Paving the Road For Forest Destruction

Key actors and driving forces of tropical deforestation in Brazil, Ecuador and Cameroon

Herwig Cleuren

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All correspondence should be addressed to: Dr. W.J. Vogelsang, CNWS Publications, c/o Research School CNWS, Leiden University, PO Box 9515, 2300 RA Leiden, The Netherlands.

Herwig Cleuren

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INTRODUCTION

Prologue: Three roads into the forest

The Rio Preto dirt road starts in the town of Marabá in Eastern Brazil and goes deep into the Amazon forest. Near the urban center, idle grasslands predominate with few cattle on the land and no dwellings along the road. Gradually, the geometric open pastures make way for small, cultivated plots. Along the road, poor clay huts mark the agricultural frontier where colonist farmers operate. Three hundred kilometers further west, the edge of the Amazon forest appears and the sound of whining chainsaws announces the logging frontier. Beyond this point, the giant Amazon is still inaccessible and only inhabited by small groups of Indians.

The journey from the slopes of the Andes towards the tropical lowland forest in Ecuador goes over bumpy roads. In the landscape, open pastures gradually give way to small plots with copses and coffee trees. Around the town of Coca, all roads are paved and maintained by oil companies that operate oil wells in the forest. On either side of these roads, colonists clear the vegetation to prepare the land for coffee. Parts of the surrounding forest have been allocated to the Indians as communal lands. Passing alongside a national park and toward a protected Indian reserve, the southbound 'Via Auca' runs through a conflict-ridden colonization frontier.

The dense tropical forest starts just twenty kilometers along the eastbound road out of Cameroon's capital Yaoundé and becomes thicker as one heads towards the Eastern province and its rich timber stands. Small Bantu villages with characteristic Pygmy huts stand along the verge. Logging trucks drive up and down, carrying raw logs to the harbors on the Atlantic coast. Most of the timber comes from remote concession areas near the border with Congo and the Central African Republic, where gorillas and elephants still wander in the forest.

Each of these three journeys into the forest offers a similar cross-section of forest decline. Old colonized areas are occupied by agricultural fields and pastures. Further down the roads, where the conversion of forest to farmland is still in full swing, the open landscape changes to a degraded one with scattered forest patches. Near the ends of the roads, slash-and-burn farming and selective tree extraction take place at the edge of the closed forest. Putting all these pictures together gives a time-lapse photo of how the destruction of the forest has occurred over the last thirty years. The transformation is neither clearcut nor linear, and is driven by

different agents and underlying causes. This study will attempt to explain the trajectory of each of these three roads, concentrating on the actors that have been involved in making them gateways for forest encroachment.

There is a general pattern in the order of appearance of the most important actors. In the earliest stage, waves of logging companies and pioneer colonists cut through the forest to make it accessible. In their wake follow project managers, small farmers, and traders, settling in small hamlets at the frontier. Gradually, the paths and dirt roads are paved and the hamlets become frontier towns. Next, government officials start to establish an institutional structure as part of a national administration. Finally, the foreign experts, donor agencies, tourists, and researchers flock in all with the best of intentions at least in their own views.

This research will focus on the dynamics of forest conversion and the adaptability and mobility of the people involved. Indigenous people and forestry engineers alike seem to be involved in a process of resource extraction that is part of a national economic system and a global commodity market. Land use patterns differ significantly in the three areas studied here, but extraction patterns show many parallels from where the roads begin to where they finally lose their way in the closed forest.

Overview of the present study

This study has three components and the first is a theoretical review of the issue of tropical deforestation. The next part presents the three case study areas, focusing on the key actors involved in the process of forest decline. The last part consists of an analytical synthesis, in which theories are tested against data and conclusions drawn regarding the deeper mechanisms of forest conversion and the relationships between the different actors.

Chapter 1 provides a general introduction to tropical rain forests and identifies the direct and indirect causes of deforestation as perceived by contemporary scholars, NGOs, international agencies, and local stakeholders. Chapter 2 presents the theoretical framework that will be used to analyze the three case studies. Theoretical elements from land use theories, economics, and political economy are introduced in order to make it clear how land use evolves along a tropical frontier. The transition from forest to colonized land unfolds in three zones: an extractive land use zone in isolated forest areas; an extensive land use zone after the pioneer frontier; and an intensive land use zone in areas which have been colonized for longer. The focus is on the different categories of actors who operate in these zones, and the processes by which they make decisions that determine the fate of the forest.

In Chapter 3, the dynamics of the frontier in the Brazilian Amazon are analyzed on the basis of field data from the colonization frontier in southern Pará around the town of Marabá. Today's dramatic situation, characterized by massive forest clearance and a rapidly advancing frontier has its origin in a forty-year long colonization movement into the Amazon heartland. Understanding the forest destruction requires an insight in state and federal policies, and into the local politics dominated by loggers and cattle ranchers. The small peasantry forms another spearhead of clearance. The livelihood strategies of these poor smallholders are constrained by squeezed land and credit

markets and by their inability to consolidate their socio-political position in southern Pará. The forest comes under particular pressure every year during the dry season, when its fringes are extensively burned.

Chapter 4 presents data from the Ecuadorian Amazon, where foreign oil companies, colonists, and a large number of indigenous people vie for access to and control of the forest and its resources. The analysis links access to forest with the role of 'lead agencies' (the oil industry and the governmental agencies), and with the position of colonists and Indians. Powerful forces situated outside the forest determine the pace of expansion of the oil industry, the involvement and policy priorities of the state, and the establishment of national parks. Local actors seem to be at the mercy of these external forces, but in reality have enough exit options at their disposal to follow their own courses.

In Chapter 5, the logging industry in Cameroon is investigated. The analysis quickly makes it clear that this third case differs greatly from the previous two. Cameroon has no advancing colonization frontier and no cattle in the forest as in the two other case studies. The old-growth forest is confronted with a booming logging industry that is expanding rapidly to the Eastern province. Foreign logging companies are now opening isolated forest areas for highly valuable timber. For the time being, logging is still highly selective in Cameroon. This new activity brings about an enormous dynamism, forcing all stakeholders to use new strategies to consolidate their position in the forest and their control over its resources. The analysis will focus on the crucial role played in the logging expansion by the central state authorities which determine the way benefits from timber are shared between logging companies and the local population.

Chapter 6 is a synthesis of the study, testing the theory of Chapter One against insights from the case studies. The whole is integrated around the central question of how the underlying actors in deforestation influence the primary actors involved in forest conversion. Comparative analysis of the actors dispels the prevailing clichés of noble indigenous people, poor and pitiful peasants, and ruthless lead agencies and governments. All actors are intertwined and involved in the gradual process of frontier colonization. Subsequently the crucial issue is whether the donor community, personified by the World Bank and NGOs, can influence these forces in such a way that the internationally sought goal of sustainable forest management is reached.

In a brief final Chapter 7, a number of solutions that have been proposed for better management of the tropical forest are summarized and considered in the light of the data. Lastly, general conclusions are drawn and policy recommendations made for more efficient and effective collaboration for sustainable management in the Amazon and Congo basins.

CHAPTER I

TROPICAL RAIN FORESTS AND DEFORESTATION

Global attention to tropical deforestation has stimulated a growing debate on which factors and actors are causing the destruction of tropical rain forests. This chapter will deal briefly with the basic characteristics of these forests and the realities of deforestation. During the last decade, forest destruction has received increasing attention from policy makers, prompting many initiatives by governments and intergovernmental agencies. However, these interventions have been insufficient to reverse current trends. To date, analyses of why the recent attempts at forest protection have failed agree that they have focused too much attention on proximate causes of deforestation, while largely ignoring the underlying or root causes of the problem. The focus in this chapter is on how the direct and indirect causes of deforestation are defined in the mainstream literature, and which actors are implicated. This general introduction will form a stepping stone to a deeper analysis of theories of deforestation in the chapters that follow.

TROPICAL RAIN FORESTS THREATENED

The different tropical forest categories

Most studies on tropical deforestation focus, as does the present one, on tropical rain forests. Following Myers' (1980) definition, tropical rain forests are evergreen and semi-evergreen forests in areas of the geographic tropics, receiving not less than 100 mm of precipitation in any month for two out of three years. Tropical rain forests occur on both sides of the equator in three continents. South America contains 61 percent of the total world area, with the Amazon Basin as the largest, most contiguous. Southeast Asia has 23 percent of all tropical forests, fragmented across the Indonesian archipelago and peninsular Malaysia. Africa accounts for 16 percent of the world's tropical rainforest, of which the Congo Basin is the largest intact forest area (WRI, 1998). The definition of tropical forests include five ecological forest types: (1) the *evergreen rain forest*, which has a permanently humid climate and is the richest of all tropical forest ecosystems with the greatest height, biomass and species diversity. Forests of this type are extensive in Southeast Asia, but found only in restricted areas in South America (for example near the mouth of the Amazon and in the foothills of the Andes; (2) the *semi-evergreen rainforest*, which has a short dry season and is the dominant form in Africa and the central Amazon region; (3) the *moist deciduous forests,* which have a distinct dry season of up to four months and cover large areas in Southeast Asia and South America; (4) *wetland rain forests*, which include freshwater swamp areas (along the Amazon rivers and its tributaries) and mangrove forests along coasts and estuaries; (5) *montane rain forests,* which show a distinct zoning of vegetation types according

to altitude and are most abundant in Southeast Asia, where mountains occupy about 30 percent of the total land area (Grainger, 1993).

The present study will focus on the moist forests, which comprises the first three ecological types. The 1990 forest assessment of FAO (1995) uses a figure of 1,509 million hectares, counting all moist forest patches varying from vast areas with closed canopy to scattered woody vegetation that covers ten percent of the surface (see Table 1.1).[1] It includes an aggregate of degraded and dispersed patches of forests (open forest). Whitmore (1992) has estimated the total remaining tropical lowland rain forest (the richest ecosystem in terms of biodiversity) at around 700 million hectares, which corresponds with the FAO's figure of 718 million hectares (Table 1.1).

The FAO-UNEP report of 1982 employs different categories that are also useful for characterizing tropical rain forests. The first is *'undisturbed forest'*, which includes old growth forest, without detectable signs of human interference. The term *secondary forest* is used to describe forest where fast-growing species spring up after an initial clearance and that has not been cleared or logged in the last 60 to 80 years. Secondary forest is less species-rich, and it can develop into old-growth secondary forest if it is not disturbed by new cuts. After some centuries without disturbance, secondary growth can come to resemble the surrounding 'undisturbed forest' (Jacobs, 1981). The report also distinguishes the category of *closed forest,* which entails a multi-layer tree canopy that suppresses ground vegetation from *open forest,* where there is a ground cover of grasses. Open forest includes *forest fallow*, which is land that has been cleared for cultivation and subsequently abandoned so that it may again have some woody vegetation. In relation to logging, the term of *'logged-over forest'* refers to productive forests that have been logged at least once in the last 60 to 80 years. *'Managed forests'* are those forests in which harvesting regulations are enforced, silviculture procedures are carried out and trees are protected from forest fires.

Deforestation: definition and magnitude

Since time immemorial, people have cleared, fragmented, and converted forests into other land use types. According to the degree of interference, disturbed tropical forest has regenerated into closed forest, been converted to other forest classes or simply disappeared. Particularly in the last half of the twentieth century, the pressure on the closed tropical forests has accelerated. The FAO (1997) has estimated the annual rate of deforestation in the tropics at 15.4 million hectares for the period 1980-1990 and 13.7 million hectares per year for 1990-1995 (see Tables 1.1 and 1.2). The total forest area lost during that whole 15-year period was more than 200 million hectares.

Such general statistics raise more questions than they answer. 'deforestation' in principle, is a generic term covering all forms of forest loss. However, there is a lack of consensus among experts regarding its precise definition, resulting in confusion and the impossibility of comparing statistics based on different interpretations. The most widely used definition is the one used by the FAO (1990) in which

[1] The FAO definition uses a ten-percent tree cover as the borderline for considering an area as forested.

deforestation is *the conversion of forest to other land uses that have a tree cover of less than ten percent*. This definition typically refers to the transformation of forested land either into a shifting cultivation cycle or into permanently cleared land; it excludes other impacts on the forest such as logging and road construction, which normally do not destroy the entire forest cover.

Ecological zone	Forest area (million ha)	million ha/year	Annual deforestation %
Rain forest	718	4.6	0.6
Moist deciduous	587	6.1	1.0
Montane forest	204	2.5	1.1
Tropical rain forests	**1,509**	**13.2**	**0.9**

Table 1.1: Worldwide deforestation figures for tropical rain forests per ecological zone in 1990 (FAO, 1995; Persson, 1995).

In this respect, FAO figures underestimate the scale of forest loss and the role of logging and road construction in the deforestation process (Lanly, 1982). In another way, however, the FAO definition overestimates deforestation: it does not make a distinction between permanent and temporary removal of forest cover, thereby failing to take into account that cleared areas return to secondary forest if they are left fallow for several decades. Total estimated deforestation is therefore exaggerated, and shifting cultivation is overemphasized as a cause of deforestation (Sunderlin and Resosudarmo, 1996).

The general definition of deforestation entails a whole range of forest uses which can be grouped into two specific categories. The process of *forest degradation,* firstly refers to changes within a forest, which negatively affect the stand or lower its production capacity. Although the land remains officially under forest, forest degradation can cause the loss of various forest attributes such as vegetation density, canopy structure, and species composition. Selective logging operations, intensive fuelwood collection, and shifting cultivation are typical activities causing forest degradation (FAO, 1998; Sunderlin and Resosudarmo, 1996). The second process is indicated by the term *forest clearing,* meaning the complete removal of the existing natural forest vegetation. In this process, the tree cover is mostly destroyed by

slash-and-burn and replaced by another form of land use such as agricultural or pasture land (Grainger, 1993). When deforestation takes place on a large scale and the forest does not have time to regenerate, it may constitute an environmental problem. There is a normative element here: deforestation tends only to become an issue if people consider it as problematic. Throughout this study, the term deforestation will be used carefully and will refer to the FAO definition, on which most calculations are based. Whenever a specific context requires further elaboration, the two underlying processes of forest degradation and forest clearing will be distinguished. In some cases consideration will also be given to the question of which local actors talk of 'deforestation' and see this as a problem.

Tropical rain forest functions and perceptions

Tropical rain forests have a wide range of functions with direct and indirect value for man and nature on the local, regional, and global levels. The three main categories of function considered here are habitat functions, regulatory functions, and production functions. These categories relate to the perceptions of different stakeholders and the rights they assert.

Tropical rain forests have important habitat functions for fauna and flora and they are the richest ecosystems on earth, containing about half of all identified species (Pearce and Brown, 1997). Many species have a localized distribution and destruction of a relatively small area may lead to their extinction. At the same time, the forest as a whole is home to millions of forest dwellers. Indigenous people constitute a particularly vulnerable group, because their social systems and cultural identities depend directly on the forest environment. In general, it can be said that the habitat function of the tropical forests implies that these forests have an intrinsic value and that their biodiversity and natural richness are worth conserving. The habitat function of rain forests also has important economic implications for the pharmaceutical and biotechnological industries. Their enormous biodiversity forms a pool of genetic material that is used for plant breeding, genetic engineering, and medicines (Balick *et al.*, 1996).

The regulatory functions of rain forests take place primarily at the regional level. The hydrological cycle of rainfall, evapotranspiration and drainage by rivers and streams is regulated by the presence of large tracts of closed rain forest (Grainger, 1993). When the forest disappears, the soil is exposed to erosion, fertility depletion, and laterization (deposition of iron and aluminum oxides). The hydrological cycle becomes disturbed and this may lead to rising temperatures, dry spells, and the sedimentation and flooding of rivers (*ibid.*). In the second place, rain forests affect the global atmosphere and climate by fixing and storing greenhouse gases. Deforestation gradually releases these gases into the atmosphere and there is increasing evidence that the disappearance of tropical forests contributes to the problem of global warming. Therefore, the conservation of tropical forests offers a large potential for forestry-based carbon conservation programs. Slowing deforestation can conserve large amounts of carbon that would be released into the atmosphere (Bruce *et al.*, 1996). Economic instruments to organize the 'carbon market' are currently being developed. The Kyoto protocol on climate change in 1997 has established 'Clean Development Mechanisms' by which industrialized countries can

pay for their own emissions by funding emission reduction projects in developing countries.

Conservationists have emphasized these habitat and regulatory functions and used them to argue for forest conservation. Environmentalists perceive the forest in the first place as a pristine natural forest, undisturbed by human activity. For a number of biodiversity hotspots, strict preservation seems to be the most adequate way to preserve the maximum biodiversity on our planet.[2] From a pure ecological point of view, the best arrangement may be a system of legally protected areas surrounded by buffer zones, which delineate the boundaries of human activity. In the past, national governments applied this thinking to establish national parks and protect rain forest with fences and fines, without paying much attention to the local population. The results, however, have been meager and protection has mainly been on paper, without much result in the field.

Some Western conservation NGOs campaigning against tropical deforestation combine a conservationist viewpoint with a plea for protection of the world's biodiversity and the global climate. They often employ the image of indigenous people living traditionally in a kind of symbiosis with the forest environment and they propose that these people should be considered as the real guardians of the forest. Hunting rituals, extraction taboos and seasonal cycles, they argue result in a balanced system that limits overexploitation. Whether this equilibrium is an intentional one, based on concepts of forest management, or whether it is a simple consequence of low population pressure, primitive technology and environmental constraints, remains a controversial issue.

The tropical forest also performs production functions in local, national and international economies. On the local level, rain forests worldwide support the livelihood of millions of forest dwellers who depend on the forest for their daily needs. The forest supplies timber and non-timber products which contribute to household subsistence and income.[3] The depletion of these forest resources deprives people of firewood, construction timber, and medicinal plants and can result in serious forest degradation. The tragedy is that many people destroy their own resource base through over-use and must then find other sources of income and subsistence production in a degraded environment. For national and global markets, timber resources and the mineral deposits beneath the trees are important commodities and the issuing of concessions generates large amounts of hard currency for tropical countries. In the last decades, tourism has also gained in importance as a new economic function of the tropical forests. A few tropical sites with abundant plants and easily seen animals are developing as ecotourist destinations and can generate substantial amounts of money for local and national economies.

These production functions, however, should not be perceived only as one-way services from nature to humanity. With the introduction of postmodernist concepts

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[2] Myers (1988) created the term 'biodiversity hotspot' to indicate that a modest number of hotspot ecosystems covering a relatively small land area, most often in tropical forest areas, account for a high percentage of global biodiversity.

[3] Non-timber-forest-products include products such as fruits, nuts, oils, gums, resins, tannins, waxes, rattan, spices, bush meat, and magical and medicinal plants.

of the forest environment, researchers have added a new dimension to the traditional view of a tropical forest as a natural habitat with a biodiversity of genes, species, and ecosystems. This new perspective emphasizes interrelationships and a diversity of culture-nature models, and sees man as an essential element of the biodiversity in tropical forest (Escobar, 1998). In the last decades, anthropologists and archeologists have gathered evidence for the interdependence between human presence and forest ecosystems. They contend that part of the forest is in fact anthropogenic due to centuries of human activities (for an overview see Sponsel *et al.*, 1996).[4] Foraging and agricultural activities have played an important role in controlling soil composition, seed dispersal, and plant domestication. These scientists consider today's tropical forests as a patchwork of various stages of secondary growth interspersed with primary forest. The concept of forests as anthropogenic ecosystems underscores their resilience to human disturbance and implies that vegetation succession, and variation in time and space are key characteristics of tropical forests. The forest becomes a dynamic landscape with a history of disturbance and variation, in which the present is a snapshot in a socio-ecological process (Fairhead and Leach, 1996).

This discussion of forest functions raises the question of whether the benefits of economic exploitation of the forest (which often results in deforestation) outweigh the costs from the losses of the different forest functions. The answer depends entirely on the value placed on those functions by different user groups.

From the perspective of the international community, conservation and economic development should ideally be balanced under a general umbrella of sustainable development. This has become part of the international discourse of all multilateral institutions after the Rio Conference. The challenge is to develop a model of sustainable development that leaves the regeneration functions of the forest intact while giving people and governments the opportunity to exploit resources from the forest for their livelihood and to the benefit of the national treasury. Controlled deforestation is not considered a problem as long as biological hotspots can be delineated and conserved in protected areas. Forest areas that are less diverse and already prone to encroachment are ideal for agroforestry, extraction of NTFPs, and small-scale farming on permanent plots. These mechanisms should stabilize the frontier and enable farmers there to develop farms of sustainable agricultural production. Many forest projects follow this approach and focus on rural development with infrastructure and basic services, establishing land titling systems and stable markets for agricultural products. Grass-roots organizations and social movements such as those of the rubber tappers in the Amazon exploit this discourse to demand funding from governments and international donors.

Several economists have tried to calculate the overall economic value of a hectare of tropical forest, and to measure marginal costs and benefits of deforestation. They have been confronted with the difficulty of determining monetary values for

[4] Balée (1989) has advanced the hypothesis that at least 11% of evergreen Amazonian forests are of Amerindian cultural origin, consisting of actual patches dominated by *babaçu*, Brazil nuts, lianas, palms, and bamboo.

all forest functions and their calculations remain rather academic (see Pearce and Warford, 1993; Pearce and Moran, 1994). In the field, actors at the forest fringe make short-term cost-benefit analyses which also not include environmental costs at all. Colonists burn the forest and transform it into cultivated and productive land. Loggers extract valuable timber species from natural forests without considering tree regeneration. Agricultural and forestry activities support the livelihood of local people and produce raw material for industrial development, agribusiness, and other services that contribute to the GDP. On a macro-economic scale, this view has driven lending agencies, central states, and large companies to consider the forest as an obstacle to economic and agricultural development. Governments in tropical countries try to bring what are perceived as unproductive tropical forests into the modern economy by means of large infrastructure works which facilitate the mining of timber and mineral resources in the forest. Their policies indicate that a certain level of deforestation is admissible if it results in a significant rise in GDP (López, 1999). They justify forest conversion by pointing out that it contributes to economic and agricultural development in countries with growing populations.

Regional patterns and historical trends of deforestation

A discussion of the magnitude of deforestation should start with a general analysis of the different patterns of tropical deforestation on the three relevant continents, and with some historical trends that indicate developments in recent years.

	Tropical forest area (million ha)		**Annual loss (million ha)**	**% loss per year**
	1990	**1995**		
Africa	523	505	3.6	0.7
Asia	295	280	3	1.1
America	936	907	5.6	0.6
Total	**1,754**	**1,692**	**12.2**	**0.8**

Table 1.2: Tropical forests and deforestation between 1990-1995 (FAO, 1997)[5]
West and Central Africa

[5] The numbers of this table 1.2 do not correspond exactly with those of table 1.1, because FAO figures of this table include dry tropical forest.

In Africa, the disappearance of the closed forests between 1980 and 1990 has largely been the result of small farmers practicing shifting cultivation with an inadequate fallow period. Rural population growth fueled the forest conversion and transformed the landscape into a patchwork in which the dominant land uses are subsistence farming and the extraction of wood for fuel and housing (FAO, 1995). In West Africa, 90 percent of the original moist forest is already gone and deforestation continues at a rate of around 500,000 hectares (one percent of the total area) per year (Achard *et al.*, 1998). Human fertility rates have remained high throughout the last 30 years and have put additional pressure on the forest in countries such as Nigeria, Ivory Coast, and Ghana. Agricultural expansion has easily penetrated the relatively small remnant forest areas. Another important factor is that the forest areas are situated near the coast, facilitating the transport and export of logs and plantations crops such as cocoa, coffee and palm oil (Rudel and Roper, 1996).

In Central Africa, the equatorial rainforest covers the whole Congo River basin and is preserved relatively well thanks to the fact that pressures on it were relatively low during the 1970s and 1980s. Most of the forest has remained inaccessible, without roads and with only a few navigable rivers. Due to urbanization in the large cities of the area (Libreville, Kinshasa, Brazzaville, Yaoundé, and Douala), rural population densities have not risen dramatically. Deforestation rates stood at about 1.2 million hectares (0.7 percent of the total area) per year (FAO, 1997). In the last decade, however, things have changed in certain areas. The growing logging industry and the expansion of plantation agriculture have opened the forest with roads in Cameroon, Gabon, and Congo. The situation is not yet critical due to the fact that national governments lack the means to stimulate logging activities and plantations by creating roads, infrastructure, and rural development schemes on a large scale.

South and Southeast Asia

Most of the forests in Asia are located in coastal zones and in the Indonesian archipelago, and this maritime accessibility has facilitated the influx of migrants and other forest colonists. In the 1970s, densely populated rural areas resulted in a growing number of shifting cultivators becoming the primary source of deforestation. In the 1980s, this factor slowed due to declining fertility rates and rural-urban migration. At the same time, other driving forces such as resettlement schemes in Indonesia, intensive timber harvesting in Malaysia and Philippines, and the expansion of plantation agriculture took over and maintained deforestation figures at a high level (Rudel and Roper, 1996). Annual deforestation amounted to 1.1 million hectares in continental Southeast Asia (1.6% of the total forest area) and 1.75 million hectares in insular Southeast Asia (1.3%) in the period 1990-95. Major direct causes of deforestation have been shifting cultivation, forest conversion to tree crop plantations, and large-scale logging operations. Other causes are urban expansion, mining, irrigation schemes, and hydroelectric projects (Collins *et al.*, 1991; FAO, 1995). The raging fires in Indonesia and Malaysia, which destroyed millions of hectares forest during 1997, have shown the dramatic consequences when closed forests are opened by roads and thinned by logging (Achard *et al.*, 1998).

South and Central America

From the 1970s on, rural population growth has declined dramatically throughout Latin America due to rapid urbanization. In Central America, proximity to the coast and the easy accessibility have led to increased pressure on the fragmented forest. In the 1970s and 1980s, the advance of the colonization frontier involved forest clearing for cattle ranching and agriculture. These activities were stimulated by growing export markets for timber, meat and bananas in the US and Europe.[6] Between 1990 and 1995, annual deforestation rates remained very high in Central America at 2.2 percent (Achard *et al.*, 1998). In South America, a considerable part of the Amazon Basin has been converted into permanent farmland and pasture for cattle ranching during the last three decades. This conversion has often been instigated by government-sponsored infrastructure projects such as road building and mining operations. The most heavily affected areas are the lowland forests adjacent to the Andean highlands in Colombia, Ecuador, and Peru, and the frontier areas in the Brazilian states Pará, Rondônia, and Mato Grosso. Lowland forest areas in the heart of the Amazon enjoyed some protection due to inaccessibility and remoteness from markets. This situation may soon change however as large Asian companies are planning to open up these last isolated forests in Surinam, the Guyanas, and Brazil.

DIRECT CAUSES OF DEFORESTATION

A brief description of the deforestation trends on the three continents has already revealed a number of important causes of deforestation. This section will give an analytical overview of what are considered as the main causes of deforestation in the relevant literature. A distinction between direct and underlying causes is necessary in order to separate concrete and visible causes from the more abstract and deeper mechanisms behind deforestation. In the last ten to fifteen years, research has focused on direct causes of deforestation such as agriculture, cattle ranching, and timber extraction. The most obvious culprits are slash-and-burn farming by small peasants; large-scale clearing for cattle ranching or plantations; and the commercial harvesting of timber above a sustainable level. The actors involved operate directly in the forest itself and are often easily recognizable in the field. Many studies, therefore, depict small peasants, ranchers, and large logging companies as the main actors in the deforestation process. Much less attention is paid to tree plantations, mining operations, and firewood collection, partly because their impact is less visible.

The debate about which of the causes mentioned above has the largest impact on the forest remains unresolved. World Bank experts diagnosed that shifting cultivation by small peasants accounted for about 70 percent of total deforestation in Africa, 50 percent in Asia and 35 percent in tropical America (Guggenheim and Spears, 1985). A

[6] The often cited 'hamburger connection', for instance, involved livestock production in Central America for the beef market in the US during the 1980s (Myers, 1981). Import barriers in the US and negative publicity for fast food companies have reduced this trade flow drastically since 1990. Recently, beef has increasingly been destined for the growing domestic markets inside South American countries (Kaimowitz, 1995).

more recent estimate by Persson (1995) attributed half of the worldwide annual forest loss to shifting cultivation, while all forms of agriculture and ranching between them are responsible for 75 percent. Logging and infrastructure development are considered minor causes with a relative small direct impact on the forest. The exact percentages differ largely due to the different definitions employed and the fact that different causes interact with each other. Below, three major direct causes are discussed in more detail and a number of other causes mentioned more briefly.

Smallholder agricultural expansion

Slash-and-burn agriculture, the typical land use pattern along the agricultural frontier has been well described. It entails felling trees and burning vegetation in order to grow food and cash crops (see Schmink, 1982; Moran, 1985; Ortiz, 1984; Dominguez, 1985; Henkel, 1971). This farming system supports the livelihood of millions of rural households worldwide. It entails a broad range of land use types, varying from long-fallow shifting cultivation to short-fallow forest pioneer farming. Traditionally, indigenous people practiced long-fallow shifting cultivation over a sufficient large area to permit natural regeneration. Many colonists, by contrast, practice slash-and-burn farming with a short fallow period of only a few years. In some areas, increased cash crop production and higher population pressure in forest areas has reduced the available arable land area, so that long rotations are no longer possible. In other areas, farmers are not willing to wait until the vegetation regenerates and prefer to clear additional land, especially when there is old-growth forest available without further costs. In many tropical regions, forest dwellers mine the natural resources for a period and then abandon their plot once declining fertility and weeds begin to affect the yields (Brown and Schreckenberg, 1998). It is difficult to generalize about the farming systems of smallholders in tropical areas because economic conditions, access to land, and technology all vary. While farmers in isolated villages in Central Africa practice the same slash-and-burn techniques as their ancestors did for cultivating crops, colonists in Latin America use chainsaws to convert forest into grassland.

Meyers (1992) has coined the phrase 'shifted cultivators' to characterize peasants who have migrated to the forest fringe to establish a new farm on unoccupied land, and who shift from one location to another. The peasant pioneer cycle starts when a colonist clears a patch of forest by burning the vegetation in the dry season, which provides relatively fertile soil for the first harvests due to the release of nutrients. After a few harvests the soil is depleted, weeds overgrow the cultivated land, and pests and diseases decimate the crops. The original piece of land remains fallow and the farmer clears an additional patch of forest for the next planting season. After five to ten years of colonization, a typical colonist's farm encompasses a remnant forest area, various patches of cultivated land, fallow land, and secondary forest.

This peasant pioneer cycle is often characterized as 'very unsustainable' because it requires the conversion of additional areas of forest every year (World Bank, 1992). This type of farming is an efficient economic response, however, to a situation where land is abundant and labor is the limiting factor in agricultural production. The debate on 'sustainable agriculture' goes beyond the scope of this

study, but its most basic interpretation implies the maintenance of a level of productivity while at the same time conserving resources on which that production depends. Sustainability depends, among other things, on biophysical aspects of the soil and the surrounding forest (National Resource Council, 1993).[7] Slash-and-burn farming without a long fallow has a major impact on soil and forest composition, but rarely does it mean an irreversible removal of the tree cover. Farmers leave forest patches of various shapes and sizes as stream buffers, wood reserves, and resource islands (Browder, 1996). Slash-and-burn agriculture results in a fragmented landscape in which patches of secondary vegetation of different ages alternate with cultivated areas. This secondary forest, however, is different from old-growth forest in biological composition and has lower biodiversity.

Cattle raising and ranching

The raising of beef cattle on pasture land of low fertility is another important activity driving the clearance of forest. By the 1990s, more than 20 million hectares of forests in Latin America had been converted to cattle pastures (Serrão and Toledo, 1990). Cattle ranching is carried out by various categories of farmers including small peasants, middle-range ranchers, and wealthy absentee landowners. Many environmentalists consider large estate owners to be the major culprits in forest conversion, but smallholders also invest in livestock production. Tending cattle is a profitable activity in frontier areas for a number of reasons. Cattle, firstly, are a liquid investment; cattle prices tend to keep pace with national inflation, whereas those of export crops such as coffee, cocoa, and rice often do not. Secondly, cattle walk their own way to markets and are therefore relatively unaffected by poor roads and high transport costs. Furthermore, farmers can delay cattle sales without the major losses suffered with most crops. The marginal costs of establishing pasture after cropping are low for smallholders (Seré and Jarvis, 1990). Raising cattle is not labor-intensive, an important advantage in pioneer areas where labor is often a limiting factor. The prestige of owning cattle, finally, is much greater than that of growing crops, especially in South America. Large *haciendas* for livestock production symbolize economic and political power and social status for the ranch owners. The consumption of beef is likewise considered a symbol of prosperity (Downing *et al.*, 1990).

Ranching has become a major cause of deforestation in Central and South America not least because it is a very extensive form of land use. Typically, the forest is cleared for agricultural purposes and when the soils are depleted and weeds take over, the land is transformed into pasture by burning and establishing grasses. Newly-planted grasses grow well during the first two to three years after burning because of the nutrients that are released by the burn. The average stocking density on tropical pasture is around one animal per hectare in the first years. After five to ten years, however, the productivity of a tropical pasture declines rapidly due to a combination of factors including nutrient depletion, soil erosion, compaction by cattle hooves, and invasion by weeds. Tropical frontier areas are characterized by

[7] Important biophysical aspects are nutrient cycling, soil erosion rates, resilience in the face of disease and pest pressure, the importance of microclimates, and soil moisture storage.

an abundance of land, poor soils, and a lack of capacity to buy inputs. In these circumstances, the best strategy is to let a few head of cattle graze on extensive low quality pastures. Gradually, shrubs overwhelm the planted grasses and the pastures finally become unproductive (Serrão and Toledo, 1990). Ranchers then clear additional patches of forest to establish fresh pastures. Bakker (1993) has typified abandoned grasslands as the natural end product of the ecological degradation of the tropical forest. In recent years, however, research and official incentives have stimulated the recuperation of degraded grasslands in Brazil. With the help of improved seeds, fertilizers, and the controlled use of agro-chemicals, former rain forest soils can become suitable for intensive cattle ranching and plantation agriculture (Smith *et al.*, 1995).

Logging

The FAO (1993) reports that almost six million hectares of tropical forest are logged annually and that the rate of logging has doubled in the last 30 years.[8] Almost all logging in tropical forests involves the short-term extraction of valuable timber species with no concern for the future of the forests. Very few of these forests are managed sustainably. The Forest Stewardship Council is the most renowned standard worldwide and controls only one percent of the tropical forests, mostly plantation forests (Kiekens, 1999a). In the natural forests, small chainsaw operators, intermediaries, local sawmill owners, and large multinational logging companies operate together to harvest the timber stands. The activities of the actors involved are characterized by a 'cut-and-run' mentality and by timber harvesting that seldom takes account of official regulations.

The most devastating type of logging is 'clear felling', which results in total clearance of the tree vegetation. This practice is relatively rare, occurring if the intention is to convert forest into plantations or to produce paper pulp. In most tropical rainforest areas, 'selective logging' is the main type of logging. The intensity of selective logging is low, leaving the majority of the original timber standing. The quantity of logs extracted per hectare depends on the quality of the stand and the commercial value of the wood types present. The intensity of logging varies from place to place. It is currently highest in South East Asia's dipterocarp forests (between 14 and 24 trees per ha) followed by Latin America (3 to 5 trees per ha) and Africa (1 tree per ha) (Johns, 1997). These low figures would appear to confirm that selective logging causes 'forest degradation' rather than 'forest clearance'. The problem, however, is that successive timber harvests follow each other at short intervals. The first logging company opens the forest with logging roads, cuts only a few valuable species, and leaves the logged-over forest accessible. Other companies, then, follow and cut a number of other species in the already damaged forest. When corporate logging has taken out all of the timber that is economically profitable for large concerns, chainsaw operators cut trees with lower value and smaller diameters. The aggregate impact of all these 'selective' loggers

[8] According to the FAO, the total logged-over area per year consists of 5,000,000 ha of primary forest and 1,000,000 ha of secondary forest.

greatly exceeds the carrying capacity of the forest and has a number of negative environmental consequences.

Excessive canopy opening and site damage during felling and extraction mean that the direct impact of selective logging is considerable (Roper and Roberts, 1999). The total area of forest disturbed – by felling gaps, skid trails, landing areas, tracks, and roads – varies according to the natural conditions and the logging practices in a given region. Haworth and Counsell's (1999) analysis suggests that selective felling operations typically damage between 10 and 40 percent of the forest area. Other impacts often arise from poorly designed logging roads which damage watercourses, from failure to apply directional felling, and from careless use of heavy machinery to extract logs. A much greater impact than this direct environmental damage, however, is the opening of the forest for colonization. Logging companies construct new roads and open new skid trails in forest areas that were previously inaccessible, thereby facilitating spontaneous colonization.

In the last few years the debates over sustainable logging have concentrated on the certification of the timber in natural forests. With the guidance of well-thought indicators and criteria for sustainable logging operations, most of the negative environmental consequences can now be eliminated. A certificate guarantees buyers that wood has come from a sustainably managed forest, and at the same time, provides 'green' producers with improved access to the timber markets in Europe and the U.S. (Kiekens, 1999a). The first certificates are already operative, but problems with national translation of the international criteria, monitoring, and high costs complicate the process. Negotiations between forest protectors and the logging industry are underway and efforts are being made to optimize the certification process, including the possibility of phased certification in countries that are lagging behind.

Large-scale plantations

The transformation of natural forests into agricultural and tree crop plantations is an important cause of forest clearing in Asia and Africa. In Latin America, by contrast, plantation establishment is only a minor cause of deforestation, private companies involved in plantation crops have enough capital and expertise to start up monoculture plantations in old-growth forests. Their cost-benefit analysis is much more concerned with soil quality, transport facilities, harbors, labor costs, official regulations and taxes than with environmental matters. Besides resulting in loss of habitat, commercial tree crop plantations also tend to involve concentrated agrochemical use. Tree crops such as rubber, palm oil, cocoa, coffee, and coconuts are important commodities with growing international markets. Malaysia and Indonesia are the main suppliers of palm oil and rubber and have converted thousands of hectares of natural forest into plantations. In both countries, oil palm estates have expanded rapidly in recent years and represent a major cause of deforestation (Potter and Lee, 1998).

Timber is another essential plantation crop in the tropics and between 1980 and 1990 the total area under plantations increased from 18 million hectares to 44 million hectares (ITTO, 1997). In some places natural mixed forest is 'reforested'

with monocultures of timber species. Particularly in South America and South East Asia, fast-growing softwood such as eucalyptus, gmelina and pine have been planted for the pulp and paper industry (Carrere and Lohman, 1996). Hardwood plantations are much less common because of their longer rotation and their low profitability compared to timber extraction from natural forests. This may change in the future, when natural stands become depleted and prices rise. Teak (*Tectona grandis*) and mahogany (*Swietenia sp.*) are examples of high value timber crops that are already grown on plantations in Southeast Asia. Most tree plantations are planted on land that has already been cleared before for other purposes, and so can not be considered as direct causes of deforestation. The role of multi-nationals in establishing plantations in the tropics could increase as a result of the Kyoto Protocol, which has outlined institutionalized carbon sequestration from reforestation (Asumadu, 1998).

Mining and petroleum exploitation

Pioneers have practiced small-scale mining of gold and other precious minerals since the first colonization waves entered tropical forests.[9] In the last decades large-scale mining operations have increased enormously, partly due to the involvement of multinational companies. Rich deposits of copper, gold, bauxite, tin, and iron ore are found in the forests from Papua New Guinea to Brazil, and these are extracted in open cast or underground mines. The direct clearing of trees for these operations is concentrated in relatively small extraction areas (Grainger, 1993). A much larger environmental problem is caused by the wastes from extraction and mineral processing operations which often seriously pollute nearby rivers and can affect whole forest ecosystems. The same holds for hydrocarbon extraction in tropical forest environments. Almost all Amazon countries have important oil and gas operations inside forest areas, with severe environmental consequences. Multinational companies together with state oil companies have been in charge of the exploration and extraction process, and have not taken much account of environmental issues. Their activities have frequently resulted in spills and oil pollution around drilling sites in the forest. Nowadays, awareness is growing and local people, backed up by environmental activists, call companies and governments to account (Rainforest Action Network, 1998).

UNDERLYING CAUSES OF DEFORESTATION

During the 1990s, research on deforestation has looked beyond direct causes and focused on the 'underlying causes' behind the people who handle the torch, the axe or the chainsaw. The Intergovernmental Panel on Forests (IPF) and its successor the Intergovernmental Forum on Forests (IFF) have also emphasized the importance of a deeper understanding of the underlying causes of deforestation and urged appropriate action (IFF, 1999). These driving forces are broader mechanisms in the socio-economic and political environment which influence the direct actors' activities. These forces operate at the local and national level in tropical countries

[9] The direct deforestation caused by these activities is rather limited, but they can have a large environmental impact, as in the case of gold extraction with the use of mercury.

and are linked to international markets and institutions. In this section, most underlying causes are clustered into three main categories; the same categories will also be used to shed light on the case studies in the following chapters.

Population pressure and income

Neo-Malthusian theories (for instance Ehrlich and Ehrlich, 1970) accord primary importance to population pressure and poverty when explaining environmental change and resource depletion. They argue for a direct link between overpopulation in tropical countries, and forest encroachment. Population pressure in tropical countries is particularly high: 60 percent of the people that were added to the world population during the 1990s live in the tropics.[10] The highest birth rates occur in the poorest strata of the population. These are often the peasants who encroach on tracts of closed forest. When poor households with many mouths to feed have no other option than to eat into forest resources, they enter a real 'poverty trap'. The result may be a downward spiral of ongoing impoverishment and resource depletion.

The often cited equation I = P.A.T, that considers environmental impact (I) to be a function of population (P), affluence (A), and technology (T), can be used to explain the relation between population and deforestation. The product of the number of people and the average person's consumption of resources (as an index for affluence) is multiplied by an index of the environmental disruptiveness of the technologies that produce the goods consumed (Ehrlich and Ehrlich, 1990). When the figures are correctly defined and measured, the formula I = PAT is a good general indicator for peoples' impact on forests. Disputes begin when the aggregate figures are used to explain specific deforestation processes in a specific forest area, in which case further differentiation of causes is required (Durham, 1995; Meyer and Turner, 1992). Capital-intensive technologies that increase deforestation such as soybean and livestock technologies in Latin America and the use of chainsaws in logging operations, exactly confirm the theory. Conversely, intensive green revolution technologies in rice and other grains have probably discouraged the bringing of new areas into cultivation (Kaimowitz and Angelsen, 1998b).

The data in Figure 1.1 demonstrate a strong inverse correlation between forest cover and population density. As more people require more food and income, population growth, *ceteris paribus*, tends to result in fewer trees. This correlation is even stronger if population pressure is combined with poverty, open access to forest, and a lack of government control. Under these conditions, population growth in forest areas is the driving force for further deforestation.

[10] Most tropical countries have an annual population growth rate of between 2 and 3 percent. In 1995, the most important countries with tropical forests and those relevant for this study all show this trend: Brazil, 1.6%; Cameroon, 2.8%; Ecuador, 3.3%; Dem. Rep. of Congo, 3.3%; Indonesia, 2% (UNDP, 1999b).

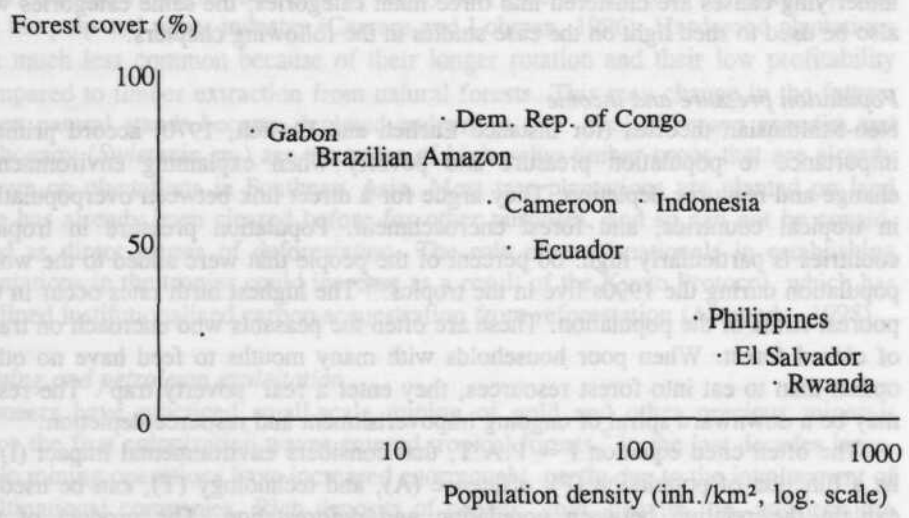

Figure 1.1: Relationship between forest cover and population density for some tropical countries. Data for Latin America cover the period 1975 and 1989; for Africa the year 1980; for Asia the period 1956-1989 (source: Palo, 1994).

Poverty and population growth are not the only causes of deforestation. Economic growth and rising levels of income per capita result in an increased availability of capital for new roads and chainsaws, and in growing demands for agricultural and forest products (Contreras-Hermosilla, 2000). The relationship is reversed, however, once per capita income reaches a certain threshold level. Whereafter further increases lead to reduced dependence on agriculture and forest products, technological improvements, better state functioning, and urbanization, all of which can relieve pressure on natural forests. This relationship is represented by the 'environmental Kuznets curve' (see Figure 1.2), which according to some evidence accurately represents the situation in many developing countries (Vincent *et al.*, 1997). An increasing population can shift the curve upwards, a fact that is particularly relevant for Africa. If two countries have similar resources, but country A has a higher population density than country B, then the maximum rate of deforestation (or the threshold GDP level) will be higher in the former (Figure 1.2). Cropper and Griffiths (1994) examined 64 countries and estimated that the threshold GDP above which further income growth no longer induces deforestation would occur at about US$ 4,800 for Latin America, and US$ 5,400 for Africa.

Still, it remains difficult to establish *a priori* the effect of economic growth on forest cover. The impact of higher incomes will depend on the types of forest products and services which are in demand, and on the income elasticity of that demand (Contreras-Hermosilla, 2000).[11] A growing demand for meat in a tropical

[11] Besides agriculture and timber production, services such as recreation and tourism can also become

country can lead to more deforestation when pastures are established in the forest; the effect is reversed when more meat is imported and there is less demand for agricultural products that are grown on forest soils. Another important issue is the social distribution of the economic growth, because wealth inequality can be responsible for severe distortions of the predicted relationship. Raw figures of population or income growth alone, therefore, require some deeper analysis before their relative importance for deforestation can be assessed.

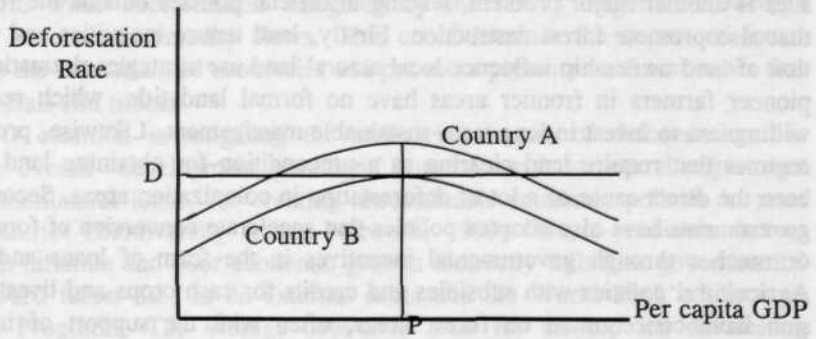

Figure 1.2: Environmental Kuznets curve showing the relationship between economic growth and deforestation (source: Contreras-Hermosilla, 2000).

