in strengthe ning pulp, react with organic chemicals present in pulp to form hundreds of org anochlorine pollutants including dioxins, which are some of the most potent poi sons known. (See Chapter 4.)

From pulp to paper

Most pulp is produced in integrated pulp and paper mills and goes directly into paper manufacture. Approximately 17 per cent, however, is dried and traded int ernationally to non-integrated paper mills, sometimes at a great distance. This ratio has increased only slightly since 1980, when the figure stood at 16 per cent (IIED 1995), and the trend among the largest paper manufacturers is to red uce dependence on pulp bought from outside the company (Higham 1995). In 1993, the South produced less than one-fifth of the world's total paper pulp output o f 167 million tonnes and just over one-fifth of its total paper output of 254 m illion tonnes (see Tables 2.1 and 2.2) (FAO 1995).

TABLE 2.1
World's top pulp producers, 1994

Country	Pulp production (million tonnes)	Per cent of world production
US	58.7	34
Canada	24.5	14
China	17.1	10
Sweden	10.9	6
Japan	10.6	6
Finland	10.0	6
Brazil	6.1	4
CIS*	3.3	2

France	2.8	2

*Former USSR minus the Baltic states.

Source: PPI 7.1995

To make paper, different types of wet pulp are blended, mixed with fillers (cal cium carbonate, kaolin, titanium dioxide, and so on) and other additives (rosin, aluminium sulphate, dyes), spread into an even sheet on a wire mesh, dried, t hen removed with an absorbent felt. The surface of printing and writing papers is then smoothed mechanically or coated with clay or chalk. Out of at least 34 different categories of pulp, over 420 commercial grades of paper can be produc ed, with individual mills often being capable of producing a variety of papers from the same forest or plantation (Fernandez Carro and Wilson 1992).

TABLE 2.2
World's top paper producers, 1994

Country	Paper production (million tonnes)	Per cent of world production
US	80.7	30
Japan	28.5	11
China	21.4	8
Canada	18.3	7
Germany	14.5	5
Finland	10.9	4
Sweden	9.4	3
France	8.7	3
Italy	6.7	2
South Korea	6.3	2
Brazil	5.7	2
UK	5.5	2

CIS	4.8	2
Taiwan	4.2	2

Source: PPI 7.1995

Newsprint (the paper used for newspapers), which typically has a weight of 40-4 9 grammes per square metre (gsm), is made mainly of mechanical (lignin-containi ng) pulp with few or no fillers added. Fine paper (printing, writing, computer and business communication papers), which tends to be thicker and heavier, is a lmost always made of lignin-free and highly-bleached chemical pulp, although so metimes chemi-thermi-mechanical pulp is also used.

Printing and writing papers range from 50 to 350 gsm in weight. Coated paper, u sed in commercial printing and glossy magazines (largely for colour advertising), as well as illustrated books, bears a surface layer of pigment particles fin er than the fibres which make up the paper itself. Either chemical or mechanica l pulps can be used, although the former currently predominate. Stationery and photocopy papers are uncoated, weighing in at around 70-120 gsm.

Sanitary products such as toilet paper, tissues, napkins, and sanitary towels r equire that resin acids and other natural wood chemicals which prevent wood fib res from absorbing water be removed. Sulphite pulp made from softwood has been the preferred raw material for most tissue and towels because of its softness. For stronger towels, kraft pulp may be used. For toilet and other absorbent pap er, recycled fibre can be used. Fluff pulp, used together with added materials for absorbence to make disposable diapers, is made from sulphate or chemo-therm i-mechanical pulp. Brown wrapping or bag papers are made from softwood kraft pu lp, bleached or unbleached.

Card, with a weight of 160 gsm and above, and board, with a weight of 220 gsm a nd above, are generally used for packaging. Linerboard is made from unbleached kraft softwood pulp. The corrugating medium which forms the 'filling' between t wo sheets of linerboard in box-making material is made from unbleached, chemi-t hermi-mechanical pulp, usually made of hardwood, as well as recycled fibre. Boa rd may incorporate unbleached or bleached kraft pulp for strength, with many co ntainers being coated with waxes or plastics. Some corrugated packaging is made from a sulphite process which involves no bleaching.

Cellulose films and rayon are made by a modified kraft or sulphite process whic h uses intense chlorine bleaching to remove all lignin and wood ingredients. Th e pulp is further treated chemically, regenerated in sulphuric acid, and then f orced through holes to produce rayon or through slots to produce cellophane. Se lf-copying papers contain ink in small droplets of wax or solvent, while fax pa per contains a layer of heat sensitive pigments (Kroesa 1990, Paper Publication s 1994, Oinn 1994, Biermann 1993).

From paper back to pulp

For over a century waste paper has been used for making new paper wherever it h as been economic to do so. Largely due to environmentalist pressures, recycled paper is today even more important as a raw material than formerly, being used increasingly in newsprint, writing papers, and toilet and tissue papers. Spurri ng the increased use of recycled paper are both technical developments which co nstantly improve the quality of recycled products and consumer

movements which point out that for most uses, paper need not be of a standard which requires a high ratio of fresh fibre.

With the globalization of the pulp and paper economy, moreover, waste paper has become an important item of trade. Some 16 per cent of world wastepaper consum ption entered international trade in 1992, with huge quantities exported within Europe and from the wood-rich, overconsuming US to wood-poor economies in Asia . When woodpulp prices are high and recycled paper in great demand, as they wer e in the early 1990s, waste paper becomes even more attractive as a raw materia l.

Recycled paper can be made from either pre-consumer waste or post-consumer wast e. Pre-consumer waste consists of unprinted industrial by-products such as prin ter's trim or paper mill waste; post-consumer waste includes already-printed pa per and used corrugated cardboard from offices, newspapers, shippers and homes.

TABLE 2.3
Waste paper use and collection, selected countries, 1992

Country	Use rate* (per cent)	Recovery rate** (per cent)
Taiwan	98	56
Denmark	97	37
Mexico	81	35
Thailand	80	35
South Korea	70	43
Netherlands	70	53
UK	60	32
Japan	53	52
Indonesia	53	17
Germany	52	51
US	33	39
China	32	24
Brazil	31	37
Canada	17	35

Sweden	14	44
Finland	5	28

*Ratio of wastepaper used in production to amount of paper produced.

**Ratio of waste paper recovery to paper consumption.

Source: P&P 10.1993 (cuoted in Ryan 1994), IIED 1995, FAO 1994

Although the amount of recycled paper used varies widely from country to countr y, waste paper accounted for approximately 18-20 per cent of the material input for the world's paper output in 1970. With environmental pressures, this figur e had risen to around 30-32 per cent by 1988 and perhaps 35-37 per cent by 1995 . Top consuming countries such as Taiwan, Japan, Germany and The Netherlands ar e major users, but Southern countries for whom waste is easier to obtain than w ood generally use a greater proportion of it in their raw material supply. Abou t half of the raw material for Asian-made paper consists of waste, and nearly 4 5 per cent of the raw material for Latin American-made paper, but only about 28 per cent for North American paper and 37 per cent for European. Overall, the S outh uses a raw material which consists of approximately 10-15 per cent more wa ste paper than does the North (IIED 1995). Many Northern countries, on the othe r hand, are more assiduous waste paper collectors. However, they often wind up dumping waste on the international market rather than using it themselves (see Table 2.3).

Industry sources suggest that the global use rate for waste paper may reach 42- 45 per cent by the year 2000, while FAO suggests it is more likely to stagnate (Niku 1993, IIED 1995). At present, the use of recovered fibres in paper-making is growing twice as fast as paper production itself. This, of course, cuts int o the demand for wood pulp. A mere one per cent increase in the use of waste fi bres in paper raw material in Finland alone, for instance, would save 376,000 c ubic metres of wood per year (FAO 1994). Roger Olsson of Taiga Rescue Network e stimates that a world recycling rate of 50 per cent in the year 2010 would save 200-300 million cubic metres of roundwood annually at projected consumption ra tes. This would obviate the construction of around two giant woodpulp mills per year between 1990 and 2010 (Olsson 1995). If the US had adopted the over 50 pe r cent recycling rate of the Netherlands in 1987, 500,000 fewer hectares of for ests would have had to have been logged per year for conversion into paper pulp (Graham 1994). Also reducing the rate of rise in demand for pulpwood, although to a lesser extent, is the increasing use of mineral fillers and coatings in p aper. The proportion of pulp in paper-making furnish is estimated to have dropp ed from 65 to 64 per cent between 1993 and 1994 alone (Ayres 1993, Clark 1994, Shell/WWF 1993, McClelland 1994, Niku 1993, Brennan and Pappens 1995).

Newspapers can be de-inked easily, making the reuse of newsprint attractive. Ca rdboard, too, can easily be recycled, and printing and other pre-consumer waste , office bond, and discarded photocopies can be converted into new stationery a nd copying paper if kept separate. Mixtures of all grades can be reycled into l ow quality products such as egg cartons. De-inking photocopies and laser-printe d material, however, requires newer technologies. In addition, highly coated pa per, envelopes with windows and paper containing synthetic glue (self-adhesive envelopes) are hard to recycle; and fax paper, carbonless copy paper and plasti cized drink cartons cannot be recycled at present. It is difficult, moreover, t o make extremely white paper out of recycled fibres without using harsh bleaches.

Like all 'technical fixes', recycling cannot in itself be equated with wood con servation, but must be viewed in political and economic context, alongside an a nalysis of demand, trade and industry structure. Even if the world recycling ra te increases to 50 per cent, for example, a 12-15 per cent increase in the worl d's industrial roundwood production will be required by 2010 if FAO projections of consumption increases are borne out. In the US, the increased use of recycl ed pulps in paper production has not even slowed the rate of growth in fresh wo odpulp production, instead merely increasing woodpulp exports (Harland 1994, Ol sson 1995, Smith forthcoming). Unless combined with institutional restructuring , moreover, more use of waste paper, instead of reducing dependence on industri al tree plantations, may merely spur the wood industry into attempting to creat e demand for alternative plantation products. For example, the FAO European For estry Commission and the UN-ECE Timber Committee concluded in 1993 that because of the weakening demand for small-sized wood which has resulted from increased recycling, 'new outlets for small-sized wood should be developed' in energy pr oduction or other fields (FAO 1994). The Brazilian firm Aracruz is meanwhile ho ping to create new markets for its plantation eucalyptus in construction, furni ture, fibreboard and plywood in order to reduce commercial vulnerability to pul p price swings (FT 21.6.1995).

Moreover, although making paper from recycled fibre, as from vegetable fibres, tends to use less water and energy than producing it from wood, and to result i n less pollution, the expenditure of water and power can still be high (Smith f orthcoming; Dudley, Stolton and Jeanrenaud 1995). In addition, both the proport ion and the grades of paper that can be made from recycled material are limited . Fibres become shorter and weaker in the recycling process, making them less u seful for papers requiring strength. Even the strongest, longest fibres turn in to useless dust if they are recycled more than ten times, and most wood fibres have a far shorter life span. Pulp made from waste paper must thus often be top ped up with longer-fibred pulp made directly from trees, hemp, kenaf or other m aterials in order to ensure strength. Although it is theoretically possible to restrict the overall ratio of fresh to recycled fibres to little more than 20 p er cent (Dudley, Stolton and Jeanrenaud 1995), a totally cyclical paper economy is not on the horizon. Mechanically-pulped recycled fibres, moreover, cannot b e used to make certain quality grades of recycled paper which require chemicall y-pulped fibres.

Recycling requires, moreover, that ink, fillers, coating materials and staples be removed. The recovered ink, which is likely to contain barium, copper and he avy metals, tends to be discarded together with unrecoverable paper fibres, whi ch may contain poisonous dioxins and furans. It is either incinerated, adding t hese pollutants to the air, landfilled, or spread on farms and gardens (Durning and Ayres 1994). The dangerous effects of such discarded compounds underline t he importance of pressing for use of nontoxic inks as part of campaigns to chec k overconsumption, reconsider waste disposal policies and use a greater proport ion of recycled fibre in paper manufacture.

Large scale, capital intensity and centralization

As a growing pulp and paper industry using local wastes transformed itself, dur ing the 19th century, into a highly-mechanized, centralized one requiring the d estruction of large swathes of forest, literacy and the demand for cheap paper grew. Many of the new paper mills built around the turn of the 20th century wer e designed to produce newsprint. These were of standard size and relatively ine xpensive and profitable. By the 1930s, however, prestige competition among Nort h Atlantic newspaper corporations, conjoined with technological advances follow ing on from the First World War, had given an incentive to machine manufacturer s to design larger and larger

machines. Many of these turned out to be one-offs . Whereas in the 1900s, new newsprint machines tended to be 2.25 to 2.5 metres wide, running at speeds from 100-150 metres per minute, by 1937 machines were b eing built up to 7.7 metres wide, running at 420 metres per minute. The kraft s ack and wrapping paper industry, which grew swiftly from 1930 onwards, soon bec ame another source of orders for big machines.

Such machines became less and less cost-effective. Not only were many machines of a unique design; huge widths and speeds also required sophisticated and expe nsive controls for efficient operation, adding yet more to costs. At the same t ime, paper prices could be increased only so much, since they were set by the m ass of earlier, smaller, less sophisticated, cheaper machines still in operatio n. By the 1960s, moreover, when widths of nine metres and speeds of 700 metres a minute were achieved, capacity began to exceed consumption by a wide margin a nd paper prices slumped. The cost per annual tonne of a newsprint machine incre ased at least 40-fold between 1930 and 1975, while the price of newsprint incre ased less than 20-fold. Yet by this time, machine manufacturers' investments in large machine tools had made it difficult for them to produce for anyone but t he biggest paper companies. As paper expert A. W. Western (1979) notes, buildin g new paper machines became a luxury which could be afforded only by multinational giants or the gov ernments of developing countries, advised by consultants that only scale to thi s degree could be economic! For the consultants it was economic; they were now essential for large mill design and coordination.

Today a single new world-class pulp mill can cost as much as US$1 billion. In m any countries only large manufacturers can afford even to renew their plants, a nd then only to adapt them to producing more specialized products with a greate r profit margin.

The nearly 200-year-old dream of concentrating paper-making power in the hands of plant owners, in short, had been realized with a vengeance. Access to the do minant stream of paper-making knowledge was now restricted not just to capital, but to big capital. For any capital-short Southern society with an interest in meeting its own paper needs efficiently with indigenous materials, and in a wa y which did not require centralized control of large areas of land, the implica tions were particularly bleak.

They were also bleak, however, for the industrialized North. Partly because tod ay's immense mills cannot generate profits without a large-scale re-engineering of their social and physical surroundings, the pulp and paper industry relies heavily nearly everywhere on political campaigns to capture handouts from the s tate and the public. As the giant Canadian firm MacMillan Bloedel instructed Al berta's Premier Harry Strom in 1969, when the company was seeking low-interest loans, tax exemptions, tax investment credit, and infrastructure subsidies from the province, 'pulp mills being built today are not profitable unless some spe cial low cost conditions or concessions prevail' (cited in Pratt and Urquhart 1 994).

Such subsidization, by making it possible for paper firms to make a profit, can in turn often motivate them to invest in yet more and bigger machines and seek even bigger subsidies, with disastrous results for raw materials catchment are as. As historian Ramachandra Guha and ecologist Madhav Gadgil note, beginning i n the 1950s, India's forest industries were subsidized so heavily, and could hike up the prices of their produce so fr eely in a seller's market, that their profitability has remained high, even as forest stocks have plummeted. . . . Even in the 1980s, bamboo prices were raise d only to Rs200 to 500 per tonne, when market prices were well over Rs5,000 per tonne. The result of this state-subsidized profitability has been an explosive growth in industrial capacity, and a non-sustainable use of forest stocks (Gad gil and Guha 1992).

The networks through which a highly-mechanized and -centralized industry captur es the subsidies it needs for survival will be explored in Chapter 5 and in the case studies of Part Two.

While ownership of today's mainstream pulp and paper sector is not as concentra ted as that of some other basic industries (the top ten paper businesses contro l only about a fifth of the international paper market, and no single market pu lp producer has more than a six per cent market share), it is dominated physica lly by relatively few large plants. The US, the world's largest producer, has o nly 203 pulp mills, implying an average mill capacity of over 300,000 tonnes pe r year. In Japan 49 pulp mills are capable of producing an annual average of ne arly 310,000 tonnes each. Finland, meanwhile, holds its position as a leading p ulp and paper exporter with a mere 43 pulp mills averaging over 250,000 tonnes per year in capacity. The relatively young export pulp industry in the South al so revolves around a small number of huge plants. In Chile six pulp mills boast an average capacity of 350,000 tonnes a year each, in Brazil 35 are able to ch urn out an average of 175,000 tonnes each and Indonesia's 13 mills have an aver age annual capacity of 215,000 tonnes each. China's huge pulp production, by co ntrast, is spread over about 8,000 small mills whose average output is well und er 2,000 tonnes per year. Some mills, like village bakeries, may be open only t wo days a week. Not coincidentally, such mills tend to rely on local, non-wood sources of raw material. In India, too, average pulp mill capacity amounts to a low 13,500 tonnes per year (PPI 7.1995, Wright 1994).

Unsurprisingly, the large-scale mainstream industry generates very little emplo yment per unit of economic output. In the US, for example, paper and pulp is th e most capital-intensive of all manufacturing industries, and twice the industr ial average, with more than US$120,000 of plant and equipment invested in every employee. The world-class mills being built in Indonesia, Brazil and elsewhere , which use the same type of equipment, are hardly less so. Approximately $750, 000 in capital, for example, is being invested for every job created in the new pulp mill at Riau Andalan in Indonesia (see Chapter 11). Similarly, $700,000 i s being invested for each job in two new cellulose, paper and thermal energy co mplexes in Galicia, Spain being backed by the German multinational Feldmuhle Ak tiengesellschaft and the Finnish firm Tampella Oy. The cost of each of the 365 jobs created at the enormous new Al-Pac bleached kraft pulp mill near Athabasca , Alberta owned by a Japanese-Canadian consortium is meanwhile a staggering $1. 3 million. Employment, already low in the mainstream industry, is moreover set to decline even further. Employment in the US's paper industry, for instance we nt down one per cent between 1993 and 1994 alone, due mainly to mergers and the phasing out of older technology. Between 1990 and 1992, Canada's forest indust ry eliminated 62,600 jobs, some 28 per cent of the direct workforce. Knowledge and skills are another casualty of the industry's capital-intensivity. The domi nance of gigantic machines ensures that the opportunity to learn about and use paper-making technology is restricted to a select few technicians and technocra ts (Van Hook 1994, Western 1979, McClelland 1994, CEPA 1992, Olsson 1995, TAPPI Journal 1.95, Smith forthcoming, Schindler 1995).

Boom and bust

Reliance on big, expensive, centralizing machines _ combined with freely-availa ble technology, easy availability of debt finance and wood, and little need for newcomers to buy into brand names _ tempts the industry, whenever demand incre ases, into building huge amounts of new plant to supply it. Big firms, in addit ion, have sometimes hoped that being the first to build a giant new machine dur ing boom times will scare off competitors and gain them enough market share to become price-setters. In what is still a crowded field, however, such hopes hav e proved vain. As a result of overspending, the market becomes glutted with pul p and paper a couple of years after the

market peaks _ it takes from 18 months to two years to bring a new pulp mill on line _ sending prices into a deep slum p. Left with enormous machines on its hands which cannot be run at full capacit y, the industry finds it difficult to pay off its debts and ceases to make a pr ofit (Wright 1993, 1994; P&PA 11.1993; PPI 9.1994).

Such cycles afflict pulp and paper even more severely than they do other basic industries such as chemicals or metals. They are possibly exacerbated by the be haviour of banks, which are the biggest suppliers of finance to forestry indust ries, and from which cheap funding is especially easily available at the peak o f the paper and pulp cycle. Adding further to the industry's volatility is the growing tendency of firms to invest across international borders, which often g ives exchange rate fluctuations a huge importance in determining a company's pr ofitability (Fletcher 1988, van Dijk and Dekker 1995, Clark 1994). Government p olicies also do their bit. Changes in US tax laws in the 1980s, for instance, g ave corporations tax breaks for debt instead of equity, giving firms extra ince ntive to take on debt by building new mills (Floegel 1994). All in all, paper a nd pulp's wild market swings appear difficult to control within the current sys tem.

During the boom years of the 1980s, for example, when demand was surging and pu lp and paper were selling at high prices, leading paper industrialist Hugh Flet cher of Fletcher Challenge warned his colleagues that although 'the industry do es not have a history of being logical', this time it really should refrain fro m investing too much in large new plants. The advice went unheeded. By 1993, pu lp prices, in constant dollars, were half of what they had been only four years previously, and 39 per cent of what they had been in 1975. By 1994, Ronald Y. Oberlander, President and Chief Executive Officer of Abitibi-Price, which had l ost over US$460 million in the period 1990-4, was lamenting with industry colle agues over the sector's 'inability to manage the periods of prosperity and our inability during these periods to spend money wisely'. Canada's pulp industry a s a whole had lost more than $4 billion between 1991 and 1993. In December 1993 , Avenor's new Gold River newsprint complex in Vancouver was forced to cease pr oduction, joining other plants such as Abitibi-Price's newsprint mill in Thunde r Bay, Ontario. In Japan, excessive supply and world economic recession brought the market to a standstill, forcing companies such as Daishowa Paper into a se rious management and debt crisis (Fletcher 1988, Oberlander 1994, Soulas 1994, McClelland 1994, Avenor 1993). Chile's industry meanwhile lost up to US$200 mil lion in income per year; Latin American earnings suffered more than those of an y other industry region in the early 1990s. At the same time, Indonesian pulp p roduction dropped to a mere 65 per cent of capacity, and producers such as Thai land's Phoenix Pulp and Paper had to stop exporting.

Yet between mid-1993 and late 1995, Northern softwood bleached kraft pulp incre ased in price from US$390 per tonne to nearly $1,000. This allowed pulp mills t o operate nearer capacity, but threatened the survival of some firms in the ove rcapacity-ridden paper industry, who were hard put to pass on such large price increases to consumers.

Among the reasons the industry cited for the spectacular reversal were economic recovery in the US and Europe; increased paper demand in Europe, Southeast Asi a, and the US; the closure of some integrated pulp lines and an associated run on market pulp; a sudden hoarding response to pulp producers' announcements of price hikes in late 1993 among buyers who had confidently allowed their stocks to be depleted; a European hardwood shortage and a rise in pulp production cost s there and in western Canada; weak US and Canadian dollars, which made North A merican pulp and paper exports cheaper, stimulating demand; rumours of a strike at pulp and paper mills in British Columbia; and the extreme depth of the prev ious slump, combined with new environmental requirements, both of which discour aged new investment which could have increased supply. Also significant was a t radition of noncooperation between pulp buyers and sellers: pulp dealers who fe el they are being pushed into offering ever lower prices in a slump tend to get even by squeezing

their customers as hard as possible when the market begins t o improve. The same holds for paper dealers (Bingham 1995; Independent 19.6.95; Pappens 1995; Edwards 1995; Stefan 1995; Rahikainen et al. 1995).

By 1996, though, the market was once again beginning to dive, with Northern sof twood bleached kraft pulp dropping about 25 per cent to US$725 per tonne in Feb ruary. Frightened by the prospect of price increases, buyers had built up stock s which they began to draw on as the economy worsened, reducing orders. At the same time, as one trader complained, hardwood pulp suppliers from Brazil, Indon esia and Russia 'have lowered prices, but they have not created demand', with C hinese purchases being especially disappointing. With capacity increases, furth er drops were projected for succeeding years (FT 23.11.95, 5.1.96, 24.1.96, 8.2 .96). Some industry observers gave vent to a hope that, due to constraints on s pending forced by environmental expenditure, the next slump would be less sever e than the one before (Bingham 1995; FT 13.7.95; Economist 14.1.95). In the vie w of executive David Clark, however, 'the paper cycle shows no sign of diminish ing. Indeed, the swings show every sign of increasing as the business becomes m ore global and more capital intensive with more aggressive competition among la rger groups' (Clark 1996).

Such slumps, of course, can often bring advantages to large corporations with t he resources to weather them. Firms such as Indah Kiat, for example, may snap u p bargain-priced machinery or plants. But the natural environment is not necess arily a beneficiary. In 1993, the integrated forestry-paper firm International Paper had to balance its paper operations' losses by increasing timbercutting t o a rate which the company itself admitted was 'unsustainable'. The Canadian gi ant Avenor, meanwhile, received state subsidies to open an idled mill (Penna 19 94; FT 9.2.95, 17.2.95; TN 5.1994; Olsson 1995).

Exacerbating the industry's chronic tendency toward overinvestment and periodic overcapacity is the zeal of many national bureaucracies _ and some of their co nsultant advisers _ in promoting pulpwood or pulp as a foreign-exchange earner. Particularly in Southern countries, a pulp export industry is often advertised as being capable of dynamizing the economy and creating rural and industrial e mployment. In some countries, it is also promoted as a means of centralizing co ntrol over land, taking over small farmers' holdings, or even as an agent of 'r eforestation'. In Thailand, government targets for pulpwood plantation acreage regularly overshoot even the most optimistic market demand projections by 1,000 per cent, and the ambition of some Indonesian government officials to turn the country into the 'world's biggest pulp producer' have contributed to an even m ore overheated atmosphere there. One Western machinery supplier has claimed tha t many prospective Indonesian investors 'don't know what they plan to do with t heir pulp', joining experts who worried in the early 1990s that the regional As ian market was 'undeveloped', uncertain, and oversupplied (Sargent 1990; Paper 4.2.92; Dench 1993; ADB 1993; WALHI and YLBHI 1992).

Concentration and liberalization

The cycles endemic to the pulp and paper industry tend to lead to renewed effor ts to increase capital intensity and concentrate production in fewer hands. Whe n slumps cause Northern manufacturers to lose market share of basic paper grade s to Southern producers, Northern firms are increasingly forced to seek out and seize miniscule competitive advantages which might enable them to get rid of t heir overproduction. Jobs are shed, still bigger machines sought, and attempts made to diversify into new, higher value-added products or concentrate on fewer niches.

As corporations struggle to cut costs, hold market share, prevent overinvestmen t, find and control markets, create demand, and cope with globalization, they a re often pushed into new mergers and

cartels. Rapid upturns, when they come, pr ovide acquisition-hungry companies with flushes of cash they can use to buy out vulnerable rivals. Economy measures meanwhile induce many companies to link th emselves more tightly to timber producers, since large-capacity, wood-based mil ls rapidly create shortages of timber unless combined with sawmill operations o r plantations (JPA 1994, PPI 7.1994, 7.1995, Rajesh 1995). Links are also incre asingly sought with paper-product manufacturers and paper customers.

Thus in the last decade the top 30 paper companies have increased their proport ion of world production dramatically (Higham 1995). In 1995 alone, the US's Kim berly-Clark took control of Scott Paper, Sweden's SCA bought Germany's PWA, the US's International Paper gained control of New Zealand's Carter Holt Harvey an d initiated moves to acquire Federal Paper Board, Canada's Canfor launched a bi d for Slocan, and Jefferson Smurfit took over Saint-Gobain Paper-Wood. In Finla nd, in addition, mergers were announced both between Enso-Gutzeit and Veitsuluo to (to create ENSO) and between United Paper Mills and Kymmene (to create UPM-K ymmene); the latter marriage will result in Europe's largest pulp and paper com pany. In Japan, meanwhile, the share of national pulp production of the top fiv e firms rose from 40 per cent in 1960 to 60 per cent in 1990, and in a further phase of what Alastair Graham calls 'mutual cannibalism' in 1993, Jujo combined with Sanyo Kokusaku Pulp to create Nippon Paper, while Oji merged with Kanzaki , Honshu and Chuetsu to form New Oji. In 1994, the two new firms took over the No. 2 and No. 3 positions in world pulp and paper sales (Whitham 1995; PPI 7.19 95). Pira International, a pulp and paper research centre, predicts that the sh are of world paper and board tonnage held by the largest companies could be wel l over 80 per cent by 2005, up from 65 per cent today (FT 13.7.95).

In addition to helping companies concentrate production in the most 'efficient' mills, mergers are likely to improve corporate ability to streamline organizat ions, sell non-strategic assets, control prices and wages and generally minimiz e risk at the expense of smaller economic actors. Local communities, however, m ay find that protecting their land, water and air against the encroachment of o ne of the new conglomerates is even more difficult than was holding the line ag ainst their predecessors.

Industry concentration both feeds on and creates pressures for centralized inte rnational structures of economic control such as the European Union, the North American Free Trade Agreement (NAFTA), and the General Agreement on Tariffs and Trade (GATT). Large-scale producers expect NAFTA and GATT to open trade routes and foreign investment opportunities for them, while the European Union is hel ping the biggest pulp and paper firms there to gain access to wood, markets and production sites across the region, transforming it into a single economic uni t with greater global power. Tariff reductions associated with a global market, meanwhile, tend to force all manufacturers into competition with their counter parts in the most cheaply-producing countries, causing the consequences of over investment in one region to reverberate worldwide.

Economic liberalization is also helping the dominant pattern of highly capital- intensive, wood-based or industrial-plantation-dependent production to spread i nto previous strongholds of small-scale, agriculture- or farm forestry-based in dustry such as India and China. In India, for example, as lower import duties o n paper begin to threaten the highly-protected, flexible, decentralized and lab our-intensive local paper industry, Indonesia's Sinar Mas group has announced p lans to set up a new mill twice as large as any other in the country, fed by su rplus hardwood kraft pulp from its operations in Sumatra. The hope is that the mill's output will help create an Indian demand for a 'high-quality' wood-based sheet which will spur the development of other such mills, which of course wil l in turn require cheap new timber sources in natural forests or plantations (B ayliss 1995; cf. DTE [Delhi] 31.8.95).

Economic risks in South and North

The highly cyclic nature of the pulp and paper industry creates risks for inves tors everywhere. But because the costs of installing world-class pulp or paper machinery are as high in the South as in the North, Southern countries who are pushed into establishing such industries risk a greater proportion of their res ources than do their Northern counterparts.

These hazards are exacerbated by a raft of additional uncertainties. Due to the scale of today's world-class mills, unanticipated increases in pulp capacity d ue to the whims of single manufacturers in Brazil, Russia, Indonesia or anywher e else have great potential for upsetting the market. While the per capita pape r consumption of some of Asia's newly-industrializing countries has exploded in recent years, in addition, it may suddenly stagnate if an economic recession h its. And while large countries with low per capita consumption such as Indonesi a and China may increase world demand greatly if incomes rise, the timing of su ch changes is uncertain. It is conceivable, too, that if enough Northern produc ers are driven out of business by new Southern competitors, the price umbrella they provide may disappear (Bazett 1993, PPI 7.1994).

Environmental activism adds another unpredictable factor to the equation. Fores t and land conservation movements affect demand for and supplies and prices of pulpwood, while recycling movements and legislation can unexpectedly increase g lobal supplies of waste paper. Environmental legislation regulating manufacturi ng processes also has a powerful affect on industry spending. The extent of the need to invest in machines capable of meeting consumer demand for chlorine-fre e paper is another difficult-to-assess factor, and one which is especially rele vant to the prospects for Southern plantations, since chlorine-free papers requ ire a high proportion of hardwood fibres (Bazett 1993, ADB 1993).

The increasing reliance on plantations which has followed on from depletion of old growth forests creates additional uncertainties for pulp and paper producer s in both South and North. Even fast-growing plantations require especially lon g planning horizons of 10-15 years, due to the time it takes trees to mature, d uring which time any number of things may change. Large monoculture plantations are prone to pests, diseases and fire, and productivity may well dwindle after the first rotations (Good, Lawson and Stevens 1993). Moreover, it is notorious ly difficult to estimate how much competition pulpwood plantations will have fr om natural forests in the Pacific region in the future. Depending on what proba bilities are given for the future economic availability of pulpwood from remote conifer forests in Siberia and Yakutsk, and for the demand from the Chinese ma rket, projections have varied from a surplus of 20 million tonnes a year to a d eficit of 60 million tonnes. According to former FAO forest economist Alf Lesli e, such 'inevitable uncertainties dwarf any market growth analyses based on sta ble market factors like population and income growth.' As the next chapter indi cates, uncertainties about raw material availability have proved a particularly powerful influence on the Japanese industry, propelling it into ventures all a round the Pacific basin (Graham 1994, PPI 1.1994).

Consumption and demand creation

Since the Industrial Revolution, owners and managers of Western pulp and paper industries have struggled to reorganize society in ways friendlier to themselve s through large-scale mechanization. As this chapter has suggested, the style o f mechanization they have followed is closely tied up with economic cyclicity, concentration of skills and of wealth, the spreading of risk, globalization, an d deforestation. As will be explored further in later chapters, it is also asso ciated with a pattern of heavy pollution, soil degradation, widespread disposse ssion, and massive subsidization by the public sector. Despite the crises growi ng out of this highly-centralized type of social organization,

the pulp and pap er industry as yet shows few signs of moving on to a more decentralized, smalle r-scale system of specialized production.

One of the most important effects of the strategy of large-scale mechanization and mass production followed by today's mainstream pulp and paper industry is o n how paper is used by ordinary people. Industrialists who have to sink huge su ms into complex production technology have a strong incentive to try to predict and control prices. As economist John Kenneth Galbraith (1972) has long pointe d out, that entails attempts at managing demand. Such attempts are all the more imperative in an industry subject to the influence of savage boom-and-bust cyc les, rapid cultural and technological changes, and unpredictable environmental pressures on production and consumption. Thus top European paper executive Davi d Clark (1994) recently told his colleagues, we shall have to fight for our future and create our own growth. . . total de mand has to be stimulated. The alternative, to do nothing, could produce a stat ic or even declining demand with serious implications for the industry, its rep utation, its technology and the quality of the people it attracts.

It is hardly surprising, therefore, that today's mainstream paper industry is c onstantly promoting new uses for paper in the overconsuming markets of the Nort h as well as seeking new outlets for its products in growing markets such as th at of East Asia. This dynamic inevitably sets a highly-centralized, mechanized industry at odds with environmentalists and others concerned about overconsumpt ion.

Stimulation of paper demand is, of course, nothing new, and is not something th e industry has to undertake alone. Since the 1800s, new processes and commoditi es _ ranging from lithography, paper shirt collars, slippers, cups, building ma terials, bags, toilet paper, drinks cartons, nappies, supermarket packaging, ex port packaging, fax paper and word-processing computer technology _ have been e mbedding paper use ever more thoroughly into business and household activities. But the scale and intensity of demand creation has recently reached new height s. To take one example, TetraPak, partly financed by the World Bank, recently o pened a disposable carton factory in Hungary that caused the country's deposit bottle system to collapse in a matter of weeks (Fairlie 1992). New technology s uch as fax machines and laser printers, as well as the growing roles of service and administration in Northern economies and the burgeoning supermarket system , with its vast needs for packaging, also stimulate paper consumption.

While industry sometimes claims when speaking with uninformed audiences that th e driving forces behind increasing paper demand are growing literacy, surging p opulation, and the need for schoolbooks and education, the figures tell a diffe rent story. Over 40 per cent of paper production in 1991 was used for packaging and wrapping, 13 per cent for newsprint, and less than 30 per cent for printin g and writing (IIED 1995, cf. Bazett 1993). In the US, according to Worldwatch (1994), it is the 'growth of advertising and the automation of office equipment ' _ including, paradoxically, computers, which were supposed to have introduced the 'paperless office' _ which have driven growth in paper consumption:

Sixty per cent of space in American magazines and newspapers is reserved for ad s, while some 52 billion assorted advertising pieces _ including 14 billion mai l order catalogues that often go straight into the trash _ clog up the US post office every year.

Explosive increases in cardboard and paper packaging in the last few decades ha ve also been largely fuelled by the desire to advertise the products within, an d even increases in demand for newsprint are primarily due to advertising (Baze tt 1993). Overall, paper consumption is growing fastest in coated lignin-free a nd coated mechanical varieties, which are used for glossy magazines

and colour advertising. Yet per capita newsprint use also continues to surge _ from 24.5 t o 32 kilogrammes between 1980 and 1991 in Britain alone (G 25.11.1995). In Sout hern countries, meanwhile, increases in paper consumption are closely tied to d emand for packaging by industry (often export industry), advertising and the co mputerization of businesses, and the rise of consumerism. In Thailand, for exam ple, one of the world's fastest-growing export economies, packaging absorbs mor e than two-thirds of production. As trade becomes more and more globalized, it is likely to entrench packaging demand even further (Kroesa 1990, Soulas 1994, P&PA 11.1994).

TABLE 2.4
Paper consumption, selected countries, 1994

table under construction

Source: PPI 7.1995

Tying demand for paper to a broad range of economic activities outside educatio nal publishing has helped free world per capita paper consumption to expand ind efinitely. Rising from .01 kilogrammes yearly in 1910 to 15 kilogrammes in 1950 and nearly 48 kilogrammes in 1994, it shows no signs of levelling off (Worldwa tch 1994, PPI 7.1995). The industry's 'efficiency' can no longer be plausibly d escribed as, say, 'efficiency in producing the medium for the books and newspap ers which society needs', but is increasingly merely an abstract ability to pro duce as much paper as possible as cheaply as possible. Unsurprisingly, per capi ta paper consumption has very little relation to literacy levels (see Table 2.4).

According to industry figures, in 1993 the South and Eastern Europe, with nearl y 84 per cent of the world's people, consumed less than a quarter of the paper and board produced worldwide, while the North, plus the Asian 'tigers', with ju st over 16 per cent of the world's population, accounted for over three-quarter s. Worldwide, wood fibre consumption is skewed even more than consumption of ot her commodities. US citizens, for example, consume 386 times as much pulpwood p er capita as Indians, while 'only' 43 times as much oil (G 6.9.94). Almost half of the world's paper production is consumed by 460 million people in the US, J apan and Germany, with the US alone consuming more than Japan, China, Germany a nd the UK (the next four top consumers) combined (see Table 2.5) (TRN 1993; IIE D 1995; Ozinga 1994; Soltani and Whitney 1995; Dudley, Stolton and Jeanrenaud 1 995).

TABLE 2.5
World's top consumers of paper, 1994

Country	kg per capita	Country	kg per capita
US	332	Brazil	28
Hong Kong	233*	Bulgaria	23
Sweden	232	Turkey	22

Japan	231	Uruguay	22
Taiwan	224	Russia	20
Canada	221	China	20
Singapore	218	Philippines	12
Finland	217	Egypt	10
Germany	201	Indonesia	10
UK	197	Lithiuania	9
New Zealand	184	Saudi Arabia	9*
Australia	167	Peru	8
Italy	143	Dom. Rep.	8
South Korea	137	Kenya	6
Spain	125	Nicaragua	4*
Slovenia	100	India	4
Ireland	98	Bolivia	3
Malaysia	82	Nigeria	3*
Portugal	74	PNG	2*
Costa Rica	55	Bangladesh	2
Argentina	45	Viet Nam	1
Chile	42*	Nepal	1
Mexico	42	Burma	1
Latvia	40	Tanzania	<1*
Venezuela	39	Congo	<1*
Poland	38	Ghana	<1*
South Africa	38	Lao PDR	<1*
Thailand	35	Mali	<1*
World	48 *		

*Apparent per capita consumption.

Source: PPI 7.1995

Significantly, the single-year increase in per capita consumption in Sweden and the US between 1993 and 1994 was five times the total current per capita consu mption of India and double that of Indonesia (PPI 7.1995). While the most rapi d recent growth in consumption has been in South Korea, China, Indonesia, Malay sia, Thailand, Taiwan, Singapore and Chile, it is the North which will continue to dominate world consumption figures. The US Forest Service suggests, in what unfortunately may well be a conservative estimate, that annual per capita cons umption in the US will reach 472 kilogrammes by 2040 (Smith forthcoming).

Overall, paper consumption has climbed from less than 15 million tonnes in 1910 to over 268 million tonnes in 1994, with the paper consumption of Japan alone doubling in two decades. According to industry figures, consumption growth from 1988 to 1996 will equal total consumption globally 30 years ago (Ionides 1994) . Although rates of paper consumption can change, and have changed, remarkably quickly, the UN's Food and Agriculture Organization strives to project such tre nds as global destiny, predicting that paper consumption will increase by 80 pe r cent by the year 2010, with more than 60 per cent of this increase to take pl ace in Europe, North America and Japan. Roger Olsson of Taiga Rescue Network ca lculates that even if recycling rates increase from the current 35 per cent or so to 50 per cent by 2010, world pulpwood consumption will still increase by 33 -41 per cent over 1990 levels (Olsson 1995, BP 22.2.95).

Interestingly, while per capita demand for paper continues to rise, per capita demand for sawnwood is lagging, with less construction timber and fewer pitprop s needed. Between 1955 and 1985 the volume of sawnwood consumed per unit of Gro ss National Product halved, while paper consumption followed GNP closely. Accor dingly, the composition of demand for industrial wood has changed radically dur ing the 20th century. Between the 1940s and the 1980s, the ratio of pulpwood to sawlogs increased from about 1:4 to between 1:2 and 1:3. Although FAO and the World Bank anticipate annual increases in paper demand to 2000 on the order of 2.7-2.9 per cent, they expect sawnwood demand to increase only 1.0-1.5 per cent . According to Michael Bazett, one industry analyst, growth in production of sa wlogs is now close to zero. Increases in wood consumption, therefore, are due m ore and more to paper consumption (Mather 1990, Gauthier 1991, Bazett 1993).

Chapter 3
Emergence of a Global System
A global marke t

In the 1950s, most production of fibre, pulp and paper was fordomestic markets, and few large producers and consumers of paperimported raw materials from other continents. Although there wasconsiderable trade of newsprint and some other grades across theborders of Southern countries, the bulk of international woodfibre and pulp trade was between Canada and the US and amongEuropean countries, with Finland, the USSR and Canada being theleading raw fibre exporters.

Today, the industry as a whole still produces mainly for domesticmarkets, and the North continues to dominate pulpwood production(see Table 3.1). Only nine per cent of fibre production, 17 percent of pulp production, 23 per cent of paper production, and 16per cent of waste paper production crosses national borders. Theoverall export market for wood pulp in 1993 was valued at littlemore than US$11 billion and for paper at not much over $43billion.

Nevertheless, international trade in wood fibre has quadrupledsince 1960, while the world market for pulp has grown fivefoldover the past 40 years. Trade in paper, including waste, has alsoincreased enormously. As Russian logs travel to Finland, chips andpulp from Canadian forests are shipped across the Pacific to feedJapanese paper mills, Indonesian pulp and paper surfaces in theMiddle East and East Asia, and vast amounts of the US's discardedpaper are exported to Mexico and the Far East. As industry leadersconstantly point out, the pulp and paper economy has become globalin just a few decades, with plantation, pulp and paper businessesnearly everywhere in increasingly active competition with firmsfrom distant countries (Dudley 1992, Hagler 1993, IIED 1995).

Thus the wood fibres in a sheet of paper in Japan or Europe todaymay well originate from trees on five or six continents. To takeperhaps the most extreme example, some 74 per cent of the woodfibres found in Japanese paper and board come from trees grownabroad. Between 45 and 50 per cent come from the US and Canada,over ten per cent from Australia and New Zealand, around seven percent from Chile, over three per cent from Brazil, perhaps one totwo per cent each from Finland, South Africa and Indonesia, andsmaller amounts from Russia, China, Thailand, Fiji, Sweden, Norwayand other countries. The average wood fibre found in a sheet ofJapanese paper or board, in other words, has travelled more than6,000 kilometres from its point of origin (estimated from JPA1994, PPI 7.94, UN 1994).

TABLE 3.1 World's top raw fibre producers, 1991

Country	Per cent of world production
US	34
Canada	11
CIS*	10
Brazil	7
Sweden	6
Finland	4
Germany	3
Japan	2
China	2
France	2
Spain	2
Australia	2
Portugal	2

*Former USSR minus the Baltic states Source: FAO

In aggregate terms, most fibre, pulp and wood trade is stillNorth-North. In 1991, nearly 83 per cent of wood fibre trade and77 per cent of wood pulp trade was among the long-industrializedcountries, with exports from South to North accounting for only 13per cent of the fibre trade and seven per cent of the pulp trade.The US and Canada still produce close to half of the world'spulpwood and pulp and account for over 25 per cent of world fibreexports, 55 per cent of pulp exports, 31 per cent of paperexports, and more than 44 per cent of waste paper exports. Most ofthe biggest paper corporations, in addition, are American firmsalso involved in timber, sawnwood and plywood production (IIED1995, PPI 7.94).

Yet this numerical Northern dominance conceals the deep impact theglobalization of the pulp and paper economy has had on the South.As fibre, pulp and paper are shipped over greater distances, oftenby sea, the South has become more integrated into the globalmarket than ever before, with several Southern countries moving upto the status of world-class exporters and importers within thelast decade. (See Tables 3.2, 3.3, and 3.4.) The still smallnumerical ratio of Southern to Northern fibre in the world market,moreover, says nothing about the rise in absolute amounts traded,the extent to which new pulp capacity in Southern countries isaimed at export (see Table 3.5), or the large changes theglobalization of the market has brought about in specific Southernrural societies.

TABLE 3.2
Top exporters of pulpwood and chips, 1991

Country	per cent of world exports
US	21
CIS	15
Germany	10
Australia	10
Chile	10
France	7
Canada	4-5
Hungary	2
Norway	2

Sources: Estimated from IIED 1995; United Nations import-export figures; USDA 1994.

TABLE 3.3
Top exporters of pulp, 1994

Country	Estimated per cent of world exports
Canada	30
US	17
Sweden	10
Brazil	7
Chile	5
Finland	5
Portugal	4
Russia	3
New Zealand	2
Spain	2
South Africa	2
Norway	2

Sources: Estimated from Stefan 1995; IIED 1995; PPI 7.1994,7.1995; UN import-export figures; Wright 1993. Indonesia will soonbe a prominent exporter.

TABLE 3.4
Top exporters of paper, 1993

Country	per cent of world exports
Canada	34
Finland	26
Sweden	21
Austria	6
Norway	4
Brazil	3
Indonesia	1

Sources: PPI 7.1994; UN import-export figures.

In 1992, for example, Brazil, the South's preeminent pulp andpaper exporter, sent around three-quarters of its approximatelyUS$750 million worth of pulp exports to Europe and North America

_the US and Belgium taking the lion's share _ with another quartergoing to Japan and the rest of East Asia. Only around two per centwent to its own Latin American region. Brazil's nearly $600million in paper and board exports were spread over even morecountries, with Argentina, Italy, the UK and Nigeria leading thepack. Some 35 per cent went to Europe, 30 per cent to LatinAmerica, 14 per cent to Africa and 12 per cent to the Middle East.At the same time, the country imported over $210 million worth ofpaper, mainly from Canada, Finland, and the US (UN 1993).

Chile, meanwhile, sold 96 per cent of its reported 1993 wood chipexports of $137 million to Japan, while the bulk of its $150million in log exports, including pulpwood logs, went to SouthKorea (56 per cent), Turkey (19 per cent) and Japan (18 per cent).The country divided 80 per cent of its $468 million in pulpexports between Asia and Europe, with only 15 per cent going toLatin America. Leading buyers included Belgium/Luxembourg, taking16 per cent, Japan with 12 per cent, and South Korea, Italy,Germany, China and the UK with around seven per cent each. WhileChile did export most of its paper and board to its own region ofLatin America, with a quarter of its $77 million in exports goingto Argentina alone, the country also imported $143 million worthof paper and board, mainly from the US, Brazil and the Nordiccountries (USDA 1994, UN 1994). (See Table 3.4.)

The continuing statistical dominance of North-North trade,moreover, can obscure the way in which parts of the North _including parts of Northern Alberta and the southeastern US _ arebeing transformed by the globalization of the industry into new'Souths within the North'. In Iberia, for example, state subsidieshave helped ensure that woodlands useful to local economies arereplaced with pulpwood plantations for the international market.In 1955, pulpwood constituted only seven per cent of commercialwood in Spain, but by the late 1980s, the figure was over 50 percent. Pulpwood trees now cover five million hectares in Spain,with other hardwoods occupying only 1.9 million. Erosion and pestinfestations have increased, while biodiversity has been cut,commons enclosed, and rural areas depopulated. Spain's 1985 entryinto the European Community has only reinforced this process.Since EC rules 'assign' milk production to Northern Europe, manyformer milk-producing areas in Spain have been switched over topulpwood plantations. European Structural Funds aimed atintegrating Spain's regions into the larger European economy havesubsidized the mechanized clearing of maquis vegetation for'reafforestation' _ a process which hastens erosion and decimateswildlife (Coordinadora Extremena de Proteccion Ambiental 1992).

TABLE 3.5

Ratio of exports to production of chips, pulp and paper, selectedcountries (per cent)

	Chips (1993)	Pulp (1994)	Paper (1993)
Australia	100	0	13**
Brazil	0	34	27
Canada	5	36	66
Chile	52	71	29
China	59	0	1
Finland	6	15	92
Indonesia	33*	***	26
New Zealand	14	48	31
Portugal	7*	68	42
South Africa	8*	28	14
Sweden	3	26	80
Thailand	na	20	4
US	8*	9	6

*Estimated from 1991 FAO figures for pulpwood and particles.

**Based on 1992 UN export-import figures.
***Indonesia plans to export over 60 per cent of its pulpproduction by 1997.
Note: Exporter status does not imply self-sufficiency in allgrades. For example, although Chile and the UK export some gradesof paper they are net importers of paper, partly because theyimport grades which they do not produce.
Sources: Estimated from Stefan 1995; PPI 7.1994, 7.1995;
USDA 1994; UN trade figures; Wright 1994; ABECEL n.d.

Globalization of production, of course, has been accompanied by anincreasing regionalization and globalization of investment andownership. Today Swedish firms operate throughout Europe; the NewZealand-based giant Fletcher Challenge holds firms in NorthAmerica; Australia's Amcor manages operations in China, Europe,Japan and Southeast Asia; Japan's Daishowa is in the forests ofthe Western Canadian interior; Finland's partly state-owned Ensois investing in Kalimantan; the US's Weyerhauser is moving intoEastern Siberia; German and Finnish firms are in Galicia; Britishcompanies are in Brazil and Swaziland; and Japanese firms areplanning moves into China. While India's Ballarpur operates inThailand's Northeast, Thailand's own Siam Pulp and Paper isinvesting in mills in the Philippines, and Indonesia's Indah Kiatand Raja Garuda Mas are putting money into mills in Bombay andSarawak.

Export destinations

Where is all the exported wood fibre, pulp and paper going? Theanswer depends on many factors, including how close the exportingcountry is to an importer. Some of the most voracious importersfor which statistics are easily available are listed in Table3.6.

TABLE 3.6
Fibre, pulp and paper imports, selected countries, 1993

COUNTRY	IMPORTS (million metric tonnes)			
	rough wood*	chips and	pulp paper	particles
Japan	16.8	11.3	3.3	1.3
US	-	0.9	4.9	na
Finland	4.2	0.4	-	0.3
Sweden	3.6	0.4	0.2	0.3
Italy	3.6	0.3	2.6	3.0
South Korea	7.3	0.5	1.5	0.5
Germany	0.9	0.1	3.6	6.8
France	1.0	0.4	2.0	4.0
Netherlands	0.4	0.2	0.7	2.5
China	2.5	0.1	0.5	0.2
HK	0.4	-	-	2.4
UK	na	na	1.6	6.0

*Includes non-pulpwood.
Sources: Estimated from United Nations export-import statistics, IIED 1995, Rice 1995, Hagler 1995.

One of the ironies of the globalization of the pulp and paperindustry is that over half of all world exports of raw fibre forpaper-making are shipped to three of the most heavily-forestedcountries in the world _ Japan, Finland, and Sweden _ all of whichmake it a matter of national pride to maintain plentiful domestictree cover. In 1991 these three nations absorbed 40, nine, andeight per cent of the

trade respectively; Belgium/Luxembourgranked next, with seven per cent (Hagler 1993, IIED 1995).

Importing the most pulp, meanwhile, are the US, Germany and Japan,with 17, 15 and 11 per cent of all imports, although these threecountries are also among the biggest world producers. The toppaper importers are the US, with 19 per cent of world trade,Germany, with 13 per cent, and the UK, with ten per cent. Taiwanand South Korea, meanwhile, import the most waste paper, with tenper cent of world trade each, followed by The Netherlands witheight and Mexico and Canada with seven each.

The biggest South-North flow of raw fibre is that of wood chipsfrom Chile to Japan, and the largest South-North flow of pulp fromBrazil to the US. The biggest North-South pulp trade, meanwhile,is from the US to South Korea, China and Mexico and the biggestNorth-South paper trade from the US to China (IIED 1995).

Overall, the global fibre, pulp and paper economy can be dividedroughly into Atlantic and Pacific trading regions. In the Atlanticregion, which is the focus of world trade in paper, pulp and paperproduction is concentrated in North America and the Nordiccountries, with growing links to wood or pulp sources in countriessuch as Brazil, South Africa and Congo. In the Pacific region,most industry trade consists of logs, chips or pulp sold to Japanand, to a lesser extent, China and the Asian 'tigers'. While inthe Atlantic region, there is a growing shortage of softwood forpulp, the Pacific region has seen a shortage of hardwood for adecade, although with new eucalyptus plantations this may ease(Hagler 1993).

Causes of globalization

The globalization of pulpwood, pulp and paper production is due toa combination of many factors. First, the industry's culture andinstitutions, like those of industrial capitalism generally, tendto be oriented toward unlimited accumulation, economic expansion,and consumption growth. When resources in one area can no longerbe tapped to feed this growth due to economic, ecological,geophysical or political reasons, but are accessible elsewhere,pressures for globalization increase. Growth in paper consumptionin Japan after 1960, for example, has been largely dependent on,first, finding West Coast North American alternatives to expensiveor inaccessible local fibre sources, and, second, as NorthAmerican sources become less economically, politically andbiologically accessible, on finding further alternatives in otherregions of the world (see below). In a world of skewed powerrelations and resource distribution, globalization thus offers away of preventing local circumstances _ whether they areclassified as economic, biological or political _ from limitinglocal consumption. Just as economic growth externalizes costs tothe future through debt and discounting, the global economicexpansion which accompanies this growth externalizes costs to'outlying' regions.

Industry- and country-specific factors, of course, have helped layout the particular paths toward globalization which wood fibre,pulp and paper have taken. Among these are the cultural andpolitical factors mentioned in Chapter 2, which, over time, havelocked the industry into reliance on big machines, reinforced theneed for a huge forest resource, and contributed to recurringrhythms of overinvestment, recession, concentration, and demandstimulation. It is partly these rhythms which define the quest formore trees and paper buyers which has pushed the industry toexpand outside its traditional centres.

Other forces behind globalization include the North Americanindustry's long-standing practice of depleting old-growth forestsand investing in new pulping technologies and biotechnologyresearch instead of replanting extensively. As native coniferousforests are exhausted, environmental activism rises, furthercutting into pulpwood harvests. Union Camp Corporation, forexample, estimates that, partly due to environmental concerns,sale of timber from public lands in the Pacific Northwest will be64 per cent lower in the second half of the 1990s than it was adecade earlier, while wetlands legislation could reduce acreageavailable in the southeastern US by ten per cent. That amounts tothe equivalent of the raw materials needed for 30 world-class400,000 tonne-per-year pulp mills. Environmentalist pressure toreduce cutting in old-growth forests in the Nordic

countries,Australia and Chile has also been significant. The Finnishindustry, meanwhile, was jolted in the early 1990s by thedisruption of Russian exports of wood, especially hardwood, due tothe breakup of the Soviet Union (Marchak 1992, Know-How Wire 1993:5, JP&P 30 (1), Ozinga 1994, McClelland 1994, Hagler 1993).

Such developments are leading the industry not only to look towardas-yet unexploited old-growth forests, but also to plan forincreasing reliance on plantation fibre. Plantations areespecially attractive in that they promise to be able to furnishexceptionally uniform raw material more quickly than naturalforests and on a smaller land base, avoiding conflict with otherland uses. While industrial plantations currently account for onlyabout 15-30 per cent of world demand for pulpwood (indeed, woodtrade consultant Robert Hagler estimates that only 11 per cent of1993 global pulp production was based on fibre from plantations ofexotic trees), these ratios are bound to rise, givendeforestation, decreased availability of extensively-managedforests, the limitations of recycled fibre, and the resistance ofmuch of the industry to non-wood raw materials. Already by 1990,95 per cent of Chile's industrial wood production, 93 per cent ofNew Zealand's, and 60 per cent of Brazil's came from plantations.By the year 2030, meanwhile, Indonesia plans to increase the shareits plantations take in production of industrial wood from thepresent 20 per cent to 80 per cent (Hagler 1994, 1995; Bazett1993; IIED 1995; R. Wilson 1991, 1995; Stefan 1995; Pandey 1992).

The more industry is forced to shift from natural forest toplantation pulpwood, the more incentive it has to shift raw fibreproduction to the South. For one thing, although growth rates varyextremely widely from place to place and depending on the methodsused, and are always higher in experimental plots than inlarge-scale plantations, fast-growing trees such as eucalyptus canon the whole grow much faster in the South than any commercialspecies do in the North, meaning both that they are availableearlier and that less land is required for plantations. While theaverage growth rate of managed forest and plantations in the US isabout 2.6 cubic metres per hectare per year, pine plantations inthe South have been shown to yield from 5.7 cubic metres atcertain locations in Madagascar to 30 in some Chilean plantations.Southern eucalyptus plantations have meanwhile yielded from around1.5 cubic metres annually per hectare in Burundi to six in variouslocations in India all the way up to 70 under certain exceptionalregimes in Brazil. Forestry consulting firm Jaakko P"yry estimatesthat while 1.6 million hectares of replanted forest area inBritish Columbia's interior are required to feed a 500,000ton-per-year pulp mill, and 800,000 hectares in the Nordiccountries, only 50,000 hectares are required in Brazil under idealconditions. Bazett calculates that to feed a comparable mill, 1.3million hectares of non-managed coniferous forest would berequired, while only 650,000 hectares of intensively-managednatural coniferous forest and 80,000 hectares of fast-growthplantations (Evans 1992, Pandey 1992, Axberg and Sthl 1989, Bazett1993).

Land is also cheaper in the South, particularly in big contiguousparcels. In many countries, for example, the state rents outnominally 'forested' reserves to plantation companies at wellbelow market rates. In Indonesia, state land can be rented byplantation firms for about US$0.30 per hectare per year, inThailand for around $2.50, and in Lao PDR for $3.00 (WALHI 1990,Bannan 1995). While land rental dominates the costs of treeplanting programmes in the US, one company which plans to set up aplantation in Lao PDR will spending a mere six per cent of itsannual outlay on lease of land (Moulton and Richards 1990, Bannen1995).

All this makes for low wood costs. According to the Canadianconsulting firm H.A. Simons, the cost in 1988 of producing onebone-dry metric ton of hardwood fibre was only a bit over US$28 inBrazil, Chile and Argentina, $40 in the southeastern US, $49 inthe interior of British Columbia, $102 in the Nordic countries,and approximately $154 in Japan. Softwood fibre production costs,according to the same company, were less than $28 in Chile butover $42 in the southeastern US, over $70 in Australia, and over$140 in Japan. In 1993, although competition with the South hadforced Northern wood prices down somewhat, Brazilian andIndonesian hardwood woodfibre costs, and Chilean and Brazilianconifer costs, were still less than half those prevailing in theNordic countries or the US's West Coast, and also less than inEastern and Western Canada, Iberia, and the

Southern US. Morerecently, the gap has widened again, as North American and Nordicraw material costs have increased sharply (Graham 1994; Know-HowWire 1.93; Bazett 1993: 77, 92-3; Hagler 1994, 1995).

Such cost differentials are critical, since wood represents 40 to70 per cent of the variable cost of making pulp, which is in turnthe most important cost in making paper. As Robert A. Wilsonremarks, 'Wood is the strategic driver in the industry . . . thekey competitive differentiator'. It is thus often profitable togrow wood in the South even if the plantations are at a greatdistance from large paper markets. Barring political and economicturmoil, the move to the South for raw fibre is likely only toaccelerate in coming years, as wood chips from the northwesternand southeastern US and western Canada become scarcer or moreexpensive (although Siberian softwood exports may also increase).Consultant Robert Hagler estimates that between 1990 and 2010,while the annual allowable cut of conifers in the US PacificNorthwest will decline from 100 to 70 million cubic metres peryear, the yearly yield of eucalyptus plantations _ situated mainlyin the South _ will surge from 82 to 132 million cubic metres andthat of conifer stands in Australia, New Zealand and Chile willincrease from 36 to 62 million cubic metres. Bruce Arnold, anotherUS forest industry consultant, claims that industrial forestplantations could account for 50 per cent of the world'sindustrial wood production by the year 2000 (Wilson 1991; Know-HowWire 1.1989; Bingham 1995; PPI 8.93, 1.94; Hagler 1993, 1995;Wright 1993; PP 1.1995; Stefan 1995; Pandey 1992).

Discounted land is not the only subsidy encouraging the expansionof pulpwood plantations in the South. As later chapters willdocument, other subsidies which governments help make availableinclude tax exemptions, low-interest-rate loans, low-cost labourand political repression. Hourly wages in Brazil, for example, are20 per cent of those in Germany. Suppression of labour unions ismeanwhile provided free of charge by the governments of manycountries witnessing a plantation boom. As Chapter 5 will argue,such subsidies are topped up through support by internationalagencies and even NGOs for infrastructure and research anddevelopment programmes which disproportionately benefit theindustry.

The move to plantations, and in particular plantations in theSouth, coincides with the growing acceptability to manufacturersof plantation fibre, especially eucalyptus. (See Chapter 2.)Conversely, the greater the inroads plantation fibre gains intothe industry, the more manufacturers will be encouraged to treatraw material as a factor whose composition can be manipulated andhomogenized. Whereas the industry has previously been largelydependent on diverse types of wood waste, and thus has had to relylargely on manufacturing processes to ensure uniform quality inpaper, it is now increasingly capable of reducing variability inthe raw material itself. Plantation output can be homogenizedthrough choice of species, site, inputs, spacing, provenance,hybridization, cloning, macropropagation, micropropagation and DNAanalysis. Genetic engineering is also getting under way. As RobertA. Wilson and O. Fernandez Carro of Arjo Wiggins Appleton note(1992), 'the process of linking genes to tree, pulp and papercharacteristics is now beginning'. Wilson (1995) adds:

Like the agricultural revolution from the wild wheat ofMesopotamia to modern, high-yielding, disease-resistant wheat, theforest industry is facing a new age of merging natural forestspecies with agricultural experience into modern fibre-croppingsystems. Tree species . . . are following the same path andimprovements as wheat, corn and potatoes.

Dependence on such uniformity will of course only reinforcedependence on plantations (Fernandez Carro and Wilson 1992, R.Wilson 1995, P. Wilson 1995, Griffin 1995, L. Wilson 1994).

Shifting pulp production

Some of the same incentives which encourage the industry to shiftpulpwood production to the South also encourage it to build pulpand paper mills there. Cheap land in big contiguous swathes, forinstance, is an advantage not only for plantation interests butalso for pulp manufacturers, since state-of-the-art pulp millstend to be huge and are thus most economically sited in the centreof large, compact raw-material catchment areas. Low labour costsare of course also attractive to pulp firms,

as is the eagernessof many Southern governments to 'apply stimuli' to the industry.Looser environmental regulations provide still another attraction.In 1990, the pulp and paper industry in North America had todevote 54 per cent of its total spending on new plant toenvironmental measures, and in Western Europe, 26 per cent, whileelsewhere the figure was only 10 per cent. New air and water rulesenacted by the Environmental Protection Agency are set to makepulp and paper production still more expensive within the bordersof the US; International Paper claims that the rules will cost italone more than $1 billion in capital improvements over athree-year period (Soulas 1994, McClelland 1994, Van Hook 1994, FT9.2.95).

Small wonder, then, that Southern-produced pulp can be as cheap,relative to that of the North, as Southern-produced wood. In 1993,for example, bleached hardwood pulp cost only US$78 a tonne inBrazil but $156 in Eastern Canada and $199 in Sweden. New regionaland global trade agreements such as GATT are making it easier forthe industry to take advantage of such cost differentials byshifting production to the South (Judt 1994, Hagler 1995). Theconsultant firm Hawkins Wright predicts that of all the majorkraft market pulp capacity increases expected between 1994 and1997, some 77 per cent, or over 3.6 million tonnes per year, willbe sited in the Southern countries of Indonesia, Brazil, Thailand,South Korea, Chile and Morocco. Over 98 per cent of the hardwoodkraft market pulp capacity increases expected over this periodwill be in the South (Bingham 1995).

Pulp, moreover, has more value added, and, when dried, is moreefficient to ship than logs or wood chips, which are up to halfwater. One dry tonne of hardwood pulp is roughly equivalent to 2.5tonnes of hardwood chips; while it costs US$150 to ship, fromChile to Japan, enough softwood to make a tonne of dry pulp, itcosts only $55 to ship the pulp made from that softwood. Thusplantation sites and mills have been integrated in the exportsectors of Brazil, Indonesia, and other Southern countries. After2000, according to Robert Hagler, 'increased pulping capacity inwood-producing regions and more joint ownership of this capacityby producers which formerly imported raw wood' will causeinternational wood fibre trade to level off and eventually todecline (Bazett 1993; IIED 1995; Hagler 1993; Whitham 1994).

While the cost of capital for mills tends to be higher in theSouth than the North, Southern countries can offer compensationswhich are often more than adequate, including soft loans frommultilateral development banks. In order to be able to reschedulethe debt service on such loans, Southern producers are oftenforced to reduce prices to keep orders _ and foreign exchange _coming in. That pushes paper prices down worldwide. Hard-pressedto compete and hold market share, some Northern firms may bedriven to subcontract out some of their basic production to theirSouthern counterparts. Thus the label of a Northern paper firm maybe affixed to boxes of photocopy paper flowing out of southernBrazil or central Sumatra, while the firm's own mills move intoproduction of speciality papers. This pattern helps explain whythe newest, biggest mills in countries such as Brazil produce soheavily for export, while the task of supplying the domesticmarket is typically left to older equipment (Graham 1994, Oinn1994).

Contributing to pressures to establish mills in the South isNorthern firms' need to export pulp and paper machinery. In theearly 1990s, for example, a severe economic recession engulfedFinland, a country particularly vulnerable to pulp and paperindustry cycles due to the high 30 per cent share its forestindustries contribute to GNP. What with heavy indebtedness,cost-cutting and layoffs by the forest industry, firms such asTampella, Valmet, Sunds Defibrator, and Ahlstrom began to striveespecially hard to find more Southern outlets. Helped by Finland'sPremixed Concessional Credit Scheme and the Finnish 'foreign aid'budget, Finnish machinery exports to Indonesia surged from nil toover US$100 million between 1990 and 1993, while those to Thailandincreased nearly fivefold, to almost $110 million, over the sameperiod. Some 18 per cent of Finland's machinery exports now go tothe two countries, up from a little over one per cent in 1990 (PPI1.1994; Finland National Board of Customs 1990-3, Rasmusson 1994,Ulvila 1994).