Other factors that may neutralize the effect of demographic and income variables are related to the available land use techniques. Economists such as Boserup (1965) have shown that the intensification of agricultural labor and technology is able to overcome the impact of a growing population. Extensive shifting cultivation intensifies into permanent cultivation. In most tropical regions, this stage is only reached when the forest has already gone. If forest is to be preserved in areas with growing populations, integrated agricultural and forest development tend to be required: agroforestry, intercropping, tree domestication, and sustainable extraction of NTFPs. With these technologies, 'more people could lead to less deforestation' (IFF, 1996b; Myers, 1991). This brief review of the debate on population and poverty has made it clear that population growth alone is not responsible for the continuous stream of pioneer colonists. Population growth acts in concert with land use systems and various external factors. These external forces are discussed in more detail in the following sections.

Government policies and institutional structure

State departments and government agencies play crucial roles in shaping the socio-political environment in forest areas. Repetto and Gillis (1988) contend that the forest sector policies which regulate timber concessions and wood-processing industries contribute directly to deforestation. The issuing of concessions and the levying of taxes and stumpage fees are as important as the forest-related factors in

important activities in forests once GDP per capita starts to rise.

shaping logging companies' investment decisions. Many government policies seek short-term benefits and grant concessions to logging companies while neglecting the long-term environmental and social effects. Forestry departments are responsible for implementing forest policies, but they often lack the skills and resources to monitor the logging operations properly. The result is that control is very ineffective and the forestry legislation that has come into power under pressure from international agencies in recent years cannot be enforced.

Lack of coordination between different departments on policy and planning issues is another major problem, leading to official policies outside the forest sector that also promote forest destruction. Firstly, land tenure inequities and the regulation of land ownership influence local actors' land use strategies dramatically. Most pioneer farmers in frontier areas have no formal land title, which reduces their willingness to invest in long-term sustainable management. Likewise, property right regimes that require land clearing as a precondition for obtaining land titles have been the direct cause of a lot of deforestation in colonization areas. Secondly, many governments have also adopted policies that accelerate conversion of forest to farms or ranches through governmental incentives in the form of loans and subsidies. Agricultural policies with subsidies and credits for cash crops and livestock expansion have concentrated on forest areas, often with the support of international lending institutions as the World Bank and the regional development banks (Roper and Robberts, 1999). During the last decade, international donors have suspended most of these direct loans for clearing forest under pressure from environmentalists. In the light of this policy change, many tropical countries today require environmental impact assessments (EIA) for new government funded projects. But often these assessments are of poor quality and treated as mere bureaucratic requirements. Consequently, few of the measures proposed are ever implemented (Kaimowitz, 1998). It, therefore, remains questionable whether public investments are actually scrutinized through EIAs, or merely 'greenwashed'.

Many tropical countries have adopted policies to stimulate the colonization of forest areas in order to take socio-economic pressure off highly populated areas ('safety-valve policy') or areas affected by land conflicts. Large countries such as Brazil and Indonesia set up large settlement schemes in forest areas during the 1970s 'to give land without people to people without land', as the slogan of that time put it. Many colonization schemes failed when government support dried up after a few years (Colchester and Lohmann, 1993). Infrastructure works like new roads, waterways, hydroelectric dams, and frontier towns are often related to rural development and land reform policies. They are also based on geopolitical strategies of opening remote frontier areas and establishing government presence in forest areas. These state-sponsored projects are direct causes of deforestation, but the indirect consequences in the form of a spontaneous influx of migrants and investors are much more detrimental for the forest.

Markets and macro-economic conditions

There is little economic appreciation of the value of the goods and services provided by tropical forests or of the real costs of forest management. Because forests are undervalued, they play no significant role in decisions regarding resource allocation,

development priorities, and land use (Pearce and Moran, 1993). A number of researchers have focused on macro-level forces such as financial mechanisms, center-periphery relations, and globalization as ways of explaining deforestation (for instance Bunker, 1985; Hecht, 1985). Global commodity markets are often regarded as more influential mechanisms controlling the exploitation of tropical forests than local or national policies. Markets for minerals, timber, livestock, and tropical crops have already been discussed above. Most of these commodities are traded internationally and price making occurs in remote consumer markets. The current trend towards trade liberalization instigated by the GATT negotiation focuses particularly on such commodity flows. This could increase the export of forest resources to the industrialized economies and put more pressure on forest zones that contain minerals and timber.

An NGO coalition investigating the underlying causes of deforestation has blamed the overall 'development paradigm' together with structural adjustment plans and multilateral loans, for creating unsustainable economic policies in most tropical countries (Biodiversity Action Network, 1999). Macro-economic factors such as high inflation and poor economic growth indirectly influence governmental policies toward forest use, as do external debts and the World Bank's Structural Adjustment Programs. The average debt/GNP ratio for the top ten deforesting countries rose from 26 percent in 1975 to 60 percent in 1996 (World Bank, 1998). However, this does not necessarily prove a direct link. In specific cases, some direct linkage can be detected between deforestation and a country's international debt (Kahn and McDonald, 1994). Research by Capistrano and Kiker (1995), however, reached the opposite conclusion. On the basis of the existing studies it remains unclear whether central governments liquidate their forest resources to pay debts or simply to obtain short-term benefits (see Shafik, 1994).

CONCLUSIONS

In the last decades, the destruction of tropical rainforests has become an important issue on the international conservation and development agenda. As a result, international donors and some governments in tropical countries have made a start with managing tropical forests in a more sustainable way. The various values of tropical moist forests are slowly being recognized and their broad functions for people and in the maintenance of biodiversity (locally and globally) are becoming evident with the gradual loss of natural forests worldwide. The consensus in the international arena about the seriousness of the deforestation problem and the need to do something about it contrasts with the general disagreement about definitions and exact deforestation figures.

In the year 2000, there are still competing attitudes and perceptions towards tropical forest. The ways in which people use or abuse the forest differ according to the functions of the forest which they value most. At one extreme stands the conservationist who wants to preserve as much tropical forest as possible for the sake of the world's biodiversity treasury. A more moderate approach is embodied in the sustainable development discourse which proclaims the harmonious presence of people inside

forest zones. Politicians and businessmen who advocate economic growth represent the other extreme. They consider forests to be barriers to development and the conservation of these 'green hells' to be a neglect of the sovereign right of tropical countries to harness their resources for the benefit of their predominantly poor populations.

This chapter had identified two fundamental forces from which the causes of deforestation arise. Human colonization of the forest, firstly, results in forest encroachment, directly visible in the conversion of forest to agriculture, in infrastructure development, and in unsustainable logging practices. A broad overview of the situation in the largest remaining tropical forests shows that three groups of actors reappear time and again. Smallholders practice slash-and-burn farming and their growing numbers require constantly more forest; private companies clearcut forest in order to start agribusiness plantations, ranches, or tree plantations; and logging companies fell trees first by selective cutting, and finally by massive clearcutting.

A second category of forces for deforestation works much more indirectly. These broader mechanisms in society form underlying factors that influence direct actors. Firstly, the social factors of population pressure and poverty can exacerbate the pace of forest loss. This relationship, however, is not always as linear as Malthusian thinkers may suggest. Boserup's idea of agricultural intensification and the Kuznets curve have indicated that economic growth and development can avert the environmental crisis, resulting in 'more people and less deforestation'. Secondly, government policies together with the functioning of global and local economic market forces shape the prices and conditions under which deforestation takes place. Many governments in tropical countries have perpetuated land inequalities and introduced 'perverse' incentives that stimulated massive forest destruction, while restricting the benefits accruing from these valuable resources. Such measures together with corruption in governmental departments, are increasingly criticized by the international donor community and by national civil society. The macro-economic forces affecting forests seem only to have increased in strength over the last decade, as market principles have permeated every hectare of forest and the will of the World Bank and the IMF has become omnipotent. Whether this is a good thing for the forest is hard to assess in general and depends largely on the local context, which will be analyzed in detail for three countries in the following chapters.

This discussion of deforestation and its main direct and indirect causes provides a general introduction to the problem, but it does not provide a theoretical explanation for the origins of that problem. The following chapter will present several of the general mechanisms that go beyond the local context and touch on regional, national, and international forces.

CHAPTER II

THEORETICAL PERSPECTIVES ON DEFORESTATION

This chapter explains briefly a number of theoretical perspectives on the deforestation process, which will together form the framework of the remainder of the study. These perspectives operate on different levels of analysis, and are therefore complementary to each other in explaining forest clearing and forest degradation. The land use theory of Von Thünen forms the starting point, and is linked to the concept of the frontier and some general deforestation patterns. These geographically-based models operate on a regional level, situated at the fringe of the forest. Other theoretical elements are taken from political economy, micro-economics, and political science of the state. With the help of all these various models, a general story emerges which divides the forest fringe into three land use zones: an extractive, an extensive, and an intensive zone. Within these zones, five important groups of actors will be examined. Finally the methodological issues raised by this research are briefly presented, and the central research question of this study formulated.

THEORETICAL MODELS AND THEORIES OF DEFORESTATION

Kaimowitz and Angelsen (1998a) argue that the issue of scale is the most crucial element in all studies of the causes of deforestation. Most theories struggle with the size and the unit of analysis under study. Perspectives differ greatly depending on whether the focus is on forest clearing in individual plots or on regional, national, or continental scales. This study will limit its scope to a regional scale in the three different case studies and adjust the different theories and approaches to that level.

Pearce and Brown (1994) give an overview of statistical studies that test hypotheses linking deforestation to population growth, poverty, income growth, external indebtedness, structural adjustment, and other aggregate variables. Many studies indicate positive correlations between these variables and deforestation. Problems remain with respect to the availability of reliable data and the complex causal relationships behind the general correlation. A number of deforestation models have attempted to explain the correlation between lost hectares of tropical forest and a variety of independent variables such as household size (Pichón and Bilsborrow, 1992), land tenure (Southgate, 1990), migrants' place of origin (Rudel, 1993) and economic variables (Ozório de Almeida, 1992). Other studies have investigated macro-level elements such as population growth, GNP, and external debt (see Rudel 1989; Gradwohl and Greenberg, 1988; Kaimowitz, 1997). Many of these studies have offered very interesting insights into the effect of these variables, which will be discussed later in this chapter.

Mathematical models use the statistical data in order to elucidate the influence of certain factors and simulate future scenarios. Some of these models focus on a single element, such as the international timber market (Jepma, 1995), cattle in the Amazon

(Hecht, 1993), or land tenure (Dorner and Thiesenhusen, 1992). The problem with these studies is that they do not take into account the multiple factors that influence deforestation and that interact with each other in a given place and time. A number of more complex multiple regression models have been developed which do take account of these interactions when explaining spatial dynamics in forest environments. They calculate actors' choices per grid cell with the help of GIS data. The DELTA model (Southworth *et al.* cited in Kaimowitz and Angelsen, 1998a) is one example. In the Netherlands, researchers have developed models such as IMAGE (Zuidema *et al.*, 1994) and CLUE (CLUE, 2000). A general criticism of all these statistical studies and models is that they cannot stand alone. The data analysis requires a theory or theoretical framework which characterizes the process of tropical deforestation. Statistical models call for theories on how specific actors come to their decisions in a given socio-economic context.

Von Thünen's land use model

In 1826, the German geographer Von Thünen developed a land-use model based on rent gradients forming expanding circles around a city. The theory works at any scale, so that the idea of concentric land use circles around a city can be extrapolated to a region or country. The model is based on simple micro-economic assumptions of profit maximization. The basic idea is that transport costs increase when one moves away from urban centers/markets. Consequently, crops produced on land close to markets have lower transport costs than the same crops on more remote and less accessible land. This has two effects. First, the economic profitability of crops and land decreases with increasing distance from markets. Second, with increasing distance from the city, economic activities with a high value/weight or volume ratio will be selected in order to remain profitable.

The general idea of land use zones around a center can also be applied to explain the different land use zones at tropical frontiers. Transport costs sharply influence the value of a plot of land and determine the profitability of extracting valuable timber, minerals, or transporting cultivated crops or cattle to the nearest market. This also causes a reduction in the intensity of agricultural production as the distance to markets increases when a new peripheral area is colonized (O' Kelly and Bryan, 1996). The costs of transport affect not only the types of commodities produced or extracted, but also the inputs (such as manufactured goods, services, institutional support, fertilizers, machines, etc.) that can be brought from the center to the zone. These inputs also show a transport cost gradient that is linearly related to distance and reinforce the impact of transport costs on land-use decisions (*ibid.*).

There is also a direct relationship between commodity prices and land prices. The price of a hectare of land stands in direct relation to the profits yielded by the most Under normal market circumstances, this economic rationality results in the formation of concentric circles of land use around the urban center that functions as the market for agricultural products. The pattern is one of an intensive land use zone closest to the market, followed by an extensive land use zone, an extraction zone, and finally wild nature (Figure 1.3). Intensive agriculture and intensive animal husbandry form the first ring around an urban center. High inputs of labor, capital, and expertise characterize these types of land use. Highly perishable products such

as vegetables and dairy products are produced closest to the market. The next ring contains extensive agriculture with low inputs including slash-and-burn agriculture, together with extensive livestock production on pastures with a low carrying capacity. Cattle walk their own way to the market and can, therefore, graze on remote pastures. The third ring is the forest fringe where some people cultivate for their own subsistence and others extract timber and minerals. It is only profitable to move heavy machinery into these remote areas for the extraction of very valuable resources. The outermost ring is the 'untouched' forest that does not supply the market because transport costs are higher than the potential profits from extracting resources. In this zone, forest-dwellers cultivate land and extract solely for their own subsistence (de Groot, 1999).

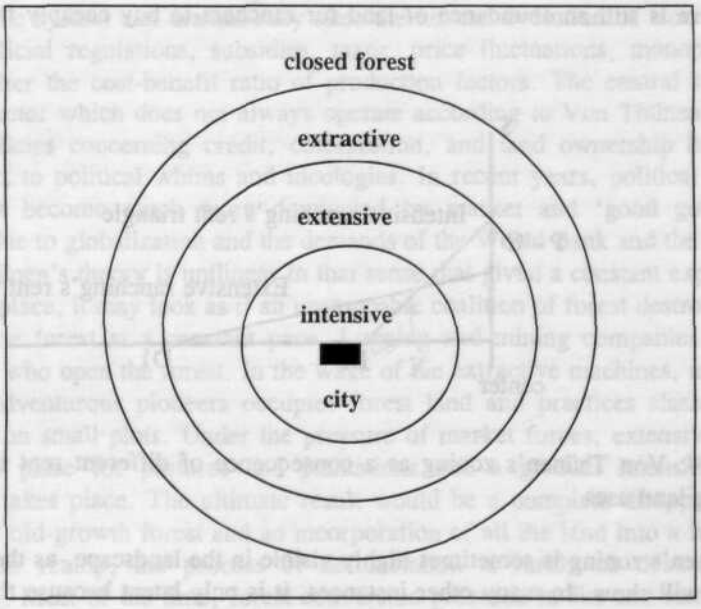

Figure 1.3: Von Thünen's theoretical land use zones applied to a tropical frontier zone (based on De Groot, 1999).

It is especially important to underline the dynamic aspect in the movement of the rings. Economic development can result in an agricultural expansion that spreads out from the center and converts forest into arable land. To illustrate this, Figure 1.4 depicts ranching that can evolve in two competing land use zones, each with a different profit triangle caused by different market prices and per-unit transportation costs. Consider an initial situation where there is a small urban center in an area of abundant forested land with few roads and limited infrastructure. When the market conditions are suitable for cattle, extensive ranching is an interesting option due to the abundance of cheap land and the fact that it requires little infrastructure or inputs. Ranchers clear the forest as far as location D1, which marks the ultimate distance from the market at which pastures are established and ranching is profitable

[Production value (P) minus Costs (C) is positive]. When time evolves, economic expansion of the urban center results in better roads and market infrastructure, which extends until the ranching area. Consequently the costs of transport decrease, intensive ranching can produce dairy products which need to transported rapidly to the city, and at the same time inputs and expertise from the center can reach the countryside. It will result in an intensive rent triangle that extends from the town to location D2. The zone up to the succession point X, will be transformed into a more intensive zone with dairy farms. Beyond point X, extensive cattle ranching will remain more profitable. The development in the intensive zone also influences the extensive rent triangle; point D1 will move along the line, causing the frontier to advance. The reason for this is that the presence of the intensive zone also lowers costs for the extensive ranchers, who then expand their pastures into the forest area. Here, there is still an abundance of land for ranchers to buy cheaply from pioneer colonists.

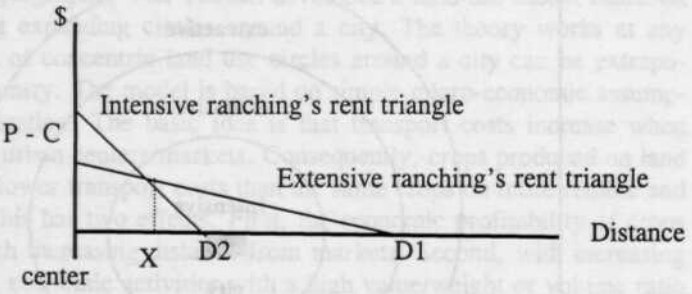

Figure 1.4: Von Thünen's zoning as a consequence of different rent triangles for competing land uses

Von Thünen's zoning is sometimes highly visible in the landscape, as the case study of Brazil will show. In many other instances, it is only latent because the empirical reality does not always show clear-cut concentric circles around urban centers. A first reason for this is that there is not always a clear-cut edge between two zones. The transition can be diffuse, and result in an intermediate space where remnant activities of the old zone coexist with activities of the new zone. Secondly, physical factors such as land quality, topographic barriers, roads and rivers, and the influence of multiple market centers can cause the zones to be non-circular in shape. Thirdly, time lags and incomplete market information mean that actors often continue to do as they are used to without adapting their land use immediately to the evolution of the zones; an old farmer for instance, may continue with a traditional form of extractivism, despite the fact that intensive cash-crop farming has become more profitable. In most areas, it will only be a matter of time before farmers adapt

to the reality of changed prices.[12] A fourth and most striking reason for complexity is the fact that frontier villages or towns in zones of extensive land use set up their own local market of the large-scale zones. Pre-processing facilities such as mineral refineries and sawmills may also be installed in the countryside, far away from the urban central market place in order to reduce transport costs.

The four situations above still fit into Von Thünen's structure, but this is not so in all cases of deviations from the circular pattern. At the level of the local actors, firstly, motivations may differ and from simple profit maximization due to considerations of risk aversion, a desire for independence, moral and social obligations, patron-client relationships, or cultural taboos. It may be the case that pioneer farmers clear forest only to claim ownership of the land in an isolated area which Von Thünen's model would exclude for frontier expansion. Secondly, the political and economic system can dramatically alter the normal evolution of Von Thünen's zoning. Official regulations, subsidies, taxes, price fluctuations, monopolies and such like alter the cost-benefit ratio of production factors. The central state is an influential actor which does not always operate according to Von Thünen's model. Official policies concerning credit, colonization, and land ownership have often been subject to political whims and ideologies. In recent years, political decision-making has become much more dominated by market and 'good governance' principles due to globalization and the demands of the World Bank and the IMF.

Von Thünen's theory is unilinear in that sense that given a constant expansion of the market place, it may look as if an unstoppable coalition of forest destroyers must roll back the forest at a constant pace. Logging and mining companies form the trailblazers who open the forest. In the wake of the extractive machines, an army of poor and adventurous pioneers occupies forest land and practices slash-and-burn agriculture on small plots. Under the pressure of market forces, extensive agriculture makes place for pastures and plantations and a gradual intensification of production takes place. The ultimate result would be a complete disappearance of the original old-growth forest and an incorporation of all the land into a full market economy. In reality, the process of deforestation is rarely so destructive and consecutive. Most of the time, forest conversion proceeds in fits and starts; boom-to-bust cycles and irregularities in the colonization expansion make possible partial regeneration of the vegetation. The result is forest fragmentation rather than a complete clear-cut, and the persistence of forest remnants next to secondary vegetation and farmland. The next section explains land use dynamics at the forest fringe in more detail.

Frontier studies

Turner (1893) used the concept of the frontier to describe the moving boundary between settled and unsettled land in North America, where pioneers colonized the wild land. Frontier settlement has been a recurrent phenomenon throughout history. The process of settlement, agricultural colonization, and boom-to-bust cycles applies to

[12] 'Trial-and-error farming' with different crops which many colonists practice during the first years in order to determine which type of land use is the most profitable for them, may also be regarded as a form of 'time lag'.

many regions. The frontier concept has mainly been used to explain the conquest of a heartland where free initiative could conquer unsettled, open-access land (Hennessy, 1978).[13] In the narrow sense, frontiers mark a transition line in a geographic region, while in a broader definition the frontier is a transitional process by which specific new territory is incorporated into a the larger economy. Most of the time, frontier expansion is not into an empty space, but is rather a transition stage between two different economic and institutional systems. On one side, there are indigenous groups or unincorporated forest-dwellers who have lived for generations in the forest. On the other side, pioneers and colonists arrive who experience the dense vegetation as a barrier to extraction and territorial expansion. Through this confrontation, the frontier becomes a zone in which economic and social relations act upon each other and sometimes collide with each other. It can result in 'enclave activities', which are not integrated in a local economy: high-tech mining operations in a forest that is used by hunters and gatherers, or extensive cattle ranches surrounded by small-scale subsistence farms. The juxtaposition of such different modes of production often result in conflicts over land or the control of forest resources.

In relation to the contemporary issue of deforestation, the frontiers of mining and logging activities, agriculture, and cattle are the most relevant. The agricultural colonization frontier is a particularly complex process, and has received the most attention from academic researchers. In the literature on colonization, a sequence of stages are generally used to explain the dynamics of an agricultural frontier as it moves deeper into the forest. Three typical stages of frontier expansion according to the deforestation literature are: (1) the pioneer stage, in which the forest is opened up for extractive activities; (2) the consolidating stage, in which farmers start to diversify their production; (3) the specialized stage, in which agricultural production makes much use of external inputs (see Moran, 1981 and 1983; Richards, 1997). In some literature, the frontier is also defined as 'old' versus 'new' or 'open' versus 'closed' frontier in order to mark the start and the end of the land colonization. Other authors relate specific activities to the frontiers and characterize them as speculation frontiers, cattle ranching frontiers or small-peasant frontiers (*e.g.* Mueller, 1996).

In this study, the concept of the frontier refers to a general transitional stage between undisturbed closed forest and a central urban market. It is divided into three zones that correspond with Von Thünen's rings (Figure 2.1). 'The extraction zone' corresponds with the pioneer stage and lies in the undisturbed forest area where pioneer colonists extract forest resources. Second is the 'agriculturally extensive zone' of subsistence and cash crop farmers, where products diversify and markets consolidate. In the 'intensive land use zone', finally, land is no longer abundant and intensified agriculture develops according to the market principles of the central economy, resulting in the closing of the frontier. The congruence of geographic and temporal categories makes sense when one considers the geographic

[13] Hennesy (1978) gives an overview of the different frontiers in the history of the Americas: Jesuit mission frontiers; gold and silver mining frontiers; cattle expansion in Argentina and Brazil; the rubber boom-to-bust cycle in the Amazon; agricultural frontiers of wheat, coffee, cocoa, sugarcane; European settler frontiers in North America and Japanese, Chinese and Mennonite migration to South America.

zones as a diachronic perspective of a fixed place during a long period of frontier expansion in which the three zones occur successively. What today is a pioneer zone with extractive activities at the forest fringe, will be an established zone of intensive agriculture after 20 to 50 years. In the ultimate stage, the frontier is old and closed and land use evolves into intensive production. Urban centers evolve from small frontier towns at the edge of the old-growth forest into fully equipped economic centers.

Spatial patterns and driving forces

Spatial models of deforestation measure the correlation between loss of forest cover and independent landscape variables. The approach here consists of determining the location of deforestation on maps that include natural and cultural variables, and incorporation into geographic information system (GIS) processing (for an overview see Kaimowitz, 1998). According to Mertens and Lambin (1997), any deforestation process leaves a 'footprint' in the forest. Husson *et al.* (1995) have proposed a typology of deforestation patterns which will be useful for the further investigation of driving forces behind deforestation in the three case studies (see Figure 2.2).

Geometric type	:	geometrically shaped cleared areas, typical of large ranching activities and plantations (Malingreau and Tucker, 1990).
Corridor-linear type	:	deforestation along rivers and roads, where (spontaneous) colonization takes place by smallholders.
Fish-bone type	:	associated with planned colonization schemes where colonists clear geometric parcels along roads (see Tucker *et al.*, 1984)
Diffuse type	:	small patches of clearings surrounded by forest, resulting from traditional shifting cultivation with long fallow periods.
Patchy type	:	cleared areas with remnant forest patches; found in densely populated or long-colonized areas dominated by agriculture or pastureland.
Concentric-island type	:	a concentric pattern of cleared areas around urban centers that gradually disappear further away from the urban centers, called Von Thünen rings by Mertens and Lambin (*ibid.*).

The different patterns can be directly related to the types of actors responsible for the deforestation, and sometimes also indicate which indirect actors or driving forces are fuelling it. Major colonization frontiers such as Rondônia in the Brazilian Amazon show a clear fish-bone type of deforestation (3). This occurs along planned roads where official colonization schemes offer every farmer a rectangular, 100-hectare piece of land. If government assistance is not available, spontaneous colonization results in a corridor-linear pattern (2), much more in accordance with the natural conditions of accessibility and with market opportunities. Geometric

deforestation (1) on enormous cattle ranches or large plantations is the footprint of large estate owners, and indicates an area where small peasants are absent. The diffuse type (4) characterizes an area where no colonization frontier is active, but forest-dwellers clear for small-scale farming. The patchy type (5) and the concentric type (6) reflect frontiers which evolve according to agricultural intensity and the influence of central market places.

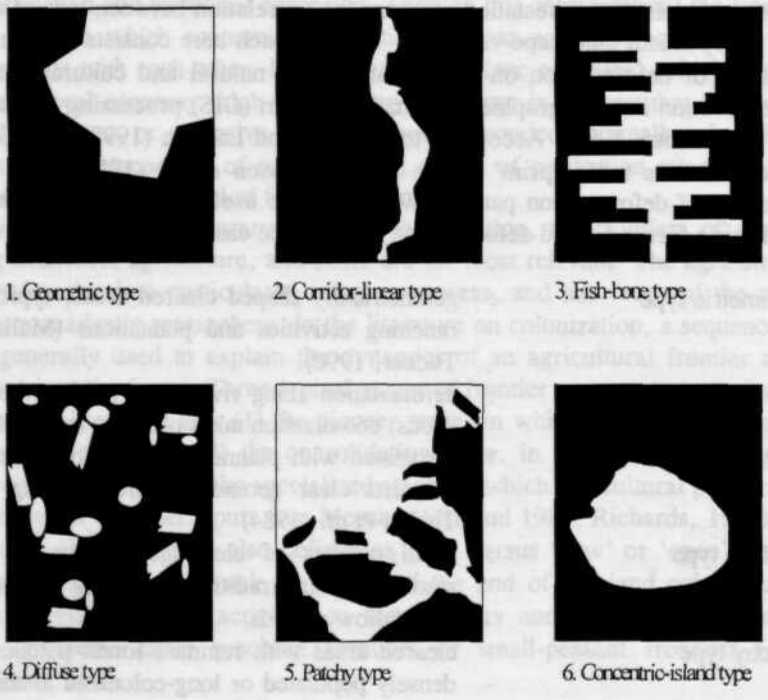

Figure 2.2: Spatial deforestation patterns (based on Husson *et al.*, 1995)

Political economy perspectives

The ideas and assumptions of political economy influenced world system theories, neo-Marxism, and dependency theories. Some political economists have focused on the role of the state and its agencies, and demonstrate how interconnected social, economic, and political processes affect the way natural resources are exploited. In their view, the environmental crisis in developing countries is not simply a reflection of policy or market failures, but an outcome of economic interests and political struggles (for an overview see Bryant and Bailey, 1997). This perspective, characterized as 'political ecology', situates the root causes of environmental destruction in class and

power relations controlled by economic and political forces. The role of the state, made up of self-interested policy-makers, becomes clear in its dynamic alliance with multinational capital and the domestic elite. Government decisions regarding the allocation of public and private capital, made in a politicized environment, can dramatically affect the livelihoods of rural people (*e.g.* Blaikie, 1985; Blaikie and Brookfield, 1987; Little and Horrowitz, 1987).

Authors such as Collins (1986), Schmink and Wood (1987), Stonich (1993) and Browder (1995) contend that the wider socio-political environment engenders the driving forces responsible for deforestation. This environment makes possible unfair conditions characterized by expulsion of smallholders by large estate owners, land inequality, and rural poverty. A lack of secure tenure systems, government assistance, and credit facilities aggravates the situation. In the absence of alternative economic opportunities, people are compelled to encroach on and cultivate marginal forest. Itinerant shifting from one plot to another is the result of pressure from external factors. Foweraker (1981) blames the breakdown of the peasant mode of production on its articulation with the wider socio-political system: the oligopsonistic marketing system of intermediaries at the forest fringe results in unequal exchange and product prices that are structurally unfavorable for the producing peasants.

World system theories offer a dual spatial (center-periphery) framework. On one side, there is the forest frontier as a typical periphery supplying resources for the global economy through boom-to-bust cycles of exploitation of valuable resources. On the other side, transnational companies organize and orchestrate the supply of and demand for these resources from their headquarters in metropolitan centers. Such dual world theories are based on paradigms of dependency, surplus extraction and unequal change (see Frank, 1978; Wallerstein, 1974; Bunker, 1985). Proponents of this approach assume that global capitalist expansion reproduces capitalist modes of production including the universal ethical and cultural values of the consumer as far as the most remote settlement in the forest (Browder and Godfrey, 1997).

Many of these valuable insights inform the theoretical approach in the analysis of the case studies in the following chapters. They must not, however, lead to a reduction and abstraction of complex interactions in which the poor are portrayed exclusively as victims and deforestation is blamed exclusively on 'capitalist forces'. In many places, poor peasants have exit options that enable them to avoid the influence of the global capitalist system and the power of state oppression. In reality, poor farmers often clear forest without pressure from above and deforestation can be particularly rapid in areas where farmers enjoy land titles and access to credit (De Groot and Kamminga, 1995).

Land clearing strategies as economic responses

Theories of deforestation cannot remain at the macro level only, stressing abstract factors and world theories. A more down-to-earth approach is to consider what profit the felling of trees brings for a particular farmer. Individual land-use decisions form the basis of larger patterns, and some writers, including Ozório de Almeida (1992), therefore take economic conditions at the farm household level as a starting point for explaining forest clearing patterns. Using Chayanov's theory

(1966), Ozório de Almeida indicates that decisions about farm production and family labor are based on demographic characteristics of the household, such as family size and age and gender composition. Households that are either too young or too old to produce a surplus, which is necessary for accumulation, have no option other than shifting cultivation with short fallow. This occurs in the poorest strata of the population, who have no other working capital than their own family labor force. Thus life cycle characteristics combined with poverty, low technological input and infertile soils may lead to itinerant farming. The peasant families involved mine the nutrients of the soil and abandon the plot after a few harvests to start over again with clearing a new plot. This results in high mobility and a high turnover of land. This 'itinerant agriculture' brings about continued movement of the agricultural frontier and occurs even if there are no interactions with other actors and the wider economy.

Ozório de Almeida (1995) considers the clearance of forest by peasants at a moving frontier as the result of a 'demand for land'.[14] She distinguishes fundamentally between two forms of deforestation. 'Productive deforestation' occurs when it is profitable to invest time and labor in the conversion of forest into arable land. However, this is not always the case. In many situations at an advancing frontier, farmers are unable to produce agricultural commodities for the market, because the costs exceed the benefits of selling. In that case, peasants cultivate only for subsistence needs and keep the land as a store of value. It is remarkable that even in this case the forest may still be burned down; this is defined as 'speculative deforestation', and occurs when farmers clear the forest to add value to the land and speculate on a higher land price in the future. This speculative land use is instigated by the fact that cleared land is worth more than forested land along agricultural frontiers, where land prices have a tendency to soar.

When speculative deforestation becomes the dominant land-use strategy, the area in which this occurs is referred to as an 'unproductive frontier'. Agricultural productivity declines and the low yields drive colonists out of agricultural production into other regions or other more profitable activities (such as trading, wage labor, services, and off-farm work). Unproductive frontiers are characterized by a diminishing cropped area and increased fallow or extensive pastureland. In terms of deforestation, this implies that much forest is left standing on individual plots, while the frontier moves rapidly into isolated areas. In the opposite case, when agricultural production is rising relative to real land prices, the area is considered a 'productive frontier'. Farmers invest in their plot; agricultural intensification and a low turnover of farming land characterize the productive frontiers (*ibid.*). As far as forest cover is concerned, productive frontiers imply a relatively complete clearance on the existing plots, but the frontier as a whole does not advance rapidly.

Schneider (1995) highlights the fact that clearance and itinerant farming, practiced by most colonists, are understandable market responses to an abundance of accessible land on an open frontier. When land is almost free and labor is scarce,

[14] In an initial stage, the supply of land is not really an issue along the forest frontier; land has *de facto* an open-access character and is abundant. Property rights are indefinite and rest with the central state, indigenous groups, and absentee owners.

'mining' of resources and extensive farming are a normal profit maximizing strategies which are followed by land abandonment when soil nutrients become depleted. A second reason for this unsustainable land use is the short-time perspective of colonists in an unstable frontier economy where lending money is scarce and expensive. Under abundant frontier conditions and where credit is unavailable or expensive, it is cheaper to destroy natural capital and gain immediate income than to invest it in long-term production.

The institutional context and deforestation

Schneider (1995) builds upon Almeida's finding that settlements with higher incomes tend to have higher farm turnover. This seems to be a paradox; a popularly-held opinion is that improving the incomes of smallholders creates landownership stability which slows frontier expansion/forest encroachment. According to Schneider, the explanation lies not so much in the direct state incentives for agriculture and animal husbandry, as in the institutional context existing in a frontier region. The abandonment of land by colonists, in his view, occurs not only because of tropical soils' decline in fertility, but also due to government presence and policies at the frontier. There is a race for the scarce resources in frontier areas and institutional rules determine, together with colonists' mentalities, the level of farm turnover and land abandonment.[15]

'Emerging institutions' are responses to spontaneous frontier developments in areas where economic rents of land emerge beyond the reach of the formal state agencies. Local people themselves create conditions for optimizing the economic opportunities provided by the available land, labor force and technology. With the arrival of more settlers, competition for forested land increases and landowners form into cooperatives, associations, and landowner societies in order to strengthen their claims on land and resources ('social fencing'). During this stage, the colonists' use of land is extensive and results in continuous encroachment on additional forest patches. When the formal state agencies emerge, they try to take over land rights adjudication and to provide credit and promote agricultural development. The state's capacity and willingness to enforce environmental regulations is low at this stage (frontier expansion yields revenues and political support, while forest protection is costly and unpopular). This leads to a situation in which colonists with access to information, credit, and power monopolize most of these facilities and are able to dominate frontier development. Their privileged position enables them to accelerate encroachment on forest land to a rate higher than would have been possible without a formal state presence. A differentiation among colonists emerges which leads to comparative advantages for one group over others. Ultimately, the more powerful take over the land of poor colonists.

Schneider (*ibid.*) calls this the 'sell-out effect', whereby early settlers abandon their farm and move to another plot. It is the lure of profit and the effect of land tenure policies that make early settlers sell out, not the pressure of economic failure. The economic rationality behind this is a result of the difference in opportunity costs

[15] Schneider uses the general term 'government', which stands for an institutional context that can be organized either by the central state or by informal civil groups.

of labor between the poor peasants who sell out, and the wealthier second-wave colonists who take over the land. The poor peasants who settle on the pioneer front are farmers who have nothing to lose, and therefore their opportunity cost is extremely low. At this stage, the absence of a regulated property right system means that physical occupation of the land is necessary in order to keep out invaders. As the frontier matures, state authorities can establish law and order, homesteading is no longer necessary and speculation becomes interesting for absentee landowners. At that moment, ownership of land can also cover the (higher) opportunity costs of second-wave colonists, who live in urban centers along the frontier and start to invest in land. They have easier access to capital markets than do small peasants thanks to their own investment capital, to real estate that they use as collateral for loans, or to urban links that give them information and contacts for credit. With such capital, they start to buy the earlier settlers off the land. Their advantage in terms of better access to capital is combined with a management advantage resulting from better links with the political elite. With their money and connections, they are often able to influence political decision-making on land allocation, and land protection, to their own advantage.

Durham's cycles of deforestation

Durham (1995) distinguishes two cycles of deforestation that are manifestations of farmers' speculative and productive responses to land as described in the preceding section. The first cycle, referred to as the 'cycle of capital accumulation', is associated with successful colonization and results in the depletion of forest resources and the conversion of the forest to arable land suitable for crops and pastures. Commercial production (ranching, logging, and export crop production) expands into the forest areas, fuelled by external demand and by a supportive government which grants land ownership and concessions for massive extraction of valuable resources. These activities generate lucrative short-term profits which are partly reinvested in expanding the existing pioneer activities. This is a positive feedback loop, since successful deforestation produces funds that fuel its own acceleration. The use of wage labor is an important element in the expansion of the agricultural zone. Established farmers hire new arrivals as laborers and the relatively low wages enable these established farms to generate increased incomes. The capital and the knowledge which laborers gain while working for established farmers enable them to save money and to set up their own farm on marginal forest land. Through this mechanism, capital generated in the commercial core moves into the pioneer fringe and fuels further frontier advancement (Thiele, 1990).

Durham's second cycle, referred to as 'the impoverishment cycle', tells a story similar to that of the peasant pioneer cycle. The cycle starts when poor migrants in search of land settle on forest land in precarious conditions and clear the forest for small-scale farm production. They practice slash-and-burn agriculture, and the unfavorable conditions of soil and climate in combination with a short fallow cycle cause nutrient levels to fall and lead to soil depletion. Driven by environmental constraints and survival needs, these poor farmers have little choice but to encroach on new forestland. The growing scarcity of land suitable for household agriculture in a colonization region leads directly to lowered standards of living. Alternatives

such as intensification and diversification of production are out of reach due to lack of capital and expertise. As a result of this cycle, farmers are caught up in a 'poverty trap' and have no alternative to the short-term strategy of encroaching on forest land.

The two cycles of deforestation outlined above are intrinsically linked. The expansion of the production-driven deforestation cycle causes land scarcity and displacement, which in turn fuel impoverishment in the second cycle. Subsequently, this situation enables the accumulation cycle to further exploit poor farmers and to make them dependent (Durham, 1995). These two cycles suggest the existence of two different categories of deforestation actors; accumulating farmers expanding their activities and impoverished peasants burdened by debts and land degradation. It results in the stereotypes that often dominate the deforestation debate; on the one hand, poor, pitiful small peasants gnawing on the forest fringe and, on the other, relentless land-grabbing large estate owners burning large tracts of forest. In reality, the two cycles are complementary and rely on each other. Frontier conditions, moreover, make possible rags-to-riches success for some and the reverse for others. Durham's deforestation cycles offer analytical insights into the mechanisms involved, but are not empirically testable in the field. The dynamism of the processes suggests that specific actor groups take land-use decisions and determine how these processes unfold.

Lead agencies and growth coalitions

Rudel and Horowitz (1993) focus more on the role of these actors and identify their involvement in the deforestation process. Their theory derives from the fact that land settlement and forest clearing are rarely undertaken alone, but the result from an interaction between actors who collaborate to overcome the difficulties of the pioneer frontier. Small farmers are not able to move independently into closed forest areas; they require the support of capital-intensive investments in infrastructure and transport. These goods are provided by agencies and institutions that supply them with assistance in the form of manufactured goods, roads, transport, credit, and information. Rudel and Horowitz distinguish two types of interrelationship between pioneer farmers and support agents. The difference is important because it defines the context in which resource use and benefits are divided and organized.

The 'lead agencies' consist of entrepreneurs, private companies, and state agencies engaged in the extraction of forest resources such as minerals and timber. The activities in the extractive zone require access and transport. Lead agencies are the only actors which own capital and heavy equipment with which to reach the valuable trees or minerals. They finance and organize basic infrastructure in the old-growth forest in order to extract a valued resource. All these activities in the forest require labor, mostly that of young males, who settle permanently in the region. After some time, their nuclear family and other relatives start to join them when they hear about the availability of free land. They form pioneer communities that follow the roads in search of new areas for settlement. Governmental infrastructure projects such as roads are another form of lead agency which invests in inaccessible forest regions.

A second important category of support agencies are the 'growth coalitions' that assist migrants in surviving the first years of hardship in the new settlement area. These coalitions mitigate the isolation and hardship of the frontier by offering services and infrastructure for the pioneers. Growth coalitions appear as products of official colonization programs, kinship ties, or patron-client relationships and are embodied in governmental agencies, farmers' associations, missionary groups, and development NGOs. Their activities include roadbuilding, the foundation of towns, and the formation of local support networks. Characteristically this collaboration is designed to assist pioneer colonists in organizing their livelihoods. Joint interests keep these coalitions together, and reciprocity and the existence of community ties are decisive for their success. The patron-client relationship, by which affluent individuals or institutions establish an exchange of services and goods with small peasants, is the most common form. The function of coalitions based on patron-client ties is to reduce the risks of trailblazing in a hostile forest environment.

In contrast to the growth coalitions, lead agencies do not assist colonists in such a direct and intentional way. Roads and infrastructure built by lead agencies are established in the first place in order to export commodities or link markets. Nevertheless, lead agents and colonists need to establish some kind of reciprocity and may benefit from each other without initially intending to collaborate. Pioneer farmers offer a source of cheap labor for companies, while pioneer farmers supplement their income by doing off-farm work. In many cases, these relationships also evolve into a situation in which lead agencies assist and supply services to local people in order to be on good terms with them. Due to their divergent goals, however, hostilities can erupt once the flow of goods and services stops, resulting in local people blocking roads or damaging equipment belonging to the lead agencies.

KEY ACTORS IN DEFORESTATION

In the brief explanations of theoretical perspectives above, a number of socio-economic groups continuously reappear and seem to be involved in the deforestation process. The following paragraphs will discuss five groups of key actors and some of the most important factors that influence land-use dynamics at the frontier. The actors represent the human faces that brings the theoretical perspectives to life and set the tone for the 'actor perspective' that is the methodological approach of this study.

Forest dwellers

The first group confronted with a frontier development is the 'forest-dwelling population'. This category is broader than that of the 'traditionally living indigenous people', who practice hunting and gathering and subsistence agriculture based on long fallow in the forest, because it also includes other groups who have lived for generations in the forest and have made it an integrated part of their livelihoods. The main characteristic of their production system is that their land-use practices do not lead to a large-scale and permanent disappearance of the tree cover. This is not synonymous, though, with genuine sustainable management, despite a number of publications from anthropologists (for an overview, see Posey and Balée, 1989).

Meggers (1971) and other cultural ecologists have explained the fact that they do not destroy the forest as the result of environmental constraints and low population pressure. Yet the ways in which they use the forest are not mere adaptations to the biological environment, but also responses to a socio-economic and political situation influenced by colonizers, missionaries, and traders (Bebbington, 1996). In the last decades, colonists, NGOs, officials, and tourists have further contributed to important changes in forest dwellers' livelihoods.

With the advance of the extraction frontier, these people are confronted with economic activities that bring with them market penetration, new social relationships, and new cultural ideas. Many forest-dwelling groups have undergone dramatic changes in their livelihood and the land-use systems, with the result that continuation of their former low impact on the forest vegetation is not guaranteed. At the same time they have to cope with a new situation in which land, forest resources, and social and cultural norms have different (economic) values and interpretations. Consequently, scholars have often portrayed them as pitiful peoples who are deprived of an authentic forest life (see Colchester and Lohmann, 1993). Today, several groups of forest dwellers (especially in Latin America) have made great social and political advances and can no longer be considered ignorant and marginalized. They have become empowered groups with international support, and take part in the discussion about the future of their forest. In Africa and South East Asia, however, many groups still have no control over the fate of their forest environments and must be considered victims of the advancing colonization frontier (Colchester, 1999). Whether these forest dwellers accord with the Western ideal of 'noble savages' is an issue that has to be answered in the next chapters.

Colonists

A striking feature of tropical frontiers is the variety in the groups of settlers that migrate to the forest fringe. Colonists do not all settle in similar circumstances, and their agricultural decision-making varies according to their household characteristics, initial capital, access to credit, and migration background. The categorization in this study distinguishes the peasantry, middlemen, and wealthier second-wave colonists as three major groups of migrants that settle at the frontier and have a decisive impact on land-use dynamics.

The peasants, who include poor subsistence-farming households, smallholders, sharecroppers and seasonal laborers on farms, all exploit the forest resources for their subsistence needs and in order to obtain a cash income. They extract forest products for various purposes, but their major activity is cultivating the land with crops and converting forest into arable land or pasture. The peasantry includes a variety of farming households and young males characterized by spatial mobility and changing livelihood strategies. Its production system is usually a mosaic involving hunting, the extraction of forest products, subsistence farming, cultivation of cash crops, wage labor, selling timber, land speculation, and ranching. The economic strategies of peasants fall between two extremes: a passive and desperate survival strategy under pressure from a harsh environment and from powerful forces that impoverish them and chase them deeper into the forest, and an active and autono-

mous strategy for livelihood construction based on capital accumulation through forest clearing, land speculation, and small-scale crop farming.

The group of intermediaries, consisting of merchants, traders, and transporters, has a specific role as secondary actors in the strategies of smallholders. Many of these intermediaries were originally small peasants and have gradually accumulated capital to fulfill an intermediate role. As merchants and brokers, they arrange the circulation of goods between the towns and the frontier and exchange manufactured goods for primary products. They pass on goods, services, vital information, and capital, and influence agricultural production, technology, and consumption patterns (Ozório de Almeida, 1992). They buy commodities and sell manufactured products or provide services such as transport and credit to local people. The most obvious examples are retailing shopkeepers, timber traders, and truck owners. They also invest in agricultural production at the frontier, but only as one option in a broader portfolio of economic activities.

Moran (1981) has made a distinction between two categories of colonists: the 'poor subsistence peasants' struggling to survive and the 'wealthy second-wave colonists' profiting from the large potential of the frontier economy to accumulate capital. The category of second-wave colonists consists of investors in activities at the forest frontier. Some, such as absentee large estate owners, without really living in the area, while others practice free professions or hold positions as officials in the municipalities, government departments, and banks in the frontier towns.[16] Both groups have access to capital, information, and power, and this makes them important actors in any frontier development.

Government presence and involvement

With their organizational structure and their economic and political power, governmental agencies steer the dynamics of the frontier. Most directly involved are state agencies that organize official colonization schemes and the other bodies (technical, health, foreign development agencies) that help and organize socio-economic life at the frontier. The most formal are the public agencies that represent central state authority (land registration, police, and judicial authorities) and act officially as neutral regulators delineating the rules of the game. All policy decisions concerning agriculture, forestry, rural development, and resource management also affect deforestation dynamics. The issues of land rights and infrastructure works, however, are particularly interesting for this study, in which governmental dilemmas concerning land titling and road infrastructure appear repeatedly.

In general, it is taken for granted that deforestation is more rapid under open access regimes than in the presence of well-defined and secure property rights, which are assumed to promote more sustainable land use (Kaimowitz and Angelsen, 1998a). In concrete cases, however, the situation is much more complicated and each of the different regimes of property rights (for example: squatting, usufruct, or full ownership of land) varies greatly according to the local institutional and legal context. Legal claims on the forest also have complete different meanings according

[16] Dignitaries who influence frontier dynamics in rural areas include municipal officials, doctors, lawyers, land surveyors, and notaries.

to the type of forest user involved. Local forest dwellers with a communal land use tradition react differently to a secure land title than does an absentee landowner who speculates on higher prices for cleared land.

The construction of roads into previously closed forest areas and the improvement of existing roads inside or near the forest are important parts of governmental intervention. Mertens and Lambin (1997) stress the importance of accessibility and road construction in the forest as determinants of levels of deforestation. The official planning of 'penetration roads', which open previously inaccessible forest areas is therefore one of the main factors accelerating the expansion of the extractive zone via land speculation and spontaneous colonization. These 'penetration roads' should be distinguished from the 'feeder roads' which result in an intensification of an already existing road network. Feeder roads are far less problematic in terms of frontier expansion because they do not push the settlement margin further into the forest, they only improve market access for rural people who were already there and help forest-dwellers to break through their isolation and lower their transport costs, which increases the profitability of agricultural production (Kaimowitz, 1999). Market access is a fundamental condition for agricultural intensification, although not in itself sufficient to stop the development of the frontier. It also gives rise to increasing land prices, which can fuel further expansion of colonization (De Groot and Kamminga, 1995; FAO, 1999).

Large private companies

Large investors and corporations with financial means and economic power can dominate large-scale economic activities in frontier environments. They operate in colonization schemes, the logging industry, cattle ranching, agribusiness, mining, and infrastructure works. The most intrusive actors in terms of forest integrity are logging companies, agro-industry, and mining conglomerates. Their headquarters are in urban centers, from where they steer their activities according to the rationality of the larger market economy. Their decisions to invest, or not, at the frontier are closely dependent on government policies, economic calculations and forecasts.[17] Most of the time their investments are only part of a larger economic portfolio, a situation which can result in short-term rent seeking.

Logging companies will receive particular attention in the following chapters due to their leading role in the advancement of the colonization frontier. A few important issues should be mentioned immediately. Firstly, logging companies' business strategies depend heavily on forest pricing in the exporting countries. Governments in tropical timber-producing countries impose export restrictions on logs and charge concession fees, royalties on cut timber, and export taxes. Forest regulations and types of logging are therefore closely related. Secondly, stumpage prices (the prices of harvested logs at the stand) are typically undervalued which gives relatively more weight to the costs of harvesting and transport. Logging techniques, thirdly, depend also to a large extent on which market segment the company is supplying (for instance: pulp for the paper industry, high quality timber for furniture, or logs for

[17] Capital investors are particularly sensitive to the existence of credit and subsidy opportunities and the enforcement of environmental regulations in forest frontier areas.

the plywood industry). A final factor is the international trade in and consumer demand for, timber in importing countries. Non-tariff barriers, together with trade restrictions, have a significant impact on prices of processed timber products. Recently, concerns about sustainable logging have been raised by consumers in industrialized countries; the issue of timber certification is becoming a new decisive factor in companies' business strategies (Barbier *et al.*, 1994).

Donor agencies and environmental NGOs

The last category of actors operates at the international level and includes international donors, which finance projects along the frontier aimed at regional development, economic growth and nature protection. In the past, the World Bank, EU development funds, and regional investment banks and credit schemes have provided funds for projects that had negative impacts on forests (for instance: penetration roads and other infrastructure which opens isolated regions). These credit programs have attracted growing criticism and subject to closer scrutiny.

A second group of actors on the international scene is that of Western 'Environmental NGOs' (ENGOs), which have dedicated much of their activity to tropical forest protection.[18] Their goal is, in the first place, to influence mainstream policy-making in tropical and Western countries. In addition, they put pressure on large companies operating in tropical countries to use environmentally sound exploitation methods in the forest. Finally, their campaigns in Western countries seek to sensitize consumers to the fate of natural forests; the publicity from these campaigns is used to raise funds (Juniper, 1998). ENGOs provide technical and financial support for forest dwellers who struggle against their loss of access and sovereignty to forest land which they consider their territory. One of their most effective weapons is media coverage that stresses the environmental risks of new economic activities in tropical forests. Media attention puts companies and governments under pressure and gains public support, indirectly it also reinforces the NGOs' own *raison d'être* (Bryant and Bailey, 1997).

THREE LAND USE ZONES: THE GENERAL IMAGE

The following sections present the general story of the three zones in a tropical forest environment. The concrete situations in the three case studies are all variations on this story. There follows a presentation of the important theories that describe the movement at the frontier and explain the driving forces behind its thee-stage dynamics.

The interrelationships and mutual interactions of all agents involved result in different systems of production with correspondingly different land use patterns (Figure 2.1).

[18] In the field of tropical forest protection, large ENGOs include the World Wide Fund for Nature (WWF), Greenpeace, Friends of the Earth, and the IUCN. Important activist groups include the Rainforest Action Network (RAN), the World Rainforest Movement, the Rainforest Foundation, and the Rainforest Information Centre.

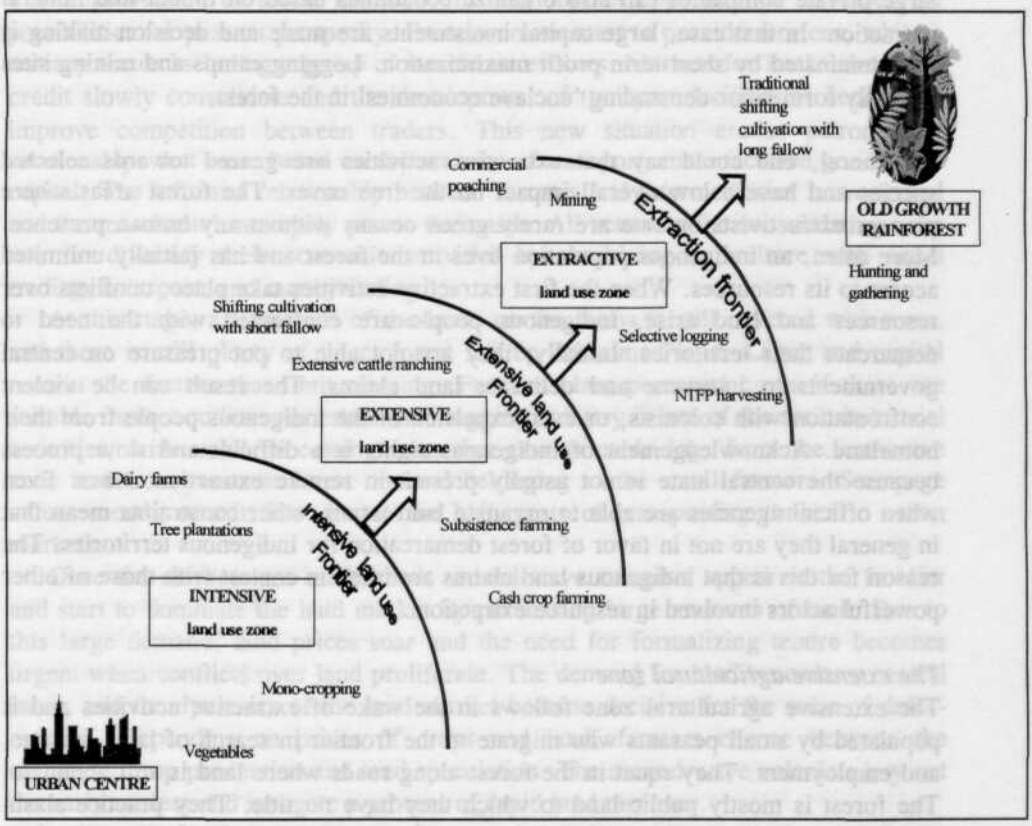

Figure 2.1: Von Thünen's land use zones combined with frontier dynamics

The extractive zone

The first agents who operate on the frontier are pioneers who concentrate on the extraction of valuable natural resources, of which minerals and lumber are the most important. The activity can be organized by individuals in a traditional extraction economy, or by modern private companies. Traditional extractive activities such as gold panning and small-scale logging concentrate profits in exchange rather than in extraction. The merchants who sell water pumps and chainsaws typically get richer than the pioneers in the forest. Extraction can become a boom when prices for particular products in the core economy are high. The resulting profits fuel the expansion, but the costs of finding the last grains of gold increase gradually. Eventually, depletion or collapse of extractive economies result in a 'bust cycle' for a specific commodity. Boom-to-bust cycles make extractive economic development discontinuous in time and space. They can even lead to a total collapse of the pioneer frontier, which becomes 'hollow' when pioneers leave the area and there are no prospects for further activities. Besides individual pioneers and middlemen,

large private companies can also organize economies based on timber and mineral extraction. In that case, large capital investments are made and decision-making is also dominated by short-term profit maximization. Logging camps and mining sites typically form labor-demanding 'enclave economies' in the forest.

In general, one could say that extractive activities are geared towards selected species and have a low overall impact on the tree cover. The forest areas where pioneer extractivists operate are rarely green oceans without any human presence. More often, an indigenous population lives in the forest and has initially unlimited access to its resources. When the first extractive activities take place, conflicts over resources and land arise. Indigenous people are confronted with the need to demarcate their territories. Initially, they are not able to put pressure on central governments to intervene and delineate land claims. The result can be violent confrontation with colonists, or even expulsion of the indigenous people from their homeland. Acknowledgement of indigenous rights is a difficult and slow process because the central state is not usually present in remote extraction zones. Even when official agencies are able to organize land issues, other constraints mean that in general they are not in favor of forest demarcation for indigenous territories. The reason for this is that indigenous land claims are often in contest with those of other powerful actors involved in resource extraction.

The extensive agricultural zone

The extensive agricultural zone follows in the wake of extractive activities and is populated by small peasants who migrate to the frontier in search of land, income, and employment. They squat in the forest along roads where land is still abundant. The forest is mostly public land to which they have no title. They practice slash-and-burn agriculture orientated mainly towards annual crops for food production, and toward the attainment of short-term benefits with a minimum of farm knowledge. During this stage there is little interest in formalizing land rights, because land is still abundant and a formal title is not what these pioneers need in the first place. The uncertainty of varying harvests and possible setbacks gives rise to income variations for poor peasants who wish to minimize risks and rely on intermediaries to survive. They seek advances on consumer goods, pledging their future harvest in payment.

The intermediaries in question are creditors who supply them with with basic products in exchange for an exclusive buyer's right (amounting to a debt-peonage system). They establish patron-client ties with the pioneer peasants and engage in land speculation, logging, and transport with a view to making a quick fortune. Transport to established markets for selling crops and buying manufactured good is scarce and expensive. This situation strengthens the bargaining power of the merchant, who is able to develop a high degree of monopoly control. Frontier development, as a result, involves a form of 'usury-mercantile capital'. The various risks of the frontier environment and the poverty of most of the peasants mean that they have to rely on debt-peonage and sharecropping. The merchant's usury-mercantile capital is central to this form of farming and leads to continual indebtedness among smallholders.

The improvement of social infrastructure and market opportunities increases the possibilities for peasant prosperity. Frontier towns start to provide services, while a tertiary sector including a group of merchants evolves. Markets for land, labor, and credit slowly consolidate and the development of transport facilities is decisive to improve competition between traders. This new situation erodes patron-client relationships that were based on the scarcity of transport, manufactured goods, and capital. The informal relationship between farmers and intermediaries is weakened and the merchants' monopoly power decreases. All actors in the consolidating zone start to diversify their economic activities by combining agriculture with small trading, transport, and moneylending.

At this stage, a large part of the lands on the farms is still covered with trees, and there is still plenty of intact forest left on unclaimed land. Labor and capital remain the factors that limit clearing. Farmers plant perennial crops if there are suitable market outlets. An established logging industry is one of the main industrial activities, with small processing units that saw valuable logs from the extractive zone and from remnant forest on land belonging to the small farmers. Stumpage values mostly remain low due to the high costs of transporting timber to urban markets.

Once the markets are established, second-wave colonists appear at the frontier and start to dominate the land market by purchasing large amounts of land. Due to this large demand, land prices soar and the need for formalizing tenure becomes urgent when conflicts over land proliferate. The demand for land becomes a central issue, and the dynamics of the land market become decisive for the pace of deforestation. Depending on prices of crops and land, farmers choose between the options of crop production and land speculation. The second-wave colonists buy out the early settlers and instigate a process of rapid land turnover.

The intensive land use zone

Once an area no longer absorbs a net migratory inflow, and starts to expel the surplus of small peasants, it becomes 'closed' and is referred to as an 'old colonization area' (Ozório de Almeida, 1992). Institutional and market infrastructure is consolidated in the presence of state authority that likewise grows stronger and better organized. A network of all-weather roads, an organized land title system, a wage labor market, and formal credit agencies facilitate the development of the zone. The role of government is decisive in defining which actors will dominate land use at the closed frontier. The usual outcome is a Malthusian road to impoverishment for smallholders rather than a Bosuperian road to agricultural development.

The main push factor for a swing into Bosuperian agricultural intensification and the protection of the remaining forest areas is the presence of a government with a law-and-order policy and a land reform program to combat the concentration of land. In an ideal situation a legitimate monopoly of violence with enforcement of regulations, taxes, fines for speculative land ownership, and laws against forest clearing form the basis of an 'integrated zoning system'. These conditions are necessary for the emergence of a peasant economy based on intensified productive agriculture incorporated in modern market structures.

A Malthusian scenario unfolds when smallholders end up in a critical land use situation after the frontier has closed. At the intensive stage, when the economic incentive to intensify is highest, the capacity of the land for intensification is at its lowest. The soils have already lost much of their fertility. Remnant forest areas remain only on large estates, closed off to small farmers. Peasants still using shifting cultivation have to intensify production on their land by shortening the fallow period below the minimum length consistent with the maintenance of soil quality; this leads to ecological deterioration and a future decline in fertility, ultimately leading to the collapse of the shifting cultivation system. Production falls considerably and peasants enter a cycle of impoverishment. A crucial determinant of the timing of this crisis is the size of the plot: farmers with 50-100 hectares can continue longer with shifting cultivation than can smallholders with only a few hectares.

When agricultural production is no longer possible by existing methods, farmers are forced to choose between three options. The first is to stay on their land as independent farmers and specialize in the intensive cultivation of vegetables or other high-value products such as fruits, vegetables, or dairy products. This first option requires conditions that are difficult to attain for small peasants: credit facilities, expertise, government assistance, secure land titles The second option is to migrate in the same direction as the movement of the frontier and seek new land where land prices are lower and extensive farming is still practiced. A third possibility is to exchange smallholder farming production for wage labor on land belonging to larger owners or to engage in off-farm work such as trading or urban laboring. Most of the time, however, these options are very limited, and the only possibility is to move to urban slums where peasants try their luck in the informal sector.

Once the frontier is closed, second-wave colonists are established in all sectors and become the dominant land users. They buy out the remaining small peasants' land and convert it into large estates for ranching or plantations. Land values continue to rise due to speculation and the demand for farm products from central markets. Social differentiation becomes more pronounced and those few small peasants who are willing and able to continue with subsistence production are squeezed between large estates. Remnant forests remain untouched on these large estates as speculative assets that can be cleared or preserved according to the potential profits and the strength of preventive regulations.

RESEARCH QUESTIONS AND METHODOLOGICAL ISSUES

Research questions

Tropical deforestation clearly is a multi-layered phenomenon. Deforestation occurs in an environment where rent seeking, unequal access to resources, and power relations interact with each other. The present study will analyze three cases of deforestation in their broader socio-political context, emphasizing the economic circumstances which influence how actors behave in their daily interactions with the forest environment. This will lead to a general analysis of frontier dynamics and the underlying causes of deforestation. With the help of social and political theory, an attempt will be made to go beyond the micro-level and grasp the driving mechanisms behind deforestation.

Regional, national and international frames of reference will all be applied. The methodological approach is actor-oriented; this means that the underlying forces are not analyzed as independent system variables, but rather to the options and motivations of these actors who are directly involved in forest conversion.

The central question of this study is:

What are the underlying forces of deforestation in the three case studies and how do they influence the use of the forest by primary actors?

The four most important sub-questions derived from this general question are:

- How can the dynamics of the frontier be characterized in the three cases studies?
- How does the economy influence social and political structures in the frontier region (and *vice versa*)?
- Who exerts power in the different land use zones, and to what extent do these actors have an impact on the forest?
- How do actors organize themselves and adapt to the rapidly evolving socio-economic conditions of the frontier?

Action-in-Context methodology

The present study uses the methodological framework of 'Action-in-Context' developed by de Groot (1992). This is a framework designed to analyze the social causes of an environmental problem. Action-in-Context is a qualitative and holistic methodology which identifies all actors involved in causing the given environmental problem. Actors are defined as social entities deciding on the activity which causes that problem. The analysis starts by identifying the 'primary actors': in this study, those who clear forest by handling a torch, a chainsaw, or a machete. Subsequently, Action-in-Context connects all the underlying actors (called 'secondary' or 'tertiary' actors) who influence the options and motivations of the primary actors. This results in a causal chain which starts deep in the forest with the primary actors who fell trees, and ends with a tertiary actor in the office of the forestry department. Many other chains are traceable, and all of them together form the so-called 'actors' field' of a problematic activity. This causal linking, which starts with the activity and then builds outwards to the secondary and the tertiary actor groups at the supra-local level, is based on Vayda's (1983) 'progressive contextualization'.

In order to understand why actors engage in an activity, Action-in-Context builds a 'single actor scheme' in which options and motivations are further analyzed. This starts by identifying all the potential options facing a decision-making actor. A newly arrived colonist at the forest frontier, for instance, may decide to plant food crops, to fell trees, or to cultivate coffee. The options ultimately chosen for are those that an actor is able to carry out given his capacities. Motivations are those factors that give advantage and appropriateness (as interpreted by the actor) to an implementable option, for example, a farmer may choose to tend cattle because owning a ranch confers prestige as well as because the profits are good. Costs and benefits obviously play an important role in decision-making, but so do other motivational factors deeply

embedded in an actor's social environment and culture. Determining why an actor chooses a specific option requires an analysis of the socio-cultural context, which may reveal important relationships and moral codes that interplay with profit maximization.

Due to extensive research in the last decade on the causes of tropical deforestation, this study did not need to start by identifying deforestation actors and their general motivations and options. Especially in the Brazilian case, an abundance of literature available was available. For Ecuador and Cameroon, a research project of the Center of Environmental Science (CML) had already produced an Action-in-Context analysis (see De Groot and Kamminga, 1994). In the present study the AIC framework is used to categorize actors according to their socio-political power and influence on deforestation. The focus is mainly on the context and the forces that surround primary actors in the forest and influence their behavior. Some particularly important actors are selected for detailed analysis, in relation not only to their role in causing deforestation, but also to their attempts at finding solutions to it and resisting the forces of forest destruction.

Fieldwork and research methods

A comparative study of three research areas requires a methodological approach different from that of a standard piece of research focusing on one site. The selection of the areas depends on the larger goal of the comparative analysis, and data collection has to be swift and selective due to time constraints.

Fieldwork was carried out in three stages between 1996 and 1999. The selection of the study location was guided by a concern to find frontier areas where deforestation was rampant and where different groups of actors (indigenous people, farmers, corporations, and government agencies) were actively involved. The focus was on the socio-political forces and on those actors which exerted power over the forest and its resources. Their strategies and alliances differ according to the context, but at the same time show parallels and common patterns. These patterns and the mechanisms behind deforestation were much more important to this study than an in-depth examination of the primary actors. Data gathering was therefore concentrated on semi-structured interviews with key policy- and decision-makers.

Key informants working for local and international NGOs, research institutes, and churches were also important sources of information because they had overviews of both land-use dynamics and the socio-political situation, and were willing to talk. Another part of the fieldwork consisted of gathering life histories of forest dwellers in order to understand how they acted. The picture emerging from these was one of a hard life that mainly consists of survival and fulfilling basic needs. Secondary sources finally, were also helpful in understanding the broader context and deforestation history of each region. Belém, the hub for my research on the Amazon, is the venue of regular congresses and lectures; plenty of material in the form of theses, reports, and newspaper articles was also available there in libraries and archives. In Cameroon, the CED office in Yaoundé was the perfect information source. The Capuchin missionaries in Coca and the NGO Esmeraldas in Ghent (Belgium) offered background information for understanding the Ecuadorian situation. Another important source of information was the Internet, which offers access to the newspapers of the three

countries on a daily basis to keep in touch with the local situation and with the latest trends in local forest dynamics.

Feldwork in Ecuador covered a three-month period in 1996. After a few weeks in Quito to investigate relevant aspects of central state's policy, I spent the rest of the time in the Northeastern Amazon region (*Oriente*). In the beginning a colleague from CML accompanied me, and toward the end two Dutch graduate students assisted in data collection. Our base camp was the town of Coca, officially named Fransisco de Orellana, from where we visited the southern colonization frontier along the oil roads, especially the *Via Auca* and the towns of Lago Agrio, Tena, Baeza, and Nuevo Rocafuerte.

My choice for the *Oriente* resulted from CML's previous research in Northeast Ecuador (see De Groot and Kamminga, 1995). This region has remained particularly interesting due to continuing oil drilling and the ensuing road construction there. The presence of foreign oil companies was a serious constraint for the research. The fact that these companies recruited anthropologists and sociologists to spy on and manipulate local people complicated our position. People were suspicious that information given to strangers would be used to cheat them or take their land away them from them, and had developed a strong aversion toward foreign researchers. The local NGO FEPP was a crucial intermediary which made it possible for me to meet colonists; extension workers of the coffee program COFENAC also took me with them on their trips to the farms. My stay in several Quichua communities gave an impression of the indigenous economies and livelihoods and was certainly the most exciting part of the fieldwork. A short visit to Coca in 2001 enabled me to check whether things had changed or not after five years.

The Brazilian Amazon was included in the research because this huge forested territory is experiencing equally huge changes resulting in rapid deforestation. Powerful forces in Brazilian society and abroad set in motion the underlying mechanisms of forest encroachment, and these linkages make particularly interesting objects of study. I traveled twice to the Brazilian Amazon, once in 1997 and again in 1999, altogether for 6 months, and spent much time in Belém at the University of Pará (UFPA). The NAEA research center at the University of Pará proved to be an excellent place to gather theoretical insights on frontier dynamics in the Amazon and provided information on the issues currently dominating policies and activities in frontier areas. Fieldwork was concentrated on the region around the town of Marabá in the state of Pará, in the Eastern Brazilian Amazon. All major players in deforestation are operating in this area which is one of the most frequently referred to in relation to forest destruction in Brazil. During the fieldwork, the issue of land reform and the accompanying land invasions was a burning one. Land reform had launched a nationwide controversy over the legitimacy of the landless farmers' movement (MST) and the environmental implications of the inequality in land ownership.

The atmosphere was tense in South Pará and around Marabá the law of the gun was in force. This made normal fieldwork difficult and investigating the role of the key actors in deforestation too dangerous. A French researcher who had investigated the logging business in the same area a few months earlier had been obliged to leave after threats. I was able to travel through the region with the help of Belgian

missionaries, who presented me as a novice visiting their parishes. The local NGO CAT and the research center LASAT in Marabá provided useful contacts and a more analytical insight in the local setting. Official agencies in Pará were not easily accessible or cooperative, and mainly provided 'standard answers'. It was through interviews with key persons in Marabá, press articles, and the reports of local NGOs that most of the delicate matters became more understandable. My pessimistic impressions of this heavily deforested frontier zone in South Pará were mitigated by a stay in the floodplain forest along the Amazon River in the towns of Abaetetuba and Macapá. Most of the floodplain forest is still standing, and this contrasts with the situation in Pará. It enabled me to discern key differences in peoples' behavior and decisions-making environments.

At the beginning of 1999, I spent three months analyzing the political economy of the logging business in Cameroon. Fieldwork around the village of Lomié, and a stay with the Dutch development organization SNV gave insights into the stakeholders involved. My interviews and field visits enabled me to identify the strategies applied by foreign logging companies in their interactions with local people and authorities. This material was then linked with information on policy-making in the capital Yaoundé. A local NGO, Centre pour l'Environnement et le Développement (CED), was my host and offered all the necessary literature and information on current forest issues in Cameroon. The CED staff was involved in all the important issues and my discussions with them improved my insight substantially.

In Yaoundé, congresses and workshops on forest issues were organized on a regular basis and enabled me to talk with officials, donors, and project managers about how forest policies work in Cameroon. Of the three case studies, data gathering on the policy level was easiest in Cameroon. Good contacts with high officials and the presence of many European diplomats and aid workers facilitated data collection. Talking 'off the record' with these people was the best way to gain an insight into the political economy of logging. The fact that my research coincided with the prosperous heydays of the logging business ion Cameroon meant that in some case, loggers themselves were willing to talk, even proudly showing off tree felling in their concessions.

THEORETICAL REFERENCE POINTS

This chapter has made it clear that the forces of deforestation can only be understood in a broad theoretical framework that relates people, land use, and the forest environment with each other. Various theoretical insights into this relationship have been presented, and will form beacons for the analysis of the case studies in the following chapters.

Von Thünen's land use model can be used to analyze deforestation in the context of agricultural extensification. Expansion of urban market centers towards 'unused' forests involves increasing transport costs. Economic decision-making adapts to this reality and creates different land use zones in order to produce crops at the lowest possible costs. The frontier concept explains how the advancement of the different zones takes place and marks geographically the advancing colonization towards the

closed forest. Three zones emerge: a remote extractive zone where pioneers take out the most valuable resources; a consolidating zone where extensive land use dominates; and an intensive zone next to the market center, where agricultural investment results in high productivity.

The spatial patterns of Lambin and Mertens offer a number of interpretations of the connection between the visible loss of forest cover and the latent driving forces behind it. The political economy approach provides insights into the social and political forces behind deforestation at the national and international levels. Ozório de Almeida shows how the cost-benefit decisions of individual smallholders can influence frontier characteristics. Schneider's focus on the role of the institutional context highlights the central role of the state in the deforestation process, and in particular the ability of the state to influence that process via the land titling system and via infrastructure development. Durham's two deforestation cycles bring in the element of chronological change and the interrelationship between different actors. The 'cycle of capital accumulation' explains what happens when people start to invest successfully in forest-clearing activities. The 'impoverishment cycle' tells the opposite story of the poverty trap in which colonist can be caught. Both cycles have detrimental effects for the forest, but the most dramatic is if both cycles strengthen each other: poor peasants offering their labor force on large estates in exchange for tools and credits that they use to clear forest on their own plots.

This chapter had also identified the main groups of actors that are relevant for understanding forest dynamics. At the local level, the forest-dwelling population and the colonists are present. Governmental agencies and the private companies operating at the forest fringe form the intermediary level. At the international level, multinational companies, donor agencies and environmental activists also have a stake in what happens at the forest fringe. Rudel's concepts of 'lead agencies' and 'growth coalitions' contribute to understanding the relationship between powerful actors (such as private companies and governmental agencies) and smallholders. Both lead agencies and growth coalitions may develop some kind of reciprocity with the local population, but the initial aim of lead agencies to operate independently results in a more problematic relationship with local actors.

Central to this study are the driving forces exerted by 'secondary actors'. These include the second-wave colonists, intermediaries and investors who dominate the markets for land, labor, and capital. They also include state agencies, the role of which is particularly clear with respect to road construction and land tenure, accessibility and land ownership being crucial factors for frontier dynamics. To a large extent, these behind-the-scenes actors determine what happens in the three land-use zones. They often manipulate both local people and international efforts to protect forests. In some cases, coalitions between local people and international activists are able to overcome powerful interest groups. The outcome of this power play can make the difference between clear felling and total forest protection. As the following chapters will show, forest dynamics is therefore a highly political game involving shifting coalitions and unpredictable outcomes.

CHAPTER III

THE BRAZILIAN AMAZON: COLONIZING THE FOREST FOR LAND AND TIMBER

The Rio Preto dirt road runs westbound from the town of Marabá towards the fringe of the closed forest, some 300 km away. It is the end of the dry season in the eastern Amazon and the innumerable fires around the town fill the air with a thick hazy smoke. At the beginning of the road, grasslands dominate the landscape; some ten years ago small farmers and large estate owners converted the forest here into pasture. In the mean time, the colonization frontier has moved rapidly; the Amazon forest fringe now lies several hundred kilometers away to the west. Logging companies built this road, and the traffic consists mainly of logging trucks that drive towards Marabá. Their loads consist mostly of mahogany logs, illegally cut in Indians reserves deep in the forest. The clay huts along the road are the dwellings of poor peasants who have come to this logging frontier in search of land and a better life. They squat on newly-cleared land and practice slash-and-burn agriculture. After they have cultivated some rice and beans, they sell the degraded land as soon as possible to large cattle ranchers and move further along the road to take possession of fresh territory.

Diary, September 1997

INTRODUCTION

Deforestation in the Brazilian Amazon is a widely discussed issue; this study will concentrate on social, political and economic aspects of forest destruction in one particular area, South Pará. The first part of this chapter, nevertheless, describes the main actors in forest destruction in the Amazon region as a whole before gradually focusing in on Pará. The core of the chapter describes forest frontier dynamics in the area around the town of Marabá, a worst-case scenario for deforestation. The last sections describe the countervailing forces in the form of green policies and initiatives of the federal government and international donors. An attempt is made to assess whether these anti-deforestation forces have established a foothold in the debate, and whether they will have a real impact on the future development of the Amazon.

FACTS AND FIGURES ABOUT SOUTH PARÁ

Pará in the larger Brazilian Amazon

The Brazilian rain forests covers an area of around four million square kilometers next to small areas of savanna and natural grasslands.This vast Amazon region contains urbanized regions with large cities and heavy industry, as well as isolated

forests where Indians practice hunting and gathering. All this forms the administrative entity of the 'legal Amazon' (Skole and Tucker, 1993).[19] Consequently, deforestation issues vary enormously between different regions inside the Brazilian Amazon. Completely cleared areas in old colonized frontiers are as numerous as selectively cut forests in remote areas at the most recently opened frontier.

The latest deforestation figures for the Brazilian Amazon in the period August 1999-August 2000 indicate 20,000 square kilometers of felled forest (Figure 3.2). Forest loss has increased dramatically since 1991 with an historical record in 1995 of 29,000 square kilometers. Some observers argue that in the latest decade the trends in deforestation have not been influenced by environmental policy or state control, but are rather the outcomes of macro-economic factors and climatic phenomena (Hall, 1998; Pasquis, 1999).[20] If one considers the whole Brazilian Amazon, most of the forest is still standing. The total loss of primary forest since 1972 is estimated at 560,000 square kilometers or about 16 percent of the original forest in 1970. This calculation, however, does not take into account the forest recovery in the form of secondary regrowth; according to calculations by Alves and Skole (1996) secondary growth may in fact cover up to 40 percent of the 'deforested' area.

The population of the Brazilian Amazon has grown from two million people in 1950 to around 18 million in 1996. Urban centers like Belém, Manaus, and Porto Velho have experienced a particular boom, with growth figures of some five percent per year (Salati and Ferreira, 1995; Browder and Godfrey, 1997). Most of this enormous growth has been due to migration of peasants from the northeast and south. Push factors there include agricultural mechanization and labor displacement (south of Brazil), and land poverty and droughts (northeast of Brazil). The colonization process started in earnest during the 1960s, when the military government launched its policy of 'bringing people without land to land without people'. The crucial factor in the opening of the forest was road construction; many federal roads were cut through old-growth forest in this early period.

The most ambitious was the Transamazônica road, a 5,000- km dirt road linking Brazil's Northeast with the state of Acre on the border with Bolivia, cut through the heart of the rainforest without adequate thought to environmental and social consequences. This and other road construction schemes were part of a large-scale development strategy which included colonization projects, hydroelectric schemes, and large-scale mining operations in Pará, Mato Grosso and Rondônia. In the 1970s alone these projects absorbed about three million migrants, most of them poor farmers. By 1980, official and private colonization schemes had already claimed the best soils, and the rest of the agricultural frontier was to be occupied by spontaneous colonization (Richards, 1996).

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[19] The administrative entity 'Amazônia Legal', covering 5.1 million square kilometer includes all the northern states of Brazil: Amazonas, Acre, Amapá, Rondônia, Roraima, Pará, and Tocantins (Figure *3.1*). It is largely covered by closed tropical forest.

[20] Deforestation figures remained low in 1996 due to heavy rains. A pronounced dry season in the Amazon Basin in 1987, and again in 1995, facilitated burning and pushed up the deforestation rate (Southgate, 1998).

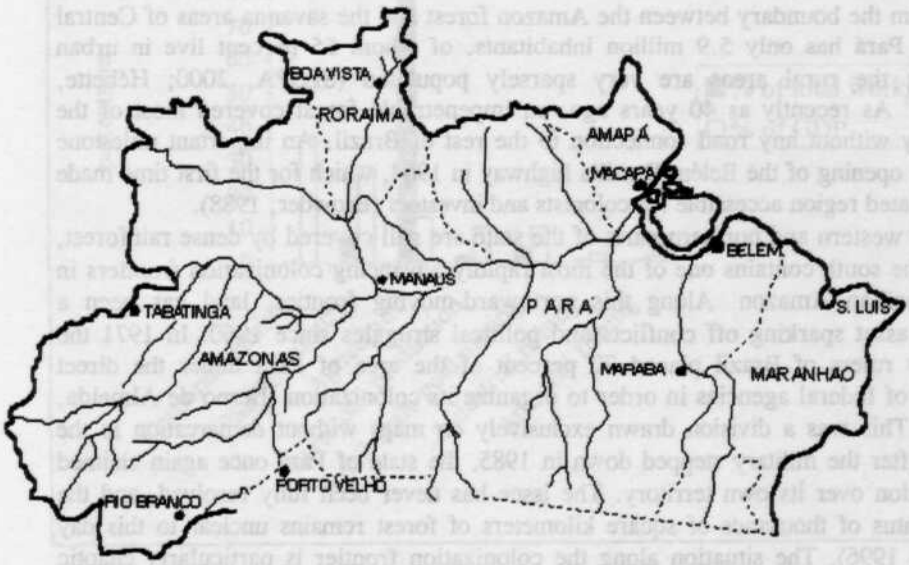

Figure 3.1: Map of *Amazônia Legal*

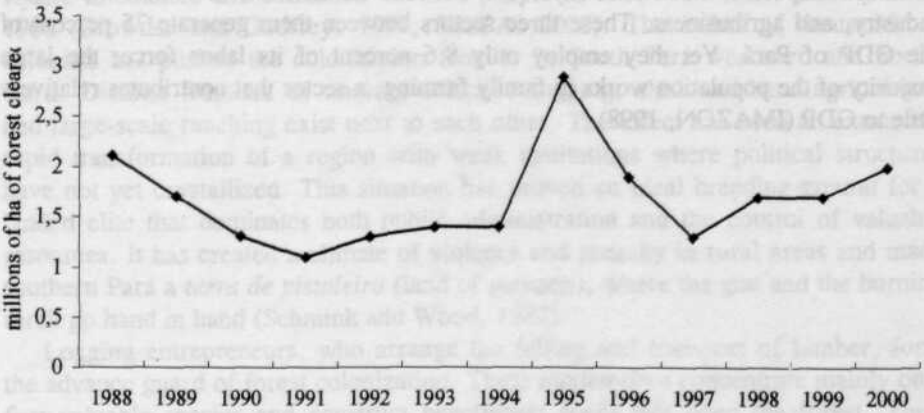

Figure 3.2: Annual deforestation figures for the Brazilian Amazon between 1988 and 2000 (sources: IBAMA, 1998; INPE, 2001).

The state of Pará

The territory of Pará state covers an enormous 1.2 million square kilometers, of which a large part in the north is covered by the floodplain forest (*várzea*) along the Amazon river and its tributaries. The south consists of forested uplands (*terra firme*) that form the boundary between the Amazon forest and the savanna areas of Central Brazil. Pará has only 5.9 million inhabitants, of whom 55 percent live in urban centers; the rural areas are very sparsely populated (SESPA, 2000; Hébette, 1989).[21] As recently as 40 years ago, an impenetrable forest covered most of the territory without any road connection to the rest of Brazil. An important milestone was the opening of the Belém-Brasilia highway in 1964, which for the first time made this isolated region accessible for colonists and investors (Browder, 1988).

The western and northern parts of the state are still covered by dense rainforest, while the south contains one of the most rapidly advancing colonization frontiers in the Brazilian Amazon. Along this northward-moving frontier, land has been a crucial asset sparking off conflicts and political struggles since 1960. In 1971 the military rulers of Brazil placed 70 percent of the area of Pará under the direct control of federal agencies in order to organize its colonization (Berno de Almeida, 1995). This was a division drawn exclusively on maps without demarcation in the field. After the military stepped down in 1985, the state of Pará once again claimed jurisdiction over its own territory. The issue has never been fully resolved, and the legal status of thousands of square kilometers of forest remains unclear to this day (Eleres, 1996). The situation along the colonization frontier is particularly chaotic with a lack of clearly-defined jurisdictions, demarcations, land registers, and reliable maps. Colonists, public agencies, indigenous people, and big investors vie for access and control. Berno de Almeida (1995) has stated that the recent history of Pará can be described as 'a war over land and a war over maps'. The colonization of the forest has brought about an economic dynamism, based on the extraction of natural resources, which is reflected in Pará's economic output (Figure 3.3). In terms of output, economic activity is concentrated in the mineral sector, the timber industry, and agribusiness. These three sectors between them generate 75 percent of the GDP of Pará. Yet they employ only 8.6 percent of its labor force; the large majority of the population works in family farming, a sector that contributes relatively little to GDP (IMAZON, 1998).

[21] The average population density is 4.2 persons/km² for the state of Pará as a whole, and lower than 1 person/km² in rural areas (Pasquis, 1998).

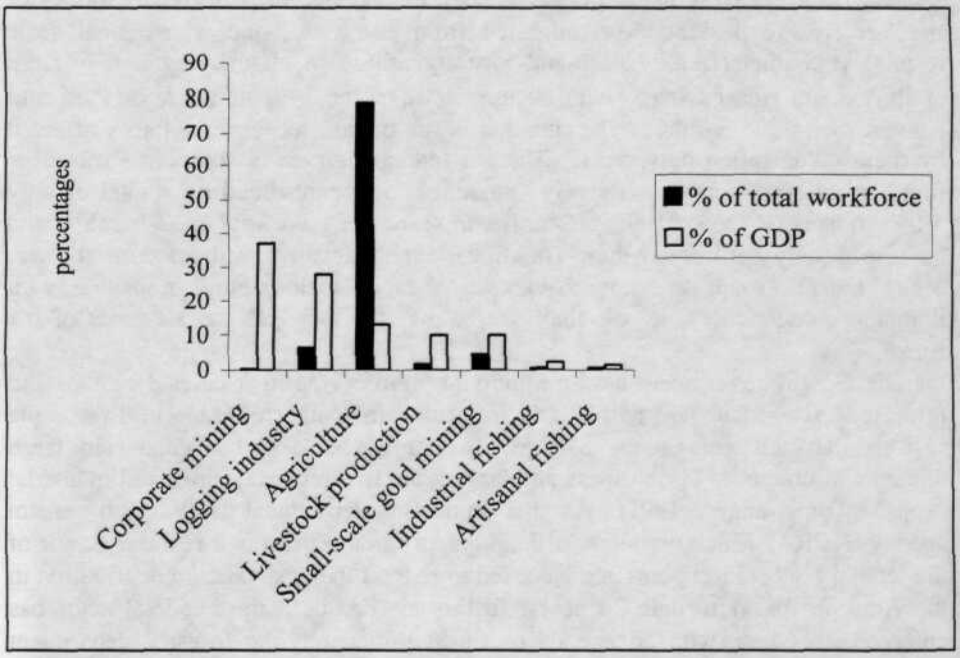

Figure 3.3: Economic importance of, and employment in the main economic sectors in the state of Pará in 1997 (source: IMAZON, 1998).

South Pará and the main actors of the frontier dynamics

The 37 municipalities in southern Pará extend over an area of around 260,000 square kilometers and contained 930,000 people in 1999 – 25 times more than in 1960 (Browder and Godfrey, 1997; SESPA, 2000). The influx of thousands of colonists has pushed the colonization frontier in South Pará westward and northward. Distinct frontiers of mining, selective logging, slash-and-burn agriculture, and large-scale ranching exist next to each other. The effect has been an extremely rapid transformation of a region with weak institutions where political structures have not yet crystallized. This situation has proven an ideal breeding-ground for a landed elite that dominates both public administration and the control of valuable resources. It has created a climate of violence and anarchy in rural areas and made southern Pará a *terra de pistoleiro* (land of gunmen), where the gun and the burning torch go hand in hand (Schmink and Wood, 1987).

Logging entrepreneurs, who arrange the felling and transport of lumber, form the advance guard of forest colonization. These *madeireiros* concentrate mainly on a few valuable species and construct penetration roads that open the forest. Their selective cutting can not be considered directly responsible for the massive forest clearance. That is the work of colonists, who follow in their wake and burn the vegetation every year during the dry season to prepare the land for crop cultivation and conversion to pasture. The fire produces thick smoke throughout the region,

causing respiratory problems and the closure of regional airfields. The majority of the farmers are peasants who migrated from elsewhere, and whose small-scale farming is characterized by slash-and-burn agriculture. A minority consists of large estate owners (*fazendeiros*), who occupy most of the land in southern Pará and convert forest into pastures. The situation of the Indians has been seriously affected by these colonization movements. The ten Indian reserves in southern Pará cover fourteen million hectares of largely untouched forest, inhabited by a total of only 5,000 Indians (Ricardo, 1996). Colonists in search of gold, timber and arable land have brusquely confronted these traditional forest dwellers with modern society. Many Indian groups are now caught in a rapid socio-cultural transition with dramatic consequences, as we shall see below, for their role as stewards of the forest.

The federal government has an important indirect role in frontier dynamics and three federal agencies are particularly influential in southern Pará. The first is the regional development agency SUDAM, which since 1960 has channeled large amounts of credits to agribusiness and large-scale livestock, farming, and industrial projects (Binswanger, 1991). Another important department is the land reform agency INCRA, which organizes official colonization schemes. It is the executor of the federal land reform plans and has tried to redress the unequal land distribution in the Amazon for more than 20 years. In the last decade a third federal actor has emerged, this time with an agenda of forest protection: the forestry department IBAMA, which is in charge of monitoring and controlling logging activities, forest burning, and nature protection areas.

The town of Marabá

Marabá is the largest urban center in the south of Pará and lies at the center of the most baldy deforested areas in the Amazon. Since the beginning of this century, it has been a hub of extractive activities due to its strategic location at the junction of the rivers Tocantins and Itacaiunas (Figure 3.4). Around 1920 Brazil nut gathering was the dominant economic activity and the area around Marabá was the largest producer of Brazil nuts in the world, denominated the 'land of the *castanhais*' (*Bertholletia excelsa*), which bear the Brazil nuts (Mattos, 1996). An oligopoly of influential families in Belém dominated the trade and exported the nuts, while a powerful landed elite restricted peasants' access to the *castanhais* stands and employed them on a seasonal basis for harvesting the nuts. For many decades an extractive economy based on Brazil nuts also dominated the political life with traders exerting total control over local politics (Emmi, 1988).

The hegemony of the *castanhais*-owners was broken during the 1960s when the military government intervened in an attempt to promote development in the region. During the same period, the authorities gave six million hectares around Marabá to wealthy colonists from São Paulo (Fernandes, 1993). This was the end for the traders and the existing local elite and the start of the dominance of land owners from South Brazil. The development of the mining complex in nearby Carajás at the beginning of the 1980s attracted thousands of people from the drought-stricken Northeast of Brazil in search of land and a better future. Gold fever raged through the region with the discovery of gold in the Serra Pelada, south of Marabá. This

became the eldorado of the Amazon, with some 40,000 gold-seekers at its peak in 1983 (Ribeiro, 1990). Simultaneously, powerful economic groups from the south of Brazil started to grab land more and more land when the official incentives for cattle ranching were at their most attractive during the 1980s. Many peasants were expelled from their land by violence and had no other choice than to crowd into the slums around towns as Marabá or to move to deeper into the forest and encroach on new forested land (Hébette, 1991).

Today the gold fever is over, but the people have stayed. Since that time, fierce conflicts over land between small peasants and *fazendeiros* have raged almost continuously. The situation is one of chaotic uncertainty regarding land ownership, rural violence, and extreme inequality between the class of *fazendeiros* and an impoverished mass of landless peasants living in urban centers. The region now produces only a fraction of the world's Brazil nut, and the last dead stands of *castanhais* on the pastures mark the end of the extractive era.[22] The urban expansion has continued throughout this rural turmoil and the city of Marabá has witnessed spectacular growth: before the colonization wave in the 1960s, its population was about 8,000, and in 1997 according to unofficial estimates, 170,000 (Mattos, 1996; *Correio do Tocantins*, 16-1-98).

Clientelism, corruption, and electoral fraud dominate politics in Marabá. Almost all candidates for mayor and town councilor in the south of Pará have been large estate owners or gained support from such people. They have taken advantage of the impoverished situation of the population to establish clientelist ties (Peixoto, 1995; *News from Brazil*, 31-7-1997). The municipal authorities are incorporated into local powerful cliques (Peixoto, 1996). In recent years, however, clientelist relationships have weakened somewhat under influence of a wider democratization process in Brazil as a whole. The influence of the Catholic church and of militant NGOs has been decisive in this process, which has diminished the dependency of people on local patrons (Petit, 1997). Local empowerment, however, has not led to the establishment of a consistent regional development policy. The socio-political order continues to be based on large estate ownership and the extraction of valuable timbers and minerals.

Understanding the landscape around Marabá

All official policies concerning land-use in Pará are directed from the state capital Belém. This city lies at the mouth of the Amazon river and forms the administrative and economic heart of the state. As an Atlantic seaport, it exports timber and minerals; its population is about one million. Along the road from Belém to the south, the landscape gradually changes from one of extended shantytowns to an open savanna. Houses become scarce and pastures, agricultural fields, and shrub vegetation stretch for 20 to 50 kilometers on both sides of the road. This is the zone of intensive agricultural production; it also includes an established timber industry. Its most important town is Parágominas, 30 years ago the spearhead of the pioneer frontier and synonymous for rapid colonization and forest clearing. Today, most of

[22] Brazil nut production in Marabá declined from 15,000 tonnes in 1980 to 3,600 tonnes in 1998 (*Correio do Tocantins*, 17-1-97; 2-2-99).

the forest here has been cleared and the pioneer frontier has moved several hundred kilometers further south. What has remained is a thriving timber processing industry with sawmills concentrated around the town (Stone, 1997; Veríssimo *et al.*, 1992).