Nordic-country consultancies in forestry, engineering and pulp andpaper manufacture are also eager to find more contracts abroad.Some ten per cent of Finland's professional foresters

werereportedly unemployed in 1994, and many are eagerly seekingcorporate- or 'foreign-aid'-funded jobs in the South. According toUlf Rasmusson of World Wide Fund for Nature Sweden, Nordicconsultants in Indonesia not only play a major role in thedevelopment of industrial forest estates but have also beeninvolved 'in most of the major mill developments on the island ofSumatra' and 'perhaps the majority of the large mill projects onKalimantan, . . . which will be the focus of much of the pulp milldevelopment ahead.' With their ability, through insideconnections, to appropriate 'aid' funds for what are essentiallycommercial purposes, Nordic forest industry consultants are alsoinvading Laos, Cambodia and Vietnam in large numbers, overwhelminglocal bureaucracies with money and plans, in their attempt torepeat past industry 'successes' in Brazil and other countries.With some analysts predicting a stagnation in Nordic harvestvolumes if large areas are planted in the South, pressures toexport Nordic consultants may well increase further in the future(Rasmusson 1994, Bazett 1993).

One of the most important incentives for investment in newplantations and mills in the South, and particularly in operationswhich integrate the two, is the expected world-leading growth ratein Pacific Rim paper and pulp consumption over the next decade. By1998, market pulp demand in Asia is likely to have outstrippedthat in North America. Some 45 per cent of the region'sconsumption growth over the next decades, according to FAO, willbe attributable to Japan, which already accounts for half itspaper use, although growth in the Asian 'tigers' and China willalso be important. According to Arjo Wiggins Appleton, the annualconsumption of printing and writing papers in East and SoutheastAsia will nearly double between 1993 and 2000, from 8.5 million to16.5 million tonnes. Latin American paper consumption is alsoprojected to grow, although less spectacularly, with demand forprinting and writing grades expected to jump from three milliontonnes in 1993 to 4.4 million tonnes in 2000. By comparison,Eastern European demand for printing and writing papers isprojected to increase from 1.9 to 2.5 million tonnes (Wright 1993,Olsson 1995, Soulas 1994, Ionides 1994, Graham 1994, WALHI andYLHBI 1992, Soetikno 1993, Aurell and Jaakko P"yry 1988, Pesonen1995).

Investment in plantations, pulp and paper is moving not only fromNorth to South and North to North, but also from South to Southand even, in some cases, South to North. Capital-surplus economiessuch as South Korea and Taiwan, for example, are increasing theirinvestment in chip- and pulp-producing capacity abroad _ not onlyin Southeast Asia but also in, for instance, the southeasternregion of the US _ partly to ensure secure supplies for domesticpaper manufacturers. At the same time, a wood-hungry Chineseconcern is looking to help build a pulp mill which would use asraw material the native forests of southern Tasmania, andMalaysian and Chinese firms have joined their Japanese and UScounterparts in investing in recently-privatized state forest landin New Zealand (Graham 1994; Dudley, Stolton and Jeanrenaud 1995).South Africa's leading pulp and paper firm Sappi, meanwhile,controls companies in the UK, Germany and the US, while Mondi, thecountry's No. 2 producer, has interests in the UK and Portugal(PPI 3.1995).

Dynamics of globalization: the case of Japan

One of the most striking demonstrations of the regionalization andglobalization of the pulp and paper industry is the expandingwood-fibre network centred on Japan. Japanese pulp and paperfirms' exploitation of cheap foreign fibre sources has helped bothto unharness national consumption from national supply and tocircumvent environmentalist opposition from any isolated point inthe network.

Soon after the emergence of modern journalism and a modernwood-based paper industry in the latter part of the 1800s, Japan'spaper companies, having depleted the limited native domesticconifer forests, were already eyeing overseas resources in Russia,China and elsewhere. After the Russo-Japanese War, Sakhalin wasannexed and a large pulp production base set up there to takeadvantage of the peninsula's softwoods. Following victory in theSino-Japanese war, Manchuria's forests were also exploited, aswell as timber in Korea and Taiwan. By the time of the SecondWorld War, Southeast Asia's forests were already being studied forpulp potential by Oji, and there was some exploitation ofSoutheast Asian mangroves as early as the 1950s. During the ColdWar, the US

government, seeing Japan as an ally against communism,offered Alaskan forests to a fibre-hungry Japanese consortium,causing a tremendous impact on the Tongass National Forest areaand river system (Nectoux and Kuroda 1990, JATAN 1993, Kuroda1995).

Between 1960 and 1970, Japan, although faced with a shortage ofeconomically-available domestic raw materials, saw its apparentpaper consumption surge from 47 to 121 kilogrammes per capita.Beginning in 1959 with the lifting of a quota system of foreignexchange for timber imports, the country began importing largeamounts of more expensive foreign fibre, particularly from sawmillwastes from western North American softwood forests. Shortages,however, continued through the early 1960s, despite increasedproduction in national and private forests, and more and more wasimported from North America, Australia, New Zealand, the SovietUnion, and _ peaking in the mid-1970s _ Malaysia. Between 1965 and1975, the proportion of Japan's pulpwood supplies which wereimported (and this does not include the important category ofsawmill residues from processing of imported logs) jumped fromthree to 40 per cent. Between 1986 and 1993, overlapping withanother period of rocketing consumption (Japanese paperconsumption rates and oil prices appear to be inverselycorrelated), this ratio increased further, from 40 to nearly 60per cent. In 1991 the country was appropriating 40 per cent ofworld imports and 90 per cent of Pacific Rim imports (Marchak1991; Ozinga 1994; Hagler 1993, 1995; Japan Paper Association1994; Penna 1992; Lamb 1992; Olsson 1995; IIED 1995).

Over the years, the form in which Japan has imported its pulpwoodhas changed largely from logs to wood chips _ a more easilystandardized international commodity. In 1964, the first of afleet of high-sided, flat-hulled oceangoing vessels madeespecially for hauling the chips was constructed. Such ships nownumber nearly 110, and are 90 per cent Japanese-owned. Between1955 and 1975, the proportion of Japan's pulpwood derived fromchips rose from 0.2 to 74 per cent. Largely as a result of thisshift, the proportion of total world wood fibre trade conducted inchips increased from ten per cent in 1960 to 54 per cent in 1990.Japan now accounts for 80 per cent of the world's wood chip trade,five times more than Europe and North America combined. Assuggested above, the next stage in this evolution is for trade inpaper raw material to take the form of dried pulp rather thanchips; between 1991 and 1994 the share of pulp imports in Japan'sapparent consumption rose from 20 to 26 per cent (Schreuder andAnderson 1988, JATAN 1994, Lamb 1992, Whitham 1995).

Since the 1960s, most of Japan's fibre imports have been WesternNorth American softwood chips. About 1968, however, the countrybegan to import plantation pine from New Zealand, rubberwood andmangrove wood from Malaysia, and, a couple of years later,Australian eucalyptus. In 1972, a pulpwood supply contract wassigned with the Soviet Union, and tropical hardwood chips begancoming out of a Honshu operation in Papua New Guinea in 1974.South Africa began shipping acacia and eucalyptus chips in 1976,and Indonesian mangrove forests began to be chipped for export toJapan about a year later.

Following a mid-1970s downturn in the Japanese industry partiallydue to new pollution-control laws, a revalued yen, higher oilprices, and depressed industrial demand, three shocks led thecountry's industry to rush to diversify its overseas supplies evenfurther. First, in 1979-80, interest rates increased in the US.This reduced housing starts, sawmill production, and thus millresidue surpluses available for export. US suppliers such asWeyerhaeuser, on which the Japanese industry had grownparticularly dependent, imposed steep price hikes overnight.Prices did not remain high enough to make a shift to domesticsupplies economic, and dropping oil prices in the mid-1980sencouraged the industry to turn to imports of softwood fromcountries such as Chile. With increased recycling, long fibresfrom these imported softwoods became particularly important to topup reused fibre mixes, but short-fibred Eucalyptus deglupta and E.grandis also began to be recognized as valuable for qualityprinting papers. By September 1981, Honshu, Oji, Jujo, and Kanzakihad teamed up in a joint firm aimed at securing new raw materialsand unifying wood fibre research.

Second, in 1987-88, the Tasmanian government increased woodroyalties, and a projected mill in the state threatened to absorbAustralian hardwood (eucalyptus) supplies which had been going

toJapan. These events led the Japanese industry to turn increasinglyto Southeast Asia and the southeastern US. A third shock arrivedin the early 1990s when logging was reduced in western NorthAmerican forests, diminishing waste chip supplies drastically.This development was due to the forest industry's depletion ofold-growth forests without sufficient replanting, accompanied bygrowing environmentalism affecting use of public lands. Chipexports from the western US declined almost 22 per cent between1989 and 1992. The Japanese industry's worries aboutenvironmentalism in Australia and Chile have only reinforced itsdetermination to secure varied raw materialsources (JP&P 30 (1);PPI 1.1994).

By the late 1980s, amid a second big surge in domestic apparentconsumption from 160 kilogrammes per capita in 1984 to 222kilogrammes in 1989, Japan was importing wood chips at a steadilyincreasing rate not only from Australia, the western US, Canada,Chile, New Zealand, South Africa, the Soviet Union, Indonesia andMalaysia, but also from Fiji, Papua New Guinea, China, Thailand,Taiwan and the southeastern US. In addition, it was laying plansto secure further supplies from the interior of northern Canada,Vietnam, Argentina, Venezuela, West Papua, and other parts ofOceania. Siberia, which has always supplied some softwood toJapan, has also become a major target for further exploitation butmust wait for infrastructure to be built, some of which may followon from oil development. Japanese chip imports shot up from 7.1 to11.8 million tonnes between 1987 and 1991, with total pulpwoodimports nearly doubling between 1985 and 1991. During the periodof overcapacity and falling profits in the paper industry in theearly 1990s, Japan's Ministry for International Trade andIndustry, rather than taking direct responsibility for reducingproduction and capacity, gave the industry yet furtherencouragement to invest in technical development, plantations andmills in Asia to take advantage of the region's resources, lowcosts and expected high demand growth (Whitham 1994, 1995). In1993, 38 per cent of Japan's chips came from North America, 30 percent from Australia and New Zealand, 15 per cent from LatinAmerica, eight per cent from other Asian countries, and over oneper cent from Fiji and Papua New Guinea. Over the next decade,hardwood supplies from Southeast Asian plantations are likely toreplace a significant portion of imports from more distant regionssuch as Chile or the southeastern US. The Japanese paperindustry's continuing foreign expansion has been critical inkeeping its prices competitive with those of imports and inreducing its dependence on the nation's trading companies; in thefuture it may also be critical in the industry's attempts to takeadvantage of new markets (Penna 1992; Marchak 1992; Schreuder andAnderson 1988; P&PA 1993; P"yry 1993; UN 1994; JATAN 1993; Hagler1995).

As Chapters 8-12 will show, one result of this drive to diversifysources was social strife and dislocation in Southeast Asia andLatin America. Another was changes in the ecological and sociallandscape in certain regions of the North. By 1993, for example,the southeastern US had become a major source of raw materials forJapanese paper, with Gulf of Mexico ports exporting over twice asmany hardwood chips to Japan than their counterparts on the WestCoast. As one Japanese industry figure commented, his nation hadtaken a 'new step to secure resources, that is, planting its ownforests in other countries as long-term resource programs' (JP&P30 (1), Hagler 1995).

Competition among such a large number of countries for theJapanese market, of course, helped keep prices low as well asprovide guarantees of steady supplies. By 1987, Australianhardwood was already cheaper in yen than domestic hardwood evenwhen transport costs to Japan were added in, while US softwood wasalmost at parity with domestic softwood. The yen prices of thesewoods declined even further between 1990 and 1994, and Indonesianhardwoods and Chilean softwoods were still cheaper (Marchak 1992,Japan Paper Association 1994, P&PA November 1993, UN 1994, JP&P 30(1), Hagler 1993, Whitham 1994).

Such low prices make it unlikely that the Japanese industry willturn from foreign to domestic supplies of pulpwood. While Japan isnearly two-thirds forested, its trees remain economicallyrelatively unavailable for pulp. Instead of being managed byintegrated corporations, forests are owned in small, fragmentedparcels by families who band together in cooperatives

andcommunities to manage them. Such owners are often not particularlyinterested in selling to the pulp and paper industry, which islocated outside forested areas. Much Japanese forest land,moreover, is on steep slopes, is difficult to get access to, andsuffers from poor management. While the government established tenmillion hectares of conifer plantations in response to heavyovercutting of hardwoods after the Second World War, it isextremely doubtful whether these trees, now over 40 years old andcovering around a quarter of the nation's land surface, will beready for harvest within the next ten years. Including suchspecies as cedar and cypress, the plantations were in any caseestablished mainly for lumber, not for pulpwood. Remnant hardwoodstands, meanwhile, are being logged less and less, due largely toconservationist pressures (Marchak 1992, Cameron 1994, JATAN 1994,Bazett 1993, Kuroda 1995).

The increase in imports of wood fibre to Japan in the late 1980sand early 1990s was overwhelmingly in hardwoods. The postwardevelopment of a hardwood pulp technology had enabled theexploitation of Japan's own broadleaved trees for paper,contributing to an increase in domestic hardwood harvesting in the1960-72 period. But although domestic softwood harvests stayedroughly level through the 1970s and after, domestic hardwoodsupplies began to dwindle in the late 1960s, when beech forestfelling, which had been increasing, began to trail off. Nativehardwoods from countries such as Chile, Australia and Papua NewGuinea, together with plantation eucalyptus and acacia fromcountries such as South Africa and Thailand, have satisfied muchof the increased demand. As Chapter 2 suggests, this move has beensupported by technological changes which made eucalyptusincreasingly attractive as a raw material for quality papers. By1991, the proportion of hardwood to total chips had increased to65 per cent, and by 1993 to 73 per cent (Graham 1994, JATAN 1993,Penna 1994, Marchak 1992, UN 1994, Japan Paper Association 1994,Lamb 1992).

Historically, Japanese companies have tended to keep their pulpand bulk-grade paper mills close to home. Among other things, thisenables the industry to take advantage of the economies ofintegrating pulp with paper plants. But with the need to securecheap fibre supplies, the savings gained by transporting pulprather than chips, and various trade pressures, Japanese foreigninvestments have increasingly included pulp and even basic-gradepaper mills as well as plantations and chipping operations. In1971, Oji and what was then Sanyo Kokusai Pulp helped establishthe 700 tonne-per-day Carter Oji Kokusaku Pan Pacific pulp mill inNew Zealand. Two years later, Nippon-Brazil Resource Development,a consortium of 20 Japanese paper companies and the OverseasEconomic Cooperation Fund, joined together with Companhia Vale doRio Doce in Minas Gerais, Brazil, to create CeluloseNipo-Braslieira, or CENIBRA (see Chapter 7). The 40,000tonne-per-year Tenma whiteboard mill was set up in Thailandshortly afterwards with the involvement of Sumitomo. By 1980, inaddition, new pulp or paper capacity amounting to one milliontonnes per year had been built in Canada through the efforts ofHonshu (in association with the Mitsubishi general tradingcompany), Daishowa (with Marubeni), and Oji (with Mitsui). NipponPaper and Alaska Pulp Corporation (in association with Mitsubishi,Marubeni and Itochu) meanwhile involved themselves in theconstruction of 800,000 tonnes of dissolving pulp and newsprintcapacity in the US.

This trend accelerated in the late 1980s, when the yen was strongand domestic demand booming, and has continued into the 1990s.Kanzaki, Settsu, Daishowa and Jujo have set up new paper mills inthe US and Settsu in Portugal and Spain, while Nippon and Marubeniare involved in a new pulp operation in Sumatra and 19 otherJapanese firms are working to expand a huge pulp operation inBrazil. Japanese firms are also involved in paper operations inIndonesia, Thailand, Brazil, Malaysia, China and Singapore. InCanada, meanwhile, Daishowa, New Oji, Honshu, Hokuetsu, andMitsubishi control gigantic 850,000 tonne-per-year pulp operationsin Alberta, with concessions covering over 10 million hectares. Asa result of such expansions, Japan's share of world wood pulpimports went up from less than five per cent in 1965 to nearly 14per cent in 1989. In 1993 Japan imported about 3.3 million tonnesof pulp, 71 per cent from North America, two per cent from Brazil,Chile and Indonesia, and smaller amounts from New Zealand, theNordic countries,

Portugal and South Africa. Japanese firms havealso begun buying paper from Canadian companies such as MacmillanBloedel (AP&P 31 (2); Dargavel 1991; Olsson 1995; Whitham 1994).

Chapter 4
Impacts on People and their Environment

Nearly every human activity has some impact on society and itsenvironment, positive, negative or both. Agricultural crops are noexception. While such crops are neither negative nor positive inthemselves, their cultivation can be defined as basically positiveif it turns out to be sustainable in the long term, if the processit begins is reversible, and if it benefits local people. On theother hand, it can be defined as fundamentally negative if it isnot sustainable in the long term, if it sets in motion processeswhich are not reversible, or if it results in losses for localcommunities.

In recent years, eucalyptus, because it is planted so extensively,has become a symbol of large-scale tree crops in the South.However, it would be wrong for analyses of the impacts of suchplantations to centre on the botanical or ecologicalcharacteristics of eucalyptus. The problem lies not in anyparticular species and its unique biological features, but in howit is used. The issue would not be substantially different if anyother tree _ native or exotic _ were planted on a large scale tosupply industry. As shown in Chapters 8 (Chile) and 10 (SouthAfrica), problems generated by industrial pine plantations arevery similar to those created by eucalyptus.

Unfair to tree plantations?

Many foresters and plantation owners claim that environmentalistshave unfairly highlighted the defects of tree plantations whilepaying less attention to other crops that _ according to them _ dojust as much to degrade the environment. Brazilian forester Walterde Paula Lima (1993) states, for example, that 'it is interestingto observe the duplicity normally encountered when comparisons aremade between agricultural crops and forest trees'. The Uruguayanpulp firm Fabrica Nacional de Papel (1992) puts forward the samecriticism, saying that 'it is worthwhile showing the moral doublestandards which seems to have been established to judgeagricultural crops'. Assuming that this accusation is made in goodfaith, it requires several responses:

- It is false that environmentalists have been especiallyharsh in their treatment of tree crops. On the contrary, theenvironmental movement has traditionally concentrated ondeforestation, indiscriminate use of toxic chemicals inagriculture, the disappearance of biodiversity, the impacts oflarge dams and nuclear power stations, and other themes, onlyrecently turning to tree plantations. Indeed, many Northernenvironmentalists, far from being too harsh, still automaticallyassume that all tree plantations must be good.
- Where environmentalists have taken an interest in theproblems of large-scale tree crops, this has been motivatedlargely by the complaints of local affected peoples. Whereinvestigations have been carried out, they have tended to confirmthe existence of deleterious effects, a fact which is increasinglyaccepted by governments and businesses alike.
- The Green Revolution _ of which the type of forestrydevelopment we discuss in this book is one part _ has been studiedand denounced by many environmentalists on both ecological andsocial grounds. Criticism of tree crops in many ways merelyfollows on from criticism of the Green Revolution _ which, ofcourse, is mainly directed at non-tree crops. Over the years,environmentalists have thus paid at least as much attention to theproblems of non-tree monocrops as they have to tree plantations.
- Large-scale industrial monocultures, by virtue of theirextent alone, can generate large-scale problems, bothenvironmental and social. Given the current worldwide promotion ofsuch plantations, disseminating information about their potentialimpact should be an important priority.

The two libraries

Scientific research on tree plantations falls into two libraries.On the one hand, a variety of scientific work has been conductedto prove that monocultures of eucalyptus, pine and other speciesdo not have large negative effects, some even maintaining thatthey have positive consequences for society and its environment. Agreat deal of equally important scientific work, on the otherhand, has concluded that such plantations do substantial damage,both social and environmental.

Why this divergence of views? Is it that one or the other group ofscientists is doing bad science? If so, in what sense? Or is itthat they are all incapable? Or is it rather that we should notexpect silviculture to be able to provide all the answers toquestions about the biological or social effects of plantations?Several reasons may perhaps be given for the existence of the twolibraries.

First, modern science is not an objective, monolithic constructionlocated outside society. Any scientific work is coloured by theexperience of the author and linked to her or his scale of valuesand vision of the world. In some cases, scientific research mayeven be reasonably suspected to have been directly affected by thematerial interests of the author. Walter de Paula Lima (1993),following extensive research on the environmental impacts ofeucalyptus, concluded that eucalyptus has no important negativeeffects on water, soils, flora or fauna. Although Lima's book isaccompanied by the obligatory disclaimer that it does not take any'stance of defence or attack, as fits true scientists, making animpartial and sensible analysis of the issue', it was in fact madepossible only through the collaboration of Brazil's NationalAssociation of Pulp and Paper Producers, 'with valuable financialsupport' from almost 40 companies, including major powers in pulpand paper such as Aracruz, Bahia Sul, CENIBRA, Champion, MonteDourado, Votorantim, Riocell, Norcell, Ripasa and Klabin.

Khon Kaen University scientists in Northeast Thailand, similarly,found clear evidence that, even under artificially favourableconditions, the use of pulp mill wastewater for irrigation woulddamage plant growth severely and necessitate large investments intechniques to fertilize and remove salt from the irrigated soil.Yet the scientists concluded, contradicting the data they hadthemselves collected, that the use of such wastewater forirrigation was 'feasible'. The research was supported by thePhoenix Pulp and Paper Company, Ltd. _ a firm eager to find newways of disposing of its water-borne effluents (Jirasak et al.1993).

A second reason for the existence of the two libraries is thatsilviculture (which traditionally focused on wood production forthe market) cannot by itself offer a comprehensive analysis of theimpacts of plantations. The problem rests not with the disciplineof silviculture specifically. Rather, it lies in the reductionismof modern science in general, which divides reality into so manyisolated parts that the larger picture remains obscure, yetinsists on identifying some of these parts with the whole (Shiva1993). Any research on the impacts of plantations needs theparticipation of many agents, social and scientific, to arrive atserious conclusions. Some knowledge forms part of the culturalheritage of local peoples. Other knowledge can be arrived at byexternal agents (environmentalists, natural and social scientists,forestry experts, and so on). Uncoerced interaction between bothgroups of agents is more likely to result in realistic, fruitfulconclusions than 'scientific' studies conducted in isolation fromthe community.

Third, because pressures to establish plantations operateworldwide, monoculture tree crops are grown today in a widevariety of environments influenced by differing social, political,economic and environmental factors, and under different managementregimes. The results of studies of plantations' effects onbiodiversity or soils in a single location thus cannotautomatically be generalised. The same is true of social impacts.

Finally, scientists studying plantations often do handle data in aremarkably unscientific fashion. Totally dissimilar circumstances,for instance, are often compared as if they were similar. It wouldseem to be a mark not only of scientific caution but also ofcommon sense to assume that a native eucalyptus forest inAustralia cannot be compared with a plantation of the same speciesoutside its native habitat, that patches of trees planted inagroforestry systems are not the same as large scale monocultures;and that an intensively-managed industrial plantation offast-growing species will not have the same characteristics as anunmanaged and unexploited plantation. Nonetheless, all thesecomparisons are regularly made, and the conclusions presented asscientific evidence, with the result _ whether intended orunintended _ that the public becomes confused.

This chapter aims to avoid this error. It will rely not on studiesof plantations on degraded soil, or studies of small plantations,or studies of agroforestry systems, or studies of narrowly-focusedlaboratory interactions. Instead, it will be based on real-worldobservations of large-scale

tree monocultures planted to supplyindustry. There is already sufficient evidence concerning thistype of monoculture in many different locations to draw some firmgeneral conclusions, and it is these that constitute the core ofthis chapter. At the same time, however, the chapter will notpretend to deal with all of the impacts of plantations, nor claimto decide in advance which are the most important, since theeffects of plantations which are most important to localcommunities vary from one place to another. The chapter aims,rather, at offering some observations which may help clarify theissues.

Impacts on water

Tree crops have been publicised as performing functions similar tothose of a forest in the maintenance of the water cycle. Someplantation proponents have even gone as far as to state that thetree plantations in prairie ecosystems help to regulate the watercycle (JICA 1987). Such affirmations are groundless.

Changes in the water cycle

The water cycle can be described as follows: part of the rainfallis intercepted by the vegetation and evaporates, while the restfalls to the ground and either runs off superficially or filtersinto the subsoil. Part of the water absorbed is used by plants andreturned to the atmosphere; another reaches the underground watertable and circulates internally toward water courses or springsand the rest evaporates (Shiva and Bandyopadhyay 1987).

In ecosystems which have not been radically modified recently, thenaturally-occurring vegetation possesses characteristics whichensure long-term balance in the water cycle. The morphology andphysiology of the component species of the local ecosystems tendto be adapted to make most efficient use of available rainfall.Large-scale tree plantations, however, modify all of thefollowing:

- The ratio between the amount of water intercepted by thefoliage and the amount of water reaching the ground. The foliageof a plantation differs from that of a natural forest, a savannaor a prairie, in biomass, height, form of cover, and shape anddistribution of leaves and branches. Plantations also generallylack undergrowth. These characteristics change the quantity ofwater intercepted and evaporated. Thus, the soil will tend toreceive either more or less water than that received under theoriginal vegetation.
- The ratio between the amount of water which runs off thesurface and the amount of water which infiltrates the soil. Thisis affected by factors such as the type of humus generated by theplantation and the quantity of accumulated leaf litter, whichfacilitate or complicate the absorption and infiltration of waterwhich reaches the surface. The volume of water which crosses thecanopy also affects this ratio. Soil compaction after the use ofheavy machinery, in addition, impedes infiltration, encouragingevaporation.
- The ratio between the amount of water evapotranspired andthe amount of water which infiltrates through to the subsoil watersupply. This ratio depends largely on how much water is used bythe species planted. There is a direct relation between trees'rate of growth and their water consumption. In plantations thatuse the fastest-growing genotypes of fast-growing species, waterconsumption tends to be extremely high.

To begin with, then, we can be almost certain that a plantationwill introduce changes in the water cycle. The type and degree ofchanges will not only depend on the species planted and itsmanagement, but will also be affected by the local climate (volumeof rainfall, seasonal changes, droughts, temperature, winds),topography and soil type.

Hydrological deficits caused by plantations can result in a numberof impacts such as:

- Reduced availability of water for other livelihood andindustrial activities. In Espirito Santo, Brazil, for example,over 150 lakes and numerous rivers are alleged to have dried up asa result of eucalyptus plantations, depriving local people of fishand reducing farm yields (IAD 6/7.1992). In the Tarawera River inNew Zealand, lower flows resulting from big pine plantations 'arecreating

problems for downstream users, including ironically, theTasman pulp and paper mill where toxic discharges have less wateravailable for dilution' (Rosoman 1994).

- Problems of water supply for hydroelectric generationsystems, such as that being faced by Electricorp in the MacKenziebasin of New Zealand (Rosoman 1994).
- Discontinuity in the flow of watercourses in low periods.In South Africa, for instance, during the growing season, flowfrequently ceases in areas where plantations have replacednatural, non-forest vegetation such as shrub or bush (Wicht 1967,cited by Sawyer 1993).
- Increased impacts of droughts. In the climaticallydrought-prone zone of the coast of the Maule and Talca in Chile,for example, excessive water consumption by rapid-growth treeplantations has been noted to deplete the groundwater reserves(CODEFF 1994). Caroline Sargent (1992) states that 'where thereare downstream water shortage problems, the excess watertranspiration of fast growing plantations . . . is likely to bedeleterious, reducing net flow and contributing to droughtpotential'.
- Less water for local communities and urban centres. InChile, houses and agricultural plots have had to be abandoned forlack of water and the town of Angol began facing serious watersupply problems eight years after plantations were established inthe area (Cruz and Rivera 1983). As a general rule, where treesreplace non-forested land uses, 'the overwhelming evidence fromcatchment research is that following reforestation, groundwaterlevels are lowered and stream yields are reduced, both effectsbeing more pronounced during the dry season or growing season'(Hamilton and King 1983).
- The modification or destruction of other naturalecosystems, such as wetlands. In Natal, South Africa, Porter(1990) points to industrial plantations as one of the principalthreats to the St Lucia Wetland Park, and in northeast Thailandplantations have damaged fish spawning grounds inseasonally-flooded riverine environments.

Rejecting empirical observations

Faced with a lack of agreement between their theoretical models ofplantation water use and some of their empirical observations,some foresters have chosen to disregard the empiricalobservations. In Chile, for example, plantations of Pinus radiatahave in some cases caused springs and other natural sources ofwater to dry up, while at the same time rendering the flows inrivers irregular, with valleys being inundated during the rainyseason. In the area of Concepci"n, the flooding of the riverAndal!en has forced people to abandon most of their farms. In thesame area, the river Mininco now floods roads and homes of localpeople (Cruz and Rivera 1983).

Faced with such observations, one soil professor and forestryexpert stated that 'the pine was brought in as a high yieldproduct and it needs sufficient water to produce wood.Nonetheless, I would doubt that a pine forest consumes a quantityof water much higher than a natural forest does'. He thencontradicted himself by affirming that 'in terms of consumption,as the pine is a rapid growth species and has a greater biomass,it would be expected to have water consumption several timeshigher than the native forest' (Cruz and Rivera 1983).

Less confused were the simply-expressed observations of a Chileanfarmer from Rere. Having inherited an area of eight hectares,nearly totally planted with pines, the farmer found that he couldget no water even for household use. As the plantation matured itwas sold, with all the pines being cut and only a small copse ofoak in a ravine being conserved. To his surprise and that of hisneighbours, a dried-up stream then reappeared (Cruz and Rivera1983). Precisely parallel observations of the recovery of streams,wells, and nong _ standing bodies of shallow water crucial forwater buffalo and other livestock _ have been made by northeasternThai farmers following the harvest of eucalyptus plantations (PRED1996).

A useful function for science, in such cases, would be not to denythat the disappearance of sources of water was a result of theplantation but rather to look for the mechanisms involved. Forexample, had the Chilean pines or the Thai eucalyptus used anexcessive amount of water? Had water failed to trickle through tothe subsoil in Chile because of the covering of needles? Was thereexcessive evaporation from the foliage or soil in either country?

A similar instance of scientific denial occurred in Uttar Pradesh,India, where Mahashweta Devi, an elderly forest guard, told of hisexperience: 'We felled mixed natural forests of this area andplanted eucalyptus . . . Our handpumps have gone dry as the watertable has gone down. We have committed a sin' (Shiva andBandyopadhyay 1987). Instead of supporting investigations intosuch occurrences, Tewari, the President of the Indian ForestResearch Institute simply denied them, writing in a contributionto a special issue of Indian Forester:

Of late in India a lot of controversy has arisen over the waterconsumption behaviour of Eucalyptus planted in forestry programmesin social forestry. It has been alleged that Eucalyptus plantationconsumes large quantities of water to the extent that they depletelocal water resources such as streams, wells, etc. This notiondoes not appear to be correct as no experimental data in supporthas so far been presented . . . There is no scientific basis inthe popular fallacy that Eucalyptus lowers the ground water table(Shiva and Bandyopadhyay 1987).

In Spain, similarly, 'experts' have sometimes ignored thetestimony of farmers such as Constancio Romero, from Aroche, whonoted that

on this farm there were irrigated crops and livestock, but oncethe Eucalyptus was planted in part of the hills, the watersreduced and we couldn't keep working here . . . With theEucalyptus everything was left devastated: no grass, no animals,no nothing. There is a lot of land in the lower part of Tariquejowhich was left without water. . . . It is very sad that peoplewith animals find themselves without water because of theEucalyptus (PSOE 1979).

In Thailand, meanwhile,

many plantations are situated on water tables and ground watersources of local villages, especially in the dry Northeast. Theeucalyptus tree absorbs and reduces the ground water so much thatthe villagers cannot irrigate the rice fields. This environmentaldamage is greatly resented by many farmers, and is one of theirmain reasons for complaining against the eucalyptus reforestationpolicy (Van Ginneken 1993).

Yet instead of taking this opposition seriously, technicians havesometimes promoted eucalyptus trees in the Northeast 'preciselybecause of their high water uptake. By lowering the water table,they [are held to] reduce the risk of salinity in paddy fields'(Van Ginneken 1993).

Accepting reality

Forestry experts, of course, are not always in the position ofhaving to discount empirical observations. In New Zealand, theelectricity company Electricorp faced up to the possibility thatplantations of Pinus radiata had reduced the flow of water intoreservoirs behind hydroelectric dams, thus threatening powergeneration. Research showed that a possible reduction of 25-30 percent in water levels would result if pine plantations weresubstituted for local grasslands. These were not merespeculations. In the MacKenzie basin, where tree crops had beenplanted (pine trees now covering 31 per cent of the catchment),flow reduction of the Tarawera river has been calculated at 27 percent for the period 1964-1992, and in Moutere Catchment, Nelson,55 percent of surface runoff and 70 percent of the water feedingthe underground water table had disappeared (Rosoman 1994).

South Africa is perhaps the country where research into theeffects of industrial plantations on water regimes has beencarried out over the longest time. Technicians there agreewholeheartedly with farmers that large plantations are voraciouswater consumers. As one South African forester affirms,'commercial timber plantings use larger quantities of water thanshorter vegetation types such as scrub, herbs and grass',concluding that 'afforestation tended to deplete substantiallyboth the total annual water yield and the base flow in the dryseason' (Le Roux 1990). As a result, in 1972, the Forest and WaterDepartment established a limit for the area that could be coveredby tree plantations in each water catchment area or subdivisionthereof. Plantations were permitted to reduce the surface waterrunoff by no more than ten percent. Even so, there is stillconcern that 'the indiscriminate planting of trees may seriouslyaffect the viability of the springs and wetlands in manycatchments' (Le Roux 1990).

Finally, even the United Nations' Food and AgricultureOrganization (FAO), which has been _ and still is _ one of themain promoters of monoculture tree crops, is beginning to acceptthat the 'plantation of extensive areas of eucalyptus in anydeforested water catchment area substantially reduces the waterproduction of this source, and the felling of the trees willincrease it':

The effect of the eucalyptus on the reduction and production ofwater is probably less than that of pine and more than that ofother hardwoods; but all tree species reduce the production ofwater to a greater proportion than scrub or grass. Consequently,when the water production of a water catchment area or the stateof the water table in the low-lying adjacent territories isaffected, the situation must be considered very seriously beforelarge scale planting or felling projects are carried out (Pooreand Fries 1985).

Conclusions

Monoculture tree crops have had negative effects on the watercycle in widely differing areas. Although this conclusion does notimply that such negative effects will occur in and around allplantations, it is sufficient to justify obligatory environmentalimpact assessments wherever such plantations are planned. Theproblem, it can also be concluded, is not with any particular treespecies, but with high-yield industrial production, which tends toconsume quantities of water in direct proportion to rapid growth.Added to this is the issue of the large scale of industrialplantations, which makes the problem more severe at the basinlevel, with serious repercussions on the economy, society and theenvironment.

Impacts on biodiversity

According to the international Biodiversity Convention signed atthe Rio de Janeiro 1992 Earth Summit, biodiversity includes'diversity within species, between species and of ecosystems'. Allof these types of biodiversity are threatened by industrialplantations _ which are often supported by the same governmentswhich signed the convention.

Human activities affect biological diversity in many ways, whetherby substituting one ecosystem for another, exterminating ordecreasing the numbers of certain species, consciously orunconsciously encouraging the explosive development of others, orhelping certain characteristics predominate within one species.One of the main ways in which human activities reduce biodiversityis through the deliberate replacement of diverse ecosystems byhomogenous ones through agriculture, animal husbandry, fishing andforestry.

Tree monocultures and biodiversity

Any industrial plantation affects not only ecosystems, but alsolocal species and genetic variety. These plantations areconstituted by a dominant species (normally exotic), which growsin extensive homogenous blocks under intensive management. Thismanagement involves soil preparation, fertilisation, herbicideuse, clearing of undergrowth, elimination of diseased trees,thinning, persecution of animals which can damage the trees, andperiodic logging. All these factors cause profound changes in theflora and fauna of local ecosystems, which can affect the regionas a whole.

Industrial plantations may replace crops, prairies, forests or anyother ecosystem. Given their scale, they generally include bothareas in which there has been a great deal of production-relatedhuman interference and areas in which there has been relativelylittle.

In many cases the biggest impact of plantations on biodiversity ismade before a single tree is planted. In many countries, nativeforests are destroyed _ legally or illegally _ partly in orderthat they may be replaced with plantations (see chapters 7, 8, 11and 12). Postel and Heise (1988, cited by Sawyer 1993) havecalculated that at least 15 per cent of all plantations intropical countries were established at the cost of natural closedforests. Native hardwoods themselves have been used, or are slatedto be used, as pulp raw material in Papua New Guinea, Cameroon,Indonesia, Malaysia, Nigeria, Chile and other countries (Dudley,Stolton and Jeanrenaud 1995).

The reduction in biodiversity in such cases is enormous. In 1993,for instance, Veracruz Florestal was accused of cutting downBrazilian Mata Atlantica forests to give way to eucalyptusplantations. The Mata Atlantica holds a record in biodiversity; arecent survey found 450 species of trees in only one hectare offorest (Faillace and Miranda 1993).

In densely-settled areas, meanwhile, especially in the tropics,big plantations frequently displace large numbers of farmers. Suchmigrants are often forced to clear areas of natural forestelsewhere to establish new farms (see the case studies of PartTwo, especially Chapter 12). In this case, plantations have apowerful indirect impact on biodiversity.

The changes plantations bring about in soil and water cycles alsoaffect plants and animals. Such changes occur preponderantlywithin plantation boundaries. However, changes in water supply canhave far broader impacts as well. The high water consumption ofplantation trees can severely modify adjoining wetlands, or evencause them to dry up, along with local watercourses. This resultsin the disappearance of, or reductions in, plants and animalsdependent on these habitats. Even when these extremes are notreached, changes in hydrological systems brought about byplantations can affect any species dependent on localwatercourses.

Impacts on plants

Industrial plantations begin with preparation of the soil. Mostlocal plant species are removed. Pioneer species which return aredestroyed either by mechanical clearing or by herbicides. Once theplantation trees attain a certain age, they impede the developmentof most other plant species as a result of increased shade,accumulation of leaf litter and dead branches on the ground,competition for water and nutrients, the cumulative effects ofcertain changes in the soil, and the allelopathic effects of somespecies which produce chemical substances that negatively affectthe growth of other species (Shiva and Bandyopadhyay 1987, Rosoman1994, Barnett and Juniper 1992).

The few species which do manage to survive in the plantation or infire-breaks are periodically eliminated to reduce the risk offire. The ecological characteristics of the plantation speciesthemselves, together with the intensive management and fellingcarried out when the trees reach the appropriate size forprocessing, bring it about that various flora which mightotherwise be associated with such trees (epiphytes, parasites,climbing plants, and so on) cannot develop. As will be suggestedbelow, the impact of this reduction of plant biodiversity on locallivelihood can be severe. In a single community in Yasothornprovince in northeast Thailand, for example, eucalyptus'destruction of local grass cover deprived local cattle and waterbuffalo of grazing, forcing a dozen families to abandon theirhomes (PRED 1996).

Photographs are sometimes shown of plantations with extensiveundergrowth (an example is in Lima 1993). Such cases, however, aretypically not industrial monocultures, but abandoned or unmanagedplantations in which local pioneers have begun to move in,occupying, in particular, spaces which open up between trees inold plantations.

It is sometimes claimed, too, that in some cases plantationsincrease local plant growth, as for example when they replacenon-forest communities. Two FAO consultants, for example, claimthat plantations 'create a forest environment which normallyproduces a beneficial result'. They admit, however, that it is'improbable' that plantations 'encourage the speciescharacteristic of the previous unpopulated terrain' (Poore andFries 1985), and another FAO study concedes that 'when indigenousplant communities (forest, woodland or grassland) are converted tomonospecific or polyspecific plantations of native or exoticspecies, with the main purpose of wood production, generally therewill be a reduction in both habitat and species diversity at thatsite' (FAO 1992).

Some of the governments and companies involved in large-scaleindustrial tree plantations have been forced, as a response topublic pressures, to adopt the opposition's discourse and toembellish the monotonous plantation landscape with some patches ofnative forest or plantings of native trees. These changes,however, are necessarily merely cosmetic, since the main purposeof the plantations _ to provide huge amounts of uniform industrialraw material _ remains unaltered. As Philip Fearnside of Brazil'sNational Institute for Research in the Amazon remarks,modifications which bring in a 'mix of a few species, includingsome that are not exotic, do not substantially change the impactof very large-scale plantations from the standpoint ofbiodiversity' (Fearnside 1993). Such changes, however, dosometimes serve the purpose of confusing the public and dividingthe opposition. The Brazilian case (see Chapter 7) is particularlyrevealing in this respect.

Plantations have an ecological impact on flora outside plantationboundaries as well:

- Some species commonly used in plantations, when put intosuitable environments, reproduce beyond the plantation and becomepests to the local vegetation. Such biological pollution occurs insome cases on a massive scale, as with Pinus patula and Acaciamelanoxylon in South Africa (Bainbridge 1990, Rosoman 1994) andPinus pinaster in Uruguay (Carrere 1994).
- Some diseases or pests that did not exist in theplantation region may begin to affect native vegetation. In India,a fungus which developed on an exotic pine (Pinus radiata) is nowthreatening the survival of the native pines P. roxburghii and P.wallichiana. In Kenya and Malawi, an aphid which began byattacking the exotic cypress Cupressus lusitanica moved on toMalawi's national tree (Widdringtonia nodifolia) and another localtree (Juniperus procera) (Barnett and Juniper 1992).
- Fires originating in or linked to plantations canseriously affect flora over immense areas. As Cavieres and Lara(1983) note, the presence of the copihue, Chile's national flower,has in one study area of that country 'seriously diminished as aresult of the fires, with only a few scarce weedy examples nowexisting'. In northern Thailand, too, fire used to simplify thestructure of plantations has entered neighbouring areas of forestand threatened non-tree plant growth used by local villagers forvarious purposes.
- Fertilisers, herbicides and pesticides carried by wind orwater may have impacts far beyond the plantation area. Thesechemicals contaminate soil, waterways and the atmosphere, andaffect people, plants and wildlife (Rosoman 1994). In Brazil, theinhabitants of the fishing community of Caravelas went to thecourts to demand an investigation into a recent reduction in crabsand other species which they linked to the use of agrochemicals byBahia Sul's plantations (CEPEDES/CDDH 1992).

Impacts on animals

For most local animals, a plantation is a desert, lacking food,shelter and opportunities for reproduction. The species commonlyused in plantations are exotic, and their principal advantagestems from the near absence of 'pests and diseases' in the newenvironment at the time they are planted. Yet however positivethis may be for the forest investor, it is not so for the localfauna whose habitat is replaced.

For some species, plantations provide shelter from predators, butthis can lead to a drastic reduction in the predator populationand uncontrolled increases in the prey population. In many regionsof Chile, for example, plantations have caused a drastic reductionin fox numbers and a related increase in numbers of rodents andrabbits, which in turn affect the pines in the plantations(Schlatter and Mur#a 1992).

Imbalances generated by plantations affect a very wide group ofspecies, the majority of which are unobserved by non-residents andnon-specialists. The enormous variety of life forms existingwithin the soil (including bacteria, viruses, fungi, smallinsects, and worms) can suffer large impacts from the combinationof changes in leaf litter and other decomposing vegetable matterand changes in the chemical composition and structure of the soil.The use of agrochemicals also importantly alters soil flora andfauna (Rosoman 1994).

Industrial plantations are characterised by intensive management,based fundamentally on calculations of economic yields. Treesnever reach full maturity, but are felled when they attain optimumsales dimensions or their growth slows. Plantations thus harbourfew of the mature, diseased or dead trees which serve asmicrohabitats for fungi and insects, which in turn serve as foodfor other animals. Epiphytes and climbing plants which supportother fauna also tend to disappear (Barnett and Juniper 1992).

A small group of species manages to adapt to newly-createdplantation environments. Even some of these species, however, areexterminated because they impede plantation development. InUruguay, Argentina and Brazil, for example, leaf-cutting ants _one of the few insects which can feed on pine and eucalyptusplantations _ have to be poisoned. The contamination whichresults, of course, can affect other animals which are inoffensiveto the plantation trees. The few species which manage to adaptthemselves to plantation ecosystems, moreover, suffer thedestruction of their new habitat

every few years when harvest timecomes round. In the case of eucalyptus this happens every six toten years, and with pine, every 12 to 20.
The impact of a plantation on animals, like that on plants, goesbeyond its boundary, as species benefiting from the plantationincrease in number and those harmed by it decrease. Firesbeginning in plantations spread into surrounding ecosystems, whileagrochemicals 'affect aquatic flora and fauna within and outsideplantations when waterways become polluted with . . . minerals orchemicals' (Sawyer 1993) (see examples in Chapters 7, 8 and 10).

How imbalances affect plantations themselves

The homogeneity of extensive tree plantations constitutes aserious problem for the plantations themselves. The great initialadvantage of exotic trees _the absence of local fauna accustomedto using them as food _ can become an Achilles heel in the longterm, when predators adapted to this species do begin to appear.At that point the food desert becomes a feast for one species,which can expand exponentially and seriously damage or annihilatewhole plantations. Such was the case in Uruguay with Pinusradiata, which had to be abandoned due to serious attacks by thepine shoot moth Ryacionia buoliana. A similar fate befell Gmelinaarborea in Brazil, and monoculture tree plantations established bythe Paper Industry Corporation of the Philippines (PICOP) havebeen plagued by pests for the same reason.
Agrochemicals developed for agriculture, moreover, are oftenawkward to use on plantations, particularly once the trees havecanopied, and can contaminate wide regions. It is extremelydifficult to apply chemicals effectively to dense stands of trees,and if airplane spraying is used, the amount of pesticide neededto guarantee coverage is enormous. These chemicals, sprayed fromwell above the level of the trees themselves, are necessarilypartly carried away by the wind to contaminate large areas outsidethe plantation itself. In New Zealand,
more than 30 brands of herbicide, pesticide and fungicide are usedon tree plantations . . . , including highly toxic and persistentorganochlorines. Large areas are sprayed with different chemicals.For example, around 10 per cent of plantations are sprayed onaverage 3.5 times for Dithistroma control. This amounts to about90,000 hectares sprayed every year over the past 14 (Rosoman1994).
Even though other methods of control are being developed insilviculture _ for example, density control (controlling thenumber of trees per hectare to make the plantation less hospitableto certain pests or diseases) or biological control (introducing apredator of the pest population) _ it is certain that the moremonoculture pulpwood plantations spread, the greater the riskswill be (Davidson 1987, cited by Sawyer 1993) finds that numerouspests now affect eucalyptus plantations in Brazil, whereas almostnone were reported early this century. Second and third rotationpine plantations in South Africa are also suffering newinfestations (Evans 1986 and Ball 1992, cited by Sawyer 1993).
Conclusions
By definition, forestry development based on monocultures affectsbiodiversity. The internal logic of the monoculture plantationconcept _ carried to extremes by the Green Revolution inagricultural crops, which influenced later developments inforestry, fishery and dairy farming _ implies the substitution ofthe diversity present in nature with the homogeneity of theindustrial process. In forestry, today's large-scale plantationsare the paradigmatic expression of this concept. There, genes,seeds and plants alike are controlled for industrial gain; therecycling of nutrients is replaced by the adding of fertilizers;competition is removed by the use of herbicides; and growth iscontrolled by spacing, thinning out, and so on. The contemporaryplantation has been defined as the 'roofless factory': at one endraw materials (genes) are introduced, other elements and energyare applied along the way, and out the other end out comes ahomogenous product fulfilling predefined conditions.
The extent to which this process undermines biodiversity dependson plantation species, plantation scale, and management methods _but that it has a negative impact on biodiversity can hardly bequestioned. On a global scale, biodiversity cannot be conserved byattempting to fence off a few

untouched areas in the middle of anincreasing sea of homogeneity. As Vandana Shiva puts it, 'notuntil diversity is made the logic of production can diversity beconserved' (Shiva 1993).

Impacts on the soil

Many existing studies of the impacts of industrial treeplantations on soils confuse the issue by citing irrelevantresearch. For example, a recent FAO publication notes that the

effects of uncropped eucalypts on soil quality have been comparedwith [those of] other species and . . . treeless areas. Thestudies were mostly in India and the Mediterranean and are fairlyrecent. Eucalypts were found to have a beneficial effect on soilstructure and compared favourably with pine and Shorea robusta(sal, a local tree). On treeless sites eucalypts improved soilfertility through decayed leaves and litter (FAO 1990).

This quotation is used to suggest that, in general, eucalyptsimprove soil quality. Yet the example refers to unharvestedplantations, while large monospecific plantations of any speciesare normally planted to be harvested and not to improve the soils.Moreover, in the real world in which investors are bent onobtaining high yields, large-scale plantations tend not to beestablished on degraded soils of the kind the FAO appears todescribe, where trees grow poorly. When discussing the effect ofreal-world commercial plantations, it is more relevant to examinea later passage in the same work, which says that, in managed andharvested plantations, the 'nutrient capital changes considerablybecause nutrients are removed from the site'.

Once such confusions are cleared up and the discussion isconcentrated on industrial monocultures, plantation proponents areforced into a final argument, which relies on a comparison betweenindustrial tree crops and the agricultural crops of the GreenRevolution model. Industrial plantations, the argument goes,should not be the subject of special environmentalist concernsince they are much less degrading to the soil than such crops.For example, the FAO cites a study showing that 'the amount ofnitrogen taken in by the cereal crop is two and a half times morethat the amount taken by the eucalypt plantation, and 15 timesmore in the case of phosphorus' (FAO 1990). Green Revolution-stylesilviculture, in other words, can defend itself only by sayingthat it is not quite as bad as the movement from which it drawsmuch of its inspiration. This defense, in addition to beingineffective against critics of the Green Revolution inagriculture, implicitly abandons the premise that one of the mainpoints of tree cultivation is to foster non-agricultural,forest-like environments.

The nutrient cycle

Trees obtain nutrients needed for growth from the soil. As Rosoman(1994) explains, in natural ecosystems many of the same nutrientsare used again and again in a relatively closed cycle. Tree rootsdraw out minerals dissolved in water from the soil and carry themto the leaves, where they are transformed into organic materialand used for the tree's vital functions. Leaves, branches, flowersand so on then fall to the ground, where various organismsdecompose them and liberate the minerals that can then be taken upagain by the roots. The tree itself then dies and decomposes inthe forest, adding more nutrients to the cycle.

Even cycles which are relatively closed in this respect, however,have some inputs and outputs of nutrients. Inputs come mainly fromthe atmosphere (as salts or other materials deposited on theleaves and which reach the soil with rainwater), from thedecomposition of the rocks from which the soil originates, fromwatercourses (particularly where floods occur), and from thedroppings and decomposing bodies of animals. Outputs leave thesystem through wind and water erosion, through the percolation ofdissolved nutrients to the underground water table or to layers ofthe soil inaccessible to plants, and through animals which extractorganic matter from the system and deposit it outside the area.

Nitrogen, in addition, can enter the system through the action ofcertain bacteria present in the roots of some plants or throughrainfall. It can leave the system, meanwhile, through oxidation oforganic material or through processes which liberate it in agaseous state.

Trees need some nutrients in relatively high quantities, whilethey use only a little of others. The former are calledmacronutrients and consist principally of nitrogen, phosphorus,potassium, calcium and magnesium. The latter are known asmicronutrients (boron, copper, zinc and others) which, though notrequired in great quantities, are just as indispensable for treegrowth.

Plantations and the soil

In ecosystems little affected by human (especially industrial)interference, nutrient cycles tend to be in relative balancebetween incomings and outgoings. Not so for intensive monoculturetree plantations. Moreover, plantations with fast-growing speciesand rapid-rotation felling bring about much more importantmodifications in the soil than do unmanaged or unexploitedplantations.

The direct impacts of such plantations on soils derive from thepresence of the trees themselves, and include changes in therecycling of nutrients and in chemical and physical soilcomposition.

In the majority of commercial plantations, an imbalance arisesbetween the nutrients taken up by the roots and those given backto the system by dead organic matter. Because trees such aseucalyptus and pine tend to reduce the action of decomposingagents such as fungi and bacteria, nutrients contained in the leaflitter are not freed up in a form which would allow them to betaken up easily by roots. Chemical changes such the acidificationof the soil and the introduction of new chemical compounds makelife more difficult for many decomposers, and changes in humidity,temperature, and light have an additional impact. The leaf litterof such pulpwood trees themselves contain tannin, lignin, oils,waxes, and other substances which are difficult to digest or eventoxic for soil flora and fauna. Many decomposers not able to adaptsimply disappear. As a result, the leaf litter decomposes veryslowly and accumulates on the soil. A study in Nigeria showed, forexample, that while leaves from native forests decomposed in twoto seven months, leaves from introduced plantation pines tookthree to six years to do the same (Barnett and Juniper 1992).

In non-commercial plantations, this problem is less serious, as abalance is eventually reached. Nutrients are not exported, littereventually decomposes and the plantation as a whole stops growing.In some cases, indeed, non-commercial plantations can help enrichsoils by reintroducing nutrients which had previously been locatedin deeper layers of the soil where the roots of native trees,shrubs or grass did not reach. In commercial plantations, however,the soil becomes poorer in direct relation with growth rates andthe felling rotation of the trees. Fast growth combined with slowlitter decomposition implies that trees are extracting nutrientsfaster than they are replacing them.

Tree plantations can also lead to greater acidification of thesoil and to changes in its physical properties. According toRosoman (1994), acidification is produced by the combination oftwo factors. One is the reduced pace of decomposition of organicmaterials which is characteristic of plantations. The other is theexport of nutrients. Trees take negatively charged ions (cations)from the soil, while leaving positively charged ions such as thoseof hydrogen and aluminium. In ecosystems subject to littleindustrial interference, the cations are eventually returned tothe soil when the trees die and decompose, while in industrialplantations many of them are removed at the moment of harvest.Other cations remain locked in non-decomposed organic matter.

Impacts of planting and management

Industrial plantations begin with large-scale preparation of thesoil. This adds to the danger of erosion, especially in areas withpronounced slopes. After the trees are planted, weeding is carriedout manually, mechanically or with herbicides, to prevent otherplants from competing with them. This destroys some or all of thenative vegetation which has survived the initial planting. Thusthe soil is left unprotected from erosion for a relativelyprolonged period _sometimes as much as two or three years. Erosioncan attack not only the surface soils of the plantations, but alsoareas where runoff collects. This has been the case in, forexample, Galicia, where terracing for planting eucalyptus hasresulted in serious erosion (Ruiz 1990).

When plantation trees are harvested, moreover, more erosionresults, together with the wholesale export of nutrients from theplantation site. Three methods exist for harvesting plantations:(1)

extracting whole trees, (2) extracting trunks together withtheir bark, and (3) extracting stripped trunks only. According tothe method adopted, the export of nutrients from the system willbe greater or lesser, though export occurs in all cases. In astudy carried out in Brazil, the nutrient content of variouscomponents of a four-year-old Eucalyptus saligna plantation with38 tonnes per hectare of aerial biomass was analysed as in Table4.1. When only trunks were taken, nearly half of the phosphoruscontained in the trees was removed, along with almost a quarter ofthe potassium and smaller percentages of the magnesium, nitrogenand calcium. When trunks were removed together with their bark,the export of phosphorus increased to 58 per cent, the magnesiumto 44 per cent, the potassium to 39 per cent, calcium to 35 percent and nitrogen to 20 per cent. Removal of the entire tree, ofcourse, was the worst option.

TABLE 4.1
Nutrient content of Eucalyptus saligna plantation (I)

Component	Per cent of tree's totalquota of elements				
	N	P	K	Ca	Mg
Trunk	12	49	24	8	14
Bark	8	9	15	27	30
Branches	17	14	26	34	17
Leaves	63	28	35	31	39
TOTAL TREE	100	100	100	100	100

Source: Poore and Fries 1985.

If these percentages are converted into kilogrammes per hectare,the figures in Table 4.2 result. It is worth remarking that at anormal commercial harvest age, even more nutrients _ between fourand five times the amount shown in the table _ would be removedfrom the soil. Even without whole-tree harvesting, it has beenestimated, three pine rotations on infertile soil will remove asmuch phosphorus from the soil as 20,000 years of natural processes(Adams 1978). (See also Holt and Spain (1986) and Jordan (1985)for depletion of soil carbon and nitrogen in Araucariacunninghammii and Gmelina arborea plantations.)

TABLE 4.2
Nutrient content of Eucalyptus saligna plantation (II)

Camponent	Element				
	N	P	K	Ca	Mg
Trunk	21	12	42	17	6
Bark	13	2	26	57	13
Branches	30	3	45	69	7
Leaves	107	7	61	64	17
TOTAL TREE	171	24	174	207	43

Source: Poore and Fries 1985.

In sum, the higher the rate of growth, the higher the rate ofextraction. The greater the amount of exported biomass, moreover,the more rapidly existing nutrients are exhausted, particularlywhen whole trees are harvested. This depletion of nutrientsentails either that the plantation must be abandoned at somestage, leaving impoverished soil behind, or that chemicalfertilizers must be applied. This second option is the onepromoted by modern silviculture. Experience with agriculturalcrops, however, proves not only that chemical fertilizers do notprovide a long-term

solution, but that they also have othernegative effects such as contamination of the above-ground andunderground water supplies and impoverishment of soil microfloraand fauna (Rosoman 1994).
This nutrient depletion occurs with both eucalyptus and pine, asis admitted even by studies done for active promoters ofindustrial plantations such as FAO and Shell:
The short-rotation harvesting of eucalyptus, especially when thewhole tree is used, leads to the rapid exhaustion of the reservesof nutritive elements in the soil. The above is a directconsequence of their rapid growth . . . Certain evidence exists toshow a greater removal of nutrients in pine plantations undersimilar conditions (Poore and Fries 1985).
[W]hole-tree harvesting and short-rotation forestry does removemuch of th[e] pool of nutrients, not only reducing soil fertility,. . . but also acidifying the soil (Good, Lawson and Stevens1993).
Short-rotation plantations, in addition, require more frequentmanagement interventions, which make the soil more prone toerosion and other forms of nutrient loss. Heavy machinery compactsthe soil, making it difficult for water to infiltrate, alsopromoting erosion. Log extraction, meanwhile, breaks the soil'ssurface, leaving it exposed to the erosive action of rain. Thegrowing tendency towards increased mechanisation, and thereplacement of chainsaws by large harvesting machines, is likelyonly to intensify damage to soils.
It is therefore absurd to suggest without qualification that anysort of tree planting protects or improves soil quality. Allevidence shows that, on the contrary, industrial plantationsdegrade soils, and that their functions can in no way be comparedwith those of natural forests.
Industrial pollution
The type of plantations analysed in this book are geared to themodern pulp and paper industry, which has historically been one ofthe most contaminating industries, emitting 'some of the mosttoxic effluent that any industry can produce' (Kroesa 1990).Chemical pulping involves the use of sulphur-based chemicals,whose recovery gives the mills _ and their surroundings _ thesmell of rotten eggs. Kraft pulping releases sulphur dioxide _ amajor contributor to acid rain _ to the air at a rate of one tothree kilogrammes per tonne of pulp, while sulphite pulping emitssome five kilogrammes per tonne. Aluminium salts used in kraftpulping are highly toxic to certain fish and 'accidental spills,which occur frequently, can have disastrous effects on aquaticlife downstream' (Kroesa 1990). Mechanical andchemi-thermo-mechanical pulping meanwhile results in the releaseof organic sulphur compounds, which, together with resin acids andother wood wastes, come to make up a highly toxic effluent, verydifficult to degrade, and dangerous to fish.
The lignin contained in pulp gives it a brown colour, which inconventional bleaching is removed through the use of chlorine gas.The pulp is further whitened using chlorine dioxide orhypochlorite. On average, between 50 and 80 kilogrammes ofchlorine is used to produce every tonne of conventionally-bleachedkraft pulp. About ten per cent of this chlorine ends up combinedwith organic molecules from the wood and is discharged in theeffluent from the mill. This produces toxic chlorine compoundscalled organochlorines, which tend to go directly into lakes,rivers and oceans. Extremely stable chemically, such compounds maybe spread hundreds of kilometres from a single pulp mill, and arelikely to accumulate in particularly dangerous amounts in animalshigh in the food chain.
Among these chemicals, the chlorinated ethers known as dioxins areamong the most potent toxics known. According to the USEnvironmental Protection Agency (EPA), people regularly eatingfish caught near pulp mills have 1,000 times more chance ofdeveloping certain cancers than control groups. In addition tobeing carcinogenic, the EPA has found, dioxins may have adverseeffects on development, reproduction and the immune system inhumans at levels close to those to which millions of people arealready exposed. Tests conducted on animals show that dioxins cancause severe birth defects, stillbirths, sterility, and thefeminization of males and masculinization of females (ES&T 29 (1),O'Brien 1990, Hocking 1991, Floegel 1994, Greenpeace International1994, Kroesa 1990).
Pulp and paper mills also create a variety of other environmentaland health problems. In the US, the EPA has reported, the paperindustry is the third largest source of toxic pollutants.

Millsgenerally release chloroform, carbon tetrachloride, hydrogensulphide and sulphur dioxide into the air as well as organicresidues and aluminum and other mineral salts into the water. InWebuye, Kenya, the Pan African Paper Mills' air and waterpollution is believed to be responsible for a number of healthproblems; more than 60 per cent of the children born in Webuyeduring the last 15 years since the mill began operations in 1974have had breathing problems between the ages of one to five.Effluents from the mill have contaminated the Nzoia River,affecting people who used to earn a living through small-scalefishing (Ong'wen 1994). The pattern is very much the sameelsewhere (see Chapters 7, 11 and 12). Research in Canada and theNordic countries has meanwhile documented a staggering variety offish disorders near mills, including skeletal deformities,reproductive problems, gill erosion, and deformed embryos (Dudley,Stolton and Jeanrenaud 1995).

Although, due to public pressure, some factories and companieshave made strides recently in pollution control, by, for example,reducing or eliminating the use of chlorine, the industry is yetfar from meeting reasonable safety standards. Worse, it is movingmuch pulp manufacture _ where most pollution occurs _ to theSouth, where controls are less strict and production thereforecheaper. While in Germany 20 per cent of the total installationcosts of a pulp plant need to be earmarked for environmentalprotection, that percentage drops to 5.6 in the case of Bahia SulCelulose in Brazil (CEPEDES/CDDH 1992).

Other socioeconomic impacts

Most large-scale commercial forestry plantations in the South arepromoted and established in inhabited locations by governmentagencies, national and foreign businesses, multilateral banks, orother organizations external to the area. Although their aim isnot to improve local quality of life, but to obtain large amountsof timber in the shortest possible time, both businesses andgovernments usually try to publicise locally the advantages thatplantations supposedly will bring to local people. On a nationallevel, too, it is often claimed that much of the economic andsocial future of a country depends on plantations and pulp, whichare said to generate both direct and indirect employment, increaseexports and support the country's development.

Experience demonstrates, however, that the environmental problemsof large-scale industrial plantations tend to be social andeconomic as well, and on both local and national levels.

Local effects

Plantations normally replace crops, grasslands, or old-growth,secondary, or scrub forests. Due to commercial necessities, theyare rarely established on degraded soil, as their objective isshort cycles of rapid growth requiring a certain level offertility and water supply (see Chapter 6) (Bazett 1993). Hencethey typically occupy areas already being used in various ways bylocal people.

In some areas, the population is sparse and land tenure is bothclearly defined legally and little-contested. In other areas,where the population is dense and many landholdings areundocumented, local people's farms may be threatened when thestate cedes land to forestry companies. In still others,plantations may usurp lands traditionally used by the community asa whole. These lands can include both communal fields andpastures, whose disappearance can force local people intooverexploiting adjacent lands or forests (Lohmann 1991).

Large-scale, fast-growing tree plantations threaten localagriculture in less direct ways, too. They may, for instance,usurp water needed by other crops or by livestock. In SouthAfrica, the Natal Agricultural Union is concerned that 'largescale afforestation of river basins is having a detrimental effecton the hydrological cycle of many of Natal's rivers and iscreating hardships for riparian farmers downstream' (Fourie 1990),and similar concerns have been expressed in Chile (Cruz and Rivera1983), Brazil (CEPEDES/CDDH 1992), Spain (PSOE 1979) and manyother countries as well.

Species whose numbers had previously remained small, meanwhile,can rapidly become economic pests when large monoculturalplantations are introduced. Such pests, which range from

mammals,birds and insects to fungi and viruses, can affect both theplantations themselves and neighbouring agricultural crops andeven livestock. In Uruguay, for instance, plantations havebenefitted populations of parrots (Myiopsitta monachus), foxes(Pseudolopex gimnocerus) and the introduced wild boar (Susscrofa), all of which can affect crops, poultry and sheep (Panarioet al. 1991, Carrere pers. obs.).

Finally, the roots of plantation trees, especially eucalyptus,because they extend several metres horizontally, can also threatenneighbouring crops by competing for their water and nutrients. Innortheast Thailand, villagers say that Eucalyptus camaldulensis is'selfish' in its nutrient use (Lohmann 1991). Acknowledging thisfact, some countries, such as Uruguay, have enacted laws requiringthat a plantation's outermost line of trees must be at a certaindistance from neighbouring land (Carrere 1993). Fast-growingtrees, of course, can also cut off sunlight to crops planted in ornear plantations. All these impacts are especially serious indensely-populated rural areas, where a reduction in production,however small, may have catastrophic effects, both threateningsubsistence and raising food prices.

Plantations' takeover of forests can also lead to severe social,economic and cultural problems. Forests often supply water andcompost for crops, fodder for livestock, and vegetables, game,honey, fruit, mushrooms, fibre, firewood, building wood, andmedicine for local communities, and in addition are frequently asource of spiritual values. Where they disappear, diets, health,housing and incomes alike may suffer.

Where local people's land or forests are directly contested, theyhave reacted in a variety of ways. In Thailand, for example,farmers have petitioned responsible government officials,publicized their grievances through the press, mobilized marcheson government offices, set up roadblocks, felled trees withinplantations and even burned entire nurseries (see Chapter 12).Repression has often resulted, with death threats, arson, andfalse arrests common.

Of course, plantations often also create conflicts within localsocieties between those who oppose and those who assimilate tothem, or, to use the rhetoric of many central authorities, between'backwardness' and 'progress'. The construction of associated pulpmills, in addition, can burden local communities with thousands ofmigrants seeking work. The enormous economic clout wielded bylarge pulp and plantation firms meanwhile tends to distort localpolitics. As whole regions become almost totally dependent on theindustry, local and regional governments are forced to bend theirpolicies to suit its needs (see Chapter 7).

In some social contexts, large-scale industrial plantations cancreate local employment, and this is one of the main argumentswielded everywhere both by state and corporations to convincelocal communities to accept the projects. However, 'very oftenplantation development results in a long-term net loss ofemployment' (Morrison and Bass 1992). Although figures vary widelyfrom place to place and source to source, on the whole thereappears to be agreement that industrial plantations cannot employas many people as conventional agriculture, particularly familyagriculture. The cases in which large-scale plantations havegenerated more employment than was already locally-available, asin Uruguay, can be counted on the fingers of one hand.

The jobs created, moreover, are mainly for seasonal casuallabourers, in particular during the plantation phase. Few climatesallow planting to be carried out year round. On the whole, workingconditions vary from bad to terrible (see Chapters 7-10).

National-level impacts

The local social impacts of tree plantations, when aggregated, cangive rise to national-level problems. For instance, thedisplacement of thousands of people by big plantation schemes _imposed or voluntary, direct or indirect _ can swell shanty townsin the big cities of the South, giving rise to increases inpoverty, crime and prostitution and leading to land disputes withother communities. In the most extreme cases, as in South Africa,such dispossession can lead to violent inter-ethnic confrontations(Albertyn 1994).

The agroexport development model on which large-scale treeplantations in the South are usually based can also createeconomic problems on a national scale. One problem isconcentration of wealth. Occupying large areas of fertile land,industrial plantations require state support and heavy, long-terminvestments varying from 600 to several thousand US dollars perhectare. In the vast majority of cases, they need tax exemptions,soft loans from foreign creditors, forestry research, roadconstruction, improved port installations, and other subsidieswhich are extracted from a nation's people as a whole. In somecases a country's people also has to underwrite the constructionof stupendously expensive modern pulp plants. Yet while thesecosts have to be met by all citizens, very few reap the profits.In Chile, for example, one of the most 'successful' cases oflarge-scale plantation development, ten years of governmentsubsidies contributed to a state of affairs in which, in 1985,
just three Chilean corporations held 70 per cent of the plantinggrants, plantation areas, and timber exports _ a very unevendistribution of the costs and benefits of plantations (CODEFF1991, cited in Sargent and Bass 1992).
Concentration of wealth implies concentration of power anddisposses-sion of local communities. In Thailand, for example,industrial plantations have been 'an exceptionally efficientdevice allowing interests responsive to the world economy to annexsupposedly "marginal" areas, smash the remaining local-orientednoneconomic or semi-economic pattern of livelihood and natureconservation there, and convert the fragments into "resources" forglobal exchange. As land is concentrated and transformed into asubstrate for eucalyptus, local villagers are cut loose to seekniches as producers, consumers, recyclers or commodities in theworld economy' (Lohmann 1991).
A further problem is the risk of national dependence on acommodity prone to wild tumbles in price (see Chapter 2).Indiscriminate planting of pulpwood trees or any other crop canlead to a glut of raw materials which, however beneficial it maybe for paper manufacturers and users, makes their cultivationprogressively less profitable. Indeed, tree crops on the whole arealready chronically unprofitable in strict market terms, asotherwise they would not need so many state subsidies. But newrisks are being added by the planting of millions more hectares oftree crops around the world in the next few years, which may putpulpwood into the bracket of other Southern primary commoditieswhose prices have fallen to persistently uneconomic levels(Editores Tercer Mundo 1989). Yet Southern countries which havecommitted themselves to pulpwood exports, as to other commodityexports, are likely to have to continue exporting at ever-lowerprices, competing among themselves for industrialized-countrybuyers. Indeed, the situation is even more serious for pulpwoodthan for annual crops, since it is not only much more expensive tocut trees prematurely than to plough a crop which has not yetmatured, but also more difficult to return land to agricultureafter trees _ particularly eucalyptus _ have been planted on it.In addition, the tree plantations in question may have beenoccupying the land for a number of years, raising financial losseseven higher. A landscape of 'tree cemeteries' _ masses ofuncropped industrial plantations like those described by PrezArrarte (1995) _ may be a real possibility in certain locations inthe future.
Similar risks, of course, afflict pulp _ the commodity whichappears to be replacing pulpwood. Here price drops are likely tobe especially serious for huge exporters such as Brazil andIndonesia, who have had to invest the same immense amounts in millequipment as their Northern competitors, but who hold less capitalto cushion potential losses when the market turns. Pulpproduction, like the large-scale industrial plantations with whichit is associated, is likely neither to bring profits to themajority of a country's people nor to decrease vulnerability toeconomic domination by the industrial North.

Conclusions

Large-scale industrial tree plantations undoubtedly help theinternational pulp and paper industry secure stable supplies ofraw materials. They are also capable of periodically makingsizable profits for the huge conglomerates which plant them. Theyare not designed, however, to benefit Southern

countries as awhole, their people or their environments. Although they normallydestroy more employment than they create (see Chapters 7 and 8),they nevertheless rely on subsidies extracted from large numbersof people to generate their profits. They do not help preserveland, forests, grasslands, or water sources, but rather exploitlocal natural advantages ruthlessly.

Neither Southern countries nor their local communities, therefore,should hope to benefit from the presence of huge plantation andpulp firms producing for export. On the contrary, they must be ontheir guard against the damage these corporations can wreak. Whileplantation tree roots may be within national territory, it is veryunlikely that the roots of such companies will be.

Chapter 5

Actors behind the Scenes

The plantation boom this book describes is not the consequence ofa conspiracy among a small group of like-minded industrialists,implemented with the careless ease of omnipotence. Nor is it theresult of 'free-market mechanisms' or an inevitable and impersonal'drive for economic development' which must now be made'sustainable'. It is, rather, a complex social, cultural andpolitical struggle featuring a multitude of agents with differentinterests, cultural inclinations, and motivations, acting againsta constant and varied background of resistance. It is only byworking in loose conjunction with each other (although usually ina contingent and sometimes uncoordinated and ad hoc fashion) thatthese actors can make paper and pulp machinery saleable, debtfinance possible, political interests meshable, and centralizationof resource control achievable. As a prelude to the case studiesof Part Two, this chapter will introduce some of the mostprominent of these actors, sketch something of their interactions,and outline a few of the strategies which shape their actions.

Pulp and paper firms

The most important customers for plantation fibre, of course, arepaper manufacturers. Together, these firms form one of the top tenindustrial sectors in the world, representing one per cent of theworld's total economic output. The 65 leading producers of paperare listed on pages 106-113.

As Chapters 2 and 3 have pointed out, the industry is dominated bythe North, where as much as 90 per cent of the world's pulpwood,over four-fifths of the world's pulp, and between three-quartersand four-fifths of the world's paper is produced. It is dominatedparticularly by the United States, which boasts between a thirdand a half of the world's pulpwood production and a rate of paperproduction about equal to that of the total of the next fourlargest-producing countries combined (Fernandez Carro and Wilson1992, Wilson 1991, IIED 1995, PPI 7.1994, FAO 1995, Van Hook1994). Nevertheless, as Chapter 3 argues, much future plantationpulpwood capacity will be established in the South, with a gooddeal of manufacturing capacity following suit, and several largeSouthern conglomerates are already climbing into the world leaguetables.

Given the size of large paper firms -- the sales figures ofInternational Paper alone rank above the Gross Domestic Productsof more than 75 countries -- it is hardly surprising that many ofthe largest paper firms are important political as well aseconomic actors. Some firms, in addition, can take advantage ofthe political clout that comes with being a member of even largerconglomerates. Arjo Wiggins Appleton, for example, whose salesfigures alone exceed the Gross Domestic Product of Honduras, is asubsidiary of the much larger British-American Tobacco firm, as isAracruz's parent firm Souza Cruz (WRI 1994, PPI 9.94). Carter HoltHarvey, a firm with pine plantations in Chile and New Zealand, isrun not only by International Paper, but also partly by BrierlyInvestments of New Zealand, a firm with US$4.75 billion in assetsworldwide, mainly in the UK.

As the list of firms on pages xx-xx shows, many prominent paperproducers supply themselves with the pulp, chips, and logs theyneed from timberlands that they own or lease. Others buy pulp onthe open market from producers elsewhere on the list, or fromother market pulp specialists such as the US's Alabama River andParsons & Whittemore; Brazil's Bahia Sul Celulose; Sweden's ASSIKarlsborg and Iggesund Paperboard; Swaziland's Usutu Pulp; Spain'sSarriopapel y Celulosa; Indonesia's Wirya Karya Sakti; andCanada's Canfor, Cariboo, Crestbrook, Irving, and Malette (thefirst three of which involve joint ventures with Japanese paperinterests) (IIED 1995, PPI 3.94). While Brazil is the South'sleader in the pulp trade, Indonesia is currently thefastest-growing

market pulp producer, with growth in the sectoraveraging nearly 29 per cent yearly between 1980 and 1991.

Still other corporations may not be directly involved in thebusiness of producing either pulp or paper, yet are involved inthe wood trade or in the development of plantations which sellwood fibre to pulp producers. Shell International, for example,began forestry operations in Brazil in 1980 and by 1991 wasinvolved in plantation projects in Congo, Chile, New Zealand andSouth Africa, as well as research operations in Australia,Thailand, France, the US, the UK, and New Zealand (Bissio 1991).While Shell's long-term interest is partly in developing petroleumreplacements from biomass (an interest shared by FLORAM inBrazil), its wood-fibre operations are currently linked to thepaper economy. Itochu, similarly, has been involved in the woodchip trade in Southeast Asia and elsewhere. Traders such asSweden's CellMark -- which is to join Marubeni in marketing pulpproduced by the giant new Tanjung Enim Lestari mill in Indonesia-- meanwhile sell pulp and paper which other firms produce.

Consultancy firms

Playing a crucial indirect role in pulp and paper manufacture area handful of Northern forestry and engineering consultancy firmswhose business is promoting, investigating, planning, designingand setting up pulp and paper mills or logging and plantationoperations.

Such companies include Canada's H. A. Simons, Sandwell, Reid,Collins and Associates, and SNC Lavalin; the US's Brown and Root,Babcock and Wilcox, CH2MHill, and Rust Engineering; the Nordiccountries' Silvestria, Swedforest and ENSO/Indufor; Switzerland'sand Britain's SGS Silviconsult; New Zealand's FORENCO Consultants;Australia's FORTECH; Germany's DFS Deutsche Forestservice; andFrance's Cirad and Chleq Frote.

Preeminent on the international scene, however, is Finland'sJaakko Poyry -- the largest forestry and engineering consultingcompany in the world, with an estimated 40 per cent of the forestindustry consultancy market worldwide and a turnover of more thanUS$300 million in 1994 alone. Poyry, which has recently absorbedthe large Swedish consulting firm Interforest, has over 60 officesin 25 countries around the world -- 11 in Brazil alone -- andthousands of employees, and has been involved in hundreds of majorcommercial forestry and pulp and paper projects in the last twodecades across North and Latin America, Africa, Asia, Oceania andEurope (FT 8.3.95; Jaakko Poyry 1994, n.d. a, b, c, d).

Firms such as Poyry are typically in the vanguard of industrialtree plantation expansion. Wherever there are possibilities forindustry growth, consultants are likely to be on the scene early,lobbying governments, evaluating forest and land resources, liningup contracts from close colleagues in 'aid' agencies,subcontracting lucrative work out to potential local allies, doingfeasibility studies or market surveys, establishing treenurseries, and designing or engineering factories. Relying oncontracts both from state and international agencies and from theprivate sector, Poyry and its fellow consulting firms serve ascrucial go-betweens linking the interests of international andnational business and officialdom and bringing together Northernmachinery and techniques with Southern land and forests.

The better that such consultancies succeed in establishing orexpanding industrial forestry or pulp and paper sectors, ofcourse, the more consulting work they are ensured in the future.Essential here are influential contacts both inside and outsidegovernment and international agencies. In 1994, for example,Poyry, which has no previous experience in India, was selectedover 15 Indian bidders to carry out World Bank forestry projectsin Kerala and Uttar Pradesh. Surprise at this remarkable

coup wassomewhat lessened by the revelation that the person in charge ofBank forestry programmes in India was a former vice-president ofthe Jaakko Poyry Group, Christian Keil. India's Inspector Generalof Forests, A. K. Mukerji, meanwhile, who had recently been aguest of Jaakko Poyry in Finland, was reportedly preparing to opena branch of the firm in India upon his retirement from the civilservice (Nation 27.11.94; Statesman 16.9.94). As Part Two willdocument, such coincidences are common. There are, moreover,virtually no official or professional sanctions which can beapplied in the home countries of such consulting firms againsttheir questionable practices abroad.

The population density of Northern consultants in the South isincreased when some of them hive off from their old firms and setup their own companies in Southern countries in which they haveworked -- thus giving themselves, and the Northern consultancieswith which they are still linked, an inside track on futurecontracts. A US$1.5 million Asian Development Bank contract fordeveloping fast-growing tree plantations in three Lao provincesbordering Thailand, for example, is being shared by Jaakko PoyryAB of Sweden and the Vientiane-based Burapha DevelopmentConsultants, whose staff is partly Swedish (DT 9.94).

Providing additional support to pulp and paper development areconsultancies which specialize in market forecasting, technicalresearch and training. The UK's Pira International, for example,performs information and research services for the paper,packaging and publishing industries, while firms such as WoodResources International and Jay Gruenfeld Associates of the US andHawkins Wright Ltd. of the UK monitor pulp or wood markets.Organizations such as London's Financial Times also providevaluable research and information for the industry, as well ashosting inter-industry meetings.

Technology suppliers

Working together with forestry and engineering consultants formutual benefit are the major Northern suppliers of pulp- andpaper-making technology. Because these firms depend on sales oflarge-scale, expensive machinery, it is to their advantage too tosupport and lobby for expansion of large-scale monoculture treeplantations. The profits to be made are enormous, with themachinery costs of each new pulp mill running into the hundreds ofmillions of dollars.

Unsurprisingly, technology suppliers tend to be based in the samecountries as forest industry consulting firms. Like the moreprominent consultants, the larger technology suppliers maintainoffices in Southern locations from Singapore to Sao Paolo, andoften team up in multinational consortia to develop or marketvarious combinations of machinery.

Among the main world suppliers of pulping and bleaching equipmentare Finland's Ahlstrom and Valmet-Tampella, Sweden's KvaernerPulping and Sunds Defibrator, the US's Beloit, Switzerland'sSulzer, and Britain's Black Clawson. Other major suppliers includethe following:

* Papermaking equipment: Valmet (Finland); Beloit (US);Voith Sulzer Papiertechnik (Germany/Switzerland); Mitsubishi HeavyIndustries (Japan) and Sunds Defibrator (Sweden).

* Power and steam equipment: ABB and Gotaverken (Sweden);Ahlstrom, Tampella, Outokumpu and Valmet (Finland); Babcock &Wilcox (Canada); General Electric (US) and Voith (Germany).

* Finishing and converting equipment: Beloit (US); Sulzer(Switzerland) and Valmet (Finland).

* Instrumentation, process control and automation: ABB(Sweden); Allen-Bradley, Modicon, Measurex, Rosemount and TexasInstruments (US); Black Clawson (UK); Fischer & Porter andHoneywell (US); Kytola and Valmet (Finland); Siemens and Voith(Germany); Sulzer (Switzerland); and Yokogawa (Japan).

* Pulp- and paper-making chemicals: BASF, Dow and Texaco(US); Ciba-Geigy and Sandoz (Switzerland); Eka Nobel (Sweden);Kemira (Finland); Nalco (Austria); Grace Dearborn and SCM (UK);and Rhone Poulenc (France).

* Chemical recovery equipment: Ahlstrom and Tampella(Finland); Babcock & Wilcox (US); and Gotaverken (Sweden).

* Woodyard equipment: Kone and Sunds DefibratorWood-handling (Finland); Iggesund and VME (Sweden); andMaschine-fabrik Andritz (Austria).

* Environmental control equipment: Babcock & Wilcox (US) andVoith (Germany).

Industry associations and alliances

Like their counterparts in other sectors, pulp and paperindustrialists have long been aware of the need to join forces toachieve common goals. In addition to constant flows of personneland day-to-day efforts at coordination among suppliers, buyers,consultants, machinery manufacturers, and so on, the industryholds regular conferences to consider general market prospects,technological developments, challenges from environmentalists andenvironmental legislation, and ways of capturing subsidies.

Such meetings -- underwritten by industry groups and organized bysuch bodies as the Financial Times or paper industry journals --are often heralded by the obligatory disclaimer that they will,for example, 'comply with the antitrust laws applicable in theUnited States and the European Union'. This does not stop theirparticipants from urging more inter-industry collaboration to dealwith difficult 'issues that go beyond the immediate realities ofour competitive marketplace'. Industry unity is vital, many of itsleaders insist, to prevent consumption from peaking. They add thatdifferent companies should also pool 'our substantial R & D fundsand expertise' to come up with new, more efficient technologieswhich can comply with environmental standards; must contributemore to environmental standard-setting and certification; and mustlearn to present a single public-relations front on environmentalmatters in order to build the right 'public perceptions'. A unitedfront with customers in publishing is also crucial, manyexecutives insist, and industry must take care not to letenvironmentalists push firms into destructive competition oversuch issues as recycling and chlorine-free paper production(Oberlander 1994; Paper Europe 1995).

In fact, of course, many industry alliances already exist.Associations such as the the Indonesian Pulp and PaperAssociation, Confederation of European Paper Industries (CEPI),the American Forest and Paper Association, the Council of ForestIndustries of British Columbia, the Japan Paper Association, theAssociaao Brasileira de Exportadores de Celulose, the Thai Pulpand Paper Industries Association, and the Paper Federation ofGreat Britain have long represented corporate interests togovernments and the public. Firms such as Beloit and MitsubishiHeavy Industries have combined research efforts to come up withnew papermaking technology. Northern manufacturers have alsobanded together to work out common strategies for marketingmachinery in the South with the help of development 'aid' (WW6.92).

Industry associations play a significant role in internationalpolitics. Sweden's pulp and paper associations, eager to gain morepolitical clout in Brussels at a time when the industry is rapidlyinternationalizing throughout Europe -- some 40 per cent ofSwedish-owned paper production capacity is already sited abroad --were influential in persuading the country to join the EuropeanUnion. The increasingly aggressive Canadian Pulp and PaperAssociation, meanwhile, is seeking closer alliances with paperusers such as the New York Times, Wall Street Journal, and KnightRidder Newspapers, and has set up an office in Brussels tocoordinate campaigns to secure European clients in the face ofenvironmental protests against forestry practices in North America(PRW 1.95). The Finnish industry's jointly-owned Paperinfo, an'information service company', monitors international markets andenvironmental groups, while the Finnish Forest Industry Federationmounts international public-relations blitzes. And in 1990, anopinion-management organization called the Pulp and PaperInformation Centre was set up in London by several inter-industrygroups. The public-relations functions of such alliances will beexamined in more detail in Chapter 6.

Bilateral agencies

Many of the Northern companies discussed in this chapter --whether forestry and engineering consulting firms or paper, pulp,wood or machinery companies -- owe their survival largely tohandouts from their governments for their work in the South.Without grants, cheap finance, and other subsidies, billion-dollarmills and tropical plantations -- which cost, on average, US$1,000per hectare to set up (Pandey 1992) -- would never make it intoproduction.

Some of these subsidies, as will be discussed below, aretransferred to multilateral agencies before being shunted to thebusiness sector. In other cases, funds collected from Northerntaxpayers are laundered through governmental bilateral 'aid'agencies before being channelled into the coffers of privatefirms. To take just one example, roughly half of Norway's 1994 aidbudget was spent on Norwegian firms' goods and services (DT20.10.1995).

Like the states to which they belong, bilateral agencies arenonetheless far from being mere creatures of their countries'corporations. The staffs of such agencies need to be responsivenot only to pressures to subsidize national industries but also toimperatives to ensure their own institutions' survival, meet theirgovernments' foreign policy objectives, and live up to their nameby making at least some token gestures toward 'helping' the poorabroad.

Multilateral agencies

Still more subsidies flow directly or indirectly to the pulp,paper and plantation industry, including Northern consultancy,construction and machinery firms, from multilateral developmentbanks (MDBs) such as the Asian Development Bank (ADB), AfricanDevelopment Bank, Inter-American Development Bank (IDB), the WorldBank and the European Bank for Reconstruction and Development. Ofthe US$40 billion which MDBs loan annually on favourable terms, aconsiderable mite goes toward planning and reviewing pulp orplantation operations and facilitating investment in forestindustries.

Between 1984 and 1994 alone, for example, the World Bank providedcheap finance for the establishment of 2.9 million hectares oftree plantations, largely for commercial purposes, at a cost ofUS$1.416 billion. Countries affected have included China, India,Bangladesh, Algeria, Tunisia, Zimbabwe, Kenya, Peru and Poland(World Bank 1994). Multilateral development banks have providedsupport for analyses describing how to build up Indonesia's pulpand paper industry (1984 and 1987-8, involving the World Bank andADB), studies of investment opportunities in Latin

America, VietNam and Nepal (1981-2, 1990-1, and 1986-present, involving IDB andADB), and forestry development plans for Cameroon, Central AfricanRepublic, Congo, Ethiopia, Ghana, Nigeria, Sudan, Bangladesh,Bhutan, Laos, Nepal, Pakistan, Papua New Guinea, the Philippinesand Sri Lanka (Jaakko P"yry n.d. b, c, d).

Although World Bank loans for pulpwood plantations are oftenconcealed within larger loans for forestry or agroindustry ordisguised under the euphemism 'resource expansion', blatanthandouts to industry are common. In Minas Gerais, Brazil, forexample, a Bank-financed project is inducing local farmers toraise eucalyptus saplings to provide raw materials for the pulpand paper industry and fuel for steelworks, thus diverting anddegrading soil resources which would otherwise be used for foodproduction (WRR 2.94). And in Kenya, the Bank loaned US$19.9million for a forestry development project promoting tree farmingat a time when the International Finance Corporation (IFC), theBank's private investment arm, had invested $86 million in Kenyanpulp, paper and packaging production (including a TetraPakpackaging plant).

MDBs, through their reassuring presence and groundbreakingoperations, have also encouraged ordinary commercial banks to getinvolved in tree plantations or pulp and paper operations in theSouth -- as lenders, guarantors of export credit agency loans, oradvisers on the raising of debt finance. By financingexport-oriented industrial development, moreover, they stimulatelocal markets for packaging and business papers.

Some of the money used by MDBs to subsidize the pulp and paperindustry is derived from past and present contributions fromNorthern taxpayers. The rest is 'donated' by the South itself inthe course of paying off debts incurred through the constructionof previous MDB-initiated projects, many of which are nowacknowledged by MDBs themselves to have been boondoggles(Wapenhans 1993, Rich 1994). The specific destinations of themoney which cycles through MDBs vary. Some of it is skimmed off bySouthern elites. Huge amounts, however, materialize almostimmediately in the bank accounts of Northern consultants,contractors and suppliers.

The mechanisms by which this happens are not hidden. The WorldBank, for example, has a policy of financing components of itsprojects that must be purchased with foreign exchange -- onaverage, about 40 per cent. With about US$23 billion committedannually, some 30,000 contracts are awarded to firms annually byborrowers of World Bank funds, 70 per cent for goods andequipment, 20 per cent for civil works, and ten per cent forconsultancies. This structure encourages close links between theBank and representatives of private firms who are seeking outletsfor their equipment or expertise.

Northern firms in particular enjoy a number of resources whichhelp them build such links. The US Department of the Treasury, forexample, has instructed its representatives on the boards ofdirectors of MDBs 'to make [US] business development and exportsone of their highest priorities within the MDBs' and to impress onthe MDBs the virtues of 'one-stop shopping' at US firms. The UK'sDepartment of Trade and Industry (DTI) employs no less than sixdesk officers to provide the British private sector with pointerson how to 'gain business' from multilateral developmentbank-funded projects through cultivating the right staff members,visiting World Bank headquarters, and so forth. In addition, awhole satellite industry of consultants -- many of them formerWorld Bank staff or the spouses of current staff -- has sprung upin Washington, London, and other capitals to monitor MDBprocurement and offer inside information and services to privatefirms; and MDBs and Northern governments hold regular meetings inNorthern capitals to help the Banks and prospective Northerncontractors get to know each other (World Bank n.d., Treasury News18.11.93, DTI 1994).

The result is predictable. According to Britain's Department ofTrade and Industry, in the financial year ending in June 1994,companies in the US, UK, France, Germany and Japan captured over46 per cent of the cash value of the contracts awarded by theWorld Bank (DTI 1994), or more than US$10 billion. Some 64 percent of the value of IDB disbursements, meanwhile, went to firmsin five wealthy Northern countries: US, Japan, Germany, France andItaly. As the UK's Overseas Development Administration (ODA)complacently observes, 'British firms and suppliers receive ordersfor goods and services that are used in aid projects far exceedingthe value of Britain's contributions to [multilateral] agencies'(ODA 1992).

Much of the money captured by MDBs thus follows a roughly circularpipeline from Northern taxpayers to Northern governments to MDBsto Southern governments to Northern companies, leaking copiouslythrough cracks along the way. Replenishments are meanwhile beingcontinually pumped from both Southern and Northern catchment areasdirectly to MDBs to be periodically injected at the top of thecycle; the Southern component of these topups makes up asignificant part of the current net annual US$50 billion capitaldrain from South to North (Rich 1994).

The damage inflicted on the Southern catchment area in the processis, of course, considerable. As a price for the privilege of beingable to insert a small tap into the circular financial flows towhich their countries already contribute so much, Southern elitesare compelled to commit themselves to projects and austerityprogrammes of staggering economic, social and environmentaldestructiveness. For nearly fifty years, in addition, Southernelites have been prodded by MDBs to set up or augment stateinstitutions which will nurture the growth of local commercialelites -- including local contractors who quickly learn to feed atthe MDB trough themselves. One result has been the creation of apermanent infrastructure for negative redistribution of wealthboth within Southern countries and between the South and theNorth. The ratio of wealth between North and South has increasedfrom 10:1 in 1948 to 30:1 in 1960 and 60:1 in 1990 (Rich 1994,Payer 1991, Adams 1991, Oxfam 1994).

Other multilateral agencies such as the Food and AgricultureOrganization (FAO) and the United Nations Development Programme(UNDP) cooperate closely with MDBs and private sector consultantsin using public funds to provide 'free lunches' for the plantationand pulp and paper elite. Such bodies are particularly helpful instudying business opportunities in the forestry sectors ofSouthern countries and planning rural development and forestryprogrammes which can feed the industry. FAO has also performed thevaluable service of discrediting, through bogus science, theenvironmental soundness of certain indigenous land-use patterns,including various types of swidden agriculture, which were seen tobe in competition with industrial forestry interests. Asanthropologist Anders Baltzer Jorgensen (1979) notes, FAO 'tookover a special branch of silvicultural opinion: the one formerlycontained in the forest departments of earlier colonialgovernments' as part of a post-colonial project of saving the'productivity of the tropics for the world as a whole, butspecifically for the occidental world' (Spencer 1966).

Another intergovernmental agency, the Institute of Applied SystemsAnalysis based in Austria, meanwhile provides computer-assisteddatabases for industry about timber supply in Siberia, Europe andthe rest of the world. The World-Bank-sponsored Center forInternational Forestry Research (CIFOR), a new branch of theConsultative Group on International Agricultural Research (CGIAR)located in Bogor, West Java, with 100,000 hectares of researchforest in East Kalimantan, may also be an institution to watch.Experience suggests that there will be heavy pressures on CIFOR todevote much of its time to helping fit tree characteristics toindustry needs through genetic research in much the same way thatthe International Rice Research Institute in the Philippines(another part of the CGIAR network) has helped to adjust rice tothe chemical regimes of

the Green Revolution (Jaakko P"yry n.d. b,c, d; Interforest n.d. a, b, c; Moniaga 1993; IIASA 1994).

As the case studies of Part Two will propose, one of the mostimportant functions of subsidies from multilateral agencies toNorthern consultants for initial studies is that they often leadto knock-on contracts for the firms involved. After landing acontract in 1984 from the World Bank to make recommendations forthe pulp and paper industry in Indonesia, for example, JaakkoP"yry's consultancies for the Indonesian private sectormushroomed. Occasions such as the 1992 Earth Summit in Rio deJaneiro also provide rich opportunities for firms such as P"yry tolobby for the diversion of public funds to their corporations inthe guise of 'environmental aid'.

In summarizing the role of multilateral agencies in the promotionof pulp and plantations, it is hard to improve on the words ofJack Westoby, the late head of forestry at FAO. In 1975, Westobydescribed how international 'aid' had helped in 'identifying forforeign capital those forest resources suitable for exploitation'and in many cases had 'borne a substantial part of the cost ofmaking inventories of those resources':

In not a few cases it has compiled the data, and helped providethe justification, for international financing agencies to provideloans to create some of the infrastructure needed to assist thepenetration of foreign capital. It has helped to train some of themanpower to be placed at the service of foreign enterprises [and]assisted some irresponsible governments to alienate substantialparts of their forest resource endowment . . . the growinginterest in, and acceptance of, forestry projects [by developmentagencies] had little or nothing to do with the conversion of thedevelopment establishment to [foresters'] idea that forestry andforest industries had a significant and many-sided contribution tomake to overall economic and social development. It had everythingto do with the fact that many of the rich, industrializedcountries needed, and needed badly, new wood material resources;and their forest industries, their equipment manufacturers,together with miscellaneous agents and operators, scented goldenopportunities for profit in those underdeveloped countries withforest resources. This was the dominant consideration whichdetermined the location, shape and direction of forest and forestindustry development projects. . . . The international financingagencies knew what foreign investors wanted, and the multilateraland bilateral agencies fell into line (Westoby 1987).

National governments

Some of the most important subsidies for the plantation, pulp andpaper industries are furnished by national or provincialgovernments, often at the behest of international agencies.

State agencies set up originally under the aegis of the WorldBank, for example, such as Thailand's Board of Investment, haveprovided tax writeoffs, technology import exemptions, andrent-free loans to industry, as well as infrastructure. Fiscalincentives including subsidies for plantation establishment, taxexemptions, and grants, were also extended by governments tocommercial plantation firms in Brazil (1966-1987), Argentina (from1974), Chile (from 1960, revised in 1974), Paraguay (1980-4) andUruguay (1960-78) (Pandey 1992, Sawyer 1993).

State forestry departments in Asia, meanwhile, redistribute vastswathes of land over which they have jurisdiction from theiroccupants to industry, often charging miniscule rents or stumpagefees. In Indonesia, for example, where 70 per cent of the landarea is managed by the state forestry bureaucracy, industry ischarged as little as US$0.30 per hectare per year for the use ofplantation land. In both Indonesia and Thailand, specialreplanting funds are shunted selectively to plantation businesses,and in the former, plantations are further subsidized by loggingrevenues recycled

through the state (see Chapter 13). The smallerthe rents, stumpage fees and timber prices levied by forestrydepartments, of course, the more resources have to be divertedfrom other sectors into forest management. Among the losers areprogrammes which might promote non-pulp-plantation,community-based land uses.

Costs of land and labour are also kept down through subsidiesprovided to military and police forces by local and foreigntaxpayers. The minimum legal daily wage in Yogyakarta inIndonesia, for example, is US$0.60 and in West Nusa Tenggara$0.72; plans by a Japanese investor who proposed to pay workers$2.40 were rejected by officials of the Investment CoordinatingBoard on the grounds it would damage Indonesia's cheap labouradvantage (DTE [London] 6.1993). Where customary lands have to beseized forcibly by the state before being turned over to industry,and where smallholders and migrant labour are used essentially asslave labour, repression -- much of it underwritten by foreigntraining programmes and foreign military hardware -- is aparticularly important ingredient in the economic mix. Exporttaxes on staples can also help subsidize cheap labour for foreigninvestors. State university forestry faculties -- many of themstaffed by foresters trained in industrial forestry in countriessuch as Finland, Canada and the UK -- can meanwhile be relied uponto provide useful lobbying and technical support for commercialschemes.

Competition with Northern wood-producing nations' own subsidizingapparatuses, moreover, is tough, forcing Southern nations to digeven deeper into their pockets to attract investors. In 1988, forexample, the Canadian province of Alberta presented the Japanesefirm Daishowa with C$70 million worth of infrastructure to helpinduce it to build a $579 million bleached kraft pulp mill in themiddle of a forest. The Japanese-controlled Al-Pac plant inAlberta, meanwhile, has received, in addition to $75 million worthof infrastructure and construction finance, a $275 millionsubordinated income debenture -- not to be repaid unless and untilthe mill is profitable -- and a $125 million standby debenture forfuture expansion. The timber subsidy for the plant is anadditional $78.7 million yearly. In addition to making a downpayment of $125, then, each citizen of Alberta is donating anadditional $28 per year for the privilege of allowing Al-Pac touse up the province's resources (TN 5.94, WCWC 1994, Pratt andUrquhart 1994). A further $47 million has been committed byCanadian governments for public relations for overseas forestindustries extracting Canadian pulpwood (MacIsaac and Champagne1994). According to forest economist Randall O'Toole, the USgovernment showered $7.2 billion in tax breaks on the US timberindustry between 1980 and 1989 and fed it $449 million worth ofbelow-cost timber in 1992 alone (Letto 1994). Forest and paperindustry Political Action Committees, of course, help fund USlegislators' election campaigns. Many originally state-ownedNordic forest industries which have been recently partially orfully privatized, meanwhile, have benefited from decades ofgovernment-enforced privileges.

So widespread are such corporate welfare programmes, indeed, thateven the government of a relatively poor US state such as WestVirginia can be prevailed upon to offer $200 million inconstruction loans, $60 million in road improvements and furthermillions in tax incentives to help the world's largest builder ofpulp and paper mills, British-based Parsons & Whittemore, turnseveral hundred thousand hectares of Appalachian hardwood forestsinto pulp. Still further subsidies were secured by West Virginiagovernor Gaston Caperton, who, after receiving campaigncontributions from Parsons & Whittemore, pressured US governmentregulators to allow the firm to pollute the Ohio River withoutbaseline studies of dioxin levels being done (NFN 1995). George F.Landegger, Parsons & Whittemore chairman, had summed up thethinking behind such subsidization during earlier dealings inCanada:

Adam Smith's invisible hand will not build pulp mills,particularly in the kinds of forest areas that remain available inCanada for exploitation. It requires a great deal of coordinationbetween private interests and public interest, and the publicinterest being willing to take a risk for development.

That riskhas primarily political dimensions for the public sector, butfinancial dimensions for the private sector (Pratt and Urquhart1994).

Thai economist Pasuk Pongpaichit offers a less mystified view ofthe matter:

Economic theory tells us it's all right to subsidize educationbecause it benefits the whole society. But while eucalyptus andpulp and paper industries earn profits for some, they causeproblems for society. Therefore, economic theory tells us, theyshould be taxed. But instead the government does the opposite.This is a matter of influence and power (Pasuk 1995).

Research institutes and NGOs

A final type of subsidy comes from governmental andnon-governmental research institutes which provide free orlow-cost ideological or scientific backing for the plantationboom. One example is Australia's state-supported CommonwealthScientific and Industrial Research Organization (CSIRO), whichbrings together academics and industry to conduct research anddevelopment on hardwood plantation techniques. Another is theSwedish Pulp and Paper Research Institute, which is supported byboth industry and government. Many state universities in the USand Europe -- including the University of Idaho, Oregon StateUniversity, and the University of New Brunswick -- meanwhileaccept research support from the pulp and paper industry (Cromerand Kile 1993). Of course, foresters and scientists with no directties to industry also contribute heavily to the industry-friendlycomponent of the 'two libraries' which Chapter 4 has described.

On the non-governmental side, the UK's International Institute forEnvironment and Development has helped Shell plan and legitimize aplantation project in east Thailand, since cancelled due to localresistance, and has also conducted a favourable mid-term review ofJaakko P"yry's plantation-promoting Forestry Sector Master Planfor Thailand. In the 1980s, the IIED's US counterpart, theinfluential World Resources Institute, trumpeted the Aracruzplantation operation in Brazil as a model for forestrydevelopment. More recently, the World Wide Fund for Nature hascollaborated with Shell on an 11-volume review of, and guidelinesfor, tree plantations. On a more rarefied level, independentresearchers such as Norman Myers have lent credibility to theplantation boom by sketching grandiose and highly-theoreticalschemes for carbon-fixing through 'grand-scale' tree-planting.Think tanks such as Resources for the Future in Washingtonmeanwhile provide strategic information of interest to theindustry on the long-term availability of industrial wood. No lessimportant are NGOs, foresters and economists who, althoughacquainted with and concerned about the problems of the pulpwoodplantation boom, find it strategic to defer to industry on theissue. The role of such experts and NGOs in supporting theindustry will be probed at greater length in the next chapter(Sargent 1990, Sargent et al. 1992, Shell/WWF 1993, Myers 1991).

Conclusion

This chapter has profiled some of the leading protagonists in thedrama of pulp and paper. It has also suggested some of themechanisms by which they coalesce, capture subsidies, and --against a background of constant challenge and resistance whichwill be described more fully in Part Two of this book -- act in away which results in the expansion of pulpwood plantations in theSouth.

These mechanisms both presuppose and facilitate an ability toshift resources within a regionally- and globally-organizedsystem. In order to be able to make effective inroads into ruralsocieties in (say) Kalimantan or Bahia Sul, pulp and paperinterests must be able to tap revenues which governmentbureaucracies have collected from office workers or landowners inHelsinki or Quebec, or cite arguments which the World Bank, usingdebt service payments from the Philippines or

Mexico, has hiredhack consultants from New Delhi or Virginia to rehearse andpolish. Yet applying such resources effectively across extensivegeographical and social landscapes presupposes that, to a certainextent, these inroads have already been made, that a far-flungpolitical infrastructure sensitive to the needs of pulp and paperinterests is already in place. Moreover, it is only when suchinroads have already been started, and local barriers have alreadybeen breached, that the pulp and paper industry can gain access tothe fresh flows of subsidies which make its continued expansion,and that of the globalizing system it relies on, possible.

Here, as elsewhere, globalization and subsidization advance handin hand; neither can succeed without the other. Trade has not onlycontinued to follow the flag but has also continued to help keepit flying. 'Trade', however, covers a greater multitude ofactivities today than formerly, and the 'flag' may bear the logoof a development bank, foreign charity, agriculture ministry,local police force, investment promotion board, or any other ofthe plethora of contemporary official institutions which serveelite interests without the possibility of democratic scrutinyever even having to be raised.

Part Two will spell out in more detail how resource transfersbetween expanding public and private sectors in Southeast Asia,Japan and the West subsidize the pulp and paper industry. Inparticular, it will discuss how, in Asia, commons are dismantledand the fragments reassembled into a capitalist structure; how, inLatin America, the emergence of locally-appropriate alternativesto industrial plantations is being thwarted; and how, nearlyeverywhere, land and water is being expropriated. The next chapterwill preface these studies by examining how an increasingly globalsystem has taken on another challenge: managing resistance to itsexpansion. In particular, it will examine how globalization bothenables, and is enabled by, attempts to block potential alliancesbetween grassroots groups fighting monoculture pulpwoodplantations in the South and environmental and social activistselsewhere.

TABLE 5.1: THE TOP 65 WORLD PAPER PRODUCERS

Company (home country) [includes 1995-6 mergers and buyouts] --1994 paper output (mt/y) -- 1994 sales (US$m) -- Remarks

1. International Paper (US) -- 8.5 (est.) -- 16,530 (est.) -- Ownsor controls over 28,600 sq km of timberlands for pulp and paper.Manages lands, through subsidiaries and shareholdings, in NewZealand, South Africa, Chile and the Southern US. Exports logs andhardwood chips to Japan, China, etc. Operates in 26 countries,sells in over 130. Large producer of market pulp, board, andprinting, writing, and kraft papers. As one of the US's top tenpolluters, the firm has been nicknamed "International Pollution"and is known for worker safety and health violations and anaggressive anti-union stance. Major buyer of pulp. Recently tookover Carter Holt Harvey, which holds 3,200 sq km of pineplantations in New Zealand and nearly equivalent pine holdings inChile, and has also absorbed Federal Paper Board, a big marketpulp maker.

2. UPM-Kymmene (Finland) -- 6.6 (est.) -- 10,638 (est.) -- Ownsnearly 10,000 sq km; imports wood fibre from Uruguay and hasplanned Turkish plantations. Producer of magazine and fine papersand newsprint.

3. Stone Container (US) -- 6.5 -- 5,749 -- Makes board in 17countries; has tried to log and plant pulpwood in Central America.A leading target of protest for its exceptional hostility toenvironmental initiatives.

4. Georgia-Pacific (US) -- 6.1 -- 12,738 -- No. 1 producer ofcommunication papers, No. 2 producer of market pulp; big exporter.Owns or controls 26,600 sq km of timberlands. Founding donor ofCenter for Defense of Free Enterprise, leading think tank for theanti-environmentalist Wise Use Movement. Involved in joint paperventure in Indonesia, has interests in Brazil. Growing target ofUS protest.

5. Stora (Sweden) -- 5.6 -- 6,337 -- Controls 15,000 sq km of landin Sweden, 6,000 in Canada, as well as around 2,000 sq km ofeucalyptus plantations in Portugal and 145 sq km of pine in Chile.Produces in nine countries. Canadian operations criticized forherbicide use and clearcutting.

6. ENSO (Finland) -- 5.5 -- 5,551 -- Partially state-owned. TopEuropean packaging producer. Owns 4,750 sq km of Finnish land;also buys wood from private owners. Involved in Kalimantanplantations and Java packaging industry. Uses old growth fromFinland, Russia.

7. SCA (Sweden) -- 5.3 -- 7,104 -- Owns 23,000 sq km of forestland (much of it planted to exotic monocultures) in Sweden andalso buys from private owners. Imports from Russia and hasoperations in Austria,France, Germany, Italy, and the Netherlands.

8. Nippon Paper (Japan) 4.8 -- 9,678 -- Has mills, plantations, orboth in Brazil, Canada, Chile, Indonesia, New Zealand, Portugal,and the US. Formed from Jujo/Sanyo-Kokusaku merger.

9. Champion International (US) -- 4.6 -- 5,318 -- Owns or controls24,900 sq km of timberlands; is involved in plantations inIndonesia and Brazil, where it is the 4th largest papermaker and6th largest pulp maker. Owns 400 sq km of eucalyptus in Brazil,where it is reportedly planning a 1000-sq-km export wood chipplantation. Target of recent protests in US.

10. Kimberly-Clark (US) -- 4.6 -- 12,114 -- Has recently absorbedScott Paper, which was forced to drop Indonesian plantation schemein 1989 and has been attempting to sell its lands. Operates inThailand, Honduras, Mexico, Costa Rica, China, South Africa andnearly 20 other nations. Owns or controls more than 36,250 sq kmof timberlands, including plantations in Spain. Controls half ofworld market for tissue. Large buyer of market pulp, includingeucalyptus pulp.

11. James River (US) -- 4.1 -- 5,400 -- Has operations in 13countries; owns 15,200 sq km of timberlands; has a five per centshare in Aracruz and an 86 per cent share in Jamont. Top napkinproducer.

12. Weyerhaeuser (US) -- 3.9 -- 10,398 -- World's largest marketpulp producer. Owns 22,400 sq km of forest land in the US; leasesor controls an additional 75,000, mostly in Canada. Half of itstimberlands are intensively-managed plantations. Exports to Asia,sells timber from Indonesia, and has interests in Siberia. Targetof major recent protests in US.

13. Jefferson Smurfit (US) -- 3.7 (est.) -- 3,750 (est.) -- Makesnewsprint, board; operates in France, Mexico, Austria; moving intoChina.

14. New Oji (Japan) -- 3.3 -- 7,629 -- Tied to Mitsui tradinghouse. Helps operate hundreds of sq km of plantations inAustralia, New Zealand, Fiji, Papua New Guinea, Viet Nam, Brazil,Thailand and

Chile. Imported chips from the ChipDeco scheme inKalimantan; runs mills in Canada and New Zealand. Formed frommerger of Oji and Kanzaki Paper.

15. Union Camp (US) -- 3.3 -- 3,396 -- Manages intensiveplantations in southern US. Operates in seven nations.

16. Jefferson Smurfit (Ireland) -- 3.2 -- 2,562 -- Schemes in 13countries, including Colombian eucalyptus plantations.

17. KNP BT (Netherlands) -- 3.2 -- 7,223 -- Operates in ninecountries.

18. Sappi (South Africa) -- 3.0 -- 2,199 -- Exports both marketpulp and paper. Runs mills using South African pulp in the UK; hasbought large paper firms in Germany and the US; is looking tomanufacture in the Far East. Owns 4,000 sq km of plantations inSouth Africa and recently contemplated a joint plantation venturein Mozambique.

19. Fletcher Challenge (NZ) -- 3.0 -- 4,818 -- Owns or has cuttingrights on 33,862 sq km in the Americas and Oceania. May expand inChile, Brazil, Malaysia, UK and invest in China with Indonesianpartner.

20. Temple-Inland (US) -- 2.8 -- 2,938 -- Operates in twocountries; owns or controls 7,476 sq km of timberlands.

21. MoDo (Sweden) -- 2.6 -- 2,625 -- Controls 10,300 sq km ofSwedish forest land and the holdings of the German firm PWA.Imports wood from Russia, pulp from Alberta. Large market pulpproducer.

22. Mead (US) -- 2.6 -- 4,558 -- Operates in Argentina and Chile;owns or controls 5,412 sq km of timberlands.

23. Daishowa (Japan) -- 2.5 -- 3,077 -- Tied to Marubeni group.Imports 60% of its raw fibre from overseas, including Australia,Canada, Chile. Russia, Thailand, the US. Imports pulp from Brazil,Canada, Chile, Finland, Portugal, Sweden, the US. Has invested inmills in Canada, Thailand, the US. Aggressive foreign investor;big target of environmental protest.

24. Westvaco (US) -- 2.5 -- 2,608 -- Makes paperboard, packaging;has Brazilian board and container subsidiary (Rigesa). Exports to69 countries. Ranked 1st in US forest products industry in releaseof toxic chemicals in 1988-89; exploits Appalachian, Mississippivalley forests.

25. Boise Cascade (US) -- 2.5 -- 4,140 -- Owns or controls 24,000sq km of timberlands; founding funder of Center for Defense ofFree Enterprise. Recent target of protests in Maine andelsewhere.

26. Abitibi-Price (Canada) -- 2.4 -- 1,546 -- Specializes innewsprint; controls or owns 95,772 sq km of timberlands.

27. Bowater (US) -- 2.1 -- 1,359 -- Makes newsprint, kraft, andprinting and writing papers in two countries.

28. Arjo Wiggins Appleton (UK) -- 1.9 -- 4,465 -- Controlseucalyptus plantations in Iberia.

29. Willamette Industries (US) -- 1.9 -- 3,008 -- Manufacturesonly in the US. Large market pulp producer.

30. Haindl (Germany) -- 1.8 -- 1,404 -- Manufactures in threecountries.

31. Riverwood International (US) -- 1.7 -- 1,283 -- Makes foldingfood and drink cartons; manufactures in 13 countries.

32. Daio Paper (Japan) -- 1.6 -- 2,623 -- Holds chipping firm inUS; supplied also from Brazil, Thailand, and 650 sq km of Chileanplantations.

33. Cartiere Burgo (Italy) -- 1.5 -- 1,444 -- Relies heavily onpulp imports.

34. MacMillan Bloedel (Canada) -- 1.5 -- 2,892 -- Manages 15,000sq km of timberlands. Plantations and pulp mills in SE US andsubsidiaries in Australia, UK, Japan, The Netherlands. VancouverIsland logging has provoked bitter conflict. Makes containerboard,packaging, newsprint, pulp.

35. Gaylord Container (US) -- 1.4 -- 784 -- Manufacturespaperboard and packaging only in the US.

36. Avenor (Canada) -- 1.4 -- 1,389 -- Has access to 114,000 sq kmof forests; favours clearcutting. Exports pulp to Japan, China andEurope. Was forced to close large pulp plant on Vancouver Islandin1993 due to low prices. Big recycled newsprint maker.

37. Norske Skogindustrier (Norway) -- 1.4 -- 1,299 -- Buys mostwood on open market but also owns 2,140 sq km of own land.

38. Honshu Paper (Japan) -- 1.3 -- 4,600 -- Pioneered chipping ofnatural forests of Papua New Guinea, where it now holds 100 sq kmof plantations. Involved in Brazil, Chile, Thailand, Canada, HongKong. Member of Oji industrial group and Daiichi Kangyo financialgroup.

39. Metsa-Serla (Finland) -- 1.3 -- 1,814 -- Operates in sevencountries; imports old-growth timber from Russia.

40. Domtar (Canada) -- 1.3 -- 1,568 -- Operates in Canada only;controls or owns 60,000 sq km of timberlands.

41. Hansol Paper (South Korea) -- 1.2 -- 1,307 -- Manufacturesonly in Korea but uses imported fibre.

42. Amcor (Australia) -- 1.2 -- 4,266 -- Integrated packaging andpaper firm operating in China, Indonesia, Malaysia, Hong Kong,Singapore, S. Korea, nine other nations. Target of Australianprotests.

43. Sonoco Products (US) -- 1.2 -- 2,541 -- Operates in 250locations in 24 countries.

44. Cascades (Canada) -- 1.2 -- 1,263 -- Operates in fourcountries.

45. INAPA (Portugal) -- 1.2 -- 216 -- Takes advantage ofgovernment-promoted plantations.

46. Settsu (Japan) -- 1.1 -- 1,195 -- Tied to Sumitomo Group. Hasinterests in Brazil, Chile and Thailand as well as mills inPortugal, Spain, and the southeastern US.

47. AssiDoman (Sweden) -- 1.1 -- 2,172 -- Large forest owner andkraft paper producer operating in ten countries.

48. Mayr-Melnhof (Austria) -- 1.1 -- 942 -- Board specialistoperating in eight countries.

49. Yuen Foong Yu (Taiwan) -- 1.0 -- 634 -- Holds shares in, andtrades machinery to, Indonesian and Thai firms.

50. David S. Smith (UK) -- 1.0 -- 1,576 -- Holding companyoperating in four countries.

51. Consolidated Papers (US) -- 1.0 -- 1,028 -- Operates only inthe US but exports to Mexico, Asia and South America.

52. Klabin (Brazil) -- 0.9 -- 1,005 -- Latin America's topintegrated forest products firm; owns 3,333 sq km; 39 per cent ofsales are abroad.

53. Potlatch (US) -- 0.9 -- 1,470 -- Makes market pulp, board, andprinting and writing papers only in US.

54. Mondi (South Africa) -- 0.9 -- 875 -- Plans to double pulpcapacity after 2000; interests in UK and Portugal.

55. Repap (Canada) -- 0.9 -- 1,138 -- Owns 65,550 sq km oftimberlands, an area the size of Sri Lanka.

56. Hokuetsu Paper Mills (Japan) -- 0.8 -- 1,084 -- Tied to NewOji, which holds shares; interests in Southeast Asia.

57. Mitsubishi Paper (Japan) -- 0.8 -- 2,042 -- Holds 100 sq km ofChilean plantations; interests in Southeast Asia and Canada; artand speciality papers a focus.

58. QUNO (Canada) -- 0.8 -- 411 -- Operates only in Canada.

59. Cheng Loong (Taiwan) -- 0.8 -- 474 -- Interests in SoutheastAsia; operates in two countries; imports fibre.

60. Rengo (Japan) -- 0.8 -- 2,749 -- Makes board in Indonesia,Thailand, China, Singapore, and Malaysia.

61. Chuetsu Pulp & Paper (Japan) -- 0.7 -- 877 -- Associated withOji group; makes newsprint and fineand printing papers.

62. Shin Ho (South Korea) -- 0.7 -- 1,220 -- Operates in threecountries; involved in Thai newsprint mill.

63. Indah Kiat (Indonesia) -- 0.7 -- 483 -- Runs pulp mills,plantations and native forest concessions in Sumatra.

64. Noranda Forest (Canada) -- 0.6 -- 1,319 -- Controls or owns57,750 sq km of timberlands, operates in two countries.

65. Holtzmann Papier (Germany) -- 0.6 -- 443 -- Operates only inGermany.

Sources: Olsson 1995, Lamb 1992, JATAN 1994, Marchak 1992,corporate reports, Rahikainen et al. 1995, PPI 9.95, FT and othernewspaper reports.

Chapter 6

Managing Resistance

If the pulp and paper industry needs subsidies in order to be ableto expand, it also needs to be able to manage opposition. Negativepublicity about deforestation, dioxin, landfills, and so forth _to say nothing of confrontations with local people over the use ofland and water _ can threaten investment, demand, growth, marketshare and profits alike. Finding ways of taking the offensive onsocial and environmental issues is thus a preoccupation of nearlyeveryone in the industry.

Here again, global reach can help. Just as the industry usesworld-spanning infrastructure, bureaucracy, and cultural influenceto find sources and conduits for the subsidies it attracts, so itacts across wide geographical and cultural distances both to bringa wide variety of resources to bear on opponents and to try todivide them from each other more effectively.

Non-threatening resistance

>From industrialists' point of view, some opposition to plantationsor pulp and paper mills, while annoying and inconvenient, isrelatively easy to get rid of or get around. It does not threatentheir most fundamental interests either because it is scatteredand localized or because the challenges it poses can be eliminatedwithout overwhelming sacrifices, simply by redistributingresources from one part of a corporation to another. In such casesthe industry tends to adopt one or more of the followingstrategies:

*Wage economic or cultural war on pockets of resisters until they give up the struggle. Smallholders who do not acquiesce in plantation or contract farming schemes may find themselves surrounded with fast-growing trees, their access to roads or rights-of-way cut off. Religious leaders or government employees may be induced to harrass plantation opponents or their families. Where political circumstances permit, resisters may also be isolated bybeing labeled 'Communists', 'traitors', or 'anti-development'. In areas coveted by speculators hoping to sell land to Shell (Thailand) for a plantation in the late 1980s, gambling schemes were even set up to relieve plantation opponents of their money in order to encourage them to sell out.

*Buy off potential sceptics or resisters with money, land, goods, jobs or status obtained through the proceeds of operations elsewhere. Bribes may be passed out, sports grounds or clinics built, official titles bestowed, temporary jobs distributed, trainings or trips arranged, or gifts of agricultural inputs made. The Al-Pac project, for example, has set up awards and other studentprogrammes for aboriginal peoples in its operating area in Alberta. In Thailand, industry agents often take lucrative contracts or proposals to individuals rather than to communities as a whole, in order to fragment possible opposition.

* Attempt to demonstrate to opponents how their concerns canbe met within the industrial system other than through acceptingbribes. This strategy amounts to politely inviting opponents toaccept 'translations' of their objections into the language of theindustry itself, in which these objections become more tractable.Contract farming schemes, which appear to meet the commonobjection that pulpwood plantations are usurping individuallandholdings, are one example (see Chapters 12-13). Another is thepromise that the suffering the expansion of plantations bringsabout today will be seen tomorrow as a mere 'cost' attached to thefar greater 'benefits of economic development'.

*Help see to it that resisters are crushed by force. Thisoption must often be chosen against local communities whoselivelihoods are entirely dependent on maintaining customary powersover local commons or land, which are felt locally as moralrights. Because the logic of such livelihoods is oftenincompatible with that of conventional economics, such communitiesare often not susceptible to the last-mentioned strategy (TheEcologist 1993, Lohmann 1995). In particular, they are difficultto buy off because they are unwilling to accept economic'tradeoffs' or relinquish their homes, resources or health at anyprice, and are often unimpressed with appeals to 'nationalinterest'. To be a candidate for intelligent repression, however,opposition must be isolated, small-scale, poorly-coordinated, outof the public eye, or saddled with an unfavourable public image.For this option to work, too, government bureaucracies must decideit is in their own interest to foot the bill for militaryoperations (see chapters 12-13). Thus pulp operations onIndonesia's Outer Islands are often able simply to seize thousandsof hectares of the land of non-dominant ethnic groups by force,hoping that local people's isolation and fear of the governmentwill keep them quiet (Kuroda 1995); Aracruz Celulose's initialland clearances in Brazil were also allegedly characterized byviolence. In India, however, when common lands under statejurisdiction were taken over by Karnataka Pulpwood Ltd. in the1980s, well-publicized mass marches and demonstrations duringwhich eucalyptus saplings were uprooted and replaced with saplingsof food and fodder trees resulted in an industry retreat (SPS1989; JV 9-12.1990, 3.1991). A 1991-2 programme by Thailand'smilitary government to evict millions of villagers from stateforest land to make way for private sector pulpwood plantationswas also stymied by high-profile, large-scale opposition.

* Prevent certain forms of opposition from being heard byinsisting on framing all discussions of plantations in the idiomof neoclassical economics and 'global demand' rather than in thelanguages of ordinary farmers or of everyday politics. Thisstrategy, an analogue of physical suppression, attempts to denyopponents the opportunity of formulating their objections in theconceptual framework of their choice. The aim is to make issues ofland rights, non-economic forms of livelihood, and so on, simplyunraisable, since industry finds it difficult to win debatesframed in these terms. Thus discussion is restricted to terms onthe right side of Table 6.1. The actual implementation of thisstrategy, conveniently enough, can often be 'assigned' totrue-believing technocrats and other ideologues not directly tiedto industry. Many academic economists and foresters, for example,even without prior consultation with industry, will shun anydiscussion of how paper demand is created: such discussionsnecessarily question their premise that human beings, as Homoeconomicus, are characterized by in principle infinitelyincreasing needs. Executives who know better, acknowledging thepaper industry's need 'to fight for our future and create our owngrowth', can thus stay in the background (Clark 1994).

TABLE 6.1: Muting opposition through language

Opposition language	**Industrial language**
subsistence	jobs
local livelihood	national economy
power	voting, 'participation'
survival	economic growth
'death vs. life'	'compromise vs.idealism'
loss of livelihood	economic cost

land rights economic benefits

bribes compensation cancelling projects mitigating impacts

* Acquiesce, where necessary, to certain demands made bycritics. This becomes an attractive choice where (i) opponentscannot be bought off or persuaded to modify their demands; (ii)suppression is counter-productive or impossible due to the scale,coordination, intensity, inaccessibility or public visibility ofresistance; and (iii) acquiescence would not actually destroy theindustry or relevant companies. Thus Western companies are slowlycapitulating to strong and widespread opposition to chlorine-usingindustrial processes, treating it as an 'economic' reason forinvesting in new technology. (In doing so, in fact, they may beable to outcompete rivals with fewer resources.) Nor does the callfor more recycling greatly trouble an industry long accustomed tousing waste paper as raw material. Rather, it is fairly easily fedinto overall supply/demand equations, and public relationsofficers welcome increased recycling capacity as an opportunity toclaim 'green' status.

* Move out of an area where local resistance is intractable.This becomes a strategic option in the same circumstances as thoselisted immediately above, but in which other regions appear moremalleable to corporate exploitation. Hence it is often acost-effective choice for companies with sufficient global reach.Japan's paper industry, for example, has had simply to acceptenvironmentalist resistance in Western North America as an'economic' datum beyond a political solution and accordingly shiftits search for raw materials elsewhere, including the South.Shell, similarly, has had to abandon its pulpwood plantation plansin Thailand in order to concentrate on similar schemes elsewhere.

More difficult forms of resistance

Some obstacles to the expansion of the pulp and paper industrypresent deeper threats. No paper corporation, faced withcoordinated, publicly-visible opposition to development of newindustrial wood fibre sources across large areas of the globe, canbuy it off everywhere it arises, smash it wholesale, or shift itssearch for raw materials to another planet. If, as Ronald A.Duchin of the US corporate public relations firm Mongoven Biscoe &Duchin points out, local groups who believe that they 'should havedirect power over industry' are 'difficult to deal with' (PRW10-12.1993), alliances of such organizations are that much moreso.

Nor can any paper corporation acquiesce to calls for reduceddemand for all its products. Movements which show signs of movingbeyond questioning one or another product (such aschlorine-bleached or non-recycled paper grades) or company towardquestioning the ethos of ever-increasing per capita paperconsumption itself are difficult for the industry to accommodate.The pulp and paper industry, like others, relies for its growth onthe suppression of a sense of 'enough' and on the blurring ofdistinctions between necessity and luxury demand. The skeweddistribution of consumption displayed in Tables 2.4 and 2.5 is,for paper executives, evidence not that high consumers areconsuming too much but that others are consuming too little. Thefact that paper demand is potentially fragile in spite of effortsto embed paper consumption ever more thoroughly into daily life _during economic recessions, for instance, advertising can fall offrapidly without consumers rising up in outrage at being deprivedof magazine inserts or new four-colour packaging _ makes theindustry particularly defensive about critiques ofinfinitely-increasing demand (Price 1995). David Clark of theConfederation of European Paper Industries

recently told hiscolleagues that the 'important question is whether paper will showthe same relationship to economic development as it has in thepast':

Consumers are no longer what they used to be. . . . [they] wish toknow the origins, content and method of manufacture of the paperthey use . . . Their behaviour is . . . less predictable than itwas. . . . Our industry stands accused, quite unjustly, of . . .creating garbage mountains. This concern . . . could . . . reducethe long-term demand for paper [, as] has already happened topackaging where in most of the legislation the first priority isto use less. . . . Many paper and board producers in the packagingsector believe that the requirement to use less and lighterpackaging spells the end of growth in the sector. Similar concernscan be seen in other sectors _ junk mail, unnecessary advertising,etc. Like packaging, paper itself, once synonymous withcivilization and culture, could now be seen as an unnecessary andenvironmentally damaging material. If you think I am being undulypessimistic and influenced by a few environmental extremists justvisit any primary or secondary school to meet the next generationof consumers. Our industry can no longer afford to take long-termgrowth for granted. More and more we shall have to fight for ourfuture and create our own growth. In this respect paper itselfbecomes increasingly a consumer product where total demand has tobe stimulated. The alternative, to do nothing, could produce astatic or even declining demand with serious implications for theindustry, its reputation, its technology and the quality of thepeople it attracts. . . . Until the paper industry and its alliescome together to . . . convince the public of the social andecological value of paper, our industry will continue to bevulnerable to more and increasingly damaging environmentalattacks. In this we have something to learn from other industriessuch as chemicals (Clark 1994).

It is a waste of time for industry to try to cultivate criticswith whom it has irreconcilable conflicts concerning land ordemand creation. Better by far for it to cut its losses with themand concentrate on isolating them from potential allies ofdifferent experience and social class. Unable either to crush suchcritics or to accommodate and conciliate them sufficiently,industry adopts the ancient strategy of divide and conquer.

That entails a dual approach. With those stubbornly resistingtakeover of land or water for plantations, or the ethos ofinfinitely-increasing demand, industry must cut its losses andresign itself to the risks associated with showing indifference,breaking promises, smearing opponents, or practicing evasion,denial, repression or trickery. At the same time, it must activelycultivate governments and uncommitted but powerful urban andNorthern middle classes, including consumers or environmentalists,who live at some distance from mills and plantations.

Thus pulp and paper interests in Indonesia have resorted torepression, abuses, and attempts to divide communities againstthemselves at home while hiring public relations firms to presenta softer picture to customers and legislators in the West.Finland's Enso, too, while taking advantage of Indonesia'sinvestment climate by involving itself in a joint pulpwood venturein west Kalimantan (see Chapter 11), has let it be known that noless an organization than the World Wide Fund for Nature will behelping to 'assess the project's environmental impact' should anyinternational observers have questions about the project (PPI3.1995).

Jaakko P"yry consultants, similarly, largely abandoned efforts toenlist environmentalists to their side midway through thecompany's master planning exercise in Thailand, smearing andbreaking promises to them, while channeling money to selected NGOsand the bureaucracy and taking pains to ensure that the nature andextent of opposition to the master plan within Thailand did notbecome important news in Finland (see Chapter 12). And when P"yryChief Executive Officer Henrik Ehrnrooth and top P"yry consultantJouko Virta were criticized in Finland about P"yry's involvementin a plantation project in the Dominican Republic, they simplydenied in public having

ever been in that country, despite beingshown a Dominican newspaper story and photograph of Virta shakinghands with a Dominican official in a Dominican setting (Wallgren1994). While such lying could be expected to provoke outrage inthe Dominican Republic, this does not greatly matter as long as itis believed in Finland, since the tactical point is merely toprevent Dominican plantation opponents' claims from being takenseriously by the Finnish public. Similar practices are alsofollowed in Japan. When a Kyodo News Service reporter uncoveredMarubeni's illegal chipping of Bintuni Bay mangroves in Indonesia,for example, the company intervened with his boss in order tosuppress publication. Japanese media coverage of the huge nationaloutcry in Australia over wood chip exports to Japan has also beenvirtually nonexistent (Kuroda 1995).

Wisely, the pulp and paper industry tends to avoid enteringdebates it cannot easily win, such as the debate over excessiveNorthern demand. Instead, it tries to prevent such debates frombeing heard by the wider public. One way of doing this is toattempt to marginalize opponents who try to get such debatesstarted. Wherever 'environmentalism' has become mainstream, it hasbecome difficult to do so by labeling them 'Communist', 'fascist','traitorous' or 'anti-development' as part of a strategy ofsuppression. Instead, industry attempts to redefine and embrace'environmentalism' itself in a way which implicitly sets suchopponents apart as radical or irresponsible (PRW 4.94, 1.93).Moreover, by promoting, in the North, the use of an idiom whichidentifies economic growth with livelihood, paper consumption withliteracy, and large corporations as merely another group of'concerned citizens', the industry strives to create an atmospherein which grassroots resistance in the South appears cranky or,even better, inconceivable.

Arjo Wiggins Appleton executives O. Fernandez Carro and Robert A.Wilson sum up such strategies well when they urge their colleaguesnot to target 'apparent opposition' if that means 'forgetting thevast mass in between: the public' and not to 'respond to themobile agenda of others' but rather to 'write the agenda anddiffuse negative issues'. Politics, they go on,

provides the packaging and the vehicle to achieve the industrialobjectives. Success is measured by the freedom to plant fibrecrops, recognizing the sum total of all the political forces (inthe broadest sense). There are two elements to the politicalsubsystem [of the total quality system of industrial forestry]:the message and the target. The message needs to be short,nontechnical, and fundamental: for example, 'Trees are good. Weneed more trees not less'. Our objective should be to create andmove inside an ever-increasing friendly circle of public opinion(1992).

US public relations firm Mongoven, Biscoe and Duchin (MBD) takethe counsel of Wilson and Fernandez Carro one step further bysuggesting that industrial corporations deal with environmentaland other activists by dividing them into four categories.'Opportunist' activists interested in adding a string of careertriumphs to their own personal curriculum vitae, MBD proposes, canbe dealt with by providing them 'with at least the perception of apartial victory'. 'Idealists', who 'want a perfect world',although they may hold considerable moral authority with thepublic because they have no visible vested interests, can beneutralized if they can be convinced that their position iscausing harm to others. So-called 'realists', meanwhile, are eveneasier to 'seek an arrangement' with. Because they tend to berelatively inexperienced in the workings of power outsidecorporate and NGO corridors, such 'realists' are easily taken inby industry's claim to be the 'only show in town'. They are alsonaively credulous of industry's claim that the only way of gettingits attention for the purpose of effective 'damage control' is toaccept its language, learn to 'live with tradeoffs', and abjureradical change. The group likely to present the most effectivechallenge to advancement of corporate interests, MBD concludes,are 'radicals' interested in 'social justice and politicalempowerment', who cannot be restricted to single technicalissues.

Given this taxonomy, corporate divide-and-conquer strategy isobvious: isolate the 'radicals', cultivate the 'idealists' andeducate them to be 'realists', then coopt the 'realists' intoagreeing with industry. Without the support of 'idealists' and'realists', MBD suggests, the 'radical' and 'opportunistic'positions will begin to 'look shallow and self-serving' to thepublic. The credibility of the 'radicals' will be lost and the'opportunists' can then be counted on to share in the final'policy resolution' (PRW 4.94).