Figure 3.4: Map of Pará state

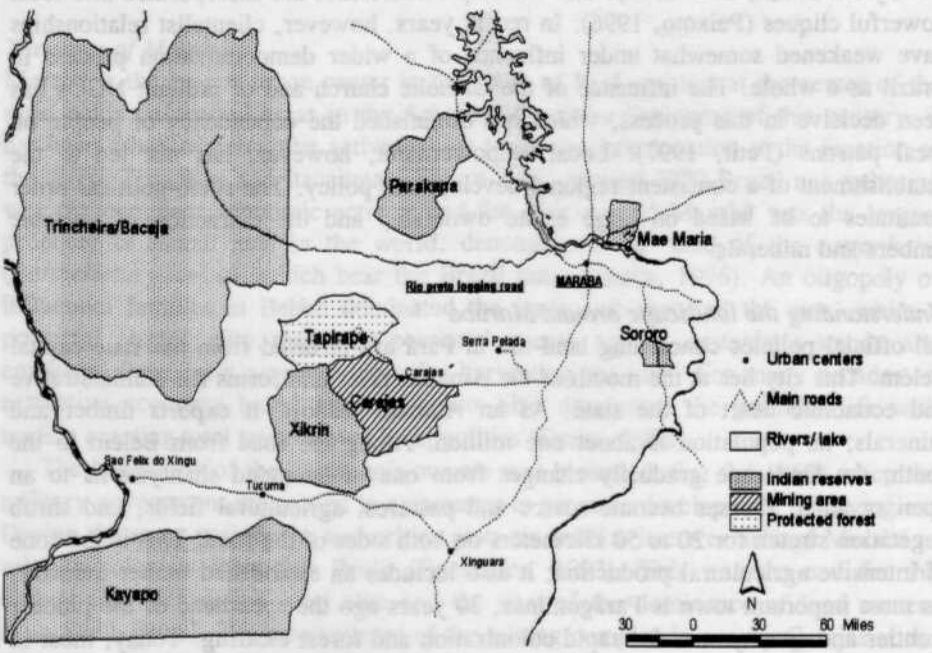

Figure 3.5: The *Rio Preto* logging road and the study area in South Pará

Further along the southbound road, large estates (*fazendas*) with pasture stretch unbroken by any tree cover. From the air, geometric cleared patches mark the grazing lands that comprise these *fazendas*, some of them up to 200,000 hectares in extent. In the 1980s, this zone was the scene of violent land conflicts with *fazendeiros* using gunmen to chase peasants from their land. There is a saying in the Brazilian Amazon: *quando chega o boi, o homen sai* – 'when cattle arrive, people leave' (Browder, 1988). Sawmills with large timber yards are scattered along the road; next to the sawmills, batteries of smoking furnaces to transform sawmill waste into charcoal.

Those Indians reserves that are situated in the colonization zone form forest enclaves surrounded by pastures. Mãe Maria, a 62,000 hectares reserve for the Gaviões Indians just 20 km from Marabá, is a forest remnant surrounded ed by ranches and colonization projects, and penetrated by a highway and electricity lines. The Gaviões have been able to stand their ground and exact financial compensation from the government. The Kayapó Indians too obtained large demarcated reserves a few years ago; living in the most remote forest areas, they now hold strong control over territories containing gold deposits and stands of mahogany trees. Other, less fortunate Indian groups, however have been forced to move ever deeper into the forest under pressure from advancing roads, hydroelectric dams, and mining projects (Ricardo, 1996).

The Transamazônica road that heads northwest from Marabá leads towards organized colonization schemes involving cattle ranches that have gradually cleared the forest on both sides of the road. From the air, deforestation shows the typical fish-bone pattern characteristic of planned colonization. Side-roads, mostly constructed by logging companies, go far beyond the official colonization areas, giving rise to the patchy and corridor-linear deforestation patterns which mark the presence of spontaneous colonization. I carried out fieldwork along one of these roads, the 'Rio Preto' dirt road, located 150 kilometers west of Marabá. Settlement in this area began in 1984 when the road marked a pioneer frontier for mahogany extraction and newly-arrived migrants. In the next ten years, the frontier advanced 200 kilometers westwards (Moreau, 1997). The history of the Rio Preto road is an interesting example of how lead agencies have opened up the forest. The military began the construction of this road in the 1970s, but soon abandoned the project due to a lack of funding. Logging companies and ranchers, however, took up where the army left off, gradually extending the road during each dry season with financial and logistic support of the municipality (*Correio do Tocantins*, 27-3-98). Today it has advanced into an officially demarcated Indian reserve some 300 kilometers from Marabá.

LOGGING ACTIVITIES

The logging industry as a lead agency

The extension of the road network along the colonization frontier has made enormous quantities of standing timber accessible to logging teams. Logging operations now take place over an area of 300,000 square kilometers (24 percent of Pará state) and every year an additional 5,000 square kilometers are exploited for timber (IMAZON, 1998). This continuous timber extraction has gradually brought a

processing industry into existence during the 1980s. Around 1,300 sawmills now operate in the state of Pará, extracting thirteen million cubic meters of timber with a turnover of US$ 1.3 billion in 1997 (Veríssimo and Lima, 1998). Less than ten percent of this timber is for worldwide export; more than ninety percent of the production serves the national market, which is largely concentrated in southern Brazil. The situation in Pará does not differ much from that of the other states in the Brazilian Amazon, resulting in the curious fact that the largest remaining tropical forest area in the world supplies barely seven percent of the internationally-traded tropical timber. The explanation lies in the absence of an export-oriented logging sector, which has not yet achieved critical mass because the costs of extraction are very high due to the heterogeneity of the forest, the large distances involved, and the prevailing conflicts over forest access. Only a few big companies in Pará export high-quality timber in the form of semi-processed wood (Fleury, 1999; Arima *et al.*, 1999).[23]

The large majority of sawmill owners are migrants from South Brazil who moved to the Amazon after 1985 when timber became scarce in the south (*Boletim Semanal AIMEX*, 1999). All logging operators search constantly for sufficient timber supplies, often abandoning their logging sites just after a few months to start over again at more remote locations. Their characteristic strategy is one of cut-and-run, and their investments along the forest fringe are seldom more than provisional. Their extraction points are often situated in Indian reserves, in recently colonized areas at the agricultural frontier, and in the remnant forest areas on large *fazendas* (Fleury, 1999).

An extended chain of wood suppliers operates in the Amazon implicating thousands of rural families that depend on timber extraction and processing for their cash income. At the apex of the industry stand big companies, often operating with foreign capital that process timber in high-quality sawmill units, some for export markets.[24] They have their own logging activities but also buy logs at the sawmill gate to complement their stocks (Cota, 1997). They may subcontract the supply of raw material to entrepreneurs who manage the chainsaw teams and are known locally as '*madeireiros*'. These middlemen arrange contacts with individual landowners and Indians, on whose land most of the felling takes place. *Madeireiros* have some basic machinery for road construction and organize the extraction of the most valuable trees and the rudimentary processing of timber for the regional market. Their business is a short-term activity profitable on a predatory basis without management plans or large investment. They establish small sawmill units along the logging roads and run them until the valuable trees are gone. Small timber operators form a third category alongside big companies and middlemen. They extract the less valuable species, on which they can still make a profit due to their low overhead costs (Fleury, 1999; Cota , 1997).

The logging industry is the most important economic sector at the frontier. It accelerates the influx of colonists and, at the same time offers them work. During

[23] A log export ban has been in force in Brazil since 1969.

[24] There are 22 foreign-owned logging companies operating in the Amazon, of which six are from Southeast Asia (*Globo*, 10-3-98).

the first years of settlement when the sale of timber from their land and seasonal jobs in timber extraction represent their only sources of cash income, many colonists are completely dependent on *madeireiros*. The relationship between loggers and colonists, however, is not entirely based on trees and timber. There are also close clientelist ties involving the exchange of support and protection for loyalty and votes. *Madeireiros* represent the only lead agency for peasant colonists who are deprived of any kind of official service or infrastructure (see Box 3.1). The *fazendeiros* too negotiate with them about timber extraction, obtaining timber revenues as an additional benefit when a plot is cleared to convert it into pasture.

The power of the logging patrons is not restricted to rural areas. The *madeireiros* also have great political influence in the regional urban centers. They are involved in municipal and state politics and manipulate decisions about road construction and road improvement. The logging sector is the second largest industrial sector after mining in Pará and the state governor has always defended the logging industry and lobbied for its expansion. On the federal level, the governors of the Amazon states form a strong caucus which traditionally supports the timber industry in Congress (*Globo*, 1-6-99; *Veja*, 18-3-98).

Box 3.1: a chainsaw operator in action

João has been a chainsaw operator for 14 years and works for a local *madeireiro* along the Rio Preto road, 200 km west of Marabá. He fells trees ten hours a day for five dollars per day. This is his sole source of income and he has a family in Marabá with six children to feed. Some years ago he tried to cultivate corn, but pests destroyed his harvest. He also tried his luck as a *garimpeiro* (gold seeker) in Roirama, but he did not make a fortune and finally returned. He believes that over the years he has cut down more than 10,000 trees. "*Mas isso não importa, a mata não vai acabar!* 'But that is no problem, the forest will not run out!"

Tree felling is the only job for people like João and the *madeireiro* supplies them with transport, electricity and other services in remote areas. "My boss is good to me and helps me when I have any problems; he is also *padrão* (godfather) to one of my children.' João gets very angry about what he sees as IBAMA's constant harassment, particularly its eagerness to fine logging companies and confiscate chainsaws from smallholders. "Logging is not destroying the Amazon, we just cut a few trees and leave the rest standing. The *fazendeiros* are the real culprits, because they burn large tracts of forest every year".

The state government of Pará has also invited Southeast Asian logging companies to invest in Pará. Malaysian companies such as Samling, Rimbunan Hijau, WTK and KTS have become emergent actors in Pará and Amazonas in recent years, obtaining an estimated two million hectares of forest and several big sawmills (*Veja*, 18-6-97; *Globo*, 13-3-98). They buy cheap existing sawmills that are on the brink of failure, then modernize obsolete machinery and poor processing techniques (Cotton and

Romine, 1999). These Asian firms concentrate on the isolated woodlands of West Pará and Amazonas, where stumpage fees are still close to zero (Stone, 1997). They have ambitious plans; Rimbunan Hijau has already invested US$ 25 million in the modernization of two sawmills in Pará, and bought a third in Amazonas (*Globo*, 10-1-98). Their activities have raised protests from environmental NGOs both in Brazil and abroad, and have been investigated by federal politicians. Massive illegal land transactions and infractions of forestry regulations have been revealed (SAE, 1997). IBAMA has reacted with an overhaul of the activities of the companies concerned and has issued huge fines for the known infractions (*Liberal*, 10-5-99). Asian companies do not at present engage directly in timber extraction, but prefer to remain in the background organizing the trade. Their apparent aim is simply to gain a foothold in the world's largest remaining natural forest zone.

Mahogany: from boom to bust

The extraction of mahogany (*Swietenia macrophylla*) has been the leading factor in the development of the logging industry in the south of Pará. Mahogany is the most valuable tree species in the Amazon, with an export price of around US$ 750 FOB for first quality sawn timber. Mahogany is thinly distributed through the forest and has a poor regeneration capacity after harvesting (Southgate, 1998). Its extraction rate is only 0.3 trees per hectare, and it has been calculated that the damage caused to the forest by selective mahogany felling alone is no greater than caused by natural tree falls (Veríssimo *et al.*, 1995). The problem, however, is that loggers operate over an extended area which they render accessible to colonization and susceptible to forest fires (Nepstad *et al.*, 1999).

Commercial harvesting of mahogany in South Pará, like organized colonization, started in the 1960s. Since then, the extraction of mahogany has developed autonomously into one of the most important lead agencies for forest encroachment. Mahogany cutters have opened thousands of kilometers of penetration roads to reach the extraction areas. When timber stocks were depleted on private land during the 1980s, invasions of indigenous reserves became common (Veríssimo, 1996; Ricardo, 1996). By 1990, Xinguara in South Pará was the main center of mahogany extraction (Figure 3.5). All the sawmills in this area were specialized in mahogany and the surrounding forest was exploited without much state control (Cerri, 1989; Pinto, 1997). In the next few years the mahogany tree disappeared completely around Xinguara and the timber frontier moved on. Tucumã, 100 km further west, became the next processing center, with new logging roads radiating out some 200 km from this town. Small peasants and ranchers as ever, followed in the wake of the loggers. In the early 1990s an annual average of 200,000 m^3 of sawn mahogany were produced by the 24 sawmills in South Pará, representing 90 percent of the total production in the state (Veríssimo *et al.*, 1995).

The mahogany industry today consists of a few integrated companies with considerable investment resources and political influence. They control everything from the cutting of the trees to the trading of the sawn timber, which is sold to South Brazil, Europe, and the U.S. (Veríssimo *et al.*, 1995). In this respect, they are very different from the small-scale logging operators who extract timber only for the national market. In 1996, IBAMA placed a moratorium on new logging permits for

mahogany. This measure gradually restricted the export of mahogany, but it also strengthened the position of the five companies already specialized in mahogany (Cotton and Romine, 1999). At the end of the 1990s, according to the official export figures for Pará (Figure 3.6) the mahogany export boom is over. Extraction has not ceased, but the trade is illegal or now supplies only the national market. This national market too is under pressure due to the scarcity of the resource and to stricter control on the part of IBAMA. These changes have increased costs and make the mahogany extraction expensive compared to that of other hardwoods.

Figure 3.6: Mahogany exports, Pará state 1987-1999 (source: *Boletim semanal AIMEX*, 1997 and 1999).

IBAMA's forest policy

A report of the investigation commission into logging of the federal congress has estimated that 80 percent of the timber trade in the Amazon is illegal and escapes any control from the forestry department IBAMA (SAE, 1997; Amigos da Terra, 1997). The explanation for this enormous figure is twofold. On the one hand, a rigid top-down regulation system makes legal logging practically impossible. Every activity in the forest is subject to dozens of permits, taxes, and items of paperwork. Only a few IBAMA offices in the state are authorized to grant permits, and for many purposes it is necessary to go to the head office in Belém, sometimes three days' travel away. These oversized bureaucratic requirements are counterproductive, forcing many smallholders and *madeireiros* into illegal activities. Local officers, secondly, do not enforce the regulations consistently because they are understaffed, badly equipped, and underpaid. A total of about ten officials, for instance, is available for the control of 20,000 square kilometers around Marabá; their equipment includes only a few cars, and fuel is scarce (source: IBAMA staff in Marabá).

Other constraints include lack of collaboration with other departments and constantly changing policies at the top of the bureaucratic hierarchy. All this has created a situation in which field officials restrict themselves to deskwork and minimal surveillance and enforcement. They are also susceptible to bribes so that instead of prohibiting illegal felling, they simply make it more complicated and expensive. Not surprisingly, much pressure and criticism has been directed at IBAMA in recent years. On one side, international donors and conservationists demand more efficiency and stricter control. On the other side, local people and timber traders consider IBAMA's excessive bureaucracy a threat to the timber industry.

In the last three years, the department has undoubtedly made serious efforts to regularize and control the timber sector. The situation nevertheless is still far from optimal. Loggers now have to consider the risk of seizure and fines, and the larger sawmills are registered and pay taxes, but the majority of the loggers operating in the forest are still clandestine. In 1997, IBAMA seized almost 300,000 m^3 of illegally cut roundwood and for the first time fined loggers for felling within an indigenous reserve. Between 1995 and 1997 the prescribed fines for illegal extraction doubled, but the problem remains that most fines are lifted in court due to legal loopholes (Cotton and Romine, 1999; Amigos da Terra, 1997).

A widespread popular hostility toward IBAMA officials complicates their work. The strict regulations which exist on paper are considered purely as a form of harassment, a way of making it difficult for people to earn a living. The IBAMA office in Marabá was set on fire in 1992, and again in 1997 (*Correio do Tocantins*, 14-8-97). An IBAMA official who had fined a big sawmill in Marabá, and refused to negotiate about a bribe, was killed by gunmen in front of his house (*Liberal*, 1-4-98). On other occasions, IBAMA officials were attacked in a hotel and held hostage by angry sawmill workers who blocked the roads with the support of the municipal authorities (*Correio do Tocantins*, 19-6-99). High officials and state-level politicians in Pará underscore the protests and condemn IBAMA's policy of confiscating illegally cut timber (*Globo*, 13-3-98). In this political environment, the enforcement of the forestry code along the logging frontier is possible only with police support. Collaboration with the police, however, is limited to sporadic raids (*blitzes*) rather than institutionalized as a regular activity. This and other problems notwithstanding, total timber production declined in 1998 due to a strengthened moratorium on mahogany extraction and stricter control of logging permits (Working Group on Mahogany, 1998).

The question remains whether stricter control does in fact make sense and whether it is capable of stimulating proper forest management. In collaboration with IBAMA, the research institute IMAZON (1998) has developed an integrated zoning plan for the logging industry in Pará. The plan proposes a system of macro-zoning which allows continued logging in an area of 400,000 square kilometers (32 percent of Pará), while prohibiting this activity elsewhere. Under this system, it is estimated, timber production could remain the same while productivity could be doubled by improving felling and processing techniques. There is, then, no lack of expertise and planning; the problem is that the current modes of forest exploitation are more profitable and that there is no lack of raw material. Under these conditions, the authorities are either

reluctant or unable to force logging companies and local people to change their practices. Local IBAMA staffs remain poorly motivated, and there is no real political will at higher level to stop illegal logging. Only a few roads, large enough for heavy logging trucks, link the region with the outside world; in principle permanent checkpoints along these roads should be sufficient in themselves.

Another key issue for IBAMA is the annual burning of the forest during the dry season, which blankets the region in a thick, hazy smoke for months. Burning the vegetation is the normal way for farmers in the Amazon to prepare their fields for planting. A complicated system of permits and regulations exists on paper, but is never enforced. In recent years, IBAMA has invested in the use of remote sensing for combating deforestation (*Isto é*, 2-10-96). Satellites and space monitoring systems can detect forest fires, but will not prevent them or even help prevent them. As long as there is no enforcement in the field, and fines are not paid, digital data will not reduce the burning on the ground. Geographic localization of 'deforestation hot spots' is undoubtedly important, but everybody in the Amazon knows where deforestation occurs and where and when the frontier burns. The fact is that most of the sophisticated data gathered in Brasilia have no implications in the field (IBAMA staff, Marabá; Cotton and Romine, 1999). It is symptomatic for a service like IBAMA that is unable to control deforestation on the ground to pretend to combat it from space.

The Indians and their confrontation with logging

All indigenous reserves in Pará have been confronted with encroachment on their reserves by *madeireiros*. The reserves are the last areas with large mahogany stands and the department of Indian affairs (FUNAI) is too poor to protect these against loggers. Only the big logging companies, it should be noted, have the means to open up these inaccessible areas by constructing roads and bridges. Not all timber extraction from Indian reserves has been simple robbery by logging companies. In many cases direct negotiations took place between *madeireiros* and indigenous leaders, or contracts were supervised by FUNAI (Monbiot, 1992). In 1989 the federal authorities put an end to the involvement of FUNAI in the timber trade, but the logging companies have continued their quest for mahogany. Leaders of the Kayapó, the largest indigenous group in the region, are now directly involved in the timber trade (Box 3.2). During the last few years IBAMA has confiscated large quantities of mahogany trees from Indian reserves, to the anger of both the *madeireiros* and the Indians. IBAMA estimates the value of the mahogany trade for the *madeireiros* at US$ 70 million FOB per year; the Indians receive only a fraction of this sum (*Globo*, 11-8-98; 14-11-98).

The extraction of mahogany remains a very selective activity and does not generate a massive threat to the integrity of large reserves. One problematic side effect of the logging roads inside the reserves, however, is the increased vulnerability of the forest to fire (Nepstad *et al.*, 1999). In the exceptionally dry year of 1998, logging roads were partly responsible for the fact that fires inside the reserves destroyed more than one million hectares of forest (*O Liberal*, 12-4-98).

Box 3.2: Kayapó Indians and the mahogany reserves

The Kayapó Indians consist of 19 different communities living dispersed in the forest from central Pará to North Mato Grosso. They are one of the most famous and belligerent groups in the Amazon, well known for their colorful body paintings. They have shown great resilience toward the advance of 'civilization', while conserving a strong cultural identity (Fisher, 1994). Today they number around 6,000 people, scattered over 30 villages in seven reserves in Pará. [25] Their various reserves cover together an enormous area of more than twelve million hectares (Ricardo, 1996).

At the beginning of the 1990s, the discussion about the demarcation of Indian reserves was at its height in Brazil. Public opinion tended to reject the reservation of large tracts of forest for relatively small groups of Indians. Governmental agencies and local actors obstructed demarcation, and the legal procedure became bogged down. The Kayapó, aided by environmental activists, made use of the 1992 conference on biodiversity in Rio de Janeiro to present their case by means of protests and rallies. Before the eyes of the world, they demanded the demarcation of their forest; at this point the Brazilian government as host tot the conference had to give in to avoid a loss of face (Fisher, 1994; Nugent, 1996).

The forests controlled by the Kayapó contain the last large mahogany stands in the Amazon. From 1983 on, FUNAI negotiated the felling of mahogany with local *madeireiros*. At that time FUNAI defended the mahogany trade as a means to finance its assistance to the Indians and to compensate for which budget cuts it had suffered. In 1989, the Brazilian Supreme Court officially prohibited timber extraction from Indian reserves as a result of corruption scandals within FUNAI. Felling, nevertheless, the timber extraction has continued illegally until today. The Kayapó themselves now negotiate stumpage fees of around US$ 40 per log, which provides them with cash for aircrafts, food and medicines. "We exchange timber for our very existence" one Kayapó leader has said (*News from Brazil*, 10-12-92). In recent years IBAMA has confiscated large quantities of mahogany logs from reserves, which has resulted in conflicts with the Kayapó (*Globo*, 11-8-98). The latest development is that IBAMA has signed a agreement with the leaders regarding the auction of the confiscated timber and the allocation of part of the resulting revenue to the Kayapó (*Liberal*, 4-2-99).

One small group of Kayapó has shown that it is able to satisfy its basic needs and harvest forest products in a sustainable way: the Xikrin who live south of Marabá fell only selected mahogany trees and produce their food from forest gathering and agriculture (Box 3.3). Assistance from NGOs together with funding from the World

[25] Figures from the Brazilian National Health Service (FNS), which is responsible for the health care of Indians (*Liberal*, 7-11-99).

Bank and a mining company operating nearby, was instrumental in designing this system and getting it approved by the appropriate bureaucratic departments.

Box 3.3: The first sustainable logging project inside an Indian reserve

The Xikrin of the river Cateté, a Kayapó group of some 600 people, live in a reserve of 440,000 ha. Until 1992 their territory was the scene of mahogany logging and gold extraction. Between 1989 and 1993, logging companies extracted an estimated 80,000 m^3 of mahogany from the reserve (*Gazeta Mercantil*, 11-4-94). The Indians gained financial profits from the concession contracts, but they suffered from social disintegration, alcoholism, prostitution, and environmental damage. The logging companies opened 400 km of roads in their reserve and the heavy logging machinery drove away game, their main protein source.

In recent years the Xikrin have changed the way they manage their forest, constructing a management plan for the extraction of Brazil nuts and the sustainable harvesting of mahogany in over area of 40,000 ha. In this endeavor they have received assistance from NGOs and funding from the nearby mining company CVRD (Giannini, 1996). Official authorization for the project from IBAMA and FUNAI took several years due to the cumbersome bureaucracy; in 1999, IBAMA finally gave authorization for the felling of 4,300 m^3 of mahogany in a pilot area of 1,400 ha (*Liberal*, 26-3-98; *Boletim Semanal Aimex*, 1999).

SMALL PEASANTS AND THEIR LAND USE STRATEGIES

The peasantry and its livelihood

Peasants around Marabá characterize themselves as *'pequenos produtores'* (small-scale farmers). They form a heterogeneous group with different migration backgrounds, a variety of livelihood strategies, and a remarkable pattern of regional mobility linking them to nearby towns. Colonists from Northeast Brazil make up the larger part of the rural population and introduced the cultivation of rice, manioc, and beans. Other settlers originated from South Brazil brought with them livestock farming and the cultivation of cash crops like cocoa and coffee (Cleary, 1993). These smallholders have developed a range of strategies for making a living on their plots of land, which average about 50 hectares in area. They are involved in an economic mosaic of subsistence farming, cash cropping, extraction of forest products such as Brazil nuts, lumber activities, informal mining, and wage labor on cattle ranches. These activities mean that peasant are obliged to move with the advancing frontier, regularly changing their place of residence. In these isolated pioneer zones, colonists are deprived of services and regularly need to visit urban centers. Therefore, most rural families have members of their extended family living in regional towns. This urban linking is essential for arranging business activities and official paperwork, and also enables children to study in towns.

Muchagata (1997b) has made a classification of four categories of peasants around Marabá, which represent a group of 20,000 rural families occupying 25 percent of the land in the area. *Landless farmers* form the poorest category of peasants and are the least numerous. They rent or share-crop land belonging to other peasants. A second category is that of *peasants practicing small-scale farming* in recently colonized areas. The income of this group comes from annual crops and from extraction of forest products. The average plot measures 50 hectares, much of which area is still covered with forest. The biggest group is that of *small peasants combining annual cropping with a small cattle herd*. Their plots, again averaging 50 ha in size, consist of arable land, recently sown pasture, and a small remnant forest area. The wealthiest category consists of peasants who arrived 15 to 25 years ago, and have established *farms of about 100 ha based on annual crops and cattle*. Part of such a 100-ha plot, typically, is still forested.

The agricultural production of rural households consists largely of food crops for domestic consumption, although a small part is sold to intermediaries. Many farmers process manioc into flour (*farinha*), which is the regional staple food and represents an important commodity generating cash income (Sautier and Muchnik, 1996). Seasonal wage labor on *fazendas* and in the logging industry is the most common way for households to acquire a stable income, and forms the cornerstone of their livelihood. Perennial crops are not cultivated on a large scale around Marabá. Only when government extension services provide credit and assistance do farmers plant cocoa and coffee; in total, these crops only occupy a few hectares per farm and are a marginal source of deforestation. What is much more important is the farmers' aspiration to own cattle. The conversion of crop land into pasture starts two or three years after the first harvest, and even before farmers own cattle. They invest early in the fencing of the pasture, and gradually build up a herd by sharing cattle with established farmers. One can speak of a settled farm when the herd reaches the level of six to seven heads, which is sufficient to generate capital for further expansion. After 10 to 15 years, a farmer may have accumulated enough capital to buy new land and to hire labor (Reynal *et al.*, 1995; Muchagata, 1997a).

Credit for small-scale agriculture has been very scarce throughout the colonization history of the Amazon. In the 1990s, however; this situation gradually began to change. Today the federal government no longer provides credit only to large estate owners, but increasingly also channels credit facilities to smallholders. A good example is the credit program PRORURAL, started in 1992 to fight rural poverty by providing small peasant with loans for investment in crops, housing, and livestock production.[26] Farmers do not need collateral; the only requirement is membership of an official peasant organization. Between 1992 and 1998, PRORURAL issued 43,000 loans with an average credit of US$ 9,000 per household. The receipt of technical assistance is a precondition for the receipt of credit and this requirement still forms a substantial bottleneck because the official extension services often do not have the capacity to reach the farmers in need (Khoury, 1999). Other problems derive from the

[26] PRORURAL (*Programa de Apoio à Produção Familiar Rural*) is part of the larger FNO (*Fundo Constitucional de Financiamento do Norte*) credit scheme that is managed by the Banco da Amazônia.

colonists themselves, who do not repay their loans and default on their commitments to the peasant organizations (Carvalho, 1999).

Itinerant farming and the ranchers' dream

In remote frontier areas, small peasants cut and burn the dense vegetation to prepare their *roças* (cultivated land) for the planting of food crops. The low fertility of the soil and inadequate farming techniques result in declining yields, and farmers have no means to invest in modern inputs. After a few years the colonists abandon their land and move on to clear new plots of forest. This 'itinerant farming system' is characterized by low agricultural productivity and a high turnover of land (Reynal *et al.*, 1995). Farmers are also pulled into forest encroachment partly by the abundance of forested land, which is opened up by continuous logging activities. Under these circumstances it remains more profitable to encroach on new land than to invest in a more intensive agricultural production. It is conceivable that no farmer will be motivated to make a switch to a more productive farming system as long as unoccupied forest is accessible along the colonization frontier. When land is abundant and the only constraint is the availability of household labor, smallholders often tend to prefer a farming system with a low labor input. Burning the forest and slowly transforming infertile forest soils into pasture land then represents best option. Such a system certainly seems to be the most cost-effective system for migrants in Marabá (Picard, 1994; 1997).

During the pioneer stage, settlers occupy a plot of forest land that is owned by an absentee landowner or the state and that is located near a recently opened logging road. Such land invasions, of course, spark off disputes with the original owners, often also with neighboring squatters. At this stage, farmers are not yet sure whether they will stay on the plot. they start by cutting a small clearing for manioc and plantain and by selling mahogany and cedar for cash income. Peasants are much dependent on logging activities, which provide them both with seasonal jobs and cash from the sale of valuable trees. In the early stages slash-and-burn is an effective way of occupying land. For the first three years the cleared land is still fertile and suitable for crops like manioc and plantain. After the soil quality declines, the land is transformed into pasture. Clearing forest at this initial stage serves many purposes; one of which is to it demarcate the boundaries of the farm and increase its value in a future sale. The turnover at this stage is high, and many people abandon their plots to try their luck elsewhere (Hébette, 1991 and 1992; Musumeci, 1988).

For those who are able to maintain their farm and to settle any conflicts about ownership, the most precarious period is over after five years of settlement. At this point, the other members of the household join the pioneers on the farm and the house is improved. Forest clearing is oriented toward the creation of pasture, for cattle and toward the preparation of the land for sale. Farmers start tending cattle when they can afford breeding animals and fencing. At this stage approximately half of their land is still covered with forest, which provides food products and medicinal plants. Meanwhile the frontier matures and better roads facilitate transport, which in turn stimulates the agricultural production and raises land prices (Hébette *et al.*, 1996). Farmers who can afford to hire labor, are able to accelerate the pace of

clearing. The forest cover is reduced to 10 or 20 percent of the plot, clustered around water sources and in areas not suitable for pasture (Muchagata, 1997a). Peasants are able to break out of the isolation of the early pioneer stage and develop livelihood strategies in which the rural-urban interface is an important aspect. Many develop a complex combination of farming, seasonal wage labor, and urban informal sector employment (Cleary, 1993). Rural families are in contact with urban centers, from which they obtain services and information; some household members periodically switch between urban and rural residence. Families are split up at certain times of year; the men may be on the farm plot, while the women and children are in town, where education and health services are available (Hébette *et al.*, 1996).

The phenomenon of families moving from one plot to another is characteristic for frontier communities. The findings of Topall (1990) in Box 3.4 show that the occupation of forest land has been a transitional stage for many colonists and that most of their clearing activities have resulted in upward social mobility. By clearing forest, settlers have accumulated enough capital to start a better life. Data show that a starting capital is a necessary condition for establishing a large cattle herd. Those farmers who do not gather the necessary capital remain at a level of perhaps ten head of cattle and twenty hectares of pasture. Reynal *et al.* (1995) have calculated that in areas colonized for less than six years, 14 percent of the plots change hands each year. In areas that have already been colonized for twenty years, the annual turnover drops to seven percent. Aside from failure or bankruptcy, the main motive for selling land is to obtain capital for investment: the money received is often used to buy new land with better physical conditions or accessibility to a paved road.

An important driving force behind this land use system is the widespread dream of obtaining a large cattle ranch. Cattle have very interesting economic advantages in isolated frontier areas. Tending cattle requires less work and provides more benefit than cultivating crops with fluctuating prices and high transport costs. With livestock, moreover, the farmer can decide at what moment to sell: when prices are high, for instance, or when there is a particular need for cash. A second important reason for the popularity of ranching is the high prestige of a cattle rancher in the Brazilian Amazon, where cattle are associated with large estates, power, wealth, and an easy life. The only problem is the need for credit to obtain the animals. In an economy with real interest rates above 40 percent and with very limited access for small farmers to bank credit, the strategy of itinerant colonization is attractive. The risks involved, however, mean that few farmers realize their dream; the majority become indebted or confronted with rural violence, and have to leave their land. The general appreciation for pasture is reflected in the price of land: cleared land is three times more valuable than land that is still forested (Reynal *et al.*, 1995).

Box 3.4: The high land turnover in the colonization zone around Marabá

A detailed study by Topall (1990) of the *travessão 14*, a side road of the Transamazônica, 60 km from Marabá, revealed the evolution of land use patterns and the motives of the colonists in an official colonization scheme. Experienced farmers sold their farms in Central and South Brazil and arrived at the *travessão 14* after the opening of the Transamazônica during the 1970s. Between 1970 and 1990, each of the 26 100-ha plots had an average of three different owners. During that period, land prices increased from almost zero to US$ 50 per ha.

Topall interviewed those who sold their land; some became merchants along the road or shopkeepers in town, others started up a new farm, obtained wage labor, or tried their luck at gold-seeking (*garimpagem*). Only very few had earned enough for a quiet life in Marabá. In the 1980s, the group of colonists who remained on their farm started to differentiate and split into two categories. Those who had enough starting capital expanded their initial land to a *fazenda* of 300 ha and converted it to pasture for a herd of about a hundred cattle. The other category kept their family farm with 20 ha of pasture and 80 ha of forest reserve. The reason why so much land on these farms remained under forest was a lack of money to hire labor for clearing it. The family unit was able to manage only a maximum of 20 ha of pastureland. The overall level of deforestation along the *travessão 14* after 20 years of occupation was around 40 percent.

Land invasions and the struggle for land

Violent land conflicts have been known in South Pará for 30 years. Their root cause lies in the establishment of a class of large estate owners occupying large tracts of forest in the same area where smallholders sought land during the 1960s and 1970s. The speculative interests of these large estate owners were so powerful that new migrants could not obtain land, and farmers who already lived in the area were expelled (Corrêa, 1996). The land conflicts in southern Pará have been among the bloodiest of the whole Amazon resulting in the killing of around 500 people over the last 30 years. The victims have mostly been landless farmers, lawyers, priests, and politicians (Berno de Almeida, 1995). The executors are gunmen (*pistoleiros*) who operate on behalf of the large estate owners, and constantly spread threats and violence in the rural areas. These *pistoleiros* are publicly known 'untouchables', whose services are available for cash (Box 3.5)(Peixoto, 1996). The federal state is not capable of securing a legitimate monopoly of violence despite having several times placed the region under military authority. Around the town of Marabá, land ownership is unevenly distributed to the tune of a Gini coefficient of around 0.9 (Costa, 1996; *Liberal*, 15-10-98); a mass of landless people is packed into the shantytowns of this and other urban centers in South Pará.[27] The rural areas

[27] The Gini coefficient for land ownership is a measure of inequality. A value of one indicates a complete concentration of land in the hands of a single owner; a value of zero implies that all

surrounding the towns, by comparison, consist of desolate, sparsely-populated *fazendas* owned by a few landowners (Costa, 1995).

Box 3.5: Fees charged by pistoleiros for killings around Marabá

peasant	:	from a bottle of rum (*cachaça*) to US$ 500
peasant from MST	:	US$ 1,000
fazendeiro	:	US$ 5,000 to 10,000
municipal politician	:	US$ 5,000 to 10,000
IBAMA official	:	US$ 5,000 to 10,000
federal policeman	:	US$ 15,000

source: article on rural violence in Marabá, *Correio do Tocantins*, 4-5-99.

At the end of the 1980s, farmers started to organize themselves into syndicates to counterbalance the dominance and repression of the large estate owners. The role of the Catholic Church in this process has been crucial and organizations as CPT *(Comissão Pastoral da Terra)* and FETAGRI *(Federação dos Trabalhadores na Agricultura)* have mobilized landless farmers. In the last ten years, landless people have started to invade unproductive *fazendas*. This has brought about new conflicts and more violence, but has also been effective in advancing the interests of the landless. The proportion of land occupied by smallholders around Marabá increased from one percent in 1980 to 25 percent in 1996 (Hébette, 1993; Muchagata, 1997a). A new emerging actor has recently accelerated the pace of this 'spontaneous' land reform in South Pará. The movement for landless peasants (MST) is very enterprising in the organization of land invasions and enables farmers to stand up against the power of large landowners.[28] By 1998 some 25,000 peasant families had invaded 128 *fazendas* spread over an area of a million hectares around Marabá, and were demanding the ownership of the land on which they squatted (*O liberal*, 11-6-98).

The critical link between this social movement and the deforestation problem lies in the fact that the invasions mostly take place on unproductive *fazendas* that still have a large part of their land forested. These *fazendas* are ripe for invasion, because their owners are often absentees and only hold the land for speculative purposes. A second important reason to choose the particularly forested *fazendas* is that these areas can supply the squatters with a immediate cash income from the sale of valuable timber. Logging companies support these invasions and even stimulate

landowners have equal-sized farms.

[28] The *Movimento Sem Terra* (MST) is a national grassroots organization that pleads for social justice and equal distribution of land. MST uses marches, invasions, and political pressure to bring about changes in federal policies.

them. There have been several cases in which companies signed exclusive timber contracts with land invaders even before the actual invasions took place (*Isto é*, 7-8-96; *Liberal*, 4-5-95). The invasion of *fazendas* is not only profitable in the short-term, but can also generate official subsidies and credit facilities for formerly landless peasants in the event that the invasion is ultimately legitimized as part of the national land reform program.

The land reform policy of INCRA

Since 1994, the federal government has made a serious commitment to national land reform in order to achieve an equitable distribution of agricultural land in Brazil. Between 1994 and 1998, the federal land reform agency INCRA spent approximately seven billion US dollars on the land reform program. This benefited 280,000 families, each of which received a plot of fifty hectares and a small starting capital; the total area land involved was 14.2 million hectares (INCRA, 1998; Governo Brasileiro, 1996). In most cases, INCRA legalizes ownership of land that farmers have already invaded and pays the original owner compensation for the expropriation. An important fact is that 75 percent of the national land reform schemes are situated in the Amazon, often in remote forested areas along the colonization frontier (INCRA, 1997). The government's intention to solve the issue of landlessness by settling farmers deep in the Amazon can be explained partly by the fact that compensation payments for remote forested land are lower than for arable, pasture, or urban land. Land reform in these sparsely-populated zones, moreover, generates relatively fewer conflicts than in urban centers where land is more valuable and coveted. That INCRA needs to provide less financial assistance in the forest results not only from lower land prices, but also from the fact that squatters there already have some cash income from the sale of timber stocks (Viana, 1997).

The conversion of unproductive *fazendas* into small farm units has positive aspects from a sustainability perspective. It is a first step to regularize land for smallholders on the advancing colonization frontier. Many farmers who receive a piece of land are motivated to set up a farm which will remain productive in the long term. Peasants' organizations stimulate the establishment of agricultural cooperatives reflecting attempts to break out of the spiral of itinerant, extensive farming. Freedom from the threat of expulsion is an important factor here. At the same time, poor agricultural techniques and lack of road infrastructure, credit, and no farming assistance remain serious constraints. The result is that newly-settled farmers often still have no other option but to practice slash-and-burn agriculture and to rely for cash on the *madeireiros* who buy their valuable trees. The current policy of INCRA, which distributes barren land to poor settlers, is not in itself enough to ensure sustainable land use. As long as forested land remains abundant, farmers have an exit option which enables them to avoid the transition to intensive agriculture on a permanent plot. Progress will depend largely on sealing off indigenous reserves and public forest from further encroachment, and at the same time providing farmers with all-weather roads, services, and credit in order to make a smallholder agriculture successful.

Other facts endorse the statement that federal land policy represents a new government-instigated force for deforestation. In a critical evaluation report, deputy

Viana (1998) characterized the current land reform as an ecological disaster for the Amazon. According to Viana's calculations, 200,000 farmers have each burned 25 hectares of their newly-granted land in the space of four years, while another five million hectares of forest have disappeared in adjoining areas affected by settlements. That brings the total to ten million hectares of forest in the Legal Amazon destroyed as a result of the latest land reform policy. MST leaders condemn this policy which obliges settlers to clear forest, sell their land, and move further along the frontier. As a new variant of itinerant farming, this will only transfer the problem of poverty from the shanty towns to the countryside: *'Vai mudar as favelas do endereço!' 'This [land reform] will only change the location of the favelas'*, as an MST leader in Marabá put it. The government has acknowledged that the current practice of giving remote forest land to poor farmers is no structural solution. Land reform should not focus on land located in an area where there are no outlets for crops and no agricultural extension services (*O Liberal*, 13-12-98). There are now plans to establish a 'land bank' which will operate under control of the government and is financed by the World Bank. The land bank will buy properties and subdivide them for sale to peasants, while at the same time serving as a credit providing institution for the purchasers.

The land reform plan is financially interesting for squatters. Once INCRA has recognized an invasion, farmers can obtain a PROCERA loan, at low interest rates, up to a maximum of US$ 7,000 per household (Picard, 1997).[29] This favorable credit arrangement has stimulated invasions and attracted people other than the target group. Small landowners and jobless urban dwellers consider these invasions as a strategy for improving their living conditions. They participate in order to sell timber and obtain PROCERA credit, after which they sell the land and return to their shacks. This land reform plan has stimulated the old mechanism of the '*indústria de posse*' (land occupation industry) which has marked the movement of small peasants to the pioneer frontier in the Amazon since the first colonization waves of the 1960s: colonists occupy forested land, clear it, and sell it with a profit (see Schmink and Wood, 1987).

LARGE ESTATE OWNERS AND EXTENSIVE RANCHING

Types of fazendeiros

The *fazendeiros* occupy 50 percent of the land around Marabá, and this generic term for large estate owners hides much variety. Most *fazendeiros* tend cattle for meat production and cultivate annual crops on *fazendas* with an average size of 4,000 hectares. The smallest *fazendeiros* are hard-working colonists from the south with a few hundred hectares on the consolidating frontier. Real land speculators are nowadays the exception. The few left own enormous stretches of forest, sometimes up to 100,000 hectares, in areas that are still isolated; they leave their land unused in the hope that it will command higher prices in the future. The richest category of *fazendeiros* has specialized in agribusiness and owns middle-range farms, with cattle

[29] The PROCERA credit line had a budget of US$ 56 million for the state of Pará in 1998 (*Correio do Tocantins*, 23-10-98).

for dairy or fattening, along all-weather roads in longer colonized areas. The product of large investments and considerable technological inputs, these estates are highly profitable (Muchagata, 1997b).

Fazendeiros represent the social class with the highest prestige and together with the *madeireiros* they dominate the rural areas of South Pará. They consider themselves culturally as well as economically superior to the backwater society of the Brazil nut gatherers and the poor colonists from the Northeast. They bring land into cultivation, generating agricultural production from formerly 'unused' and 'worthless' forest land. Traditionally, politicians and government decisions have endorsed their idea of superiority. *Fazendeiros* have established strong political ties at all levels, from clientelist municipal politics to the *ruralistas*, the biggest political caucus (*bancada*) in Brazil's federal parliament (Hall, 1989; *Globo*, 12-10-1998).

In recent years, *fazendeiros* have come under attack from peasant organizations, conservation agencies, and certain federal departments. Their public image in Brazil has been tarnished by a stream of negative publicity in the press, revealing their role in forest destruction, land speculation, and killings. In addition, they are plagued by invasions of landless farmers and are under much increased pressure to pay land taxes and reduce their forest clearing activities. *Fazendeiros* now need to defend their way of using the land and to prove that it is productive. The loss of their omnipotent position is not taking place without resistance. They demand respect for their private property, organize themselves in militias, and hire more *pistoleiros* to chase off squatters from their land. The revival of their political party UDR in the south of Pará represents another move to counter the recent empowerment of small farmers (*Liberal*, 17-9-96).[30]

Cattle ranching in South Pará

Cattle ranching started with the colonization of the region in the sixties and seventies when large parts of Eastern Pará were transformed into pastures using credit and tax exemptions from SUDAM. The burning of the forest generated a layer of nutrients for the pastures, which initially had a carrying capacity of 2.5 head per hectare. Gradually the soil was depleted and invading weeds lowered the carrying capacity of the grasslands. The crisis of the pasture lands of that first cycle occurred in the middle of the seventies. Many pastures never recuperated and were left idle, the *fazendeiros* moving along with the agricultural frontier towards new patches of forest. In the 1970s and 80s, with high inflation rates, ranching was linked more to land speculation and inflation hedging than to meat production. A number of researchers have blamed governmental subsidies as the single most important factor underpinning the development of cattle ranching in the Amazon (Schmink, 1992; Browder, 1988; Hecht, 1992; Mahar, 1988; Binswanger 1991). Cattle ranching, however, also had its own economic rationality; demand for beef and dairy products came from the booming Amazonian towns (Faminow, 1998).

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[30] The right-wing conservative party UDR (*União Democrática Ruralista*) was founded in 1985 as a reaction against the agrarian reform. It represents more than 40,000 *fazendeiros* and uses intimidation to curb official attempts at land expropriation. Much rural violence has been attributed to UDR and its members (Dreifuss, 1989; Peixoto, 1995).

The livestock sector in the Amazon has evolved since that time and the equation of ranching with large-scale low-productive land use is no longer completely valid. Small peasants have also started to invest in livestock production, and those *fazendeiros* who have continued with ranching have modernized their ranches and improved their profitability (Mattos and Uhl, 1994; Faminow, 1998). Today South Pará contains several million head of cattle, 25 percent of the total cattle stock in the state. Constant expansion has made the region one of the three livestock growth poles in Pará, the others being Parágominas and Marajó (Arima and Uhl, 1996). Two characteristic zones have gradually emerged. In pioneer areas, firstly, extensive ranching is still the dominant land use. The pastures here, which account for one half of all pasture land, have trouble with weed infestation (Serrão and Toledo, 1992). In these zones, *fazendeiros* still have the option of cutting old-growth forest instead of engaging in the costly recuperation of degraded pastureland. In the longer established colonization zone around cities like Parágominas and Marabá, secondly, pasture management has intensified considerably. Ranching has reached the critical point where the degraded pastures no longer supply enough nutrients for the herd. Bringing new forest land into use is no longer possible because the forest is already gone or because land has become too expensive (Mattos and Uhl, 1994). In these longer-colonized areas, governmental pressure for more intensive production is also mounting. There is stricter control on the payment of the land tax and the threat of expropriation when the ranch is not productive. The most viable option for these *fazendeiros* is to recuperate the degraded pasture and to make a shift towards a more intensive production.

Researchers such as Serrão and Toledo (1990 and 1992) and Mattos and Uhl (1994) have shown that cattle ranching can be economically viable if ranchers make investments for improving their pastures and cattle. Improved ranches can produce three times more animal weight per unit of land area than their predecessors (IMAZON, 1998). Another incentive for intensive ranching is the lucrative market for milk which exists in urban centers in South Pará. A dairy zone has already emerged along the highway north of Marabá. A group of smallholders along the road that connects Belém with Marabá sells around 80,000 liters daily to two dairy plants with outlets in both cities. This 'mature' frontier area has evolved into an intensive production zone due to growing urban markets and improved road connection with Belém (Smith *et al.*, 1995; Sautier and Muchnik, 1996).