Public relations, intelligence, and 'astroturf'

The thinking of Fernandez Carro and Wilson and MDB highlights howthoroughly industry's divide-and-conquer strategy is enmeshed inthe contemporary mechanics of public relations. The future of theplantation, pulp and paper industries is likely to be highlydependent not only on advertising, the bribery of experts, andother classic forms of 'the engineering of consent', but also onintelligence-gathering, counter-intelligence, infiltration,division and funding of NGOs, cooption of environmentalists,political subversion and provocation, and the creation of fakegrassroots movements. Also crucial are those related 20th-centuryarts of enclosing or replacing democracy known as opinion pollingand cost-benefit analysis (Stauber and Rampton 1995, Carey 1995,Adams 1994, Hitchens 1994).

Some forestry industry consulting firms carry out such activitiesthemselves. In 1993, for instance, Jaakko P"yry began to publish aconfidential quarterly intelligence report on environmentalistthinking and activities, aimed at a clientele of wealthycompanies. The editors of the report, known as EcoDigest, collectinformation partly by monitoring NGO publications, watchingenvironmentalists' electronic mail conferences, and sendingqueries to environmental groups. One such query to a Canadiangroup was aimed at determining if 'your organization has a policyas regards forest plantations. If so, do you see them as a GoodThing (e.g., because they take pressure off primary forests) or aBad Thing (e.g., because they reduce biodiversity)? Furthermore,what are the arguments you use?' (Ikonen 1994, Orton 1994). TheSwedish Pulp and Paper Association, meanwhile, has started sendingout regular 'press briefings' on the environmental virtues of treeplantations, and PaperInfo also publishes news on environmentalgroups in its Environews section.

Other important actors in pulp and paper hire outside publicrelations and advertising firms. Concerned about its environmentalimage among British paper consumers, for example, the FinnishForest Industries Federation is paying the London firm JackieCooper PR to disseminate information detailing its environmentalcommitments; while Canada's MacMillan Bloedel has hired Pielle andFinland's United Paper Mills has retained EIBIS International tocarry out similar assignments. The Finnish industry becameparticularly assiduous in inviting journalists andenvironmentalists to tour its forests in 1994 following a damagingarticle about Finnish forestry practices in the mass-circulationGerman periodical Der Spiegel. The Indonesian timber industry,meanwhile, has employed high-priced Western advertising firms,including Grey/MediaCom, to prepare print and televisionadvertisements claiming, falsely, that clear-cutting is notpermitted in Indonesia, that areas which in fact are to be loggedare being set aside as 'permanent forest', and that the country'sforest management is 'sustainable'.

Clients of the world's largest PR company, the US firmBurson-Marsteller (B-M) _ which boasts annual fees totalling over$200 million, 2,071 employees, 62 offices in 29 countries, and itsown Environmental Practice Group _ meanwhile includeKimberly-Clark, Asea Brown Boveri, Dow Chemical, TetraPak,Alliance for Beverage Cartons and the Environment, Shell, and theGovernment of Indonesia (Stauber and Rampton 1995). For more thana decade, B-M has helped forestry firms shedding jobs pioneer anovel combination of union-busting and anti-environmentalism.During a

period in which it has taken B-M's advice, for example,the US firm Louisiana-Pacific has destroyed its workers' union andbuilt pulp mills in Mexico where it has been able to pay workersless than US$2 per hour for processing US logs. At the same time,it has encouraged threatened employees to blame environmentalistsfor their plight, bussing them to rallies staged to counter forestprotection movements and nourishing the growth of pro-logging'grassroots' groups. After helping to sow similaranti-environmentalist sentiment across forest regions of westernCanada, B-M advised its forestry industry clients to set up theBritish Columbia Forest Alliance, a front group 75 per cent fundedby 16 forestry companies, which could then position itself as a'moderate' organization on environmental issues (Nelson 1994).Other multinational public relations firms becoming active on thegreen front (see Table 6.2 for prominent US firms) can also beexpected to become increasingly involved in work supporting thepulp, paper and plantation industries.

TABLE 6.2
Leading US PR firms working on environmental issues

Company	1992 net fees (US$million)	1993 'green' fees (US$million)
Burson-Marsteller	204	18
Shandwick	166	7
Hill & Knowlton	149	10
Omnicom PR Network	66	na
Edelman PR Worldwide	60	6
Fleishman-Hillard	59	9
Ketchum PR	46	15
Rowland Co.	44	5
Ogilvy, Adams & Rhinehart	36	3
Manning, Selvage & Lee	31	2
E. Bruce Harrison	na	7
Pacific/West Communications	na	5

Source: PRW 4.94, 1.95.

Among the services which the 'green teams' at such firms can offerthe pulp and paper industry are the following:

* Lobbying domestic or foreign parliamentarians orgovern-ment officials, often using parliamentary veterans, formerenvironmentalists or former reporters, in order to securefavourable legislation or enforcement on trade, environ-mental, orother issues.

* Disseminating propaganda supporting industry positions,including 'scientific' evidence emanating from pundits or researchorganizations funded by industry, and placing advertisements and'advertorials' in mass-circulation newspapers and otherperiodicals as well as commercials on television. PR disguised asnews or disinterested commen-tary is increasingly reaching thecolumns of the most respectable publications and is oftenreproduced by mainstream or academic book publishers as well.

* Suppressing enviromentalist books before they are printedby sabotaging promotional tours, planting callers to talk shows,or convincing journalists that books are unsubstan-tiated (PRW10.94)

* Infiltrating environmentalists' meetings in the guise ofactivists or housewives to gather information or 'guide'discussions. In Britain, there is considerable evidence thatenvironmentalists' telephones are tapped both by govern-ment andby private security firms.

* Posing as journalists in order to obtain previews ofresearch results which might be damaging to industry.

* Setting up fake 'environmentalist' NGOs with apro-industry agenda yet no obvious financial interests (includingso-called 'astroturf' grassroots groups, named after theartificial grass used in some American sports arenas) (PRW 10.94).Forestry corporations such as Weyerhaeuser are also creating'community advisory panels' or conducting 'open community forums'in efforts to regulate and co-opt criticism of the industry(Weyerhaeuser 1995).

* Helping Southern elites win over Northern consumersthrough advertising and other means.

* Keeping clients posted on global warming, packaging,rainforests, Green political parties, seeds, pesticides, chlorine,biotechnology, eco-marketing and certification.

* Monitoring and collecting data on environmentaljournalists and their interests and weaknesses so that they can bebetter manipulated.

* Building up files on activist groups, their leaderships,methods of operation, anticipated reactions to new products,funding sources, and 'potential for industry relationship' with aneye to finding out 'what's motivating them, how serious they are,what they will consider "success"' (PRW 1.93, 4.94).

* Advising corporations on how to offer financial support toNGOs with heavy needs for funding and 'respectability'. Tellingly,corporate sponsors of large US-based organizations such as WorldWide Fund for Nature and Environmental Defense Fund have alsofunded about one-quarter of the 37 organizations described in theGreenpeace Guide to Anti-Environmental Organizations (PRW 1.95).

* Advising corporations on how to put critical individualenvironmentalists or former government regulators on theirpayrolls. One of the authors of this book, for instance, wasoffered a consultancy at Shell following his involvement in acampaign against Shell's involvement in a Thai plantationproject.

Given the convergence of method between public relations andgovernment intelligence or police organizations, together with theincreasing interest of both in managing 'green' issues,organizations critical of the spread of pulpwood plantations canexpect in the future to be the subjects of a growing variety ofsophisticated political dirty tricks. Fake letters or literaturewill be disseminated,

and incidents manufactured or provoked,which either divide environmentalists against each other ordiscredit them in the eyes of the public. Agents provocateursplaced in green movements have already been responsible forconsiderable violence in the US, particularly on the West Coast(Helvarg 1994), and Hill and Knowlton has distributed a phonymemorandum using an Earth First letterhead calling for acts ofviolence 'to fuck up the mega machine' (PRW 1.95). Such tacticsdraw on the experience of the US's Federal Bureau of Investigation(FBI), which has frequently attempted to break up domesticpolitical movements not only by murder, assault, bombings,harrassment, and subsidized book publication, but also by'bad-jacketing', or making dissident groups suspicious thatcolleagues are associated with rightist organizations or arecorporate spies, or paranoiac about state or corporatesurveillance (Churchill and van der Wall 1988). In addition, thepractice of cultivating public hostility toward activists byframing them for various outrages _ historically used widely bySouthern security apparatuses against environmentalists andothers, by the FBI against US liberation and civil rightsmovements, and by the UK's MI5 against trade unions _ is likely tobe used more extensively in the future against Northernenvironmentalists as well.

Supporting conditions

Industry's attempts to divide plantation critics from potentialallies are made easier by a number of cultural factors.

First, the idiom in which corporations prefer to have discussionsframed _ an idiom which tends to equate the left and right sidesof Table 6.1 _ is already accepted by a large part of the publicto which all sides appeal. In particular, mainstream news organssuch as The Economist, The New York Times and Time magazine stillregularly claim that the technical 'expertise' Northerngovernments and corporations urge on the South is neutral,politically disinterested, and universally beneficial tolivelihood. From this perspective, the anger of Southerners whosee the damaging effects of such 'experts' intervention on theirdaily lives, even on those few occasions when that anger isreported in the Northern press, often appears bewildering,irrational, even unintelligible. What seems to many Southernactivists to be common sense _ that 'economic development' isdestroying occupations and making people hungry _ often appears inthe North as a contradiction in terms.

It is immensely useful to globalizing pulp and paper interests,moreover, that there exist very few channels through which Finns,say, can come to understand Thai ways of life, or US citizens tounderstand Brazilian culture. Protests which are potent inSouthern contexts thus lose much of their force when transposed toNorthern ones, helping to keep Southern plantation opponentsdivided from potential allies in the North. Self-flatteringNorthern cultural lore, for example, holds there to be apredetermined sequence of developmental stages through which allsocieties must pass until they have replicated the Northern'success story'. Southern plantation opponents who reject thislore are often dismissed by astounded Northern observers as beingsimply outside the pale. When told of Thai NGO opposition to pulpplantations in Thailand, for example, one Swedish forester,despite having no personal or institutional stake in the issue,was frankly mystified, remarking that 'as a Swede, I cannot acceptthat, because almost all of Sweden is covered with plantations'(Usher 1994). By disproportionately strengthening actors with aglobal reach, such gaps in understanding help push along theprocess of globalization.

Third, in many of its endeavours the plantation and pulp and papersector enjoys the tacit support of various nominally independentexperts (a few of them even associated with NGOs such as the WorldResources Institute and the International Institute forEnvironment and Development) who are not necessarily eitherfinancially supported by industry, or particular targets of publicrelations firms, or otherwise directly associated with privatefirms. Such experts, whether foresters, biologists, or

economists,tend not even to consider the possibility of making alliances withdissident villagers, even of their own nationality. One of theresults, as Chapter 4 has pointed out, has been the emergence oftwo distinct, seemingly conflicting, yet equally extensive'libraries' detailing the effects of commercial tree plantations,one cited by proponents and one cited by critics.

Dividing experts from plantation opponents

Why do so many seemingly independent professionals often work in away which pits them against rural dwellers adversely affected bypulpwood plantations? Part of the explanation, Chapter 4 hassuggested, lies with such experts' reductionist approach toknowledge. Yet to stop here is to leave many difficult questionsunanswered and thus to risk political ineffectiveness. Why, forexample, do many scientists, economists and NGOs who accept muchof the critique of pulpwood plantations, and who are not wildlyaverse to putting their own fields in an interdisciplinaryperspective, still act in a way which supports the abuses of theindustry? What are the psychological, cultural, and politicalroots of their stance? If 'reductionism' is a problem, canplantation critics do anything to encourage such intellectuals toabandon it? The loyalty which many experts hold for the idea thatit is mainly industry and capitalism which hold the answers to theproblems they create, in short, is of a type and degree whichrequires an explanation which has not yet been given.

Many experts, of course, frustrated by having to work fororganizations which they know cannot act on their most importantrecommendations, have learned, as a matter of psychologicalself-defence, to moderate those recommendations while avertingtheir gaze from the political meaning of such actions. Some areeven driven into denying that their actions have a politicalmeaning. As one eminent Yale University forester has remarked,'There are so many foresters accustomed to taking orders from onhigh that they don't question. They just go on drawing their payand saying it's not their fault' (Vail 1993). Another part of theexplanation of the limitations and lacunae in the thinking of manyscientists, economists, and NGO staff lies in the class, social,or educational background which they tend to share with each otherand with industry figures (Dove 1992, Frossard 1995). This temptsthem to seek out, and listen to, each other and to industry,rather than delve too deeply into unfamiliar facts or socialmilieux. The simple lack of awareness on the part of many expertsof the many existing social alternatives to 'working withindustry' should never be underestimated. The familiar notion thatcertain scientific 'paradigms' exercise a hegemony over experts'imaginations also helps explain the pervasiveness of pro-industryattitudes among intellectuals who seemingly have no vestedinterests _ although, unless this explanation is combined with athoroughgoing sociology and history of scientific practices, itleaves mysterious where these 'paradigms' come from and how theymight be challenged.

A more fundamental part of the explanation perhaps has to do withmany experts' innocent beliefs about power. In the academic,planning, and development circles in which many experts and large,well-financed NGOs move _ circles which have flourished during theprocess of globalization _ power is frequently represented assomething which industry and its governmental andintergovernmental allies 'possess' and which others (who arecharacterized as their beneficiaries or victims) 'lack'. It is notdifficult to see what nourishes this conception. Experts areaccustomed to the interplay of power in the restricted arena oftheir offices, laboratories, and social milieux, where experienceteaches them that industry, the state and internationalorganizations 'get things done'. The easiest way such experts haveof conceptualizing other actors with whom they are less familiaris to assume that they are what these bodies are not: that is,powerless.

Professionals have a vested interest in viewing themselves,moreover, as repositories of knowledge which others lack. Bringingabout the changes they desire, they often assume, must then be amatter

of ferrying that knowledge to industry, the state and theirallies, who, as mentioned above, are in turn seen as having thepower that others lack. This does not mean that experts needalways agree with industry and the state, or cannot ever take theside of their victims. It does mean, however, that if experts dofight for the downtrodden, they tend to be willing to do so onlyif they are allowed to present their case in lawyerlike fashion,and transformed into proper 'knowledge', to the people theyimagine to be 'the powerful'. The most important audience for thetruth, the assumption goes, is industry, the state, and theirallies.

Of course, as experts are the first to admit, 'speaking truth topower' in this way may not always get results, despite theflattering noises industry makes to court expert endorsement. Tohave the chance to speak truth to power even once in a while,moreover, requires staying on its good side and thus acceding tofrequent and frustrating compromises. But making compromises withindustry and the state, the reasoning goes, is at least morelikely to result in effective 'damage control' than makingcompromises with impotent villagers. Surely, hopeful professionalsreason, governments, corporations and international agencies arelikely to let us be their 'brains' at least some of the time!

It is only on this naive, dichotomous have/lack view of power andknowledge that some of the preposterous utterances of experts whohave formed de facto alliances with industry begin to make sense.The claim of one IIED consultant that to reject the framework ofthe industry-oriented Tropical Forestry Action Programme would beto 'start from square one', for example, is intelligible only onthe assumption that opponents of the plan are so powerless thatsupporting their own environmental movements would be a dead end(Sargent 1990). An Audubon Society official's insistence that'conservationists have just got to learn to work with industry',similarly, is plausible only if one excludes from the outset thepossibility that one can influence the establishment game by notplaying it as well as by playing it (PRW 1.95, Ferguson 1994,Scott 1990). The notion that good environmental practice or localcommunities' rights can be 'secured' only by appealing togovernments or to the United Nations is based on the same illusorydichotomy between official power and vernacular impotence, as isthe widespread notion that the only way to engage in effectiveenvironmental 'damage control' is to participate in activitiesdominated by states, international organizations, and business.

Indeed, it is probably not too much to say that the have/lack viewof power and knowledge _ and the Orientalism and lack ofintercultural engagement out of which this view grows (Said 1978,Lohmann 1993) _ lie at the root of a whole cluster of falsecliches about social change. These include the cliche thatactivists must choose between, on the one hand, acting onprinciple and being impotent and, on the other, compromising andbeing effective; between having 'clean hands and living in anivory tower' and having 'dirty hands and living in the realworld'; between being uncompromising but powerless 'idealists' andcompromising but influential 'realists'. Only on the oddassumption that ordinary people are not engaged in power politics,and do not dirty their hands with compromises, could such ideasget off the ground. Only on the assumption that effectivegrassroots movements do not exist could the alternative to'working with industry' be seen to be 'living in an ivory towerwith only one's principles for company'. And only on theassumption that governments or international organizations arepowerful but neutral machines awaiting programming by expertscould those experts allow themselves to be divided so easily frompotential allies at the grassroots.

So seductive is the image of power as something which the state,international organizations, and industry 'have' and others 'lack'that it often prevents evidence of grassroots power from evenbeing seen. Has a plantation scheme been cancelled in a Southerncountry? Has a logging ban been instituted? Has a pulp millimproved its effluent treatment? The natural assumption of manyexperts is that such things can't have happened because of popularresistance. There must be some other, invisible explanation. SomeWestern environmentalist must have met quietly with officials topoint

out the error of their ways. Or perhaps a secret deal wasstruck at high governmental levels to get logs from some othercountry. Or perhaps a think tank released a new cost-benefitanalysis or proposed a new natural resource accounting scheme. Itthus becomes difficult even in principle for many experts torecognize counterexamples to their assumption that there is onlyone true language of power, that spoken by themselves, businessand officialdom. While this assumption flatters professionals'feelings of self-worth and helps expert institutions securefunding, it only further entrenches contempt for the public.

Ironically, the have/lack picture of power, regarded as so'realistic' by its acolytes, is one to which corporations andgovernments themselves _ at least those which have lasted _ havenever subscribed, although it is in their interest for them oftento advertise themselves as doing so. As this book makes clear innearly every chapter, when the plantation, pulp and paper industryspeaks to itself, or maneuvers to gain 'freedom to plant', or mapsstrategy with PR specialists, it reveals a persistent andpragmatic preoccupation with grassroots resistance and theopinions of ordinary people. While the industry is also concernedto win over the newspaper, the government official, the collegeprofessor and the professionalized NGO, fear of the irate crowdwho may be so stupid or disobedient as not to listen to theseluminaries is never far from its collective mind. As always, theself-styled 'realists' eager to 'speak truth to power' turn out tobe largely the victims of their own naive and self-aggrandizingfantasies, encouraged by the genuine realists of the corporate andofficial worlds who, by contrast, are always conscious of havingto act against a constant background of opposition. The more thatpotential professional critics of plantations are neutralized inthis way, the more easily effective expert-grassroots politicalalliances can be prevented.

Stories for the uninformed public

Most plantation industry propaganda is disseminated as part of thegeneral divide-and-conquer strategy for managing difficultopposition. This propaganda seldom seeks to convince critics whoalready have a good knowledge of local plantation conditions or ofindustry maneuverings; as Fernandez Carro and Wilson intimate,these critics are not likely to be susceptible to it. Rather,industry propaganda tends to be aimed at consumers, officials, andenvironmentalists whose day-to-day lives are not touched byproduction operations, and who have little time to acquaintthemselves with the technical issues. Correspondingly, it isusually deployed through the channels which will reach thesegroups best: public debates, newspaper columns, and governmentalnegotiations. The purpose throughout is to prevent critics withsome knowledge of the industry's actions from finding support frompotential allies in other circles.

Among the bite-sized 'messages' which the plantation and pulp andpaper industry have disseminated to this end are the following:

* Pulpwood plantations can 'relieve some of the pressure' onthe world's natural forests (Bazett 1993: 100).

Without extensive plantations being established in the South, itis said, and with continuing rising demand, both local old-growthforests and distant ones such as those in Siberia will become moreeconomically attractive to the pulp industry; yet with plantationsthey can be saved. This 'message' has a theoretical attractivenesswhich can appeal to Northern groups not directly acquainted withthe facts on the ground, but must be used with care elsewhere. Forone thing, as the case studies of Part Two will show in detail,for historical, technical, economic and political reasons alike,plantations and increased logging of natural forests often go handin hand. The logging of natural forest often provides thenecessary funding for, or is justified by, the establishment ofindustrial plantations. In Chile, for example, many plantationsare being established by logging

native hardwoods which mightotherwise have survived; as one industry source admits, the suddenexpansion of wood chip exports has 'exerted pressure on nativeforests, even though the pulp and paper industry uses onlyplantation wood' [sic]. In Argentina, a British-based companyplanned to embark on an integrated scheme to log in a50,000-hectare area containing natural quebracho (Schinopislorentzii) and algarrobo (Prosopis spp.) forest in Santiago delEstero and then replace it with eucalyptus, untilenvironmentalists got wind of the scheme. In Brazil, VeracruzFlorestal has destroyed native forests in Mata Atlantica in Bahiato plant eucalyptus, with advice from Jaakko P"yry. In Thailand'sNakorn Ratchasima and Chachoengsao provinces, too, as well as inMalaysia, Kalimantan and Sumatra, logging and plantations havegone hand in hand. Many plantations in Indonesia are subsidized bylogging revenues recycled through the state. Second, theestablishment of plantations on already deforested land tends toinduce the inhabitants to settle in forests elsewhere (as hashappened in Thailand), resulting in deforestation at a distance,and sometimes even setting off a chain reaction of furtherimpoverishment and forest destruction. (See Part Two.) Finally,pulpwood plantations are not designed to supply industrialsawlogs, nor logs for plywood, and so can hardly remove what areprobably the dominant motivations for logging tropical forests,particularly in Southeast Asia and the South Pacific.

*** Pulpwood plantations can increase aggregate tree cover.**

'Trees are good,' the industry rationale goes. 'We need moretrees, not less.' Again, this disingenuous 'message' is plausiblebut must not be used with audiences aware that the establishmentof large monoculture pulpwood plantations is, as suggested above,merely a continuation of deforestation by other means. It mustalso not be used with audiences alert to importance of thedistinction between mere tree cover and forest. The exotic,homogeneous trees of an industrial plantation cannot in any wayfulfil the same environmental functions as the trees of a forest,which interact with soils, the water cycle, animals, other plants,and surrounding ecosystems in a way that assures the regenerationpotential of each.

Tellingly, the confusion between forests and plantations which theindustry is eager to promote with uninformed audiences is onewhich it is equally eager to disavow with more sophisticatedaudiences. With the latter, the industry insists that pulpwoodplantations be judged not as forests but as agricultural crops(Aracruz Celulose 1996), asking its critics why they do notcondemn fields of maize with equal fervour. Needing to appeal toaudiences with different levels of understanding, the industrymust try to have it both ways.

*** Indefinitely rising paper demand is either inevitable ordesirable or both.**

This assumption is so fundamental a part of the contemporaryideology of economic growth that it is seldom stated explicitlyand even less often discussed. To call it into question among abusiness audience tends to elicit either silence or the rebuttal'Do you want to go back to the Stone Age?', and it is reinforcedin other arenas by repeated uncritical reference, for example, toFAO projections of demand increase. Taken together with the ideathat further exploitation of old growth is undesirable, theassumption leads naturally to the conclusion that plantations mustbe expanded and that side effects, however regrettable they maybe, are unavoidable. The search for 'alternatives' to the currentpaper and pulp production model, instead of being concerned withsuch social matters as demand creation or the desirability of junkmail or mini-packaging, thus becomes narrowed to the search for'alternative technical means of increasing production'. For anappropriate response to this ideology, it is useful to turn onceagain to the late ex-FAO forester Jack Westoby:

Can we be sure that it is in the public interest that pulp andpaper should be a growth industry? . . . [I]t irks me to have tocarry about a kilogramme of newsprint when all I want is a grammeof news. I

also begrudge the time it takes me to transfer 50 or 60unsolicited circulars from my letter-box to my waste bin everyweek . . . My blood pressure rises each time I pick up a packageat the supermarket and discover when I get home that it takes atleast ten minutes and a good deal of ingenuity to penetrate it andreach the contents. The fact is that the pulp and paper industryproduces a lot of things I don't want, that I never asked for, butthat I am compelled to have and also compelled to pay for,directly or indirectly. As an individual, I resent all thesethings. As a member of the community, it strikes me asirrational.

Westoby adds that if a country 'sets as its goal a specific futurelevel of GNP per head, and assumes that this carries with it aconnotation of so many kilos per head of paper and board, . . . itis setting out on the wrong foot'. Treating such numbers asdivinities is like projecting recent US heroin-consumption trendsin linear fashion into the future, which rapidly leads one to theconclusion that 'every man, woman and child in the US will be ajunkie by 2020' (Westoby 1987).

*** Demand for paper comes not from particular groups,classes, or societies, but rather from 'the globe' or 'the nation'as a whole.**

*** To argue against the large-scale spread of pulpwoodplantations is to deny Third World schoolchildren the books theyneed, or to claim that only Northerners are entitled to milkcartons**.

This sentimental message, when floated by industry executives inpublic forums, cynically hopes to trade on its audience'signorance. As the industry knows perhaps better than anyone else,new plantations are established principally to feed surges inconsumption in heavily-consuming industrial and elite sectors _particularly for items such as advertising and export andsupermarket packaging _ and do not respond effectively to the cryof the downtrodden for education, food, and basic necessities.(See Chapter 3.) The message also quietly begs the question ofwhat the outcome of potential negotiations between the downtroddenwho are resisting the establishment of plantations around theirhomes and those others, downtrodden or not, who want to use paperderived from those plantations. Why, after all, should it betreated as a foregone conclusion that paper consumers would notchange their expectations if they had an opportunity of enteringinto a dialogue with those affected by the plantations which feedthem? Nevertheless, the message often powerfully swayssocially-concerned outsiders who are unversed in the structure ofpaper demand or the undemocratic way in which it is created. Forexample, the Executive Director of one prominent Northern NGOrecently remarked dismissively, echoing mainstream economicideology, that to investigate paper demand critically wouldinvolve dictating to ordinary people what their wants andpreferences should be (Sandbrook 1995).

*** Fast-growing monoculture plantations are up to ten timesmore productive than natural forests.**

In one sense of 'productive' _ 'productive of trees with marketvalue as pulpwood over at least two or three growing cycles' _this 'message' is true. In other senses of 'productive', however _for example, 'productive of other trees, of animals, vegetables,fruit, mushrooms, fodder, fertilizers, water retention capacityand medicines, and of improved agriculture on neighbouring fields'_ it obviously is not. Hence this 'message' cannot count in favourof plantations unless it is accompanied by an explanation of whythe first sense of 'productive' should be privileged over others.To be democratic, this discussion must include affected peoplespeaking in their own idioms. Yet when used by industrialists,state foresters, and some economists, the claim that plantationsare 'productive' is often used in a context in which othermeanings of 'productive' are ignored or suppressed and

those whomight articulate them excluded from the discussion. In suchcontexts, the claim is misleading and the discussion biased.

*** Fast-growing tree plantations can help curb globalwarming.**

This notion has proved extremely attractive to Northern elites whoare reluctant to cut their fossil-fuel emissions, disinclined tomaster the intricacies of improving energy-use efficiency, andnaively confident of their corporations' ability to implantlarge-scale plantations in any political context in the world. Ithas already legitimized environmentally-damaging plantations inGuatemala, Ecuador, Bolivia, Peru, Costa Rica, Brazil and Malaysia_ most of which are intended to 'offset' carbon dioxide emissionsfrom Northern industries. Various proposals have also beenpresented to the Global Environment Facility of the World Bank(GEF) to establish carbon plantations in Africa with co-financingfrom electric power firms in the North (Fearnside 1993).

Some industrialized-country environmentalists such as Norman Myershave even gone on record with the preposterous claim thatgrand-scale plantations are the leading way of buying time inwhich to cut CO2 emissions (Myers 1990). The NoordwijkDeclaration, signed by 63 countries in 1989, reinforced this wildnotion, calling for an increase in the rate of tree plantationestablishment to 12 million hectares annually by the year 2000 asa response to global warming. Corporations and multilateral andbilateral agencies, too, have learned to wave their hands about'global warming benefits' when attempting to justify plantationprojects they support for other reasons. For example, a recentreport sponsored by the Swedish Forest Industry Water and AirPollution Research Foundation recently found that 'Swedish forestsbind greenhouse gases' even when the effects of pulp, paper andtimber production using those 'forests' as raw material were takeninto account (Skogsindustrierna press release 29.4.94).

However, such arguments are not very effective as justificationsfor industrial plantations with audiences aware that in anyeconomic and political regime in which large fast-growingplantations are likely to be established, it is far more probablethat they will be a cause of, than that they will be a solutionto, global warming. These audiences will be conscious, forinstance, of plantations' powerful and difficult-to-calculate rolein accelerating deforestation, whether through direct encroachmenton forests or through the displacement and deskilling of localpeople (see Chapters 7, 8, 11 and 12). They will also point outthat the peak carbon mass of a plantation is far less than that ofa natural tropical forest. For instance, as Chapter 7 points out,the above-ground biomass of Gmelina plantations ready for harvestat Jari in Brazil was only a quarter that of the native forestthey had replaced (Russell 1983), making nonsense of officialclaims that the plantations helped alleviate global warming.

A 'message' about the supposed global-warming benefits ofplantations is also unlikely to impress audiences who know thatplantations are capable of sequestering carbon only temporarily.Even the longest-lasting wood products are unlikely to be able tokeep their carbon out of the atmosphere for more than a fewdecades, while the paper produced from plantations may well beoxidized within months of harvest.

Yet even if plantations could be fashioned that resulted in netsequestration of carbon, and even if they were capable ofsequestering it for a meaningful length of time, the sheer scaleof the plantations that would be required makes the ideapolitically and technically impractic-able. According to oneestimate, reducing atmospheric CO2 to preindustrial levels wouldrequire a plantation capable of producing annually many times theexpected global demand for wood (Grainger 1990), or a tree farm15-20 times the size of Britain. The fact that growth rates inlarge-

scale plantations are always much lower than in test plotssuggests that even this may be an underestimate.

Proposing industrial plantations as a meaningful response toglobal warming, in short, demonstrates a lack of perspective _particularly given the multitude of more feasible approaches tothe problem which are available, including reductions in fossilfuel use and no-cost improved energy efficiency (Rocky MountainInstitute 1990). As even Philip Fearnside (1993), who has somesympathy with the idea of plantations as a part of a solution toglobal warming, notes, 'plantations are a much less cost-effectivemeans of avoiding net emissions of greenhouse gases than isreduction of tropical deforestation, as well as having many fewerbenefits in realms other than global warming abatement'.

The attempt to justify large plantations in the South on theground that they will alleviate global warming, finally, will beespecially ineffective with audiences who question why the South(or, for that matter, poor rural regions of the North) shouldprovide ever-expanding sinks for infinitely-growing industrialcarbon dioxide sources in industrialized regions (Barnett 1992,Sargent and Bass 1992, Shell/WWF 1993). Any historically- andscientifically-informed approach to the issue will have toacknowledge that global warming is primarily due to the industrialactivities of the North, and that that is where the burden of themain changes necessary for its alleviation must lie.

It is perhaps worth adding that while plantations whose harvestwas prohibited might be temporarily useful in mitigating globalwarming, these are not the sorts of plantations advocated by thepulp and paper industry. In any case, such plantations wouldeventually cease to be carbon sinks, achieving a rough carbonequilibrium with the atmosphere. Faced with such considerations,some scientists have proposed deep-sixing huge masses of logsunder ocean sediments after harvesting them, sequestering theircarbon permanently, and then replanting the ground where they hadgrown, establishing a perpetual carbon sink. Although theelaboration of such techno-fantasies undoubtedly promises years ofamusement for boffins, it is unlikely to appeal to pulp and paperindustrialists, who would like to use scarce plantation land forquite other purposes.

*** Plantations are profitable to local and nationaleconomies.**

This message, which is frequently floated by governments eager toattract plantation investment, is most effectively used withaudiences unaware of the massive subsidies channeled to theindustry mentioned in Chapter 5. It would be of little use with aUruguayan audience (say) which was aware that in that country,government subsidies underwrite roughly half of the expense ofestablishing pulp plantations, which would be commerciallyunviable without them.

*** Plantations create employment, either directly orindirectly (through transport, pulp and paper industries, andsales).**

This argument is also standard among governments promotingplantations, although industry and its consultants are less likelyto resort to it now than formerly (Shell/WWF 1993). As Chapter 4shows, the claim is false. Large plantations generate directemployment mostly at planting and harvest times. In Asia inparticular, they tend simultaneously to deprive previous occupantsof the land of their former occupations, so net employment trendsmay well be negative even at this stage. After planting,employment drops off substantially. Growing mechanization isreducing harvest-time jobs even further. In general terms,plantations create much less employment than agriculture, thebalance being positive only in extensive, sparsely-populatedlivestock-raising areas. As for industrial employment, plantationsdo not always result in the creation of local industries, as inmany cases production is aimed at the direct exporting ofunprocessed logs. Even where pulp and paper

industries are set up,the high degree of mechanization implies few employmentopportunities, as Chapter 2 reveals.

*** State-of-the-art pulpwood plantations exemplify forestry'sGreen Revolution in harnessing science and technology to the goalof bringing more people a better life.**

This argument, which has been put forward by some corporatetechnicians, is likely to attract, say, Economist leader-writersrather more than many of those who were at the receiving end ofthe original agricultural Green Revolution. The Green Revolutionsucceeded above all in making profits for big business, especiallyNorthern business, who benefited from sales of seeds, fertilizers,pesticides, tractors, and so forth, but devastated many existingecosystems and societies (George 1988, Shiva 1990). In some ways,the effects of the plantation boom promise to be even more biasedthan those of the Green Revolution, in that it is focused evenmore tightly on promoting exports of a cheap raw material _ inthis case wood _ at the expense of local peoples and their land.The 'scientific management' which is advertised as a benefit ofplantations in reality consists of the ability to produce plantsand timber in the shortest space of time and as cheaply aspossible, while social and environmental impacts tend to beexternalized.

*** Promulgating plantation guidelines is the crucial steprequired to make plantations 'sustainable'; if these principlescan be agreed upon by all interested parties, then abuses shouldbe avoidable through a few adjustments to production systems.**

This extremely subtle assumption is implicit in, for example, theguidelines formulated by Shell/WWF, the International Timber TradeOrganization, the Canadian Pulp and Paper Round Table, the NewZealand Development Assistance Division and the ForestryStewardship Council, as well as in most eco-labeling schemes(Shell/WWF 1993, Clark 1994, IIED 1995). It is also easilyembraced by a wide variety of Northern academics, scientists,technocrats, public relations executives and environmentalistswhose history, institutions, and jobs give them incentives forbelieving that if theory, objectives, or sound legal measures canbe formulated 'correctly', even by those who live far fromplantation areas, then good practice, implementation orenforcement will follow fairly straightforwardly through theefforts of existing effective, disinterested, benevolentinstitutions.

Such figures, when interrogated by critics with experience of some of the disastrous effects plantations can bring about in practice, often consider it sufficient simply to disavow responsibility, protesting (for example), 'But that's not the way it's supposed to work in theory', or 'The implementing agencies didn't follow my instructions'. Whether the implementing agencies, or indeed the capitalist systems within which such ideologists and scientists work, have any interest in or capability of following those instructions is frequently considered to be 'not my department'.

Thus one British advertising executive recently accused of makingmisleading claims for Indonesian forestry in a televisionadvertisement retorted that what actually happens in practice inIndonesia is irrelevant. Evidence of rampant industrydeforestation in Indonesia should not disqualify advertisers fromsaying that forest use there is sustainable, he maintained, anymore than the evidence for the existence of drunk drivers inBritain should prevent anyone from saying that drink driving isnot allowed there (Brooks 1994). In the same vein, Philip G.Adlard of the Oxford Forestry Institute has responded defensivelyto documentation of cases in which eucalyptus planting has reducedfood production by invoking an irrelevant Cloudcuckooland ofcontextless markets, uncoerced economic actors, and benevolentstate intervention:

If market forces are allowed free play this would result in a risein price of the local staple foods and a reversal of the trend togrow tree crops for cash benefits in place of food crops needed bythe local community. The market price for forest produce (polesand pulpwood) would also lead to checks on the areas planted . . .The farmer has the right to choose whether he grows a cash cropand buys his staple food or grows some or all of his food crop andforegoes possible cash benefits. If market forces do not lead to abalance, or if there are proved ecological reasons for not growinga particular crop, then some form of subsidy may be the bestincentive to good land use (Adlard 1993).

Part of what makes such responses so inadequate is the fact that,even in the unlikely case in which principles of plantationmanagement could be formulated which, on paper, respect the claimsand desires of people in plantation areas, such principles bythemselves turn few cogs in the economic, political and socialmechanisms of contemporary industrial capitalism. A number ofimmense practical difficulties immediately intervene _ all ofwhich, however, tend to be more familiar to activists on theground than to office- or trial-site-bound environmentalists ortechnocrats.

One problem is that implementing, enforcing and financinginstitutions are never 'neutral' and tend either to ignore or toreinterpret management principles as they see fit. Nor doidealized egalitarian social structures of the type Adlard invokesactually exist in the real world. In 1989-90, for example, Shellhired the International Institute for Environment and Developmentto formulate management recommendations for a proposed plantationoperation in Thailand to ensure the project was carried out in asocially and environmentally responsible fashion. Yet, as wasobvious to Thai observers from the beginning, there was never anychance that IIED's plan, even if formulated with the best will inthe world by the foreign experts responsible for it, could engagewith Thai political and social realities in the way advertised orindeed do more than shore up repressive forces while providing acover for business as usual. A Shell (Thailand) executive chargedwith implementing the project inadvertently summed up thedifficulty when he stated forthrightly that the company wouldfollow those recommend-ations which were 'consistent withprofits'.

Similarly, none of the environmental controls recommended by PapuaNew Guinea government consultants for Japanese corporate pulpwoodclearfellings in the Gogol Valley _ which included restrictions onlogging coupe size and measures to alternate clearcuts withlightly-logged forest patches _ were ever implemented (Lamb 1990).In a parallel case, Jaakko P"yry's Forest Policy, althoughexplicitly committing the company to maintaining speciesbiodiversity and to advocating that 'any natural forest area whichdemonstrates untouched unique ecosystems be set aside forconservation even it it has been assigned for industrialforestry', has not prevented the firm from involving itself in(for instance) several enormous projects in Indonesia which areexplicitly designed to start up by feeding off mixed tropicalhardwoods from native forests (P"yry n.d. e). Multilateraldevelopment banks' structural inability to abide by their ownguidelines has also been exhaustively documented (Rich 1994,Ferguson 1990).

A second, equally deep problem with promoting plantationguidelines as a solution to plantation problems withoutinvestigating their political context concerns information andmonitoring. To take one indicative example, B&Q, a large Britishdo-it-yourself outlet which has come under heavy environmentalistpressure due to its sales of tropical timber, has hired staff toaudit its wood supplies to ensure they meet rigourous standards of'sustainability'. Yet in a highly-extended global commercialsystem, with its myriad, convoluted and difficult-to-tracelong-distance transactions among agents many of whom have somevested interest in concealment or prevarication, it has provedhugely difficult in practice to guarantee a 'sustainable' pedigreefor many wood products no matter how well-formulated the standardsare (Cox 1993). Even more fundamentally, any team of experts sentout to certify that plantation operations in the South are abidingby certain management principles, because it is likely to consistof professionals of a certain class and background,

willcommunicate far more easily and comfortably with corporate andstate personnel than with affected rural residents, to understandwhose observations might indeed require months or years ofcultural immersion. Such experts may not even find time to meetbriefly with local people requesting opportunities to pass oncritical information, as happened in 1989 in Sarawak when thenoted ecologist and conservationist Lord Cranbrook was enlisted bythe International Timber Trade Organization to review Malaysianlogging practices. The report any such 'certifiers' file after abrief visit will thus inevitably be biased and riddled with gaps.

Participating uncritically, with industry or with others, inefforts to formulate principles or guidelines for plantationmanagement, therefore, runs the risk of merely helping corporateefforts to delay structural change or to provide ideological coverfor continued depredation. This is not to deny that, on someoccasions, formulating such principles can be one step in a seriesof actions and arguments which effectively challenge industrypractice. Framing principles prohibiting wood from any extensiveindustrial exotic monoculture from being certified as 'sustainablyproduced', for example, could be part of a realistic programme toreduce the damage done by such plantations. Nor is there any pointin denying that the exercise of formulating such principles canhelp environmental groups clarify their own viewpoints tothemselves. The question of whether negotiating over the contentof such principles is a waste of time or not, however, is anempirical one, to be settled by a close and, if necessary,anthropological examination of the social and political context _including the context of industrial structure and economiccentralization _ in which the principles are expected to operate.Such an examination, to be meaningful, must be conducted beforenegotiations about the principles' content begin, rather thanafter they are completed.

Conclusion

The 'messages' and assumptions described in this section, deployedselectively and shrewdly, foster the globalization of the pulp andpaper industry by helping block alliances between grassrootsgroups fighting monoculture pulpwood plantations and environmentalgroups elsewhere. Yet the converse is also true. It is only theglobal reach of the contemporary pulp and paper industry _ itsability to exploit the spatial and cultural distance betweengrassroots movements and intelligentsias elsewhere _ that allow itto deploy its mystifications _ 'Trees are good. We need more treesnot less' _ to drum up support for industrial tree plantationsamong largely urban and Northern power bases. This support iscrucial, since a ballooning 'free market' in wood fibre, pulp andpaper can be constructed and coordinated only if the subsidiesgiven to consultants, foresters, aid agencies, andnon-governmental organizations to promote plantations can bejustified before a large and diffuse public.

To use such mystifications, however, is always to gamble that theywill not be exposed. Whether that gamble pays off _ whether thepulp and paper industry gains its 'freedom to plant' at theexpense of the people directly affected _ depends largely on theskill in intercultural conversation of plantation opponents. Theprospects are far from hopeless. In a world thronged with nakedemperors, paper industry figures claiming sustainableenvironmental benefits for large-scale monoculture pulpwoodplantations are more notable than most for their sartorialminimalism.

Chapter 7

Brazil: The Eucalyptus Pulp Giant

Many people think of Brazil as an enormous, half-empty country,where the impact of a few hundred thousand hectares of eucalyptusmust be minimal. This impression is mistaken. As in othercountries, eucalyptus plantations in Brazil are not located onland no one wants, but rather are concentrated in the mostpopulated coastal zones, close to the ports from which pulp isexported abroad. Plantations and pulp mills can be found from theextreme southern province of Rio Grande do Sul to Par and Amapin the extreme north. They have a great impact not only on land,vegetation and water, but also _ more importantly for us _ onpeople and their livelihoods.

Brazil has had long experience in planting eucalyptus for charcoalproduction and conifers for pulp. Indeed, the country's largestplantation area is still occupied by eucalyptus charcoalplantations. As late as the mid-1960s, however, the area plantedwith exotic species was relatively small and concentrated mainlyin the state of Sao Paulo, where wood consumption was highest andwhere deforestation had necessitated expensive imports of rawmaterials from elsewhere in Brazil.

The situation changed radically after a military dictatorship cameto power in 1964. New policies favouring large-scale capital wereimplemented, forming part of a modernization strategy seeking togain the Brazilian economy access to the international scene(Goncalves 1992). A new forestry code was also developed, andfiscal incentives were given to promote tree plantations. Largeplantations quickly sprang up in many regions of the country, inmany cases without the developers having much idea of what thewood planted would finally be used for (Knight 1991b). Poorlocation and poor maintenance led to the loss of many plantations.Of the six million hectares planted under the government incentivesystem, only 2.3 million hectares of eucalyptus and 1.6 millionhectares of pines survived (Bazett 1993). Years later, however,the pulp industry was able to take advantage of these extensivesources of raw materials _ although to what extent is unclear,since in 1994 the total pulp plantation area was estimated byindustry sources at only between 1.2 and 1.5 million hectares(three-fifths of which was eucalyptus) (Associaao Nacional dosFabricantes de Papel e Celulose n.d., Higgs 1994).

Despite the apparent anarchy in the plantation sector, themilitary government clearly aimed to establish a large export pulpindustry. A late-1960s package of tax breaks promoting the importof pulping machinery was followed by the National Paper and PulpPlans I (1974) and II (1979/80). The industry became one of themain beneficiaries of the government's developmentalist policy(Goncalves 1992, Goncalves et al. 1994).

A National Economic Development Bank (BNDE) resolution meanwhilegave priority to financing huge projects with a daily pulpproduction capacity of 1,000 tonnes or more. Such lendingarrangements, of course, also favoured gigantic plantations.Indeed, loans were to be made available for mill construction onlyin those cases in which half of the fibre required was alreadyavailable (Goncalves et al. 1994). In addition to investing publicfunds in the pulp industry, the state also played a central rolein establishing institutional and legal conditions necessary fordeveloping tree monocultures and in spreading the idea that pulpprojects would guarantee regional development and progresswherever they were set up (Miranda 1993a). In some cases statecompanies and cooperative ventures between the state and privatecapital have also been involved (see below).

The new pulp businesses were situated mainly in the east and northof the country. Such locations, since they made it possible forfactories to be sited near large raw-materials sources, allowedthe industry to take advantage of economies of scale andintegration. They also enabled the industry to avoid thelarge-scale popular resistance to pollution which would haveresulted if factories were sited near major urban centres. Bybuilding mills near the coast, finally, the industry was able tokeep transport costs to export ports low (Goncalves 1992).

An apparent success

Brazil first began producing pulp and paper on a considerablescale in the 1950s, when pulp production reached 280,000 tonnes.During the 1960s, production reached 780,000 tonnes, but it was inthe 1970s that the sector really took root. In 1980, more thanthree million tonnes was produced, with short-fibre eucalyptuspredominating over long-fibre conifer pulp. In the 1980s, theindustry's motor became export pulp production, as total outputrose to four million tonnes. By 1994, Brazil was supplying 50 percent of the world's eucalyptus pulp (Goncalves et al. 1994, ABECELn.d.). Today Brazil is regarded as home to the outstandingexamples of large, industrial fast-growing tree plantations andballyhooed as the 'leading supplier of eucalyptus market pulp inthe 1990s', shipping nearly two million tonnes abroad each year(Know-How Wire 2.1993, ABECEL n.d.). The country harbours thesecond-largest area of such plantations in the world and boastspulp production costs among the lowest anywhere (Shell/WWF 1993).

This enormous expansion of the pulp sector, ironically, has takenplace in a country with a per capita paper consumption whichremains well below the world average. While yearly per capitapaper consumption in the US is 332 kilogrammes and in Switzerland216, Costa Rica 55 and Argentina 45, in Brazil it is only about 28(PPI 7.1995). The majority of the Brazilian people have notbenefitted from increased paper consumption; nor have significantnumbers of new jobs been created by the industry. The people as awhole, instead, have suffered a series of negative environmentaland other effects.

This prompts a question: in what sense can Brazil's massive pulpand plantation development be considered a success? To try toanswer this question, this chapter will examine the history,claims and records of five of the most frequently-praised of thecountry's pulp operations _ Aracruz, Bahia Sul, Monte Dourado,Celulose Nipo-Brasileira (CENIBRA) and Riocell _ which, amongthem, produce 90 per cent of Brazil's bleached eucalyptus pulpexports.

Aracruz

Aracruz is the world's largest producer of bleached eucalyptuskraft market pulp and operates the world's largest pulp mill. In1978 it inaugurated its first 400,000-tonne-per-year plant (laterenlarged to 500,000 tpy) and in 1991 the second, which produces afurther 500,000 tonnes (Willums and Goluke 1992). Aracruz'sproduction is aimed primarily for export, with Europe as the maindestination, followed by the United States and Japan. The companyaccounts for more than half of Brazil's pulp exports, or more than850,000 tonnes (Miranda 1993a, ABECEL n.d.).

Aracruz's mills feed off its extensive eucalyptus plantations inthe states of Esp!rito Santo and Bahia, where the company hasachieved increasingly rapid growth rates through the selection andcloning of the fastest-growing species and the individual treesbest suited to the needs of industrial processes (that is, thosewith the least bark and branches). Wood consumption per tonne ofpulp produced was thus reduced from 4.5 to 4.1 tonnes between 1985and 1991 (Swann 1993). At

the same time, average tree growth inthe plantations has gone from 25 to 35 cubic metres per hectareper year (Willums and Goluke 1992).

Although ostensibly a highly-successful private undertaking,Aracruz was in fact conceived and developed through direct andindirect state assistance. One of Aracruz Florestal's original1967 partners was the ECOTEC consultancy company, which not onlypressed the government into approving fiscal incentives forplantation forestry, but also advised the government of Esp!ritoSanto state to promote the activity. ECOTEC also recruitedentrepreneurs to back the business and chose the location of theplant. In 1974, the government approved a decree allowing theestablishment of an 80,000 hectare afforestation project inEsp!rito Santo. One of the signers of this decree was the thenMinister of Mines and Energy, Antonio Dias Leite Jr. _ an ECOTECpartner (Goncalves et al. 1994).

Established in 1968, the plantations soon fell victim to disease.Aracruz responded by sinking large resources into research onseeds of a variety of provenances, becoming a recognized authorityon the subject of plantations from the 1980s onwards (Goncalves etal. 1994). By the middle of the 1980s, meanwhile, the company hadacquired so much land in Esp!rito Santo that the state governmentwas forced by the public to come to a 'gentlemen's agreement' withthe company to prevent it from buying more land. This resultedonly in Aracruz's investing in 80,000 to 100,000 hectares of newterritory in the neighbouring state of Bahia. A newly-enactedForest Development Programme, moreover, allowed the company andthe state to promote eucalyptus planting on the land of thirdparties (CEPEDES/CDDH 1992, FASE 1993). As of 1994, Aracruz owned1.86 per cent of the territory of Esp!rito Santo, commanding inall 203,000 hectares in Esp!rito Santo and Bahia. Of this total,132,000 hectares had been planted with eucalyptus (IBASE 1994b,Aracruz 1996).

Aracruz Cellulose was set up in 1972 and Aracruz Florestal becameits subsidiary. The first shareholders were a widely-varied groupof banks, petroleum firms, construction companies, and otherbusinesses, none of which had any previous experience in pulpproduction. Among them was the Lorentzen group (one of the fewwhich is still a major shareholder in the company). To boost itsexpertise, Aracruz formed an association with the Swedish Billerudcompany, which had some experience in eucalyptus pulp manufactureand which took responsibility for marketing 50 per cent ofAracruz's production in Europe (Goncalves et al. 1994).

Then, in 1975, the state's BNDE agreed to contribute US$337million, in the form of loans and share purchases, to theconstruction of Aracruz's first mill. The financial package,granted on exceptionally favourable terms, was the largest everoffered to a private company. The Brazilian state became the mainshareholder in the company, with 40 per cent of the shares,followed by British American Tobacco with 30 per cent, and in allprovided 55 per cent of the support needed to build the mill.Without this state support, the plant could never have beenconstructed (Goncalves et al. 1994).

Following further BNDE loans to increase plant capacity, aprivatization process got under way in 1985, ending in 1989 withthe sale of the majority of state-held shares. Current mainshareholders are Souza Cruz (a subsidiary of British AmericanTobacco), the Lorentzen Group, and the Safra Group, with 28 percent each; the holdings of BNDE (now renamed BNDES) have beenreduced to 12 per cent. According to the research findings of FASEand IBASE, two major Brazilian non-governmental organizations(NGOs), while privatization 'represented a good deal for thosegroups assuming control of the company', it was an 'absurd move'from the point of view of the state, which thereby abandoned itsstrategic position in a lucrative undertaking, handing thetaxpayers' inheritance over to the private sector (Goncalves etal. 1994).

Aracruz, perhaps more than any other big pulp producer, has takenseriously the need to respond to pressure from the environmentalmovement _ above all through publicity. The firm's directorsplayed a leading role, through the Business Council forSustainable Development, in preparing big business for the RioEarth Summit in 1992. This resulted in a book, Changing Course,which was distributed to delegations of all participatinggovernments before the conference. The company's environmentalpublicity has been widely disseminated, both by the company itselfand through the Business Council for Sustainable Development, aswell as by journalists and researchers. Aracruz has also supportedthe London-based non-governmental International Institute forEnvironment and Development in a large study on the 'sustainablepaper cycle' (IIED 1995).

In its publicity, the company claims not only that it uses 'clean'industrial processes. It also asserts that it has plantedeucalyptus only in areas where the natural forest was clearedbefore its arrival. The firm stresses, in addition, that it ismaking every effort to conserve remaining native stands. It statesthat 27 per cent of its land has original forest cover and thatfor every 2.4 hectares of eucalyptus one hectare of natural forestis preserved. To counteract forest defence campaigns, Aracruzhighlights the fact that it has always used wood from its ownplantations or has bought eucalyptus wood from farmers providedwith free seedlings by the company (Willums and Goluke 1992). Atthe same time, it states that its plantations do not compete forland used for agriculture or other activities (Know-How Wire2.1993). Perhaps no one has promoted this image better thanSargent and Bass in their book Plantation Politics (1992). Afterdescribing the panorama of desolation in Esp!rito Santo and Bahia,these authors go on to say that 'Aracruz Celulose S.A., withgovernment support, took control of much degraded land within thetattered fragments of natural forest, and has established majoreucalyptus plantations. In doing so, it has begun to improve thelocal environment and social conditions'. So successful hasAracruz publicity been, indeed, that in 1991 the company wasofficially singled out by the United Nations for its 'rigorouscommitment' to sustainable development (IBASE 1993a).

This chorus of praise, however, has little factual foundation. Theactual effects of Aracruz's tenure have been deleterious both tolocal people and their livelihoods and to the soil, water andforests of the region.

First, the enormous area bought by the company beginning in the1960s was not, contrary to company claims, empty: thousands ofindigenous people and subsistence farmers lived there. In order toovercome local resistance to the takeover, mainly from blackcommunities and small agricultural producers who had recentlymigrated from other states, the company used a strategy in whichphysical violence was joined to symbolic violence. Land purchaseswere made through two people: a military officer and a local blackleader, a combination which had an especially clear meaning giventhe dominance at that time of the military dictatorship (Miranda1993b). Approximately 7,000 families are said to have beenremoved, through violence and coercion, from the areas Aracruzoccupied, including several thousand people who received nocompensation (FASE 1993, Valarelli 1992, IAD 7/8.1992). Crucial tothese expulsions was the negligence or collaboration of localauthorities, including the then governor of Esp!rito Santo state,Artur Gerardt, who later became president of Aracruz (FASE 1993).

In 1967, recalled Jos Luis Ramos, the head of Caieira Velhavillage, Aracruz, with the support of the state government,

felled large areas of forest and planted eucalyptus across theregion, including on our land. In a little time, this companydestroyed around seven Tupiniquim villages, expelling us, andtoday we are surrounded by a sea of eucalyptus in threediscontinuous areas. Now there is no forest or game left. Thevalley's rivers disappeared following the planting of theeucalyptus (Miranda 1993c).

Three principal options were left to the people expelled: emigrateto other rural areas; move to a life of underemployment in thefavelas or shanty towns of cities; or work for the company, mainlyon the plantations. Aracruz plantation work, however, has beendescribed as near-slave labour, with conditions so dangerous andunhealthy that few workers can remain on the job more than tenyears. Over 50 per cent of those who have worked on theplantations long-term suffer from serious work-related healthproblems as a result of their tasks. While they have the right tomedical treatment, it is rare that they can ensure that they aregiven it, since the doctors are also Aracruz employees. Thecompany tends to dismiss long-term plantation employees withoutcompensation, replacing them with younger people (Inyaku 1993).The abundant reserve army of unemployed _ whose numbers have beenswelled by the crisis of another export monoculture crop, coffee;by the company's dispossession of local people; and by migrantsattracted to the Aracruz 'development centre' _ meanwhile helpskeep salaries low.

Yet opportunities for even low-paid, health-endangering jobs havebecome limited as tree harvesting and other plantation work havebecome increasingly mechanised (IBASE 1994b). During the firstmonths of 1993 alone, Aracruz dismissed 20 per cent of itsemployees, reducing the workforce from 7,000 to less than 6,000,with forestry jobs being most affected (Inyaku 1993). In 1993, theindigenous people who lost their land to Aracruz started a newbattle to get it back.

Aracruz attempts to divert attention from its record byadvertising itself as having voluntarily built several recreationcentres, schools, vocational training centres and health centres,at a cost of over US$15 million. What the company does notmention, however, is that as part of the plant expansion project,the BNDES both demanded that Aracruz reinforce social structure inthe regions where it operates and provided 80 per cent of thetotal funding required to do so (Goncalves et al. 1994).

Aracruz's claim that it does not usurp agricultural land iscontradicted by, for example, the way the firm has bought land inBahia previously dedicated to small-scale cultivation of mamao, alocal fruit. Although a company director suggested that mamaoproduction was in decline, it had in fact provided a viablelivelihood for local farmers (Goncalves et al. 1994). In general,the company's insistence that its activities are compatible withagriculture makes little sense given its propensity for buyingprecisely the best agricultural land on the ground that it makesmechanization easier. Aracruz owns a full 15 per cent of theplains in Esp!rito Santo (FASE 1993).

On the environmental side, meanwhile, Aracruz has been accused ofhaving felled and burned more than 50,000 hectares of forestduring its first phase of tree-planting (FASE 1993, Miranda 1993c,IAD 7/8.1992). It has also been fined by IBAMA, Brazil'senvironmental protection agency, for planting eucalyptus inprotected areas. Rogrio Medeiros, National Coordinator for theEnvironment of the National Federation of Journalists, who hasbeen monitoring Aracruz's activities since its beginnings, statesthat 156 streams have disappeared in the region during that periodand that wells are drying up in a number of areas; even a river,the San Domingos, has stopped flowing. In the words of Joao PedroStedile of the Landless Workers Movement, '50,000 people in thearea used to eat fish every day. Now they eat fish no more; somefishermen have stopped fishing because there are so few fish tocatch' (IAD 7/8 1992).

The Tupiniquim Indians, meanwhile, found that soils on landreturned to them after having been used for eucalyptus plantingdid not return to their old levels of agricultural productivity,having become sandy. Indiscriminate use of the herbicides Goal andRoundup and the ant killer Mirex have been blamed for thewholesale poisoning of regional animals (FASE 1993). (Since 1993,apparently, all major pulp companies have used Mirex-S, a lessharmful piretroid, instead of Mirex, an organochlorine [Fanzeres1995].)

According to the local NGOs Centro de Estudos e Pesquisas para oDesenvolvimento do Extremo Sul da Bahia and Centro de Defesa dosDireitos Humanos, Aracruz has in addition been 'constantly fined'for industrial contamination. Local people have testified that

near the factory it is nearly impossible to breathe. The majorityof the people working in the factory probably have no nasal mucousleft . . . Air pollution emitted by Aracruz reaches distances ofmore than 100 kilometres, depending on the wind (CEPEDES/CDDH1992).

The Pulp Industry Workers Union (SINTICEL) has accused Aracruz ofincorrect management of both water-borne and airborne emissions(FASE 1992). Local activists claim that chemical releases into theAtlantic have killed and poisoned both fish and vegetation (IAD7/8.1992).

Aracruz's newly-professed concern with implementing 'clean'industrial processes cannot be expected to lead to consistentenvironmental results, moreover, if it consists mainly in aninterest in profit margins. When the company incorporated newtechnology for non-chlorine pulp bleaching in late 1993, it wassimply responding to foreign consumer demand for chlorine-freepulp. A company directive stated that 'without the new technology,we would lose sales of 150,000 tonnes of pulp on the internationalmarket' (IBASE 1993b). It is for this reason that the firm runsthree different types of industrial process among its fourproduction lines. One uses chlorine gas, two others are elementalchlorine free (ECF) and only the newest one is totally chlorinefree (TCF) (Fanzeres 1995).

Small wonder that in May 1992, on the eve of the Earth Summit, theBrazilian NGO Forum, together with representatives from othersectors of society, organised a public event denouncing the'Aracruz farce' and criticizing a proposal to present thecompany's activities as a model of sustainable development. At thesame time, Greenpeace symbolically closed the port of Portocel,the company's export port, as a sign of protest against theenvironmental and social damage it had inflicted during pulpproduction, including its destruction of native forest (FASE 1993,Bruno 1992). As one research team concluded, Aracruz

assumes the image of protector of the environment, but itseucalyptus trees have dried streams, destroyed the local fauna,impoverished the soil, impeded the regrowth of native plantspecies, and drastically reduced the area available forcultivating basic foodstuffs (in a country where many people dieof hunger). This is not to mention land concentration and theexpulsion of the rural population, which has contributed toincreasing the urban population and the degradation of livingconditions in the cities. Where is the sustainable developmenthere, we might ask (Goncalves et al. 1994)?

Bahia Sul Celulose

Bahia Sul Celulose was set up in 1984 by one of the main businessconglomerates in Brazil, the Suzano Group, and the state-ownedCompanhia Vale do Rio Doce. Suzano, with interests in many areas,is owner of the Suzano Paper and Pulp Company, one of the mainintegrated paper-producing concerns in the country and involvedalso in wood, publishing, and graphics. Previously, Suzano Paperand Pulp had produced pulp only for its own paper mills; Bahia Sulwas its first venture into export pulp.

Bahia Sul's shareholders include Suzano (CSPC), which today holds35 per cent of the shares; Companhia Vale do Rio Doce (CVRD), with29 per cent; the National Economic and Social Development Bank(BNDES), with 26 per cent; and the International FinanceCorporation (IFC) of

the World Bank, with three per cent. However,voting rights have always rested with Suzano and CVRD, who hold 55and 45 per cent of the ordinary shares.

Total investment came to US$1.5 billion, with the companybenefiting from 10 years of low-interest BNDES loans worth $387million, all of which had a three years' grace period. Bahia Sulalso obtained $33 million from Citibank and $83 million fromManufacturers Hanover Trust. The IFC role in the enterprise, bysignalling support from the World Bank, served to make it easierto obtain funds from other sources (Goncalves et al. 1994).

Bahia Sul Celulose has the capacity to produce 500,000 tonnes ofbleached eucalyptus pulp and 250,000 tonnes of printing andwriting paper per year. Some 45 per cent of its pulp is earmarkedfor the firm's own paper mills, another 45 per cent for export andthe last 10 per cent for the domestic market (CEPEDES/CDDH 1992).Half the export pulp goes to Asia and another quarter each toNorth America and Europe. Three-fifths of the company's paperproduction is also shipped abroad, half of it to North America andequal parts of the rest to Europe and the Middle East (Goncalveset al. 1994). The company ranks fifth among Brazil's pulpexporters.

The decision to locate the company in Bahia was motivated largelyby the existence there of extensive eucalyptus plantations.Suzano, a pioneer in eucalyptus pulping, had exhausted itsexpansion possibilities in Sao Paulo state and wanted more pulp.CVRD, which was already embarking on joint ventures in the pulpsector, and which held 100,000 hectares of eucalyptus in Bahiaoriginally planted for charcoal for the steel industry, made anideal partner (Higgs 1992a, 1992c).

The CVRD plantations were the result of a government incentivepolicy promoting tree-planting in the central southern region ofBrazil. At the end of the seventies, land prices rose in thoseregions and plantation companies moved into southern Bahia, wherelarge areas of cheap or deforested land were becoming available inthe wake of highway construction and the associated unsustainablelogging. The objective was less to set up productive enterprisesthan simply to get hold of the subsidies that were being pouredinto the plantation sector. In 1982, the state of Bahia became thesecond largest afforested region in the country (Miranda 1992).All the conditions for a large export pulp mill were thenavailable: abundant raw materials, cheap land, a cheap workforce,transport infrastructure and a nearby port in the city ofVit''ria.

Today Bahia Sul Celulose owns 114,000 hectares of land, dividedbetween 68,000 of eucalyptus, 34,000 of native forest and 12,000occupied by infrastructure works. The company plants an additional1,000 hectares annually and since 1992 has also promotedtree-growing by small farmers on their own land in order tobroaden the resource base with a view to future expansion of theplant (Goncalves et al. 1994, Higgs 1992c).

Like Aracruz, Bahia Sul Celulose presents itself as a defender ofnature and blames the poor for environmental degradation. Thehunting practiced by local people to supplement their poor diet,for example, is treated in the company's literature as an'ecological crime' which the firm is heroically striving to curb.An industry journalist reported approvingly in 1992 that'environmental considerations were important both in the locationof [Bahia Sul's] plant and in its construction':

Apart from Bahia Sul's conservation of 30 per cent of its forestland for native species and its planting of 20,000 such treesannually, extensive studies were produced prior to construction toassure the aquatic environment was safe. Features of the millinclude oxygen delignification, primary and secondary effluenttreatment and biomass energy production (Higgs 1992).

Such statements are misleading. They ignore the fact that, beforethe region was opened up to 'development', local people had beenusing natural resources in a far more responsible manner than thecompany is using them today (Miranda 1992). They are alsocontradicted by the fact that Bahia Sul used only an exceptionallylow 7.2 per cent of its total mill construction costs oncontamination control equipment (Goncalves et al. 1994), asopposed to the approximately 20 per cent figure common inindustrialized countries (CEPEDES/CDDH 1992).

Also unmentioned are other socioeconomic dangers the Bahia Sulinstallations pose for the region as a whole, such as thoserelated to dependence on a single monoculture. In the case ofcacao cultivation in Bahia, this dependence led to repeated crisesattributable to climatic irregularities, pests, and fallinginternational commodity prices over which local producers hadlittle control. Overdependence on monocultures of eucalyptus maybring similar problems. The reduction in size of the state'sagricultural area has already forced it into greater dependence oncostlier food imports from other regions, with negativerepercussions on the quality of life of the worse-off(CEPEDES/CDDH 1992, Miranda 1992).

To make way for Bahia Sul, in addition, the families from nearly8,000 small properties in the region were driven from their land.Evictees who became forestry employees are now by and large worseoff than small producers who managed to keep their properties(Goncalves et al. 1994).

Nor has Bahia Sul proved to be an efficient creator of new jobs.Each one of the existing 5,500 jobs at the company has required aninvestment of between US$226,000 and $338,000 _ much of thecapital deriving ultimately from public funds. According to astudy conducted by local NGOs (CEPEDES/CDDH 1992), an alternativedevelopment project (based on diversified agriculture) with asimilar level of investment could generate 150,000 jobs at a costof a mere $8,300 each. In the forestry sector, the company employsonly one person per 45 hectares, while agricultural activitiesgive work to at least 18 per hectare; mamao production requires1.5 workers per hectare (CDDH 1993). In spite of companypropaganda, moreover, many of the jobs which have been providedhave not gone to local people, who are often not well enoughqualified (Miranda 1992).

Living and working conditions have hardly improved, either. Thelarge numbers of people attracted to the Bahia Sul site by thecompany's advertisements for construction workers precipitated anexaggerated rise in housing rents. For labourers who lodged alone,living conditions were dreadful. Rooms measuring three by fourmetres lodged six or more workers, with one toilet per 32 men.Family problems were exacerbated by extended separations. Some5,000 workers lived in such conditions over a three-year period,with the population around the construction site occasionallysurging as high as 13,000. The resulting strikes delayedcompletion of the plant. Inmigration also contributed to thecollapse of health, education, drainage, housing and securityinfrastructure. New shanty towns sprang up, and poverty, violence,crime, disease and prostitution increased (CEPEDES/CDDH 1992, CDDH1993, Goncalves et al. 1994).

Trade unionists have meanwhile pointed to high unemployment andunderemployment and at poor working conditions in the forestrysector (Miranda 1992). The transport system used for both theconstruction works and forestry areas has been denounced asdegrading and dangerous. Workers have been treated as livestockand transported in the back of lorries, a practice which has ledto frequent injuries. Bahia Sul has also damaged local fishing andtourism livelihoods (CEPEDES/CDDH 1992).

A megaproject of the Bahia Sul variety implies enormousconcentrations of capital, land and political power. As itgenerates little employment in relation to the level ofinvestment, little of this capital and power ever finds its waydown to society's deprived. As a result, large firms such as

BahiaSul come to wield disproportionate political clout and the statesin which they are located run the risk of suffering from a modern'feudal' syndrome in which large holders of land and capitalbecome 'lords' who attempt to dictate policy. Before Bahia Suleven started up, official complaints were being aired about theuse of company funds in election campaigns (CEPEDES/CDDH 1992).Years later, an advance payment of taxes by Bahia Sul was used bythe Bahia government to surface the roads most used by thecompany's lorries (Miranda 1992c). In 1989, in a parallel withevents in Esp!rito Santo, the state government of Bahia wasbelatedly forced, in reaction to the company's buildup of 'feudal'power, to demand that the firm suspend acquisition of new lands.

The environmental problems caused by Bahia Sul Celulose are alsosignificant. In southern Bahia, where the company is located, onlysome 60,000 hectares survive of a forest which, in 1930, covered amillion and a half hectares. These remnants are part of the MataAtlantica, an endangered forest at least as rich in biodiversityas the Amazon rainforests (CEPEDES/CDDH 1992). The eucalyptus usedby Bahia Sul threatens the survival of this forest mainly becauseit takes over crucial areas which would otherwise have regeneratedinto native forest. Unless these areas are allowed to regrow, thestrict conservation of a few tiny areas of untouched MataAtlantica forest _ which, for public relations purposes, Bahia Sultakes great care to say it supports _ has little meaning.

Bahia Sul's eucalyptus plantations are also affecting both thequantity and the quality of local water. Inhabitants of the townof Veracruz, for example, have declared that, as the result of anearby eucalyptus plantation, several wells have dried up and theyhave had to dig down a further three metres in order to findwater. Insecticides, fertilizers, and herbicides used on theplantations, in addition, contaminate watercourses, taking theirtoll on aquatic fauna. The inhabitants of the fishing community ofCaravelas have gone to the courts to demand an investigation intoa recent reduction in crabs and other species, which has beenlinked to the use of agrochemicals (CEPEDES/CDDH 1992). Localresidents fear that water contamination from Bahia Sul'sindustrial plant will only add to the problems.

CENIBRA

The first eucalyptus plantations were established in Minas Geraisin the 1940s by the Belgo-Mineira Company, for charcoal. Theyexpanded enormously from the late 1960s onwards (particularly inthe 1970s), due largely to state subsidies. Plantations were setup by Florestas Rio Doce (created by the state and the CVRD in1968) and the steel company Acos Especiais Itabira (ACESITA) aswell as many independent tree growers, the aim being to supply thepulp, iron and steel and cement industries with raw materials orenergy. Minas Gerais state became home of the largest eucalyptusplantation area in Brazil (M. T. Goncalves 1995).

By 1970, Japan was CVRD's biggest customer. In 1972, CVRD signedan agreement with the Japan-Brazil Pulp Resources Development Co.(JBP) to set up a jointly-held company called CeluloseNipo-Brasileira, or CENIBRA, to produce eucalyptus kraft pulp forexport, half of which would go to Japan. CVRD held 51.5 per centof the shares (JATAN 1993). JBP, the minority shareholder, was inturn over 36 per cent owned by Japan's bilateral foreign 'aid'agency, the Overseas Economic Cooperation Fund. Other JBPshareholders included Oji Paper (nearly ten per cent); Jujo Paper,Honshu Paper and Itochu (over eight per cent each); Tokai Pulp,Daishowa Paper, Hokuetsu Seichi Paper Mills, Mitsubishi PaperMills, Daio Paper, and Sanyo Kokusaku Pulp (over 3.5 per centeach); and, with smaller stakes, Kanzaki Paper, Daiko Paper,Chuetsu Pulp, Nippon Kakou Sheisi, Abegawa, Kishu, Sanko, Jubanand Mishima (M. T. Goncalves 1995).

In 1974, when CENIBRA began operations, its pulp mill was suppliedwith wood from Florestas Rio Doce, the CVRD subsidiary. At thesame time, another firm called Florestas Nipo-Brasil, or FLONIBRA,was created, with the aim of acquiring an additional 400,000hectares of land for pulp plantations in Bahia and Esp!rito Santo.In 1984, the 155,000 hectares which had actually been acquired _including 88,000 planted with eucalyptus and 48,000 given over to'conservation areas' _ were passed to the control of CENIBRAFlorestal, the firm now responsible for supplying the CENIBRA millwith pulpwood and energy (Goncalves et al. 1994). Some 4,600people are employed on the CENIBRA Florestal lands. Among othertasks, they plant 6,000 hectares of eucalyptus per year (JATAN1993).

CENIBRA's pulp mill, which employs around 1,300 people, hasincreased production from 116,000 tonnes in 1978 to 376,000 in1993, and plans to double that figure have already been approved(JATAN 1993, Goncalves 1995). In all, 80 per cent of thecompany's pulp goes for export (50 per cent to Japan and 30 percent to Europe and the US), making the firm Brazil's second-rankedpulp exporter after Aracruz (JATAN 1993, Miranda 1993a).

The firm's inland mill in Minas Gerais is able to compete withcoastal export pulp operations such as Aracruz only because it hasthe use of a high-quality railway belonging to CVRD. When theplant came on line, the railway was improved and adapted to pulptransport (Goncalves et al. 1994). The company is also able tokeep costs down through being co-owner, together with Aracruz, ofthe Portocel port, a specialist pulp-exporting installation(Knight 1991b). In 1975, moreover, CENIBRA received US$128 millionin state financing. This was supplemented by another $14 millionin 1976, $16 million in 1981 (to reduce energy consumption), $6.6million in 1982, and $15 million in 1985 (Goncalves et al. 1994).

CENIBRA's claim to green credentials comes in the form of afive-year strategic plan developed in 1991 to assure 'sustainabledevelopment' (Higgs 1992d). As a result of this plan, 240 hectaresof pine and eucalyptus surrounding the plant were to be enrichedwith local species in order to encourage the return of otherindigenous species. In addition, some 1,000 hectares of nativeforest were to be preserved, while company land on the banks ofthe Rio Doce was to be reforested with native species. AtCENIBRA's mill, meanwhile, the plan called for company-monitoredmeasures to control effluents, as well as initiation of productionof chlorine-free pulp.

Several aspects of this plan call for comment. First, the plantingof indigenous species and the preservation of a few areas ofnative forest (the latter, far from being a voluntary measure, isa legal obligation) are essentially cosmetic measures to pacifylocal people increasingly concerned by the advance of eucalyptus,as well as environmental groups in the North. (They may alsolimit, to a small extent, the risk of pests.) Second,effluent-treatment systems were installed only in 1988 _ 11 yearsafter the mill came on line _ and only after heavy pressure fromlocal people (Goncalves 1995). Their installation thus hardlydemonstrates trustworthiness on environmental matters. Similarly,chlorine-free bleaching techniques began to be used only as aresult of demand from the European Community, and are usedexclusively with pulp destined for the European market (JATAN1993).

As with Aracruz's and Bahia Sul Celulose's 'greenwashing' efforts,moreover, CENIBRA's 'sustainable development' plan artfully failsto mention a number of destructive realities about the company'soperations. One such reality is the way CENIBRA's projects andthose of other companies such as CVRD, ACESITA and Belgo Mineiraconcentrate vast swathes of land in a few hands in a process oftenmarked by violence. According to JATAN (1993), for instance,FLONIBRA 'used whatever methods were available to acquire land forits plantations':

sometimes it purchased land at above market prices; at other timesresidents were chased away with violence. It also often resortedto deception; for instance it would first move a FLONIBRA insideronto land adjacent to the farmer's land and set up a localconflict; then a third party would be sent in who would act as a'mediator' between the two and offer to purchase the farmer'sland.

FLONIBRA is also reported to have felled secondary forest used byindigenous people, obliging them to emigrate to nearby towns(JATAN 1992).

As elsewhere in Brazil, the concentration of land with good soilsin a few hands has undermined subsistence agriculture and led toincreased urban migration and the weakening of autonomy and localsocial ties (Guerra 1992, M. T. Goncalves 1995). Wage labour,meanwhile, has proved an inadequate substitute for small-scalefarming in both economic and cultural terms. As one worker said,'the salary that we earn does not go very far . . . it is onlyenough to survive on' (M. T. Goncalves 1995). As a result of largeplantations taking over agricultural areas, Minas Gerais has hadto import food from other regions. As the holdings of plantationfirms accumulate, moreover (ACESITA, for example, has 250,000hectares, Belgo Mineira 100,000 and CENIBRA 155,000), thedependence of local towns on a few businesses grows, and theinfluence of such companies on decision-making processesincreases. One result is yet more industrial projects and treeplantations (Guerra 1992, JATAN 1993).

CENIBRA's relationship with its workers, meanwhile, has beenauthoritarian and exploitative. While, according to oneinterviewed worker, wages were initially good and there was astrong trade union, salaries declined considerably after CENIBRAstepped in to manipulate union elections through pressure andfraud. The company also dismissed unionized workers and startedcontracting out both industrial and forestry tasks to other firms.This move, aimed at reducing costs, resulted in even lower wagelevels and a smaller worker population, making unionization evenmore difficult (M. T. Goncalves 1995). Working conditions areoften inadequate, with many plantation chainsaw operatorssuffering from nervous disorders and other health problems (JATAN1993).

CENIBRA is also moving into contract farming through theFazendeiro Florestal programme, operated in conjunction with astate agency, through which seedlings, fertilisers and ant poisonare provided to individual farmers if they plant eucalyptus ontheir own land. This allows the company to increase its forestrybase in a way other than through simple acquisition of land. Thefarmers are contractually obligated to sell CENIBRA wood at the'market price', which is established by the company itself(Goncalves 1995).

The environmental impacts of CENIBRA plantations includedestruction of native forests and loss of biodiversity (Guerra1992, JATAN 1993, M. T. Goncalves 1995). Fertile agricultural landhas also been taken over. Not only does CENIBRA not restrict itsplantations to 'degraded' land; it also plants, contrary to itsstated policy, on pronounced slopes (Guerra 1992).

Soil ecology has also been affected. Because the thick layer ofplant material associated with plantations cannot be mineralisedrapidly by microorganisms, organic acids are formed and calcium,potassium and magnesium ions are replaced by hydrogen ions in theupper layer of the soil. This implies a lower pH, which affectsthe availability of nutrients to plants. The long term productivecapacity of the soil is endangered and it is not known how muchlonger the same land can keep on producing eucalyptus wood (Guerra1992). Tree bark, which, according to FAO, contains the best partof the nutrients taken from the soil by the tree, is removed fromthe site and used in the pulp mill for energy generation, furtherreducing soil fertility (JATAN 1993).

Local people have observed, moreover, that the rate of replacementof underground water tables has slowed. This is attributable tothe increased surface runoff associated with plantations and witheucalyptus's high water consumption. Finally, the use ofpesticides such as Aldrin and Mirex has resulted in thecontamination of soils and watercourses, with proven high fishmortality (Guerra 1992). The company has even begun to sprayherbicides from the air, endangering local agriculturalists(Goncalves 1995).

Environmental impacts at CENIBRA's pulp mill have been equallyserious. The first complaints of water pollution date from 1977,the year the plant started up, and have been continuous eversince. Yet only at the end of 1986 did the company formally commititself to installing an industrial and sanitary effluent treatmentsystem, giving itself a 30-month deadline. Since 1990, CENIBRA hassubmitted monthly reports to the appropriate state agency, butwithout making them public (Goncalves 1995). Although scientificdata on air pollution around the pulp mill is unavailable, JATANmembers visiting the plant in 1992 remarked that 'we couldn'tavoid noticing the horrible smell present in all of the plant andwe felt sorry for the people who had to work there' (JATAN 1993).

Jari and Companhia Florestal Monte Dourado

In 1967, United States shipping magnate Daniel Ludwig paid theBrazilian military dictatorship US$3 million for 1.6 millionhectares of tropical forest on the Jari River near the frontierwith French Guyana. A year later he began planting vast homogenousmasses of fast-growing trees for pulp. Ludwig's pulp mill,constructed in Japan and taken by sea to the chosen site, wasfinally installed in 1979.

Ludwig's project was similar to others in Brazil, except for thespecies chosen. This was Gmelina arborea, a tree indigenous toIndonesia, and was a failure. In addition to the problems normallyexperienced with eucalyptus and pine (leaf-cutting Atta andAcromyrmex ants), the gmelina was afflicted by the fungusCeratosystis fimbriata, which not only delayed tree growth, butalso reduced the quality of the pulpwood (Higgs 1993b, Shell/WWF1993). These difficulties caused the company great losses, as by1978 it had already planted 64,000 hectares of gmelina (Shell/WWF1993). From then on it began to plant a pine (Pinus caribaea var.hondurensis), which had already been tried in the area.

In 1982, when Brazil was moving towards democracy and Ludwig couldno longer count on support from the military establishment(Sargent and Bass 1992), he decided to sell Jari to a consortiumof 23 Brazilian companies, led by the CAEMI group, who acquired 40per cent of the shares (IBASE 1993a). The BNDES supported theoperation through a US$180 million loan (Shell/WWF 1993). One ofthe main new shareholders was AMCEL (Amap Florestal e CeluloseS.A.), owner of some 90,000 hectares of pine plantations near theplant (Knight 1991b).

The latter were of great importance to the company. As its ownexisting plantations were so unproductive, it had no other rawmaterial sources to rely on until its new pine, and theneucalyptus, plantations matured (Knight 1991b). At present thefirm owns some 90,000 hectares of plantations, which are mainlyeucalyptus and pine, with a 2,000 hectare remnant of gmelina.Eucalyptus now dominates, 60 per cent from selected clones and 40per cent from seed. More trees are being planted at a rate of13,500 hectares per annum (Higgs 1993b).

Jari's mill _operated by Companhia Florestal MonteDourado_produces 300,000 tonnes of pulp annually, 55 per cent ofwhich is long fibre and 45 per cent short. Some 65 per cent isexported to

Europe, 14 per cent to the US, and another one percent to increasingly important markets like Japan, Indonesia,Korea and China (Shell/WWF, 1993).

Jari has not lagged far behind its fellow firms in attempting to'greenwash' its activities. As journalist Richard Higgs writes,'Jari is very proud of its almost surgical blending of plantationspecies in among the predominant and thriving natural forest' _ apractice which helps 'to prevent the spread of pests and disease',something of which the company has bitter experience _ andmaintains reserve areas and carries out research into nativespecies which may be of economic use. Like other pulp firms, Jarihas also recently displayed much concern about chlorine pollution,although this concern had lain dormant for 14 years before 1992,when European consumers began calling for non-chlorine-bleachedpulp (Higgs 1993b). Jari's own public relations efforts havereceived a boost from Paulo de T. Alvim, a leading Brazilianagricultural planner, who has claimed that the Jari plantationsreduce global warming because they grow, whereas the tropicalforest that had occupied the site previously had been inequilibrium with the atmosphere, neither absorbing nor emittingcarbon (Fearnside 1993).

Such claims conceal a great deal more than they reveal. Forexample, although the company is legally obliged to preserve 50per cent of the native forests it controls, it has already felledaround a third of them in order to supplement shortfalls ingmelina with species such as Jacaranda copaia, which in 1982 madeup around 20 per cent of its wood supply. Some 1,200 hectares ofthe forests Jari claims to be protecting are being felled eachyear (Shell/WWF 1993), mostly for energy generation and for theexpansion of its plantations (Fanzeres 1995). In 1992, Brazil'sofficial environmental conservation organization, IBAMA, rejectedthe company's request to cut 5,000 hectares of dense forest whichit wanted to replace with plantations (IBASE 1993a). Felling suchnative forests, of course, has resulted not only in loss of nativetrees but also in loss of habitat for a very large number of otherspecies.

Other environmental problems centre on the project's continuingreliance on monoculture. Forestry experts never tire of pointingout Ludwig's serious mistake in choosing gmelina as his plantationspecies (Sargent and Bass 1992, Shell/WWF 1993). This 'error',however, is merely one instance of a much more general problemwhich foresters seem far less eager to acknowledge, and which thecurrent Jari project also exemplifies: namely, that in alarge-scale monospecific plantation of any fast-growing species, afungus, virus, insect, or other animal which can find food maywell be able to decimate the entire plantation in a short time.

Pest infestation, moreover, was only one of the environmentalproblems afflicting the Jari project. When the gmelina fellingrotation was shortened to three to four years to avoid fungusattacks, nutrients began to be extracted from the soil at a higherrate. It is estimated that most of the potassium and phosphoruswill have disappeared from the estate by the end of the 21stcentury (Shell/WWF 1993). Meanwhile, soil compaction and erosionhas resulted from the use of heavy forestry machinery (Sargent andBass 1992).

Nor has the company shown itself to be particularly concernedabout water and aquatic life. Effluents from the plant areeliminated by the simple traditional procedure of dumping themdirectly into the Jari river. This has resulted in fish killsdownriver from the plant. The fertilisers and the agrochemicalsused by the company also contaminate local watercourses (Shell/WWF1993). Jari's 'environmental answer' to its energy needs,meanwhile _ a hydroelectric dam on the Jari river (Knight 1991b,Higgs 1993b) _ would destroy one of the most beautiful andhistoric sites of Amap state, Cachoeira Santo Antonio (Fanzeres1995).

The claim that Jari's plantations help alleviate global warming,finally, has been convincingly refuted by scientist Philip M.Fearnside (1993), who points out that 'the much greater standingbiomass of the forest [replaced by Jari] as compared to theplantation means that the effect of Jari is emission rather thanremoval of atmospheric CO2'.

Jari's public relations exercises also conceal a pattern ofwidespread social abuse. When it was first set up, the company hadto invest in a great deal of social infrastructure in order toattract the huge forestry and industrial workforce it needed. Some3,000 housing units were built, as well as four schools, a1,100-bed hospital, clinics, supermarkets, a radio station and11,000 kilometres of roads (Higgs 1993b). Despite theseinvestments, however, 'work-crew contractors were notorious fortheir treatment of workers brought in from the poor north-easternstates'. This was reflected in a constant turnover of staff at alllevels, which reached rates of 200-300 per cent per year (Sargentand Bass 1992).

After the company changed hands, new social problems emerged.Between 1988 and 1993 the number of workers fell from 8,000 to4,500. In the forestry sector, many workers were replaced withmachines. Many migrants were thus left unemployed in a region withfew other potential employers. In the service sector, meanwhile,the company began to pass the responsibility for hospital, schooland restaurant management onto local and federal authorities(Higgs 1993b). Having attracted a large number of workers andtheir families to work on the project in its initial stages, inother words, Jari then shunted off the long-term costs of theirwelfare onto the state. According to a local journalist, 'thelegacy of the Jari project has been a shanty town in the middle ofthe jungle' (M. A. Goncalves 1995).

Riocell

Riocell, in the far southern state of Rio Grande do Sul, wascreated in 1975. The firm is owned by KIV, made up of Klabin,Votorantim, and the Iochpe finance company. Klabin is the world's52nd-largest pulp and paper firm in sales. Votorantim, thecountry's biggest private conglomerate, took over the powerfulSimao company in 1992. Holding interests in cement, aluminium andother metals, it has recently thrown itself into pulp and paper aswell, becoming in 1994 the 65th biggest firm in the sector in theworld (Higgs 1992b, Marcus 1993a, PPI 9.1995).

In 1975, Riocell bought its pulp mill from the Norwegian firmBorregaard, which had closed the plant earlier in the year as aresult of public protests against the pollution it had causedsince its construction in 1972. Apart from this factory, which islocated in the city of Guaiba on the right bank of the Guaibariver 15 kilometres from the centre of the large city of PortoAlegre, the company owns 71,693 hectares of land, 53,000 of whichare plantations (Schinke 1992b, Marcus 1993a). Riocell producessome 300,000 tonnes of bleached eucalyptus pulp each year and isthe main pulp producer for the Brazilian rayon industry. The firmshares third place in Brazilian bleached eucalyptus pulpproduction and export with Monte Dourado (Jari), and is in theprocess of expanding its plant to a capacity of 700,000 tonnes peryear. It has its own terminal in the port of Porto Alegre (Higgs1992b, Knight 1991b).

In recent years Riocell has responded to both domestic and foreignenvironmental pressures with various 'green' claims. Klabin, forexample, invites visitors to view company operations 'so they cansee for themselves that we are not cutting down the rainforest'.Alfredo Lobl, a Klabin director, has stated that of the 330,000hectares owned by the company, some 100,000 are preserved asnative forests. 'We support environmental education programmes for18,000 school children', Lobl adds (Marcus 1993a). Another Klabindirector, Celso Foelkel, has insisted that 'rather than plant hugetracts of monocultural eucalyptus, the company has tried tointegrate its growth as far as

possible into the countryside ...nobody can say Riocell has a green desert' (Higgs 1992b). Riocell,like other Brazilian manufacturers, has also begun to producenon-chlorine-bleached pulp.

These 'environmentalist' moves, however, simply make a virtue ofcommercial necessity and hardly reflect a thoroughgoing commitmentto change. It is the difficulty of finding large contiguous tractsof land for planting in Rio Grande do Sul, for example, and not apolicy to 'fit into the area', that has forced Riocell into apattern of dispersed holdings across the region. Similarly, it ispressure from the European market, and not a determination to besocially responsible, that is pushing the company intonon-chlorine bleached pulp. Explains director Alfred Freund: 'Wedecided to go this way [elemental chlorine-free pulp production]because we're market oriented. Europe's our main market andGermany's important to us' (Higgs 1992b). To discover whereRiocell's priorities really lie, it is necessary to examine otheraspects of its record.

When the firm began operating in 1975, it claimed to have investedUS$100 million in an effluent treatment system. According toenvironmentalists, however, the company installed a sludgetreatment unit only in 1987 (AGAPAN 1992), and in 1992, it wasstill being accused of dumping more than 60 tonnes oforganochloride compounds yearly into the Guaiba river, whichprovides the drinking water for Porto Alegre (Schinke 1992b).

In 1992, the company, facing heavy opposition fromenvironmentalists and others in its attempt to secure officialapproval to double its production capacity, tried to bribe a localgovernment official who was opposing the expansion. Failing, itwent on to tell the state governor that if he did not approve theproject, the company would move to another state. The governorfinally passed the project when the state government received aUS$170 million loan from the Inter-American Development Bank forthe decontamination of the Guaiba river basin (Schinke 1992a).Interestingly, Riocell had financed several studies at the localuniversity which showed that fish bred in water contaminated witheffluent from the plant had developed serious geneticabnormalities (AGAPAN 1992).

Other planned projects

Among the other plantation and pulp projects under development inBrazil are the following:

- CELMAR, with a eucalyptus pulp production capacity of420,000 tonnes to be located in Maranhao, is a partnership of theRisipar group (an association of Votorantim with Ripasa), with 55per cent of the capital; CVRD, with 30 per cent; and the JapaneseNissho Iwai Corporation, with 15 per cent. Some 80 per cent of thefirm's output will go to the foreign market, and 60 per cent ofthe funding will come from the BNDES, the World Bank and Japanesecompanies (Mat!as 1994).

- FLORAR, sited near Maranhao's Carajas railway, has amongits partners Aracruz Celulose, CVRD, and various Nordic companies.The firm's pulp mill will have a production capacity of 500,000tonnes of bleached eucalyptus pulp, 80 per cent of which is to beexported (Mat!as 1994).

- CELPAV, a Sao Paulo plant, was acquired half-built fromthe BNDES in 1988 by the Votorantim group. The mill a productioncapacity of 280,000 tonnes of bleached eucalyptus kraft pulp, halfof which is slated for export. The company draws its raw materialsfrom the plantations of the Votorantim group itself, which amountto some 45,000 hectares (Marcus 1993b).

- Champion Celulose, a subsidiary of the North Americangiant Champion International, which has had a presence in Brazilsince 1959, is now installing a new pulp and paper plant in Amap .The project involves the acquisition of 200,000 hectares of land,half of which to be planted with

eucalyptus (M. A. Goncalves1995). By 1993 the firm had already planted 25,000 of the 50,000hectares of eucalyptus destined to feed the plant (Knight 1991b).According to local sources, these plantations are replacing a rareAmazonian instance of cerrado, the native scrubland of centralBrazil. Characteristic problems associated with land takeovers andexpulsion of small farmers are reportedly occurring (Fanzeres1995).

- Veracruz Florestal, created in 1992, is a subsidiary ofthe powerful Odebrecht S.A. holding, which is involved in civilconstruction, petrochemicals, industrial assembly, aviation, navalconstruction, and agrobusiness (Goncalves et al. 1994). Based inBahia, it aims to produce some 600,000 tonnes of bleached pulp peryear, with a raw material base of 62,000 hectares of eucalyptusmonoculture. The first 41,000 hectares were acquired through anexchange of lands between Veracruz and CVRD. Veracruz has beenimplicated in deforestation since it was founded (Faillace andMiranda 1993).

Conclusions

The forests and rainforests of Brazil, with their enormousbiodiversity and valuable woods, are rapidly disappearing. Yet theresources invested in studying how to manage them sustainably areridiculously small. Instead of exploring the immense diversity ofenvironmental and socioeconomic realities in Brazil, experts arechanneled into studying and promoting uniformity in large-scalecultivation of coffee, cacao, sugar, soya _ and fast-growing treemonocrops.

In addition, the state is pouring billions of dollars intodeveloping the export pulp sector and its enormous industrialexotic eucalyptus and pine plantations. These plantations, whichare often held up as a triumph of private-sector development,would not have been possible without massive direct and indirectstate intervention in the form of fiscal incentives, soft loans,support from BNDES and similar agencies, and the involvement ofthe state's Companhia Vale do Rio Doce. The coercive power of thestate has also been extremely useful in transferring the land ofindigenous peoples and small farmers who have no title to theirproperty into the hands of large forestry concerns. Finally, the1964-1984 military dictatorship's develop-mentalist vision of'progress' filling 'empty spaces' has been critical in enlistingpopular support for large pulp and plantation projects advertisedas bringing progress to the 'backward' regions of the country. Itis no coincidence that the period of greatest growth in Brazil'sforestry sector was precisely this 20-year period.

The plantation development hailed in this way as 'progress',however, has benefitted only a minority. Concentration of land andpower, migration, social disruption, a worsening of the quality oflife, and long-term environmental degradation have been theresults for Brazil as a whole. Environmental arguments adopted bypulp and plantation businesses cannot entirely hide this reality,though they do succeed in confusing public opinion both nationallyand internationally.

Chapter 8

Chile: A Plantation Model

Imposed by a Dictatorship

Chile's forestry development is being publicised as a successfulapplication of neoliberal policies (Lara 1992, Messner 1993). Over1.5 million hectares of trees have been planted in the country,the starting point for an impressive increase in timber exports,which have diversified to include over 400 different products withmarkets in 80 countries (PPI 11.1993). Chile currently holds thelargest planted area of Pinus radiata in the world (Lara 1992),approximately 1.2 million hectares (Pandey 1992). However, Chile'sforestry approach has resulted in a reduction of quality of lifein the plantation zones, and has been an important cause ofenvironmental degradation. Despite its 'neoliberal' label, theChilean model has been based on direct and permanent stateparticipation in the creation of wood resources and industrialinfrastructure as well as in the establishment of 'rules of thegame' favourable to the interests of the most powerful economicgroups, both national and foreign.

The native forests

A bit of history

When the Spanish invaders arrived, most of the current territoryof Chile (especially the South) was covered by magnificentforests, inhabited by indigenous communities using them in asustainable manner. Like all colonisers, the recent arrivals aimedto exploit local resources and dominate local populations. Whenthe indigenous peoples resisted, the colonisers resorted toviolence. The war was long and hard. As indigenous peoples usedforests as refuges to defend themselves against attacks, thecolonisers deliberately burned large areas of tree cover with thesole aim of removing the native population's hiding place (CODEFF1992, Cruz and Rivera 1983).

Once control had been established over local peoples, the forestswere further degraded for commercial gain, a process whichcontinues today. 'Civilising' the country, moreover, required thefelling of large areas to provide land for pastures andagriculture. In the region of Malleco, Arauco and Caut!n, 300,000hectares of forest were cleared in only ten years for grasslandsand crops. The main crop was wheat, whose cultivation led toserious erosion within a short period. In other areas, such asPuerto Montt-Puerto Varas, enormous stretches of forest wereburned for agricultural colonisation projects which were neversuccessful (CODEFF 1992).

The new agents of destruction

In the last few years, two new agents of forest destruction havecome to the fore: pine (and more recently eucalyptus) plantations,and the export of wood chips for paper pulp production.

One of the main arguments wielded by promoters of tree crops isthat wood from plantations, by meeting part of market demand, willmake it less necessary to fell trees in native forests. In thecase of Chile, this argument has proved false. In fact, pineplantations have become an active factor in the degradation ofnative forests.

In 1965, the existing 200,000 hectares of pines were indeedproviding a substitute for native industrial raw materials (Cruzand Rivera 1983, Leyton 1986). However, in 1974, a new

forestrypolicy gave rise to a process of substituting pine plantations fornative forests. By 1983 it was being reported that 'thedestruction of the Chilean native forest [and its replacement]with plantations of radiata pine constitutes one of the mostserious and pressing problems of mismanagement and conservation ofnatural resources in Chile' (CODEFF 1983). In 1992, it wasestimated that 6,195 hectares of forests were being replaced eachyear by plantations (PAF 1992).

>From 1986, exploitation of native forests was accelerated in orderto produce woodchips for export (mainly to Japan) for paper pulpproduction. According to estimates made by the non-governmentalorganization CODEFF in 1992, exports in 1990 alone used some19,000 hectares of forest land, for the most part destroying itsproductive potential, with many native forests being replaced witheucalyptus plantations. Native forest-based woodchip exportsincreased from 13,900 tonnes in 1986 to 1,702,900 tonnes in 1991,constituting in this year 55 per cent of total woodchip exports.The other 45 per cent was based on plantations of eucayptus (30per cent) and pine (15 per cent). Eucalyptus woodchip exports havehad an impressive growth, from nil in 1987, to 210,000 tonnes in1988, 430,000 in 1989, 575,000 in 1990 and 920,000 in 1991 (CODEFF1992). According to FAO (1994), Chile's total exports of chips,particles and wood residues reached 3,796,000 tonnes in 1993.Since 95 per cent of these go to Japan, it is perhaps notsurprising that Mitsubishi _ which boasts a wholly-ownedsubsidiary called Astillas Exportactiones Lta. which produceschips from old-growth forests as well as from joint plantationventures _ is the largest wood-chip exporter.

Genesis of the current model

The origin of pine monocultures

Although it possesses extensive forests made up of valuablespecies, Chile has based its forestry development in large part onthe monoculture of Pinus radiata, a pine from the United States.The introduction of this tree to the country dates from early thiscentury when it was tested for its possible use for coal mine pitprops in southern Chile. The wood was not suitable for thispurpose, but the fact that the tree could grow rapidly led to theestablishment of large plantations in the region from 1930onwards.

This process was initiated principally by social securityorganizations which planted pine extensively on arable and pastureland of low productivity. Following suit were financial societieslinked to forestry businesses, who sold middle-class investorssmall individual parcels of one hectare in extensive plantations.Timber industries seeking a secure source of raw materials thenbecame directly involved.

Between 1940 and 1959, 10,000 hectares per year were planted. Thisrate diminished to 6,000 around 1964 as a result of thepaper-industry's policy of pushing wood prices down, whichdiscouraged non-integrated wood producers (Leyton 1986).

The initial model

Since 1965, the Chilean state has actively encouraged forestryactivity. The first step was legal and institutional restructuringaimed at increasing the area planted and encouraging industrialinvestment.

Simultaneously, the state became active in providing seedlings(produced in state nurseries) as well as in plantations themselveson both public and private land. From 1965 to 1973 (the year ofthe military coup against Salvador Allende's government) some300,000 hectares of pine were planted.

Similarly, the stateparticipated directly in industrial activity, building a new pulpmill in Arauco (Celulosa Arauco) and starting another inConstituci"n (CELCO). Arauco was initially a joint venture betweenCORFO (80 per cent) and the US company Parsons & Whittemore (20per cent). In 1972 CORFO (the state Corporation for the Promotionof Production) bought Parsons & Whittemore's shares and became thesole owner of the company. CELCO, meanwhile, was created by CORFOby the end of the 1960s, with shares also held by the Bishopric ofTalca (ten per cent) and the French consortium Creusot-LoireEnterprises (18 per cent). The Bishopric withdrew from the projectin a disagreement over the project's direction, and in 1974 CORFObought the French consortium's shares and became the company'sowner.

At this stage plantations constituted an important contribution torural development, as particular attention was given to small andmedium-sized producers, who reacted very positively to stateinitiatives. In contrast to those which were established later,pre-coup plantations did not take up the total area of any estate,part of which was set aside for crop and grazing land, and wereowned by small and medium-sized producers. Labour conditions, too,were improving in the pre-coup years, as a result of markeddevelopment in union activity in the rural sector (Leyton 1986).

It is important to ask, however, why the state, technicians,businesses and rural producers alike concentrated exclusively onpine production, instead of attempting to manage native forestssustainably. After all, not only can native forests achievesimilar growth rates to radiata pine; their timber also fetchesprices two to four times higher than those of plantation pine(Cavieres et al. 1983, Lara 1992, CODEFF 1992, Leyton 1986). Usingindigenous forests could also lead to important environmental andsocial benefits. The answer, according to CODEFF (1983), can befound in

a style of development which, corresponding to external interestsand markets, overlooks and undervalues existing forest resourcepotential, destroying with the aim of 'creating' the resourcesrequired by these markets. . . . the reason for not using[existing forest] resources is not their lack of potential _ thatpotential being quite high _ but rather problems ofcommercialisation, lack of state incentives, and the nonexistenceof a technological management model.

The dictatorship's model

The initial defects of the pine-monoculture model became moreserious following the establishment of the Pinochet dictatorshipin 1973. Although the dictatorship advertised itself as followinga 'neoliberal' model in matters of economic policy, thisfree-enterprise philosophy did not seem to apply to the forestrysector, where disproportionate state subsidies for export-orientedbig business and direct investors became notorious (Lara andVeblen 1993, Leyton 1986). The negative impacts of plantationforestry were aggravated and the positive ones minimized. AsLeyton (1986) sums it up:

The two periods studied (1965-73 and 1974 to date) revealdivergent styles in relation to profit distribution andparticipation in the decision-making process. At present there isan extraordinary concentration of property, means of production,sales management and decision-making in the hands of a smallnumber of businesses belonging to the three most powerful economicgroups in the country. In return, there has been a considerabledeterioration in conditions for the small proprietor and forestryworkers who have remained marginalised from the benefits of growthin the pine economy. The current public policies have not favouredthe wider strata of rural society, but they have to a largemeasure converted these into machines for the transfer offinancial resources towards the big forestry companies of theradiata pine zone.

State assets of land, plantations and processing plants wererapidly sold at bargain prices to prominent actors in the privatesector, granting them an enormous subsidy to help them compete onthe international market. The state, which had taken theinitiative and risks of long-term investment in forestry resources_ for example, by planting 420,000 hectares of timber in the1965-1973 period _ handed over the fruits of its efforts to theprivate sector just at the moment when the returns on its workwere about to start coming in (G"mez and Echenique 1988). In thewords of Cruz and Rivera (1983), the 'current power of the largeforestry businesses is based on public capital, as the handingover of the industrial infrastructure and plantations occurred atartificially depressed prices'. Large businesses have used theproceeds from this windfall to pay for tree planting andplantation maintenance. As Antonio Molina, president of the RuralWorkers' Confederation notes, what large forest businesses earntoday 'comes to them without having cost them anything' _ andthey, rather than rural workers, receive the benefits (ChileForestal 1.1993). Between 1973 and 1979, moreover, thedictatorship returned around 4,000 of the landholdingsexpropriated during the agricultural reforms of the previousgovernment to the earlier owners. This measure, whichredistributed 28 per cent of all the expropriated land in thecountry, further encouraged large-scale forestry exploitation(Leyton 1986).

Similarly, it is not the actors who currently own the forestassets who had to put up investments in large pulp and paperfactories, but rather the state, both directly through CORFO orthrough government support at the request of transnationalcorporations linked to national private projects (Leyton 1986).Some of the most significant agro-industrial conglomerates havebenefited from this process:

- The present Celulosa Arauco y Constituci"n company, whosetwo pulp mills (ARAUCO and CELCO) were sold by the state in 1977and 1979 to the Compa$!a de Petr"leos de Chile (COPEC), thelargest private company in the country.

- Forestal Arauco, the seventh largest Chilean company,which owned 64,000 hectares of plantations in 1976 when it wastaken over by COPEC.

- INFORSA, with a pulp mill, a paper mill and thousands ofhectares of plantations, acquired from the state by Grupo Vial(one of the three major economic groups in Chile) in 1976 (Cruzand Rivera 1983).

Not sufficiently happy with their new property acquired at'artificially depressed prices,' private industry pressured thestate into providing a further set of incentives. These incentivesranged from direct subsidies for plantations (75 per cent of thecost), as well as for pruning, thinning, surveillance, andfencing, and even to guaranteeing the availability of a cheapworkforce through the prohibition of union activity and repressionof workers' and farmers' movements.

Within the confines of the current development model, whichprivileges the powerful sectors at the expense of the weakest,this policy has been highly successful. The Chilean forestrysector is today one of the main axes of the national economy, withpulp, paper and fibre shipments accounting, in 1991, for over fiveper cent of export income (IIED 1995). Its pulp industry isinternationally considered to be a young giant (Swann 1993),well-positioned to sell to the growing Asian market, and thereturn to democracy in Chile has not caused substantial changes togovernment forestry policy (Lara 1992, Lara and Veblen 1993).

Support in implementing Chile's forestry policy has been offeredby multilateral credit entities like the World Bank and theInter-American Development Bank (IDB) and other multilateralagencies. Forest research and development, for example, have beenpromoted through the 'Investigaci"n y

Desarollo Forestal' fundedby CONAF, the United Nations Development Programme (UNDP) and theFood and Agriculture Organisation (FAO). In 1991 a project todevelop a Forest Action Plan for Chile was initiated as part ofthe worldwide Tropical Forest Action Programme, a World Bank andFAO-supported initiative which boosts forest investment and linksthe interests of transnational forest industries and consultantswith those of Southern business elites and forest departments(Leyton 1986).

During the last few years, eucalyptus (particularly Eucalyptusglobulus), has been incorporated into this model, mainly as asource of raw material for chemical pulp for export. In 1988,8,000 hectares of eucalyptus were planted, and the yearlyplantation rate increased to 17,000, 29,000, 34,000 and 41,000 insuccessive years. This increase was spurred by the good pricespaid for pulp timber and woodchips, the fact that eucalyptus growsfaster than radiata pine, and the fact that radiata pines havebegun to suffer from disease, making them a risky investment.Eucalyptus plantations have replaced both native forest and arableand pasture land (Cerda et al. 1992, Caba$a 1993, Rada 1992).

Interest in eucalyptus on the part of Chilean and Japaneseindustries was awoken by the Santa Fe project (a venture involvingShell, Scott Paper and Citibank), which built the first eucalyptuspulp plant and simultaneously acquired the most extensiveeucalyptus plantation in Chile (P&PA 5.1991). Instead of merelyimporting wood chips, Japanese firms became large-scale investorsin Chilean eucalyptus plantations. It is estimated that in thecoming years, subsidiaries of Itochu, Daio Paper, MitsubishiPaper, Sumitomo Corporation, Nippon Paper and others will plantbetween 10,000 and 16,000 hectares annually, aiming at the yearlyexport of between 3.5-5.6 million tonnes by the beginning of thenext decade. Similar planting rates are planned both by firmswhich have already built pulp mills (CACSA, CMPC, and Santa Fe)and by new groups proposing the installation of a new eucalyptuspulp plant (Andinos and Forestal Ace) (Rada 1992).

Socioeconomic and environmental consequences

Who benefits?

Most government support for Chile's forestry sector during the1970s and 1980s went to only a few corporations. Four holdingcompanies are estimated to own 40 per cent of all forestplantations and account for almost 70 per cent of forest exports.Another nine per cent of Chile's plantations are in the hands ofseven holding companies controlled by foreign capital, whichaccount for another 10 per cent of forest exports (Cabrera 1989,cited by Lara and Veblen 1993). Two of the large economic groupsalone, Matte-Alessandri and Angelini, control nearly 50 per centof existing Chilean pine plantations. Since 1975, moreover,'forest corporations have been acquiring land from private owners,which, added to the large expanses acquired in open bidding fromthe state, has allowed them to concentrate enormous stretches ofplantations' (G"mez and Echenique 1988).

In addition, the three most powerful Chilean economic groups(Vial, Cruzat-Larra!n and Matte-Alessandri) have acquired not onlyplantations, the main pulp and paper plants, and, throughsubsidies, enormous forest holdings, but also sawmills, timberagglomerates, packaging factories, and other industrial plants(Cruz and Rivera 1983). These groups are thus able to coordinateplantation operation with forest exploitation, industrialprocessing, transportation and sales (Leyton 1986).

Pulp production, concentrated in five large plants, is dominatedby two large companies, Compa$!a Manufacturera de Papeles yCartones (CMPC) and Celulosa Arauco y Constituci"n (CACSA), withsignificant participation by a third firm, Forestal e IndustrialSanta Fe (Swann 1993). Arauco is

owned by Compa$!a de Petr"leos deChile (COPEC), which is controlled by Chilean entrepreneurAnacleto Angelini. Angelini is a partner of Carter Holt Harvey ofNew Zealand, which is in turn jointly controlled by the US'sInternational Paper Company and Brierly Investments of New Zealand_ a firm which is also responsible, through a joint venture, forthe illegal seizure and degradation, through eucalyptus plantings,of fertile public lands in Thailand (see Chapter 12). Araucooperates the Arauco I and II and Constituci"n mills, with acombined capacity of around 850,000 tonnes per year, giving thecompany a three per cent share of the world pulp market (Swann1993). In 1992 Arauco was the top national exporter, with anincome of US$314 million (PPI 11.1993). CMPC, meanwhile, operatesa pulp mill in Laja, with a capacity of 315,000 tonnes per year,and another plant of equal capacity in Mininco (Celulosa delPac!fico) in partnership with the US's Simpson Paper (Papermaker8.1993). CMPC owns almost 415,000 hectares of land, most of whichare planted with pine (PPI 8.1993).

Another firm, Forestal Santa Fe, is owned 60 per cent by RoyalDutch Shell, a British/Dutch firm, and 20 per cent each by theUS's Scott Paper and Citicorp. Santa Fe runs a pulp mill with acapacity of 240,000 tonnes per year, of which Scott Paper (nowassimilated to Kimberly-Clark) is contracted to buy 40-80 per cent(Swann 1993). The Swiss firm Cellulose Attisholz meanwhile holds25,000 hectares of Pinus radiata and another 100,000 hectares ofland suitable for planting; all of its pulp production is exportedto Western Europe (PPI 11.1993).

The export orientation of Chile's forest industry and forestpolicy also benefits large paper companies in the North, who needincreasing quantities of cheap raw material to maintain andincrease current levels of consumption. Some 60 per cent ofChile's pulp production _ mostly chemical pulp _ is exported(Cerda et al. 1992). More than three-quarters of this goes to theNorth and to the East Asian 'tigers', with Europe being by far thebiggest customer (FAO 1994).

As a result of the indiscriminate support on the part of theChilean state for large national and international businesses,this pulp is one of the cheapest in the world (Shell/WWF 1993;P&PA 5.1991). According to a World Bank study, the productioncosts of pine logs (from planting to transportation to points ofexport) are only between 30 and 50 per cent of the normal costs inthe US and Scandinavia (cited in Messner 1993). Such low costs, aswe will see later on, do not take into account the high social andenvironmental costs which underlie them. Chilean citizens, inother words, subsidize Northern consumers.

Chile is also an important exporter of other timber goods(Shell/WWF 1993). Of the over 400 forest products which Chileships abroad, the mainstays continue to be pulp and unprocessed orsemi-processed goods such as pulp logs, wood chips, and sawntimber. Principal markets are in Asia (especially Japan) andEurope, with South America and the United States also important(Cerda et al. 1992).

Who loses?

Chile's rural people are not only missing out on the benefits ofthe country's forestry 'development', but are by and largeactually in a worse situation than before plantations wereestablished. The current pattern of forestry development is evenseen by many rural people as a threat to their survival (Otero1990). One rural cooperative leader has suggested that the pinetree symbol on the current logo of Chilean rural cooperatives beremoved, as this species is seen as an enemy by the localpopulation (Leyton 1986).

For one thing, forestry activity, far from creating moreemployment, has directly caused the expulsion of small farmers andwage earners from rural areas. Censuses demonstrate that the

areaswith greatest plantation cover are those which have expelled thegreatest number of rural workers, while at the other end of thescale, the agricultural areas of the central valley, which producetraditional crops, maintain their agricultural population (Leyton1986). Even officially, it is recognised that 'poverty, eventhough it is an old problem, has been aggravated by largerural-rural and rural-urban migrations as a result of theexpansion process of modern forestry' and that 'zones of highplantation concentration see the effects of enforced ruralmigration, with high levels of poverty and marginalisation' (Chile1991). After emigrating to unfamiliar rural areas, migrants mustthen often move on to cities, a process accompanied by increasinglevels of alcoholism and prostitution (Lagos 1993). Settlementscalled 'forest shanty-towns' have meanwhile sprung upspontaneously on public ground, along the sides of roads, riversor old railway lines (Cruz and Rivera 1983, Leyton 1986). Theexodus stems from several causes:

- When forestry businesses acquire estates previouslydedicated to agricultural production, most or all of the workersare swiftly dismissed. With trees planted on all available estateland, the rural population is left with few ways of making aliving. One estate originally employing 260 people cut its staffto 14. On another estate, only one worker was kept on (as a guard)out of an original 120 (Leyton 1986, Equipo de Pastoral Campesina1993, CODEFF 1994).

- The closure of many small sawmills and the concentrationand modernization of the industry in a few large, highlymechanised mills has meant the loss of still more rural jobs.

- Rural residents seeking new forestry jobs must emigrate tothe towns, since employers contract their workers there.

- Because forestry companies fear that local rural peoplemay start forest fires, they also try to coerce them intoemigrating. Firms kill domestic animals (Cruz and Rivera 1983);fence the countryside (Equipo de Pastoral Campesina 1993, Leyton1986); cut off road access; and deliberately exclude local peoplefrom consideration for forestry work. As a result, many farmersand small holders are forced to sell their land to the firms(Equipo Pastoral Campesina 1993). Very rarely, firms have been soeager to get rid of local residents that they offerhigher-than-market prices for farmers' land (CODEFF 1994).

- The environmental impacts of large plantations have alsodirectly led to emigration. In many cases, rural dwellers havefound themselves deprived of water for themselves and theirlivestock. The replacement of native forests by pine andeucalyptus plantations has taken away other important componentsof rural residents' system of survival as well, including wood,fuel, fruit, fibres, dyes, honey, mushrooms, forage, game andmedicinal plants (Otero 1990, CODEFF 1992). The application ofherbicides and pesticides by forestry companies has meanwhilethreatened the health of human beings and domestic animals alike(Cruz and Rivera 1983, Cavieres and Lara 1983). Large forest firesare another cause of displacement. In 1988, for example, over18,000 hectares of plantation were burned in the B!o-B!o region ,resulting in the destruction of 80 homes (Otero 1990).

Another reason for popular hostility to the new forestry modellies in the tough working and living conditions in the plantationand forestry sector faced by those who have not been forced toabandon the countryside.

Largely responsible for these conditions are post-coup changes inpower relations between companies and workers. For example, thesurplus of seasonal and unemployed labour brought about by theuprooting of rural people, coupled with the repression of theorganised labour movement and the absence of almost any legalprotection for labourers regarding salaries, working hours,working

conditions, safety regulations, etc. (Federaci"n 1988),has allowed big forestry companies to impose an employment systembased on subcontracting. Under this system, forestry industriesdismiss most of their permanent labourers, maintaining a reducednumber of employees for administration and supervision (G"mez andEchenique 1988) and hiring subcontractors to carry out the bulk ofthe work. Only 2.3 per cent of the staff at Crecex, for example,is permanent, most of the firm's 2000 workers being dependent onseasonal contracts issued by subcontractors. Subcontractors, whichare usually small enterprises, meanwhile compete strenuously forcontracts by reducing their costs _ mainly payroll _ to a minimum(Leyton 1986).

The lack of worker unity promoted by the subcontracting system,combined with prevailing high rates of unemployment, big business'political power, and legal restrictions on unionisation, hashelped push forestry wages down to minimal levels. Unsurprisingly,the current forestry development model was implemented mostswiftly during the fiercest part of the Chilean dictatorshipfollowing the 1973 coup. As the union movement was disbanded and a'free' labour market developed, businesses were enabled to gainlarge profits by lowering salaries (Leyton 1986).

Seasonal labourers, in addition, lack job security and usuallywork without a contract, without protection against dismissal, andwithout rights to collective bargaining or old-age pensions.Informally-hired workers are dismissed as soon as their job isfinished _ usually a matter of weeks or months _ and must returnto unemployment until another job offer comes up (Federaci"n1988). Jos Gonz lez Castillo, president of the Chilean NationalConfederation of Forestry Workers, estimates that 75 per cent offorestry workers are in precarious employment, with fixed-termcontracts depending on the whims of the contractors (ChileForestal 5.1993). In spite of the existence of an estimated100,000 workers in the sector, the total number of days workedshow that only half of these workers are employed on a permanentbasis (Cruz and Rivera 1983).

The majority of subcontractors, moreover, do not provide theirworkers with safety equipment, even obliging workers to providetheir own chainsaws. As Leyton (1986) notes,

Living conditions in the camps are on a minimum subsistence level.The housing has no plumbing, and often not even flooring. It isnormally built from wood cut on site, with no sanding and lackingeven the most basic comforts ... the working day runs from six inthe morning to eight at night on the plantations ... a situationworsened by the 'pulper!a' system whereby the contractor sells allthe basic goods the worker needs on site. These sales are madewithout money changing hands, the amounts being noted down anddeducted on payday. These discounts can easily add up to 60 or 70per cent of the worker's salary, as a result of the markup imposedby the contractor.

One unionist maintained that even this situation, however,represented an improvement on the situation immediately followingthe coup, when 'the majority of us slept out in the woods all yearround in the rain, dirt and cold.' It is hardly surprising thatunionists describe subcontractors as 'twentieth-century slavedealers' (Federaci"n 1988).

Despite benefiting hugely from this type of exploitation, largebusinesses cynically affect disappointment at the 'lowproductivity' of Chilean forestry workers. Responding to this'concern', the University of Concepci"n, in a number of studies'to determine if it is innate characteristics or social problemswhich explain the low productivity of the forestry worker',concluded that Chilean forestry workers have an aerobic physicalcapacity similar to that of Swedish forestry workers and betterthan that of most of the Chilean working population. The studiesfound, however, that as a result of poor diet and deficientsanitary conditions, Chilean workers only use 27 per cent of theircapacity while their European counterparts use 50 per cent (Leyton1986).

Environmental degradation

A study recently published by the Forestry Institute (INFOR) andthe Corporation for Promotion of Production (CORFO) implicitlyrecognises that Chile's current model of forestry development hasso far tended to displace environmental damage onto othersectors:

The increase in exportable timber on offer . . . and itsconsequent economic and social benefits allow both individualcompanies and the nation to offer compensation funds to mitigatethe environmental impacts of forestry and forest industries (Cerdaet al. 1992; emphasis added).

Three such 'impacts' will be discussed here: on biodiversity, onwater, and on soils.

Biodiversity

One of the main effects of the new forestry on biodiversity, ofcourse, derives from the conversion of large areas of nativeforests into industrial plantations of pine and eucalyptus throughclearcutting or burning. Some 50,000 hectares of native forestdisappeared in two of Chile's main forested regions (Regions VIIand VIII) between 1978 and 1987, among which practically a thirdof the coastal forest in the VIII Region was felled in order to bereplaced with pine plantations (Lara and Veblen 1993).

These conversions have threatened several plant and animalspecies, including three species of tree (Nothofagus alessandri,Gomortega keule and Pitavia punctata) and one shrub (Berberidopsiscoralina) native to Regions VII and VIII, which are on the list ofwoody species in danger of extinction (Lara 1992). Theplantations, whose density prevents the development ofaccompanying vegetation, also wipe out native plant communitiestypically containing between 20 and 158 species of vascular plants(Lara and Veblen 1993, Schlatter and Mur#a 1992).

Animal species have also been devastated. In the unmanaged pineplanta-tions of the central zone, the ground is covered by:

. . . fallen needles of an orangey coffee colour. From time totime fungi can be spotted _ especially after a rainstorm _ alongwith various other small plants. The fauna is very scarce; theforests lack birdsong and have no amphibian life. There is a totalabsence of reptiles and mammals. Only in the fringe zone, the firebreaks and open glades are there greater signs of life (Schlatterand Mur#a 1992).

According to the National Forestry Corporation, the monoculturetree plantations constitute a threat to the survival of variousendangered species like the pudu (Chilean goat), the Chilote fox,the little long-nosed weasel, the huemul (Andes deer), the littleforest monkey and the Darwin frog, among others (CODEFF 1992).

Pulpwood plantations, of course, are hospitable to certainspecies. But the homogeneous nature of the plantations allows suchspecies to run rampant in them, sometimes resulting in theannihilation of whole stands of trees. For example, two species offield mouse, accustomed to feeding on roots, recently adaptedthemselves to eating pine as a result of the changes in theirenvironment. In some zones this resulted in the destruction of upto 30 per cent of the trees. In the last few years, similarly,Rhyacionia buoliana (European pine shoot moth) has also appearedin Chile, eating the internal sections of terminal pine shoots andforcing the tree to put out new ones, causing a loss in growth anddirectionality, weakening the tree and leaving it open to fungusinfections which eventually kill it. The fungi Diplodia pinea(which mainly kills the tip of the tree) and Dithistroma

pinea(which causes the needles to fall) are other serious afflictionsof pine plantations, while Bacunculus phyllopus (an insect) eatspine needles and hinders photosynthesis (Otero 1990). Epidemics ofsuch organisms constitute a serious danger for local people whohave become economically dependent on forest production (Schlatterand Mur#a 1992).

Other species can also become problems. For example, the plantingof pine in monoculture, by modifying the structure of localvegetation, has 'prevented nest building by birds and stoppedfoxes from being able to move around inside the forest. Rodentsand rabbits, competitive species, have increased in number,endangering young pine plantations and causing economic damage tothe forestry companies' (Schlatter and Mur#a 1992).

The companies have then applied chemicals which poison not onlythe rabbits, but also bird, mammal and other species. Carnivoresneeded to regulate the herbivore population go into decline as aresult, creating yet more opportunities for the rabbit populationto increase and promoting a vicious circle (Cavieres and Lara1983). Herbicides (including one containing a component of AgentOrange) have also been used on young plantations for weed control,and undoubtedly contribute further to the reduction of diversityin indigenous flora and fauna (Lara 1992).

The use of fire as a management method has also reducedbiodiversity. As Cavieres and Lara (1983) note, fire

kills practically all the existing fauna in the area in all stagesof development: eggs, young, adults etc. . . . Not only are wholepopulations of various species killed, but also, through actionsof this type, their habitats and micro-habitat are destroyed(burrows, nests, etc.), a situation which persists for a long timeor even indefinitely in some cases.

In the province of B!o-B!o, the copihue (the national flower ofChile), has seen its 'presence in the study area seriouslydiminished as a result of the fires, with only a few scarce weedyexamples now existing'.

The process of substituting plantations for native vegetation alsoimpoverishes the landscape as a whole. Natural diversity isreplaced with homogenisation. A diversity of life, whose outcomeis a landscape of unique characteristics, is transformed into themonotony of uniform lines of one species of pine. A recent studyhas shown that the pine plantations are less attractive totourists than areas of native forests (CODEFF 1992).

Soil

With each new study, evidence accumulates that industrialplantations are an important factor in soil degradation. Thisdegradation can be attributed to several factors.

First, unlike native forests, pine plantations tend to extractmore nutrients than they give back to the soil, due to the absenceof a rapid humus-production process. They thus gradually reducesoil fertility (Gayoso, cited in CODEFF 1992). The rapid growth ofthe Chilean plantations, in other words, is owed, 'among otherreasons, to the existence of a large quantity of nutrientsgenerated by the native forests'. It is this which has made itpossible for forestry firms to plant radiata pine compactly andachieve better growth rates than in this pine's originalenvironment (Cruz and Rivera 1983).

Poor humus production is in turn a result of several factors,especially the soil acidification associated with pineplantations, which impedes the development of microorganisms whichhelp

break down organic materials. While this acidificationsimultaneously encourages the growth of a different type ofmicrofauna, especially various forms of fungi that help pinesabsorb nutrients from the soil, these fungi are not capable ofproducing humus (Cruz and Rivera 1983). The faster the pines grow,the more impoverished the soil becomes.

As one academic apologist for plantations admits, moreover, two orthree rotations of pines leads to a 'pronounced loss of somenutrients, like boron, making fertilisation necessary'. Pineplantations thus have to be treated, even in the eyes of theirdefenders, as 'an intensive crop and have to be dealt withtechnically just as agriculture has its annual crop management'(Cruz and Rivera 1983). Pine plantations, in other words, are theforestry equivalent of Green Revolution agricultural crops, thenegative impacts of which have been extensively described byVandana Shiva (1991a).

Erosion is another source of soil degradation on plantations. Thefelling of native forests and the burning of residual wood leavethe soil unprotected for the first two or three years of aplantation, resulting in intense erosion during the heavy winterrains (Lara 1992, Cavieres and Lara 1983). The same thing occursafter the final harvest, when all the plantation trees are felledand the remains burnt off. As Otero (1990) observes,

Studies by CONAF in the VII Region show that the practice ofburning the waste, as is currently done in over 10,000 hectares ofthe zone, causes a loss of between 35 and 566 tons of topsoil perhectare per year, in circumstances where the maximum tolerableloss for forest soils should not be above four tons per hectareper year.

This process is even more serious in mountainous areas, Oterocontinues, where the burning of residues leads to the loss ofbetween 500 and 2,000 tons per hectare per year. When a forest isexploited, moreover, access roads and the dragging of logs opendeep ruts down which winter rains flush topsoil and undecomposedneedles (Cruz and Rivera 1983).

Plantation supporters, citing the insignificant soil loss oncertain unmanaged plantations, have sometimes concluded thatplantations are the most efficient method of recovering soils(Endlicher 1988, cited by Otero 1990). Such data are irrelevant tothe majority of Chilean pine plantations, which are commerciallymanaged and are thus oriented toward timber extraction at thefastest possible rate.

Water

Chile's current model of forest development has, in the words ofLeyton (1986), contributed to 'levels of extreme danger in termsof flooding or scarcity of water on a local level'. Industrialplantations (and associated industrial processes) affect watersupplies in two ways: through changes in the hydrologic cycle andthrough contamination.

A large body of evidence demonstrates that pine plantations causeimportant changes in the cycling of water in catchment areas.According to studies carried out in 1991 by Anton Huber (cited inCODEFF 1992), an adult radiata pine tree evapotranspires _liberates into the atmosphere _ 60 per cent more water than adultnative trees.

In addition, the soil under pine plantations has little rainfallabsorption capacity, with a thick layer of undecomposed needlesoften preventing water from even reaching it. As one forest rangerin an area of extensive pine plantations has observed, the humuslayer of a native forest is always damp and a great number ofsmall sources of running water can be found there. The floor of apine plantation, on the other hand, is dry for most of the year.Even after heavy rains there is little

noticeable dampness, andthat is seen only on the surface of the carpet of needles; 10centimetres down the soil is dry (Cruz and Rivera 1983). As theHuber studies concluded,

[P]ine plantations, in continuous extensive stretches, cause agreat desiccation of water sources. The smallest streams shrink ordisappear, and as a result the flow of the larger water coursesand the water supply for rural populations do likewise.

In some areas, streams dried up when plantations were established,reappearing only when the trees were felled. Wells, too, havedried up during the summer months, depriving local residents ofwater both for themselves and for their livestock. Towns such asAngol began facing serious water supply problems eight years afterplantations were established in the surrounding countryside. Insome cases houses have been abandoned when water suppliesdwindled. The inability of soils under pine plantations to holdwater, combined with a lack of water-retaining undergrowth, canalso lead to flooding in the valleys below, when, after storms,rainwater rapidly flows down hillsides (Cruz and Rivera 1983).

Increasing use of fertilisers, herbicides, and pesticides on thepart of the forestry sector, moreover, is unquestionably leadingto the contamination of watercourses. Erosion has also caused highlevels of cloudiness in water supplies (Otero 1990), sometimesmaking them unfit for drinking (Cavieres and Lara 1983). Thedownstream industries fed by tree plantations, of course, alsopollute water supplies. As a result of a pulp plant, for example,the tourist city of Constituci''n has seen its beaches contaminatedand its coastal fisheries damaged (Cruz and Rivera 1983).

Conclusions

Present-day Chilean plantation forestry constitutes an example ofsocially regressive and environmentally unsustainable development.Arising under a military dictatorship which offered its support tolarge economic interests and transnational capital, this style ofdevelopment has engendered poverty, despoliation and exploitation.Not only have the country's plantations failed to ease pressure onnative forests, improve soil and water conservation, or promoteemployment and social development. They have also brought about anincreasing artificialisation of the ecosystem, particularlythrough the use of agrochemicals which create even greaterproblems than those they claim to solve.

What is extolled as an ingredient of a 'boom' in exports andindustrial production, moreover, has resulted in the decline oreven disappearance of much of Chile's rural society. As Badilla(Equipo 1993) puts it, 'History is repeating itself. In the pastit was the indigenous peoples who suffered the rape of theirlands; and now we are seeing the same with the rural population'.

While a factory model of monospecific industrial plantations isbeing promoted, native Chilean forest resources, which are ofbenefit to the majority of both present and future Chileans,continue to be ignored or pillaged, since managing them in asustainable way is not in the economic interests of a small,powerful minority based both in Chile and abroad. To Chile's ruralpeople, the advance of pine and eucalyptus plantations seems toconstitute the 'advance of a green army' (Equipo 1993).

Chapter 9

Uruguay: 'Forests' on the Grasslands

The Uruguayan landscape is dominated by prairie ecosystems. Over90 percent of the territory is grassland, a fact which led theSpanish conquerors to introduce cattle, which reproduced quicklyand successfully on the country's fertile plains.

At the time the Spanish arrived, what native forests existed weremainly found bordering the many rivers. This is still true today,although the forests have dwindled and the variety of species hasdecreased, with some species even disappearing in some areas. Atpresent forests cover three per cent of the national territory(some 600,000 hectares), down from an estimated original figure ofabout six per cent.

>From tree planting to industrial plantations

Today Uruguay is embarking on intensive forestry, mainly theplantation of large masses of eucalyptus and, to a lesser extent,pine. Because these swathes of exotic trees are being planted ontop of prairie ecosystems, where, by and large, forests neverpreviously existed, this process clearly does not constitutereafforestation. On the contrary, as an ecosystem change, itamounts to an environmental disaster similar to theinternationally-condemned replacement of tropical forests bygrasslands, except that here it is the prairie which is beingdestroyed.

Tree plantings began with the arrival of the first Spanishcolonists, who brought with them seeds of pine, olive, poplar, oakand many other exotic species, which were grown mainly forornamental reasons. Later, the seeds of trees from even moredistant regions were introduced, among them various species ofeucalytus in 1853 and Pinus pinaster in 1890, both of which becamestaples of 20th-century plantations.

The initial plantation model might be described as one of'spontaneous agroforestry systems'. In general it involved theplantation of small patches of eucalyptus on cattle ranches forthe purpose of providing shelter and shade for the livestock whichconstituted the economic basis of the nation. Because the main aimwas not timber production, no intensive management techniques wereused. In general the plantations were made up of a mixture ofvarious species of eucalyptus (Eucalyptus globulus, E.tereticornis, E. camaldulensis, E. saligna, E. robusta, E.diversicolor, E. cinerea, and so forth). No prior preparation ofthe soil was required (the trees were simply planted in holes),nor were fertilizers used, although some chemicals to combat leafcutting ants were applied during the first two years of growth.

These plantations had no significant negative impacts. Their smallextent minimized their effects on local hydrological systems andon flora and fauna. The main tree species used, in addition, didnot turn out to be invasive of other ecosystems, and the use of avariety of species protected the plantation from pests anddiseases. Only Eucalyptus globulus (the species most often plantedin solid masses) suffered disease, being attacked extensively bythe weevil Gonipterus gibberus. Soil was not lost, nor nutrientsexported; when the plantation reached maturity, a balancednutrient cycle was achieved. Low chemical use, in addition,prevented water contamination.

This plantation model generated confidence in eucalyptusplantations generally; indeed, today many Uruguayans believeeucalyptus to be an indigenous tree. At the same time, it providedexperience in seedling production, plantation and plantationmanagement techniques, and the best species were identified forvarious soils and regions.

As this plantation model developed, another was also beingexplored: pine plantations to stabilize the dunes lining thebeaches in Uruguay's south. These plantations, copied from thoseestablished in southwest France (les Landes), were in line withother contemporary efforts to dominate nature. Even though theexperiment ended in the near-elimination of the originalecosystems, one important by-product was the development of aneconomically very significant tourist industry which today drawsvisitors from foreign countries as well as from Uruguay itself. Aswith eucalyptus, the pine became 'naturalised' in the Uruguayanconsciousness and its planting therefore tends not to raiseresistance among the public in general.

These two models began to change as a result of an economic crisiswhich began in the late 1950s and forced the country to turn fromforeign to domestic wood sources. It was then that the potentialof wood supplies from self-regenerating pine plantations wasdiscovered. Timber buyers also began to obtain supplies from theeucalyptus plantations on livestock ranches. When internationaloil prices rose in the 1970s, too, the manufacturing sector foundin eucalyptus a far more economical and, initially, abundantsource of fuel (gasified wood). Plantings increased, helped by a1968 forestry law which, through tax exemptions, promoted speciessuitable for the timber industry. However, it was not until themilitary dictatorship of 1973-1985 expanded these exemptionssubstantially that large areas were finally planted, between 1975and 1979, with eucalyptus _ mainly for fuel _ and pines. In 1979this subsidy was eliminated and new plantation development came toa virtual halt.

Toward the end of the 1980s the country moved on to the exportmodel, according to which 'forestry management does not differmuch conceptually from the management of any business or factory'(Pou 1992). The aim was to produce for foreign markets at acompetitive price using the technological package of the GreenRevolution: intensive soil preparation; large scale monoculturesof fast-growing species; fertilizers, herbicides and pesticides;and mechanised harvesting. The exportable product was initially tobe eucalyptus roundwood for pulp, later on changing to pulp once a'critical mass' of plantations was reached and pulp plants becamefeasible.

Domestic conditions encouraging the industrial model

The fact that Uruguay, originally lacking an industrial woodresource, has become an exporter of wood to countries as distantand traditionally as thickly-forested as the Nordic nations isvery nearly beyond belief. It can be explained only by referenceto an extraordinary set of conditions, partly internal to thecountry and partly external.