Governmental credit and support for cattle

Large-scale ranching projects supported by the development agency SUDAM occupied 84,000 square kilometers in the Amazon in 1987. Most of this land was situated in Mato Grosso and South Pará; 20,000 square kilometers of it had actually been cleared by 1987 (Schneider, 1995). During the 1990s, the federal authorities have reduced tax exemptions and official incentives for ranching and have announced an overhaul of the investment schemes. Government credit for cattle ranching, however, has continued to be available. In addition to SUDAM credit, a regional investment fund (FNO) launched a new credit program in 1990 with the explicit goal of supporting infrastructure and cattle-ranching projects in the Amazon region. Up to 1994, FNO allocated US$ 162 million, half of its resources for rural

development to cattle ranching in the Amazon. This money was allocated for the production of 212,000 head of cattle benefiting 4,000 *fazendeiros* (SUDAM, 1997a). Another credit program PRODEPEC, was used exclusively for cattle ranching and provided loans to the value of US$ 3.3 million in Pará between 1989 and 1994 (*ibid.*).

A landmark decree was the Green Protocol in 1995, which ordered all public credit providers to follow a set of guidelines designed to guarantee environmentally sound investment (Lele *et al.*, 2000). Nowadays, the emphasis is on intensification of livestock production and recuperation of degraded pastures. The agricultural extension services, for instance, have started large projects to rehabilitate degraded pasture lands around Marabá (*Liberal*, 10-12-99). The implementation of the green protocol, however, is weak and many things have remained unchanged. *Fazendeiros* still receive credit in Belém for their ranches in South Pará, the only difference being that official schemes such as FNO have been 'greenwashed' and the loans designated are today called 'cattle intensification programs'. In practice, the Banco da Amazônia and SUDAM do not effectively monitor compliance with the clauses that prohibit the conversion of primary forest into pasture; officials are susceptible for corruption (Carvalho, 1999).[31] A recent World Bank report therefore concludes that loans and incentives still support the conventional system of cattle ranching in areas where forest is converted into pasture (Lele *et al.*, 2000).

Official support for livestock production also continues in other respects such as the construction of slaughterhouses and cold stores in the region (SUDAM, 1997b). South of Marabá there are four slaughterhouses with a capacity of one million head per year (*Liberal*, 17-2-99 and 29-9-95). Governmental agencies in Pará are also actively wiping out the livestock disease aftosis, which still obstructs the export of Amazonian meat to foreign destinations. Several states in southern Brazil have already been successful in eliminating aftosis and have obtained the much-coveted permit for export to the European Union. The authorities in Pará are also eager to obtain that certificate and have a state-wide plan for vaccination. If it succeeds, this will raise prices and mean a major boost for the livestock industry. Much official effort, then, is still directed at making South Pará a major center of livestock production.

Land speculation and its consequences for the forest

During the opening of the Amazon in 1960s and 1970s, land speculation was a very lucrative business on the rapidly moving colonization frontier in South Pará. Entrepreneurs from South Brazil occupied land in order to sell it at a higher land price a few years later. They had no experience and little incentive to start farming themselves in a region with poor transport, untrained labor, and mostly poor soils. Land prices did indeed soar due to continuing colonization and under these conditions extensive land use and speculation were much more attractive than agricultural production with high inputs (Sawyer, 1984). The result is that even today, areas of land along the colonization frontier have not yet come into production. With no

[31] In 2001, SUDAM was abolished after allegations of massive fraud and the federal government has used this opportunity to overhaul the different federal credit schemes.

interest in complete clearing, the speculators have left large parts of their *fazendas* covered with old-growth forest and let secondary vegetation grow. Land speculation, then, has not been a direct cause of deforestation. It has, however, created one of the most important preconditions for the further advancement of the settlement frontier, the practice of *grilagem* (land fraud) and the ensuing land conflicts in South Pará.

The illegal appropriation of public forest land by speculators and ranchers has severely hampered any official attempt to organize land use in Pará. In 1999, a parliamentary investigatory commission found that 21 million hectares of land in the state was under false titles or not properly registered (*Liberal*, 12-8-99)(Box 3.6). The problem is no less widespread in South Pará than elsewhere in the state and recently the various departments in charge of land issues there have finally started to address the problem (*Liberal*, 1-2-2001). For decades, public forest land in the Amazon has been traded without any legal monitoring or taxpaying. This situation has left poor peasants no other choice but to seek land in those frontier areas that are so remote or marginal that speculators have no interest in them. It has contributed to the land invasions and to the thriving *indústria de posse* which makes use of the national land reform subsidies.

Until a few years ago the demand for land exceeded the supply of it, so that speculating on selling land in rapidly advancing colonization frontiers was a lucrative business. During the 1990s, pure land speculation has lost its viability due to socio-economic changes. Subsidies for cattle ranching have diminished and after decades of hyperinflation the Cardoso administration succeeded in stabilizing the Brazilian currency (the *Real*) in 1994. Consequently, the interest of the landed elite has shifted from real estate to financial investments that are more liquid and profitable. Prices throughout the country have fallen (Governo Brasileiro, 1996). Although there is much local variation, in general prices of unproductive forest land along the Amazon frontier have experienced a particularly serious decrease, in some cases losing half of their value between 1994 and 1998 (INCRA, 1998). Another important factor in South Pará has been the MST movement and the associated land invasions, which have contributed to the fall in the value of *fazendas* by making them costly to guard.

At the same time, the land reform plan has offered a new mechanism for property owners to profit at state expense. INCRA has conferred enormous wealth on the *fazendeiros* in the form of debt securities (*Títulos da Dívida Agrária, TDA*) in order to compensate them for the loss of their property. The prices paid per hectare are relatively high in order to make the landowners disposed to collaborate, thereby avoiding further violent land conflicts. For those proprietors who considered their land only as a speculative asset, the recent wave of invasions and expropriations offers a profitable chance to cash it in; under the current conditions of monetary stability in Brazil, TDAs have become an attractive investment option. In some cases expropriation has been made particularly lucrative with the help of corrupt officials prepared to issue inflated compensation (*Folha de São Paulo*, 16-11-1997). Official investigations have revealed that *fazendeiros* in South Pará and Mato Grosso have been overpaid in this way by INCRA to the tune of US$ 120 million (*Folha de São Paulo*, 21-6-1999). Government, in fact, has been buying back the same land

which it sold to the *fazendeiros* in the 1970s and 1980s for up to two times the price. This is part of a recurrent pattern in the history of the Amazon whereby public spending favors large estate owners without halting the advance of the colonization frontier.

Box 3.6: land fraud (grilagem) and the forest sell-out in Pará

In April 1999, the state parliament of Pará has attempted to shed light on the land titles of Cecílio Do Rêgo Almeida. This man allegedly owns a *fazenda* of 4.7 million ha in the remote Xingu forest region (East Pará) (*Liberal*, 25-2-99). Much of the land which he claims, however, lies in areas demarcated as biological reserves, Indian reserves and INCRA settlement projects. Do Rêgo owns several deeds, issued by a doubtful land registration office in Altamira, that seem to prove his ownership. The authorities have found evidence that he obtained the land by means of massive fraud with forged deeds (*grilagem*). The public prosecutor has started criminal procedures against him, but the investigation is difficult due to the lack of a reliable land register (*Provincia do Pará*, 2-5-99). In 2001, a new commission was charged with combating *grilagem* and reclaiming the illegally appropriated public land (*Liberal*, 5-2-2001).

The name of 'Carlos Medeiros' appears on 1,200 deeds in 83 different municipalities in Pará without anyone knowing the man. On paper, his property covers a total of 9,000,000 ha in Pará, 8 percent of the state's surface (*Liberal*, 1-2-2000). During the 1980s, authorities investigated the case and found out that that Medeiros is a phantom whose name is a cover for land fraud. With the collaboration of lawyers, officials in Belém, and notaries, a group of land speculators has used the name to appropriate public land and bypass land taxes and legal obligations (*Folha de São Paulo*, 23-3-95). They sell the falsified deeds to *fazendeiros* and *madeireiros* at prices of around US$ 1/ha of forest, well below the regular market prices (*Veja* no. 11, 2000). The federal prosecutor in Belém minces no words: 'Carlos Medeiros is synonym for *grilagem* in Pará' (*Liberal*, 25-1-00).

In the field of land taxes, a principle of productive use was finally introduced in 1998. The rural property tax (ITR) was adjusted to sanctions for large estate owners who clear forestland and then leave it idle. Today the ITR bears heavily on unproductive agricultural land, while exempting remnant forests areas that are left untouched (Trindade de Almeida and Uhl, 1995). This seems to be a very effective way of countering land speculation and forcing landowners to clear less forest and produce more intensively. A critical issue remains how this regulation can be translated into the effective payment of more tax; at present only one quarter of the total ITR is actually paid in Brazil. Tax collection figures in the Legal Amazon are the lowest of the country due to the lack of a land register and the fact that the tax is based on self-assessment by the ranchers (*ibid.*). IBAMA and INCRA are now beginning to use remote sensing and to undertake verifications in the field followed by fines (Scharf, 1997; *Globo*, 10-15-98). This policy will increase the costs of converting

forest into low-productivity pasture and will gradually stimulate estate owners to apply more controlled burning and more intensive types of land use.

INDUSTRIAL PROJECTS AND AGRIBUSINESS AROUND MARABÁ

Mining and charcoal production

The Carajás mining project has been the most important mega-project in the Amazon and was conceived as the hub of a new regional development strategy for that region. It was based on establishing a mining sector that would generate valuable foreign exchange for curbing Brazil's foreign debt. Mining activities were initiated in 1983 at a site to the south of Marabá which contains the world's largest reserve of iron ore, together with a number of other valuable minerals.[32] The state Company Vale do Rio Doce (CVRD) invested over US$ five billion in the region with the aid of foreign loans from the World Bank and the EU (Hall, 1989).[33] The mine has unleashed direct deforestation, the displacement of indigenous people and massive immigration (*ibid.*). At the same time the Tucuruí hydroelectric dam north of Marabá constructed to supply energy for the booming industry and urban population has flooded 2,785 square kilometers of dense rainforest and has displaced more than 30,000 people including many Indians (*Parábólicas* no. 52, 1999). The dam now generates power for urban centers and aluminum smelters while leaving most of the local people in the immediate vicinity without electricity. Many mineral deposits in the area have not yet been exploited, and the mining industry will, therefore, continue to be a leading agency in regional development. The latest project, the Salobo Mine, is a US$ 1.5 billion investment for a copper mine situated in a protected forest area to the west of Marabá; if it goes ahead, it will generate work for around 5,000 people (*Liberal*, 31-10-98). This project has been in cold storage since 1998 due to the low international copper price, but the deposit will almost certainly be exploited at some point in the future, and speculation and immigration have already taken place around the site.

The mining industry is aware of its crucial role in the region's development and has also become concerned about its bad environmental reputation, which it has recently sought to correct by means of various 'green initiatives'. Open-cast mining within CVRD's 411,000-hectare concession takes place in accordance with strict environmental regulations, rewarded with an ISO 14001 certificate in 1997 (CVRD, 1999). CVRD is also in charge of conserving the Carajás National Forest (see Box 3.7). Only a very rich and strong agency like this mining company is capable of protecting a forest enclave in an area that has already been a colonization frontier for 20 years.

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[32] The Carajás mine one of the largest mineral deposits in the world, with 18 billion tons of high grade iron ore (66 % Fe) and large deposits of copper, manganese, nickel, bauxite, and gold (Hall, 1989).

[33] The initial mining project has been part of the larger 'Program Grande Carajás' (PGC), which also encompasses infrastructure works and industrial investments spread over an area of 900,000 sq. km in the states of Pará, Tocantins, and Maranhão.

Box 3.7 : Protected areas in the vicinity of Carajás

The Tapirapé biological reserve (103,000 ha) and the Tapirapé/Aquiri national forest (190,000 ha) straddle the northern borders of the CVRD's mining area, but were managed for many years by IBAMA, the inadequate funding of which hampered an effective protection against invasions by landless farmers, gold miners, and loggers. CVRD received the control over the area by federal decree in 1997, and in sharp contrast to IBAMA it is able to guarantee strict enforcement of the forest reserve boundaries (CVRD, 1999). CVRD's motivation is given in by their concern to compensate for the damage they have inflicted with the mine and to polish up their public image. Conservation has also the positive side effect of keeping the area, which covers gigantic mineral deposits, free of wildcat miners and squatters. Armed guards backed by helicopters, speedboats and vehicles control the areas and expel land invaders who try to squat on the land or to extract gold or valuable trees from the conservation area (Smith *et al.*, 1995).

Outside the strictly managed areas, on the other hand, the mining project has triggered the same social and environmental problems associated with other frontier areas. The booming frontier towns and the massive influx of people in search of jobs and land have resulted in deteriorating health conditions, poverty, rural violence, and a massive attack on the forest (Pinto, 1997). The impact of the Carajás project alone is difficult to assess Spontaneous colonization, ranching, and logging have also contributed to the deforestation of the area around the mine, which is characterized by empty and idle land and dotted with overpopulated urban centers and shantytowns (Kohlhepp, 1992; Hall, 1989; Lele *et al.*, 2000).

After the discovery of Carajás' huge iron ore reserves, the regional planning focused on the establishment of a metallurgic industry which could generate economic development and employment. Stimulated by loans and tax exemptions from SUDAM, the large pig iron industry of South Brazil began to shift to South Pará (Anderson 1990; da Motta and Reis, 1994). The fuel for the smelters would be charcoal, the production of which was seen as a form of economic backward linkage. In the initial plans during the 1980s, there were calculations of 20,000 new jobs in the metallurgic industry, but in 1994 fewer than 2,000 new jobs were actually created (Monteiro, 1997). Up to the present, no major spin-offs in the form of more diversified production activities have been realized. The need for charcoal, it is true, has resulted in the appearance of charcoal kilns along the highway axes. This local charcoal industry requires a constant supply of fuelwood and produces copious smoke, causing health problems for local people. The contribution of charcoal to the deforestation problem has been the subject of much debate and conjecture. At the start of the Carajás project, many scholars warned that charcoal production would be a major new cause of deforestation in South Pará. Estimates of the amount of forest which would be cut annually to fuel the furnaces ranged from 100,000 to 220,000 hectares (see Fearnside, 1989; Kohlhepp, 1990; Mahar, 1988; Hall, 1989).

Ten years on, however, it is clear that these forecasts were too pessimistic. Monteiro (1997; 1998) has analyzed the current situation and contends that charcoal production is not significant as cause of forest clearance. The first reason for this is that only half of the initially planned pig iron furnaces have been built.[34] High transport costs, secondly, have limited the wood-buying range of the charcoal kilns to a radius of a few hundred kilometers around the furnaces, whereas the pioneer frontier now lies considerably further away. The third and most important factor is that the wood burned to produce charcoal is mostly either sawmill waste or brushwood cleared to make pastures. Timber waste from sawmills provides 60 percent of the supply (Monteiro, 1997). The importance of transport costs in the charcoal business has resulted in a typical pattern of von Thünen rings. For those sawmills situated not far from the furnaces, the sale of waste for charcoal production is a significant source of income (Carneiro, 1997). For more distant sawmills, the same trade yields little profit but offers a cheap way of cleaning up of the mill yard: The remaining 40 percent of the fuelwood used by charcoal kilns comes from forest land that is cleared for pasture. Subcontractors clear both secondary and primary forest and carbonize the cut vegetation on site after the most valuable timber has been sold to *madeireiros* (Monteiro, 1998).

These facts may suggest that there is no direct relation between forest destruction and charcoal production in the south of Pará. The demand for charcoal, however, remains a contributing factor in that it accelerates the process of logging and pasture formation in the old frontier around the furnaces. The cost of clearcutting the land is reduced by the additional benefits from charcoal. The sawmills, moreover, do not see waste of timber as a major problem, and this discourages them from using more efficient processing techniques. Finally, the charcoal industry also intensifies the concentration of land in a few hands and social tensions on the old frontier. The pig iron companies involved own large forest reserves in the area, and are eager to buy yet more cleared land. The reason for this is that they are officially obliged to manage natural forests and set up plantations producing raw material for charcoal (Carneiro, 1997). At present there is still enough timber waste available close by, and consequently they save their forests for later. Only when there is no more cheap timber waste or natural forest left in the vicinity will eucalyptus plantations become a viable investment.

Agribusiness and soybean cultivation

The growth of agribusiness represents the latest trend in large-scale business investment in South Pará. Companies have started to invest in grain-cropping and industrial meat production, poultry farming, and dairying. The land used for these purposes are typically those which have already been settled for more than 30 years, and have road infrastructure and electricity. The tendency is toward concentration of ownership and the scaling up of all production factors. Land concentration gradually squeezes out the independent smallholders in the closing frontier zone. Agribusiness represents a

[34] In 1995, six furnaces in South Pará were operational with an annual demand for charcoal of 700,000 tonnes per annum (Carneiro, 1997).

modern version of the *latifundio* system which has dominated rural Brazil for centuries.

The best example of this trend is the boom in soybean production in the Amazon. Brazil is the second largest soybean exporter in the world. Traditionally, large agribusiness companies such as Maggi, Cargill, and ADM have produced this crop in South Brazil where the climate is temperate (*Liberal*, 14-6-99; *Economist*, 8-9-00). In the last decade, new varieties suitable for equatorial regions have made it possible for the soybean frontier to move into Mato Grosso and Pará (Sousa and Busch, 1998). Here the soybean is planted mainly on degraded land cleared in the 1970s or 1980s but subsequently left idle. Mato Grosso has become Brazil's second largest soybean-producing state over the last ten years, and South Pará is the latest pioneer zone for soybean planters. Besides new plant varieties, another important factor behind this shift has been a reduction in the cost of transporting the product to export harbors. Roads and rivers are used to transport the beans to the port of Belém and from there to overseas markets. Southern Pará's comparative advantage lies in its relative proximity to Belém, which makes transport 50 percent cheaper than in the case of soybean produced in the center-west of Brazil (*Liberal*, 24-1-99).

The modern agricultural sector can count on much political support. Since 1995, state politicians and development agencies such as SUDAM have started to promote soybean production in Pará with loans and subsidies. The governor of Pará has stated that agro-industrial expansion has high priority and that the goal is to transform Pará into a 'grain pole' of soybean, corn, and rice production. In 1995 the soybean harvest was 200,000 tonnes and by 2003 it is expected to reach 5 million tonnes (*Liberal*, 14-6-99). Three 'soybean poles' have been designated on deforested land in Pará: South Pará, Parágominas and Santarem. Between them they cover one million hectares of cleared land (*Liberal*, 24-1-1999).

The rationale behind state support for agribusiness appears obvious: subsistence farming in isolated areas is of little political concern for the state governors in Belém and its contribution to Pará's GDP is marginal (Figure 3.3). The soybean industry, in contrast, beefs up Pará's export figures and the agribusiness lobby is an important political factor in Belém. NGOs criticize these projects as the latest form of government sponsored deforestation. There are important differences, however, between today's agribusiness and the state-sponsored livestock production of the 1980s. It is unlikely that soybean planters will clear primary forest, because *fazendeiros* have provided thousands idle hectares of cleared land that can easily be used instead. Secondly, whereas many cattle ranchers only burned forest in order to claim governmental credit and subsidies, soybean cultivation is much more viable economically and will generate jobs and economic activity in a poorly developed region. It is true that mono-cropping provides fewer labor opportunities than small-scale household farming, but lack of land, expertise, infrastructure and credit make smallholders farming much more risky. Most of the cleared land in South Pará, moreover, has very poor soils and requires high inputs in order to have a profitable agricultural production, an effort that only the soybean industry is able to do at this stage. Taking into account all these facts, soybean production may well be the least bad option for the old frontier lands of South Pará.

The Tocantins-Araguia Waterway

The advancing soybean frontier has stimulated a great improvement in the bulk transport infrastructure of South Pará. The most cost-effective way of moving bulky products is by barge and plans for a 2,200-km Tocantins-Araguaia Waterway have already been drawn up. This waterway will connect South Pará with the port of Belém, a stepping stone for worldwide export. The project is projected to cost US$ 220 million and will allow the transport of minerals and timber as well as agricultural goods from the interior to the Atlantic. It reflects a continuation of the traditional political support for large-scale projects, which for decades have taken the lion's share of available public funds in the Amazon. The secretary of the state department of transport in Pará (SETRAN) stated: 'The *hidrovia* (waterway) is one of the most strategic plans promoted by the government of Pará' (*Liberal*, 2-5-99).

The priority given to infrastructure projects, however, is no longer as unquestioned as it was in 1960s and 1970s. Local people and NGOs have launched a wide debate on the problematic aspects of this project and have demanded modifications and compensations. Together with environmentalists and indigenous groups, they have warned of the social and environmental risks entailed by this latest mega-project. Drainage plans, for instance, threatens wetlands in Ilha do Bananal protected area, and the habitat of Indians and smallholders along the banks of the rivers that will be canalized (*Liberal*, 2-5-99). Critics consider the waterway as similar to earlier roads and dam projects in the Amazon, and therefore condemn it in advance. A more practical approach, in my view, would be to consider how the social and environmental costs of the project could be reduced to an acceptable level and its economic benefits made to trickle down to a large proportion of the population.

GREEN POLICIES

Federal government policy towards deforestation

Until the 1990s, Brazil's federal policy in the Amazon unconditionally endorsed large-scale development projects in order to make the region an integrated part of the national economy. Thousands of poor migrants were pulled towards construction sites for dams, roads and mines. The forest became a stopgap solution to the problem of peasant landlessness, and the associated social tensions in other parts of Brazil. Deforestation, then, was the price to pay for development (Hurrell, 1992). The 1992 Biodiversity Conference in Rio de Janeiro was a landmark for green thinking and since that time '*desenvolvimento sustentavel*' (sustainable development) has become a politically correct buzzword in Brazil. The Brazilian variant of this Western idea has been much affected by its close association with new grassroots organizations of farmers, rubber tappers and Indians. The empowerment of these local people has primarily been a political struggle for social justice, and only secondary an environmental awakening (Hall, 1996; Nugent, 1996). The examples of log-selling Indians and tree-felling squatters described above illustrate how this ambiguous breeding ground of Brazil's environmental concern have engendered conflicts over resources and often-contradictory outcomes for the environment.

On the macro level, the federal government has initiated forest conservation policies and launched legal actions against the deforestation in the Amazon. The Cardoso

administration has addressed some of the underlying causes of deforestation, but its initiatives have met with severe opposition from powerful vested interest. The opposing stakeholders include some of the state authorities in Pará as well as powerful private interest groups that support the long-standing policy of colonizing the Amazon on the basis of large-scale development projects (Lele *et al.*, 2000). This situation has severely hampered the implementation and effectiveness of federal regulations, especially in the vast and still partly inaccessible Amazon basin. The examples given in Box 3.8 indicate that the effect of new federal forest protection in the field is minimal, and that these often function primarily as window dressing with which to impress the international donor community. Federal decrees concerning the protection of the Amazon are often retracted under pressure of the powerful *bancadas* of *fazendeiros* and *madeireiros* in Congress.

It was rather in the same spirit that federal government committed itself to the creation of new conservation areas totaling 25 million hectares in 1998. This agreement was made in the framework of the World Bank-WWF Global Alliance, which called for 10 percent of the Amazon basin to be protected. It was announced as the largest-ever conservation initiative in the Amazon, but NGOs in Brazil and elsewhere have questioned depth of the government's commitment and have pointed to the dozens of 'paper parks' already existing in the Brazilian Amazon (Lele *et al.*, 2000).

The weakness and inadequate financial resources of IBAMA are among the principal problems in the field of forest conservation (*Folha de Sao Paulo*, 9-3-99). There is some slow progress toward better-organized institutions. The Ministry of the Environment (Ministério do Meio Ambiente (MMA)), which supervises IBAMA and coordinates environmental policies in the Amazon, was long an obscure department without much influence or many resources; since 1999, however, it has obtained much more punch under the leadership of José Sarney Filho, becoming an actor that federal politicians have to reckon with. One of the first actions of the new director was a complete overhaul of IBAMA including the dismissal of its director who was charged with accepting bribes from logging companies.

Besides pure forest conservation, another initiative has involved the planning instrument of 'integrated ecological zoning'. In 1990, a federal commission launched the process of *Zoneamento Ecológico-Econômico, ZEE*) for the whole Amazon region, taking into account both economic and environmental concerns (Schubart, 1994). In Pará, the planning department IDESP is in charge of the zoning process and the large donor project of the G-7 (see the following section) has financed the ZEE in three demonstration areas. The paperwork was completed in 1999, and in principle the zoning structure should by now have been implemented. The problem is that there is no translation of the technical and scientific criteria for zoning into administrative and political measures. An important formal constraint is the weak legal status of the ZEE, which is only indicative and not normative, and approval for which always depends on the state parliaments. Experience with the PLANAFLORO zoning project in the neighboring state of Rondônia has shown that local stakeholders are able to water such initiatives down to the status of traditional infrastructure plans for regional development. *Fazendeiros*, peasant organizations, and Indians in Rondônia have obtained more land than before the zoning plan, and all at the expense of forest areas (Nitsch, 1994).

Box 3.8: the political economy of forest protection measures

A federal regulation in force since 1996 limits deforestation on large private properties in the Legal Amazon to a maximum of 20 percent. Landowners are legally obliged to conserve the remaining 80 percent of their land as forest reserve. The enforcement of this regulation, however, has not been a priority for IBAMA, and for a long time there was no policy of prosecution for the flagrant burning of millions of hectares of forest every dry season (*Estado de São Paulo*, 17-15-97). In 1999, a turning point was reached when IBAMA made public a list of *fazendas* on which more than 1,000 hectares had been cleared in one year. These *fazendas* were identified by means of remote sensing and then visited in the field and their owners fined (*Veja*, 14-4-99). This exposed *fazendeiros* for the first time to public scorn, and their *bancada* reacted with a vote in Congress in May 2000 to abolish the forest reserve legislation. In the end, the rule nevertheless remained in force thanks has to worldwide media attention and the mobilization of environmental NGOs and grassroots organizations (*News from Brazil*, 18-5-2000).

In May 1998, the Environmental Crimes Act was announced as a milestone for the protection of the Brazilian Amazon. For the first time since its creation, IBAMA acquired the statutory authority to enforce environmental legislation by means of fines and criminal sentences. Large companies in the timber and mining sector protested, lobbying successfully through the national federation of industries (*Isto é*, 19-8-98). It was estimated that Brazilian companies operating without environmental licenses generated 20 percent of Brazil's GDP. A few months later, president Cardoso issued a decree that drastically reduced the effectiveness of the regulation by exempting all major companies from penalties and fines for a maximum of six years (Gonçalves, 1998; Campanili, 1997).

Berno de Almeida (1995) mentions this form of ineffective planning as characteristic for the Amazon as a whole including Pará. The data used to design the ZEE, moreover, are obsolete, incomplete, and imprecise, while poor legal infrastructure and a lack of political will have frustrated the implementation of the plan at every stage (Malato, 1997).

The internationalization of the Amazon

Transnational companies have been present in the Amazon since the 1960s when they took advantage of the friendly investment climate then offered by the military government.[35] These companies have been responsible for clearing large areas of virgin forest as part of a short-term strategy of extracting resources without gaining territorial control. Their activities nevertheless resulted in a nationalist reaction based on an irrational concern that international forces would gain control of the Amazon and defy

[35] Key examples are the Ford rubber plantations in Amazonas, the American mining interests in Amapá, the Volkswagen cattle ranches in Mato Grosso, and Ludwig's Jarí project in North Pará.

Brazil's sovereignty. Brazilian politicians and the national press have used the specter of 'internationalization of the Amazon' in an opportunistic way to block conservation initiatives such as debt-for-nature swaps, and to keep vested interests in power (Hurrell, 1992).

International attention to the Amazon basin in the 1990s has come mainly from an environmental angle, and the international actors now present there are mostly forest protection agencies. Intergovernmental organizations such as the World Bank, and environmental NGOs like WWF and Greenpeace, are the main donors and influence environmental politics in the Amazon through projects that are implemented with the consent and collaboration of Brazilian authorities (Kolk, 1996). They are at the same time moneylenders and watchdogs lobbying for forest protection at the federal level in Brasilia. The old nationalist reflex against 'internationalization' however, recurs every time the influence of these international actors really challenges Brazilian vested economic interests in the Amazon.

The World Bank has supervised environmental projects worth US$ 900 million in the states of Rondônia, and Mato Grosso (Schwartzmann, 1998). By far the largest single project has been the PPG-7 (Pilot Program of the G-7), which was launched in 1990 to conserve the Brazilian rainforest. It is a US$ 250 million aid package directed by the seven most industrialized countries, with Germany and the European Union as the major financial contributors. The project has played an important role in the demarcation of Indian reserves and in supporting a broader formulation of policies for sustainable development. Its implementation, however, follows a typical top-down trajectory and attempts to please all actors throughout the Amazon (Gérard, 1999). The project has been plagued by delays and confronted with a lack of political will and financial commitment on the part of the Brazilian authorities (Lele *et al.*, 2000; *Folha de São Paulo*, 1-6-1999). The World Bank and the federal government have both accused each other of non-cooperation, but it is a fact that federal budget cuts have delayed the progress of planned projects and postponed many indefinitely (Schwartzmann, 1998).

Halting the march of the frontier

A number of scientists, Pará NGOs and representatives of local grassroots organizations are active in the formulation of an alternative development model for southern Pará.[36] This is intended to guarantee a basic income for poor households and to improve the living conditions of people in rural areas and *favelas*. The plan includes an agricultural policy which stimulates smallholder food crop production and the extraction of forest products much more than investment in plantation crops such as soybean. Cattle ranching is not condemned, but according to the alternative plan needs to be modified with the help of credit and extension services in the direction of more intensive techniques. This should result in grazing on well-maintained pastures occupying a constant area without progressive encroachment on old-growth forest (Mitschen and Miranda, 1996).

[36] Important NGOs working on rural development and social welfare include FASE , CNBB and CAT. The Rio Maria Committee, CPT, and MST and others are active in the field of land reform.

There are very few examples, however, of sustainable land-use techniques that have successfully combined ecological sustainability with socio-economic development in southern Pará. Contenders for this accolade include the pepper-based agroforestry system practiced by Japanese colonists in Tomé Açu (Northeast Pará), the harvesting of Brazil nuts in extractive reserves, and the fruit farming system based on *cupuaçu* (*Teobroma grandiflorum*) (Matheson, 1996; Allegretti, 1990; Subler and Uhl, 1990; Pasquis, 1998). These success formulas all depend heavily on capital investment, all-weather roads, and expertise on the part of the farmers. Consequently they operate only on a limited scale in the longer colonized parts of Pará and typically start functioning only when most of the forest on farmers' plots is already gone (Homma, 1994). They do not yet represent a general development model to counterbalance the dominant paradigm of destructive land use. Their emulation is especially problematic in those crucial pioneer zones where alternatives are most urgently needed to halt forest destruction (Smith *et al.*, 1995; Richards, 1997). The introduction of 'green' land use models not only tends to be too costly and complicated, but is also at odds with the deeply-rooted 'clearing mentality' typical of colonists in South Pará. The problem is that forest is still too easily accessible along the colonization frontier to make such alternatives attractive.

The challenge for policy makers, then is to guide agricultural change by means of credit and subsidies in the direction of an intensified ranching system which does not involve progressive deforestation. But policy makers are still convinced that investments in large industrial and agro-livestock production units oriented toward export markets are the only way to realize economic progress. The latest large-scale development projects in the south of Pará show how persistent this discourse has remained. In the past, such projects have been among the most important causes of deforestation without ever contributing significantly to poverty reduction. The peasants in the cleared frontier areas and the inhabitants of the shantytowns in the urban centers of Southern Pará live in misery without access to basic education or health care. State investments, moreover, continue trigger conflicts over land and resources. This reality seriously undermines the popular argument, often used by local politicians, that deforestation is unavoidable if the region is to develop economically. In the words of Deputy Gilney Viana of the opposition party '*Partido dos Trabalhadores*' (PT): 'It remains impossible to impede forest burning when state and municipal governments themselves stimulate and finance forest-destroying activities' (*Globo*, 10-3-98).

Solving the problem of unequal land distribution and stabilizing the socio-political situation in the region must be the first steps toward a real end to deforestation. Yet even this will not lead automatically to more intensive agricultural production and a slowing of frontier movement. An effective zoning policy is also needed to protect the forest and sanction farmers, rich or poor, who clear it for profit. The Indian reserves form clear landmarks on which to base this zoning and still include large areas of old-growth forest. As long as zoning is not considered a priority, the annual deforestation figures for the Brazilian Amazon will not fall. A change in the mentality of immigrant settlers, finally, may also be needed if the forest is not to continue burning even given entirely sound land reform and zoning policies. Migrants who are unfamiliar with tropical conditions perceive dense forest as worthless vegetation obstructing the use of potential farmland. The mentality of

ranching and clearing, based on patron-client ties, is an ideal breeding-ground for a *latifundio* system in which a landed elite dominates politics.

CONCLUSIONS

South Pará is the scene of massive forest destruction caused by three groups of actors. The first to open the forest are the logging teams of the *madeireiros*, who seek out and extract few valuable species. Logging roads bring the second wave of colonization in the form of smallholders who squat on unoccupied land while practicing itinerant slash-and-burn agriculture. Large estate owners, thirdly, buy the land once it is cleared and invest in cattle ranches and mono-cropping on their enormous *fazendas*. These three waves of colonization can convert an old-growth forest area into a degraded landscape of idle grasslands in the space of ten years.

The advance of the colonization frontier in eastern Amazon forms an arc of destruction that advances slowly but surely into the Amazonian heartland. In the vast rural areas of southern Pará, it has progressed according to the three-stage pattern just outlined. The pioneer zone in West Pará is still in the first stage of frontier expansion, characterized by an abundance of timber, high transport costs, and uncertain property rights. It encompasses the forest zone where the Indian reserves are situated and logging teams search for the last stands of mahogany. The second zone is the small-scale agricultural frontier that develops in the wake of the logging industry. Poor peasants squat on selectively-logged land, burning the trees and moving on to the next piece of forest after a few years. The third zone encompasses most of the *fazendas* and is situated close to the urban center of Marabá, forming a circle of large cleared areas extending few hundred kilometers around the town in every direction. A gradual agricultural intensification is taking place on these large estates, with *fazendeiros* now investing in soybean cultivation and intensive cattle ranching on degraded land.

Economic strategies are directed, in the first place, towards the extraction of resources such as timber and minerals and the conversion of 'useless' forest into low-value agricultural land that is used in an extensive way. The two domains in which this pattern is most evident are the logging and livestock industries in southern Pará. Logging operates according to a cut-and-run mentality largely unaffected by legal regulations. Cattle ranching is the predominant type of land use in South Pará, and the growing urban demand for meat and dairy products will only exacerbate this predominance.

Four underlying mechanisms influence the movement and transformation of the frontiers. The logging industry and the lure of cattle ranching, firstly, that keep people settling at the forest fringe. These are the most profitable options for the rural population in South Pará and form the motor of the colonization frontier. They operate on the basis of very extensive techniques according to the principle of economizing on scarce inputs (labor and expertise) while exploiting the abundance of land and trees. As long as these forces are able to prevail almost uncontrolled at the forest fringe, investment in intensified livestock production and more sustainable logging will not take place in the pioneer and consolidating zone.

The poor organization of the land entitlement for smallholders forms the second underlying mechanism. State authorities exert very little control over the land market, which functions largely according to the whims of the most powerful actors and has resulted in a lopsided land distribution. For many years, *fazendeiros* have dominated the land scene by intimidating and buying out smallholders. In recent years the power balance has slowly shifted in favor of the Indians and the peasantry. Indians have obtained demarcated reserves and now represent crucial actors in the struggle for the future of the forests. Poor colonists now invade many unproductive *fazendas* and call for federal land reform. For both groups, land use strategies are determined in the first place by a concern for basic needs and pure survival. Longer-term orientations toward sustainable forest use have also started to seep in as a consequence of NGO activities and international attention.

The third underlying mechanism behind forest burning is the potential process which causes official policies at all levels to support uncontrolled logging, extensive farming and ranching. At the federal level, various 'green' policies are pursued on paper but lack implementation. Meanwhile a disproportionately large share of public investments goes to large estate owners, road construction, and large development projects. This continuous flow of 'clearing loans' stimulates the advance of the frontier and shows that the rulers in Brasilia do not fully endorse their own pledges to protect the Amazon and encourage sustainable development. At the state level in Belém, secondly, there is a bias toward large-scale development 'poles' based on mining, logging, and agribusiness. On the local level in southern Pará, thirdly, municipal politics in urban centers such as Marabá are dominated by a monolithic bloc based on patron-client relationships and collusion, that favors the interests of loggers and large landowners. A policy which stimulates Amazon people to make a living in a way which involved less forest destruction, it can be concluded, has yet to be developed.

Yet it is too easy to blame the lack of land regulations and the mentality of the authorities in general for forest destruction. Socio-cultural and economic relations have molded state policies in Pará into their current form. This touches on the fourth and most profound reason why every year the forest fringe burns anew: a combination of pioneer spirit and economic realism that motivates everybody from the poorest smallholder to the largest *fazendeiro* to fell trees. Land users' interests lie in extracting the short-term benefits obtained by clearing forest. The presence of poor colonists with loggers and a small landed elite of ranchers will therefore continue to form a threat to every standing tree in southern Pará.

CHAPTER IV

THE ECUADORIAN AMAZON: OIL HAS COLOURED THE FUTURE OF THE FOREST BLACK

The town of Coca in Ecuador's Amazon Region is a bridgehead for oil exploitation. It is also the starting point of the 'via Auca', a well-maintained tarmac road that winds hundred of kilometers southward to the indigenous reserve of the Huaorani Indians. The 'via Auca' is one of hundreds of roads constructed by foreign oil companies along which trucks deliver equipment to the oil wells day and night. On the roadside, the rusty oil pipelines lie exposed. Colonists have settled along this road, gradually converting the forest into coffee plantations and pasture land. From the 'via Auca', small paths lead through the forest to various Indian communities and the nearby national park. The Indian way of life has changed drastically since the oil industry started drilling in the forest. Some communities clear the forest for cattle ranching and sell timber to traders. Others, further down the road, continue their traditional hunting and gathering; they have formed alliances with Western conservation activists in order to halt the advance of the oil industry. A project financed with Dutch money, due to start in the buffer zone of the park, is the latest player in the drama along the 'via Auca'.

Diary, October 1996

INTRODUCTION

Reliable deforestation figures for Ecuador's eastern Amazon region (*Oriente*) are scarce. Data from the FAO (1993) for the period 1980-1990 indicate that 142,000 hectares of tropical lowland forest were lost per year, representing an annual loss of 1.1 percent of all such forest in the *Oriente*. Deforestation is closely related to the oil industry in the northeastern provinces, where foreign oil companies have started to drill in the forest and agricultural colonization has advanced in their wake. This chapter briefly analyzes the behavior of the primary actors (colonists and Indians) in this deforestation process. The two most important 'actors' fields' here are the oil industry and the sphere of national policy-making, which have repercussions for agricultural land use, the forestry sector, and the protection of national parks.

FACTS AND FIGURES ABOUT THE ORIENTE

Ecuador's backward border region

Ecuador's Amazon region covers an area of 130,000 square kilometers in the East (*Oriente*) of the country.[37] Until the 1960s this vast area was an impenetrable tropical forest, only accessible by boat and inhabited by a few Indian groups. Agricultural colonization advanced slowly down from the slopes of the Andes. The pace of the frontier movement accelerated drastically when oil exploitation started in the northern *Oriente* during the early 1970s. Since then, the oil industry has become the driving force behind forest encroachment in that area. The oil roads form an extensive network which has made possible the influx of thousands of colonist families from the Andean and coastal provinces. These immigrants have cleared the forest in strips along the roads.

The Ecuadorian Amazon has been a backward area in relation to the central Andean highland (*Sierra*) where the political capital Quito is located, and the coastal plains (*Costa*), with the harbor Guayaquil as the country's economic hub. The only commodity that makes the *Oriente* economically significant is the oil. The region is completely oriented towards the *Sierra* and *Costa* and has little connection with neighboring countries. The border with Peru in the east was closed for many years due to a lingering border conflict and Peru's claim to a large part of Ecuador's Amazon territory. A peace agreement between the two countries in 1998 has brought an end to the deadlock and to the regular military conflicts along this border. The situation on the northern border, by contrast, remains critical due to the civil war in Colombia and the activities of the FARC guerrilla movement which controls coca cultivation on the Colombian side of the border (*The Economist*, 19-8-2000).

Ecological and land use zones in the Northeast

The provinces that are officially considered to make up the Amazon region encompass three different ecological zones. Lowland rainforest firstly, cover approximately seven million hectares or 60 percent of the region; here the altitude is under 600 meters and the average annual rainfall about 3,200 millimeters. The pre-mountain rainforest at altitudes of between 600 and 1,200 meters covers 30 percent and has a milder climate with lower humidity. The mountainous areas cover 10 percent of the Amazon provinces and are part of the Andean highlands (Goméz, 1994). Marked variations in soil fertility within the lowland rainforest zone preclude generalizations about the agricultural possibilities of the Ecuadorian Amazon. According to figures from the Ministry of Agriculture (MAG), 85 percent of all forest land in the provinces of Sucumbíos and Napo is unsuitable for conventional agriculture due to low soil fertility, susceptibility to erosion, and poor drainage (Southgate, 1992).

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[37] In 1996 the *Oriente* encompassed six provinces of which the three in the north (Napo, Sucumbíos, and Pastaza) contained oil drilling sites. In 1999, Napo was split into the two smaller provinces of Orellana and Napo.

One can distinguish three different land use zones in the oil provinces. (1) The longest colonized area is the pre-mountain area closest to the Andean highland around the towns of Baeza and Tena, cattle ranching is the main agricultural activity, and most of the land has been converted into pasture. (2) The lowland area around the oil towns of Lago Agrio and Coca is a zone where coffee plantations and pasture dominate the landscape. Land use in this zone varies considerably from place to place according to soil quality and date of colonization. Around Shushufindi, with its fertile black volcanic soils (*inceptisols*), most of the forest has already been cleared. There are large oil palm plantations and smallholders have cleared plots for tending dairy cattle and producing coffee. Southwards along the new oil roads such as the *via Auca*, acid red soils (*ultisols*) hinder agricultural development. This has resulted in relatively less clearing and only small coffee gardens and pastures appear along the strips of the road. (3) Further from the oil roads, the forest is largely untouched. This is also the case in the eastern part of the region where the designation of two large national parks, and the existence of a large swamp area at the border with Peru, have slowed colonization.

The main actors in the Oriente

The most recent census, that of 1990 counted 383,000 people living in the *Oriente*, four percent of the national population.[38] The three oil provinces accounted for 214,000 people with an annual growth rate 5.85 percent caused by the influx of new migrants, but has remained sparsely populated with a population density of four inhabitants per square kilometer (Hicks, 1990; Gomez, 1992). Suárez *et al.* (1992) mentioned a net migration of approximately 30,000 families for the two northern provinces from the early 1970s until 1988. More accurate and recent figures are not available. These colonists have come from the *Sierra* and from the *Costa* to work for the oil companies since the beginning of the 1970s. They have settled along the oil roads and have started to clear the forest. Their living conditions are poor, with limited access to all basic services. Consequently, child malnutrition and mortality figures are high in comparison with other regions in Ecuador (Hentschel *et al.*, 1996).[39]

The *Oriente* is home to eight different groups of Indians with heterogeneous backgrounds, accounting for almost a third of the population of the region. In the northern provinces, the Quichua Indians account for the great majority together with smaller groups of Cofan, Siona, Secoyas, Shuar, and Huaorani. These groups live in forest communities and have experienced rapid socio-economic change during the oil era. Nowadays, many communities combine hunting and gathering with cash crop cultivation and cattle-raising. Catholic missionaries have been present in the *Oriente* since the 17th century and have influenced the history of this region and the life of the Indians significantly. Nowadays, Evangelists, Jehovah's witnesses, Mormons, and Baptists are also present even in the most remote settlements. In

[38] Projections for the year 2,000 have calculated 640,000 inhabitants (Uquillas, 1993a; Sponagel, 1992).
[39] Child malnutrition in the *Oriente* affects 38 percent of all children under the age of seven (ECORAE, 1998).

many colonist settlements, these churches are the only organized providers of education, medical care, and social structure.

The American oil company Texaco dominated oil extraction in the *Oriente* for twenty years. Since Texaco pulled out in 1992, the state oil company Petroecuador has been in charge of operating the majority of the oil fields. For the exploration of new fields, Petroecuador has granted concessions and signed contracts with foreign oil companies. Most of the large multinational oil companies are operating or have operated in the provinces of Sucumbíos, Napo and Pastaza. Together with Petroecuador, they are the lead agencies that open the region with all-weather roads and attract migrant laborers.

Official development agencies have a low profile in the frontier areas. The presence of the departments for education, health care, agricultural extension, and forest management is restricted to a few small offices in the larger towns. The forestry department INEFAN is in charge of controlling the logging sector and protecting the national parks. The Ecuadorian armed forces are the only really powerful authority present in the Amazon region. The elite troops deployed in the *Oriente* are well equipped and trained, and their task is to control strategic roads and oil sites. In general, they are the authority which maintains law and order and intervenes in conflicts between oil companies and local people.

Coca, an oil boomtown on the Napo river

Spanish Capuchin missionaries founded the town of Coca, officially called Fransisco de Orellana, at the junction of the rivers Coca and Napo in 1956. The river was the only communication line with the *Sierra* and formed the outer limit of colonization. South of the river began the forest inhabited by the fierce Huaorani Indians, and no Quichua or white man entering their territory was sure of returning alive. The town's history is directly linked to the oil exploitation which started in the late 1960s when the first well came into production in Lago Agrio, 80 kilometers north of Coca. In 1972, the construction of the road between the two towns and a bridge over the Napo opened the region for colonization. This was the turning point in the history of the region. From that moment on, oil companies dominated the town of Coca and colonists occupied the surrounding forest. The colonization frontier has gradually moved southward along two major oil roads, the *via Auca* and the *via Zorros* (Grefa, 1985).

Coca has around 20,000 permanent inhabitants and a variable number of seasonal workers bringing its total population to 25,000. Immigration is high, and the town is growing at around ten percent per year (Coca municipal statistics, 2001). It expands without much planning and every day new arrivals squat on invaded land. These *invasiones* are situated in the swamps on the outskirts, where people live in shacks. The town has a limited water supply system and a few paved roads, making it a city of dust during the few dry days and of mud for the rest of the year. Heavy trucks pass through the center around the clock to supply equipment for the drilling sites. The oil companies have their camps around the town, while the military forces have a large base on the bank of the river Napo. Oil has created jobs and income for some people, but the unplanned development has also brought about many problems. In the words of Coca's mayor: '*Oil, for most of us has been synonymous with*

misery, irreparable environmental damage, and depredation of natural resources' (*Comercio*, 22-7-98).

Figure 4.1: The via *Auca* and the research area in the Ecuadorian Amazon.

OIL IN THE *ORIENTE*

Oil exploitation has been the most important economic activity in the Amazon provinces for thirty years. The oil sector influences prices and wages along the frontier, constructs roads, and powers the movement of the agricultural frontier deeper into the forest. Oil-related activities have created an economic and socio-political context in which forest-dwellers have accelerated the conversion of forest into extensively used agricultural land. A decisive role in this process is the government's policy of expanding oil production without taking in account the environmental consequences.

Ecuador's oil dependence

The Ecuadorian State has depended heavily on incomes from oil since the first barrel was pumped.[40] In the early 1970s, Ecuador experienced a foreign exchange boom due to strong oil exports and foreign investments. After 1983, the country was

[40] Oil revenues form 1/3 of public sector revenues, representing 14 percent of the GNP in 1996 (Embassy of Ecuador, 1998).

confronted with economic stagnation. During the 1990s the problems deepened, aggravated by a fall in oil prices (Wunder, 1997). In 1998 the devastating impact of a severe *El Niño* on agricultural production, combined with persistently low oil prices put the country in a critical economic situation. Political instability, national strikes, and violent protests ensued. A period of hyperinflation in 1999 resulted in a total breakdown of the financial system and the introduction of the US dollar as the official currency (IDB report, 1999). Ecuador entered the new millennium in economic and political crisis, with IMF requirements imposing a stringent austerity policy.

Ecuador's dependence on oil income inspired Wunder (1997) to investigate whether the oil export boom between 1972 and 1984 caused a reduction in the rate of deforestation compared to the periods before and after the boom. His hypothesis was that the foreign exchange boom could slow deforestation by alleviating poverty and reducing incentives for the conversion of forest into cropland. His analysis, however, suggested the opposite. There was no slowing down of deforestation in the oil boom period. On the contrary, forest destruction accelerated during the boom and remained rapid thereafter. Wunder's conclusion is that this has much to do with the state policy of using oil revenues to finance activities that encourage deforestation such as road construction, organized colonization schemes, and oil sector expansion in the forest (*ibid.*).[41] This official policy has not changed much since the boom and has resulted in successive environmental and economic problems, some of which are described in the following sections.

The oil industry and its environmental impact

Oil production in the *Oriente* fluctuates around 380,000 barrels per day, of which 80 percent are produced by Petroecaudor and the remaining 20 percent by six multinational oil companies (Energy Information Administration, 2000). Petroecuador is in charge of 659 wells, spread over an area of 2.5 million hectares in the two northern provinces (*Comercio*, 15-8-00). The total area in different stages of exploitation and exploration is much larger: about 4 million hectares, or nearly half of the two northern provinces (Figure 4.2). The concession blocks have average 200,000 hectares in area and are drawn with rectangular lines without considering the land titles of colonists and Indians or the borders of national parks. Petroecuador is still expanding oil exploitation and has signed new contracts with foreign companies for exploration and exploitation in nine newly-designated blocks in the most remote forest areas of Napo, Sucumbíos and Pastaza. Once an oil company has obtained a block, it has virtual sovereignty over the forest within its concession and is free to develop an enclave economy according to its own production techniques. Subcontractors are hired for such tasks as seismic exploration, road building, drilling, transport, security, and cleaning. Management and skilled labor are in the hands of foreigners, while colonists perform the unskilled labor and Indians do most of the forest clearing along the seismic lines.

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[41] Another cause was the larger urban demand for meat, which stimulated the expansion of cattle ranching in rural areas such as the *Oriente*.

Thirty years of oil exploitation have caused a creeping pollution of the tropical lowland forest. Oil and toxic wastes from drilling sites have leaked to nearby streams and cultivated land. Drinking water has been affected, and many people suffer from skin diseases and health problems (Box 4.1). The direct deforestation caused by oil extraction is concentrated in small areas and has a rather moderate impact on the forest canopy. A much more devastating effect for the forest, however, has been the creation of an extensive road network. Hundreds of kilometers of tarmac roads have been constructed to make the oil wells accessible for exploitation and maintenance. Road extension is now advancing towards the province of Pastaza, where large forested areas are still unexplored.

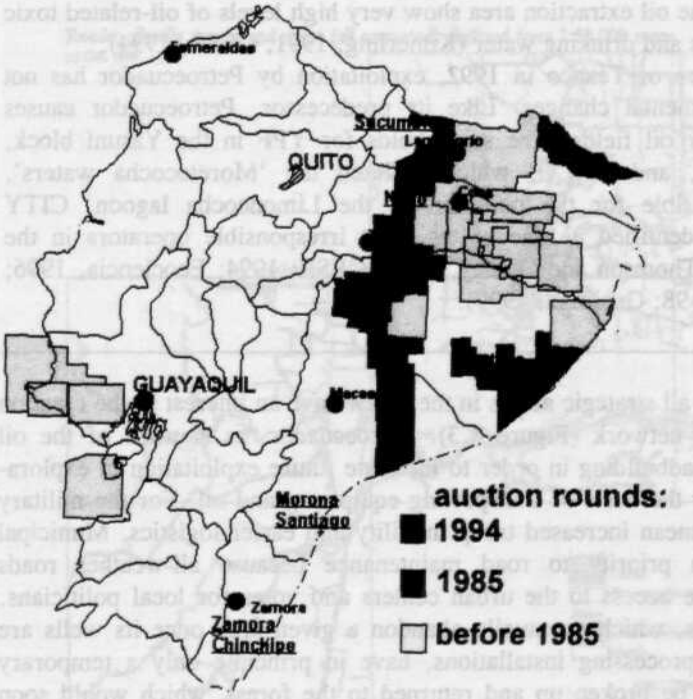

Figure 4.2: Oil concessions in the *Oriente*

Box 4.1: the environmental impact of the oil industry

The process of oil extraction in the forest starts with exploration. First, trails 3 m wide are cut with machetes at intervals of 1.5 km. Along these 'seismic lines', geologists use explosive detonations to search the subsoil for oil deposits. Several thousands km of seismic lines are cut in every concession. The next stages involve the construction of drilling sites, service roads, pipelines, production facilities, and working camps, all of which entail forest encroachment (Hettler, 1996). The actual oil extraction generates a toxic residue of mud and polluted perforation water. The process of separating the oil from the oil/water emulsion requires toxic chemicals. All this polluted water is collected in open ponds and drains without proper treatment into nearby rivers. An assessment of Texaco's oil exploitation activities up to 1992 estimated that 100,000 barrels of oil had been released by accidental spills (see Kimerling, 1991 and 1993; CESR, 1994). The few independent studies on health conditions in the oil extraction area show very high levels of oil-related toxic contaminants in rivers and drinking water (Kimerling, 1991; CESR, 1994).

Since the departure of Texaco in 1992, exploitation by Petroecuador has not brought about fundamental changes. Like its predecessor, Petroecuador causes pollution in all major oil fields. The same holds for YPF in the Yasuní block, Tripetrol in Pastaza, and ARCO, which polluted the 'Moretococha waters'. Occidental is responsible for the pollution of the Limoncocha lagoon. CITY Company has been identified as one of the most irresponsible operators in the region (RAN, 1999; Thomson and Dudley, 1989; CESR, 1994; Ecociencia, 1996; *Blanco y Negro*, 19-7-98; Gualinga, 1999).

A crucial issue is that all strategic actors in the forest have an interest in the creation of a permanent road network (Figure 4.3). Petroecuador, as steward of the oil industry, promotes roadbuilding in order to facilitate future exploitation in exploration blocks and lower the costs of transporting equipment and oil. For the military establishment, roads mean increased troop mobility and easier logistics. Municipal authorities give high priority to road maintenance because all-weather roads guarantee rural people access to the urban centers and votes for local politicians. For the oil companies, which eventually abandon a given area once its wells are depleted, roads like processing installations, have in principle only a temporary function. They could be broken up and returned to the forest, which would soon erase all trace of them. No obligation to dismantle roads, however, is included in the oil company contracts and no company that is about to leave a site would incur these extra costs voluntarily (Ortiz and Varea, 1995; Grylls, 1992).

Oil exploitation in the *Oriente* has changed considerably since the Texaco era. Texaco was able to follow its own business strategy with complete neglect for environmental regulations and local peoples' interests. After Texaco pulled out in 1992, the extent of pollution and environmental destruction was gradually made public and local people started to react (Box 4.2). The companies operating in the *Oriente* today, consequently, are much more careful about their public image. They

publicize their investments in environmentally sound production technologies such as re-injection of perforation water, the use of geo-grid material for road construction, and the cleaning of depleted oil wells. Nevertheless, 'clean production' is rather the exception than the rule. Conservation activists, independent reports, and press articles regularly reveal abundant evidence that all major oil companies in the region are responsible for pollution on land and in rivers (Box 4.1). Protests of a few Ecuadorian-based NGOs such as Acción Ecologica, and of American environmental activist groups (RAN and Oilwatch) have concentrated on these foreign oil companies, which they attack in the U.S. by organizing boycotts and negative publicity. The problem, however, is not restricted to the foreign companies that operate as lead agencies for further forest encroachment. Behind these agents is a central policy that constantly stimulates further oil exploitation at the lowest cost.

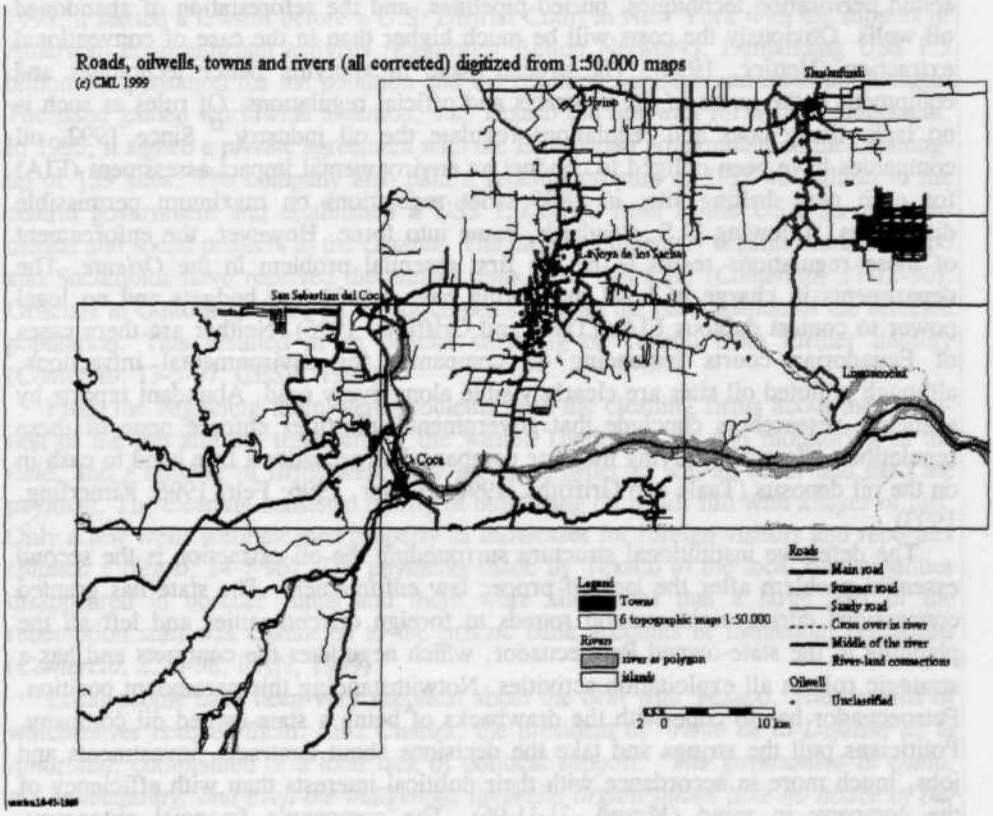

Figure 4.3: Oil roads Northeast of Coca

The central state: counting the benefits without considering the costs

Ecuador withdrew from OPEC in 1992 in order to increase its oil production unilaterally. Enough oil deposits have already been detected to double daily

production from 400,000 barrels for the next 25 to 30 years. The government has issued new concessions to foreign companies and unveiled investment plans for a new oil pipeline to transport the additional oil (Hettler *et al.*, 1996; Energy Information Administration, 2000). In the *Oriente*, the state authorities are equally determined to expand oil production in the coming years. Inevitably, this will lead to encroachment on some of the last remaining untouched forest areas. The presence of large foreign oil companies with considerable capital and expertise implies that the technical and financial capacity is available for adopting environmentally sound production techniques. The state's willingness to impose such techniques on the companies, however, is much more problematic.

The oil sector is capable of mitigating its environmental impact and regenerating the forest areas which it affects – if the companies take their responsibilities seriously. Technology now available for achieving this includes environmentally sound perforation techniques, buried pipelines, and the reforestation of abandoned oil wells. Obviously the costs will be much higher than in the case of conventional extraction (Hettler, 1996). The crucial issue in applying better techniques and equipment is the terms of the contracts and official regulations. Of rules as such is no lack: many laws and regulations regulate the oil industry.[42] Since 1992, oil companies have been obliged to conduct an environmental impact assessment (EIA) for each new drilling site; in 1995 strict regulations on maximum permissible discharges, following U.S. standards, came into force. However, the enforcement of these regulations seems to be the first essential problem in the *Oriente*. The departments in charge of legal monitoring have insufficient budgets and no legal power to contest dubious EIAs (Taale and Griffiths, 1996). Neither are there cases of Ecuadorian courts sentencing oil companies for environmental infractions, although polluted oil sites are clearly visible along every road. Abundant reports by academic researchers conclude that government authorities enforce none of these regulations effectively, giving the state company Petroecuador a free hand to cash in on the oil deposits (Taale and Griffiths, 1996; Hettler, 1996; Felt, 1996; Kimerling, 1993).

The defective institutional structure surrounding the oil extraction is the second essential problem after the lack of proper law enforcement. The state has granted concessions during eight auction rounds to foreign oil companies and left all the planning to the state-owned Petroecuador, which negotiates the contracts and has a strategic role in all exploitation activities. Notwithstanding this paramount position, Petroecuador has to cope with the drawbacks of being a state-owned oil company. Politicians pull the strings and take the decisions about contracts, investments and jobs, much more in accordance with their political interests than with efficiency of the company in mind (*Vistazo,* 21-11-96). The company's financial autonomy, guaranteed by law, exists only on paper and the government uses Petroecuador's revenues to compensate for budget deficits (*Universo*, 21-3-98).

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[42] Ley de Hidrocarburos (1978), Ley de Petroecuador (1989), Reglamento ambiental para las actividades Hidrocarburíficas (1992)(for details see Taale and Griffiths, 1996).

Box 4.2: The clean-up of Texaco's oil wastes

Texaco began oil exploitation in Ecuador in 1967 and pulled out in 1992, leaving behind 632 contaminated areas around oil wells and processing plants scattered over an area of one million hectares, in the province of Sucumbíos (RAN, 1999). This was the result of 25 years of oil exploitation without concern for the environment. The company used obsolete equipment, frequently causing oil spills and pipelines ruptures and dumped toxic perforation water and hazardous wastes without proper treatment. The pollution of rivers and soils was never systematically assessed and a lack of legal means and political will to sue Texaco in Ecuadorian courts, meant that the company was not prosecuted in Ecuador.

A grass-roots organization called *Frente de defensa de la Amazonia* was formed by some 35,000 people affected by Texaco pollution in order to obtain compensation. In 1993, it started a lawsuit before a U.S. District Court in New York with the support of American environmental activists (Rainforest Action Network). Demanding US$ 1.5 billion compensation for the pollution and the resulting personal and material damage. The issue gained worldwide attention, and Texaco did not wait for a final judgement. In 1995, it signed a private agreement with the Ecuadorian government on the cleaning-up of 139 sites. The company also paid a redemption sum of US$ 40 million to the central government and established a US$ 1,000,000 fund in the USA for environmental and social projects in the *Oriente*. The largest indigenous organizations of Napo and Sucumbíos have received the annual rents from this fund (*Comercio*, 17-12-96). Officials in Quito negotiated all the agreements without the participation of the affected population. This resulted in an official shielding of Texaco from further liability (*Comercio*, 13-5-97; CESR, 1994).

From the beginning there were problems with the cleaning firms about the execution of the job and the treatment of the waste. There was no real monitoring in the field, and a number of firms were only set up in order to win an order and cash the payment. The cleaning consisted mostly of bulldozing oil ponds full with a layer of dirt. Only a few wells were cleaned properly as showcases for foreign visitors and reporters (*Blanco y Negro*, 14-7-96). The payments made by Texaco to the local municipalities disappeared in obscure funds and there were allegations that a large part of the redemption sum was channeled to the private bank accounts of influential politicians (*Comercio*, 22-6-98; RAN, 1999).

Local people have been very skeptical about the deal with Texaco. The benefits of which never reached them. Luiz Chanza, the president of *Frente de la Defensa de la Amazonia*, complained of a total lack of political support: "*The government in Quito, the municipality, and even the indigenous umbrella organizations take no notice of our problems. They have all received money from Texaco to keep their mouths shut*" (pers. comm.). Local people are continuing their legal battle for individual compensations, and the case is still pending (RAN, 1999).

The result of this situation is a badly managed and poorly functioning enterprise, without proper investment capital, whose only goal is to increase production in the

short term. In 1998 the company came to the brink of a total breakdown. In the same year three major ruptures of the central pipeline occurred due to overdue maintenance, spilling more than 60,000 barrels of oil into the environment. In 2000, the situation was still critical. Of the 659 existing wells, only 356 were operational, while the others were standing dry due to overdue maintenance and a lack of spare parts (*Comercio*, 15-8-00).

In theory, Petroecuador could be the main promoter of an efficient and environmentally sound oil extraction because of its strategic position in the negotiations. But the turmoil in the company's management means that it is able neither to manage its environmental impact in its own oil fields effectively, nor to monitor and control the activities of the foreign oil companies in their concession blocks. Moreover, the decline in the prices of oil throughout most of the 1990s and the concomitant economic crisis in Ecuador put the company under even greater. Petroecuador is not inclined to take costly environmental measurements when the country is desperate for more petrodollars.

The military forces are another important organ of the state in the *Oriente* and have developed a similar attitude towards the oil business. The army has the official task of safeguarding the exploitation of the strategic oil deposits and, meanwhile, has its own direct financial interest in this lucrative business. The Ecuadorian armed forces are partly self-funded through a dedicated share of petroleum revenues, the size of which fluctuates according to production.[43] They also own the Ecuadorian oil tanker fleet, FLOPEC (*Vistazo*, 21-8-97).[44] In diverse ways, then, the military have a direct interest in opening the *Oriente* as quickly as possible for more oil production.

Regional benefit-sharing

The oil revenues flow directly to the central government; no part of this income is first siphoned to local communities. On the executive level, where power is really concentrated in Ecuador, politicians consider the *Oriente* as a backward region full of oil resources that should be exploited in order develop the country. The centralist state in Ecuador concentrates all power and financial means in the administrative machinery in Quito, while the municipalities in the *Oriente* suffer from a chronic budget crisis. According to law, 15 percent of the national budget is reserved for municipalities and provincial boards; in reality, the figure is only 3 percent (*Hoy*,

[43] A fixed share of the national oil revenues is destined by law for the budget of the military forces (*regalías*) (*Vistazo*, 21-8-1997). The exact amount has been a secret for a long time. Finally in 2000, there was a serious political row when it was revealed that they received not less than 45% of the oil revenues (*Hoy*, 24-11-2000).

[44] The military forces manage autonomously the company FLOPEC (Flota Petrolera Ecuatoriana). This part of a larger commercial enterprise managed by the military with a turnover of US$ 250 million, other elements of which include an airline (TAME) and companies active in shrimps, flowers, and tourism (*Comercio*, 5-3-98; *Blanco y Negro*, 15-3-98).

31-8-97). Influence of the *Oriente* in the national parliament is marginal, since its population represents only a constituency of 3.5 percent (*Comercio*, 17-7-98).

Under these circumstances, lobbying in Quito is vital for funding purposes and this strengthens political favoritism and the importance of personal ties between regional politicians and politicians in Quito. The much-coveted offices of mayor (*prefecto*) and governmental envoy (*teniente politico*) control the availability and destination of the scarce funds in frontier districts. These political positions have been central in many irregularities and political scandals, of which a few have reached the national press. There has been proof of corruption in official development projects, involving representatives and mayors of municipalities in Napo (*Blanco y Negro*, 13-4-97). In 1998, illegal transactions were revealed that explained the disappearance of money paid by Texaco to the municipality in compensation for damage caused by oil pollution (Box 4.2). This sparked off a popular outcry in Joya de las Sachas and the military forces had to intervene (*Comercio*, 22-6-98).

Box 4.3 : The fist turbulent years of ECORAE

Under its first director in 1993 and 1994, ECORAE spent much of its funds on constructing a master plan (ECORAE, 1996). Results in the field were poor, and the Amazon municipalities complained about the department's slow bureaucratic procedures and lack of a coordinated approach. In 1995, the second ECORAE director was fiercely criticized by the provincial authorities in Napo for maintaining a large bureaucracy in Quito without action in the field (*Hoy*, 21-7-95). The editorial of the largest newspaper characterized ECORAE projects as 'dripping funds, contaminated by clientelism and paternalism, for short-term projects without continuity or assistance' (*Hoy*, 2-7-97). The third ECORAE director announced in 1998 that the master plan did not generate, an executable strategy and that the institute urgently needed to reorient itself from theory to practice (*Hoy*, 24-2-98). The fourth ECORAE director stated that it took so long because officials preferred to allocate funds according to the whims of political leaders in Quito (*Blanco y Negro*, 2-8-98).

Repeated popular protests and constant demand by the Amazon municipalities and NGOs for local people to receive share of the oil revenues, resulted in an important institutional change in 1992. The central government agreed to siphon part of the national oil revenues back to the Amazon region. Since 1993, US$ 0.10 for each barrel of oil produced in the Ecuadorian Amazon has flown into a newly-created development fund. This regional share will gradually increase to US$ 0.50 per barrel by 2005. A new department for the sustainable development of the Amazon (ECORAE) administers 10 percent of this fund independently and the 40 Amazon municipalities and provincial authorities manage the rest. ECORAE has an annual budget of several million dollars and its main task is to organize and monitor sustainable development projects in the Amazon region (ECORAE, 1996). The

turbulent birth of this department (Box 4.3) indicates that it has all the defects of the Ecuadorian bureaucratic apparatus, illustrating the fact that a policy for the sustainable development of the *Oriente* is difficult to organize from the national capital Quito. Out of its difficult start, this fund represents the first long-term commitment by the central authorities to invest a considerable part of the oil revenues in the development of the *Oriente*.

Local peoples and benefit-sharing

The oil revenues extracted from this backward region have not brought much prosperity for the majority of the population. Local people have little impact on the institutional distribution of the money and the political intrigues surrounding it. They grasp the only effective weapon that remains to them: '*paros*', or the blocking of major roads. Such roadblocks are often the only means of putting the municipal and central governments under pressure to release funds for a concrete need such as a road, a bridge, or a health center. In 1991, a group of Indians blockaded eight oil wells and obtained in cash funds for schools, roads, and a clean-up of oil wastes on their land (*Hoy*, 9-3-91 and 15-12-93). In 1997, a joint action by all the municipalities in the Northeast blockaded the most productive oil wells; this time the armed forces broke the blockades with violence; the municipalities received some promises of more funding and a road construction plan for the region, but these plans have been postponed indefinitely (*Comercio*, 17-10-97; *Hoy*, 18-12-97).

On their own plots of land, owners have to negotiate directly with the oil companies for compensation. The oil deposits in the subsoil belong legally to the Ecuadorian State. Individuals can own only the surface of the land, and receive compensation for any crops, pastures, and standing timber affected by the oil extraction. The oil companies pay landowners an indemnity ranging from US$ 300 to US$ 2,500 per well. They also try to gain some goodwill from the local population by constructing new roads, houses and schools, and by connecting remote side roads to the main road. Most of the time these negotiations run smoothly, but when there is a deadlock the local population uses roadblocks, occupation of wells, and kidnapping of company workers as weapons to demand better conditions. In response, oil companies have developed a specific strategy towards the indigenous people living on their oil concessions. They recruit anthropologists and indigenous people who build up 'community relations' in order to get the Indians to accept company activities. Promises and bribes are often deployed in such a way as to engender conflicts and divisions inside the communities (Gualinga, 1999). Oil companies negotiate compensation in kind or in services: roads, medicines, outboard motors, electricity, community houses. The inequality between the parties results in dependency on the part of the indigenous people, who become divided internally by competition for money and jobs and 'addicted' to the supply of food, medicines, and fuel for their outboard motors. After some debate the company always yields to their relatively small demands, and things are quiet until the next *paro*.

Since the oil companies Tripetrol and Arco started exploration in the territory of the Quichua in Pastaza province, the indigenous organization of Pastaza (OPIP) has been struggling for a role in the planning and oil exploitation and for a share in its

benefits (Sawyer, 1996). OPIP's strategies herald a new stage in the negotiations between forest dwellers and oil companies. This organization uses an aggressive approach and has learned not to be satisfied only with outboard motors and fuel. OPIP has regularly blockaded the oil industry in its province. In 1989, it held a group of government officials hostage, in 1998 it took workers of the ARCO company hostage and demanded two dollars per barrel of oil extracted in Pastaza for financing a development fund (Gualinga, 1999). These actions have not yet settled the problems, but OPIP claims an active role in decision-making concerning oil extraction. It no longer recognizes the state's authority in this matter, preferring to negotiate directly with oil companies and international donors (Villamil, 1993). OPIP has its own homepage on the internet and a permanent representative in Brussels who lobbies at the EU.[45] These developments indicate that the state authorities are losing their function as mediators between the population and the oil industry. They are not able to guarantee the industry's investments once the contracts have been signed. When serious conflicts arise with local people, the central authorities leave the oil companies to their fate in the face of constant demands from local people – despite the fact that these companies have already paid their taxes to the government.

THE CURRENT FARMING PATTERN IN THE NORTHEAST

The dominant farming system of colonists and Indians in the Northeast is characterized by a combination of subsistence and cash crops, further diversified by small-scale livestock production. The inhabitants cultivate plantain, rice, and manioc, and raise pigs and chickens, for their own food supply. Colonists have Robusta coffee as their main cash crop and to a lesser extent corn and cacao. For those farmers who live in the higher forest areas, with cooler temperatures and better road connection to the *Sierra,* naranjilla (*Solanum quitoense*) is also an important cash crop.[46] Farmers' aspirations are directed towards cattle ranching and all farmers clear land for pasture in so far as their labor force allows. Even when they do not yet have the capital to establish a herd, they prepare for this by clearing the land.

Forest dwellers in the *Oriente* are subject to a set of limitations curtailing their potential agricultural performance. The backwardness of the region and its poor road links to the core of the country, firstly, hamper the transport of agricultural products. Secondly, natural constraints arising from the poverty of the soil, the prevalence of pests and diseases, and the hot, humid climate also restrict agricultural production considerably. In contrast with other regions of the Amazon, there is no marked dry season in the Ecuadorian Amazon. Farmers cannot burn and need to clear all the vegetation in order to let it rot. This *slash-and-mulch* method is much more labor-consuming than burning and limits the annual clearing capacity to an

[45] OPIP's internet address: //www.applicom.com/opip

[46] The *naranjilla* fruit is highly perishable and requires rapid transport to the markets in the *Sierra*, where it is processed into juice. At the beginning of the 1980s the area of *naranjilla* cultivation expanded rapidly around Puyo (see map 4.1), but production subsequently stagnated as a result of pests and fluctuating prices (Alava, 1988).

average of one hectare per household, a crucial consideration in view of the constraint: the scarcity of labor in such a frontier area. Estrada *et al.* (1988) conclude that most households need their entire family-based labor force to keep their small amount of cultivated land in production for a few years. Hired labor is not an option because it is too costly for the average smallholder. Furthermore, colonists lack investment capital and expertise in tropical farming, which makes them reluctant to take the risk of experimenting with unfamiliar techniques or crops.

Colonists and their use of the land

The abovementioned constraints determine to a large extent the dynamics of the two most important land use options: coffee cultivation and livestock pasturing. Natural and locational constraints, however, cannot entirely explain the extensive farming practices employed. The following sections will briefly present the current land use strategies of the colonist farmers and their impact on the forest. Indians, the other important group of forest dwellers, have developed a land use system similar to that of the colonists; this will be discussed later in the chapter. The focus will be on the underlying factors influencing agricultural production among the forest-dwellers – in particular the property rights regime, the availability of credit, the institutional framework, and the oil industry.

The colonist group is a very heterogeneous category of settlers who have migrated to the *Oriente* during the last thirty years. They have a wide range of starting positions in terms of capital, farming knowledge, and initial place of settlement. An average colonist family occupies an 50-hectare farm situated along an oil road or a more remote side road (*línea*). Most of the farms are already half-cleared and consist of cropland, pasture, and remnant forest. Colonist households get their income from various sources: they cultivate coffee, tend cattle, engage in off-farm work, sell land, and cut timber. The clearing of trees is essential for developing all further activities and the relative impact on the forest of the former four income sources will be the subject of the following sections.

Coffee cultivation

Coffee has been the most important cash crop in the *Oriente* since the 1980s, when high prices for this product led to a coffee boom. Today, however, the boom is over, and the future for coffee is uncertain. Since the last price peak in 1987, unstable and declining coffee prices have made the investments required for rejuvenation of the coffee stands unfeasible.[47] Another setback has been the insect plague 'broca' (*Hypothenemus hampei*), which appeared in the *Oriente* since 1988 and has caused substantial losses. In 1996, the system of hiring seasonal labor for harvesting coffee collapsed for the first time when the coffee price became too low to cover harvesters' wages. Farmers employed only their family labor leaving the unharvested beans to rot on the trees. Farmers in the *Oriente* no longer invest in the maintenance of their coffee plantations, and productivity has declined further.

[47] Robusta coffee hit a 30-year low in November 2000 at the exchange in London. This was the result of overproduction caused by countries such as Vietnam and Indonesia, which have recently started to cultivate and export large quantities of coffee (*Financial Times*, 24-11-2000).

The whims of the international coffee market, resulting in boom-to-bust cycles cannot be held solely responsible for the weak performance of coffee in the *Oriente*. Much has also to do with the way farmers cultivate the crop. Most have no experience with pruning and maintenance techniques. They harvest many rotten and immature beans, and sell the beans (green coffee) to intermediaries mostly without proper drying. According to a field study in Sucumbíos, 67 percent of the green coffee sold was of inferior quality (Sponagel, 1994). Production is therefore suitable only for instant coffee, which has the lowest price. The main agricultural product in the *Oriente*, in fact, is produced at very low levels of efficiency and productivity. This situation has prompted the government to establish an office of the national credit program (COFENAC) in Coca in order to increase coffee production and to improve its quality by rejuvenating coffee plantations. A number of NGOs have also tried to improve the marketing system by bypassing intermediaries. All these NGO projects have failed because the bottleneck is not the intermediaries' high profit margins, but the low market prices and the inferior quality of the product (Sponagel, 1994; Bourliaud, 1996).

Colonists around Coca have an average of four hectares of coffee per farm (COFENAC staff, Coca). The perennial character of the crop could potentially make it a profitable and ecologically sustainable asset. If properly managed, coffee cultivation would not require additional forest clearing once a farmer had established high-yielding coffee stands. But yet this is not the case, farmers have to look for more profitable land use options involving further forest clearance on their farms.

> "*Coffee is finished in the Oriente. Too low prices and too many pest and diseases make it unprofitable and there is no money to rejuvenate the old unproductive coffee bushes. One should invest in new things, but there is no capital or capacity to make that shift. For most of the poor colonists there is no alternative, so 'continuamos luchando' (the struggle continues)*".
>
> COFENAC extension worker

Cattle ranching in the Oriente

Livestock production in the *Oriente* has all the typical advantages of a flexible commodity in a frontier economy, especially one with high inflation rates. For the farmer who manages to become the owner of a large ranch (*hacienda*) it also offers status. Most colonists and a growing group of Indians, strive toward this goal and convert as much forest as possible into pasture. But despite this strong drive to make a total transition to livestock production, cattle are not the main source of income for the majority of the farmers in the northern *Oriente*. Colonists have an average of only seven cows, and large cattle ranches are scarce. Most colonists have experimented with cattle, but often the result was a fiasco involving more costs than benefits (Estrada *et al.*, 1992).

Several factors hinder the development of large cattle herds in this frontier zone. Farmers lack the starting capital to set up a herd, and once they have obtained a few

animals they are confronted with high losses due to the absence of technical assistance and veterinary care (Eberhart, 1996). The long distance to markets in the *Sierra* means that the Northeast cannot compete with husbandry in the *Sierra* itself (Caballero *et al.*, 1992). Government agencies, moreover, seem more often to block than promote the development of livestock for smallholders. This contrast between official policies and local agendas does not stimulate collaboration, as has become clear during the fight against aftosis (Box 4.4). Another critical issue is the high cost of maintaining productive pasture. Declining soil fertility, invading weeds, spittlebug infestations (*salivazo*), and soil compaction result in a rapid decline in carrying capacity to 0.5 head/ha after three to five years. Additional conversion of forest is then required in order to extend the available pasture (Alava, 1998; Seré and Jarvis, 1990).

Box 4.4: The aftosis eradication program in Napo

Every year, the national department for animal sanitation (SESA) invests in national campaigns for the eradication of foot-and-mouth disease (aftosis) in order to enter international export markets for meat. Although the target year has been postponed several times, the current goal is to have the country aftosis-free in 2003 (SESA, 1998).

In November 1996, four officials of the *comisión nacional para la erradicación de la fiebre aftosa* came from Quito with the assignment of vaccinating around 120,000 cows in Napo and Sucumbíos. Their impossible mission was to reach approximately 20,000 cattle owners spread over an area of 50,000 km², in the space of two months. During an extension course for farmers in Coca, they introduced themselves and asked the farmers to collaborate. They stressed that an aftosis-free herd would generate higher profits. They vaccinated 600 cows in the first week, and were then forced to wait for new vaccination kits from Quito. The price of the vaccination and a certificate was US$ 4 for an average farmer with seven cows. In order to force farmers to collaborate with the program, the certificate was made a precondition for obtaining a cattle transport permit (*guia de mobilización*) from January 1997 onwards.

The farmers' reaction to this regulation was one of outrage: *"These vaccinations will never reach our remote farms in such a short period. Since the need for a transport certificate will be effective in January, we will be forced to transport cattle illegally or bribe the officials the control posts.'* [...] *'Aftosis is not really our problem, because it is not life-threatening for our herd; rabies and intestinal diseases are much more serious"*. Not one farmer present at the meeting planned to collaborate and the conclusion was clear: *"As always, our real problems are of no concern for the bureaucrats in Quito. They want to stimulate meat exports in accordance with agribusiness interests. Nosotros estamos cagados y perdidos aqui en el Oriente! (They don't give a shit about us here in the backward Oriente!)"*.

The importance of livestock production to colonist households is strongly related to the duration of colonization and the consolidation of the frontier. Farmers who migrated more than ten years ago possess more cattle than those who arrived recently (Paladines, 1992). On the old colonization frontier between Coca and Baeza, dairy cattle are numerous (see Figure 4.1). A nearby Nestlé plant collects milk from the smallholders, who have an average herd of 30 animals (Alava, 1988; Salazar, 1988). Since the early 1990s, Nestlé has expanded its reach up to the colonization area along the main road axis between Lago Agrio and Coca. Farmers living further afield and along the *Via Auca* cannot yet sell milk because of sanitary requirements and rapid transport. In that new frontier area, cattle are held only for meat production at low productivity and a low animal carrying capacity.

Off-farm work and seasonal labor

Off-farm work is an important income source for many colonists, especially for the young who want to save money to buy land or start their own farms. The most important form of wage labor is a temporary job in the oil industry. Colonists occupy the lowest-qualified jobs, which are nonetheless higher paid than seasonal work on a farm (US$ 10 per day in comparison to US$ 5). Farm work consists of harvesting coffee or tending cattle. Other large employers in the region include the two large oil palm plantations near Coca. For Ecuadorians living near the border with Colombia, work on coca plantations on the Colombian side is an important income source. Wages for coca harvesting in Colombia are double those of coffee harvesters in Ecuador (*Hoy*, 10-9-96; Rossi, 1997).

A crucial question is whether colonists use the income generated from seasonal work to intensifying cultivation on existing farmland, or to expand the cultivated area by clearing additional forest. Pichón's (1996) findings show that the two trends approximately counterbalance each other. On the one hand there is a group of colonists buying modern inputs (fertilizers, pesticides, and improved seeds) to intensify the cultivation of crops and to improve the carrying capacity of pasture. On the other hand, there is a group that buys chainsaws to accelerate the conversion of forest to pasture. The discriminating factor between these two groups is their date of settlement. While newly-arrived colonists invest their cash in coffee cultivation concentrated on a few hectares of land, established colonists invest in cattle and in expanding their pasture land as much as possible.

The brisk market for land in the Oriente

The provinces of Napo and Sucumbíos represent typical frontier areas where oil companies open closed forest that was previously inaccessible, and settlers search for new agricultural land. This situation puts pressure on land prices, and farmers who started a farm 20 years ago near Coca have seen the value of their plots rise as Coca expanded and more and better roads were constructed. A comparison of the land prices around Shushufindi between 1975 and 1996, during which the town

evolved from an inaccessible hamlet into a secondary urban center, reveals a fivefold increase in value (corrected for inflation)(Eberhart, 1996).[48]

These soaring land prices mean that a brisk market for land flourishes in the *Oriente*. Travelling along the oil road one sees many little signboards with '*se vende finca*' (*finca* for sale), indicating a high turnover of farm properties. In Pichón's survey (1993) 61 percent of farmers bought a plot from settlers who they said were already the second or third owners. The mobility of colonists, and the diversity and dynamism of the their livelihood strategies, can explain the high farm turnover. Young families looking for land, but without the necessary cash, engage in off-farm labor. Some owners want to upgrade their farming by moving to a plot closer to the road or with better soil or more pasture. Older colonists have accumulated enough capital to become traders, start a business in an urban center, or return to their place of origin.

The price of land is dominated by the principle that cleared and productive land has a surplus value in comparison to forested land (see Table 4.1). The prices shown here were recorded in 1991, but the principles behind them have not changed. The highest prices were paid for a hectare of young high-productivity coffee trees (*café mozo*), which guaranteed the buyer a large coffee harvest without the need for direct investment in maintenance. A hectare of fenced pasture was less valuable because most colonists lack labor force to maintain pastures and the capital to buy cattle. The relatively low value of pasture land indicates that large landowners with access to much capital and labor were not (yet) present. The relatively low value of forested land (US$ 40/ha) inspired all farmers to clear more of their remnant forests; under these circumstances there was no economic incentive to conserve trees. Fallow land with secondary vegetation had the lowest value, because its already depleted soils would have no agricultural value for the next ten years (Pijnenburg, 1991). The lower coffee prices after 1991 have now reduced the value of coffee land, but the rule of thumb that improved land is worth more than forest has remained intact. On this basis, early colonists have been able to accumulate capital by converting forest into coffee plantations and pastures before they put their farms up for sale.

The four main sources of income for colonists, coffee, cattle, the sale of land, and off-farm labor are all related to forest clearing. Conserving trees does not benefit landowners much, while clearing enables them to improve their livelihoods. This seems very destructive, but an important nuance is its limited long-term impact on the vegetation. Secondary forest is able to regenerate on previously cleared land, and mitigates much of the initial forest encroachment. Reasons for leaving previously cut forest to long fallow are lack of labor and capital for keeping the land under cultivation or pasture. This, however, is only a transitional stage before the largest part of the 50-hectare farm is permanently converted to pasture. Individual farms, it should also be remembered are part of a colonization frontier which is still expanding into closed forest. Extensive land use occurs in the broader context of

[48] In 1979 the price (corrected for inflation) for a *finca* of 50 ha along the road was around 10 million Sucres (US$ 2,840); in 1996 a similar *finca* was worth 50 million Sucres (US$ 14,200) (Eberhart, 1996).

governmental policies towards agricultural production and credit. In the following paragraphs, these policies will be discussed in relation to the support that they give to colonists who gnaw at the forest fringe.

Type of land use	Price US$/ ha
Mature coffee (*café mozo*)	466
Fenced pasture	333
Young coffee (*café joven*)	325
Old-grown coffee (*café viejo*)	230
Unfenced pasture	200
Subsistence crops (plantain, corn, manioc)	175
Old-growth forest without valuable trees (*monte*)	40
Fallow land with secondary forest (*rastrojo*)	20

Table 4.1: Land prices according to land use along an oil road south of Coca (Source: Pijnenburg, 1991).

The governmental land titling policy

The land titling agency IERAC began supporting the colonization of the Amazon region at the same time as the oil roads opened up the region in the 1970s. In the Northeast, several state-directed colonization schemes were established as a safety-valve strategy to reduce pressure on the land in the *Sierra*. Another official motive for the colonization was the creation of 'living frontiers' (*fronteras vivas*) where settlers affirmed the territorial sovereignty of Ecuador against Peruvian claims on the *Oriente* (Southgate and Runge, 1990). These organized colonization programs were not a success, and IERAC abandoned the policy during the 1980s.[49] Most of the 50-hectare farms that IERAC parceled out after that period were located along oil roads and colonized spontaneously. In the period up to 1990, IERAC granted 1.1 million hectares of land to farmers and indigenous people in the northern provinces Sucumbíos and Napo (Tamariz and Villaverde, 1995). This was a legalization *post factum*, carving out rectangular plots of already occupied forested land along the oil roads without taking in account topographic or soil characteristics.

Settlers could claim an official title (*escritura*) for a plot of 50 hectares if they proved that they used 40 hectares for agricultural purposes (the '80 percent rule'). This was an efficient instrument to prevent the formation of a class of large landowners (*latifundismo*) during the early colonization of the *Oriente*. It meant that colonists started from approximately equal positions. In contrast with the *Sierra* and *Costa*, where *latifundismo* and rural poverty have gone hand in hand for centuries, land concentration and the expulsion of smallholders has not occurred in the *Oriente*. The 80 percent rule has certainly affected the clearing practices of farmers

[49] Seven directed and semi-directed projects were started in the Northeast during the 1970s in order to settle around 4,500 families on an area of 230,000 ha. Official support was stopped in the 1980s due to failure and lack of funds, whereupon most settlers abandoned their land (Grefa, 1985).

and Indians, who wanted to secure their claims to the land. Its importance, however, should not overestimated, since most farmers have operated in an informal land market without titles. The effect of official land regulations has been secondary to those of frontier dynamics and local land prices (Navarro *et al.*, 1996).

In the early stages of the colonization, the environmental impact of the 80 percent rule was of no concern to the authorities. Later, during the 1980s, the emerging international discourse on tropical forest protection led to its abolition (*ibid.*). In recent years the agrarian land reform act of 1994 has given market forces more influence and simplified the procedures for land allocation and price fixing. The new department for land titling, INDA, operates with a reduced staff and fewer regional offices. The price of legalized land is now determined according to the current market price, which has resulted in higher costs for poor farmers (discussion forum about the new law, Universidad Cátolica, Quito 28 Oct. 1996; INDA, 1996).

The majority of the colonists have only a provisional title and no legally registered right to their land.[50] Many of them have started the procedure, but never completed the legal requirements. The reason for this is that the costs involved sometimes outweigh the advantage of a legal title. The only big advantage, in fact, is that legally registered land can be used as collateral for official credit, and therefore also has a higher price on the land market. Even without legal title, however, farmers can still sell or divide land informally. The common claim that land titling serves to promote sustainable forest use, then, seems unjustified in this context. Field data show that there are other reasons besides insecurity of ownership why many farmers do not choose the option of sustainable agricultural production. Farmers with a formal land title have 28 percent of their 50 hectares covered with pasture, while farmers with a provisional title have only 14 percent under pasture (Pichón, 1993). Pichón's data also show a close correlation between the duration of settlement and the rate of forest conversion, which endorses the hypothesis that farmers continue to clear with or without a land title.

The credit market for farmers in the Oriente

Carefully structured credit facilities can offer poor smallholders a way out of extensive land use strategies that require the conversion of forest. Credit, however, is very scarce in the *Oriente*, and the difficult economic situation of most of the borrowers obliges lenders to restrict loans to secure investments. In most cases this means that loans are available for livestock, but not for new and more sustainable investments.

The official credit agency Banco de Fomento (BNF) demands either a legalized land title or cattle as collateral. The majority of the smallholders can not meet this requirement, with the result that BNF is primarily a bank for cattle ranchers and large estate owners. Figures for the period 1981-1991 show that the official policy has stimulated large-scale livestock production.[51] In 1992, almost two thirds of the

[50] In the *Oriente*, 65 percent of the farmers do not have a legalized land title (ECORAE, 1998).

[51] Between 1981 and 1986, 83 percent of BNF's agricultural credits for Napo went to livestock production (Guillén, 1988). In 1991 the sum of US$ 310,000 was lend for cattle, representing 87 percent of all agricultural credit in Napo (Poveda, 1993).

land that received BNF credits belonged to landowners with more than 100 hectares (*Hoy*, 10-7-94). Another credit channel for farmers is the coffee project of COFENAC. This is exclusively designed for the improvement of coffee production in the *Oriente*, and BNF is the executive agency for issuing COFENAC credit. The NGO FEPP is the third institutionalized credit supplier, giving loans on favorable terms to farmers who are formerly associated with FEPP. Smallholders receive small loans with low interest rates and without collateral requirements.

The major problem for all credit providers in the *Oriente* is that many farmers do not reimburse their credits. Farmers' financial basis is so weak that a capricious change in the coffee price, a setback with cattle, or a doctor's bill puts them in a financial crisis. Another important factor is their lack of knowledge of budgeting and financial planning. Many consider these loans as gifts and do everything to obtain them without thinking of repayments or interest rates. This leads to very low restitution rates (50 percent for BNF in 1996), bringing the credit providers into their own financial crisis. This was one of the main reasons why BNF came to the brink of financial collapse in 1998 (*Hoy*, 29-8-96 and 23-6-98). FEPP's branch in Coca has had similar problems with arrears. Around ten percent of the credits are not reimbursed, while collecting the rest involves high costs. FEPP's worst reimbursement figures came from the loans for legalizing land titles. In contrast to crops or cattle, a land title does not generate cash income in the short term, which causes trouble for most borrowers on the date of reimbursement (interview with FEPP staff in Coca). The difficulties experienced by existing credit programs, in turn, mean that loans and investment for new initiatives are difficult to come by. Because of reimbursement problems, lenders allocate credit mainly to producers of commodities such as coffee and cattle for which established markets exist. Loans for more sustainable or intensive activities such as NTFP production, pig farms, or aquaculture are considered very risky, and require high collateral (Alonso Vallejo, 1988). The chronic budget crisis of the regional funding agencies and their restraints mean that international donors and multilateral investment banks are the only lenders for agricultural development in the *Oriente*. The Inter-American Development Bank (IDB) granted large loans to Ecuador to improve the productivity of the agricultural and livestock sector (IDB, 1997). In 1996, the Shuar organization FICSHA received a US$ 500,000 loan from IDB for rural development, agriculture, and livestock production in the southern *Oriente*. The Quichua organization CONFENAE received the same amount in 1997 for the northern *Oriente*, with particular emphasis on livestock production (*Hoy*, 8-12-97). These international loans are labeled as 'sustainable income-generating initiatives' and presented as stimuli for intensive ranching. In the *Oriente*, however, livestock production is restricted to extensive cattle ranching, still the most viable option in a region where land is abundant and labor is scarce. In reality, it looks as if the majority of these loans have stimulated additional ranching and thereby actually encouraged further forest encroachment.