One domestic factor leading to the extensive growth of exotic treeplantations in Uruguay involves the country's cultural dependency.Uruguay, a nation of immigrants, has always looked at itself as amirror of Europe and this vision is also reflected in its forestrypractices. Instead of stressing that the country is covered bymagnificent pastures, many Uruguayans have emphasised its lack ofEuropean-style forests as a negative element. For example, one ofthe first books on forestry edited in the country (Lopez andCussac 1943), points to an 'insufficiency of forests in Uruguay',saying that Uruguay is 'by far the poorest nation in forests inLatin America', a state of affairs which 'brings with it seriouseconomic, climatic and soil problems'. This point of view, sharedby most technocrats and the public in general, helps explain thesupport tree plantation has historically received in the country.

Another relevant internal condition has been the stagnation ofUruguayan agriculture, due to a large extent to the constant fallin the international prices of its traditional products _ meat,leather, wool and cereals. Wood is currently seen as a moredynamic agricultural activity. On a more general

level, the nationis being increasingly pushed to increase exports in order to payoff a large foreign debt. The global pulpwood market is viewed asinsatiable and therefore well able to generate the necessaryforeign currency.

At the same time, Uruguay attracts transnational corporateforestry investment for several reasons. For one thing, land ischeap, fertile and relatively flat, favouring mechanised forestryoperations. Land titles are clearly defined and socially accepted.In addition, climatic and soil conditions favour the rapid growthof the species needed for the paper industry.

Opposition in the thinly-populated livestock-raising areas wherethe government promotes plantations, moreover, is minimal. Indeed,the lack of other job opportunities in these areas encouragesexpectations that plantations will result in net employment gains.Rural underemployment helps depress wage rates to less than US$2per hour (which Forestry Department leaflets aiming to attractforeign investors claim falsely to be 'one of the lowest levels inthe world' [Uruguay MGAP 1995].)

In addition, the country has built up considerable technicalexpertise in plantation management, and basic infrastructure forextraction and export of forestry products already exists _ thoughenormous additional investments will be needed to deal with thehuge production levels that are foreseen. Officials project that2.8 million tonnes of roundwood will be exported in the year 2001and six million tonnes in 2004 (Buxedas 1995). This implies oneloaded 30-ton lorry arriving at a port every 15 minutes yearround, or seven shiploads per month (Prez Arrarte 1994).

A new forestry law (1987) to promote plantations with directsubsidies, tax exemptions and soft loans is also in place. The newlaw differs from the 1968 law mainly in offering plantationfinancing through a World Bank loan. Finally, Uruguay isattractive to foreign investors in that there is little likelihoodthey will be accused of destroying indigenous forests: not onlyare such forests a relatively small feature of the landscape, butthey are also explicitly protected by national law.

External conditions

To take advantage of these long-standing domestic conditions,investors also required outside stimuli.

One long-term source of such stimuli has been the United NationsFood and Agriculture Organisation (FAO). In 1951, a jointFAO/World Bank mission made recommendations which, taken togetherwith those of a later mission (Rogers 1955), formed the basis ofthe forestry laws passed in 1968 and 1987. The vision of Uruguayanforestry development which FAO articulated at the time has exerteda great deal of influence over the country's foresters, who tothis day repeat unsubstantiated FAO statements about thesupposedly protective properties of plantation 'forests' _ forexample, that 'they will help to resolve . . . the extremelyimportant water supply problem' (Hutton and Winkelmann 1953).

Other international organizations such as the United NationsDevelopment Programme (UNDP) and the Organisation of AmericanStates (OAS) have also backed the industrial plantation model. TheOAS, in particular, has contributed studies of markets,production, transport, industrialisation, and so forth. OAS hasbeen the only international organisation to raise questions aboutthe environmental sustainability of plantation forestry, stressingthe need for research and for producers and technicians tomaintain 'an open posture on the issue' (OAS 1994).

The principal external catalyzing agents for industrial plantationdevelopment in Uruguay, however, appear to be the JapanInternational Cooperation Agency (JICA) and the World Bank. In1986 a JICA study team took up residence in the country for threemonths, working alongside Uruguayan government officials. On thebasis of the team's studies, JICA published, in March 1987, a'Study Report for a Master Plan for the Establishment of TreePlantations and for the Use of Wood Planted in the EasternRepublic of Uruguay'. In December of the same year, the governmentpassed the new forestry law, followed the next year by a nationalforestry plan explicitly based on the master plan put forward byJICA. JICA continued to participate in Uruguayan forestrythereafter, using staff permanently based in the country and newmissions sent to study specific issues, though Japanese capitalhas not yet been directly invested in either plantations orwood-related industries.

While JICA gathered and analyzed much useful information, itrestricted itself mainly to examining the economic viability ofindustrial pulpwood plantations and a pulp mill. The convergencein interests between the Japanese researchers and their Uruguayancounterparts _ who were exclusively foresters _ made it almostinevitable that the study would neglect non-plantationalternatives in rural development. The fact that the studies wereseen to be Japanese gave the industrial plantation modeladditional credibility with Uruguayan investors and the Uruguayanpublic, as well as with foreign investors and the World Bank.

The JICA studies _ which, incidentally, could have been doneentirely by local experts _ failed completely to investigateplantations' socioeconomic and environmental impacts. Thisirresponsible attitude is exemplified by the statement one JICAexpert, Takahito Mikami, offered at a 1991 conference with thepreposterous title 'Afforestation: Foundations for Building aNation'. Contradicting available evidence, Mikami glibly assuredthe audience that plantations would offer 'advantages likeregulating the climate, protecting against flooding, conservingwater resources, fertilising the soil and improving theenvironment' (Mikami 1991).

In the final report for the 1987 Master Plan, JICA's argumentswere equally lightweight. Evaluating the functions ofafforestation, the agency asserted without substantiation orexplanation that 'the public functions of the forests are toguarantee water resources, prevent soil erosion and sanddisplacement, and provide protection to the natural environment'.In relation to water, JICA states, again with no evidence, that'it is supposed that afforestation improves the water reservecapacity by 1,000m3/h', going on to recommend the afforestation ofone of the nation's main river basins where three dams alreadyexist for hydroelectric generation (JICA 1987). It seemsirresponsible, to say the least, to recommend afforestation in theway JICA has done if no previous studies have been done, takinginto account the huge water consumption that fast-growingindustrial tree plantations entail and the impacts they mighttherefore have on the water needed to feed the hydroelectricturbines.

The resources needed to back JICA's plantation vision weresupplied largely by the World Bank. Indeed, it was World Bankfinance that made the 1987 national forestry law into theeffective tool for plantation development that the 1968 law hadfailed to become. In 1989, the Bank approved a US$65 million loanfor the Second Agriculture Development Project. Some $27 millionof this was aimed at helping to create 100,000 hectares ofeucalyptus plantations for a short-fibre export kraft pulpindustry and 60,000 hectares of pine plantations for both asawmill and a chemi-thermo-mechanical export pulp industry. This'critical mass' of plantations, to be planted over eight years,would also make possible both continued pulpwood exports andcontinued production of firewood (to consist increasingly offorestry residues) for the domestic market. Plantation enterpriseswere to be promoted in three ways: by developing wood productsexports, by expediting the handing out of the financial incentivesprovided under the 1987 forestry law, and by providing credit forplanting, logging and small industrial development (World Bank1989).

The World Bank's injection of money had immediate effects. Bothnational and international entrepreneurs began to invest in thesector, with the latter in particular boosting its perceivedviability. According to the Forestry Department, annual privatesector afforestation in the 1989-92 period was eight times greaterthan average annual afforestation between 1979-88 (Uruguay MGAP1994) and annual plantation has continued to increase at a similarrate since (see Table 9.1).

The most important foreign enterprise has been Forestal OrientalSA, owned 60 per cent by Royal Dutch Shell and 40 per cent byFinland's Kymmene (shortly to merge with United Paper Mills tocreate Europe's biggest paper firm). Forestal Oriental isestablishing 30,000 hectares of eucalyptus plantations to produceexport timber for UPM-Kymmene mills in Finland. Drawing on theinternational experience of its partners (in particular Shell'sfailed plantation attempt in Thailand, where opposition from localpeople was strong), Forestal Oriental is currently the onlycompany in Uruguay with a 'green marketing' policy. As a result,it carried out an environmental impact study for its plantationeven before this was made a legal obligation under national law _though only a short summary has so far been made available to thepublic) (Forestal Oriental 1993).

TABLE 9.1

Area of plantation established

per year, Uruguay (hectares)

Year	hectares
1975-88	2,045 (average)
1989	6,239
1990	10,791
1991	15,451
1992	23,631
1993	34,808
1994	33,768

Source: Buxedas 1995.

Spanish and Chilean businesses have also invested in Uruguayanplantations, encouraged by the President of the Republic himself,who recently wrote in a promotional pamphlet: 'With the experienceof having invested in my own ranch, I recommend that you look intothe opportunities and follow my example' (Uruguay MGAP 1995).

Voluntary blindness

Although current plans call for 200,000 hectares of treeplantations to be established in the five years from 1991, none ofthe multilateral or bilateral organisations supporting theplantations has studied their possible environmental impacts.

For example, Jaime Latorre, the Executive Director of the IBRDForest Development Project in Uruguay, has denied that treemonocultures have any negative environmental effects _ even thoughhis project has carried out no research into this issue. Latorreclaimed in 1991 that with the new plantations 'the country wouldbe showing the world that establishing forest where there was nonebefore is to become a member of the short list of countries whoeffectively contribute to environmental improvement . . .'(Latorre 1991). The World Bank itself, in a report submitted forapproval to its board of Executive Directors, assumes withoutevidence that industrial plantations, instead of bringing aboutenvironmental problems, will help counteract soil erosion anddegradation (World Bank 1989). Although the OAS, by contrast, hassuggested the wisdom of looking into 'how the expanding forestplantations behave and the ecosystems' responses to this' (OAS1994), no research has resulted.

It has thus fallen to non-governmental organizations (NGOs) and asmall number of independent researchers to study and disseminateinformation about the actual and potential social andenvironmental impacts of plantations. In particular, NGOs havepresented evidence sufficient to justify allocation of governmentresources to continuing research on the matter. Possible impactson water and soils have been documented by Panario et al. (1991);on fauna by Gudynas (1989, 1990) and Gudynas and Rudolf (1987);and on society and the economy by Carrere (1989, 1992), Carrere etal. (1995), Prez Arrarte et al. (1993), Damiani (1990), andStolovich (1995).

Information countering official forestry propaganda has also beendisseminated to the general public through a variety ofactivities. NGOs have used books and articles to raiseconsciousness about plantations, and workshops, seminars,conferences and public debates have been held with theparticipation of environmental NGOs, trade unions, agronomists,forestry company representatives, youth organizations,universities, and local communities in forestry areas. Thedifferent vision put forward by NGOs is allowing people to makemore informed decisions about how to approach plantations. As aconsequence, opposition is gaining strength.

Interestingly, transnational corporations are more receptive thanlocal foresters to the idea that industrial plantations may havenegative effects on the environment. For example, environmentalimpact assessments carried out by Forestal Oriental and by theconsulting firm Informes y Proyectos S.A. (INYPSA) for Transpapel(a paper mill project reportedly backed by Swiss capital) point topossible impacts on water, soils and biodiversity. Such warningshave not been taken seriously or have been greeted with silence bygovernment officials and foresters in general. In June 1995,Roberto Cal, the Director of the Renewable Resources Department,said that campaigns by Uruguay's Environmental NGO Networkpointing out environmental problems with plantations were 'basedon erroneous information' and that in Spain 'it was shown thatnegative impacts did not exist' _ an astonishing statement, giventhe work of Bermejo (1994, 1995), Groome (1994), Gonz lez Bernldez et al. (1989), Castroviejo Bolibar (1985), M rquez Fern ndez(1985), Ruiz Prez (1990), PSOE (1979), Coordinadora Extremena deProteccion Ambiental (1992), and others. In Uruguay, Calmaintained, 'there are no indications that . . . plantationsprovoke any negative impact or degradation' (La Rep#blica7.6.1995).

Yet ample evidence already exists of the intrinsic weaknesses ofmonoculture industrial plantations in Uruguay. Although initiallysuccessful extensive plantations of Pinus radiata were establishedin the 1960s (just as FAO expert Lewis Rogers had recommended),within a few years the plantations were attacked by the Europeanpine shoot moth Rhyacionia buoliana, which, along with

anassociated fungus, Diplodia pinea, spread rapidly to nearly allthe plantations. As a result, plantings of this species had tocease (Morey and Porcile 1992).

Fortunately, the country had not yet embarked on an ambitiousforestry plan, so economic losses were comparatively small. Today,however, with 200,000 hectares already in place, in addition tothe 200,000 to come, losses could be enormous, particularly sincethe plantations consist mainly of two species of pine (Pinuselliottii and P. taeda) and two of eucalyptus (Eucalyptus globulusand E. grandis).

Indeed, most current species already have pest problems, includinginsects such as leaf cutter ants of the Atta and Acromyrmexgenera, Platypus sulcatus (a eucalyptus wood borer), Pissodescastaneus (a pine weevil), Sirex noctilio (the sirex wasp, whichinfests pines), Gonipterus gibberus and G. scutellatus (eucalyptusweevils), Phoracantha semipunctata (a longhorn beetle) and fungiwhich attack pines (Diplodia pinea, Dothistroma pini) andeucalyptus (Phytophtora cinnamomi, Cladosporium eucaliptii,Septonema eucalipticola, Pestalozzia molleriana and Alternariaspp.) As Morey and Porcile (1992) state, 'increased forestresources entail a potential increase in pests and diseases alongwith a greater risk that new damaging organisms may findconditions more favourable for their expansion in the country'.And if chemical pesticides have to be applied every time that apest cannot be controlled by silvicultural means, seriousenvironmental consequences are likely to follow.

The country also already has some experience of the damageplantations can cause to the yields of small farmers. In theperiod from the mid-1970s to the mid-1980s when plantations werebeing designed to meet fuel needs, small producers were extremelyactive in trying to get a ban on planting eucalyptus inpredominantly agricultural areas, although their reasoning was notfully assimilated at government level. Among other effects, thesmall producers mentioned crop pests, competition for water andnutrients, shade-out effects reducing agricultural yields, and thedanger of fire. The latter, it was felt, even led to personalinsecurity due to the proximity of plantations to farmers' homes(Damiani 1990).

Land tenure is also being affected by plantations. Before theplantation boom, large cattle ranches had been decreasing in size,mainly as a result of inheritance laws. Now, however, plantationsare bringing about an agrarian reform in reverse. Investment inthe forestry sector is allowing land to be concentrated in fewer,and, in many cases, foreign, hands. The typical Uruguayan estanciaor cattle ranch covers 2-3,000 hectares, ranches of more than10,000 hectares being extremely rare. Yet the ventures dominatedby the transnationals Shell/Kymenne and ENCE, a Spanish pulp andpaper company, already own more than 30,000 hectares each, and areplanning to double their land holdings. The new landowners, inaddition, are typically investors and not traditional farmers.This could lead to important changes in Uruguayan society, with anincreased dependence on new transnational actors who are likely tocome to dominate large areas of the country.

Rural workers, meanwhile have little to gain except for a fewjobs. These, moreover, are characterised by low pay, instability,seasonality and poor working conditions _ particularly wherecontractors are involved (Carrere 1989, Stolovich 1995). Yet eventhese jobs are in some places preferable to being unemployed orliving off the low wages on offer in the cattle-raising sector.Although conditions vary from place to place, moreover, the levelof rural unionisation is extremely low due to unions' limitedexperience, low worker concentrations, seasonality of work (halfof all forestry workers work on a seasonal basis), workers' fearsof losing their only possible employment possibilities, and insome cases repressive management (Latorre 1995). Unions exist onlyin those few areas with liberal management regimes (for example,those of companies managing forest investments for bank workersretirement schemes) and large concentrations of full-

time workers.The solution, as sociologist Ra#l Latorre (1995) suggests, is notplantations but rather 'a state policy which, in addition toincentives for investors, offers measures to ameliorate workers'quality of life'.

A bad investment for the nation

One of the main claims made by the government for tree crops isthat they will generate substantial foreign exchange. However,analysis of the probable export figures casts doubt on thisassertion. When all costs are included, the balance could eventurn out to be negative. Pulpwood exports are likely to net thecountry only US$53 million in income by 2000 and US$82 million by2010, or around three and four per cent of total annual nationalexports (Stolovich 1995).

But even to achieve these levels of exports, the country will haveto take resources from other sectors and pour them into forestry.Tax exemptions, highways, bridges, railways, port facilities,state investments in plantation and machinery imports _ all mustbe paid for by the public. This is not even to take into accountthe income lost when land is taken out of other forms ofproduction and planted to fast-growing trees. Economist LuisStolovich (1995) has sketched out a balance sheet showing thatfinancial gains from projected pulpwood exports in the year 2000would be far outweighed by losses and that the balance would stillbe negative in 2010 (see Table 9.2). As one NGO analyst puts it,'the export of roundwood for pulp . . . means going back to the19th century':

Uruguay would not only become an exporter country of commoditieswith little added value, but would also be making a great socialeffort (of social transfers, investments, etc.) to promote anactivity which, even in the best case, would make few socialcontributions and would not be a source of surplus to fund aglobal economic revitalisation of the nation (CIEDUR 1991).

TABLE 9.2

Uruguay pulpwood exports: gains vs. losses for the country as awhole in two indicative years ($US million)

Category	2000	2010
Year's pulpwood exports	+53.1	+81.8
Year's subsidies and tax exemptions	-10.0	-2.0
Year's infrastructure expenditures		
specifically for pulpwood transport	-45.0	-45.0
Year's import costs	-6.0	-7.9
Year's opportunity costs	-14.4	-21.4
Balance	-22.3	-4.5

Source: Stolovich 1995.

According to Stolovich, the balance becomes positive only whenpulp exports are also included. In that case, a projected surplusof US$20 million is generated for 2000 and US$60 million for 2010.

Even in current dollars, however, this is not very substantial incomparison with Uruguay's 1994 external debt of $5.253 billion(World Bank 1995). Stolovich's figures, moreover, do not includeenvironmental costs such as the impacts of plantations on water,soils and biodiversity as well as industrial pollution. They alsoassume that the country will be able to export all its pulpwoodand pulp, a dubious premise given that in 1993, for example,'exports came to a near-standstill because the international pricefor pulpwood did not allow export dealers to buy wood internally'(Prez Arrarte 1994). As Stolovich notes, specialisation incommodities such as pulp, which may well fall in price in the longterm, is likely to put the export sector 'in a state of permanentuncertainty at the mercy of concentrated demand' (Stolovich 1995).Such uncertainties and costs only add weight to the basic questionof why the Uruguayan people have not been given the opportunity todecide whether so many of the the country's scarce economicresources should be spent on pulpwood plantations.

Conclusions

The successive Uruguayan governments which have promoted anindustrial export model of forestry development claim to befollowing a neoliberal economic policy and thus to be denying allforms of subsidy to productive activities, leaving them to theirown devices in an increasingly globalized and competitiveinternational market. In truth, however, they are pouringresources into the sector. While withholding funding fromeducation, social security, health, housing, and so on, thegovernment is subsidizing giants like Shell, 'which, worldwide,move figures far greater than the whole national economy'(Stolovich 1995). Without such subsidies, this form of forestrydevelopment would not be profitable for private investors. Evenwith them, it cannot substantially improve the country's exportearnings.

Industrial afforestation for export, moreover, not only does notimprove the environment, but also threatens to degrade it.Plantations supplanting grasslands have a deep impact on local andregional ecosystems and their soils, water, plants and animals.At the social level, the employment opportunities created dolittle to improve the quality of life of rural people, at the sametime that land and other forms of power are concentrated in fewerand fewer hands. In short, while the new industrial plantationswill benefit Northern-based paper industries, who will be enabledto exploit a fresh source of cheap and homogeneous wood fibre,heavy environmental and social costs will be paid by present andfuture generations of Uruguayans.

Chapter 10

South Africa:

A Fibre Exporter with Few Forests

South Africa's native forests, which probably never occupied morethan one per cent of the surface area of the country (Cooper1990), shrank significantly following the arrival of Europeancolonisers, mainly due to overexploitation in the 19th century.Today only between 200,000 (Bethlehem 1994) and 300,000 (Dudley1992) hectares remain, and these continue to be degraded _ despitethe fact that the majority are within protected areas _ as aresult of poor land use strategies (Dudley 1992).

Though South Africa lacks extensive natural forests, the countryhas become a significant exporter of forest products from largeplantations of pine and eucalyptus established as the result of along process of state intervention. The first plantations datefrom 1890 (Bethlehem 1994), though eucalyptus had been introducedas early as 1807 (FAO 1981). Between 1890 and 1900, the majorityof these plantations were small and were aimed at satisfying theneeds of local communities.

Large plantations began to appear at the beginning of the 20thcentury, established mainly by the state and aimed at theproduction of timber for industry. Wood shortages resulting fromsupply difficulties during the First World War encouraged thegovernment to embark upon more intense tree plantation programmes,initially to achieve self-sufficiency in timber. The post-wardepression, along with unemployment in the poorer sections ofwhite society and among soldiers returning from the battlefields,gave the government additional incentives to undertake large-scaleafforestation (Bethlehem 1994). The main species used were exoticpines (particularly Pinus patula and P. radiata), eucalyptus(mainly E. globulus) and Australian acacias. By 1923 the countryboasted 140,000 hectares of acacia, 65,000 of eucalyptus and35,000 of pine (van der Zel 1990).

>From 1920 to 1960, the state became the main national forester,with private industry occupying a secondary role (Bethlehem 1994).In the 1960s, however, the industry began to accelerate treecultivation. At present the country has almost 1.5 millionhectares of plantations almost equally divided between softwoodsand hardwoods. Some 73.5 per cent of these are private property,of which 58 per cent belong to forestry companies. The threelargest companies (Mondi; Sappi; and Hunt, Leuchars & Hepburn) own35 per cent, 30 per cent and 20 per cent of the total area inprivate hands.

The state, meanwhile, owns 26.5 per cent of the planted area,which is covered mainly by pine (the government holds 44 per centof total pine plantations) with a lower percentage of eucalyptusand other hardwoods. Private and state-owned plantations alike areconcentrated in Transvaal (49 per cent), Natal (40.6 per cent) andthe Cape (10.4 per cent) (Bethlehem 1994).

In the last few years, more hardwoods (particularly eucalyptus)have been planted than pines, in line with worldwide trends inmarket pulp (see Table 10.1). The percentage of eucalyptus inplantations accordingly climbed from 31 to 40 per cent between1982 and 1992. The total area of eucalyptus as of 1989-90 was538,000 hectares, mainly E. grandis. Annual yields in 1986-7 wereestimated to be 19.3 cubic metres per hectare for E. grandis and11.9 cubic metres per hectare for other species (Pandey 1992).

TABLE 10.1

New plantations in South Africa (hectares)

Year	softwoods	hardwoods
1973-74	15,265	7,098
1974-75	25,168	13,770
1975-76	22,350	8,954
1976-77	15,223	6,845
1977-78	10,078	4,154
1978-79	1,095	4,790
1979-80	7,987	5,721
1980-81	8,585	1,581
1981-82	8,051	1,983
1982-83	5,745	2,516
1983-84	6,544	2,434
1984-85	10,489	4,210
1985-86	6,294	10,310
1986-87	4,584	17,308
1987-88	5,511	17,759
1988-89	7,212	22,845

Source: van der Zel 1990.

South African plantations are managed according to the finaldestiny of the timber. Some 38 per cent produce pulpwood, 35 percent sawlogs and 22 per cent mining timber. However, given thatthere is a dwindling market for mining timber, a large proportionof these plantations may be turned over to wood chip productionfor export (Bethlehem 1994). Assuming that most plantationssupplying the sawlog industry are in state hands, we can concludethat the majority of private industrial plantations are aimed atthe pulpwood market, both national and foreign, and that it islargely private plantations which have converted the country intoa significant pulp fibre exporter (Shell/WWF 1993).

During the 1980s, South Africa became a net exporter of forestproducts. Whereas in 1981 exports were worth 300 million rand andimports 400 million rand, in 1988 the figures were R1.5 billionand

R650 million respectively (Edwards 1990). In that yearforestry production came fourth in the list of nationalnon-mineral exports (University of Natal 1990). In 1991, 56 percent of total roundwood sold was pulpwood, and pulp and paperexports made up 40 per cent of the total demand for pulpwood(Bethlehem 1994).

The export of wood chips to Asian countries, especially Japan,Taiwan and South Korea, has grown markedly since it began in 1970.In 1993 1.2 million tons of chips were exported, over 97 per centto Japan, and if the target export total of two million tons isreached by the end of the decade, the country will become one ofthe three leading world wood chip shippers (Bethlehem 1994, FAO1994). In 1993, the country also exported 340,000 to 550,000tonnes of pulp (FAO 1994, PPI 8.1995), overwhelmingly to theNorth, with Japan, Austria, the US and Italy being leadingimporters.

The South African industry publicises itself as having establisheditself through its own initiative and resources, with little or nostate support (Edwards 1990). In truth, the state has not onlyplayed a pioneering role in establishing plantations anddeveloping sawlog industries, but has also, for many decades,'favoured the commercial forestry sector by assisting it with landuse planning, training extension officers and providing financialsupport as well as research and development services' (Fakir1994). The state, moreover, has already taken the first steps toprivatize the remainder of the plantation sector (Bethlehem 1994).Making the most of this subsidized foundation, the industry is nowexpanding.

The two top South African companies, Sappi and Mondi, are alsomoving overseas. Sappi has bought Germany's Hannover Papier andthe US's

S. D. Warren (the world's leading coated lignin-free papermanufacturer), as well as five paper mills in the UK. It alsoholds 49 per cent of the shares of the Usutu Pulpwood Company inSwaziland, whose pine plantations and kraft pulp mill cover morethan 50,000 hectares (the UK's Commonwealth DevelopmentCorporation and the Swazi government control the rest) (Beer 1995,Shell/WWF 1993). Sappi has also entered into a joint venture withMozambique's government and two local companies to develop a majoreucalyptus plantation across the border (Pollett and Mander 1995).Mondi, meanwhile, holds interests in the UK and Portugal (PPI7.1995).

A lack of firewood in a sea of trees

In an astonishing paradox, South Africa's supposedly 'successful'model of plantation development nevertheless fails to meet theneeds of the third of the national population who depend onfirewood as their main source of energy. It is estimated thataround 12 million people living in rural areas use more than sevenmillion cubic metres of wood per year (University of Natal 1990).In the face of increasingly serious shortages, rural people arebeing forced to collect firewood from native woods and scrublands,degrading what scarce patches of forest remain in the country.

Even communities hemmed in by enormous plantations often do nothave enough wood to meet their basic energy needs. Company treesare protected by a forest police service, and while local peoplemay be able to scrounge a few fallen branches, even this isillegal. In one community in Natal where Mondi planted tree farmsin 1990, women and older daughters are forced, every two to threedays, to walk kilometres across the valley and up hills toneighbouring farms to collect wood which they carry back to theirhomes balanced on their heads. 'Some of the hills are so steep myknees shiver as I climb them' said one woman. 'And on the waydown, I feel my bones clicking with tiredness.' 'There is no woodleft for cooking,' another villager stated. 'The tree people burntour forests and now we walk very far to fetch wood for fires. Butit's running out.' Added a third: 'It's a cold day today, but yousee we have no fire. There just isn't enough wood any more'(Hornby

1994a). As Lael Bethlehem (1994), observes, 'Thissituation is unacceptable, both in terms of rural development andenvironmental protection. There is an urgent need for thedevelopment of sustainable forms of forestry which are able toprovide fuel to rural people.'

More power to the powerful

Large forestry businesses have brought about substantial changesin power relations in rural areas and in control over land andother natural resources. Historically, 'commercial forestry hasoften been to the detriment of black people in rural areas, asplantations have generally involved forced removals' (ANC 1994).Today, vast tracts of farm holdings are reportedly being bought upby large timber firms for planting to commercial tree species atprices which are sometimes nearly double the market value of theland (Schulze 1990).

Such purchases are apparently motivated by corporations' plans toachieve control over scarce land, and to assure themselves of aconstant supply of raw material (Dobson 1990). These plans havebeen made more urgent by the fall of apartheid. In the new SouthAfrica, the previously repressed majority's claims on land mayresult in less land being available for plantations, so bigcompanies are rushing to secure holdings and to plant them withtrees as quickly as they can. This policy is pursued not only bythe forestry industry but also by a growing number of landlordswho by this means hope to increase the value of their land andthus make it more difficult for the government to expropriate it,since the constitution specifies that expropriations must bejustly compensated (Fakir 1994). This, of course, reduces theamount of land the state can redistribute under its land reformprogramme and thus has a direct negative impact on the nation'srural poor.

Jobs, work and migration

Although figures vary, in general it can be stated that the timberbusiness generates less employment per unit of land than theagricultural sector. For example, according to Fourie's (1990)surveys, agriculture employs one worker per 20-25 hectares ofland, while the timber sector requires only one every 35 hectares.Sugar cane producers, meanwhile, claim to employ one worker everyfive hectares, while insisting that forestry provides only one jobper 18 hectares of plantation, and accuse large forestrybusinesses of creating 'socioeconomic deserts' (Hudson 1990).

The advance of the timber business also brings about changes inwelfare and community life. For every 150-200 hectares dedicatedto sugar cane, for example, there exists, according to the CaneGrowers' Association, a family farm employing some 40 people,providing them with housing, schooling, medical care andretirement benefits. Such units form the basis of coherentfunctioning rural communities, as they support commerce, villagesand towns, educational establishments, security, medical care andother social services. Timber companies, on the other hand,consolidate a number of estates under one manager, reducingemployment opportunities by 70 percent. This leads to migration tocities, which in turn hastens the disintegration of ruralcommunities and reduces the number and quality of services offeredto those who remain in the area (Hudson 1990, Fourie 1990).

Subsistence farmers, too, experience a decline in the quality oflife following the planting of large forest monocrops. In the mostcommon scenario, people living on a farm offer their labour to awhite landowner in exchange for the right to plant their own cropsand keep livestock. Even though many such farmers are descendantsof people who had occupied the land before the colonisers arrived,they have no legal title to it. When landowners sell out to timbercompanies, such farmers' circumstances change dramatically. Thecompanies buy the land to plant trees and, in the face of strongresistance, try to oust families who have lived there forgenerations. In some cases the firms and the local people come toan agreement, but dispossession is still one of the most difficultsocial

problems created by forestry development (Hornby 1994b).Land disputes are likely to be exacerbated when dispossessedvictims of apartheid attempt to reoccupy land now covered bytimber plantations (Bethlehem 1994).

Working conditions on plantations are far from adequate. First,the sector is marked by a low level of unionization, and manybusinesses still refuse to deal with worker organisations. Mostplantations are 'located in conservative rural areas, where aracist and authoritarian culture often prevails. On state forestsin particular, a coercive management style is common' (Zikalala1992, cited in Bethlehem 1994). Second, plantations are dispersedwidely across the country, creating great organisationaldifficulties for existing unions.

Large companies, moreover, have lately reduced permanent staff andencouraged the development of small subcontracting businesses tocarry out tasks from planting to harvesting. This is claimed to bethe result of a 'desire to see the establishment of a strong andviable informal sector serving the industry, and to move away fromthe concept of "paternalism" towards labour' (Edwards 1990). Inreality, however, large firms are trying to lower labour costs inan industry in which levels of mechanisation are very low and inwhich 45-50 per cent of the cost of timber production prior totransportation consists of wages. It is estimated that around 30per cent of forestry tasks are currently carried out bysubcontractors, with this figure rising to 60 per cent at harvesttime (Bethlehem 1994).

In addition to drawing wages far lower than those of regularcompany employees, contract workers receive fewer housing,education and pension benefits. In one case, workers weredismissed by a company and hired by subcontractors at 33 per centlower pay for 20 per cent longer hours. Elsewhere, salary cuts ofup to 75 per cent have been reported. Contract work is also moreseasonal and less secure than standard employment (Bethlehem1994).

Yet even for permanent employees of the large plantationcompanies, working conditions and levels of pay _ with a fewexceptions _ leave much to be desired. Salaries are low, with anaverage working day stretching to nine strenuous hours. Companiesprovide workers with housing in either family units or single-sexaccommodation, where conditions have been described as 'appalling'(Zikalala 1992, cited in Bethlehem 1994). Women are given theworst-paid tasks, many of which _ such as bark stripping, plantingand weeding _ are extremely wearing and are associated with a widevariety of health problems (Bethlehem 1994). Spraying paraquat _ anotorious herbicide manufactured by the UK-based firm ZenecaAgrochemicals and banned in many countries _ is regarded as'lighter work' and is mostly left to younger women employees (EJNF1995).

Some observers expect that the forest industry will use the'agri-villages' which are to be financed by the government's newland reform programme as subsidized dumping grounds for redundantlabour. Thus, just as under apartheid, bantustans absorbed surpluslabour from agriculture as it became more commercialized andcapitalized, so agri-villages may become rural slums created, inpart, by the expansion of the plantation sector (Hallowes 1995).

Changes in rural lifestyles

Large-scale planting of pulpwood trees in South Africa has alsohad other far-reaching effects on rural livelihood and lifestyle:

- Pastoralists have been deprived of vast areas ofgrasslands, including the Kwazulu area (University of Natal 1990).

- It has become more difficult for farmers, too, to raiselivestock for meat and milk or for sale, and to thatch houses,following the conversion of grasslands into plantations.

- Reeds needed for making mats or cords used for roofing ortrays have disappeared after plantations have caused smallwatercourses to dry up.

- When workers are expelled from farms, they can no longerplant crops or raise chickens, and poverty and malnutritionincreases. 'We cry because our children have no clothes and noshoes,' said one villager. '[L]ife has been difficult since thetrees came' (Hornby 1994a).

- People have been forced against their will to live in anew and threatening environment. In the most forested zones,nearly all roads pass through plantations at some point. Thisunfamiliar landscape inspires fear of 'wild animals' such assnakes, wild pigs, lions and other unknowns (Hornby 1994a).

- Fire has increasingly threatened the lives and livelihoodsof rural inhabitants (Dobson 1990).

Water: a scarce and disputed resource

While the director of South Africa's Forest Owners Association,like his counterparts elsewhere, has declared that he does notwish to become embroiled in the 'emotive' issues of environmentalconservation (Edwards 1990), the effects plantations have on waterand biodiversity are of growing concern to many South Africans.The country's large-scale tree monocrops have recently been dubbed'biological deserts' and a 'green cancer' (Dobson 1990, Edwards1990).

The area of greatest environmental concern has traditionally beenwater. In South Africa, unlike most other countries, bothopponents and supporters of timber plantations accept thatplantations have a big impact on water resources. This consensusis due largely to the fact that, as a result of the relativearidity of the country, which receives an average rainfall of only444 millimetres per year (van der Zel 1990), a great deal ofscientific work has been carried out on the subject. Studies wereinitiated as far back as 1923, and the first catchment experimentswere started in 1940 to monitor how Pinus radiata plantationsaffected hydrological systems. These experiments _ and othersstarted in 1945, 1955 and 1970 in other catchments _ have gainedSouth African catchment hydrology a world reputation.

One finding of particular importance is that, in South Africa, large-scale industrial plantations consume a greater amount of water than shorter vegetation types such as scrub, herbs and grasses (Le Roux 1990). In one case, pine trees were found to consume 1,080 millimetres of water and grasslands 850 (van der Zel 1985, cited in Le Roux 1990). In 1982, van der Zel proved that in one area of grasslands with 1,000 millimetres of annual rainfall and a runoff of 200, afforestation reduced runoff by half. A six-hectare tree plantation in this area, therefore, would reduce runoff to an extent equivalent to the water required by one hectare of irrigated wheat (Le Roux 1990).

Groundwater as well as surface water is affected. Trees tend toextract water from deeper layers within the soil than do grasses,then dispersing it through evapotranspiration (Fourie 1990).Streams and wetlands fed by grasslands can thus be endangered byplantations.

South African research on catchment hydrology under tree crops ledeventually to the enactment of the 1972 Afforestation PermitSystem (van der Zel 1990). This system established limits on thearea to be afforested in each catchment area, based on accumulateddata showing how plantations had already modified the localhydrology. Each catchment and sub-catchment area was categorised,with

each class being allowed a certain percentage of forestcover. In Category I, no planting is allowed. In Category II(where water scarcity problems already exist), only a limited areais allowed to be planted, and the planted area must not cause meanannual runoff to decline by more that five per cent. The rest ofthe country falls into Category III, where plantations must notcause annual runoff to decline by more than ten per cent (van derZel 1990). This system seeks to spread the impacts of runoffreduction more homogeneously across several sub-catchment areas.

Yet even with this system in place, water problems remain, andmany water users _ particularly in agriculture _ are demandingimprove-ments. The Natal Agricultural Union, for example, iscalling for modifications to the current permit system, claimingthat 'large scale afforestation of river basins is having adetrimental effect on the hydrological cycle of many of Natal'srivers and it is creating hardships for riparian farmersdownstream' (Fourie 1990). The director of the Wildlife Society ofSouth Africa states that

streams which once carried perennial water before afforestationhave been converted into dry watercourses or streams with erraticflow.

. . . Downstream users have been adversely affected by suchprogrammes. Life-forms dependent upon these streams havedisappeared (Cooper 1990).

Other critics point out that the 1972 data on which theAfforestation Permit System was based are no longer valid. Newspecies are being planted, and new varieties and clones with farfaster rates of growth and water use have also been developed(Bethlehem 1994). In addition, commentators have recommended thatthe system be more finely tuned to each individual catchment area.This would involve barring tree crops which reduce runoff by morethan ten per cent not only from catchment areas as wholes, butfrom subdivisions within them as well (Fourie 1990). The system isalso being asked to take into account the impacts of afforestationon biodiversity, scenic beauty, soils, and so on. It is claimedthat in many cases the current rules are being broken because of alack of effective controls _ especially by the state's owncompanies (Bethlehem 1994).

Biodiversity in danger

Industrial pulpwood plantations affect biodiversity in SouthAfrica in many ways. Localised impacts are generated by the treesthemselves. Generalised effects result from plantation managementand dispersal of seeds from plantation trees. Studies in Natalshow that 236 bird, 97 reptile, 57 amphibian, 55 mammal and 13fish species will be affected, to a greater or lesser degree, byfuture plantation development. Among these are several endangeredspecies: 24 birds, ten mammals, six reptiles, two fishes and anamphibian (Porter 1990). None of these impacts have been takeninto account in current regulations, which consider only thehydrological effects of plantations.

One of the most widespread threats plantations pose tobiodiversity relates to the way they alter the relationshipbetween fire and the natural landscape. First, fires in extensiveplantation blocks are nearly impossible to control once they havestarted. Such fires not only kill off species which have adaptedthemselves to life in plantations, but also affect the organiclayer of the soil, its microfauna, the infiltration and runoff ofwater, and so on. In attempts to prevent these fires, commercialforesters set controlled fires annually in the firebreak zones,generally located in botanically sensitive areas which are home toendangered native species (Porter 1990).

Since the law prohibits controlled burning between July andOctober due to the risk of fires getting out of control,preventive burning of natural vegetation is done in the wetterspring and summer months. These controlled fires have adverseeffects on both native flora and native fauna, especially

as theycoincide with the plant growth season and the period of greatestreproductive activity among invertebrate, bird and rodent species.Such fires destroy animals' food supplies (leaves, grasses,flowers, seeds, nectar, pollen, and so on), niches where they liveand breed, and cover that provides a refuge from predators (Porter1990).

Agrochemicals used on plantations also have a severe effect onbiodiversity. Included are a wide range of weed-killers such asGarlon (triclopyr, manufactured by Dow Chemicals), Tordon(picrotam, also a Dow product), Gramoxone (produced by ICI) andRoundup (glyphosate from Monsanto), which are generally applied inthe first three years of a plantation cycle and again at the timeof final felling. Insecticides, meanwhile, are used to combatwattle bag worm, pine woolly aphid, and leaf-cutting ants, whichattack the acacias and pines. Rounding out the cocktail ofindustrial poisons used on pulpwood plantations are rodent controlproducts such as Storm, Finale and Rattex. Plantation managersoften also hunt grey duikers and bushbucks and set traps forporcupines and Samango monkeys, which are an endangered species(Porter 1990).

Apart from the above impacts, large industrial plantations affectbiodiversity in ecosystems such as grasslands, wetlands and nativeforests.

Grasslands

Grasslands support a wide variety of native flora and constitutethe sole habitat of numerous animal species. They are home to theblue swallow, the most endangered national bird species, whosebreeding areas coincide with many of the main plantation zones.Other species such as the Oribi antelope, the Stanley bustard, theblue crane, the bald ibis and many other threatened animals alsodepend on the large areas of natural grasslands which aredisappearing under plantations (Cooper 1990).

Plantations also affect a great number of other less charismaticspecies, which are nonetheless just as important in grasslandecosystems. Grasshoppers, for instance, are important as indicatorspecies, as they have very specific habitat requirements. Studiesin Natal revealed that exotic pine plantations had effects oncommunities of 26 regional grasshopper species, even in areasrelatively far from the treeline (Sanways and Moore 1991, cited inBarnett and Juniper 1992).

Several grassland plant species are also in danger ofdisappearing, including some used locally for straw roofing andmedicine. Given that pulpwood plantations have been establishedwithout the necessary baseline studies having been done, manyspecies may have already become extinct without anyone havingbecome aware of the fact (Bainbridge 1990).

Wetlands

By reducing runoff and groundwater supplies through waterconsumption higher than that of the natural grasslands,plantations also indirectly affect wetlands. Especially in the dryseason or in periods of prolonged drought, species which depend onan aquatic medium for their survival can be deprived of water anddisappear (Porter 1990, Cooper 1990).

Among the species affected is the wattled crane, which requireslarge areas of wetland to nest and extensive neighbouringgrasslands for the raising of its young. The plantations _ whichsimultaneously take over the grasslands and dessicate wetlands _have been responsible for the disappearance of several nestingsites of this species, increasing the threat of its extinction.Other aquatic flora and fauna are affected when debris fromfelling washes into watercourses, releasing

toxic organiccompounds like tannin. In other cases, felled trees and waste fromfelling block watercourses, driving out species which cannot adapt(Porter 1990).

Native forests

South Africa's scarce existing indigenous forests are beingdamaged by pulpwood plantations in several ways. Most importantly,exotic trees are being planted right up to the margins of nativeforests. This results in the destruction of the ecotone (the areawhere grasslands and forests meet), which is an important habitatfor both woodland and grassland fauna. Plantation trees may alsoshade out trees on the edge of native forests (Cooper 1990), andwhen commercial plantations adjoining forests are logged, manyfelled trees fall onto the forest, causing extensive harm.Finally, plantations often result in non-plantation areas' beinginvaded by exotic species. Patula pine, black wattle andaccompanying species, for example, are capable of replacing entirenative ecosystems (Bainbridge 1990, Porter 1990).

Soil degradation

The impact of plantations on soils has thus far received littleattention in South Africa. Current legislation appears to be basedon the assumption that plantations improve the soil: unlikeplanters of agricultural crops, planters of forest crops areexempted from having to obtain permission from the appropriatestate department before ploughing previously uncultivated land (LeRoux 1990). Nevertheless, notable soil losses have been observedduring the period between initial planting and canopy formation.These losses have become more serious over recent years asplanters have begun to act on studies which conclude that the moreintensively soils are prepared prior to planting, the faster treeswill grow. The resulting increase in erosion has eventually led tothe promulgation of conservation rules for the planting period.However, these guidelines still fall far short of dealing with thewhole problem and only apply to slopes of over 20 per cent (LeRoux 1990).

Erosion is also caused by roads within plantations and byextraction methods. As a result, soil is lost both when aplantation is established and when it is harvested. To this isadded the damage caused by disking and clean cultivation of eventhe most fragile soils in firebreaks _ a practice which isrequired by insurance companies (Le Roux 1990, Porter 1990).

Conclusions

South Africa offers an excellent example of a type of forestdevelopment which prioritises the interests of the powerfulwithout taking into account the needs of the majority, meanwhiledegrading the environment. Large sectors of the South Africanpopulation need land, firewood and water to survive. What doesafforestation offer which can satisfy these basic needs? Largetimber monocrops occupy vast tracts of land and expel the ruralpopulation, who thereby lose access to the resources they subsistupon. Forced removals and rural-urban migration are oneconsequence.

The example of firewood shows perhaps more clearly than any otherthat forest development policy in South Africa does not evenconsider satisfying the needs of the majority. As noted above, athird of the South African population use wood as their primarysource of energy. Common sense would seem to indicate that thesatisfaction of this need should be the key element of anytree-planting policy. However, after years of intenseafforestation, with 1.5 million hectares of land now given over toplantations, people have less wood available than before theprocess began.

For a country which must concern itself with water scarcity, itwould also seem that water conservation should be an absolutepriority. While the state has in fact taken hydrology

intoconsideration, timber plantations, which generate such littlevalue per hectare while consuming such vast quantities of water,do not seem, in the eyes of many South African observers, the mostintelligent choice from a national point of view. Even if it isassumed that monospecific crops of exotic trees are necessary,there are still two possible options: large scale afforestation orthe incorporation of tree planting into farming. Unfortunately, itis the first _ which generates worse social, economic andenvironmental damage _ which is still predominant.

However, there is still hope. The African National Congress'sforestry policy clearly states that

The potential benefits in terms of fuelwood supplies, watershedmanagement and the prevention of soil erosion, as well as otherindustries tree-planting could stimulate, have been overlooked.Forestry research has failed to focus on tree varieties whichcould be used for the purpose of social forestry . . . The ANCbelieves forestry can play an essential role in rural developmentthrough social forestry programmes. The design and implementationof these would be devised in collaboration with rural communities,and would seek to satisfy social, economic and environmental needs(ANC 1994).

Chapter 11

Indonesia:

Deforestation, Plantations and Repression

Early in 1994, the countryside around what was formerly the little village of Kerinci, 10 kilometres south of Pakanbaru, Sumatra, was witness to an extraordinary scene. Working to a plan formulated by Helsinki-based consultants Jaakko Poyry, some 4,ooo Indonesians laboured day and night, often in mud and rain, to finish the biggest single-line pulp mill in the world by October 1994. Under the eye of a Finnish project manager, an immense soda boiler built by Finland's Tampella firm was assembled on the three-square-kilometre site, supplemented by complicated machinery from a score of other companies including Finland's Kone, Valmet, Ahlstrom, Sunds Rauma and Outukumpu; Sweden's Sunds Defibrator, Noss and Asea Brown Boveri Flakt; Japan's Mitsubishi Heavy Industries and Nippon Sanso; Canada's Chemetics and Bailey; the US's Cranston and Solarturbines; Germany's Siemens and Voith; Britain's ICI; Taiwan's Teco; and India's Ion Exchange (Helsingen Sanomat 23.1.1994, PPI 9.1994).

Built to be capable of converting four million cubic metres of wood into 75o,ooo tonnes of pulp each year by the time it comes up to full capacity, the mill, known as Riau Andalan, will cost its owner, the Raja Garuda Mas company, US$75o million. Two-thirds of its output is slated for export. To satisfy the mill's appetite for wood, the equivalent of one log truck must pass through its gates every three minutes from 16o,ooo hectares of logged-over timber estates southwest of the mill and sources elsewhere. The mill's needs of approximately 4,75o cubic metres of water per hour will meanwhile be supplied by the nearby Kampar River. According to company executives, the mill, which will require the establishment of a port and 45 kilometres of railway for the transportation of wood and wood products, will employ a mere 1,ooo people -- $75o,ooo of capital investment per mill job. The startup of an integrated 28o,ooo tonne-per-year paper mill is scheduled for the end of 1996 (Wright 1994; FT 14.12.1992; PPI 7.1994, 9.1994, 7.1995; DTE 4.1994).

Concentration

Riau Andalan, as one of a number of enormous pulp mills which have been springing up across Indonesia's 'hinterland' island of Sumatra, is in many ways a fitting symbol of a boom which has seen the country's pulp production rise from 167,ooo tonnes in 1983 to 1.4 million tonnes in 1994 and paper production increase from 377,ooo tonnes to 3.o5 million tonnes over the same period (PPI 7.1995, 8.1985; Wright 1994).

For one thing, the mill exemplifies a trend toward concentration of both production and ownership. As average Indonesian pulp plant capacity has leapt from around 5,ooo tonnes per year in 197o to 85,ooo in 1991 and 217,ooo in 1994, the explosively-growing industry has gravitated ever more clearly into the hands of Indonesia's biggest business families, many of whom have built their fortunes through commercial logging or plywood. Reinforcing th's trend is a recent government proclamation requiring that any pulp and paper firm exploiting an industrial timber estate (Hutan Tanaman Industri or HTI) must develop an associated site to bring in Javanese labourers under the transmigration programme; only the largest companies are likely to have enough capital to develop such sites (Brooks 1994).

All of the largest new pulp installations are associated with some of Indonesia's most influential business families:

* Riau Andalan's parent conglomerate, Raja Garuda Mas -- which also runs the 24o,ooo tonne-per-year Indorayon mill in Northern Sumatra and is building a 75o,ooo tonne-per-year pulp mill on a 3oo,ooo-hectare site in Sarawak, Malaysia -- is headed by Harvard-educated Sukanto Tanoto (Tan Kaung Ho), the 'timber king' of Northern Sumatra (NST 16.3.96). Among the many state subsidies which Tanoto has been able to attract for h's operations are a US$5oo million loan from the Domestic Lending Board for the Indorayon plant.

* The 45o,ooo tonne-per-year Tanjung Enim Lestari (TEL) mill in Musi, South Sumatra is a cooperative venture of (1) Pangestu Prayogo's Barito Pacific Timber Group, Indo-nesia's largest wood-based industries group and one of the world's largest plywood manufacturers, which holds over 4.5 million hectares of Indonesia's forest lands and a one-million-hectare concession in Viet Nam; (2) President Suharto's daughter Siti Hardiyanti Rukmana (Tutut); and (3) a consortium of Marubeni, the Japanese Overseas Economic Cooperation Fund and Nippon Paper. The mill, starting up in 1997, has a raw material catchment area of at least 3oo,ooo hectares.

* Two giant pulp mills in Perawang, Sumatra, with a combined capacity of 79o,ooo tonnes per year, are run by Indah Kiat, one of around 135 subsidiaries of the Sinar Mas group. In addition to producing one-third of Indonesia's paper output (the firm is Southeast Asia's largest producer of pulp and paper and the largest stationery producer in the world), Sinar Mas also shares the world's largest holdings of palm-oil lands as well as interests in chemicals, finance, banking, hotels, telecommunications, pig-breeding, and, in collaboration with Suharto's children, various real-estate ventures. Sinar Mas is directed by Eka Tjipta Widjaja (Oei Ek Tjhong), and five of h's eight children hold top posts in Sinar Mas companies. Sinar Mas also boasts another huge pulp mill called Wirya Karya Sakti at Jambi, Sumatra, with a rated capacity of 41o,ooo tonnes per year. Feeding the Sinar Mas mills are concessions totalling over 54o,ooo hectares (Soetikno 1993, Paper 4.2.1992, Paper Asia 8.1991; PPI 2.1994, 7.1995; TAPPI Journal 6.1995).

* Mohammad (iBobi) Hasan (The Kian Seng), Indonesia's top timber businessman, chair of the loggers' and wood-processing trade association, and longtime Suharto crony, has also moved into pulp and paper. Hasan holds interests in the 165,ooo tonne-per-year Kertas Kraft Aceh cement-sack mill in Northern Sumatra -- built as a joint venture with the US's Georgia-Pacific and partly owned by the state and by Suharto's son Sigit Harjojudanto -- and in a Korean/Hong Kong joint venture called Aspex Paper. In 1997, Hasan is also planning to start up a 472,ooo tonne-per-year pulp operation in Kaltim, East Kalimantan called Kiani Kertas, whose industrial plant alone will cost around $7oo million.

Export focus

Although Indonesia's pulp and paper industry has high hopes of building a bigger domestic market among the country's 19o million people (per capita consumption, now only 1o kilogrammes per annum and concentrated 6o per cent in Jakarta, could rise quickly), new capacity for both pulp and paper of the type which Riau Andalan represents is focused largely on exports.

In net terms, the country became self-sufficient in paper in 1987, with paper exports (mainly fine paper and packaging boards) rising from 2oo,ooo tonnes in 199o to 6oo,ooo tonnes in 1994. (In 1993, Indonesia also imported over 12o,ooo tonnes, or US$168 million worth, of paper and board -- a third from the Nordic countries, another third from North America, and much of the remainder from Japan and Germany. Sinar Mas, for example, has been buying pulp and paper on the open

market to supply domestic customers, even while continuing to supply overseas customers [UN 1994, Sonnenfeld 1995].) Pulp exports, in 1994 around 3oo,ooo tonnes, are expected to triple by 1996, and Indonesia may soon be shipping 6o per cent of its total production abroad (Wright 1994; PPI 2.1994, 7.1994). Part of th's market is being created by Indonesia's own Sinar Mas conglomerate, as it invests in paper plants in Bombay and in Ningpo and Cheng Chiang, China which can take Indonesian pulp as raw material; and Raja Garuda Mas, which is also planning two paper mills in China. Sinar Mas already exports nearly half of its production of pulp and paper, while Indorayon's North Sumatra plant at Sosor Ladang, Porsea, has recently been exporting 6o per cent of its pulp production to Japan, Southeast Asia, Europe, Taiwan, the Middle East, China and Korea (PPI 8.1993, 2. 1994, 7.1994, 8.1994, 1o.1994, 5.1995; WALHI 1992). Indonesia as a whole has recently risen to be the 17th largest paper producer and the 18th largest pulp producer in the world (PPI 7.1995).

Just as Indonesia shifted years ago from exporting raw logs to exporting value-added processed wood, it is now shipping far more pulp and paper than wood chips. Hundreds of thousands of tonnes of hardwood chips left the country in 1993 valued at tens of millions of US dollars, bound mainly for Japan, but the trade in paper and pulp is already valued in the hundreds of millions. (Indonesian government hardwood ship export figures are wildly discrepant with official Japanese import figures, making it difficult to quantify the trade. According to Indonesian figures, a total of 385,466 metric tonnes valued at US$13.5 million, was exported in 1993, with 161,78o tonnes, or 42 per cent, going to Japan and the rest going to unspecified 'developing countries' in Asia. Japanese statistics, however, indicate that in the same year the country imported 331,198 tonnes of hardwood chips from Indonesia at a valuation of $4o million [UN 1994]. FAO, meanwhile, estimates that of 1.o65 million cubic metres of chips, particles and wood residues exported from Indonesia in 1993, 6o per cent went to Japan, 32 per cent to Taiwan, and six per cent to China [FAO 1994].) In 1993, 44 per cent of Indonesia's pulp exports went to South Korea, Japan and Thailand, and the rest to the Philippines, Bangladesh, Malaysia, Pakistan, India, Viet Nam, Singapore, China and other Asian destinations (UN 1994). The same markets, together with Taiwan, are likely to remain at the centre of the Indonesian industry's international marketing strategy as the country becomes a net pulp exporter.

Indonesia's foreign paper and board shipments meanwhile, go to a somewhat different range of countries. In 1993 half of the country's exports ended up in Hong Kong, Malaysia, Singapore and South Korea, with the bulk of the remainder going to Australia, China, Thailand, Egypt, Sri Lanka, Saudi Arabia, and the US. The paper sector's growing export orientation helps further to concentrate industry ownership. As Sinar Mas executive Suresh Kilam explains, '[t]he companies which cannot export will go under, with the smallest mills being closed down rather than taken over. With an annual capacity of only a couple of thousand tonnes, they are not economical' (PPI 2.1994).

Foreign involvement

A third industry characteristic exemplified by Riau Andalan is heavy Northern involvement. Most of the hundreds of millions of dollars spent to build and plan the wood supplies for new mills goes to Nordic, Japanese, and North American suppliers and consultants and their consortia (Allen 1992; PPI 8.1993, 2.1994, 1o.1994; DTE 1991; Paper 4.2.1992). Sinar Mas's Perawang and Jambi mills, for example, carrying total price tags of US$52o million and $63o million, use pulp lines supplied by Sweden's Kvaerner Pulping, power and recovery boilers purchased from Ahlstrom, a Kone woodyard, and other equipment from Andritz Sprout-Bauer and Asea Brown Boveri Flakt (Wright 1994, Pappens 1993, TAPPI Journal 6.1995). Finland's Rauma Repola, meanwhile, provided washing and bleaching equipment for Indorayon's pulp and rayon project in Porsea (DTE 1991),

with the mill's waste-based energy turbine being supplied by Ahlstrom and Sunds Defibrator of Sweden and its wood yard by Elof Hansson (Paper 4.2.1992). Bob Hasan's Kiani Kertas firm in East Kalimantan has meanwhile ordered a woodyard and 472,ooo tonne-per-year fibre line from the US's Beloit and other machinery from IMPCO (Ingersoll-Rand). Also important in Indonesia's pulp and paper industry are German, Austrian and Swiss technology and engineering services suppliers such as Voest-Alpine, Voith Sulzer, Klockner Stadler Hurter, Bielomatik and E.C.H. Will, as well as Sweden's Asea Brown Boveri and Belgium's Novarode (PPI 2.1994; Sonnenfeld 1995).

Japanese paper manufacturers have also long been interested in Indonesian wood fibre. Kojin, Kanzaka Paper, MDI, Sanyo-Kokusaku and what was then Jujo Paper were all involved in the Chipdeco mangrove chipping plant in East Kalimantan, and Marubeni in the chipping of Southeast Asia's largest mangrove forest at Bintuni Bay, West Papua. Barito Pacific Timber's 45o,ooo tonne-per-year pulp mill, meanwhile, is to be one-third owned by Japan Sumatra Pulp, an investment company jointly owned by Marubeni, OECF, and Nippon Paper, who together put up US$1oo million for the project. Japanese pulp and paper equipment is now also being sold to Indonesia, aided by the attractive financing made possible by Japanese trading houses. Indah Kiat's Perawang, Riau plant, for instance, uses machinery from Hokuetsu Paper Mills of Japan as well as from Beloit-Mitsubishi, and Kotobuki, together with Valmet, supplies Tjiwi Kimia, Sinar Mas's huge paper firm (PPI 8.1993, 2.1993, Paper 4.2.1992).

In order to land machinery or forestry contracts or negotiate partnerships, of course, industrialized-country firms have to engage in a great deal of stage-setting beforehand. Here a local presence is crucial, and inter-industry collaboration extremely useful. Sweden's Sunds Defibrator and Ahlstrom Machinery, for example, have regional offices, and work together with each other and with Kvaerner and Valmet to provide complementary equipment. Valmet sells its machinery through Swedish-based CellMark, one of the largest commodity traders in the world, which plans also to join Marubeni in marketing pulp from Barito Pacific's TEL mill (see below) (Kuroda 1995).

Acting as brokers, planners and coordinators are forest industry consultancy companies such as Finland's Jaakko Poyry and Canada's Sandwell and H. A. Simons. Such consultants profit from adjusting resources to technology, bringing together Northern machinery suppliers, local business groups, and Indonesian leaders with power over land, forests, finance and labour in a way which benefits all. Working through a network of old colleagues, friends and like-minded technocrats in overworked donor agencies who are happy to be relieved of onerous planning and monitoring duties, the consultants have been able to use public funds to build up a private forestry industry sector in Indonesia which ensures them a continuing stream of future contracts. For example, a 1984 contract with the World Bank and the Indonesian government to do a sector analys's of the country's paper and pulp industry helped Jaakko Poyry land over 3o subsequent contracts to plan or implement public and private sector projects to supply mills with pulpwood from natural forests or plantations. In addition, the company has picked up scores of contracts -- some of them subsidized by Finnish taxpayers through Finnish Export Credit and the bilateral 'aid' agency FINNIDA -- to plan or engineer pulp or paper mills for Indonesian clients or do market surveys for Western machinery manufacturers (Jaakko Poyry n.d.). It has also benefited from other agreements, as when Finnish Export Credit and FINNIDA granted a 13-year interest-free loan worth US$4 million for a forestry development and training centre for the Indorayon firm in Northern Sumatra (DTE 1991, USDT 1993, ODA 1992, Westoby 1987).

Using Canadian government lobbying and handouts, H. A. Simons and Sandwell also mediate politically between the interests of Northern and Indonesian elites. In March 1992, for instance, the Canadian Embassy in Jakarta hosted a mission of 35 companies from the pulp and paper sector to promote Canadian pulp and paper expertise and technology through seminars and top-level

meetings with government and trade officials and local industrial officials and associations. CIDA, the Canadian bilateral 'aid' agency, is meanwhile funding a feasibility study for a plantation and pulp and paper mill in Sorong, West Papua owned by the Kayu Lap's Indonesia group. While Sandwell provided engineering, design, training and operation services to Indorayon, and also helped to plan Barito Pacific's TEL mill (DTE 1991, Paper 4.2.1992), H. A. Simons's supervising site preparations for Bob Hasan's Kiani Kertas plant in East Kalimantan (PPI 9.1994).

Foreign investors and financiers are also joining Indonesia's pulp and paper tycoons in helping to get the industry's immensely capital-intensive projects off the ground. Already by 199o the pulp and paper sector was Indonesia's seventh largest in terms of forest investment, receiving $73o of the total $8.75 billion invested that year (WALHI 1992).

Helping to start up Sinar Mas's lucrative exploitation of natural forest, for example, was the Taiwanese firm Chung Hwa Pulp, which shipped one of its used pulp lines to central Sumatra in 1984 as part of its joint venture with Sinar Mas subsidiary Indah Kiat (DTE 1991, PPI 8.1993); today Chung Hwa and Yuen Foong Yu own a quarter of the shares in Indah Kiat. The partly state-owned Finnish paper giant Enso, meanwhile, has been involved in forestry in Indonesia since 1981, most recently as a consultant for a FINNIDA-funded plantation trial and 'reforestation' project. ENSO is now teaming up with state-owned forestry company Inhutani III and Gudang Garam (Indonesia's biggest cigarette firm) in a 1o-year plan to develop an approximately 139,ooo-hectare acacia pulpwood plantation in Sangau, western Kalimantan, partly on grasslands -- some 8o,ooo hectares of which is already claimed by local residents (JP 22.7.94; PPI 8.1994; Enso Vision 9.1994; Junus 1994; Rasmusson 1995). Enso and its state backer the Finnish Fund for Industrial Cooperation are contributing $3o million of the total $1oo million cost of the project. Enso may also participate in the 5oo,ooo tonne-per-year pulp mill which would be built on site after the acacia matures, and plans to develop a liquid and food packaging board plant with Gudung Garam, which it would supply with chemical pulp and knowhow (PPI 8.1994).

Foreign finance is also crucial to industry development. Some 7o per cent of the capital needed for the US$1 billion Barito Pacific TEL project, for example, is being sought through a flotation of an international stock issue with the assistance of Morgan Grenfell Asia. Finance will be in the form of loans for which sales of the product will serve as security (JP 9.4.1994). Sinar Mas, in the guise of a holding company called Asia Pulp & Paper, has filed an initial public offering worth $39o million in the US to help finance mills in China, India and Indonesia. And Raja Garuda Mas has set up a Bermuda-based holding company, Asia Pacific Resources International Holdings, which recently carried out a $15o million offering in the US and Canada to obtain finance for projected operations in both Indonesia and China. The US's Chemical Bank, as well as other Northern banks, are helping to organize similar offerings for other mills in Indonesia (PPI 8.1993, 1o.1994, 5.1995; Kuroda 1995; DTE 1991; Sonnenfeld 1995). Foreign finance is necessary not only to build big mills, but also to set up huge plantations, which, at a cost of at least $3,ooo per hectare, require injections of capital 'beyond reach' of domestic groups (Data Consult 199o).

International promotion of the mainstream pulp and paper industry in Indonesia, as elsewhere in the South, involves a reapportioning of risk from the private to the public sector, and from North to South. The inequities involved are obvious. The immense price tags of Kvaerner or Tampella machinery constitute a far greater proportion of Gross National Product in Indonesia than in the US, straining not only clients but also public guarantors. And while the hard-won knowledge of a subsidized Jaakko Poyry consultant about how to work Indonesian bureaucracies is a permanent gain for the firm in its future dealings abroad, Indonesian magnates' profits in a volatile global pulp and paper market may be less secure. Still more precarious are the livelihoods of the ordinary

people from whose land, water and labour Indonesian officials and pulp and paper businesses must squeeze their margins and taxes.

It is often remarked how debt and poor terms of trade provide incentives for Indonesia to rush to cash in on its forest land. As income from oil and gas, Indonesia's top earners, falls, the contribution of the forestry sector to GNP, foreign exchange earnings and the payment of the national debt becomes more and more significant. After log exports were banned in order to add value to forest exports, and after the huge wood-processing industry began to face the prospect of eventual raw materials shortages from existing concessions, pressures grew to focus on pulp and paper. As Eddie E-Tak Shaw of Sinar Mas explains:

In 198o the government set aggressive targets for the development of plywood and softwood production. Indonesia was the number one plywood manufacturer in the world. But ten years on the government has realized that with 6o-1oo years' growing time (the plywood industry) couldn't survive. . . . it initiated a study into how to develop other wood-related industries. And there was environmental pressure. Paper and pulp was the right one to go for (Paper 4.2.1992).

Thus the government has spoken of making the country into one of the top ten paper producers in the world by 2oo4, with as much as ten per cent of its land under tree plantations. Industry Minister Hartarto has even voiced the hope that Indonesia will become ithe biggest paper and pulp producer in the worldi. In addition to opening up much of the nation's forest land to the industry, the state has also provided it with incentives such as exemptions on import duty for pulp and paper machines (Data Consult 199o).

Whatever the external pressures are which have led to such actions, however, translating them into working logging concessions, tree plantations, pulp and paper mills, and other types of forest-consuming technology would be impossible without the concrete activities of foreign consulting firms and foreign investors, as well as their helpers in their countries' bilateral 'aid' agencies, export-credit organizations, and so forth. It is largely through these activities that opportunistic tycoons and others are enabled in practice to integrate more and more of Indonesia's forest lands into the world economy (incidentally helping to keep world markets flooded with fibre products). The destructive results are sketched in the next section.

Plantations and deforestation

A fourth characteristic of the new Indonesian pulp mills is that they are, by and large, fed in their initial stages by natural (though often logged-over) forests. While plantations are often advertised as improving 'degraded' or 'unused' lands, the most obvious candidates for this treatment -- anthropogenic, homogeneous *alang-alang* grasslands colonized by Imperata cylindrica -- are difficult and expensive to convert, due to low soil fertility, the grass's toughness, and their tendency to be scattered in patches over a large area. Such grasslands are, in addition, far from being unused by local peoples (WALHI and YLBHI 1992, Sonnenfeld 1995). While the state timber firm Inhutani III and Finland's Enso have established plantations on grasslands in West Kalimantan, it generally makes far more sense for pulp tycoons with privileged access to the Ministry of Forestry, which has jurisdiction over about two-thirds of the country's surface area, to take out what are essentially large, contiguous logging concessions at a rent of approximately US$o.3o per year, clear-cut them, claim the wood as raw material for pulp, apply for HTIs, and then replant the land with pulpwood monocultures. Plantation entrepreneurs who do so are entitled to equity capital and no-interest loans from the Ministry of Forestry. Such loans cover, in effect, 2o per cent or more of the costs of setting up and maintaining HTI plantations through an eight-year cycle (Fearnside 1993). Plantation companies can also use revenues collected from logging companies and

earmarked for rehabilitating logged-out concessions as a way of financing tree-planting. Logging concessionaires' ability to hold onto deforested land and convert it to tree plantations has meant that it is less available to inmigrating smallholders, who may therefore have to invade forest land elsewhere.