The lack of sustainable alternatives

Between 1984 and 1989, the Coca agroforestry project was the only integrated agricultural project in Napo. Financed by USAID, it involved 2,000 colonist

families. Its main objective was to promote agroforestry and silvo-pastoral methods in frontier areas (Peck, 1990). The final evaluation report mentioned important difficulties faced by individual farmers attempting to continue autonomously. The main problems were the limited agricultural expertise of the colonists, lack of access to capital, and considerable economic risk. The lack of a coordinating body caused the project to collapse once USAID pulled out. Ecuadorian INIAP extension workers did not take over the role of the foreign donor, and the tree nursery established to provide seedlings in the long-term had ceased operating by 1991 due to lack of funds (Suárez *et al.*, 1992; Pancar and Samaniego, 1991).

Today two oil palm companies, Palmera de los Andes and Palmoriente occupy 20,000 hectares of the most fertile volcanic soils north of Coca. They represent the only estates with intensive land-use on permanent plantations, but their use of chemicals and the pollution from their processing plants are serious environmental drawbacks. As far as smallholders are concerned, the development of alternative crops, more intensive land-use techniques, and agroforestry systems has come to a standstill. The possibilities offered by NTFPs for steering agricultural production away from pioneer farming are not developed in the *Oriente*. Governmental assistance for smallholders is virtually non-existent. The agricultural research institute INIAP has a field station in Coca, but its deplorable financial situation hampers research. Only large entrepreneurs are able to invest in new agricultural products. They are the only economic actors with access to capital, expertise, and a commercialization network suitable for marketing such products. The forestry department INEFAN, furthermore, turns out to be an important obstacle to new initiatives. When it comes to new agricultural initiatives INEFAN officials are notorious sticklers for the rules:

> "*Frog farming (ranacultura) is good business. Everything is for export and is flown directly to Miami. The only problem is INEFAN. They have obstructed my work from the very first day. The permit cost years of bureaucratic battles, and they are constantly coming up with new requirements. If I do not bribe them, they block my production for several months each year* ".
>
> Owner of a frog farm, Napo Province

Agronomists have hailed the cultivation of the *chontaduro* palm (*Bactris Gasipaes*) for the extraction of palm heart (*palmito*) as a promising activity for the *Oriente*. An assessment study for a *palmito* project in Napo listed a number of requirements for successful production on the household level: an investment of US$ 1,000 for each two-hectare *palmito* per plot; a high level of farmer organization; research into protecting the plantations against pests; and efficient transport to canning factories in Quito (Soria, 1992).[52] All of these conditions are problematic in the *Oriente*: no credit is available for such an initiative, there is no active research, farmers are not well organized, and feeder roads are in bad condition most of the year. This may explain why only two large estate owners near Coca have started *palmito* plantations

[52] Palm heart perishes in a few days and requires prompt processing.

on a total area of 3,000 hectares; they alone have a mechanized harvesting system and their own means of transport.

INDIGENOUS PEOPLE AND THE USE OF THE FOREST

The lowland Indians: between tradition and acculturation

The eight different groups of Indians in the *Oriente* comprise a total of more than 100,000 people, almost a third of the *Oriente's* current population. In the northern provinces the Quichua Indians with 50,000 people are the most numerous (community survey published in *Comercio*, 16-6-97). [53] The government considers all as Indian groups as indigenous people. They have a strategic role in determining the fate of the forest due to their militant associations and skill in attracting donor money and international exposure (Uquillas, 1993b).

For centuries, Amazon Indians have had a marginal position. It is only in the last ten years that they have made serious progress in emancipation and empowerment. The indigenous uprising (*levantamiento*) in 1990 marked the start of a national demand for more rights and land for the oppressed indigenous population, and brought about a political earthquake in Ecuador. Highland Indians became serious political actors for the first time, and their success inspired the lowland Indians of Pastaza, organized in the OPIP, to march to Quito in 1992. They claimed communal titles to large tracts of tropical forest, and demand regulations to control oil extraction. The government has finally recognized the land rights of most of the indigenous communities in the Amazon region. Indians in the *Oriente* have now acquired legal titles to five million hectares of tropical forest. According to figures from 1993, indigenous people owned 68 percent of all the land parceled out by IERAC in the *Oriente* (Uquillas, 1993b; Fernanda Espinosa, 1997; Trujillo, 1988).

The lowland Quichua

The lowland Quichua Indians, who live around Coca, represent the largest Indian group in the *Oriente*. They migrated to the lowland forest two generations ago, descending from their original homelands in the mountain forest on the slopes of the Andes under the pressure of colonization and due to their own population growth (Asenio, 1989; *Comercio*, 16-6-97). Their traditional land use system is a type of swidden agriculture in *chacras* (forest gardens of one hectare), using a slash-and-mulch method that leaves the large trees standing. In contrast to other indigenous swidden types, the *chacra* is never completely abandoned, providing manioc, plantain, fruits, firewood, medicinal plants, timber, and game in continuous rotation (Peck, 1990). Quichua settlements stretch along the fertile alluvial borders of those rivers that are navigable by canoe. Fishing and hunting are still their main sources of protein, although livestock production is increasing.

Colonization and the oil industry have changed the Quichua way of life dramatically. Today, they are increasingly adopting the colonists' own land use practices.

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[53] The smaller Indian groups are the Cofan (300 people), the Secoya (240 people), the Siona (110 people), and the Huaorani (2,000 people)(Fundación Natura and ECORAE, 1995; Ecociencia, pers.com. 2001).

Cash-crop agriculture and livestock production are now part of their daily activities. They also clear forest on their communal land for coffee and cattle ranching in the same way as colonists do (Ulbert *et al.*, 1995; Macdonald, 1981), sell timber and take jobs in the oil industry. The Quichua consider this transition as essential for their survival, and combine such 'modern activities' with their work in the *chacras*. Most young men perform seasonal labor for oil companies, especially the cutting of seismic lines (Uquillas, 1993b; Macdonald, 1989). The communities in the longest-colonized area, along the roads between Coca and Baeza, now cultivate *naranjilla*, and grow coffee as well as selling timber and tending cattle (Ecociencia, 1996).

The transformation of some Quichua livelihood in the space of a single generation has given rise to heterogeneity between these groups that have access to cash incomes and those that live more isolated lives. Within certain communities, heterogeneity is also evident between community leaders and the rest of the group. The most obvious example is the deteriorating role of shamans who lose power and the youngsters who are pulled away from traditional values (Macdonald, 1989). Roads and even power lines, supplied by the oil companies, have connected the communities around Coca to markets and introduced television. Some outsiders see these changes in terms of the loss of a true forest identity and the deterioration of living conditions. Young Quichua, however, are eager to take advantage of the new opportunities, and some communities have been able to adapt smoothly to a new lifestyle that combines a forest livelihood with modern inputs (Box 4.5).

Box 4.5: The Comunidad Corazón del Oriente

Corazón del Oriente is a small Indian community of 25 Quichua families, numbering some 200 people. They live on 1,400 ha of forested land, situated in the zone of fertile black soil 15 km north of Coca. They combine traditional *chacra* production with crops like coffee, rice, and corn, and tend a few head of cattle. The oil company Oryx extracts oil in their forest, and has built a road to Coca. In compensation for itsactivties Oryx paid US$ 14,000, and provided medicines, a communal house, a pond for aquaculture, and a fenced site for the breeding of forest game. The *comuna* leader describes the relationship with the *compañía* as 'rewarding': *"If we run out of goods, we organize a paro by the bridge to obtain what we need. After some negotiation, the compañía always yields"*.

The community has developed a strong leadership and communal sense, and has been active in the indigenous umbrella organization FCUNAE. It has received agricultural assistance from the development NGO FEPP, and planted an experimental soybean field. It repays credit on time, so that FEPP is willing to provide further loans on favorable terms. The community is involved in a project to market coffee and corn without the interference of intermediaries. Corazón del Oriente illustrates that the encounter between oil men and Indians can work out well provided certain conditions are met: a favorable location, fertile land, rich oil deposits, strong social organization, and external assistance and funds.

Huaorani Indians

The Huaorani were originally the fiercest lowland Indians in the *Oriente*, whose warriors killed outsiders entering their forest south of the river Napo. They became sedentarized when the American Evangelist organization 'Summer Institute of Linguistics' (SIL) Christianized them in the 1950s (Santos Ortiz, 1991 and 1996). Today they number 2,000 people living in a few hamlets surrounded by a 679,000-hectare protected reserve in the province of Napo (*Comercio,* 16-7-96). With the help of the Rainforest Information Center NGO they have delineated the borders of their territory, which is under the constant threat of invasions by colonists. There have already been several violent conflicts and military forces have had to intervene to prevent further clashes (*Comercio,* 16-7-96). Another serious threat to the integrity of their reserve is oil exploitation, which takes place in the whole eastern part of their territory and has caused severe environmental damage. The oil company MAXUS started oil exploitation in 1994 and has signed a friendship agreement with the Huaorani. International observers and activists have criticized the contract as too favorable for the oil company and unclear in its promise to the Huaorani (Jochnick, 1995; Kane, 1995).

Horticulture, hunting, fishing, and food gathering are still part of the Huaorani economy, but the supply of consumer goods and alcohol by the oil company is becoming increasingly important. In recent years, tour operators have also found their way to these forest people; small groups of tourists now visit the Huaorani villages weekly. Young Huaorani are already part of the cash economy and tourist dollars are an important income source for them. Over years of contact with missionaries, oil companies, and tourists, the Huaorani have developed a strategy of begging for gifts and cash money. They also demand money for photos, impose tolls on oil company trucks that cross their territory, and sell forest animals as pets at the market in Coca (Smith, 1993).

Missionaries and activists 'guiding' Indians

The American SIL evangelists and the Catholic missionaries have had a particularly important role in the history of the indigenous population in the *Oriente*. In the 1950s, SIL recorded the Cofan and Huaorani languages and accelerated the process of sedentarization in order to help the Indians to survive the pressure of the ongoing colonization. The Capuchin missionaries concentrated on the Quichua population to save their souls. With the arrival of the oil companies, SIL and Catholic missionaries made contracts with oil personnel to inform the Indians about oil exploitation and avoid conflicts. Their paternalistic philosophy was based on the fact that oil exploitation was there to stay and that the Indians had no other choice but to collaborate (Santos Ortiz, 1991 and 1996). Subsequently, critics in Ecuador and abroad have accused SIL of neutralizing Indians' resistance to the invasion of their territories (Kane, 1995).

Today, Western environmental activists are like the modern missionaries preaching a credo of forest protection. They portray the Indians as traditional forest people living in harmony with nature and threatened by the evil machinery of the oil companies (see RAN, 1999; World Rainforest Movement, 1997 and 1998). On the

one hand, Western activists use this for attracting attention and funds (Egan, 1996). On the other, they use their skills and resources in order to empower and assist the Indians in their struggle against central governments and oil companies. How this complicated task of representation can get out of hand is illustrated by the case of the American NGO National Resources Defense Council (NRDC), which negotiated with the oil company CONOCO over oil drilling in Huaorani territory in 1990. It turned out that NRDC had not received a mandate from all the Huaorani who lived in the oil concession, and had followed its own agenda instead. The negotiations ended in a deadlock with distrust between all parties (Egan, 1996; Kane, 1995). The environmental NGOs Rainforest Information Center and Acción Ecologica stress the importance of dialogue and collaboration with oil companies. They demand guarantees of environmental safety and compensations for environmental damage that represent long-term investments in real sustainable development for indigenous groups (Jefferys, 1997).

The position of all these lowland Indians today poses the question whether they represent a living fence/frontier for the protection of the remaining forest areas, and can be considered stewards of forest protection. On the one hand, they are the only actors in the *Oriente* with knowledge of and respect for the standing forest as an important part of their livelihood. On the other hand, they themselves increasingly engage in felling trees to clear agricultural land, and in selling timber; some of them are responsible for overhunting and dynamite fishing in the national parks. The answer to this question ultimately depends on how the Indians' perception of the forest evolves in the next decade. Indians have always considered the forest as a natural supermarket, where they can extract animals, medicinal plants, and fruits in exchange for respect and gifts to the spirits of the forest, but without a clear notion of resource management. Nowadays, their limited territory and growing population are causing them to put forest resources under pressure for the first time. From their viewpoint, the only solution to their growing need for forest resource may well be the expansion into the 'unused' national parks. Some Quichua groups restrict the notion of sustainability to the issue of 'preserving land for the next generation', a concern which places little priority on biodiversity protection or resource management as such. One reason for optimism is perhaps the fact that Indians have obtained their land titles, and won international funding and support, thanks to their image as forest people living in harmony with nature. This international projection of Western perceptions could eventually stimulate them to view the forest as a supermarket that should not be plundered.

THE TIMBER TRADE IN THE ORIENTE

The small-scale timber industry in the Oriente

The commercial extraction of timber in the provinces of Napo and Sucumbíos does not play a leading role in the deforestation process, but the sector represents an important source of opportunities for off-farm labor. Its informal character makes it very suitable for the mostly casual and unskilled colonist labor force. Virtually every household has a member who is involved in the extraction, transport, or processing of timber during some period of the year. The sale of timber is the most

important source of cash income during for new arrivals the first years of colonization. Thereafter the economic importance of timber diminishes, but it remains a means of saving for unexpected outlays such as those demanded by medical problems or bad harvests.

Extraction is limited to a few valuable species such as cedar (*cedrela odorata*), laurel (*cordia alliodora*), and to a lesser extent balsamo (*myroxylon balsamum*) and guayacan (*Tabebuia chrysantha*). Most of the boards and logs are destined for the processing industry in the *Sierra* (1.1 million m^3/year), another considerable proportion goes to Colombia (200,000 m^3), and a smaller part is processed in local sawmills.[54] There are no official logging concessions in the *Oriente*; timber companies buy logs and boards at the gate, and let intermediaries organize the supply (Raposo Pereira, 1996; PROFORS, 1993).

The three kinds of extraction practiced in the *Oriente* are related to the accessibility of the standing trees. (1) Log extraction occurs along the main roads in longer-colonized areas close to the *Sierra*, where a few timber traders (*madereros*) are specialized in the supply of logs for the plywood companies. They have at their disposal skidders and heavy trucks that can reach the plots near the road for the extraction of entire logs. These *madereros* arrange with the landowners a fixed price per hectare and the construction of roads and bridges. Their monopoly position has resulted in unfavorable contracts and conflicts with local people (*Hoy*, 4-11-94). (2) In the rest of the *Oriente*, extraction is restricted to sawn timber from forest that is accessible via nearby oil roads. The *madereros*, operating in the oil extraction zones possess mobile circular saws, small trucks, and canoes for transport. They organize chainsaw operators who cut the trees and saw the logs into boards in the forest, after which they are brought by mule, horse, or canoe to the paved oil road for further transport (Comisión ecumenica, 1996). (3) In remote areas far from paved roads, indigenous communities and colonists arrange felling independently. They cut trees, transport the boards out of the forest and sell them to the *madereros*. The profitability of this option depends on the availability of a chainsaw and a means of transport.

In general, it is the *madereros* who benefit most from the timber trade. The farmers receive a relatively low price for their standing timber or boards. The exact sum varies strongly according to the accessibility of the plot and the difficulty of extraction.[55] A study in 1991 estimated that landowners received 20 percent, chainsaw operators 8 percent, and middlemen 72 percent of one cubic meter of the valve of cut timber ready for further processing (ITTO-INEFAN, 1991 in Raposo Pereira, 1995). The size of the middlemen's share could be explained by the fact that they monopolize transport and control the smuggling of timber to Colombia (Comisión ecumenica, 1996).

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[54] Figures presented by the organization of timber producing companies (AIMA) in a public statement in the newspaper *Comercio* (21-12-96).

[55] Farmers on the *via Auca* receive US$ 15 - 30 for a mature standing laurel or cedar tree on land along the oil roads or up to the fourth *línea* (Eberhart, 1996). On more remote land, *madereros* do not operate because high transport costs make tree cutting unprofitable.

Box 4.6: INEFAN's attempts to stop illegal logging

In 1996, the new INEFAN director Quevedo attempted to stop timber smuggling to Colombia by means of a shock therapy. With the support of the military forces he ordered the seizure of 110 truck loads of timber, for which the permits were forged or incomplete. He also declared a five-year national moratorium on six endangered timber species, including cedar. For the province of Sucumbíos, he even prohibited all timber cutting for a period of ten years (*Comercio*, 2-12-96). The INEFAN director took these draconian measures without consulting the wood industry or farmers organizations. This was the first time that INEFAN seriously tried to enforce the forest code, and it provoked a storm of protest from the timber industry. Under the pressure of its powerful lobbying, Quevedo was forced to resign (*Hoy*, 30-1-97). His replacement, Sr. Cardenas followed a more moderate course and eventually destroyed the moratorium's effectiveness by excluding from it the two major timber-producing provinces Esmeraldas and Sucumbíos (*Hoy*, 26-7-97; *Comercio*, 23-6-97; MAG, 1999).

In 1994 INEFAN signed a collaboration pact (*convenio*) with the military forces regarding the inspection of timber trucks at a strategic bridge in Coca where the military controlled traffic day and night. This *convenio* resulted in the seizure of a number of illegal loads between 1994 and 1995. *"The military in Coca were so eager to sign the convenio because they wanted to have their share in the lucrative timber trade and they needed timber to construct houses. Now that the houses are built and there are disputes over how they share the proceeds with INEFAN, they have ended the convenio. But even when it was in force, bribing the guards with booze was always possible. Large loads had to be arranged with the 'comandante'* (pioneer colonist in Coca)." In 1996 the *convenio* came to an end and trucks were no longer checked for illegal timber at the bridge in Coca.

In 2000, 'Vigilancia Verde' came in force to control timber transports. This consisted of coordinated monitoring units including forestry officials under the new Ministry of the Environment, police and army officials, and representatives of NGOs. They operated at control posts along the strategic roads that leave the *Oriente* in Baeza and Shell. Fifty percent of the budget for the control teams came from the auction of confiscated timber. In 2001, most control units were no longer operational and plans to transfer control of forestry from the Ministry of the Environment to the Ministry of Agriculture (MAG) would put an end to this initiative (*Blanco y Negro*, 20-1-01).

The control of the forestry department INEFAN

The Forest Law of 1981 was the Ecuadorian government's first attempt to end to the anarchy in the forestry sector. INEFAN's regulations prescribe detailed forest management plans, taxes, reforestation stumpage fees, and permits for timber extraction and transport. The necessary instrument of a land register for monitoring extraction and reforestation, however, has never been set up. A regular forest patrol guard (*Guardia Forestal*), planned in 1994 as a collaboration between INEFAN and

the military forces, has never become operational (Unda, 1991; Taale and Griffiths, 1996). INEFAN itself estimated that it receives taxes and issues permits for only 20 to 25 percent of the national timber trade; the remainder is carried on illegally (Raposo Pereira, 1996; MAG-INEFAN-ITTO, 1993). Even the legal quarter, moreover, does not meet the official standards of sustainable forest management, because INEFAN staff rarely inspect the management plans or permits on site and never monitor activities after a logging permit is granted. INEFAN has taken some measures to combat uncontrolled timber extraction, and sometimes joint actions function for some time (Box 4.6). The problem is that these remain isolated repressive actions rather than leading to structural changes in the forestry sector.

A handful of INEFAN officials in Coca are in charge of approving and monitoring forest management, and controlling timber transport, over the whole province of Napo. They are understaffed, badly equipped, and susceptible to bribery. Many *madereros* forge permits and management plans, and smuggle sawn timber between coffee loads. The commonly used method is transport at night, when the officials are off duty. The *madereros* bypass the controls not because they fear the official fines, but rather because the inspectors and soldiers at the checkpoints demand too many bribes. The opinion of the man in the street in Coca on the timber regulations is clear: "*It is ridiculous that you have to pay taxes for selling the wood from your own farm. The whole system of management plans (planes de manejo) and transport permits (guias de movilización) is a joke. INEFAN officials inspect only in order to pocket bribes (coimas).*"

Forest protection and the National Parks

The forestry department INEFAN

The central government has developed a policy for tropical forest protection and park management during the 1990s. A major step was the foundation of INEFAN in 1992, which united two competing subdirectorates: the forestry department, responsible for forest exploitation and control of the timber industry and, the conservation department, responsible for the protected areas. INEFAN has undergone successive organizational transformations and changes of director and suffers from a chronic budget crisis (INEFAN, 1996b). All the necessary legislation exists to protect the parks and control timber extraction, but the agency has no real inspecting capacity and enforces the regulations only sporadically. Neither does INEFAN offer legal, logistic, or technical support for alternative extractive techniques and sustainable forest management. It is indicative that although every cubic meter of legally cut timber is charged with a reforestation tax, INEFAN still has not established a tree nursery to support reforestation programs, (INEFAN, 1995a and 1995b).

In the early 1980s, two important national parks were designated within the oil extraction zone on sites internationally identified as 'hot spots of biodiversity' (Myers, 1988). Originally these were 'paper parks' without proper management in the field or sufficient staff to control and protect them (Ulloa, 1995). Gradually, however, international donor money has paid for the demarcation of the park

boundaries and for a permanent INEFAN presence. The ecotourism lobby and the environmental NGOs have supported the protected status of the parks and the increasing involvement of the department. In 1994, the World Bank granted a US$ 7.2 million GEF loan to protect biodiversity by strengthening the national parks system in the Amazon (Chatterjee, 1994). In 1996, the European Union started a US$ 14,000,000 collaborative project with Petroecuador and the forestry department to mitigate the environmental impact of oil exploitation in the national parks (*Hoy*, 6-4-96; *Comercio*, 15-4-96). This coalition for protection has inevitably led to conflicts with the inhabitants and with the oil companies that operate in the parks.

The Cuyabeno Wildlife Reserve [56]

The land around the Cuyabeno river in Sucumbíos was declared a protected area in 1979 in order to protect its extraordinary biodiversity. However, colonization of the region had already begun before that date, and new colonists, as well as Shuar and Quichua Indians went on to settle in the park during the 1980s. The conflict escalated in 1983 when these *cooperativas* could not receive a formal land title, because their land was declared a protected area. INEFAN has tried to organize the management of the park since 1993 with financial aid from GTZ (PROFORS project). The most densely populated areas of the park were separated from the original park in 1994, and declared *patrimonio forestal*, where settlements are allowed. The whole park measures today 600,000 hectares and includes villages and indigenous communities containing 12,000 people (PROFORS, 1995; INEFAN, 1996a; Taale and Griffiths, 1996).

Besides colonization within the park, oil exploitation has been another major threat to its survival and has already had a destructive impact. Petroecuador exploits several oil fields inside the park limits, and problems with oil spills have frequently been reported. One major spill occurred in 1989, leaking tons of oil into the Cuyabeno lagoon. Petroecuador started the clean up only months later, too late to contain the impact (*Comercio*, 3-8-93). In 1991 there was an attempt to stop all oil activities under pressure from environmental activists, ecotourist companies, and indigenous organizations. Cuyabeno is a major ecotourism destination in Ecuador, and INEFAN's park department found the tourist industry an ally in its campaign for a zoning plan for the park. A presidential decree prohibited the drilling of new wells in one part of the reserve, and Petroecuador was forced to halt its activities in the park. A few weeks later when the media attention was over, however, drilling resumed. The head of INEFAN in Sucumbíos bitterly criticized Petroecuador's behavior, adding "*that the situation is worsening every day*" (*Hoy*, 10-6-96). There exist two master plans for the management of the park, neither of which have ever been executed.

It seems that INEFAN's incapacity is a serious obstacle to the imposition of restrictive regulations. INEFAN is confronted with colonists and oil companies that have already operated in the reserve for many years. Budgetary constraints do not seem to be the main problem, international donors can and do provide funding. In 1996, the World Bank allocated part of the US$ 15 million PATRA project in

[56] This section is based on Little (1992) and Garcés (1995).

Ecuador for mitigating the environmental impact of oil exploitation in the most polluted parts of Sucumbíos (PATRA, 1998). The European Union has set up the PETRAMAZ project, which is part of a larger US$ 14,000,000 deal with Petroecuador and the Ecuadorian forestry department (PETRAMAZ, 2000).

The Yasuní National Park

The Yasuní Park became a protected area in 1979 and its definitive boundaries, enclosing an area of 982,000 hectares, were demarcated by a presidential decree in 1990 (INEFAN, 1996a). This park has problems similar to those of Cuyabeno, and INEFAN experiencing the same conflicts with resource users. The limits of the park were established without consent of the local communities, and a number of Quichua settlements were situated inside the protected area and so officially prohibited from using the forest. After difficult negotiations with INEFAN, these communities have finally been able to demarcate their land. The traditional territory of the Huaorani also lies almost completely inside the park limits (FEPP, 1995). By far the most conflicting land use, however, is oil exploitation inside the park. The CONOCO oil company received a concession in the park and started to drill for oil in 1988. Environmentalists appealed to Ecuador's High Court, but the government circumvented the resulting negative verdict by redrawing the park's boundaries in 1990 and allocating 612,000 hectares of its initial area to the Huaorani Indians (*Comercio,* 16-7-96). On condition that they would not impede oil exploitation on their territory (CESR, 1994). CONOCO, nevertheless, experienced too many problems and too much negative publicity in the U.S. due to the drilling in Yasuní, and pulled out in 1991, selling its concession to MAXUS (RAN, 1999).

This new company built a 120 km-road penetrating the national park, and the oil started to flow in 1994 (RAN, 1999). MAXUS made some efforts to mitigate the environmental impact. In order to prevent the invasion of the park by colonists, no bridge was constructed over the river Napo, transport across which was limited to a ferry service. The company also proposed to construct a temporary road that would be demolished once oil exploitation had finished. This interesting offer was not registered in the final text of the contract. Petroecuador preferred a permanent road, which could later become a strategic route for the exploitation of blocks south of the park. The military forces were also in favor of a permanent road in order to improve their access to the border area. In contrast with this official lack of commitment at national level, international donors have been generous in their funding for effective park management. The Dutch Ministry of Development Cooperation, for instance, started a US$ 3,000,000 project in 1995 to support the management of the park's buffer zone (FEPP, 1995).

The history of both the Yasuní and Cuyabeno parks shows that oil activities have expanded without environmental restriction inside the protected areas. This might seem to justify the conclusion that forest conservation in Ecuador must inevitably give way to oil exploitation. The prospects for official protection, however, have recently received a new boost.

Recent and future developments

The department of INEFAN was reshuffled in 1999 and became part of a new Ministry of the Environment (Ministerio del Ambiente, MA) with responsibility for all environmental issues. In the same year, a presidential decree declared two areas inside existing national parks 'untouchable zones' (*zonas intangibles*) for the oil industry. The first of these, Cuyabeno-Imuya, is situated in the east of the Cuyabeno park and covers a swamp area of 435,000 hectares. The second zone, covering 700,000 hectares, lies in the heart of the Yasuní Park, where a small group of isolated, uncontacted Indians is thought to live (Min. del Ambiente, 1999). The decree prohibits not only oil exploitation, but also all other kinds of extraction activity apart from traditional hunting. As a direct result, six oil wells have been shut down in PetroEcuador's Block 32 and oil exploitation in another block has been stopped (*Comercio*, 15-6-99). The official decree states that when the environmental costs and risks of oil exploitation are weighed against the loss of existing oil investments, its is more appropriate to preserve the environmental equilibrium (Min. del Ambiente, 1999). It should be recalled, however, that an earlier ban on oil exploitation in Cuyabeno had simply been put aside by the oil companies. Success will depend on the new ministry's power to implement these regulations by organizing strict monitoring in the field and imposing effective sanctions on transgressors. The real test will come when the planned new pipeline is operational, allowing oil production in the *Oriente* to double.

The struggle of the MA raises the question of whether the armed forces, who represent the only powerful and well organized authority in the *Oriente* could be a potential partner in forest protection now that peace with Peru has been established. A joint statement by the Ministry of Defense, INEFAN, and the NGO Ecociencia (1994) has already announced that the armed forces are the authority best positioned and equipped to monitor the logging industry and the protection of national parks. The supreme military commander also stated that his forces should have a leading role in promoting sustainable development in Ecuador (Moncayo, 1994). The ambivalent track record of the army in regulating the timber trade and controlling access to the national parks, however, suggests that its interests may still lie in an expansion of the oil industry.

CONCLUSIONS

Oil drilling lead by foreign companies together with the agricultural activities of thousands of colonists, have transformed Ecuador's Northeast Amazon region over the last 30 years from closed forest into a polluted settlement frontier. The two booming oil towns of Lago Agrio and Coca represent bridgeheads for further forest encroachment by smallholders and acculturated Indians in the *Oriente*. Colonists are the agency that slowly transforms forest into arable land and pasture. They form a heterogeneous and dynamic group, including both poor and more prosperous farmers with diverse backgrounds and varying amounts of starting capital. All of them encroach on forest land along the oil roads in order to generate income. Established colonists slowly cut the remnant forests on their 50-hectare farms, while new colonists start to clear the forest fringe in the areas opened up by oil compa-

nies. The rate of clearance is limited to one or two hectares per household per year. The process is relatively slow because a household's clearing capacity is limited by natural and economic constraints. Nonetheless, this farming system is not sustainable: the soil becomes depleted after a few years and new land is required in order to continue extensive land use without fertilizers. Most colonists gradually transform their land into pastures, and themselves into extensive cattle ranchers.

Indians in the *Oriente* are rapidly adapting to the new socio-economic situation dominated by the oil industry and agricultural colonization. Most of their forest is still used for subsistence purposes, but an orientation towards cash crops, cattle, and timber selling is also emerging as a response to market opportunities. Young men, moreover, can earn cash from off-farm laboring for oil companies. All these economic changes have affected the social and cultural values of the Quichua and the future of their community. They are now at a crucial point where they need to design a viable and self-determined livelihood in a shrinking forest. Some groups are able to cope with these changes. Their recent political empowerment, and the support of Western environmental activists, have brought about an affirmation of their pride as forest people. This has helped them to withstand the advance of polluting oil companies and forest-clearing colonists. Other Indian communities, however, contribute to the advance of the agricultural frontier by adopting the same land use techniques as the colonists. However that may be, at this moment the Indians represent the only important actors in the *Oriente* who have a long-term perspective on the economic use of the forest.

The colonization frontier is fueled by two major underlying factors behind forest encroachment. Firstly, the oil industry represents the most influential lead agency and acts as an important catalyst by providing roads and jobs for thousands of colonists. The application of environmentally sound oil exploitation does not seem to be a possibility for the near future given the lack of legal enforcement. The expansion of the oil sector and its road network, moreover, continues every day, transforming remote areas along the national borders and in Pastaza province into oil fields accessible for colonists and loggers. The most likely scenario to the future is that of forest encroachment already witnessed in the established oil zone around Lago Agrio and Coca.

Governmental policies form the second underlying factor. Politicians in Quito consider the *Oriente* primarily as an extraction zone, and are more concerned about oil revenues than about forest conservation. Petroecuador and the military forces are effectively the main authorities in the *Oriente* and they promote forest encroachment due to their own interests in oil production. This explains why the central state is only visible and effective in maintaining order around the oil wells themselves. Oil incomes are vital for Ecuador's ailing economy, and this pushes the government to increase production levels. Other governmental agencies have a very low profile in the *Oriente*, to which they do not allocate the money from their development budgets which could stabilize the colonization frontier. The bureaucracy does not implement existing regulations and policies that regulate the oil industry, agriculture, or forestry. A combination of centralism, corruption, and development strategies favoring agricultural expansion is responsible for the poor socio-economic

situation. It has generated conditions under which colonists and Indians are not able to make the transition from extensive towards more sustainable land use techniques.

The lead agencies, then, have so far missed the opportunity to organize sustainable development in this remote forest area. The colonists and Indians are left to their own devices, and their most viable options are extensive land use and encroachment on forests situated in national parks and along new oil roads. Yet the destruction of the forest advances slowly and much land reverts to secondary vegetation. The future of Ecuador's rainforest, therefore, seems not completely black, but it remains ominously darkened by oil exploitation.

CHAPTER V

CAMEROON'S TIMBER BOOM AND THE FATE OF THE FOREST

High tropical forest, full of valuable timber stands, stretches along both sides of the eastbound road just 20 km out of the capital Yaoundé. The logging industry is booming in this region and foreign logging companies are rapidly mining the forests of valuable trees. A small stretch of dirt road towards the town of Lomié has generated much controversy because of its improvement with EU development funds. Western NGOs have accused the EU of facilitating timber transportation for European logging companies and stimulating the trade in illegally hunted monkeys from the nearby Dja reserve. The local Bantu population in Lomié, in contrast, is pleased with the road improvement, which has cut travel time to markets and hospitals. But for the Pygmy people who live along the road, EU funds have delivered nothing but more dust from the racing lumber trucks. In the surrounding forest, everything is changing due to the whining chainsaws. Gradually, forest dwellers are realizing what enormous wealth is leaving their forests in the form of raw logs. In an attempt to share in the proceeds, they are now beginning to organize blockades and protest.

Diary, January 1999

INTRODUCTION

The expanding timber industry represents the leading actor of the fate of Cameroon's forests, which are still relatively little affected by colonization and land use conversion. The focus in this chapter is on how this industrial logging sector is spearheading the economic, social, and political changes in the whole of the south of Cameroon. This case study differs from the two previous Amazon examples in that here the central state, by directly influencing the logging companies' business activities and decisions, plays a more strategic role. Donor agencies have great difficulty stimulating sustainable forest management in Cameroon: conservation, timber certification, and community forestry projects all encounter severe implementation problems. At the sidelines of this game of interests and economic rents, the local people appear to be marginal actors. Confronted with an economic crisis and declining incomes from cash crop production, they consider the logging sector as a viable alternative to the difficult agricultural situation. Increasingly, they claim the right to play a decisive role in the allocation of timber revenues and to benefit from timber extraction via royalties and jobs.

THE TROPICAL FOREST IN PRESENT CAMEROON

The forest and its people

Tropical humid forest covers most of South Cameroon stretching from the coast to the eastern border. Cameroon's rain forest zone forms part of the larger Congo Basin, most of which is covered by lowland rain forest featuring the richest floral and faunal diversity in Africa (Bergmans, 1998). At the end of the 1980s, Cameroon's rain forest area measured around 17 million hectares. Today, its very existence is seriously threatened by population growth, agricultural expansion, and timber exploitation (Laporte, 1995). The western section and the areas around the main urban centers now only have secondary vegetation, although a closed canopy forest cover still persists in the east. Lack of data or terminological agreement make it difficult to estimate annual deforestation or degradation. Most deforestation figures range between 100,000 and 200,000 hectares per year.[57] In 1987 it was calculated that 4.7 million people lived in the humid forest zone (more than half of them live in the two large cities of Yaoundé and Douala)(Ndoye and Kaimowitz, 1998). The local forest population in Cameroon consists of several ethnic groups, of these the Bulu, Kozime, Beti are dominant, all part of the larger Bantu family; their main activity is small-scale farming of food crops, cocoa and coffee. There are also a few Pygmy groups such as the Baka and Bagyeli, whose semi-nomadic livelihood depends almost entirely on the products of the forest. Cameroon has a population growth of around 3 percent per year. The degree of urbanization is now 45 percent and is estimated to reach 70 percent by 2020 (Hoogeveen and Soest, 1993). The question of how this growing population is to find income and food will play an important role in determining how the forest is used, especially around the major cities (Foteu Kameni, 1998). Figures from the latest UNDP report indicate that throughout the south of the country, the number of people living in poverty is growing every year. Half of the population now lives under the poverty line, and 87 percent of the poor are found in rural areas (UNDP, 1999a).

The economic crisis and the forest

Since the 1980s, living conditions have deteriorated dramatically for the majority of the population as a consequence of the severe economic crisis in relation to declining export revenues from oil, coffee, and cocoa. At the end of the 1980s, the government of Cameroon reacted with a general overhaul of the country's institutional and economic organization under pressure from the IMF's Structural Adjustment Program (SAP). Since the first SAP plan of 1989, markets for agricultural products have been liberalized and a privatization program for the public sector is slowly advancing. Ministries have been restructured and the number of public servants drastically reduced (World Bank report, 1998).

[57] The FAO (1997) calculates an annual forest loss in the period 90-95 of 129,000 ha, representing 0.6 percent of the total forest. Laporte, Justice and Kendall (1995) give an average figure of 130,000 ha per year between 1970 and the late 1980s. Figures from the World Resource Institute indicate a forest loss of 190,000 ha annually, while Cameroon's National Forestry Action Program (1995) mentions a figure of 200,000 ha per year.

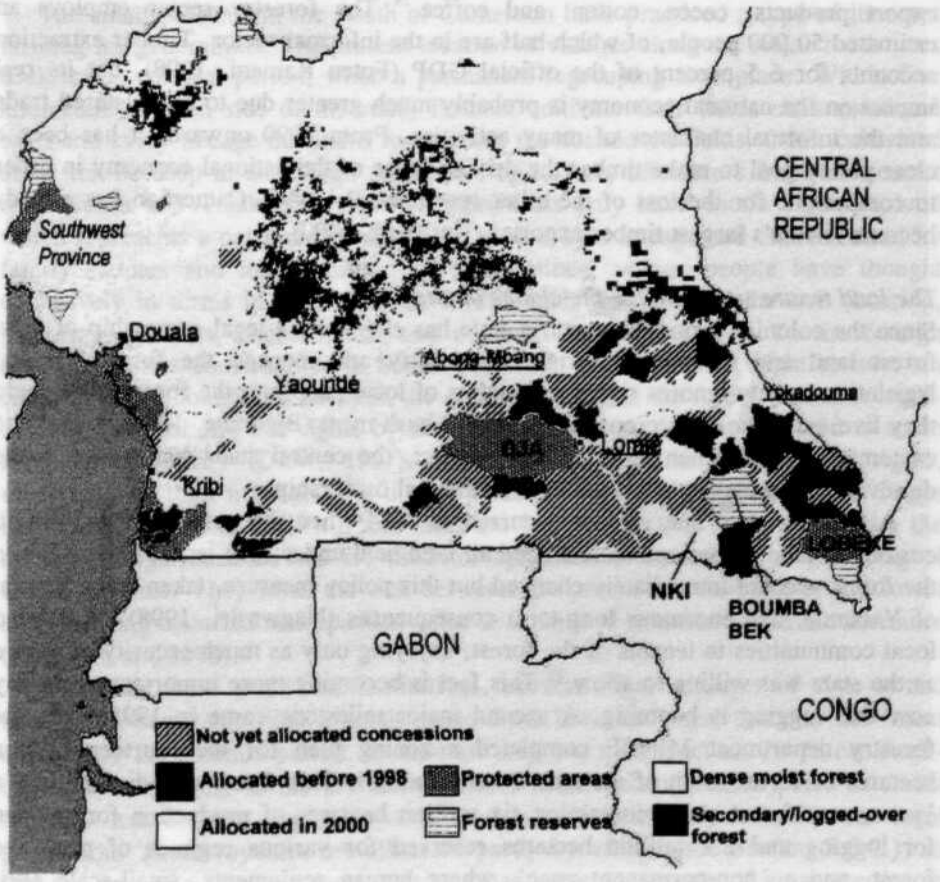

Figure 5.1: Study area and logging concession status in 1999 (source: Global Forest Watch, 2000)

The result of this economic and political turmoil was that the GDP declined by 20 percent between 1989 and 1993. A turning point was the devaluation of the CFA currency in 1994, which restored the competitiveness of Cameroonian products and brought about a economic growth of an averaging five percent per year in 1994-98. For the average Cameroonian, nevertheless, the devaluation was a serious setback. It resulted in lower incomes, while many consumer goods became more expensive. The macro-economic situation is still far from bright and the debt burden remains significant. In the fiscal year 1998-99, one third of the public budget was spent on debt repayment, while the total external debt represented 89 percent of the GDP (IMF, 1999; Tandjeu, 1998).

Timber exploitation is becoming more important for Cameroon every year, especially after the steady decline of world prices for Cameroon's major agricultural export products, cocoa, cotton, and coffee.[58] The forestry sector employs an estimated 50,000 people, of which half are in the informal sector. Timber extraction accounts for 6.5 percent of the official GDP (Foteu Kameni, 1998), but its real impact on the national economy is probably much greater due to unregistered trade and the informal character of many activities. From 1990 onward, it has been a clear policy goal to make timber the driving force of the national economy in order to compensate for the loss of the other revenues. By 1999, Cameroon has already become Africa's largest timber exporter (Verbelen, 2000).

The land tenure situation and the claims on the forest

Since the colonial period, the central state has claimed the legal ownership of most forest land and reserved the right to classify and manage the forest. Central legislation largely ignores rights and claims of local people to the forest land where they live, cultivate their crops, and hunt for bush meat (Bigombé, 1996). Legal and customary systems then, overlap and conflict, the central state dominating to the disadvantage of claims based on local communal ownership.

A decisive state intervention occurred in 1974 when the government abolished customary land tenure and nationalized all land held under such tenure. Daily life in the forest was not immediately changed but this policy measure, taken in the capital of Yaoundé, had enormous long-term consequences (Nagwasiri, 1998). It reduced local communities to tenants of the forest, enjoying only as much security of tenure as the state was willing to allow.[59] This fact is becoming more important every day now that logging is booming. A second major milestone came in 1995 when the forestry department MINEF completed a zoning plan for the fourteen million hectares of forest south of the axis Douala-Batouri. This forest was divided into a `permanent forest zone' containing six million hectares of production forest open for logging and 2.7 million hectares reserved for various regimes of protected forest, and a `non-permanent zone', where human settlements, small-scale agriculture, agroforestry, and plantation agriculture are permitted (ESE, 1995; MINEF, 1998). Particularly in the East Province, the non-permanent forest area is confined to a narrow strip a few kilometers wide along forest roads, surrounded by large areas open for logging concessions. This zoning plan bears no relation to the forest's social history and is based on geographical boundaries for delineating Forest Management Units (FMUs) based on economic criteria. The result is that agriculture, hunting and gathering occur in the area that is designated for logging activities, generating conflicts between forest-dwellers and loggers. In principle, the zoning plan was a preliminary proposal, requiring local approval to be obtained during village meetings (*tenues de palabres*). In reality, all official agencies have regarded

[58] Cameroon's export revenues in the fiscal year 96-97 consisted of petroleum (41%), timber products (16%), cocoa (8%), cotton (7%), and coffee (7%).

[59] There exists a legal registration system for rural land, but the procedure is very onerous and costly. Since 1975, only 2.3 percent of the rural land has been titled as private land (Ngwasiri, 1998).

the plan since 1995 as a finished document with full legal force regardless of local views.

The small peasants in the South of Cameroon have practiced a type of itinerant farming for generations. The present location of villages along the major roads goes back to the colonial period, when a permanent regrouping took place. Within five kilometers of each side of the road, farmers cultivate their fields on a rotational basis and every lineage maintains its rights to the abandoned fields. Other cultivated areas can be deep in the forest, sometimes up to forty kilometers from the nearest road (Joiris and Tchikangwa, 1997). Individuals only have user's rights to land which represents a patrimony collectively owned by a lineage and characterized by family statutes and inalienability. For generations, village people have thought exclusively in terms of spaces in the forest, each with a particular use (hunting, gathering, gardens, cocoa fields, and common forest property). To the foreign observer, forest communities in South Cameroon appear at first sight to have no clear notion of boundaries between the different zones in the forest. Social recognition of historical and axe rights by neighbors, however, does in fact lead to some form of exclusivity (Diaw, 1997). Many communities have traditional rights, recognized by their neighbors, to distant areas of forest which correspond to stages in historic migrations (*bilik*). These sites are found up to one day's walk from the modern village locations and are used for agriculture, extraction and gathering of forest products. They form the link between the production function of the forest and its strong historical and spiritual value as a place of encounter with the ancestors (Oyono *et al.*, 1998).

Alongside these traditional institutions, modern legal concepts of state-owned land, legal ownership, and logging concessions have had legal force in the forest areas since the colonial period. In the past they had no impact on the forest dwellers' daily life. Only in the last decade has a drastic change taken place as forest territory has become important as a source of logging royalties for the local population. These royalties are allocated partly by village (see Section 5.5.2.), so that the area of a village's forest territory has become a matter of great account in negotiations with logging companies. This generates the potential for conflicts between neighboring villages. Another critical point is that state regulations consider the village as a single homogenous party in negotiations over logging royalties. In reality, different factions inside the village shape the local power play; lineages of neighboring villages can claim their rights, based on kinship ties together with the connected user rights about forest spaces, crisscrossing village boundaries. These different undercurrents complicate the official division of logging royalties by village, and undermine the proposed community forestry projects described below (Vermeulen, 1996; 1998).

The above described land situation applies to the Bantu peasants, but does not take into account the Baka pygmies, who are nowadays in the process of sedentarization, with some groups still nomadic, others semi-nomadic and some already sedentary. They intersect these lines, boundaries and limits of the Bantu communities, although without having brought about serious conflicts until now. As more and more of the forest is divided into logging concessions, it ceases to be a green sea of

trees in which the Baka can wander. The Baka are not represented in governmental bodies and their negotiating position is also very weak in the villages, which are dominated by Bantu. When land has to be designated and money divided, their protest is not heard and, most of the time, they finally surrender.

East Province, the backward region of Cameroon

In 1992 the East Province had 600,000 inhabitants, with an urbanization rate of 30 percent and a population density of around 4.5 inhabitants per km² (Présidence de la république, 1992). This province, together with the border area with Gabon in the South is the last forest area of Cameroon with large stands of valuable species. Around 60 percent of timber extraction now occurs in the East province (Verbelen, 2000). In the coastal and central provinces, timber exploitation goes back to the German colonization at the beginning of this century; this has resulted in a patchwork landscape of forests interspersed with urbanized areas and cultivated land around the seaports Douala, Kribi, Limbe and Tiko. Nowadays in the East, the logging industry is becoming the most important economic activity. This confronts small peasants and Baka people with a totally new concept of forest use.

My study will concentrate on the region around Lomié, situated in the department of Haut Nyong. Lomié became a town during the German era. Lomié district covers 13,612 square kilometers and has 16,000 inhabitants, and 2,000 in the town of Lomié itself. In 1987, the annual growth rate was 2.17 percent and the density 1.2 people per km². The inhabitants of the region lack basic needs and suffer from isolation, which excludes them from economic and infrastructure development. The dirt road linking Lomié to Abong Mbang represents an economic lifeline, and its deteriorating state was a major cause of the stagnation in the past. Electricity was installed in 1996 (Graziani, 1998). The Kozime, part of the larger Bantu family, are the dominant ethnic group; other groups include the Kaka, Beti, Bamiliké and Haoussa, as well as Baka pygmies (SNV, 1996).