So easy, in fact, has it been for business to gain or keep control over forest land by claiming to be interested in pulp and paper -- by 1992, 37 companies had submitted applications for seven million hectares of pulp estates, although only eleven bothered even to undertake feasibility studies on estate development -- that the government recently had to stop granting the concessions (PPI 9.94). The state has also helped companies acquire land by discouraging enforcement of customary adat claims to many of the territories affected. Such claims, although they are recognized in theory, are in practice overridden by the demands of idevelopmenti. As former Forestry Minister Hasjrul Harahap said in 1989, iIn Indonesia, the forest belongs to the state and not the people . . . they have no right to compensationi. In South Sumatra, out of ten million hectares, farmers hold only 1.5-1.7 million hectares, while 19 companies own 1.9-2.o million (Kuroda 1995).

Thus, until at least 2oo2 Riau Andalan will be harvesting 5o species of native tropical hardwood from its concessions while waiting for Acacia mangium and eucalyptus plantations established on cut-over sites to mature. By the end of 1993, however, only 4,ooo hectares of clear-cut forest had been replanted (PPI 9.1994). Elsewhere in Sumatra, Sinar Mas's 79o,ooo-tonne-per-year, 1.2 square-kilometre Perawang installation will consume 2oo square kilometres of old-growth forest per year until the year 2ooo, much of it cut by transmigrant labour, before switching over to acacia; the company's 41o,ooo tonne-per-year Jambi mill further south will denude its 2,4oo-square-kilometre concession of logged-over forest at perhaps half that rate (PPI 1o.94). By 1988, the first of the two Perawang mills alone was reported to be consuming 4oo,ooo tonnes of wood yearly from over 1oo species of tropical hardwood. 'Basically,' the company's vice president Eddie E-Tak Shaw explained at the time, iwe are looking for forest which can be clear-cut and replaced with eucalyptus and acacia' (PPI 1.1988). The site's new 41o,ooo tonne-per-year pulp mill will also feed on mixed tropical hardwoods until 1999 before switching to acacia from plantations which will ultimately total 14o,ooo hectares, of which 6o,ooo have already been planted. Sinar Mas's Wira Karya Sakti mill in Jambi, Sumatra, also at 41o,ooo tonnes per year, had by 1994 planted only 7,ooo hectares of pulpwood trees on its 241,ooo-hectare concession of logged-over secondary forest, although there are plans to add 15,ooo hectares per year from 1994 (PPI 8.1993).

Indorayon's 240,000 tonne-per-year pulp and rayon mill in NorthSumatra, which started off using 86,000 hectares of old stands ofindigenous Pinus merkusii planted during the Dutch colonialperiod, has also clearcut mixed hardwood forests from a150,000-hectare selective logging concession and plantedeucalyptus there. Natural forests elsewhere are also falling preyto Indorayon, most notably 40,000 hectares of what was formerlyHarionboho Protection Forest. Some 100,000 hectares of pineforests in Central Aceh, meanwhile, will feed the Kertas KraftAceh cement sack mill in Northern Sumatra through the turn of thecentury, until replanted pines become available. Mills projectedfor Kalimantan and West Papua, such as Bob Hasan's Kiani Kertas,will also consume natural hardwoods during the first years ofoperation (TAPPI Journal 6.1995). Of the major new plants nowcoming on line, or about to, only Barito Pacific Timber's plannedTEL mill will not start out by being mainly dependent on naturalforest, benefitting from at least 300,000 hectares of concession,of which 210,000 has already been planted, mainly to acacia(Wright 1994, Allen 1992). Even here, however, natural forest hasbeen cleared in preparation for plantations (Kuroda 1995).Although some observers expect future mills to rely in theirinitial stages less on mixed tropical hardwoods than on pulpwoodor even palm oil plantations (Sonnenfeld 1995), industry analystssuggest that even if the government is able to develop itsoriginally projected 4.4 million hectares of industrialplantations by 2004, pulp mills will continue to have to relyheavily on the 55.4

million hectares of designated natural forestlogging concessions until well after that date (Data Consult1990).

Legal restrictions on clearcutting or on logging on steep slopesor near watercourses, such as they are, carry little meaning inthis context. The Department of Forestry itself admits that over86 per cent of timber concession holders violate governmentlogging rules, while the Environment Ministry confesses that500,000 hectares of forest are cut illegally each year (JP18.2.1994, Tempo 5.2.1994). According to the World Bank,meanwhile, 'only 2.2 per cent of cutover lands have ever had alegally required residual stand inventory, and cutting outsideapproved boundaries is frequent'; the Bank warns that timbercompanies are cutting 50 per cent more logs than can be replacedthrough replanting (World Bank 1994; IHT 22.9.1994). In 1994 itwas reported that some 248 logging concessionaires had recentlybeen found guilty of logging violations (PPI 9.1994). To take justone example, Indah Kiat, which, as the government acknowledges,has insufficient access to forested land to meet its pulpwoodrequirements legally, was fined US$1.4 million recently foremploying transmigrants in its charge to carry out illegal logging(JP 8.9.93, 27.9.93, 3.6.94, 30.7.94; Kompas 27.9.93; FT 9.9.1994;Forum Keadilan 6.1.94; DTE 1991; Zerner 1993). Companies' ownconservation pledges _ for example, Riau Andalan's promise not tocut endangered species or log on slopes of 23 degrees or morewithin 200 metres of rivers _ are even less likely to be actedupon than the forestry laws themselves.

Moreover, if plantations do not mature as expected _ which is notunlikely given scant experience with them on the generally poorsoil of the Outer Islands _ then pressure on natural forests mayincrease yet further (PPI 8.93, 10.94; WALHI and YLHBI 1992).Although thus far the largest contiguous plantation of any kind inIndonesia has occupied some 20,000 hectares, P"yry consultants arerecommending plantation units of 30,000-50,000 hectares. The risksare considerable. Plantations of Leucaena leucocephala onunforested land, for example, ran into disaster during the 1980swhen insects attacked the plants on a large scale. Given that nopest-resistant species of acacia have been found, similar problemsmay await pulp plantations. A prominent softwood silvicultureresearcher has gone so far as to comment that 'Indonesia may be adisaster waiting to happen' due to hasty plantation planning(WALHI and YLBHI 1992).

No less signficant in forest destruction is the disruption ofcommunity-based resource-management systems through, for example,road-building, site clearance, land takeovers, the blocking oftributary streams and the disruption of local irrigation systemsand fisheries. Indah Kiat's Riau concessions, for example, arelargely on ancestral lands belonging to the Sakai people, who havebeen resettled outside the area. Imported labourers also play apart in deforestation. In the words of the World Bank,

the fact that only a small fraction of [traditional] adat rightshave been registered makes it difficult for existing forestdwellers to prevent spontaneous transmigrants from taking overtraditional clan lands and, lacking the cultural traditions of theindigenous agriculturalists, farming the soils to exhaustionbefore moving on in search of new land (1994).

As Charles Zerner points out in a suppressed World Bank report,the agricultural and forestry systems threatened in these variousways have been not only effective in sustaining forests in theOuter Islands, but in some cases have even enhanced biologicaldiversity (Zerner 1993). Through displacement, impoverishment anddeskilling of local people, pulpwood developments are thusundermining one of the main bulwarks of forest protection inIndonesia.

Forest fires linked to pulpwood operations are another importantcause of deforestation. Logging often leaves behind large amountsof dry wood and scrub which provide ideal fuel, as does

thepractice of clearing scrub and remnant forest in order to plantfast-growing trees. Fires can also be deliberately set in order toprovide a rationale for declaring the burned-over area a timberestate, or as an act of retaliation or resistance by evictees orunderpaid transmigrant timber workers. Fires can be particularlyextensive in certain areas of Kalimantan, where a layer ofsubsurface coal provides additional fuel: in 1982-3 a singlegigantic blaze devastated 3.6 million hectares of the island'sforest cover, an area 56 times the size of Singapore. Huge firesin succeeding years have wiped out further thousands of squarekilometres and disrupted air traffic over wide areas. Plantationsthemselves, of course, often fall victim to fire, resulting inmillions of dollars in damage (Setiakawan 1-6.1992, SKEPHI 1995).

Further subsidies

Subsidized land, wood and technology, in sum, have helped makeIndonesia into one of the cheapest pulp and paper producers in theworld. But the subsidies do not stop there. Salary levels are alsoamong the world's lowest, kept that way partly throughstate-supplied suppression of labour movements. As the FinancialTimes wrote in November 1990, 'The almost total absence of labourunrest, together with officially-sanctioned low wages inIndonesia, has been one of the main factors in attracting largeamounts of foreign investment to the country'.

Near-captive labour, meanwhile, is provided by the transmigrationprogramme for projects such as Barito Pacific's TEL pulpinstallation. At Sinar Mas's Perawang complex in central Sumatra,inadequately-housed transmigrants required to do illegal logginghave had to wait up to three months at a time for their wages, onone occasion being paid only after they took some of the companyvehicles hostage (Forum Keadilan 6.1.94). Tree-planting wagesoffered by the Jayanti Group to transmigrants on the company'stimber reforestation site on Seram Island, Maluku, meanwhile,amount to only one rupiah per seedling planted. At a rate of onetree a minute this earns only Rp 600 per day, or about $0.30. Thenucleus estate/smallholder model, which the government is hopingto adapt to pulpwood plantations, also has a record of poor wages(DTE 1991).

At a time of tightening controls in the North, lax enforcement ofpollution laws (however strict some of them may be on paper) alsoattracts pulp investors. To take one example, Sinar Mas's IndahKiat _ the subject of a lawsuit threat in 1992 for its pollutionof the Siak River _ uses its wastewater treatment facilities whenthere is an inspection but otherwise only sporadically, and hasconsistently failed to meet deadlines for waste control. Anotherfirm which installed over $30 million worth of expensive-to-runpollution control equipment also operates it only rarely.

During Indorayon's startup period, similarly, the company paid noattention to an official directive that it construct an aeratedwaste-treatment lagoon according to a government plan. When thewaste lagoon it did build collapsed, sending effluent into theAsahan River, no compensation was paid to fisherfolk, who, up to40 kilometres downstream, saw their yields fall by up to 90 percent and were forced to find another source of income. When localNGOs undertook studies that showed persisting high levels ofpollution six months after the accident, Indorayon staff succeededin intimidating affected villagers into not taking the case tocourt, appearing at meetings only in the company of districtmilitary officers, showering locals with gifts of food and offersof jobs, and insinuating that NGOs interested in the case had ahidden Communist agenda (WALHI 1992; JP 7.9.92, 10.9.92, 22.9.92,24.9.92, 8.10.92; Suara Pembaruan 31.8.91, 4.9.92; Kompas17.11.93; Anon n.d.). Following the explosion of a chlorine tankat Indorayon in November 1993, which drove away many terrifiedlocal residents, Environment Minister Sarwono Kusumaatmadjaordered the mill to halve its production pending completion of anenvironmental audit by an independent consultant. However, theaudit, carried out by the US firm Labat Anderson, cannot do morethan recommend how Indorayon can best continue to use chlorine. InNovember 1995, rumours of a hazardous gas

leak provoked hundredsof local protesters into burning 100 houses, a radio station, andvehicles owned by Indorayon (FEER 15.2.96).

A final selling point for Indonesia in the eyes of the plantationindustry is a climate which allows pulp species to mature three tofour times faster than in, say Finland, theoretically makingpossible shorter lead times, smaller plantations, and moreefficient use of a given land area.

Disintegration and resistance

Many ordinary Indonesians, unsurprisingly, experience theintegration of local land and forests into the world pulp andpaper economy as a disintegration of local livelihoods andrelationships, and gifts of low-cost forest land and riverinewaste sinks to the industry as something more closely akin totheft.

When, following independence, the Indonesian state arrogated toitself the country's forest lands in a move which has paved theway for many of today's pulpwood developments, it was not imposingits legal order on a vacuum, but on the customary andinformally-enforced claims of local communities. Industrial timberestates (HTIs) and nucleus estate schemes have often functionedessentially as ways of redistributing customary lands to thewealthy _ although they are advertised as ways of reclaimingcritical lands, providing an alternative to logging naturalforests, supplying an incentive to reforestation, and providingemployment to predominantly Javanese transmigrants in a way whichwill prevent them from having to resort to destructive forms ofagriculture on the unfamiliar soils and terrain of the OuterIslands. The effects that Zerner (1993) has enumerated for timberconcessions, HTIs, and nucleus estate schemes generally also applyto pulp plantation development in particular:

[T]he effectiveness of local resource management institutions hasdecreased and community control over historically owned andmanaged forest territories and resources has been eroded.Community nutrition has declined as the quality of huntingterritories and fishing sites has decreased and access to theseareas is progressively limited. Access to markets throughriver-based transport networks has been reduced. In addition, . .. community health and food security may have declined and theincidence of . . . sexual abuses and assaults has increased. Inthe vicinity of logging camps, prostitution has increased andvenereal disease has spread. . . . exclusion of local communitiesfrom . . . forest territories has often resulted in the politicalpolarization of communities rather than their integration ascitizens. Alienation, opposition and violence are among the socialcosts of a failure to recognize community needs and rights toequitably participate in the forest management enterprise.

In Northern Sumatra, to take one example, Indorayon's clearcuts,roads and plantations have displaced thousands of Batak people inthe Lake Toba area through usurping their traditional lands anddegrading the environment which sustains them. Logging-relateddroughts have depressed rice harvests over wide areas, and a pineplantation has been established in the Sibatuloting ProtectionForest, a catchment area of two river systems supplying water to65,000 hectares of wet rice paddies and 688,000 people thorughoutthe 'rice bowl' of Northern Sumatra. Logging roads built into pineforests have meanwhile destroyed rice fields and resulted in twolandslides, one in October 1987 and another in November 1989,taking a total of 30 lives. Painstaking attempts to use officialchannels, and then road blockades, to get the company to acceptresponsibility for the damage have resulted mainly only in arrestsand military intimidation of villagers, clergy and NGOs. Thecompany has also succeeded in dividing villagers by offering thempartial compensation.

In March 1987, in addition, without permission from local elders,Indorayon began stripping ancestral pasture lands legallybelonging to Batak people of the village of Sugapa and plantingthem

to eucalyptus. A fine of 10,000 rupiah was imposed on anyanimal found grazing in the area where seedlings had been planted.Distraught villagers' attempts to pursue the case with local anddistrict authorities through 1988 bore no fruit. To forestallfurther opposition, village- and local-level government officialstricked villagers into signing blank sheets of paper that werethen turned over to Indorayon staff, who appended them to anagreement awarding the pasture land to the company. This was thenshown to Sugapa residents at an official meeting at which theywere protesting the abuse of their land rights. At the same time,local government officials claimed that they had already been ableto induce several villagers into accepting compensation for thelost land. Enraged by these machinations, Sugapa villagers,particularly women, in whom according to matriarchal custom landrights are invested, finally exploded in April 1989, whenIndorayon employees were caught sexually violating local women _an action considered by the Batak people to be the most heinous ofall crimes. When the men were released by the police withoutcharge, infuriated Sugapa women marched on Indorayon's plantationand ripped up thousands of eucalyptus seedlings planted on adatsoil. Charged with destruction of company property, the womensubsequently traveled to Jakarta to take their case to theMinister of Home Affairs. At the February 1990 trial at which tenwomen involved were sentenced to six months' imprisonment (laterreduced on appeal to probation), they vehemently defended theirrights to the property: 'The land is the only source of incomethat the people have. If it is planted with eucalyptus, how are wegoing to eat? How are we going to feed and herd our cattle?'. Bythis time, however, Indorayon had succeeded in dividing thecommunity sufficiently to blunt the movement for return of theland (WALHI and YBLHI 1992, Anon n.d.).

Indorayon has also provoked local resentment by blocking access towoodlands which villagers rely on for rattan, fodder or carvingwood; by planting eucalyptus on an ancestral graveyard; and bydemeaning villagers by forcibly overriding traditions ofhereditary land transfers important to clan identity. In November1992, farmers in Gonting Silogomon village, 156 hectares of whoseland had been appropriated for an HTI to supply pulpwood toIndorayon, asked the firm's workers to stop clearing theircultivated fields. During the following days, local farmers wererepeatedly threatened by military officers from the DistrictInfantry armed with M-16s, with several shots being fired(Tjahjono 1993). Farmers from one village who agreed to groweucalyptus for Indorayon subsequently regretted becoming involvedsince they were no longer allowed to pasture their animals ontheir land and feared Indorayon would set low prices for the woodthey produced. The Indorayon pulp plant's pollution of the Asahanriver, meanwhile, has resulted not only in degradation offisheries but also in health problems and loss of village watersupplies, while air pollution has brought on nausea and dizzinessas far as 40 kilometres from the factory (Environesia 4-8.1990,Anon n.d.).

In South Sumatra, meanwhile, PT Musi Hutan Persada, one ofBarito's timber estate management companies, when it found thatthe 300,000-hectare concession it had been awarded overlapped withone given to another timber company in the area, took over fertileland belonging to 200 farmers in Muara Enim regency withoutwarning, destroying durian and jackfruit trees, rubberplantations, wet-rice fields and forest commons. Protestingfarmers were arrested and their claims dismissed out of hand bythe provincial governor, who claimed they were merely seekingfinancial gain. Minister for Forestry DjamaloeddinSoeryohadikoesoemo, for his part, claimed it was theresponsibility of the company to settle the dispute _ despite thefact that the concession was awarded only on the condition thatfertile or privately-owned land would not be used (Brooks 1994,Tempo 18.12.93, SKEPHI 1995). The fate of the displaced villagersremains unclear. In other locations in Muara Enim and Muara Rawasregencies, thousands of hectares of other forests and farmlandhave also been seized by company agents for pulpwood plantations(sometimes on the pretext of establishing oil palm or rubberplantations) without consultation with local farmers (WALHI 1995,JP 15.6.1995). In many cases, promised

compensation for seizedland in the form of rubber plantations, livestock and hospitalservices has not been forthcoming (SKEPHI 1995, Kuroda 1995). Norhave villagers now farming on the TEL mill site been informed ofthe details of the factory (Kuroda 1995).

In Kalimantan, finally, in one of dozens of such examples, loggingroads constructed parallel to a river on one plantation concessionblocked tributaries, halving the river's flow and creating amalarial swamp. Filled with sediment from erosion from logging androad-building, the river became useless for transport to market orfor fishing. No compensation was paid, meanwhile, for the loggingof lands which had been owned and managed by the local communityfor 400 years. The company involved also put up a sign indicatingthat subsistence swidden farming on community land was now acrime, and ordered local residents and Javanese transmigrants touse hoes instead. Although only the transmigrants obeyed,catastrophic erosion was the result. Another disaster wasprecipitated when the company tried to 'develop' the villagers'traditional rattan cultivation methods by getting them to plantrattan in straight lines without regard for site conditions, withthe result that 90 per cent of the crop died (Zerner 1993).

In another Kalimantan case, a company planned to establish an HTI,apparently for a paper mill, not on degraded land, as regulationsrequire, but on secondary forest land. This land had been underadat ownership for 200 years and used, among other things, forrotational swidden and rattan gardens. Company 'experts' did notrecognize these productive agroforestry systems even when theywere walking through them. When the local community refused thecompany permission to survey the area, the company claimedownership of the land and promised compensation for destroyedrattan of 300 rupiah per cluster. It is estimated that the 20-yearvalue of returns for one cluster of rattan, however, is between Rp500,000 and Rp 1 million. That is, the compensation offered wasonly .06 per cent or less of the market value of the commodity inquestion.

Such cases underscore the role plantation projects have indegrading forests through displacing people and disruptingcommunity-based forest stewardship systems. In contesting theactions of plantation and pulp companies _ whether by appealing tolocal, district, provincial and national bureaucracies andparliaments, taking firms to court, blocking roads, seizingcompany vehicles, pulling up stakes put down by survey teams,tearing down signs criminalizing traditional agriculturalpractices, cutting bridges built by encroaching companies, peltingcompany houses with rocks, or simply refusing to cooperate withfirms who do not consult with residents according tolocally-approved political processes _ local villagers are alsoattempting to defend the main features in their social landscapewhich hold out a secure promise for the future.

In doing so, they have often worked with local legal aid groups orNGOs. On some occasions, national-level alliances have also beenformed which use national law as a tool, as in the late 1980s whenWALHI, a Jakarta-based NGO, began working with North Sumatracommunity development NGOs in surveying Indorayon's abuses with aneye to taking the firm and the government to court in Jakarta totest a 1982 statute on environmental regulation. Foreign groupshave meanwhile demonstrated solidarity by asking funding agencies(for example, Japan's OECF) and foreign investors in Britain andthe US to reconsider their support for projects such as Barito'sTEL scheme (Tjahjono 1993, WALHI 1992, Kuroda 1995).

All alliances critical of the Indonesian pulp industry carryrisks. Villager-NGO alliances may provoke an official backlash inwhich both allies are charged with 'Communism', an accusationwhich has proven fatal to many in the country since the massacresof the mid-1960s. Villagers may be beaten, arrested, or coopted,while NGOs may be faced with closure and intimidation.International campaigns, if they are seen as linked with localstruggles, may increase government intolerance of local groupseven further.

Yet alliances can also bring gains. The lawsuit initiated byWALHI, for example, helped catalyze coordination among NorthernSumatran NGOs on broader environmental issues and laid afoundation for further united action. It has also yielded thelesson that by presenting their demands as coming from forumsrather than from individuals or organizations, villagers and NGOscan be protected to some extent from corporate or officialretribution. At the same time, the experience of the lawsuit _which, predictably, was lost _ has helped impress upon urban-basedNGOs the importance of patient work in the field with villagersand rural NGOs.

As the government's investment in global public relations testifies, international campaigns can also affect the development of the pulp industry in Indonesia. A campaign involving the threat of a boycott in Europe and North America, for instance, helped force Scott Paper to withdraw in 1989 from a joint venture in West Papua which would have displaced 15,000 people. Scott's partner, Astra, Indonesia's second largest business conglomerate, has vowed to continue the scheme, butfinancial difficulties have slowed its progress.

Chapter 12

Thailand:

From 'Reforestation' to Contract Farming

Incentives for establishing commercial pulpwood plantations are asstrong in Thailand as in Indonesia: a booming economy, goodgeographical location, lavish subsidies, and local and foreignelites eager to invest. But competition for available land andforest, a less repressive political climate, and, most of all,heavy resistance, have so far prevented a plantation boom on thescale of that in Indonesia. Continuing pressure from the paper andpulp industry and its allies, however, has led to a seesaw battlefor high stakes across large areas of the country betweenplantation promoters and local villagers and environmentalists.

Manufacturing and export growth

Much of the impetus for establishing new plantations stems fromthe Thai economy's growth rate, one of the highest in the worldover the past decade. Rises in paper and paperboard demand,however, are driven not simply by aggregate economic expansion,but by manufacturing and export growth in particular. Packaging,for example, accounts for a staggering two-thirds of the paperused by the country. Revealingly, moreover, the 1994 paper andpaperboard demand increase of over 14 per cent matches increasesin exports (16 per cent) and in manufacturing (12 per cent) moreclosely than the increase in Gross Domestic Product (eight percent). Between 1985 and 1990, paper manufacture shot up from294,000 to 889,000 tonnes, reaching 1.66 million tonnes in 1994,with around 3 million tonnes expected in 1997 (Apichai 1992, P&PA11.94, PPI 10.93, 7.1995). Pulp production, meanwhile, doubled inthe decade to 1993, to about 200,000 tonnes per year, and isexpected to reach 815,000 tonnes per year by 2000 (Rajesh 1995).

Among the companies recently making large new investments in pulpand paper have been the Soon Hua Seng Group, one of Thailand'sleading rice traders. In late 1995 the firm's subsidiary AdvanceAgro brought a new 217,000 tonne-per-year Mitsubishi-Beloit papermachine on stream in east Thailand, with an integrated 175,000tonne-per-year Sunds Defibrator eucalyptus kraft pulp millfollowing shortly thereafter. Finance for the US$670 millioninstallation was raised largely in the US and Europe. The firm hasalso ordered another 200,000 tonne-per-year paper machine fromMitsubishi Heavy Machinery. The Siam Cement Group, a companyassociated with the Crown Property Bureau and which holds elevencompanies producing paper and pulp, has meanwhile recently boostedits production capacity to around one million tonnes per year ofpulp, paper and converted products, with three new machines slatedto come on line by 1997. Hiang Seng and Panjapol have also addednew capacity (Nation 14.4.1994; BP 13.7.1994; PPI 8.1995, 11.1995;Rajesh 1995; Papermaker 12.1994). Nationwide, overinvestmentpushed containerboard capacity to 50 per cent over demand in 1994,and net paper self-sufficiency is expected to climb to around 117per cent in 1997, when the country will be producing far moreshort-fibre (eucalyptus) pulp than its papermakers require (Adul1993; P&PA 11.1994; PPI 10.93, 7.95; Rajesh 1995). Freshlong-fibre (conifer) pulp, however, cannot be produced in largequantities in the country and will continue to be imported.

As in Indonesia, foreign machinery suppliers are importantbeneficiaries of the boom, with Nordic, Japanese and NorthAmerican suppliers again dominating the market. Foreign investmentis also significant. Phoenix Pulp and Paper, currently Thailand'slargest producer of pulp, with 200,000 tonnes per year, is aventure of Ballarpur, India's largest pulp and paper manufacturer_ which holds

over 13 per cent of the shares _ and the EuropeanInvestment Development Corporation based in Luxem-bourg. In goodyears, Phoenix exports over a third of its pulp to such countriesas India, South Korea, the Philippines, Japan and the US. AsiaTech, a firm partly owned by the New Zealand-based multinationalBrierly Investments (see Chapter 8), is meanwhile laying thegroundwork for pulp and paper mills by promoting contract farmingof Acacia mangium pulpwood trees over 32,000 hectares in fourprovinces of Thailand's Northeast. Taking advantage of localgovernment connections, Asia Tech has also illegally seized over500 hectares of public seasonally-flooded forest on the banks ofthe Songkhram River to plant eucalyptus. Japanese and Taiwanesefirms, for their part, have formed consortia to produce wood chipsand pulp. Itochu, for example, has entered into a joint venturewith Sahapattanapibul Group to export eucalyptus chips, and NewOji has ties with Advance Agro, which will export jointly-brandedproducts to the Japanese market. The US's Kimberly-Clark, inaddition, has invested in Thai tissue capacity and Korea's Shin Hoin a 100,000 tonne-per-year newsprint mill using recoveredmaterials. Banks such as the UK's Barclays meanwhile help advisefirms such as Soon Hua Seng on debt finance and share offerings(PPI 11.1995, Lang 1995).

Anticipated future growth in both exports and domestic production,together with the need to keep machines running even in times ofsurplus, has compelled industry to push for more and more of thecountry's land area to be planted to pulp trees. Eucalyptuscamaldulensis, known since the early 1970s to be easily adaptibleto Thailand's wide range of habitats, and increasingly attractiveto paper manufacturers, has been the tree of choice since theappearance of cheap seed on the market in 1978. By 1992 around80,000 hectares of eucalyptus had been planted by a wide varietyof firms and private owners, mainly in the Northeast and Centralregions, and industry has continually lobbied the government forfurther land, recently claiming it needed another 128,000 hectaresunder fast-growing trees by 2002. With its eye on increasingexports, the industry association has also requested soft loanswith grace periods of six years, reductions in corporate incometax, waivers on sales tax, suspension of import duty on pulp- andpaper-making chemicals and machinery, more government-underwrittentraining and infrastructure, and state collaboration in plantationventures (Apichai 1992, BP 1.2.93, P&PA 11.1994, Rajesh 1995).

Official collaboration

Until confronted by massive popular resistance, governmentofficials, by and large, have been only too willing to cooperate.In the late 1980s, government agencies were calling for 4.3million hectares of commercial tree plantations in NationalReserve Forests (or over eight per cent of the country's landarea), with communities and the government planting an additional1.85 million hectares. This eagerness caused some head-scratchingamong corporate consultants, who, try as they might, could notlocate a prospective market for the products of more than ten percent of such a huge plantation area (Sargent 1990, PrachachartThurakit 4-6.1.1989).

Such official enthusiasm for commercial eucalyptus plantations,however, is not as mysterious as it may look. The Royal ForestDepartment (RFD) has been overwhelmingly oriented towardcommercial exploitation during its entire 100-year history. Whenlogging was banned in 1989, it was only natural that it shouldturn its attention to promoting commercial plantations. This biashas been reinforced by the associations many RFD bureaucrats enjoywith eucalyptus nursery owners or brokers and the equally closecollaboration the state Forestry Industry Organization has forgedwith the private pulp and paper sector (Apichai 1992).

Promoting commercial plantations has also allowed the RFD toportray itself as discharging its responsibility to 'reforest thecountry' in the wake of the catastrophic logging of the past 30 to40 years. This is particularly important in that most RFDofficials have consistently held that

conservation and restorationof forest cover are beyond the abilities of local villagers, andcan only be made possible through state or commercial projects.The RFD has in addition been eager to regain control over largeareas of National Reserve Forest land, which, following decades ofcommercial logging and official promotion of upland export cropssuch as kenaf, maize, sugar cane and cassava, fell into the defacto possession of peasant 'encroachers' (Usher 1990a). Just asthe RFD once granted timber companies cheap logging concessions,it subsequently began to grant even cheaper concessions toeucalyptus firms in the hope that they would help drive out thesettlers that the logging concessions had helped attract.

The parastatal Forest Industry Organization (FIO), too, has beencasting about for a new role for itself since logging was banned,and as a result has become involved in pulpwood schemes, includingcommercial plantations on state land, as well as pulp mills. Onesuch mill was mooted for Sri Sa Ket until local opposition forcedthe FIO to shift the projected site to Ubon Ratchathanee; anotheris planned for Sakon Nakhon.

Both foreign and domestic eucalyptus-growing firms, moreover, havebeen linked with political parties responsible for powerfulministries. Soon Hua Seng, for example, whose board chairman isNarong Mahanond, a former Director General of the PoliceDepartment, has helped finance the Democrat Party, which for yearsheld the portfolio of the Ministry of Agriculture and AgriculturalCooperatives, which is responsible for the RFD. Asia Tech's landgrabs in upper northeast Thailand, similarly, have reportedly beenfacilitated by politicians in the New Aspiration, Chart Pattana,Nam Thai and Chart Thai parties (Krungthep Thurakit 15.2.96).

As in Indonesia, in addition, planting trees may not be the onlything tycoons have had in mind when they demand access to moreland for pulpwood plantations. While natural forests are not aleading source of pulp raw material in Thailand, businesses haveoften hired or encouraged villagers to clear forest so that it canbe categorized as 'degraded land' legally eligible for plantingwith eucalyptus. The timber has then been sold illegally forlumber. On occasion, a forest which is not 'degraded' at all maybe earmarked for plantations in order that it may be logged(Nation 20.1.1996). By putting on a show of interest in pulp andpaper, moreover, some business figures have attempted to amassland with potential for profitable uses such as golf courses ortourist resorts. RFD officials and politicians who stand to sharethe benefits have often been only too happy to play along.

Influenced by Western models, Thailand's official institutions arestructured in a way which has helped to subsidize the plantationindustry. The Royal Forest Department, for example, has legaljurisdiction over approximately 40 per cent of the country'ssurface area in the form of National Reserve Forests (NRFs), manyof which are forested in name only. Until recently, transferrableland documents could not legally be granted in NRFs, even in the5.6 million hectares which are estimated to be currently undercultivation, though many NRFs were gazetted in areas alreadyoccupied by villagers. In the 1980s and early 1990s, thisarrangement enabled the government to label the more than 10million people who live in the NRFs _ some of whom have beenpresent since before the NRFs were gazetted _ as 'illegalencroachers'. Accordingly, the land they were occupying could begiven away to plantation or other businesses at the derisory rateof US$2.50 per hectare per year, little more than five per cent ofthe (already low) typical going market rate (Apichai 1992). Intheory, the Director-General of the RFD can still authorize therental of up to 16 hectares of NRF per company, the Minister ofAgriculture up to 320, and the Cabinet, still larger areas. InSeptember 1994, the Minister of Agriculture was even givenauthority to allow state agencies to use parts of protected areaswithout cabinet approval 'if their projects involve national andeconomic security'.

Other apparatuses have been set up for granting special privilegesto pulpwood plantations which no other agricultural crop enjoys.In the late 1980s, the RFD set up a separate office devotedspecifically to promoting commercial tree farms, complete with apublic relations budget of over US$24 million, and in 1994 askedfor approximately US$130 million from the 1995 fiscal budget tosubsidize private sector plantations and other 'reafforestation'projects, including one in which farmers in National ReserveForests are given soft loans to plant fast-growing trees. TheBoard of Investment has meanwhile granted some firms tax holidaysand exemptions from duty on imported machinery and raw materials(Apichai 1992, Usher 1990b, Nation 9.4.1990, Tunya 1990, BP31.8.94).

Foreign subsidies

Providing additional subsidies are foreign governments.Particularly prominent, unsurprisingly, are those of Japan,Canada, and Finland, three of the countries which are likely tobenefit the most either from sales of machinery and consultanciesor (in the case of Japan) also from imports of Thai chips andpulp.

As long ago as 1981, the Japan International Cooperation Agencyset up a trial eucalyptus plantation in Northeast Thailand tofoster research and training in the field, and in the early 1990sfunded a nursery project growing 20 million tree seedlings yearly.Japanese taxpayers' money has also been channeled through theOverseas Economic Cooperation Fund to support farmers'participation in the Thai-Japan Reforestation and Wood IndustryCo., which was designed to supply raw materials to a consortium ofJapanese papermakers (Nectoux and Kuroda 1989, Tunya 1990, Masaki1995). CIDA, the Canadian 'aid' body, has helped finance theCanadian consultant H. A. Simons' work with Soon Hua Seng as wellas tree plantation research by the Thai Development ResearchInstitute. Britain's Commonwealth Development Corporation, whichdraws money from the British 'aid' programme, has also providedloans and debt finance to Soon Hua Seng. And the Swedish Board forInvestment and Technical Support has hired the Swedish consultingfirm Swedforest to help FIO's attempted transition from a loggingto a plantation-managing agency (Usher 1994, Rajesh 1995).

The struggles of the 1990s

In the early 1990s, plantation proponents and opponents alike hadto struggle for purchase on a slippery, constantly changingpolitical field. In May 1990, then Prime Minister ChatichaiChoonhavan prohibited all commercial 'reforestation' in NationalReserve Forests following the arrest of 156 Soon Hua Sengemployees for logging a plantation site in Eastern Thailand. (Inaccord with normal practice, Soon Hua Seng had been allowedunofficially to have access to the forest in order to 'degrade' itbefore negotiations for the concession were concluded, butpolitical intrigue against the company's president led toexposure.) In February 1991, however, a military coup d'tat pavedthe way for a massive official programme, which, with a budget ofhundreds of millions of dollars, was aimed at evicting fivemillion residents of National Reserve Forests in order to free upapproximately 1.37 million hectares for private-sector treeplantations. Within a year, perhaps 40,000 families were forciblydisplaced in the Northeast, with repression especially severe inareas targeted by the military as hotbeds of resistance (Sanitsuda1992, Phuu Jatkaan Raai Sapdaa 16-23.9.91).

When a broad-based popular movement overthrew the military juntain May 1992, resistance to pulpwood plantations emerged again inforce. Following major demonstrations by Northeastern villagers,including the blockade of the region's principal highway, andprolonged negotiation with farmer leaders, the government scrappedthe military's eviction programme, suspended

'reforestation' witheucalyptus, and imposed a ceiling of eight hectares on any type ofcommercial tree plantation.

The protests of the last decade have made Thailand a watchword inthe industry for conflict over raw materials. This has discouragedboth foreign and domestic investment, particularly in giant exportschemes such as those to be found in Brazil and Indonesia. Shell,for example, was forced to drop plans to plant 12,500 hectares ofeucalyptus in east Thailand in 1990 after violent conflicts andscandals forced delays in governmental approval for the project.Soon Hua Seng, Birla, and other firms have also been compelled toabandon ambitious plantation or pulp schemes out of fears of localopposition or subsequent rejection by the government. Phoenix'smill, meanwhile, lost 141 production days during 1992-4 due tocontroversies over pollution releases which have damaged localfishing livelihoods, while investors including Panjapol and SiamPulp and Paper have run into problems with licensing authorities.Such difficulties have increased investors' reluctance to move outof the Bangkok area, with its good infrastructure, consumers, andeasy access to waste paper for raw material (P&PA 11.1994).

In September 1993, under pressure from the pulp and paper industryand its allies, Thailand's economic ministers decided once againto open National Reserve Forests to commercial reforestation. Inpractice, however, grassroots resistance and public opinion haveensured that the conversion of state land to pulpwood plantationsremains difficult. In 1994, for example, local opposition to aeucalyptus-planting RFD development programme in Roi Et become sostrong that district officials had no choice but to expresssupport for villagers who chopped down over 300 hectares of theAustralian tree in order to replace it with community-conservedforests of native species (BP 27.3.95). By 1995, village networksin the province were attempting to eliminate eucalyptus from theirareas altogether, forcing the RFD to suspend its eucalyptusoperations over a wide area. Responsibility for existingplantations, meanwhile, was passed to other authorities, whomvillagers have pressured through a variety of channels to cut theeucalyptus and distribute the profits locally. Throughout theircampaigns, Northeastern villagers and their NGO allies haveresearched and publicized multi-purpose native alternatives toeucalyptus which are responsive to the diversity of food,construction, medicinal and ecological needs of differentlocalities; launched supplementary plantings of native trees ondegraded sites; and posted new areas as community forest.

Increasingly, government agencies are conceding both the necessityof granting land rights to occupants of NRFs and the problems oflarge-scale eucalyptus cultivation. In 1994, a new 'land reform'programme called Sor Por Kor was instituted to distribute over600,000 hectares of NRF land per year to farmers before it wasderailed by high-level abuses. A scheme in which privatecorporations and state enterprises are being invited by theMinistry of Agriculture and Agricultural Cooperatives to helpcover at least 540,000 hectares of land with trees between 1994and 1996 to mark the 50th anniversary of the King's coronation hasmeanwhile specified that the plantings must be for conservationpurposes, must use native trees, and must not evict occupants ofthe land affected -- although whether these goals are achievableis open to question (BP 20.1.95).

>From planting leased land to contract farming

Facing clashes with landless farmers or governmental vacillationor opposition in its efforts to take over NRF land outright, theindustry and its official allies have turned increasingly tocontract farming as a second-choice strategy. Here the industry,instead of dispossessing peasants directly, contracts with them togrow pulpwood trees on their own land, often distributing freeseedlings and promising to purchase their harvest years hence at aguaranteed price.

Although this approach can be unwieldy, requiring pulp or chipfirms to deal with thousands of smallholders scattered across alarge area, it is unlikely to provoke the type of organizedresistance to plantations which has followed on from attempts atoutright eviction, and may even encourage farmers to clear newareas to plant trees. Thus by early 1996, Asia Tech had convincedfarmers in Thailand's Northeast to plant acacia on 16,000 hectaresof their own land, half what the firm requires to feed itsprojected 150,000 tonne-per-year pulp mill in Nong Khai. Soon HuaSeng's Advance Agro, meanwhile, is promoting contract farmingamong over 4,000 farmers near its mills in eastern Thailand. AndPhoenix contracts with over 10,000 farmers within a radius of 150kilometres for bamboo and eucalyptus supplies; in the areasurrounding the company's plant, farmers hard-pressed to findlucrative crops for their sandy soil have been successfully wooedwith offers of cash stipends of US$125 per year per hectare forlooking after eucalyptus plantings on their land (PPI 11.1995,Anuchit 1995b).

While contract tree farming can be more expensive in many respectsfor pulp firms than plantations on leased land, it too is capableof attracting substantial state subsidies. The Sor Por Kor landreform programme, for instance, was associated with a programmeproviding soft loans for farmers planting fast-growing trees ontheir new land (Nation 15.2.94). Asia Tech, meanwhile, can rely onthe assistance of the government's Agricultural ExtensionDepartment in persuading farmers to switch to tree crops. Contractfarming, in addition, is capable of displacing considerable riskonto farmers themselves. Dependent on plantation or pulp firms forseedlings, materials and cash, small farmers may well find out toolate that eucalyptus is economically unviable for them and bepushed into foreclosure (Usher 1990b, Phuu Jatkaan 3.5.95, PRED1996). Plantation or pulp firms may then simply be able to buy uptheir land at bargain prices.

In the long term, indeed, the types of social and economic controlinherent in the contract farming system may well engender newforms of popular opposition to industrial pulpwood cultivation.Over 90 per cent of surveyed farmers participating in the contractfarming package Phoenix has recently pioneered on 325 hectaresnear its mill in Khon Kaen, for example, already want the projectto be suspended (Anuchit 1995a). The package, dubbed 'ProjectGreen' by the company, was conceived partly as a way for Phoenix,plagued by accusations of water pollution, to reduce the amount of(supposedly fully treated) waste water released into the PongRiver by using it instead to irrigate the eucalyptus crops ofnearby contract farmers. Participating farmers, who wereapproached as individuals rather than collectives in order toundercut village unity, were entitled to the benefits of theprogramme -- including a guaranteed price of US$32 per tonne forthe five-year-old trees -- only if they accepted the effluent asirrigation water. Although according to the terms of the contract(of which the only copies are held by the company), participatingfarmers were to have complete control over the water releasesthemselves, in reality a team of Phoenix employees circulate amongfarmers' fields, ensuring that pipes remain open around the clock.As a result, the effluent has not only contaminated and salinatedthe soil on which eucalyptus was growing, but has also seeped intolower-lying rice fields of non-participating farmers, killingseedlings, full-grown plants, and trees. While the company hasbeen forced to hand over compensation of US$100,000 to villagers,calling it fully to account for the permanent damage it may havedone to smallholders' land is difficult (BP 12.7.1995, 30.7.1995,9.8.1995; Anuchit 1995a, 1995b; Wannasri 1994).

Given the problems connected with both contract farming andestablishing plantations on state land, it is hardly surprisingthat some firms have found it advantageous to grow pulpwood treeson land they already own, or to buy up smallholdings now used forother crops. Siam Cement Group, for example, which is the parentcompany of Siam Pulp and Paper and Siam Cellulose, has recentlyacquired 1,600 hectares in the north of the country, and Soon HuaSeng has for many years been buying parcels of land from indebtedcassava or sugar cane farmers in the east to supplement itscontract farming and other plantation efforts. Phoenix's rawmaterials chief, meanwhile, confesses

that he would rather thecompany buy up smallholders' land adjoining its mill than continuewith the Project Green contract farming scheme (Suppachai 1996).

Moving abroad

Another strategy for Thai pulp and paper investors facing domesticresistance is to move abroad. Phoenix, for example, working withthe Asian Development Bank (ADB), Jaakko Poyry, and the Finnishgovernment, plans eventually to tap a 9,600-hectare plantation inLaos. Some 70 per cent of the ADB loan for the project will go tothe private sector -- which the Lao state is ill-equipped tomonitor -- with only 30 per cent to small farmers. Finnishtaxpayers are subsidizing the planning and political manipulationessential to the move through a US$5.8 million grant for technicalassistance. The grant supports the World Bank's so-called ForestManagement and Conservation Project in Laos, which will lead totens of millions of dollars being poured into a sector wheregovernment officials' salaries are around US$30 per month (Malee1994). Siam Pulp and Paper, meanwhile, has approached the Laotiangovernment about a possible $250 million project involving a150,000 tonne-per-year pulp mill and 32,000 hectares ofplantations.

Asia Tech, too, has ambitions to invest in plantations in Laos andBurma. A 16,000-hectare Pinus radiata plantation planned forLaos's Bolovens Plateau, according to Asia Tech's own estimates,will displace nearly 5,000 people, for whom no new land has yetbeen found. A bit over US$1 per person will be allocated duringthe project's first year toward finding new livelihoods for theevictees. Huge quantities of pesticides, herbicides fungicides,and chemical fertilizers will be used on the project area,including glyphosate, Pulse, Simazine and Gardoprim. A mere US$3per hectare will be paid in annual rent to the state during thefirst ten years of the project (Bannan 1995). Asia Tech is alsoplanning to cooperate with the Lao government in another, evenlarger plantation project in Khammouane province (KrungthepThurakit 15.2.96).

Meanwhile, like Indonesia's Sinar Mas and Raja Garuda Mas, SoonHua Seng has moved into China, investing hundreds of millions ofdollars in joint ventures to plant over 220,000 hectares ofeucalyptus in Canton and set up chip, pulp and paper mills. Led bythe Ministry of Agriculture and Agricultural Cooperatives, theThai government has also signed a cooperation pact on industrialforestry science and technology with China which is aimed at,among other things, supporting that country's policy of planting6.5 million hectares of fast-growing trees such as eucalyptus andpoplar by the year 2000 with investment from Japan, New Zealand,Australia, Indonesia and Thailand (BP 23.6.1993, Rajesh 1995).

Siam Pulp and Paper, in addition, is taking advantage ofIndonesia's 'huge wood resources' by buying into a US$1 billion,350,000 tonne-per-year pulp joint venture in East Kalimantan withthe Astra International Group (FT 4.1.96). Siam is also investingin a kraft paper mill in the Philippines with Phinma Group (Nation1.3.96).

The Thai Forestry Sector Master Plan:

a case study of international pulp and paper politics

Jaakko Poyry's Thai Forestry Sector Master Plan (TFSMP) offers aninteresting illustration of the attempt by the international pulpand paper industry and its allies to build up support networks,rewrite policy, and manage resistance in an interculturalcontext.

Much of the original impetus for the TFSMP, like that for othernational Forestry Master Plans, came from the Tropical ForestsAction Programme (TFAP), a gigantic scheme which had originated

inan early 1980s conversation in a Washington bar between the WorldBank forester John Spears and a colleague, who were brainstormingways of getting more international development funding forprofessional forestry consultants in the new atmosphere of concernin world capitals for tropical forests. As developed by the WorldBank, FAO, the United Nations Development Programme (UNDP) and theWorld Resources Institute, the plan encourages each tropicalforest country to join donor agencies such as CIDA, FINNIDA or theWorld Bank in setting up missions to review the state of itsforests. Management plans are then formulated -- usually highlycommercially-oriented -- whose components can attract funding frominternational or bilateral agencies (Colchester and Lohmann 1990).

A second set of interests behind the TFSMP was Poyry's consultancybusiness (see Chapter 4). Having helped to establish Poyry as akey player in several Asian countries, including the Philippines,Indonesia and Nepal, Jouko Virta, President of the firm'sConsulting Division, was hard at work in the mid-1980s trying tomake inroads into the highly-personalized Thai government system.Virta's way was smoothed by a fortuitous meeting with a Swissnamed Nat Inthakan, who had been living in Thailand for severaldecades and had Thai nationality and an intimate knowledge of thelocal timber industry. Nat arranged introductions for Virta toSnoh Unakul, a businessman and Secretary General of the NationalEconomic and Social Development Board; General Harn Leenanonda,then Minister of Agriculture and Agricultural Cooperatives, whichhad jurisdiction over the Royal Forest Department (RFD); andPhairote Suwannakorn, then Deputy Director of the RFD. Virta thenwrote up terms of reference for a Master Plan for Thai forestrydevelopment which Nat, now acting as representative of Poyry inBangkok, used to brief then Prime Minister Prem Tinsulanonda. On a1988 visit to Finland, Prem signed an agreement whereby FINNIDAwould fund a Thai master plan along TFAP lines. Since Thailand'sper capita Gross National Product was too high for the country toqualify technically for Finnish bilateral aid, FINNIDA's fundswere channeled through UNDP. UNDP duly selected Poyry as planconsultant. Rauno Laitalainen, who had been in charge of Poyry'smaster-plan team in Nepal, arrived in Bangkok in July 1990 with atax-free annual salary of US$240,000 (Usher 1991).

Despite Prem's imprimateur, Laitalainen faced immediate problemsin creating a plan which could satisfy the various bureaucracies,state enterprises, businesspeople and speculators with interestsin the forests -- to say nothing of farmers' groups,non-governmental organizations and environmentalists. Having hadprior experience with FAO and UNDP, and aware of the controversyover TFAP, the Forest Department's planning division at firstrefused to work with Poyry, and as late as August 1991, an FAOofficial found that 75 per cent of Forest Department staffremained opposed to the plan (Inglis 1991). Some 205 NGOs involvedin rural development, meanwhile, noting Poyry's unconcealedinterests in promoting commercial plantation development, objectedto the plan on the grounds that it would strengthen state andindustrial control over forests at the expense of localcommunities and their commons. Under pressure, Laitalainen agreedto sign a statement stipulating that the plan's Terms of Referencebe rewritten after consultations with NGOs working with villagecommunities.

Laitalainen and his team then began to devote considerable time tolearning the political ropes, lobbying for a coordinated approachto industrial forestry, making elite alliances, distributingconsultancies, starting up publications, mollifying malcontents,and lining up potential supporters for a plan many of whosedetails would be left for the future. Knowing that the moreparticipants he brought in on the side of the plan, the easier itwould be to accuse others of 'marginality' and 'obstructionism'and to hide behind the authorities, Laitalainen went out of hisway to make the TFSMP seem capable of answering the needs of allactors. When speaking with the government's Forest Department, hesuggested that TFSMP could help increase the country's forestedarea and wood industries. When speaking with business, Laitalainenstressed the need for

the government to subsidize privateinvestment in plantations through provision of land and othernecessities. Trying to integrate NGOs into the planning process,he praised grassroots efforts to conserve forests; acknowledgedthe need for land reform, popular 'participation', and grassrootsbenefits; and claimed to be in a unique position to intervene withthe government on the side of ordinary people. Photographs ofvillage groups sitting in conclave or planting trees under thetutelage of officials began to feature in TFSMP documents. TheTFSMP was presented as an infinitely self-correcting 'rollingprocess' capable of accommodating any objections from any actor.Criticisms were consistently dismissed as 'premature' and criticsinvited to participate in succeeding stages.

These efforts had some effect. The TFSMP's ability to hireconsultants eventually attracted many Thai forestry faculty.Although most Thai NGOs stuck to their demand that the Terms ofReference of the plan would have to be revised before they wouldconsider any invitation to participate in the planning process,two NGOs agreed to serve on the steering committee in the springof 1991. One of these soon afterwards received an unusualUS$20,000 grant from FINNIDA.

Pressure nonetheless built from the majority of NGOs, who pointedout that Poyry, in providing supposedly 'neutral' informationabout economic demand and forest resources and uses, promoting'correct' management techniques and environmentally-friendlytechnologies, trying to integrate land managment into globalwood-fibre supply systems, and proposing repeal of the popular1989 logging ban, was in fact already engaged in politicalsubversion against land reform and many village ways of life. Theplanners' profession of support for customary land rights andlocal control meant little, NGOs noted, given that, under theplan, villagers' own systems of knowledge and organization were tobe subordinated to technocrats' schemes and 'measures undertakento . . . accelerate out-migration from the forest lands'. JaakkoPoyry consultants' 'bottom-up' planning, they added, was bottom-upin name only, since in fact it consisted merely in officals"outlining' their management plans in the presence of villagers.

Partly out of reaction to such pressures, and partly out of atypically corporate frustration with Thailand's existing'institutional and social frame', the master plan team movedfurther and further away from presenting itself as a mere'technical' appendage supplying facts to a unified body offorward-looking policymakers. Instead, it was forced to beginadvertising itself as a political facilitator of a compromise'national vision' of Thai forests, a reservoir of expertise ondemocracy and 'participation', and a redrafter of policy.Predictably, this stance roused even sharper sarcasms. As one NGOleader noted in a 1993 letter to the Bangkok Post, 'oNationalvalueso as perceived by the master plan team bear littleresemblance to the values local people place on collectivelymanaging community forests and commons within cultural, social andeconomic contexts of local communities throughout the Kingdom'. Inthe end, the company was forced to cut its losses with NGOs. Onthe suggestion of Heikki Rissanen, forestry adviser to FINNIDA,Laitalainen broke his promise to sign the recommendations comingout of the February 1991 meeting (Wallgren 1994). Jouko Virta,although aware that the bulk of Thai NGOs involved in rural workopposed the TFSMP, went on record claiming that only two or threemarginal and 'extremist' individuals -- 'I think they areanarchists' -- were critical of Poyry's planning exercises. Theclaim began to be heard that it was 'too late' to influence theplan and that if there were problems with it they were due toNGOs' refusal to participate.

Yet Thai officialdom proved hardly more willing than NGOs toindulge Poyry's pretence of being able to redraft Thailand'sentire forest policy and reform its practice from top to bottom.The cabinet never approved the completed TFSMP; nor did any statebureaucracies rally round its banner. Predictably, the plan woundup, in words which anthropologist James Ferguson has used todescribe development projects in Lesotho, like a 'bread crumbthrown into an ant's nest' (Ferguson 1994).

Instead of providing ablueprint for a brand-new, comprehensive and coherent forestmanagement regime, the plan remained a relatively small componentin a larger machine, treated at most as a 'shopping list' fromwhich various actors could choose isolated items which couldbenefit their own circles.

Poyry's ability to pursue the master plan at all, and thus tocarve out an at least slightly more spacious niche for pulp andpaper interests, was due partly to the fact that it couldsuccessfully conceal from the Finnish public the scale ofresistance its schemes were experiencing in Thailand. In this itwas helped not only by the physical distance between the twocountries, but also by the fact that the Finnish public sharedmany of the Poyry consultants' assumptions. To many Thai observersit was merely common sense that Poyry, in laying out the masterplan, was seeking commercial benefit and that it was unaccountableto the people whose livelihoods it was threatening. In Finland,where the belief in the 'neutrality' of corporate consultants andtheir 'objective expertise' remained strong, such claims, if theycould be heard at all, often sounded like paranoia. Similarly, tomany Thais, the idea that Finnish foresters could provide aneutral forum in which the goals of (say) transnationalcorporations, Thai government ministries, local politicians, andNortheastern villagers could be reconciled under centralizedauthority seemed fanciful. In Finland, however, it was givensolemn credence. Finally, while in Thailand it was commonknowledge that millions of rural residents depended for theirlivelihoods on the type of commons regimes commercial eucalyptusschemes were disrupting, such regimes seemed simply quaint oreconomically marginal to many Finns.

Chapter 13

Conclusion: Looking to the Future

The priority of politics

As this book has shown, a great deal of bad or inappropriate science and bad or inappropriate development economics is used to promote large-scale industrial tree monocultures. But these plantations are not established simply out of an intellectual mistake. They do not proliferate merely because someone, somewhere, has made a scientific error or perpetrated a fraud in biology, accounting, or risk analysis.

Plantations are established, rather, because they serve certain interests, make sense within certain discourses, and provide a whole range of organizations with opportunities to reshape their surroundings, and themselves, in a way which prolongs their survival. Plantations result in real gains for real people _ many of whom may be found in the institutions described in Chapter 5. These gains almost never 'trickle down' to the people who live where the plantations are established, and are accompanied by long-term degradation of the land and livelihoods of large numbers of communities. But there is little use in denying that they exist.

If the institutions of Chapter 5 did not exist, few people would pursue, and still fewer would accept, the one-sided science and economics used to promote massive industrial plantations. If academic forestry were not so closely confined, historically and institutionally, within the conceptual universe which has grown up around the wood industry, fewer foresters would be likely to neglect the issues this book has highlighted, or to make excuses for the industry's depredations, or to give short shrift to existing or potential alternatives, and more foresters would be likely to recognize the possibility of finding common cause with more diverse groups. Similarly, if no institution were assigned the job of finding taxpayer subsidies for big, destructive pulp mills, the biased economics which justifies the operation would perhaps not need to be promoted so shrilly as 'neutral' social science.

But as long as such institutions enjoy disproportionate power, bad forestry science and bad development economics will continue to be produced in great quantities, no matter how 'logically' they may be refuted in scientific papers and actual plantations. This flow will hardly be stemmed merely by herding those responsible into a seminar room and pointing out a few scientific errors or omissions. The interests and institutions which feed it must also be challenged _ and not only in meeting rooms but also in fields and forests _ by political alliances including those whose resources plantations have stolen.

By the same token, any attempt to promote 'solutions' to the patterns of destruction outlined in this book is unlikely to bear fruit if it is undertaken exclusively within the conceptual and political universe of the institutions examined in Chapter 5. Many practical 'alternatives', indeed, are already well-known, but because they are not particularly friendly to the institutional cultures involved, they have been neglected.

It is well-established, for example, that for people to be able to continue to use reasonable amounts of paper does not intrinsically require huge machines, large technocracies, extensive road networks, intercontinental marketing mechanisms, the mining of vast amounts of raw material in single locations, or the immensely water-, energy-, chemical- and capital-intensive installations which

characterize the mainstream industry today. China, for instance, still supplies its immense paper needs largely through small local mills which use surplus local agricultural wastes such as straw, support community economies, require no advanced infrastructure to support them, and, like village bakeries, can safely shut up shop temporarily when no one is buying without the proprietors needing to worry about paying off their machinery investments. While little effort has so far been dedicated to effluent treatment, with the result that pollution problems are serious, there are no overwhelming technical or economic obstacles to running such mills cleanly (Wong 1992).

Paper manufacturing expert A. W. Western (1979), moreover, has argued that in India and other Southern countries, 'detailed comparisons between the large mill and the equivalent capacity in small mills overwhelmingly favour the smaller unit in economic terms'. According to researcher Maureen Smith (1995), there are no serious obstacles even to current US paper and paperboard consumption being met by a more decentralized network of small- to medium-sized mills using a raw material base of approximately half waste paper and half non-wood crops including straw, hemp, or other regionally-appropriate materials.

In addition, a great deal of information is available demonstrating how excessive pulpwood use by the North can be avoided. The Rainforest Action Network in San Francisco, for example, has put out an informative and well-thought out booklet entitled Cut Waste, Not Trees: How to Use Less Wood, Cut Pollution and Create Jobs (available from RAN at 450 Sansome Street, Suite 700, San Francisco, CA 94111, USA). Friends of the Earth UK, meanwhile, has produced an outstanding book entitled Out of the Woods, which outlines concrete steps for reducing pulpwood consumption in the UK (available from FoE at 26-28 Underwood Street, London, UK).

None of these paths, however, are likely to be taken by industry, or supported by most governments, without strong social and political pressures for more democratic control of the paper economy being brought to bear _ which is why the last-mentioned books have been explicitly designed as part of extended campaigns.

Nor are other, newer paths likely to be found merely by researching 'alternatives' and experimenting with technical fixes while leaving for others the political question of who is to implement them and how. Doing so is likely to lead, by default, to those 'alternatives' being constrained, perverted and deployed by these same institutions in such a way that they are of little use to industrial plantations' most important critics. That would lead, in turn, to a failure to challenge effectively the prevailing unsustainable forestry model. Indeed, only when inquiries into 'solutions' are conjoined with concrete efforts to cooperate with or encourage popular movements challenging the excessive power of the institutions of Chapter 5 does the full range of alternatives which are of most practical use to currently available political forces even become visible.

To be sure, researchers who work closely with industry and shun popular movements will still have incentives to come up with various technical 'solutions' to the 'problems' posed by plantations and paper manufacture. They may explore, for example, timber and paper certification, recycling, alternative fibre sources, programmes to plant a greater variety of trees in plantations, schemes to move plantations to new locations, biotechnology, compensation programmes, chlorine reduction, and water-conserving closed-cycle mills (Smith forthcoming; Galloway 1994; Dudley, Stolton and Jeanrenaud 1995). And many of these 'solutions' will be accompanied by information and analyses which rural plantation critics and environmentalists find tactically useful. Yet to advocate them by themselves _ on the ground that only industry-friendly proposals will have an effect on industry practice _ is to forget the lesson that another way of influencing the progress of the games that industry plays is to refuse to play them.

Seekers of more firmly-rooted, lasting, thoroughgoing, and politically-feasible 'alternatives' to industrial plantations, and the forces which give rise to them, will thus also involve themselves in movements for broader social change. They will not rest content merely with demonstrating, for example, that paper can be made from hemp as well as from wood, since without more thoroughgoing changes in industrial structure, some of the same social problems familiar from wood-based papermaking _ expropriation of smallholders, for example _ could also persist with hemp. Rather, they will also inquire whether the hemp alternative is useful as a political tool to rural tree-plantation opponents and investigate, together with those opponents, how a hemp-based paper economy might be conjoined with more democratic, decentralized, livelihood-friendly and environmentally-stable patterns of land use and paper consumption.

Some of the most interesting practical examples of popular movement-aligned research into 'alternatives' to large industrial plantations can today be found in Thailand, where villagers and NGOs have joined together to document the sustainability of systems of stewardship of land and forests based on local power and a respect for local ecological and social diversity. Researchers allied with the movement of Karen villagers to keep control of their land in North Thailand, for example, are demonstrating the superiority of long-tried systems of communally-managed swidden agriculture to industrial plantations in maintaining tree cover and biodiversity in highland watersheds (Jawni 1996). Similarly, cooperative 'action research' among villagers and NGOs in the country's Northeast is bringing to public attention the virtues of locally-managed plantings of the native trees on which local villagers have long relied (PRED 1996).

One important conclusion emerging from this research is that, in order to promote sustainable 'alternatives', certain premises of the industrial system must be called into question at the outset: for example, that a single tree species must be found which is suitable for many localities, or that 'demand' must be met no matter where it arises or what it is based on. This conclusion is more likely to flow out of inquiry closely engaged with the realities of grassroots livelihood, knowledge, and social action than from the efforts of scientists linked to the entirely different realities of the corporate world.

Only through close contact with popular movements, too, can investigators and activists interested in 'alternatives' discover which proposals would, if pursued now, prove counterproductive, and which processes of political alliance might be necessary to the achievement of other solutions. Only through contact with people aware of the actual grassroots-level results of programmes to certify plantation wood as 'environmentally sound', for example, will NGOs be able to determine whether these programmes are not in fact merely shoring up business as usual, and thus whether it is strategic to participate in them. For those concerned about the problems of the plantation boom this book has described, therefore, the first question should not be 'What are the solutions?' but rather 'Who are we working with to find and press for solutions?'

Hence just as Part One of this book insists on presenting facts about plantations and their problems (Chapters 1, 2 and 4) together with a discussion of the actors, interests and strategies which promote them (Chapters 2, 3, 5 and 6), so this concluding chapter insists on not divorcing talk about 'solutions' from the context of the political battles which are necessary to achieve them. Instead of trying to distill 'policy recom-mendations' or 'position statements' for state, international, or private institutions which are assumed to be ready to act on them, it puts its emphasis, more realistically, on sketching some of the challenges facing existing political alliances among plantation critics.

Working positions

This is not to deny that this book has 'working positions' on various issues as a result of its analysis of the history of pulpwood plantations in a variety of countries; it does. These include the following:

- Large monoculture industrial tree plantations are socially and environmentally unsustainable. There is no place whatsoever for them in any social system which seeks to nurture soil and people.

- Local people must have the right to veto land uses and manufacturing processes they do not accept.

- Ways must be found of promoting existing ways of decentralizing pulp and paper manufacture, making it more receptive to local needs and plans, reducing its scale and dependency on vast amounts of a single, standardized commodity such as wood, and lowering demand, particularly in the North.

- Large industrial tree plantations cannot be fruitfully discussed in isolation from the global economic and social realities of which they form a part. The issues they raise are political, not merely technical; the plantations therefore require political action to be stopped.

Such 'working positions' can be useful in many ways. At the very least, they are a means of organizing the thoughts of plantation critics in ongoing discussions and struggles. They also express conditions which would have to be fulfilled by any international attempt to 'certify' pulpwood timber as environmentally and socially sound; and insofar as enforcement of these conditions is likely to be impossible, they tend to call into question the feasibility of certification. These 'working positions' are best viewed, however, not as master plans which dictate in advance every action which is to be taken against plantations, but merely as occupying a small clarifying role in a large practical social dynamic.

Alliances among interest groups

The struggle against large-scale industrial tree plantations is fought in many different social arenas at the same time: in rural areas, newspaper pages, government offices, informal seminars, test sites, scientific journals, lobbies, courts, parliamentary corridors and economists' conclaves. In each arena, different things may be at stake and different styles of argument used. Yet it is often important to be able to work in all such arenas. This is for at least two reasons. First, it is undemocratic to ask all plantation opponents to inhabit the same arena _ to ask rural villagers, for example, to prepare scientific papers proving the chemical effects of eucalyptus or pines on the soil. Nor is it democratic to ask plantation opponents to stand by silently while lobbyists or lawyers pursue their case 'through proper channels'. All critics should have opportunities to express their opposition in arenas of their choice. Second, to restrict opposition to plantations to only a few social arenas is simply not politically effective. Publicity, lobbying, scientific research and grassroots action, undertaken at the right moments as components of a single struggle, will be more effective than any one of these pursued alone. Movements which have many arenas in which to act (as in Thailand) tend to be stronger than those which have few (as in Uruguay or Indonesia).

There are, however, no rules of strategy which dictate when it will be effective for plantation critics to take action in one arena rather than another. For example, going to court against pulp interests (as has happened in Indonesia), or promoting new forest legislation safeguarding the rights of local

people (as has happened in Thailand), can be useful at certain moments when newspapers are paying attention to a court case, or when the law is in flux _ even when no one believes that the solutions to plantations' destructiveness will ultimately be merely legal. At other times or in other circumstances it may be more useful to sit down and debate forestry consultants, publicize local abuses, or present 'alternatives'. This is a matter of political judgment and consensus best exercised by those closely acquainted with the relevant local and national contexts.

Effectiveness therefore requires alliances between different groups of plantation opponents with different interests and different skills acquired in struggles in different arenas. Only through careful discussion is it possible to find out what sort of scientific, lobbying, or legal action will mesh most effectively with potential or actual struggles in local arenas.

International solidarity

International alliances are both necessary and problematic. While they aim to strengthen local groups, make possible networks of support and advice, and desanctify centralization, they also use 'global' tools of communication, such as electronic mail and brief international meetings, which seldom foster much cross-cultural understanding. Gaps in understanding may delay effective mutual action until areas of common concern and prior misunderstanding are identified. Northern and Southern groups may differ, for example, even about what a plantation is, and some Northern groups receptive to criticism of the expropriation and environmental destruction associated with plantations in the South may not be as strongly critical of plantations in the North.

International alliances may be of many kinds. Southern groups may share information and strategic thinking with other Southern groups within a region or across the globe. Southern groups may also offer insights and solidarity to Northern movements concerned with the protection of local land and forests, as has happened in the Nordic countries, whose growing forest networks have benefited considerably from the lessons learned from struggles in the South.

Northern groups, finally, can also play an important supporting role in Southern groups' attempts to curb the damage done by plantations. They can, for example, monitor the plantation-promoting activities of the bilateral 'aid' agencies, consultancies, commercial development investment agencies and transnational corporations based in their countries. Northerners can legitimately both question the use of their tax money to subsidize destructive commercial plantations abroad, and to challenge the practices of companies which use their countries for their home offices. Thus Finnish NGOs such as the Finnish Forest Action Network, in close association with Southern NGOs, held pathbreaking public forums in the early 1990s in Helsinki at which NGOs from Thailand, Indonesia, the Philippines, Nepal and other countries criticized Jaakko P"yry and its official helper FINNIDA for interfering in their countries to promote plantations, and called on the Finnish public to curb the abuses of its government agencies and corporations.

Northern groups can also call Northern investors' attention to the destructiveness and the risks connected with Southern private-sector projects floating stock or bond offerings in the North. Thus British activists raised questions about Barito Pacific's operations during its attempts to raise finance in London for its gigantic TEL mill in Sumatra (see Chapter 11). The threat of a boycott of Scott Paper products in Europe and North America, similarly, forced the company to withdraw in 1989 from a scheme for a plantation in West Papua which would have displaced thousands.

There is also a great deal of potential for international links between, on the one hand, community and labour groups in the North organizing around issues of contamination with toxics (particularly dioxins) and paper company union-busting, and, on the other, Southern groups concerned about

pulp mill and plantation expansion. Both the Citizens' Clearinghouse on Toxic Wastes (CCTW) in the US and the Women's Environmental Network in the UK have launched campaigns on dioxins whose research and activities could benefit, and benefit from, related movements in the South.

Of particular potential, perhaps, are links between Southern and Northern regions which are threatened in similar ways by the pulp and paper industry's recent expansion outside traditional resource areas. As the industry exhausts the resources of regions such as North America's Pacific Northwest, after all, it is not only establishing Southern plantations, but also logging places like West Virginia and Eastern Siberia, and a united front among environmental and social activists in all such regions could help check the advance of the industry in each local area.

Sharing of general information can also be useful, whether it is analysis of the possible consequences of technological or market shifts, or news on alternative land and community forest management systems, or findings about the specific biological dangers associated with pine plantations (Rosoman 1994), or ideas for keeping the plantation industry away by increasing the cost of capital and thus the cost of the pulp mills the industry wants to build (Graham 1994). Media for exchange range from news clippings to videos to electronic conferences managed by the Association for Progressive Communications. These last include the conferences for.paper (in English) for.plantation (in Spanish) and dioxins.info (in English). While such information cannot always be adapted for use in local circumstances, sharing it can often stimulate strategic thinking.

In sum, the powerful alliance of interests described in Chapter 5 requires an even stronger opposing alliance which recognizes that people are not helpless pawns in the hands of large corporations, states and international agencies. Well-informed and well-organized citizens at local, national and international levels can find common ground together and put a halt to the global advance of the currently-dominant model of tree plantations and paper manufacture. Indeed, they are already starting to do so. The aim of this book _ whose authors have relied throughout on the views and comments of many people concerned with plantations and their links to the paper industry _ has merely been to lend a modest hand to this alliance by sharing some of this information and analysis. We hope that it may prove a useful tool.

Bibliography

Adams, J. A. (1978) 'Long-term Aspects of Nutrient Loss fromForest Soils and Ecosystems', New Zealand Journal of Forestry 23(1).

Adams, John (1995) Cost-Benefit Analysis: Part of the Problem, Notthe Solution, Green College Centre for Environmental Policy andUnderstanding: Oxford.

Adams, Patricia (1991) Odious Debts, Earthscan: London.

Adlard, Philip G. (1993) Historical Background, Study No. 1,Shell/WWF Tree Plantation Review, London: Shell InternationalPetroleum Company and World Wide Fund for Nature.

Adul Udol (1993) 'The Development of the Pulp and Paper Industriesin Thailand' in Appita Journal 46, 1: 14-18.

African National Congress (ANC) (1994) 'Agricultural policy: 11.Forestry'.

Albertyn, Chris (1994) Personal communication.

Allen, J. (1992) 'Aspirations - and the reality', Paper, 4February.

Anon (n.d.) 'Profile of the Indorayon Pulp and Rayon Mill', ms.,Medan.

Anuchit Karakate (1995a) 'Samruaj Thatsanakhati Chaaw Baan kapProject Green' (survey of villagers' views of Project Green), ThaiVolunteer Service: Bangkok.

__ (1995b) 'Phon Krathop Taw Chumchon: Koranii Khrongkaan ChaiPrayoot jaak Nam Thing Phuea Kaankaset Phattana Aachiip laeRaaidai Chumchon (Project Green)' (effects on the community ofProject Green), ms., Bangkok.

Apichai Puntasen, Somboon Siriprachai, and Chaiyuth Punyasavatsut(1992) 'Political Economy of Eucalyptus: Business, Bureaucracy andthe Thai Government', Journal of Contemporary Asia 22, 2:187-206.

Aracruz Celulose (1996) The Eucalyptus and Sustainable PulpProduction, Rio de Janeiro: Aracruz Celulose.

Argentina Secretar!a de Agricultura, Ganader!a y Pesca (SAGP)(1992) Gu!a forestal, Buenos Aires: SAGP.

Asian Development Bank (ADB) (1993) Indonesia: Private SectorIndustrial Tree Plantations Program: Report of a TechnicalAssistance Consulting Team, Manila: ADB.

Associaao Brasileira de Exportadores de Celulose (ABECEL) (n.d.)ABECEL, Rio de Janeiro: ABECEL.

Associaao Ga#cha de Proteao do Ambiente Natural (AGAPAN) (1992)'Dioxins from pulpmill: South Brazil' in haz.pulpmills electronicconference, 11 February.

Associaao Nacional dos Fabricantes de Papel e Celulose (1995) ORelatoria Estatistico Florestal de 1994: ANFPC.

Association for Progressive Communications (APC) (1992) 'Brazilpulp mill scandal', in haz.pulpmills electronic conference, 10June.

Aurell, Ron and Jaakko P"yry (1988) 'Pulp and Paper: WorldwideTrends in Production, Consumption and Manufacturing' in Schreuder,G. (ed.) Global Issues and Outlook in Pulp and Paper, Seattle:University of Washington.

Australia, Parliament of the Commonwealth, Parliamentary ResearchService (PRS) (1994) The Woodchip Licensing Issue, Current IssuesBrief 31, Canberra.

Avenor (1993) Yearly Report, Vancouver: Avenor.

Axberg, G. N. and Sthl, P. H. (1989) 'How Much Wood Does YourForest Yield?', in Know-How Wire: Jaakko P"yry Client Magazine,January: 11-13.

Ayres, Ed (1993) 'Making Paper without Trees', Worldwatch,Sept./Oct.: 5-8.

Bainbridge, W.R. (1990) 'Commercial Afforestation in theApproaches Zones of the Natal Drakensberg as a Potential Threat toEnvironmental Quality and the Integrity of Natural Communities inthe Drakensberg region' in University of Natal Institute ofNatural Resources, The Physical, Social and Economic Impacts ofLarge-Scale Afforestation in Natal/Kwazulu, Proceedings of theForestry Impacts Workshop, Pietermaritzburg: Institute of NaturalResources, May.

Ball, J. B. (1992) 'Forest Plantations and the Wise Management ofTropical Forests', in Adam, K. L. and Miller, F. R. (eds.)Proceedings of the Oxford Conference on Tropical Forests: WiseManagement, Oxford: Oxford Forestry Institute.

Bannan, K. J. (1995) Pre-feasibility Report on a SoftwoodPlantation Project on the Bolovens Plateau, Chapasak Province,Southern Laos, prepared for Asia Tech Co., Ltd.: Rotorua, NZ:Forenco Consultants.

Barnett, Adrian and Juniper, Tony (1992) Deserts of Trees: TheEnvironmental and Social Impacts of Large-Scale Reforestation inResponse to Global Climate Change, London: Friends of the Earth.

Bayliss, Martin (1995) 'India's Paper and Board Industry: Steadybut Unspectacular', P&PA 21, May: 29-39.

Bazett, Michael D. (1993) Industrial Wood, Study No. 3, Shell/WWFTree Plantation Review, London: Shell International PetroleumCompany and World Wide Fund for Nature.

Beer, Michael (1995) 'Profile of Sappi: South Africa's Major Pulpand Paper Producer Goes Global', P&PA 22, August.

Bermejo, Isabel (1994) 'The Conservation of Dehesa Systems inExtremadura' in Bignal, E. M., McCracken, D. I. and Curtis, D. J.,Nature Conservation and Pastoralism in Europe, Peterborough: JointNature Conservation Committee.

__ (1995) 'Background Paper', ms., Vernejo, Cantabria.

Bethlehem, Lael (1994) 'An industrial strategy for the pulp andpaper sector', Cape Town: University of Cape Town Press.

Biermann, Christopher J. (1993) Essentials of Pulping andPapermaking, San Diego: Academic Press.

Bingham, John (1995) 'The World Pulp Market: Where Next?', P&PA22, August.

Bissio, Roberto (1991) Personal communication.

Brennan, Wendy and Pappens, Rita Anna (1995) 'Annual Review:Producers Set New Records', PPI, July: 19-23.

Brooks, Teresa (1994) Personal communication, December.

Brouwer, Roland (1993) 'Between Policy and Politics: The ForestryServices and the Commons in Portugal', Forest and ConservationHistory 37, October: 160-67.

__ (1995) 'Commons, Pulp and Politics: Portuguese Communities inDefense of their Baldios', ms., Wageningen.

Bruno, Kenny (1992) 'O Relatorio Greenpeace sobre a MaquiagemVerde: O Desfarce Ecol"gico das Empresas Transnacionais', Rio deJaneiro: Greenpeace.

Buxedas, Mart!n (1995) 'Un gran sistema maderero: notas sobre larealidad y sus posibilidades', Montevideo: CIEDUR.

Caba$a, Carlos (1993) 'Forestaci"n con eucalyptus en regiones VIIIy IX: una v lvula hacia la reconversi"n', Chile Forestal 211,November.

Cameron, Owen (1994) Personal communication, March.

Campinhos Junior, Edgar (1992) 'Plantaci"n de eucalipto de altorendimient", Uruguay Forestal 3, June.

Campos Perrone, Edson and Borges Filho, Orlindo (1994) 'A faunaassociada ao plantio de eucaliptos', Ecologia e Deenvolvimento 3(41), July.

Cardellichio, P., Yeo Chang Youn, Adams, D. M., Rin Won Joo andChmelik, J. T. (1989) A Preliminary Analysis of Timber and TimberProducts Production, Consumption, Trade and Prices in the PacificRim Until 2000, Seattle: Centre for International Trade in ForestProducts, College of Forest Resources, University of Washington.

Carey, Alex (1995) Taking the Risk out of Democracy: Propaganda inthe US and Australia, Sydney: University of New South WalesPress.

Carrere, Ricardo (1989) 'El complejo forestal: situaci"n actual yperspectivas', Montevideo: CIEDUR.

__ (1992) 'Forest development and environment in Uruguay. 17:Forest geopolitics and sustainable development. An overview andthe Uruguayan example', Montevideo: CIEDUR.

__ (1993) 'Dossier forestaci"n', Tierra Amiga 12, April: 15-28.

__ (1994) 'La invasi"n de las especies ex"ticas', Tierra Amiga 22,March.

Carrere, Ricardo et al. (1995) Impactos de la Forestaci"n enUruguay. Montevideo: ITEM/REDES.

Castroviejo, Bolibar et al. (1985) 'Pol!tica forestal en Espa$a(1940-1985): (Producci"n o conservaci"n?', Quercus 19.

Cavieres, Aaron and Lara, Antonio (1983) 'La destrucci"n delbosque nativo para ser reemplazado por plantaciones de pinoinsigne: evaluaci"n y proposiciones I. Estudio de caso en laprovincia de B!o-B!o', Santiago: CODEFF.

Centre for Science and Environment (CSE) (1995) Should Paper andPulp Industry Get State Forest Lands for Captive Plantation?, NewDelhi: CSE.

Centro de Defesa dos Direitos Humanos (CDDH) (1993)Eucalipto-celulose. Desenvolvimento para quem?, Texeira deFreitas-BA: CDDH. Centro de Estudos e Pesquisas para oDesenvolvimento do Extremo Sul da Bahia/Centro de Defesa dosDireitos Humanos (CEPEDES/CDDH) (1992) Eucalipto: uma contradicao,impactos ambientais, sociais e economicos do eucalipto e dacelulose no Extremo Sul da Bahia, Eun polis-BA: CDDH.

Cerda, Ignacio (1993) 'Aportes para la formulaci"n de pol!tica enel sector foretal: el caso chilen", in Alfaro, Marielo et al.(eds.), Taller Regional: Necesidades y prioridades deinvestigaci"n en pol!ticas forestales y agroforestales paraLatinoamrica, Costa Rica: IICA.

Cerda, I; Olavarr!a, J. and Abalos, M. (1992) El sector forestalen Chile: logros y desaf!os, Santiago: INFOR-CORFO, December.Chalker, Lynda (1992) Letter to Larry Lohmann, 12 November.

Chami Zugman, Isac (1988) 'Reforestation effort pays off well inBrazil', World Wood, June.

Chaudhuri, Panya (1995), 'Sowing the Seeds for a New FiberSupply', PPI, March.

Cheney, Karen (1992) 'Fast-Growing Plantations Offer Fiber for USMills, World Wood, October.

Chile (1991) Corporaci"n Nacional Forestal. Memoria anual,Santiago: PAF.

__ (1992a) Plan de Accion Forestal, Informe Final. Comisi"n MedioAmbiente, Santiago: PAF.

__ (1992b) Plan de Accion Forestal, Informe Final. Comisi"nIndustrias Forestales, Santiago, PAF.

__ (1992c) Plan de Accion Forestal, Informe Final. Comisi"nrecursos forestales, Santiago: PAF.

__ (1992d) Plan de Accion Forestal. Propuestas nacionales del plande acci"n forestal para Chile, Santiago: PAF.

Churchill, Ward and van der Wall, Jim (1988) Agents of Repression:The FBIs Secret Wars Against the Black Panther Party and theAmerican Indian Movement, Boston: South End.

Centro Interdisciplinario de Estudios sobre el Desarrollo (CIEDUR)(1991) 'Desarrollo forestal y medio ambiente en Uruguay 16:Relatoria del seminario "Desarrollo forestal: ambiente, econom!a ysociedad"', Montevideo: CIEDUR.

Clapperton, R. H. (1967) The Paper-Making Machine: Its Invention,Evolution and Development, Oxford: Pergamon Press.

Clark, David (1994) 'Fighting for the Future', Appita Journal 47,3: 198-203.

Comit Nacional pro Defensa de la Fauna y Flora (CODEFF) (1991)'Position paper on the Forest Policy Draft released by the WorldBank on April 1, 1991', ms., Santiago: CODEFF.

__ (1992) El futuro del boque nativo chileno: un desaf!o de hoy,Santiago: CODEFF.

__ (1994) Hacia un Manejo Sustentable del Bosque Nativo Chileno.Memoria de Taller para Peque$os y Medianos Propietarios, Santiago:CODEFF.

Colchester, Marcus and Lohmann, Larry (eds.) (1993) The Strugglefor Land and the Fate of the Forests, London and New Jersey: ZedBooks.

Coleman, Donald Cuthbert (1958) The British Paper Industry1495-1860, Oxford: Oxford University Press.

Commissao Pastoral da Terra de Minas Gerais (CPT)/Centro Mineirode Estudos e Pesquisa sobre o Ambiente e Florestas (CEMEPAF)/Pacific-Asia Resource Center (PARC) (1995) Pau que nasce certo eentorta a vida dos outros. Monocultura de eucalipto e producao decelulose no Vale do A o, Brazil: CTP/CEMEPAF/PARC.

Commonwealth Development Corporation (1992) CDC: Report andAccounts 1991, London: CDC.

Compa$!a Forestal Oriental (1993) Estudios de impacto ambiental,Montevideo: Forestal Oriental.

Cooper, K.H. (1990) 'Commercial forestry impact on wetland,grasslands and indigenous forests', in University of Natal, op.cit. Coordinadora Extremena de Proteccion Ambiental (1992)'Dealing with Disparity: European Structural Funds in South WestSpain', in The Ecologist 22 (3), May/June: 91-96.

Cox, Chris (1993) Presentation at European Rainforest Movementmeeting, Oxford, November.

Crawford, Leslie (1991) 'Eucalyptus Joins Chilean Paper chase',FT, 6 June.

Cromer, Robin N. and Kile, Glen A. (1993) "Hardwood Plantation R &D into the 21st Century", Appita Journal 46, 4, pp. 293-295.

Cruz, M. Elena and Rivera, Rigoberto (1983) Cambios ecol"gicos yde poblamiento en el sector forestal chileno, Santiago: GIA.

__ (1984) La realidad forestal chilena, Santiago: GIA.

Dacorso, Daniela (1994) 'Os pr"s e contras do eucalipt", Ecolog!ae Desenvol-vimento 3 (44), October: 20-22.

Damiani, Octavio (1990) 'Desarrollo forestal y medio ambiente enUruguay, 4: Un estudio de caso en el noreste de Canelones',Montevideo: CIEDUR.

Dargavel, John (1991) 'Australia and New Zealand in the EmergingForest Economy of the Pacific Rim', Proceedings, Australia and NewZealand Institute for Forestry Conference, Christchurch,September-October.

Dataconsult, Inc. (1990) The Pulp and Paper Industry in Indonesia:Its Current State and Prospects, Jakarta: Data Consult.

Davidson, J. (1987) Bioenergy Tree Plantations in the Tropics:Ecological Implications and Impacts, Gland: IUCN.

Deal, Carl (1993) Greenpeace Guide to Anti-EnvironmentalOrganizations, Berkeley: Odonian.

Dench, Ian (1993) 'Appita's Asia Profile', Appita Journal 46, 3:173-5.

Department of Trade and Industry (1994) Guide to Gaining Businessfrom World Bank- and Inter-American Development Bank-FundedProjects, London: DTI.

Dobson, D. (1990) 'Large scale afforestation in Natal/Kwazulu: thechallenge facing the small private growers', in University ofNatal, op. cit.

Dove, Michael (1992) "Foresters' Beliefs about Farmers: A Priorityfor Social Science Research in Social Forestry", AgroforestrySystems 17, 13-41.

Down to Earth (DTE) (1991) Pulping the Rainforest, London: Down toEarth.

Duarte, Silvana Torquato (1993) Impactos ambientais doreflorestamentos com eucalipto. A polemica do norte do Esp!rituSanto e extremo sul da Bahia, Rio de Janeiro: FASE/IBASE,October.

Dudley, Nigel (1992) Forests in Trouble: A Review of the Status ofTemperate Forests Worldwide, Gland: WWF.

Dudley, Nigel, Stolton, Sue and Jeanrenaud, Jean-Paul (1995) PulpFact: The Environmental and Social Impacts of the Pulp and PaperIndustry, Gland: WWF.

Durning, Alan Thein and Ayres, Ed (1994) 'The Story of aNewspaper', Worldwatch, November/December, 30-32.

The Ecologist (1993) Whose Common Future? Reclaiming the Commons,London: Earthscan.

Edwards, John C. (1995) 'CEO Forecast: The Recovery Has Arrived',TAPPI Journal, January: 30-34.

Edwards, M. B. (1990) 'The economic significance of the forestryand forest product industry to the Natal-Kwazulu region', inUniversity of Natal, op. cit.

Environmental Defense Fund (EDF) (1987) 'Social Forestry inKarnataka', The Ecologist 17.

Environmental Justice Networking Forum (EJNF) (1995) 'Report onParaquat Use in Agriculture in South Africa', ms.,Pietermaritzburg.

Equipo de Pastoral Campesina (1993) Revista Pastoral Campesina 8,Autumn.

'Eucalyptus cloning in Veracruz, Bahia, Brazil' (1993) in Know-HowWire (Jaakko P"yry Client Magazine), 1.

Evans, Julian (1986) 'Plantation Forestry in the Tropics: Trendsand Prospects', The International Tree Crops Journal 4.

__ (1992) Plantation Forestry in the Tropics: Tree Planting forIndustrial, Social, Environmental and Agroforestry Purposes,Oxford: Clarendon Press.

F brica Nacional de Papel (1992) 'El dilema del eucalipto', ElMercado Agropecuario (Uruguay), 18 June.

Faillace, Sandra and Valarelli, Leandro (1994) 'O setor papel ecelulose e suas verdes intencoes', for.plantation (APC electronicconference), 29 December.

Faillace, Sandra and Miranda, Moema (1992) Relat"rio Esp!rituSanto. Rio de Janeiro: IBASE.

__ (1993) Dossie Veracruz, Rio de Janeiro: Federacao de Orgaospara Asistncia Social e Educacional (FASE).

Fairlie, Simon (1992) 'Long Distance, Short Life: Why Big BusinessFavours Recycling', The Ecologist 22 (6), November/December:276-283.

Fanzeres, Anna (1995) Personal communication.

Federacao de Orgaos para Asistncia Social e Educacional (FASE)(1993) Inquerito civil sobre fomento florestal, Vit"ria: FASE.

Fazzini, Cecilia and Leal, Joao Carlos (1988) 'A Souza Cruz plantao futur", Senhor 367, 4 April.

Fearnside, Philip M. (1993) 'Tropical Silvicultural Plantations asa Means of Sequestering Atmospheric Carbon Dioxide', ms., Manaus,29 June.

Federaci"n Internacional de Trabajadores de la Construcci"n y laMadera (Federaci"n) (1988) 'Chile: la legilaci"n del trabajocortada por lo san", Bolet!n 3: 12-16.

Ferguson, James (1994) The Anti-Politics Machine: 'Development',Depoliticization and Bureaucratic Power in Lesotho, Minneapolis:University of Minnesota.

Fernandez Carro, O. and Wilson, R. (1992) 'Quality Management withFiber Crops', TAPPI Journal, February: 49-52.

Finland National Board of Customs (1990-3) Statistics, Helsinki.

Fletcher, Hugh (1988) 'The Pulp and Paper Industry: A New ZealandPerspective', in Schreuder, Gerard F. (ed.) Global Issues andOutlook in Pulp and Paper, Seattle: University of Washington.

Floegel, Mark (1994) The Medium is the Message: Water Pollution,Time Magazine, and Opportunities for Clean Production, Washington:Greenpeace.

Flynn, Bob (1992) 'Chip exports set the pace for Chile's forestrysales', World Wood, February.

Food and Agriculture Organization (FAO) (1981) El eucalipto en larepoblaci"n forestal, Rome: FAO.

__ (1990) The Eucalypt Dilemma, Rome: FAO.

__ (1992) Mixed and pure plantations in the tropics andsubtropics, Rome: FAO.

__ (1994) Forest Products Trade Flow Data, Timber Bulletin vol.XLVII, no. 5, Rome: FAO.

__ (1995) Forestry Statistics Today for Tomorrow, Rome: FAO.

Forestal Oriental (1993) 'Estudios de impacto ambiental',Montevideo: Forestal Oriental.

Fourie, J. J. (1990) 'Organized agriculture's concern overlargescale afforestation in Natal/Kwazulu', in University ofNatal, op. cit.

Gadgil, Madhav and Guha, Ramachandra (1992) This Fissured Land: AnEcological History of India, New Delhi: Oxford University Press.

Galbraith, John Kenneth (1974) The New Industrial State,Harmondsworth: Pelican.

Galloway, Leslie (1994) Closed-Cycle Technologies for BleachedKraft Pulp Mills, National Pulp Mills Research Program TechnicalReport No. 7, Canberra: CSIRO.

Gauthier, J. J. (1991) 'Plantation wood in international trade',Rome: FAO.

Geerling, Chris, N'Sosso, Dominique and Kitemo, Gaston (1991) Pland'Amnagement Environnemental, Congolaise de DveloppementForestier, Pointe Noire: CDF.

George, Susan (1988) A Fate Worse than Debt, Harmondsworth:Penguin.

G"mez, Sergio and Echenique, Jorge (1988) 'La agricultura chilena:la dos caras de la modernizaci"n', Santiago: FLACSO.

Goncalves, Marco Antonio (1995) 'Fabrica de papel desencadeiacrise no Amap : Champion adquire fatia da floresta amazonica',Parabolicas 2 (12), November.

Goncalves, M#cio Tosta (1992) 'Aspectos gerais da expanao doreflorestamento no Brasil' in forest.plantation (APC electronicconference), March.

__ (1995) 'Pau que nasce certo e entorta a vida dos outros:Monocultura de eucalipto e producao de celulose no Vale do Aco',Belo Horizonte: Comissao Pastoral da Terra/Centro Mineiro deEstudos e Pesquisa sobre Ambiente e Florestas/Pacific-AsiaResource Center.

Goncalves, M#cio Tosta et al. (1994) Explora o florestal no nortedo ES e sul da Bahia _ impactos e alternativas. Estudio de caso:explora o florestal, industria de celulose e ocupa o do espa oregional. Relat"rio final, Rio de Janeiro: FASE/IBASE, May.

Gonz lez Bern ldez, Fernando; Ruiz Prez, Manuel and Levassor,Catherine (1989) 'Effets des plantations d'Eucalyptus dans le nordde l'Espagne' Madrid: Universidad Aut"noma y UniversidadComplutense.

Good, John, Lawson, Gerry and Stevens, Paul (1993) NaturalEnvironment, Study No. 8, Shell/WWF Tree Plantation Review,London: Shell International Petroleum Company and World Wide Fundfor Nature.

Graham, Alastair (1994) 'Wood Flows around the Pacific Rim (ACorporate Picture)', Cygnet, Tasmania: World Wide Fund for Nature.Grainger, A. (1990) 'Modelling the Impact of AlternativeAfforestation Strategies to Reduce Carbon Dioxide Emissions', inIntergovernmental Panel on Climate Change, Response StrategiesWorking Group (RSWG), Subgroup on Agriculture, Forestry and OtherHuman Activities, Proceedings of the Conference on TropicalForestry Response Options to Global Climate Change, Washington: USEnvironmental Protection Agency.

Grant, Julius, Young, James H., and Watson, Barry G. (1978) Paperand Board Manufacture, London: British Paper and Board IndustryFederation.

Greenpeace International (1994) Achieving Zero Dioxin: AnEmergency Strategy for Dioxin Elimination, London: Greenpeace.

Griffin, Rod (1995) 'Taking the Middle Ground from Laboratory toPlantation', PPI, August: 28-9.

Gudynas, Eduardo (1989) 'Amphibians and reptiles of a coastalperiurban ecosystem (Solymar, Uruguay): list, preliminary analysisof community structure, and conservation', Bulletin of theMaryland Herpetological Society 25 (3) September.

__ (1990) 'La articulaci"n urbano-rural: ecosistemas ecol"gicosperi-urbanos', Medio ambiente y urbanizaci"n 8 (31), June.

Gudynas, Eduardo and Rudolf, Juan (1987) 'La herpetofauna de lalocalidad costera de "Pajas Blancas" (Uruguay): lista sistem ticacomentada y estructura ecol"gica de la comunidad', Com. Mus.Cienc. PUCRS (Porto Alegre) 46: 173-194.

Guerra, Claudio (1992) A Case Study in Brazil: EnvironmentalImpacts on the Piracicaba River Basin, Delft: InternationalInstitute for Hydraulic and Environmental Engineering, August.

Guha, Ramachandra (1988) 'Commercial Forestry: Defending theIndefensible', Deccan Herald, 19 June.

Hagler, R. (1993) 'Global Forest', Papermaker, May: 40-46.

__ (1994) 'The Global Wood Fibre Equation _ A New World Order?',in What is Determining International Competitiveness in the GlobalPulp and Paper Industry?, Proceedings, Third InternationalSymposium on Pulp and Paper, Center for International Trade inForest Products, University of Washington, Seattle, 13-14September.

__ (1995) 'Outlook for Woodchip Trade in the Pacific Rim',Commodity Markets and Natural Resources: Proceedings of theNational Agricultural and Resources Outlook Conference, Canberra,7-9 February.

Hallowes, David (1995) Personal communication, EnvironmentalJustice Networking Forum, Pietermaritzburg, 18 October.

Hamilton, Clive (1995) 'Woodchipping: Who Pays?', Wilderness News(Australia) 140, February/March.

Hamilton, L. S. and King, P. N. (1983) Tropical ForestedWatersheds: Hydrologic and Soils Response to Major Uses orConversions, Boulder, Colorado: Westview Press.

Harbinson, Rod (1995) 'Portugal's Eucalyptus Invasion', SEEDlinks17, April.

Harland, Tim (1994) 'Recycled Paper and the Environment',Permaculture Magazine 8, 16-18.

Heguy, Eduardo and del Rey, Jos (coords.) (1981) Estudios sobre laforestaci"n en el Uruguay, Montevideo: Univ. de la Rep#blica.Helvarg, David (1994) The War Against the Greens, San Francisco:Sierra Club.

Higgs, Richard (1992a) 'On the Right Lines', Paper, September.

__ (1992b) 'Riocell: Growing Fast', Paper, September.

__ (1992c) 'Bahia Debut', Paper, September.

__ (1992d) 'Brazil's Japanese Connection', Paper, September.

__ (1992e) 'Big and Beautiful', Paper, September.

__ (1993a) 'Investing in the Future', Paper, August.

__ (1993b) 'Jari: The Mill in the Jungle', Paper, August.

__ (1994) 'Battling through Hard Times', World Paper, May.

Higham, Robert (1995) The Paper and Paperboard Industry in Europeand North America: The Future for Producers and End Users, London:Financial Times.

Hills, R. L. (1988) Papermaking in Britain 1488-1988, London:Athlone Press.

Hitchens, Christopher (1994) For the Sake of Argument, London:Verso.

Hocking, Jennifer (1991) 'Regulation of Discharge ofOrganochlorines from Pulp Mills in Canada', EnvironmentalManagement 15 (2): 195-204.

Holt, J. A. and Spain, A. V. (1986) 'Some Biological and ChemicalChanges in a North Queensland Soil following Replacement ofRainforest with Araucaria Cunninghammii (Coniferae:Araucariaceae)', Journal of Applied Ecology 23 (1): 227-237.

Hornby, Donna (1994a) 'The trees are killing us', The NatalWitness, 5 December.

__ (1994b) 'Yearning for the return', The Natal Witness, 7December.

Hudson, J. R. (1990) The cane growers' view on timber production,in University of Natal, op. cit.

Hunter, Dard (1978) Papermaking: The History and Technique of anAncient Craft, New York: Dover.

Hutton, Maurice and Winkelmann, Hans (1953) 'Informe sobreforestaci"n y desarrollo forestal en el Uruguay', Silvicultura 3(3), April.

Ikonen, Matti (1994) Personal communication.

Informes y Proyectos SA (INYPSA) (1995) 'Informe ambientalresumen: Fabrica de papel _ Transpapel SRL', Fray Bentos: INYPSA.

Inglis, Andrew (1991) 'Travel Report', FAO: Rome, August.

Instituto Brasileiro de An lises Sociais e Economicas (IBASE)(1993a) 'Cronolog!a sobre a industria de celulose no Brasil' infor.plantation electronic conference, 3 March.

__ (1993b) 'Cronolog!a sobre a industria de celulose no Brasil',in for.plantation electronic conference, 6 November.

__ (1994a) 'Cronolog!a sobre a industria de celulose no Brasil',in for.plantation electronic conference, 3 August.

__ (1994b) 'Cronolog!a sobre a industria de celulose no Brasil',in for.plantation electronic conference, 10 October.

Instituto del Tercer Mundo (1989) 'Commodities: Why Doesn't theThird World's Salary Go Up?', in Third World Guide 1989-1990,Montevideo: Editora Tercer Mundo.

Interforest (n.d.) Interforest Experience in Africa, Stockholm:Interforest.

__ (n.d.) Interforest Experience in South and South East Asia,Stockholm: Interforest.

__ (n.d.) Lista de Referencias en America Latina, Stockholm:Interforest.

International Institute for Environment and Development (IIED)(1995) The Sustainable Paper Cycle: A report for the BusinessCouncil on Sustainable Development (draft), London: IIED.

Inyaku, Tomoya (1993) 'Why Brazilian pulp is cheap', for.paper(APC electronic conference) 22 April.

Ionides, George N. (1994) 'Technological Developments inPapermaking', presentation to the Financial Times Conference onPulp and Paper, London, 17-18 May.

Jaakko P"yry (1994) Address List, Helsinki: Jaakko P"yry, 14November.

__ (n.d. a) Experience in Asia-Pacific, Helsinki: Jaakko P"yry.

__ (n.d. b) Selected References and Related Experience RegardingForestry Programming, Helsinki: Jaakko P"yry.

__ (n.d. c) Experience in Sectoral Development of Forestry andForest Industry, Helsinki: Jaakko P"yry.

__ (n.d. d) Experience in Forestry Project Planning andImplementation, Helsinki: Jaakko P"yry.

__ (n.d. e) Our Commitment to Sustainable Resource Management:Jaakko P"yry Forest Policy, Helsinki: Jaakko P"yry.

Japan International Cooperation Agency (JICA) (1981) Study Reporton the Pulp and Paper Industry Development Program of the OrientalRepublic of Uruguay, Tokyo: JICA.

__ (1987) 'Informe para el estudio del plan maestro para elestablecimiento de plantaciones de rboles y utilizaci"n de lamadera plantada en la Rep#blica Oriental del Uruguay', Tokyo:JICA.

__ (n.d.) For Our Green Earth, Tokyo: JICA.

Japan Paper Association (JPA) (1994) Pulp and Paper Statistics1994, Tokyo: JPA.

Japan Tropical Forest Action Network (JATAN) (1992) Report onEucalyptus Plantation Schemes: Investment Activities by Japan'sPaper Industry in Brazil and Chile, Tokyo: JATAN.

__ (1993) 'Report on Eucalyptus Plantation Schemes in Brazil andChile by Japanese Companies', Tokyo: JATAN

__ (1994) Briefing paper for World Rainforest Movement meeting,New Delhi, April.

Jardine, Kevin (1994) The Carbon Bomb, Greenpeace: Amsterdam.

Jawni Odochao (1996) 'Kaan Tham Rai Mun Wian (swiddenagriculture)', ms., Chiang Mai: Project for Ecological Recovery.

Jirasak Jindarojana, Juckrit Homchan, Patcharee Saenchan et al.(1993) Research and Development as Experimental Agriculture withTreated Wastewater. Phase I: Preliminary Experiment andPre-feasibility Study, Final Report, Khon Kaen: Khon KaenUniversity and Phoenix Pulp and Paper Company, Ltd.

Jordan, C. F. (1985) Nutrient Cycling in Tropical ForestEcosystems: Principles and their Applications in Management andConservation, New York: Wiley.

Jorgensen, Anders Baltzer (1979) 'Forest People in a World ofExpansion', Transactions of the Finnish Anthropological Society,2: 77-96.

Joyce, Christopher (1988) 'The Tree that Caused a Riot', NewScientist.

Judt, Manfred (1994) 'Hemp: Papermakers Should Take It with aPinch of Salt', PPI, October: 32-35.

Junus, I. (1994) Indonesia Plywood Industry, London: WI Carr,Banque Indosuez Group, June.

Kardell, Lars, Steen, Eliel and Fabiao, Antonio (1986) 'Eucalyptusin Portugal _ A Threat or a Promise?', Ambio 15, 1: 6-13.

Karkkainen, Matti (1994) Presentation at Jaakko Poyry Oy, March.

Kerski, Anita (1995) 'Pulp, Paper and Power: How an IndustryReshapes Its Social Environment', The Ecologist 25 (4),July/August: 142-9.

Knight, Patrick (1991a) 'Plantations May Support Brazil's FirstMDF Plant', World Wood, April.

__ (1991b) 'Brazil: A Growing Force in World Pulp and Paper',P&PA, August.

__ (1993) 'Latin America', PPI, July.

Kroesa, Renate (1990) Greenpeace Guide to Paper, Vancouver:Greenpeace.

Kuroda, Yoichi (1995) Personal communication, August.

Lagos, Ernesto (1993a) 'No queremos regalos', Chile Forestal 202,February [?].

__ (1993b) 'Proyecto de ley de bosque nativo beneficiar lasinversiones', Chile Forestal 208, August.

Laitalainen R. (1992) Letter to Witoon Permpongsacharoen, Projectfor Ecological Recovery, Bangkok, August.

Lamb, D. (1992) Exploiting the Tropical Rain Forest, Paris:UNESCO.

Lang, Chris (1995) Personal communication.

Lara, Antonio (1992) 'Case Study: Chile', in Dudley, Nigel, ed.,Forests in Trouble: A Review of the Status of Temperate ForestsWorldwide, Gland: WWF.

Lara, Antonio and Veblen, Thomas (1993) 'Forest Plantations inChile: A Successful Model', in Mather, Alexander, ed.,Afforestation: Policies, Planning and Progress, London: BelhavenPress.

Larrobla, Ricardo et al. (coords.) (1992) Plantemos rboles. Gu!apr ctica para el forestador. Montevideo: Rotary Club/HemisferioSur.

Latorre, Jaime (1991) 'Monocultivo forestal: mito y realidad',Uruguay Forestal 1, July.

Latorre, Raul (1995) 'Informe sobre empleo y capacitacion en laforestacion', ms.

Le Roux, S. D. (1990) 'Impact of Afforestation on the AgriculturalResources of Natal', in University of Natal, op. cit.

Letto, Jay (1994) 'Go East, Young Timberman!', E Magazine,Jan./Feb.: 26-33.

Leyton, Jose et al. (1986) 'El fomento de la actividad forestal ysu impacto sobre el desarrollo rural en Chile', in El DesarrolloFrut!cola y Forestal en Chile y Sus Derivaciones Sociales,Santiago: CEPAL.

Ligrone, Atilio (1992) 'Situacion actual y pol!tica del fomentodel sector forestal nacional', in Plantemos rboles. Gu!a pr cticapara el forestador, Montevideo: Rotary Club.

Lima, Walter de Paula (1993) Impacto Ambiental do Eucalipto, SaoPaulo: EDUSP.

Lohmann, Larry (1991) 'Peasants, Plantations and Pulp', Bulletinof Concerned Asian Scholars 23, 4: 3-17.

__ (1993) 'Green Orientalism', The Ecologist 23, 6.

__ (forthcoming a) 'No Rules of Engagement: the Creative Politicsof oEnvironmento in Thailand', in Rigg, J. (ed.) Counting theCosts: Economic Growth and Environmental Change in Southeast Asia,Singapore: ISEAS.

__ (forthcoming b) 'Freedom to Plant: Indonesia and Thailand in aGlobalizing Pulp and Paper Industry' in Parnwell, Michael J. G.and Bryant, Raymond (eds.), Environmental Change in South-EastAsia: Rendering the Human Impact Sustainable, London: Routledge.

Lohmann, Larry, Wallgren, Thomas and Witoon Permpongsacharoen(forthcoming) 'Intercultural Politics: the Coevolution of a MasterPlan and Its Critics', in Gudeman, S. and Marglin, S. (eds.)People's Ecology, People's Economy.

Lopez, Elvio and Cussac, Carlos (1943) Arboles forestales en elUruguay y problemas afines. Montevideo: Mercant.

Lugo, A.E., Brown, S. and Chapman, J. (1988) 'An Analytical Reviewof Production Rates and Stemwood Biomass of Tropical ForestPlantations', Forest Ecology Management 23: 179-200.

Luukkanen, Olavi and Hakulinen, Mervi (eds.) (1991) From Bangkokto the Blue Nile: Review of the First Decade of the TropicalSilviculture Research Group 1980-1990 and Abstracts of ResearchReports, Tropical Forestry Reports 7, Helsinki: University ofHelsinki Department of Silviculture.

MacIsaac, Ronald and Champagne, Anne (1994) Clayoquot Mass Trials:Defending the Rainforest, Gabriola Island, B.C.: New SocietyPublishers.

Magee, Sean (1994) Letter to Chris Lang, Earth Action ResourceCentre, 1 December.

Malee Traisawasdichai (1994) 'Laotians oLook Likely Loserso fromForeign-Funded Forestry', The Nation (Bangkok), 11 July.

Marchak, M. Patricia (1991) 'For Whom the Tree Falls:Restructuring of the Global Forest Industry' in BC Studies 90,Summer: 3-24.

__ (1992) 'Latin America and the Creation of a Global ForestIndustry', in Steen, H. K. and Tucker, R. P. (eds.), ChangingTropical Forests: Historical Perspectives on Today's Challenges inCentral and South America, New York: Forest History Society,International Union of Forestry Research Organizations.

Marcus, Amanda (1993a) 'Klabin enjoys lead role among Latins',PPI, November.

__ (1993b) 'CELPAV paves the way for more woodfrees', PPI,December.

M rquez Fern ndez, Dominga (1985) 'Las repoblaciones de eucaliptosy su impacto en la ultima decada 1973-83', Revista de EstudiosAndaluces 5.

Martone, Francesco (1993) 'Brazil: Anti-Pulp Activist Killed', infor.paper electronic conference, 3 May.

__ (1995) Overview on Current and Projected Trends in Trade,Production and Consumption of Pulp and Paper Products; Details onMain Paper TNCs; Trade Analysis for Selected Countries, Rome:Greenpeace International.

Masaki, Mikio (1995) 'Commercial Reforestation and Japanese ODA',ms.

Mather, Alexander (1990) Global Forest Resources, London:Belhaven.

Mat!as, Moises (1994) 'A implantaco da industria de celulose noMaranho: CELMAR na regio Tocantin Par ', Par : Sociedade Paraensede Defesa dos Direitos Humanos.

McClelland, W. Craig (1994) 'Issues for the 1990s: US Pulp andPaper Industry', presentation at Financial Times conference onWorld Pulp and Paper, London, 17-18 May.

Megalli, Mark and Friedman, Mark (1991) Masks of Deception:Corporate Front Groups in America, Washington: EssentialInformation.

Messner, Dirk (1993) 'Busqueda de competitividad en la industriamaderera chilena', Revista de la CEPAL 49, April.

Mikami, Takaito (1991) 'Forestacion: base de la construccion deuna nacion', Montevideo: JICA.

Miranda, Moema (1992) 'O extremo sul da Bahia e a avassaladorachegada da modernidade. II relatorio de viagem ao extremo sul daBahia', Rio de Janeiro: FASE/IBASE, October.

__ (1993a) 'Papel e celulose no Brasil: novos projetos, velhosdilemas', Rio de Janeiro: IBASE.

__ (1993b) 'Nas pontas do extremo: outras historias, outrostempos', Rio de Janeiro: FASE/IBASE, April.

__ (1993c) 'Indios reivindicam suas terras', for.plantation (APCelectronic conference) 14 July.

Moniaga, Sandra (1993) oCIFOR Establishment: Consistent withConser-vation?o, unpublished paper, Pontianak, Kalimantan.

Morey, Carlos and Porcile, Juan (1992) Proteccion sanitaria de losbosques: necesidad de una estrategia nacional', in Plantemosrboles. Gu!a pr ctica para el forestador, Montevideo: RotaryClub.

Morrison, Elaine and Bass, Stephen (1992) 'What about the People?'in Sargent and Bass (eds.), op. cit.

Moulton, R. J. and Richards, K. R. (1990) Costs of SequesteringCarbon through Tree Planting and Forest Management in the UnitedStates, Washington: US Department of Agriculture Forest Service.

Muzio, Gabriele (1995) 'A contribution to the discussion on ForestPlantations', March unpublished.

Muzio, Gabriele and Ortiz, Rosario (1995a) 'A brief commentary onthe FAO's draft report on oCombating Deforestationo',unpublished.

__ (1995b) 'Another FAO-inspired oGreen Revolutiono',unpublished.

Myers, Norman (1989) Deforestation, London: Friends of the Earth.

__ (1991) Presentation at Issue Dialogue on oTree Plantations:Benefits and Drawbackso, Centre for Applied Studies inInternational Negotiations, Geneva, 23-24 April.

__ and Goreau, T. J. (1991) 'Tropical Forests and the GreenhouseEffect: A Management Response', Climate Change 19 (1-2): 215-225.

NGO Network for Forest Conservation in Indonesia (SKEPHI) (1995)'The Development Impacts of Industrial Planting Forest (HTI)Belongs Barito Pacific Group Company and South Sumatera', ms.,Jakarta.

Native Forest Network (NFN) (1995) 'Pulp in the Machine:International Day of Action against Pulp and Paper', Earth First!,Beltane.

Nectoux, Francois and Kuroda, Yoichi (1989) Timber from the SouthSeas: An Analysis of Japan's Tropical Timber Trade and ItsEnvironmental Impact, Gland: WWF.

Nelson, Joyce (1994) 'Pulp and Propaganda', Canadian Forum,Jul./Aug.: 14-20.

Niku, Pekka (1993) 'Worldwide Review of Recycled Fibre', Know-HowWire (Jaakko Poyry Client Magazine) 1: 6-7.

Oberlander, Ronald Y. (1994) 'A Canadian Perspective: UncommonApproaches to Common Problems', paper presented to the FinancialTimes Conference on Pulp and Paper, London, 17-18 May.

O'Brien, Mary (1990) 'A Crucial Matter of Cumulative Impacts:Toxicity Equivalency Factors', Journal of Pesticide Reform,Summer.

Oinn, David (1994) Presentation at PIRA teach-in on paper,Leatherhead, Surrey, 7 December.

Olsson, Roger (ed.) (1995) The Taiga Trade: A Report on theProduction, Consumption and Trade of Boreal Wood Products,Jokkmokk: Taiga Rescue Network.

O'Neill, John (1993) Ecology, Policy and Politics: HumanWell-Being and the Natural World, London: Routledge.

Ong'wen, Oduor (1994), 'Death Mill: A Case Study of Pan AfricanPaper Mills (EA) Ltd., Webuye, Kenya', prepared for the NGOSymposium during the African Development Bank Annual Meeting ofthe Board of Governors, Nairobi, May.

Organization of American States (1994) Uruguay: proyecto regionalde alternativas para la inversion forestal, Washington: OAS.

Orton, David (1994) Personal communication.

Otero, Luis (1990) 'Impacto de la actividad forestal encomunidades locales en la VIII Region', Ambiente y Desarrollo 6(2), August: 61-69.

Overseas Development Administration (1993) British Overseas AidAnnual Review 1992, London, ODA.

Oxfam (1994) 'Fifty Years is Enough', Oxford: Oxfam.

Ozinga, Saskia (1994) 'Production and Consumption of Timber andTimber Products', Amsterdam: Milieu Defensie.

Paavilainen, Leena (1993) 'Non-wood Plants: A Potential Source ofFibre', in Know-How Wire (Jaakko Poyry Client Magazine), 2: 8-9.

Panario, Daniel et al. (1991) Desarrollo forestal y medio ambienteen Uruguay 11: Hacia una evaluacion de efecto ambientales de laforestacion con especies introducidas, Montevideo: CIEDUR.

Pandey, Devendra (1992) Assessment of Tropical Forest PlantationResource (draft), Ume: Swedish University of AgriculturalSciences.

Paper Europe (1995) Conference Programme for Third GlobalConference on Paper and the Environment, London, 27-28 March.

Paper Publications (1994) UK Directory of Papers and Boards,London: Paper Publications.

Pappens, Rita Anna (1995) 'Market Pulp: From Bust to Boom . . .and Back Again', PPI, January: 76.

Pare, Luisa (1992) 'El eucalipto y la integracio'n de Mexico almercado internacional', El Cotidiano 48, June.

Partido Socialista Obrero Espa$ol (PSOE) (1979) El eucalipto:Actas de las jornadas de trabajo sobre el eucalipto, Huelva: PSOE.Pasuk Pongpaichit (1995) Presentation at Seminar on CommunityRights and Environmental Conservation: The Case of the Paper PulpIndustry, Chulalongkorn University, Bangkok, 27 April.

Payer, Cheryl (1991) Lent and Lost, Pluto: London.

Penna, Ian (1992) Japan's Paper Industry: An Overview of ItsStructure and Market Trends, Tokyo: Friends of the Earth Japan.

__ (1994) 'Daishowa Paper Manufacturing Co.: A Corporate Profile',Tokyo: JATAN.

Perez Arrarte, Carlos (comp.) (1993) Desarrollo forestal y medioambiente, Montevideo: CIEDUR/Hemisferio Sur.

__ (1995) 'Impactos socioeconomicos', in Carrere, Ricardo et al.,Impactos de la Forestacion en Uruguay, Montevideo: Instituto delTercer Mundo/REDES.

Pesonen, Kari (1995) 'Indo-China P & P Industry _ Its FutureProspects', Paper Asia, May: 11-18.

Pollett, E. A. and Mander, M. (1995) Mosa Florestal AfforestationProject, Mocambique: Report on Preliminary Field Visits andScoping Workshops Held at Maputo, Zitundo and Ponta do Ouro toIdentify Potential Environmental Issues, Pietermaritzburg:Institute of Natural Resources, January.

Poore, D. and Fries, C. (1985) Efectos ecologicos de loseucaliptos, Rome: FAO.

Porter, R.N. (1990) 'Future Afforestation and the PotentialImpacts on Nature Conservation in Natal', in University of Natal,op. cit.

Posey, Darrell (1985) 'Indigenous Management of Tropical ForestEcosystems: The Case of the Kayapo Indians of the BrazilianAmazon', Agroforestry Systems 3: 139-158.

__ (1990) 'Cultivating the Forests of the Amazon: Science of theMebengokre', Orion Nature Quarterly 9 (3): 16-23.

Postel, Sandra and Heise, L. (1988) Reforesting the Earth(Worldwatch Paper No. 83), Washington: Worldwatch Institute.

Pou, Rosario (1991) 'Algo m s sobre el eucalipto' UruguayForestal, July.

__ (1992) 'Tratamientos silviculturales', in Plantemos rboles.Gu!a pr ctica para el forestador, Montevideo: Rotary Club.

Pratt, Larry and Urquhart, Ian (1994) The Last Great Forest:Japanese Multinationals and Alberta's Northern Forests, Edmonton:NeWest Press.

Price, David (1995) 'Europe's Disposable Paper Market: The GoingGets Tough', P&PA 21, May.

Project for Rural Ecological Development (PRED) (1996) Seminar onResearch and Planning on Eucalyptus, Kaset Wisai district, RoiEt.

Rada, Jose Antonio (1992) 'Plantaciones de eucalipto en Chile',Chile Forestal 196, July.

Rahikainen, Anne, Paun, Dorothy and Catlett, Lynn (1995) 'AnExamination of the United States Pulp and Paper Industry',CINTRAFOR Working Paper 54, College of Forest Resources, Seattle.

Rajesh, Noel (1995) 'Thailand's Pulp and Paper Industry: AnOverview', Bangkok: Project for Ecological Recovery.

Rasmusson, Ulf (1994) Swedish/Scandinavian Involvement inIndonesian Forestry - The Industrial Forest Plantation and PulpMill Sector, Stockholm: World Wide Fund for Nature.

Rice, Tim (ed.) (1995) Out of the Woods: Reducing Wood Consumptionto Save the World's Forests: A Plan for Action in the UK, London:Friends of the Earth.

Rich, Bruce (1994) Mortgaging the Earth: The World Bank,Environmental Impoverishment, and the Crisis of Development,Beacon: Boston.

Riddlestone, Sue, Desai, Pooran, Rice, Tim and Solly, Tom (1995)'The Reclamation, Reuse and Recycling of Post-Consumer PrimaryIndustrial Wood Product Waste' in Rice, Tim, ed., Out of theWoods: Reducing Wood Consumption to Save the World's Forests: APlan for Action in the UK, London: Friends of the Earth.

Rocky Mountain Institute (1990) 'A $20 Bill on the Sidewalk', RMINewsletter.

Rogers, Lewis (1955) 'Informe sobre forestacion en el Uruguay',Silvicultura 8 (31), May.

Rosoman, Grant (1994), The Plantation Effect: An EcoforestryReview on the Environmental Effects of Exocit Monoculture TreePlantations in Aotearoa/New Zealand, Wellington: Greenpeace.

Ruiz Perez, Manuel (1990) 'El eucalipto: un tigre de papel?',unpublished report prepared for Greenpeace Spain.

Ryan, Megan (1994) 'Recycling on a Roll' in WorldWatch Institute,Vital Signs 1994, New York: Norton.

Said, Edward (1978) Orientalism, New York: Pantheon.

Samaja Parivartana Samudaya (SPS) (1989) Whither Common Lands?,Dharwad: SPS.

Sandbrook, Richard (1995) Personal communication.

Sanitsuda Ekachai (1992) 'Man and the Forest', Bangkok Post, 24January.

Sanways, M. J.and Moore, S. D. (1991) 'Influence of Exotic ConiferPatches on Grasshopper (Orthoptera) Assemblages in a GrasslandMatrix at a Recreational Reserve, Natal, South Africa',Biol.Conservation 57: 117-137.

Sargent, Caroline (1990a) The Khun Song Plantation Project,London: International Institute for Environment and Development.

__ (1990b) Personal communication.

__ (1992) 'Natural Forest or Plantation?' in Sargent and Bass(eds.), op. cit.

Sargent, Caroline and Bass, Stephen (eds.) (1992) PlantationPolitics: Forest Plantations in Development, London: Earthscan.

Sargent, Caroline, Mingsarn Khaosa-ard, Butler, John and vanGinneken, Pieter (1992) Thai Forestry Sector Master Plan: Mid-TermReview, London: International Institute for Environment andDevelopment.

Sawyer, Jacqueline (1993) Plantations in the Tropics:Environmental Concerns, Gland: International Union for theConservation of Nature.

Saxena, Naresh C. (1992a) 'Farm Forestry and Land-use in India:Some Policy Issues', Ambio 21 (6), 420-5.

__ (1992b) 'India's Eucalyptus Craze: The God that Failed',Panoscope, May.

Schindler, David (1995) 'Toward Sustainable Development of theCanadian Pulp and Paper Industry', in Western Canada WildernessCommittee, Al-Pac: Mitsubishi's Attack on Alberta, Edmonton:WCWC.

Schinke, Gert (1992a) 'Brazil pulp mill scandal', in haz.pulpmills(APC electronic conference), 10 June.

__ (1992b) 'Alerto: Riocell escandalo', in haz.pulpmills (APC electronic conference), 12 June.

Schlatter, Roberto and Murua, Roberto (1992) 'Control Biologico dePlagas Forestales: Bosque Artificial y Biodiversidad', Ambiente yDesarrollo 8 (1), April: 66-70.

Schreuder, Gerard F. and Anderson, E. (1988) 'International WoodChip Trade: Past Developments and Future Trends, with Emphasis onJapan', in Schreuder, Gerard F. (ed.) Global Issues and Outlook inPulp and Paper, Seattle: University of Washington.

Scott, James C. (1990) The Arts of Resistance: Hidden Transcripts,New Haven: Yale University Press.

Shell International Petroleum Company and World Wide Fund forNature (1993) Tree Plantation Review, 11 vols., London: Shell/WWF.

Shiva, Vandana (1991a) The Violence of the Green Revolution,Penang: Third World Network.

__ (1991b) Ecology and the Politics of Survival: Conflicts overNatural Resources in India, New Delhi: Sage.

__ (1993) Monocultures of the Mind: Perspectives on Biodiversityand Biotechnology, Penang: Third World Network.

Shiva, Vandana and Bandyopadhyay, J. (1987) Ecological Audit ofEucalyptus Cultivation, Dehra Dun: Research Foundation for Scienceand Ecology.

Shiva, Vandana, Sharatchardra, H. C. and Bandyopadhyay, J. (1982)'Social Forestry: No Solution within the Market', The Ecologist12.

Smith, Maureen (1995) 'The Paper Industry: Agenda for Reform' inRainforest Action Network, Cut Waste, Not Trees: How to SaveForests, Cut Pollution and Create Jobs, San Francisco: RAN.

__ (forthcoming) The Paper Industry and Sustainable Production: AnEnvironmental Argument for Industrial Restructuring, Cambridge,MA: Massachusetts Institute of Technology Press.

Soetikno, Abubakar (1993) 'Appita's Asia Profile', Appita Journal46, 2: 90-92.

Soltani, Atossa and Whitney, Penelope (eds.) (1995) Cut Waste, NotTrees: How to Save Forests, Cut Pollution and Create Jobs, SanFrancisco: Rainforest Action Network.

Sonnenfeld, David (1995) Personal communication.

Soulas, Alain (1994) 'Post-Recession Global Strategies:Competition, Trade and the Environment', paper presented to theFinancial Times Conference on World Pulp and Paper, London, 17-18May.

Spencer, J. E. (1966) Shifting Cultivation in Southeast Asia,Berkeley: University of California.

Stauber, John C. and Rampton, Sheldon (1995) Toxic Sludge is Goodfor You: Lies, Damn Lies and the Public Relations Industry,Monroe, ME: Common Courage.

Stefan, Virginia (1995) 'Market Pulp Figures Signal a New Brand ofRecovery', PPI, August: 14-16.

Stolovich, Luis (1995) Forestacion (Un Negocio Para Quien?Montevideo: Instituto del Tercer Mundo/CIEDUR.

Suppachai Saranaraksa (1996) Interview, Phoenix Pulp and PaperCo., Ltd., 21 February.

Susaeta, Eladio (1993) 'Madera Pulpable: Interesante Opcion parael Uruguay', Uruguay Forestal 5, May.

Swann, Charles (1992) 'Mexico: Importer of pulp and paper',Papermaker, November.

__ (1993) 'South America: The Promise and the Problems',Papermaker, August.

Taiga Rescue Network (TRN) (1993) 'The Taiga: A Treasure or Timberand Trash?', Jokkmokk: TRN.

Terra, Patr!cia (1992) 'Papel: uma industria poluente', Ecologia eDesenvolvimento 2 (19), September: 18-20.

Thailand Royal Forest Department (RFD), Ministry of Agricultureand Cooperatives, Royal Thai Government (1993), Thai ForestrySector Master Plan, Bangkok: RFD.

Thomen, Antonio (1990) Personal communication.

__ (1991) 'Desierto Verde: La Conspiracion del Eucalipto',Ecolog!a y Conservacionismo 15, May.

Tjahjono, S. Indro (1993) 'The Tragedy of Indonesian Forests',ms., Jakarta.

Tunya Sukpanich (1990) 'Killing the Land for Money', Bangkok Post,22 February.

Tuset, Rinaldo et al. (1990) El Complejo Forestal en Uruguay,Montevideo: Fac. Agronom!a.

Ulvila, Marko (1994) 'Pulp Industry in Indonesia: FinnishCompanies Participate in Rainforest Destruction', Tampere:Coalition for Environment and Development.

United Nations (1993-4), Import-Export Statistics, New York: UN.

United States Department of Agriculture (USDA) Forest AgricultureService (1994) Wood Products Trade and Foreign Markets,Washington: USDA, August.

University of Natal Institute of Natural Resources (1990) ThePhysical, Social and Economic Impacts of Large-scale Afforestationin Natal/Kwazulu, Proceedings of the Forestry Impacts Workshop,Pietermaritzburg: Institute of Natural Resources, May.

Uruguay Ministerio de Ganader!a, Agricultura y Pesca (MGAP) (1994)Forestacion: Negocios de Buena Madera, Montevideo: MGAP, 1994__ (1994) Uruguay Forestal: M s Naturaleza. Oportunidades deInversion, Montevideo: MGAP.

Usher, Ann Danaiya (1990a) 'A Forest Policy Sadly Gone Awry' inThe Nation (Bangkok), 10 May.

__ (1990b) 'Eucalyptus _ Widening the Gap', in The Nation(Bangkok), 14 June.

__ (1991) oA Finn-Ancial Harvesto, The Nation (Bangkok), 10February.

__ (1994) oSwedes Assisting FIO Reformo, The Nation (Bangkok), 13December.

__ (1994) Personal communication, December.

Vail, David (1993) 'The Internal Conflict: Contract Logging,Chainsaws and Clear-cuts in Maine Forestry' in Banuri, Tariq andApffel-Marglin, Frederique (eds.), Who Will Save the Forests?Knowledge, Power and Environmental Destruction, London and NewJersey: Zed Books.

Valarelli, Leandro Lamas (1992) 'Complexos Florestais de Celulose:O Mito da Modernidade', Proposta 53, May.

Vandermeer, John and Perfecto, Ivette (1995) Breakfast ofBiodiversity: The Truth about Rain Forest Destruction, Oakland:Food First.

van der Zel, D. W. (1985) A Decision-Making Modelling Approach toMountain Catchments Management in Southern Africa, UnpublishedPh.D. thesis, University of Natal (?).

__ (1990) 'The Past, Present and Future of the AfforestationPermit System in the R.S.A.', in University of Natal, op. cit.

van Dijk, Martha and Dekker, Ariette (1995) 'Industry FacesAnother Cycle When Tapping Finance Markets', PPI, September:23-27.

van Ginneken, Pieter (1991) Not Seeing the People for the Trees? AReview of Practices and Policies of Tree Planting, Amsterdam:AIDEnvironment.

van Hauwermeiren, Saar (1995) 'La Sustentabilidad del Ciclo dePapel: Aspectos Criticos para Chile', ms., Santiago: Instituto deEcologia Politica.

van Hook, Matthew (1994) Paper presented to the Financial TimesConference on Pulp and Paper, London, 17-18 May.

Wadsworth, John (1993) 'Perspectiva de los Mercados yComercializacion en el Marco del Desarrollo de las Plantaciones deEucalipto en Uruguay', Uruguay Forestal 6, November.

Wahana Lingkungan Hidup Indonesia and Yayasan Lembaga BantuanHukum Indonesia (1992) Mistaking Plantations for Indonesia'sTropical Forest, Jakarta: WALHI and YLBHI.

Wahana Lingkungan Hidup Indonesia (1995) Letter to OECF, Jakarta,14 July.

Wannasri Boonyarattaphan (1994) Phonkaansamruaj lae wikhrohphonkrathope buengton khrongkaan kaanchainamsia phueakaankasetborisat phoenix pulp and paper jamkat (Preliminary results ofsurvey and analysis of Project Green, Phoenix Pulp and Paper,Ltd.), Khon Kaen, Thailand: Khon Kaen University.

Wapenhans, Willi (1992) Effective Implementation: Key toDevelopment Impact, confidential discussion draft, World Bank,Washington: World Bank, 24 July.

Western, A. W. (1979) Small-Scale Papermaking, Rugby: IntermediateTechnology Information Services.

Western Canada Wilderness Committee (WCWC) (1994) Al-Pac:Mitsubish!s Attack on Alberta, Edmonton: WCWC.

Westoby, Jack (1987) The Purpose of Forests, Oxford: Blackwell.

Weyerhaeuser (1995) Weyerhaeuser Report 1994, Tacoma.

Whitham, Jeremy (1994) 'The Foreign Expansion of the Japanese Pulpand Paper Industry', in What is Determining InternationalCompetitiveness in the Global Pulp and Paper Industry?,Proceedings, Third International Symposium on Pulp and Paper,Center for International Trade in Forest Products, University ofWashington, Seattle, 13-14 September.

Wicht, C. L. (1967) 'Forest Hydrology Research in the SouthAfrican Republic', in Forest Hydrology Proceedings of anInternational Symposium on Forest Hydrology, New York: PergamonPress.

Willums, Jan-Olaf and Goluke, Ulrich (1992) From Ideas to Action:Business and Sustainable Development, Oslo: ICC.

Wilson, Lisa (1994) 'No Sex Please, We're Clones', New Scientist24/31 December: 26-28.

Wilson, Philip (1995) 'Getting Back to the Roots of TreeImprovement', PPI, April

Wilson, Robert A. (1991) 'Managed Forests: Economic and EcologicalAspects', presentation to the World Pulp and Paper EnvironmentalConference, Leningrad, 16-17 April.

__ (1995) 'Learning Lessons from Intelligent Fibre', PPI, April:45-6.

Wong, Alfred (1991) 'Industry Development and EnvironmentalProtection _ Compatible Goals?', Proceedings, Tropical PulpConference, Jakarta: Arbokem Inc. and Deutsche Papierwirtschaft.

__ (1992) 'New Direction in Industry Development and EnvironmentalProtection for Non-Wood Pulp Mills in Developing Countries', ms.,Vancouver: Arbokem Inc.

Wong, Al, Krzywanski and Chen Chiu (1993) 'Agriculture-Based Pulpas Secondary Papermaking Fibres', TAPPI Proceedings, PulpingConference.

World Bank (1989) Uruguay Second Agriculture Development Project,Staff Appraisal Report, Washington: World Bank.

__ (1994a) Indonesia Environment and Development: Challenges forthe Future, Washington: World Bank.

__ (1994b) Forest Policy Implementation Review (draft),Washington: World Bank.

__ (1995) World Development Report 1994, Washington: World Bank.

__ (1995) Monthly Operational Summary of Bank and IDA ProposedProjects, November.

__ (n.d.) Guide to International Business Opportunities,Washington: World Bank.

World Resources Institute (1994) World Resources 1994-95, NewYork: Oxford University Press.

Worldwatch, Vital Signs 1994, New York: Norton.

Wright, Roger (1993) 'World Pulp Market: Forecasts and Prospectsas at Mid-1992o, P&PA 14, 13-19.

__ (1994) 'New Markets; New Developments _ Indonesia',presentation to the Financial Times Conference on World Pulp andPaper, London, 17-18 May.

__ (1995) Personal communication.

Zerner, Charles (1992) Indigenous Forest-Dwelling Communities inIndonesia's Outer Islands: Livelihood, Rights, and EnvironmentalManagement Institutions in the Era of Industrial ForestExploitation, unpublished report commissioned by the World Bank.

Periodicals

Asia Pulp and Paper (AP&P)

Bangkok Post (BP)

Chile Forestal

Deccan Herald

Development Today (DT) (Oslo)

Dirigente Industrial

Down to Earth (Delhi)

Down to Earth (London)

The Economist

Environesia (Jakarta)

Enso Vision

Far Eastern Economic Review (FEER)

Financial Times (London)

Forum Keadilan (Jakarta)

The Guardian (G) (London)

Helsingen Sanomat (Helsinki)

The Independent (London)

International Agricultural
Development (IAD)

International Herald Tribune (IHT)

Jagruta Vani (JV),
quarterly newsletter of Samaja
Parivartana Samudaya
(Dharwad, Karnataka)

Jakarta Post (JP)

Japan Pulp and Paper (JP&P)

Know-How Wire
(Jaakko Poyry Client Magazine)

Kompas (Jakarta)

Krungthep Thurakit (Bangkok)

Management and Technology (MT) (Leatherhead, UK)

Matichon (Bangkok)

The Nation (Bangkok)

New Straits Times (NST) (Singapore)

Observer (London)

Paper

Paper and Packaging Analyst (P&PA)

Paper Asia

Phuu Jatkaan (Northeastern edition, Khon Kaen, Thailand)

Phuu Jatkaan Raai Sapdaa (Bangkok)

Phuu Jatkaan Raai Wan (Bangkok)

Public Relations Watch (PRW) (Madison, WI, USA)

Pulp and Paper (P&P)

Pulp and Paper International (PPI)

Paperboard Packaging (PP)

Papermaker

Prachachart Thurakit (Bangkok)

La Republica (Montevideo)

Revista Pastoral Campesina

Setiakawan (Jakarta)

Skogsindustrierna Press Releases

Statesman (New Delhi)

Suara Pembuaran (Jakarta)

Taiga News (TN)

TAPPI Journal

Tempo (Jakarta)

The Times (London)

Treasury News (Washington, DC)

Uruguay Forestal

World Rainforest Report (WRR)

(Lismore, Australia)

World Wood (WW)