THE LOGGING INDUSTRY IN EASTERN CAMEROON

Introductory facts and figures on logging in Cameroon

Cameroon's timber production has increased steadily during the last decade due to exports to the Asian market. In the fiscal year 1997-98, 3.3 million m³ of roundwood was produced, of which 1.8 million m³ was exported (mainly to Italy, China, and France). Until 1994 most of the export was directed towards Europe, but after that time the Southeast Asian market became increasingly important, representing 50 percent of the market in 1997. The Asian crisis at the end of 1997 has brought a temporary end to this increase, although China has remained a strong buyer (Fotso, 1999) (see Figure 5.2). In 1998 the total of all logging concessions, issued under various concession regimes, covered an area of 3,867,000 hectares in the South, Center and East provinces of Cameroon (Ambassade de France, 1998). In recent years the East has become the main extraction area, supplying 57 percent of the total timber production; this figure will rise in the next few years with the depletion of the reserves in the Western provinces (Nguiffo, 1994). The logging concentrates on five species that between them represent 70 percent of production (ayous, sapelli,

azobé, iroko and fraké). The most important of these are ayous (*Triplochyton sceroxylon*) and sapelli (*Entandrophragma cylindricum*). Not all the exported wood originates from Cameroon's own forests. Timber in transit from the neighboring Central African Republic and Congo leaves Africa through the port of Douala and represents 15 percent of Cameroon's exports. The volume of transit timber shipped annually is around 250,000 cubic meters, all consisting of valuable species which can beat the high transport costs involved (*Bubinga* 18, 1999).[60]

Figure 5.2: Total roundwood production and export, Cameroon, 1975-99.

Until recently, the forestry sector was dominated by companies with French, Italian and Lebanese capital. Since the 1990s, however, Asian companies have also become active in Cameroon. A small group of foreign companies controls as much as 60 percent of the national timber production and three quarters of all timber exports (MINEF, 1998). A large part of these exports is directed toward the demanding European market for furniture and wood decoration, which explains why logging in Cameroon has traditionally been highly selective, with only the most valuable species and the best quality logs being exported. This 'skimming' of the forest is currently the only method used in the East province, where not more than 15 species are extracted. Typically around ten cubic meters or two trees, are used per hectare (Robin des bois, 1998). Such selective cutting implies a high rate of on-site aban-

[60] The Central African Republic (CAR) has no seaport and the Republic of Congo exports part of their timber via Cameroon due to political unrest. Timber exporters in northern Congo have been forced to use the 500 km route to Douala (*Panafrican News Agency*, 15-4-99).

donment. After felling, scalers select the best logs and leave the deformed and damaged ones to rot. This selective extraction is a logical consequence of the prevailing tax system, which imposes a blanket levy on all timber of given species regardless of quality. The rate charged is an average rate for a species concerned, so that the highest quality logs are effectively taxed relatively more lightly than average specimen. The result is that timber companies select only perfect logs after the trees are felled, abandoning the rest in order to maximize profit per unit volume (Karsenty, 1998). This means considerable waste, with far more trees cut than exported. After the first wave of selective cutting, logging re-entries (*repasses*) in logged-over forests extract the trees that in the mean time have reached sufficient diameter, or species that have become more valuable on the international market. This happens in the second or third year of a concession period, when heavy machinery is being withdrawn and is used for *repasse* work (Robin des bois, 1998).

Cameroon has a growing forestry sector, and large investments in new processing plants are underway. The amount of value added nevertheless, is still low and most of the timber leaves Cameroon unprocessed due to the high processing standards set by the export markets and the inefficient processing techniques applied in Cameroon (Foteu Kameni, 1998). In 1997 half of the timber exported consisted of logs that left the country without further processing, although the law prescribes a 70 percent processing rate per company and imposes surtaxes when this percentage is not reached (MINEF, 1998). To produce one cubic meter of sawn timber in a sawmill requires three cubic meter of roundwood, while the price of sawn timber is around twice the price of logs. In this situation it remains more profitable to export logs to highly sophisticated sawmills in France, Italy, and Spain than to process the roundwood in Cameroon. The reasons for such wasteful milling are obsolete equipment, low technical standards, a lack of qualified personnel, and the absence of a local market for secondary products (*La lettre de Yaoundé* 31, 1998). To address this problem, it was planned as early as 1994 to introduce a log export in 1999.

Forest exploitation in the East is highly selective and generates only a small direct loss of forest cover. For the moment there is still plenty of closed forest in the East at the border with the CAR and Congo, but this situation is gradually changing as a result of road construction and ongoing logging activities. Coastal and central provinces, by contrast, have been exposed to logging since the German colonization. Here the process of conversion into secondary forest is much more advanced and lower transport costs allow logging companies to extract a range of less valuable species. Governmental policy is favoring this tendency by promoting low-value species with tax exemptions in order to diversify Cameroon's timber exports. Demand for construction timber, fuelwood, and charcoal from urban centers of Douala and Yaoundé also puts pressure on the nearby forest zone.

Even if logging is not a direct threat to the forest flora in the East, the selective logging has had, in all respects, a devastating impact on the fauna, especially on large mammals such as gorillas and elephants. Logging roads have made formerly isolated forest zones accessible for commercial poaching, while logging trucks offer a means of getting fresh bush meat to the urban areas, where consumption has increased during the past few years (Klein and Van der Wal, 1997). The logging companies also

contribute actively to the problem of poaching, because their workers are supplied with daily bush meat by hunting and trapping in the concessions. Existing legislation on poaching is not enforced and most of the companies still rely on bush meat to feed their logging teams. A few European companies restrict hunting inside their concession, but they remain exceptions (Pearce, 1995; Horta, 1992).

The activities of logging companies in the forest

The logging industry in Cameroon today is in a transitional stage, characterized by strong dynamism and a growing number of companies operating in the chain of extraction, transport, and processing. The once-typical situation of a foreign company managing and controlling all activities on its concession is now becoming rare. Today it is a common practice to 'outsource' activities (Mangang, 1998). Felling is mostly subcontracted to Cameroonian companies, and the transport of logs and sawn timber to Lebanese companies, who dominate the transport sector and systematically bribe the military and gendarmes at the road check-points (Robin des bois, 1998). The business strategy of most of the concessionaires concentrates on securing and expanding the production of cut timber. Although several European companies have already been active in Cameroon for decades, they still operate mostly with a short-term perspective that lends to grab-and-run strategies. Foreign loggers state they are constantly uncertain about the duration of their stay in the country, and claim to be ready to leave at any time. This argument is always used in negotiations with the forestry department in order to obtain privileges. Companies justify their strategy with reference to the uncertain socio-political environment and the lack of a stable forest policy, and the fact that major investments in machinery pay off only in the long term. Therefore, most of the sawmills are constructed on a temporary basis with obsolete materials; examples include the installations of the companies SFID in Dimako and SIBAF in Kika (Robin des bois, 1998). During the last years, foreign companies have made several investments in processing units, some of them with very low capacities (*Messager*, 3-7-99). Some of these sawmills can be characterized as 'alibi factories' designed to bypass regulations that require the 70 percent processing capacity per company.[61] These sawmills process wood with a very low efficiency are set up solely to justify the application for a logging concession, while the bulk of profits are expected to flow from the export of unprocessed logs (Karsenty, 1998).

The poor infrastructure means that establishing a sawmill is costly, and the short average life of a concession (15 years according to the official regulation, but in reality companies calculate 10 years) does not allow an adequate amortization. Obsolete machinery is therefore used rather than efficient modern machines. This results in high wastage: for every cubic meter of sawn wood, three cubic meters are felled. For the moment, companies do not invest in more efficient processing methods, because they have no long-term interest in the logging site. Road construction proceeds just ahead of the logging frontier without much planning.

[61] The authorities and the local population are first tempted with the prospect of fiscal revenues and jobs to vote in favor of a concession for the logging company. Once the concession is obtained, the sawmill never becomes operative or functions with obsolete machines processing wood with very low yields.

Sustainable production is not part of existing strategies and when company spokesmen speak of sustainability they interpret this in terms of business efficiency.

> *"Instead of 3 m³/ha today, we should cut 15 m³/ha and stay not 1 but 3 years in an area. Investments in prospecting and better plans for roads will then reduce the damage to the forest. Verticalization in sawmills then becomes interesting and more species can be extracted. More time in a concession means a less rapid pace of destruction throughout the forest".*
>
> Director of a Cameroonian logging company, *Bubinga* no.11, 1998

Box 5.1: The environmental impact of logging

In the field, one can observe diverse breaches of the technical requirements mentioned in the forestry regulations. Exceeding the limits of the concession area, ignoring the minimum diameters, felling protected species, and committing irregularities in the numbering of the logs are all common practices. Logging teams set traps and snares and provide local people with large-caliber guns to hunt monkeys and duikers for bush meat. A report from the NGO 'Enviro-Protect' presented a list of companies involved in uncontrolled bush fires, cutting timber under the minimum diameter, and other illegal felling (Friends of the Earth, 1997).

Companies save on machines by not using a roller to seal the surface (sealing allows rainwater to drain off). Instead, they clear an extra 20m of forest on each side of the road to allow sun drying. The result is that logging roads are larger than necessary, which slows forest regeneration. There is no enforced requirement for reforestation in Cameroon. A company that did this would not benefit from it, because there is no guarantee that it would be able to harvest what it had planted under a new license (Carret, 1998).

In the areas where logging companies have already been operating for many years, the over-harvesting of species such as doussie and sapelli have resulted in their depletion. This is also documented for the moabi tree, which has a high value for local people. Around Lomié and around Pallisco's sawmill, no more moabi trees are left (Verhagen and Enthoven, 1993). The FHC company destroyed a large part of the Campo reserve (Verhagen en Enthoven, 1993).

The Asian logging companies, emergent actor

In 1998 about 20 companies from Malaysia, Thailand, Korea, and Indonesia were active in the timber industry in Cameroon, including WTK and Shimmer International of the group Rimbunan Hijau.[62] Most companies are active in Cameroon's Southwest region (around Bakundu, Korome, Bambu, and Barombi). Their presence

[62] Shimmer has been operative since 1995 in the littoral province and has skidders, bulldozers and trucks. WTK is operative in the South province around Djoum and Ebolowa, extracting timber from illegal concessions under the protection of a high army officer (WWF, 1997b).

is a result of the high timber demand generated by the booming Asian economy of the early 1990s. High Asian demand prompted these multinationals to look for alternatives to their existing supply areas, where forest have been exhausted and forestry regulations are stricter. The Asian market became really interested in Cameroon's timber after the devaluation of the CFA in 1994, which coincided with government plans to expand the forestry sector (Debroux and Karsenty, 1997; 1998).

The Asian multinational companies show worldwide mobility, enormous financial power and diverse activities linked with agriculture. They concentrate on extraction and export activities, not on the processing of logs, which takes too long to amortize. They, therefore, invest in machinery such as skidders, trucks, and bulldozers. Their short-term mobility results in no real integration in the national economy and little creation of local employment (Debroux and Karsenty, 1998). They mostly use a lease system to assure their supplies, a system which requires less regulation and control than formal concessions and implies less responsibility towards the authorities and the local population. Their business structure is characterized by opaque financial constructions and partnerships with obscure ghost-companies and Cameroonian counterparts, who arrange networking and have good contacts in the administration. The way they operate often results in conflicts with the local population in the concession areas. Villagers become angry when the promises of royalties and compensation are not realized, leading to conflicts and tension in several forest communities (WWF, 1997b; Fokou, 1998).

In contrast to their European counterparts, the Asian companies also exploit a number of secondary timber species for plywood and paper pulp. This results in a major direct environmental impact: 25-40 cubic meters of timber are extracted per hectare of forest in most areas, and as much as 100-200 cubic meters per hectare in the more accessible places. Up to 60 timber species are cut and shipped to plywood plants in Malaysia, Thailand and the Philippines (Ngome, 1998). These companies operate in the logged-over forests of the Southwest and Central provinces, where access and transport are easy and secondary species are still abundant. Besides reflecting the market demand for less valuable species, clear-cutting also seems to be intended to create land for plantations. Many of the Asian multinationals are conglomerates integrating logging activities, agribusiness and processing industries. Obtaining forest land may give them the opportunity to re-utilize the soil after clearcutting for plantation crops, in particular oil palm, as in Sarawak and Indonesia. Activists warn of this possibility (WWF, 1997b), but as yet there is not a trend towards foreign investments in large-scale plantations in Cameroon.

This emerging Asian influence in Cameroon's forest has pushed up export figures and altered the type of timber extraction in the coastal province. The proportion of logs exported to Asia increased from fifteen percent in 1994 to fifty percent in 1997 (Global Forest Watch, 2000). Low-value timber formed half of the total export in 1997 (*La lettre de Yaoundé*, nr. 20, 1997). The Asian crisis has now put most of these companies' activities into cold storage for an indefinite time. This downward trend can be seen in the life cycle of the seaports of Limbe and Tiko, which experienced a real boom during the era of the Asian companies, but were

paralyzed after 1998. Chinese influence, however, is still growing. During my fieldwork in 1999 several Chinese business delegations were negotiating important contracts in the forestry sector, which strengthens the idea that China will become the most important export market for Cameroon after 2000. The financial power and the large markets which these companies control have raised both expectations and concern in Cameroon. Without having enough evidence to make a final judgement about the Asian influence, one may say that they will trigger further economic development in Cameroon. To what extent this becomes reality will depend on macro-economic trends and the authorities' ability to monitor and control their activities.

CAMEROON'S FOREST POLICY

Forestry legislation and the 1994 forestry code

In 1994, a lively debate started in the national parliament about the new forestry code. The discussions revealed the maneuvering and interests of the stakeholders, and shed some light on the position of the various actors in the forestry debate and the contradictory elements in the government's policy. Protagonists included national MPs, the executive branch of the government[63], French companies supported by French authorities, and the World Bank. Throughout the whole discussion, MINEF had a very weak position and the loggers were not involved directly, although they lobbied behind the scenes to promote to their interests. According to the official discourse, the basic idea of the new law was the development of sustainable exploitation of the forest in order to achieve economic, ecological and social goals by using integrated management plans. The plan was to unite and reconcile the interests of the national Members of Parliament (MPs), the executive branch of the elite in power, and the World Bank and the donor agencies (Ekoko, 1997).

The first issue was the auction system for concessions, which became the object of a struggle between political opportunism and economic efficiency and transparency. The majority of the deputies was against the principle of an auction system, arguing that the forest would be sold out to the foreign companies, which have much greater financial means than Cameroonian businessmen. The dominance of the foreign logging companies had always been an emotive issue among MPs, many of whom are concerned that Cameroon's natural wealth is being exported without leaving a fair share inside the country. Public opinion was also against auctions, which it considered as a plunder of the forest. MPs were therefore in a position to express public fears while at the same time safeguarding their own private business interests in logging. Their eagerness to obtain more power in the very lucrative process of concession-granting inspired their aversion to an auction system. There existed much political envy due to the fact that only a few high officials negotiated the contracts with foreign companies and received commissions (Ekoko, 1997). The

[63] The executive branch of the government should not be confused with the Western concept of executive ministries, led by a minister. In Cameroon, the Presidency (including some important ministers) exerts real power.

official reservation of *ventes de coupes* for Cameroonian nationals, which opened the door to a broader clientelism based on logging permits that could involve the whole political elite, must be seen in this light. The assembly agreed that the minister should be in charge of allocating standing timber on the recommendation of a commission. For the World Bank, however, such a granting commission was not negotiable, the Bank demanded a transparent auction system to reduce corruption and increase state revenues. The World Bank had to put strong pressure on the government before an executive decree reintroduced the auction system against the parliament's will. The same protectionist reflex that dominated the discussion about the auction system also inspired the limitation of the concession period to 15 years. According to international standards of efficient and sustainable forest management in the tropics, 30 years is the minimum acceptable length (Friends of the Earth, 1997).

During the initial stage of the debate over the law, the World Bank had an important bargaining position vis-à-vis the government. The Bank threatened to suspend its financial assistance (in the form of the third SAP agreement with Cameroon) if the forestry law was not passed. This condition of a new forestry code represented a policy shift, since earlier SAP loans had only required adherence to the principles of the Tropical Forest Action Plan (TFAP)(Ekoko, 1997). World Bank experts had found that TFAP principles were too general and would never allow a more efficient fiscal policy in the forestry sector. But in the final decisive stage of the negotiations, MPs and other powerful people earning money from the logging industry were not impressed by the World Bank's threats to cancel credit lines and pushed through their own will on crucial issues. The stance of the government itself remained ambiguous during that stage. In some cases there was determination to implement the technical recommendations of experts; in others, an inability to oppose the parliament's amendments. Reason for this inconsistency was probably a combination of limited institutional capacity and a desire to go along with national sentiments that could not be supported openly given the existing commitments to the World Bank.

The second controversial issue was the introduction of a log export ban, which was seen as a way to stimulate processing capacity and break out of the enclave character of the logging industry. The goal was to generate jobs, industrial activity, and tax revenues for the national treasury. Loggers and the government were against a total ban, and agreed on a 70 or 80 percent rule for local processing. The World Bank's viewpoint was much the same and its experts were also against a ban. A total ban would lead to a collapse of national log prices, leading to high wastage percentages. The French minister of cooperation intervened personally, lobbying strongly against a total ban in order to save the business interests of the French logging companies. Under pressure from these powerful foreign donors, the government of Cameroon used all its power to avoid a complete and immediate logging ban in the assembly. In the end, the government had to settle for a compromise which boiled down to a transitional stage of five years with gradually increasing requirement that would end with a full ban on the export of logs in 1999 (Ekoko, 1999). In 1998, 40 percent of the timber exports still consisted of logs and

companies were not willing to invest in enough capacity for total local processing (Eba'a-atyi, 1997). MINEF had to find a way out of the impasse and its minister declared that the export ban, which according to the law should be effective in January 1999, would be postponed to June 1999. There was simply too much opposition to a rigid implementation of the sanctions. The ban would also harm the fiscal revenues of the state, a fact that was unacceptable for the World Bank and IMF.

In June 1999, therefore, the forestry department did not implement the ban transforming instead it into a complex system of taxes and permits. This enabled the administration to behave with even greater arbitrariness and to negotiate bribes. Exporters were granted another three months delay before the surtaxes came in earnest, prohibiting the export of certain species but making exceptions for others (Global Forest Watch, 2000). A large loophole for exporters has remained the transit logs from CAR and Congo, which continue to be exported in their raw form. Customs documents can easily be falsified and SGS in Douala has the impossible task of distinguishing the logs that have been extracted in Cameroon from those from the CAR side of the border (Friends of the Earth, 1997). A Cameroonian logger in Yaoundé was not anxious about the export restrictions in June 1998:

> *"I have very good contacts at MINEF and there is no problem. They will maintain exceptions for less-valuable species to promote their export and for the logs from CAR and Congo. From June onwards, all my logs will have one of these characteristics".*

Concession policies and Cameroonians involved in logging

At first sight, Cameroon's logging industry appears an organized business dealing in high-value products and dominated by European and Asian companies. In reality, these foreign companies are confronted with a variety of negotiators, ranging from high-level officials in Yaoundé and regional officials in the field, to a local population that is present daily at the logging site. Logging companies have to work out flexible solutions with all actors separately in order to be able to continue their work. A closer look at the policy level in Yaoundé reveals an administrative chaos in the execution of the official forest policy, arbitrary decisions regarding concessions and regulations, and the necessity of paying bribes at all levels to keep business going. All companies are obliged to operate according to the codes and customs of the political actors who control access to and the profits from timber resources. The following paragraphs deal with the concession policy and the wider policy environment with respect to the forestry sector.

The first stage for a logging company is to obtain a logging permit in Yaoundé. The forestry agency MINEF issues concession areas, called Forest Management Units (FMUs), of between 50,000 and 200,000 hectares for a period of 15 years. An exploitation plan must be drawn up, in accordance with international technical requirements for forest exploitation. The first FMUs were only issued in 1997 and the process advances very slowly. No FMUs were yet fully operational at the time of my fieldwork.

With the new forestry code, Cameroonians obtained exclusive rights to Sales of Standing Volume (SSV). These SSVs are the second type of exploitation permits, issued by MINEF; they are called *ventes de coupes* and can cover a concession of 2,500 hectares in the non-permanent forest zone. SSVs are issued for a term of three years, but in practice extraction occurs usually in less than a year. They do not require a management plan and felling occurs according to a grab-and-run procedure, resulting in high collateral damage to standing trees. There is virtually no control, and illegal cutting is rampant. The temporary character of the operation disinclines loggers to comply with the law or the arrangements made with the local population. Another mechanism for illegal logging is provided by the *permis de récupérations*. These confer harvesting rights to forests that are cleared for cropping, or road construction or rights to collect abandoned logs in logged-over forests. Observers have reported many irregularities with this kind of permit, because no attempt is made by the authorities to establish the real purpose of any given episode of forest clearing (Brunner and Ekoko, 1999).

According to the law, concessions and SSVs are granted on the basis of an auction featuring a fixed minimum price and fixed annual royalties. In practice, however, this is not the case. The granting of felling and concession permits is mostly based on clientelist relationships. Logging permits are often sought in partnership with high-ranking officials and influential politicians. As they say in Cameroon:

"*Unless you have a brother at the top of the tree, you won't eat black plums*".

During the 1997 auction round, 16 out of the 26 concessions did not go to the highest bidder (Brunner and Ekoko, 1999). This system is a particularly interesting option for the people who have contacts in high political circles and can obtain the *ventes de coupe* as part of political and economic deals (Mangang, 1998). Around 300 privileged Cameroonians have used the opportunity to obtain a *vente de coupe*. These militaries, officials, deputies, and traditional chiefs hold around 40 percent of the three million hectares of forest concessions. Not having the experience or capital to organize extraction themselves, they negotiate with a foreign company which does. This leasing of SSVs (*affermage*) has become a lucrative way for nationals without investment capital to cash in on their privileged access to the forest resources.

Some French and Lebanese companies are said to be particularly adept at obtaining permits in this way, arranging their concessions directly with the ministry. Greenpeace revealed that French companies have received concessions without following the normal procedures (Verbelen, 1999). The independent press and other logging companies always accuse Lebanese companies of doing the same, thereby, strengthening the system of corruption. Corruption, indeed, has become the rule rather than the exception, and the result is that the auction system loses any form of rationality. Companies that do not belong to these most privileged circles require a Cameroonian partner, or are subject to the whims of an arbitrary bureaucracy. For

these less privileged companies, supply security is a major concern (Brunner and Ekoko, 2000). As one logger explained:

> *"There is plenty of good timber left in the forests in the East, but our most important problem is that we do not have enough forest concessions to secure a stable supply".*

A common business strategy is to lease an SSV from a Cameroonian owner. The *affermage* leaves all the legal requirements surrounding the SSV to the Cameroonian licensee, and discharges the logger from the heavy burden of lobbying to obtain the concession permit. The SSV permits merely need approval from the secretary of state, and MINEF controls are less frequent than in concessions owned by foreign companies. As much as 50 percent of the production handled by foreign companies operates via *affermage* (Cerna, 1998). For them, it has become much more easy to work with SSVs and to buy logs at the sawmill gate than to apply for costly and burdensome concessions. Large logging companies, therefore, do not seek their own FMU-concession according to the newly designed systems of FMUs. One reason why these are not favorable, they say, is because they involve the payment of a fixed annual royalty according to the total area of the concession rather than the volume of extracted timber. Investing large amounts of money is also risky in view of the costs which can arise from delays in exploitation or from administrative problems. The loggers' preference for SSVs undermines MINEF's ambition to put the FMU system at the core of forest exploitation, with the SSV as a supplementary and transitional mechanism. Recommendations by experts and the donor agencies' stress the importance of introducing a solid FMU system if the logging industry is to be rationalized and monitored effectively.

The department of MINEF and its control on the forestry sector

MINEF and its institutional framework was established in 1992 for the management of the forest resources. Since that time the department's budget has suffered from austerity measures and the number of employees has dropped, while the logging sector has expanded. In the East province, where the majority of the concessions are located, the department's logistical capacity is limited to one car and four motorbikes and there are 116 agents for a concession area of 2.5 million hectares (Global Forest Watch, 2000). In order to carry on-site inspections, local MINEF staff must rely for transport on the same logging company which they are supposed to control and sanction.

> *'Sanctioning a logging company at its site – you only do that once! If you dare to fine them they refuse to bring you back with their vehicles and just abandon you in the late afternoon at the logging site. Then you must walk the whole distance sometimes fifty kilometers or more to the nearest village.'*
>
> MINEF official in the East

The fiscal regime for timber is divided into three geographic zones, with taxes decreasing from West to East in order to compensate for the higher transport costs of timber extraction in the East.[64] This regulation sets aside Von Thünen's normal optimization mechanism determined by transport costs and has serious consequences for the isolated and largely untouched protected areas in the East province. The result is that the less disturbed forest area in the East comes under greater pressure than would be the case if market forces were allowed to apply. Another fiscal measure is that the less-known species are subject to lower taxes in order to increase the volume of timber extracted per hectare, and to discourage skimming techniques. Between them, these two measures show there is effectively a policy of opening the whole forest for massive logging. This policy is a major obstacle to the internationally proposed option of creating a monitored forest production zone in the West and a protected area in the less-disturbed eastern forest zone.

Once companies obtain a logging concession in Yaoundé, they virtually have complete liberty to organize their activities. Logging companies admit that control on logging inside the extraction areas is non-existent (Cerna, 1998). Research by the Enviro-Protect NGO has estimated illegal felling and undeclared timber production amounted to one third of total production in the East province during the fiscal year 1992-93 (Friends of the Earth, 1997). The loggers' first concern is to secure a regular supply of roundwood at the lowest cost, and to maintain good relations with the local administration and regional MINEF staff. Once the site is operative, gifts and regular payments characterize the relationship with provincial and departmental officials. Loggers bet on the MINEF staff, parts of the local elite, and the state representatives such as *préfets, sous-préfets,* and mayors. Controlling these authorities is a necessary, but not sufficient condition for operating without harassment. Ties, factions and interests inside the administration can change over time and the loyalty and smooth running of the companies' operations is never guaranteed for long, which makes the situation for the loggers unstable and risky.

Under pressure from the IMF, the government issued a ministerial decree in 1996 to combat corruption. This interposed a private inspection company between business operations and the customs department in order to control the volume of exported timber and secure fiscal revenues in exchange for a commission (Cerna, 1998). After the contracting company, SGS,[65] started to verify customs duties in February 1996, corruption at customs reportedly diminished and fiscal revenues increased dramatically. SGS has had a decisive role in fiscal reform, and privatization of state functions seems to be a viable solution for the control and monitoring of the whole forestry sector. SGS has plans to expand its activities in the forestry sector in Cameroon. In 1997 it proposed to set up a high-tech monitoring system to control the whole supply chain of timber from the forest to the port (SGS, 1999). Privatization and computerization of public inspection leaves opportunity for irregularities and provides much more transparency. These characteristics please all

[64] Region I: West Province with the highest tax; Region II: South and South West Province with the benchmark tariff for all species; Region III: Center and East provinces with the lowest tax.

[65] The Swiss transnational company SGS (Société Générale de Surveillance) has a worldwide reputation for inspection and monitoring assignments.

the international donors, but make national politicians concerned that they will lose their discretional power. The political will to expand this system will therefore be the critical issue in establishing more efficient monitoring for he benefit of the public treasury.

Box 5.2 : Bribing practices in the East[66]

A foreign company, operating around Bertoua made monthly payments of US$ 1,700 to the *préfet, sous-préfet*, the local police commander, and the divisional chief of MINEF. The MINEF official in charge of marking the logs received US$ 34 to stay in his office and 'lend' his marker to the company which marks the logs itself.

Another large company in the area paid all local police a monthly salary of US$ 170 to prevent its trucks from being stopped. Police officials at the roadblocks cost would otherwise have immobilized these for hours of African palaver.

In the Lomié area, a foreign logging company 'had things under control' by paying all the officials at key positions a shadow salary next to their official wage. The local MINEF officials, earning just US$ 70 per month, received an equal additional sum for turning a blind eye at the logging site. MINEF teams from Yaoundé, making sporadic inspections on the logging site, were not included in these agreements and therefore blackmailed the operator by demanding personal commissions.

A logger in the East explained his quasi-total control of the officials: "Sometimes a MINEF delegation of the head office in Yaoundé arrives to *'enmerder'* (making trouble) and it ends with paying bribes, but the local MINEF normally does not make problems, because I pay them every month".

For the logging companies, constant harassment by officials is a problem only in so far as it entails additional costs. The contradictory and arbitrary MINEF decrees and the lack of a stable forest policy, on the other hand, are seen as serious impediments to making long-term predictions and venturing new investments.

The lack of financial means, field staff, and equipment inside MINEF cannot explain its poor monitoring capacity. This has to do with a much more deeply rooted problem within MINEF's own policy agenda. The first concern of the forestry department is to make the forestry sector as spearhead of economic development in Cameroon. In the vision of all major politicians, the country's forest resources represent large quantities of potential revenue and need to be exploited more intensively. It is a widespread belief among these policy-makers that there is more than enough timber in Cameroon and that nobody has to worry about protection and conservation for the moment. The expansion of the forestry sector is, therefore, MINEF's major goal for the sake of Cameroonians in general and the ruling elite in particular. Paradoxically, this expansion does not motivate high MINEF officials to

[66] No names are included in Box 5.2, because the information was gathered during not-for-attribution interviews with logging company personnel.

strive for greater fiscal revenues. One reason for their lack of enthusiasm here is that the largest part of these revenues is not earmarked for MINEF, but 'disappears' into the larger governmental budget. Secondly, official wages are relatively low and the largest benefits to the officials and the ruling elite from the timber sector are gained through obscure mechanisms of commissions and corruption. All of the parties which profit from the forestry sector, then, have an interest in as little control as possible and a failing administration.

Cerna (1998) has described a recent shift in decision-making power from the forestry department (MINEF) to the ministry of Finance (MINEFI). This has influenced fiscal policy and demoralized MINEF even more. MINEFI has a different agenda; its aim is to increase state revenues from logging, and it follows the World Bank's single account principle for forest royalties. The World Bank wants to keep the 'locus of control' in one central and transparent organization, where it has a strong foothold, and to prevent fragmentation over a range of commissions and departments (World Bank, 1998). MINEF, on the other hand, wants to enlarge its control of the forestry sector and become the executive agency for all kinds of externally financed initiatives in the field of sustainable forest management and conservation. With the 1998 decree regulating the annually new fiscal regime for the forestry sector, the tax department under the control of MINEFI secured the right to collect all the forestry revenues. MINEFI's fiscal forest policy has proven to be solid in the last years, which has resulted in increasing fiscal revenues from the forestry sector. Nevertheless, the World Bank considers the new decree too weak, because increases in royalties have logged far behind the spectacular rise in timber production.[67] A new commission was formed to remedy this for the following years and at the same time to fight fraud and to set up a system of computerized data control (*Cameroon Tribune*, 8-4-99). This stricter monitoring was expected to yield an additional US$ 35 to 50 million for government coffers by the end of the fiscal year 1998/99.

The new committee, the introduction of SGS monitoring of the customs, and MINEFI's eagerness to raise tax revenues seem to be steps in the direction of a more effective forestry policy desired by donors, but they remain exceptions. MINEF sometimes exerts control and fines logging companies. In 1999, MINEF published a report featuring a list of irregularities in concessions and demonstrating the extent of illegal logging (MINEF, 1999). These sporadic activities, backed up by occasional inspection raids on logging sites, contrast with a lack of control and data for most of the felling. The contrast is not haphazard, but has its own rationale. A first factor that inclines policy makers inside MINEF and especially in MINEFI to exert some kind of control is the demand from the IMF's and World Bank for higher fiscal revenues from the forestry sector. This is particularly significant for Yaoundé-based officials who periodically venture forth to collect taxes and fines, at logging sites (Box 5.2). Such raids remain small compromises, endorsed rather than

[67] In 1997-98, MINEF collected approximately US$ 20,000,000 of forestry taxes. Total public revenues from the forestry sector, including company and export taxes, amount to US$ 50,000,000 (MINEF, 1998).

obstructed by the ruling elite because they help persuade the World Bank to release the next installment of the SAP loans.

A second and much deeper-rooted mechanism functions at the lower levels of the MINEF and MINEFI administrations. Executive officials in Yaoundé and in the regional offices, who do not benefit directly from the bribes that are arranged during high-level talks, want to upgrade their salaries.[68] They achieve this by constantly threatening to 'work-to-rule' in a sector where many routine are known to be illegal. This puts companies in a situation of having to pay bribes in order to continue to work. Lower forestry officials have an interest in creating as many (ultimately ineffective) obstacles as possible to logging, exerting a kind of 'over-control' by dragging out the procedures and the paperwork, requiring stamps and signatures. At every stage there is the possibility of personal cash commissions when a logging company tries to bypass or speed up the procedure. To arrange a permit or settle a fine, one has to frequently visit the central MINEF office in Yaoundé and arrange an appointment with a high official against a commission fee for the secretary. The result is that the arrangements, commissions, and bribes are an indissoluble part of the *modus operandi* for every logger operating in Cameroon.

The control of forest resources in Cameroon's political context

There are only a few indications that MINEF and other ministries are willing to monitor and control the forestry sector with the intention of developing sustainable forest management. Corruption, collusion, and nepotism dominate the functioning of the state agencies involved in the forestry sector. MINEF is officially in charge, but real power is exerted by a combination of the bureaucratic elite, the Presidency, and circles of businessmen with strong political ties. It is this parallel authority which actually controls the royalties which the state earns from the logging permits, the processing and transport sector, and the custom duties. Bigombé Logo and Magloire (1998) describe these people as part of the *compradores elite*. They are not involved in the cutting or sale of the timber, but control access to forest resources and receive commissions from foreign logging companies. The power and importance of these mechanisms seems so overwhelming that they are the fundamental explanation for the fact that the logging sector in Cameroon does not operate according to the principles of efficiency and to the standards of a modern state bureaucracy.

To answer the question of why Cameroon's central state is so reluctant to maximize its extractive capacity, it is useful to apply Yates' (1996) concept of the 'rentier state'. In a 'rentier state', authorities grant permits for the exploitation of natural resources as expressions of gratitude kinship or friendship ties rather than according to a strictly economic rationale. The state bureaucracy is reluctant to extract more taxes, a course of action which would threaten the income and status derived by the elite from the control of valuable resources (see Chapter 6 for details). Lower taxes do not mean less income for this group. The elite earns its parallel income not by sharing in the official royalties, which are largely monitored by World Bank and IMF officials, but by generating its own. Politicians earn money

[68] The salaries of MINEF officials were reduced by 60 to 70 percent because of the austerity measures imposed by the SAP program.

via the parallel system of commissions and bribes and the ubiquitous phenomenon of 'straddling' or *chevauchement*.[69] This takes the form of owning SSVs, possessing commercial interests in national logging companies, and giving assistance to foreign companies. Whatever the exact nature of their connection with the logging industry, decision-makers are pleased with as little transparency and taxation as possible. There is no pressure from the urban population for a closer monitoring of the forestry sector, because a large majority of the people does not pay taxes and is not concerned with governmental efficiency. The role of the rural population, on the other hand, is changing and protests and conflicts over the loss of forest resources sometimes occur. A debate on decentralization of forest management, in which the crucial issue is direct payments of royalties to local communities, has begun.

The current forest policy brings us inevitably to the functioning of state agencies involved. In 1998, the NGO Transparency International ranked Cameroon number one on its list of most corrupt countries (Transparency International, 1999). Although the criteria used are not scientifically validated, this survey is a valid touchstone.[70] Fraud and embezzlement of public money by high officials is a constant issue in Cameroon's politics, regularly denounced by the independent press (Friends of the Earth, 1997). The question is whether these practices should be interpreted as ordinary corruption, which is a problem in every bureaucratic system, or rather as the characteristics strategy of a ruling elite. Bayart (1993) considers it a major error to view these Cameroonian practices as mere corruption or a symptom of political decay. He considers it as the fundamental *modus operandi* of what he calls the 'politics of the belly - *la politique du ventre*', motivating major decisions in Cameroon's state apparatus. From the viewpoint of the ruling elite it is a highly efficient and rational distribution system, and not a defect of an administration that should ideally function as a modern bureaucracy.

The main instruments used by this pyramidal power structure are clientelist networks, corruption, and intimidation. Favor and benefits cascade from the uppermost elite positions to the lower strata of the bureaucracy, and finally into civil society. Everything is based on kinship and personalized networks and factions. The crucial positions in MINEF's bureaucratic hierarchy and the executive branch of the government are the stakes to be fought for, the strategic points from which the accumulation of wealth and the distribution of benefits are controlled. Ekoko (1997), in his analysis of the forestry code, mentions that these 'politics of the belly' have lost much of their power due to the economic crisis and SAP requirements. He observes a 'politics of allegiance', where 'eating' is restricted to a select upper level while the administrative lower levels and civil society can no longer enjoy the flow of profits. In the forestry sector, one may discern some indications of this process. The World Bank has put increasing pressure on customs control and on the forestry

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[69] Straddling: activities of an official or politician, who expands his activities towards commercial interests in business, abusing his official position and network in order to promote his private activities (Kitching, 1980).

[70] The ranking is based on comparing data from an unequal number of different surveys (economic country surveys from international organizations such as the World Bank). In 1997 there were no data for Cameroon; and in 1996 it was the 6th most corrupt country on Transparency's list.

department. Lower officials are the most affected by the stricter controls and have lost much of their discretionary power. It seems as if the flow of gifts and privileges no longer runs to the lowest level. Perhaps that is how one should understand the cryptic statement of a MINEFI minister who declared that *"The state would not distribute the fruits of Cameroon's recent economic recovery from house to house"* (*Messager*, 14-8-99), as was done during the 1980s.

FOREST DWELLERS AND THEIR CONFRONTATION WITH LOGGING

Logging companies and the local population

Logging companies that enter forest areas allocated to them by SSVs are always confronted with a local population that is already living there and using the forest. The concession areas (FMUs), although designed exclusively for logging according to the official zoning maps, also contain large areas where peasants cultivate land, hunt, and gather forest products. Conflicting uses and upsurges of local discontent can result in road blockades, and form an important source of uncertainty for every logger. In logger's negotiating strategies, coping with the local population is as important as getting along with the authorities. There are different ways of remaining on good terms with local communities and operating without blockades and conflicts. Loggers operating in isolated areas are the only economic lead agencies in those areas and their financial power, and access to machinery and means of transport give them a very strong negotiation position. Road construction and maintenance is of vital importance for the accessibility of the villages. If a conflict does escalate, the loggers can ultimately appeal to the local authorities and *gendarmes*, who will intervene to defend the loggers' interests if they are paid to do so (Bigombé Logo and Magloire, 1998).

The local population's claims for benefit-sharing

When looking at the local populations' bargaining position with respect to timber royalties, it seems as if they could only get the worst of it. A first problem is that they have little or no knowledge of the regulations and the procedures affecting the forestry sector, which are decided in the ministry departments in Yaoundé without consulting local people. The day a logging company arrives in its area with an official permit to cut in an SSV, a village community is confronted with irreversible facts. Its only choice is to negotiate with the company in an attempt to profit at least a little from the logging activity. Secondly, although 50 percent of logging royalties are officially destined for the local population, this amount is never issued as cash available to the villagers.[71] According to the law, the largest part goes to the local administration (40 percent), while the 10 percent allocated to the community itself is reserved for infrastructure works planned by a village committee and approved by the municipal council (Nguiffo, 1998a). The allocation procedure is opaque and dominated by the personal interests of regional officials so that in practice little money is ever invested in public facilities or projects in the villages. Logging

[71] The formal distribution key for the logging royalties allocates 50 percent to the central state, 40 percent to the local council and 10 percent to the 'local community'.

royalties vary from region to region without a clear standard, and regional and local officials have full discretionary power over allocation (Brunner and Ekoko, 2000). In 1998, MINEFI announced without further explanation that the community's 10 percent share would be put on an account of the tax department for an undetermined period of time. The logging companies were not pleased with this central government decision, fearing that local people would now demand a direct cash payment above and beyond the official royalties paid in Yaoundé (Cerna, 1998).

Box 5.3 : Negotiations between loggers and the local population

In Mindourou a town with 3,000 inhabitants in the eastern province, the Pallisco company exploits a sawmill and 'owns the town'. The company is the only employer and has built schools, houses for the workers and the district chief, the municipality building, and the *gendarmerie* post. As an act of goodwill, the company provides the timber waste from the sawmill at no cost to the nearby village, where villagers use it for construction and fuelwood (Robin des bois, 1998).

In the village of Adjap north of Kribi, the German company Grumcam operated between 1974 and 1979 without any conflicts with local people. Its charismatic director had excellent contacts with villagers and they considered him as a patron always willing to help with gifts and assistance. In 1990, however, the Dutch company WIJMA started to log in the region and from the beginning there were tensions and misunderstandings that ended in conflicts. WIJMA solved the problem by shifting its responsibility to subcontracting companies, which have been exploiting its SSVs since 1995 (Andjembe, 1997).

In the town of Kika in the East Province, 6,000 people are working for the French logging company SIBAF. A decade ago, only twenty-five people were living in the same place. The timber company brought workers from other parts of the country and built a sawmill, schools, health facilities, and an airstrip (WWF, 1999).

The company FHC is the only logging operator in the isolated region of Campo, next to the border with Equatorial Guinea. FHC maintains the main road with provisional repairs after every downpour, but never makes structural improvements. This seems to be a deliberate strategy designed to highlight the dependency of the region on the company. The fact is that FHC has never had problems with roadblocks, and people are pleased with its presence in the isolated region.

In Lomié, a French logging company paid US$ 5,000 to the local community every month in the framework of a new local tax that is paid per cubic meter of cut timber. The manager explained: "*I pay the money to the village head, only when all representatives of the village are present and can see me hand it over. Otherwise the money disappears, and they accuse me afterwards of not having paid.*"

A recent development is the creation of Forest Management Committees in some villages in order to administer tax revenues. A problem is that these committees are not representative bodies, and are set up only to meet legal requirements in order to cash in on the logging taxes (Diaw, 1997). The most widespread technique whereby

the communities obtain benefits from the logging companies is the 'list of demands' (*cahiers de charges)* negotiated during informal talks (*tenues de palabres)*.[72] It is a tried and tested strategy of the logging companies to fulfil the clauses of the *cahier de charges* only partly, holding some benefits back in order to retain a strong position in the continuous give-and-take negotiations. People are often bitter about broken promises:

> *"The loggers gave us some sacks of rice, salt, machetes, and alcohol. They built the road for their trucks. But as far as the school and the health center are concerned, they got no further than building walls and roofs; no furniture or equipment has appeared".*

For the moment, logging activities do not represent a labor opportunity for the villagers in the newly opened concessions in the East. Villagers complain about the very few and low-paid jobs that are available to them. Experienced laborers originating from older logging regions like the Southwest fill all the better-paid jobs in the logging teams. Loggers justify this enclave character of their activities in terms of the rapid advancement of the extraction frontier for selective cutting, which makes it cheaper to import regular workers from an old logging region than to train local people in each new concession (Robin des bois, 1998). Another important ground for complaints is the cutting of tree species with a high value for local people. The *moabi* (*Baillonella toxisperma*)[73] *bubinga (Guiboudia Tesmanii)* and the *manguier sauvage* (*Irvingia Gabonensis*), which supply forest-dwellers with oil, fruits, and nuts, are also on the loggers' list of valuable timber to be cut.

In general, the villagers' attitude towards the advancing logging industry is ambivalent. The logging companies supply roads, cash and access to other amenities of development during their presence, and are an important lead agency to which the population appeals for help and support. But at the same time, their aid never leads to a structural improvement of living conditions and their activities mean an irreversible destruction of vital local resources such as bush meat, trees and plants. These negative aspects of logging have led in recent years to much protest and mobilization of the rural population, which has expressed its discontent in protests, conflicts and even confrontations such as road blocks and attacks on logging camps ((Verhagen and Enthoven, 1993). The politicization of conflicts in order to expand and develop personal political careers is always imminent inside the villages. Some MPs have become known for defending the villagers' cause, but it remains difficult to distinguish personal interests from real commitment (Bigombé Logo, 1996).

In 1996, a small revolution took place with a MINEF decree that ordered a royalty of CFA 1,000 per cubic meter (US$ 1.7) to be paid to the local community in certain SSVs. What is revolutionary about this tax is that it goes entirely and directly to the local community. This represents a considerable amount of money,

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[72] The *cahier de charge* typically includes engineering works (road, bridge, well, school building, health center), payments in kind (wine, beef, food products), and sometimes cash.

[73] The moabi tree is particularly important for the forest-dwellers, oil produced from its nuts is sold on local markets.

since 10,000 to 15,000 cubic meters is extracted from a SSV in a few months, which means the donation of US$ 17,000 to 25,000 in cash to a local community. The measure is not applicable to all SSVs, but in most parts of eastern Cameroon all villages have heard about the *mètre cube* system and loggers have to make some kind of arrangement about cash payments (Karsenty, 1999a). MINEF did not announce the decree in advance, and it has no legal basis in the forestry law. It sparked off much criticism from the loggers, who complained about the unpredictable nature of MINEF's decisions. Some loggers, on the other hand, are now happy to pay this tax, because it inspires villagers to protect them from government interference (Brunner and Ekoko, 2000). The real reasoning behind MINEF's decision to take such a far-reaching step remains unclear. Is this decree a result of local protests or of pressure from international donors for local benefit sharing? One informant explained it as a move by MINEF to correct the give-away price that certain SSV beneficiaries have been obtaining through their high-level contacts in Yaoundé.

For the moment, the local management committees that administer the timber royalties stand far away from the donor-designed format of a body that ensures local sharing of the benefits from timber resources. This sudden influx of money is new in forest communities, where most existing trade is barter and money is scarce. It has obviously caused tensions and conflicts around the allocation of the royalties. Village leaders have received the money and used it for their own purposes, money has disappeared and the lack of a legal procedure has created conflicts inside many communities where logging is taking place. A delicate issue is that of who is in charge of administering the funds. There is an enormous risk of embezzlement and of the elite usurping the committees for political means. The concept of the community is very problematic and once resources have to be divided, an internal struggle occurs in the villages between different factions distinguished by kin, age, gender, ethnicity, and class. This often ignites conflicts over who is the legitimate representative to receive the money. Another typical problem is the exclusion of the Baka pygmies, who traditionally have an inferior position to the Bantu population and are not treated on an equal basis when benefits are shared.

In 1998, an official decree tried to bring an end to the uncertainty by determining that a village committee has to make an investment plan for the money. The funds are kept in an account administered by village officials, and can only be allocated to infrastructure, education, and health care. A representative of the local community is designated *(chef de poste forestier)* who controls the volume of cut timber that leaves the log pond and who is trained in scaling. He keeps a record of the felled timber and at the end of the month, the logging company pays CFA 1,000 per felled cubic meter to the village committee. A new problem to arise since money has begun to flow into the communities is the demarcation of the non-permanent forest areas between different village territories. In the past, borders were highly flexible and left to unwritten customary rules. The new tax has created a totally novel situation in that the forest territory around villages has now become economically valuable, its extent determining the allocation of royalties to one village or another. Village communities that were once unaware of or uninterested

in the question of on whose territory the logging activities took place, now start to claim forest areas and demarcate these as their own territory.

Agricultural dynamics and its impact on the forest

The above description of the villagers' attitude towards benefit sharing in the logging activities indicates their drive to earn money from the forest. A full picture of the village communities, however, requires a brief consideration of the nature of agricultural activities in the forest and the way village structures evolve under the influence of logging. Villagers are concerned to safeguard the forest as their principal source base of meat, fruits, and fibers, and as the home of their ancestors. An overview of these characteristics may provide some counterweight to the impression of their ruthless hunger for cash and help to explain why elements of sustainable forest use do exist today and how it may evolve in the future.

A general characteristic of forest-dwellers in Cameroon is that they have a marginal position in the whole debate about the development of the logging industry and forest management. It is the state agencies which negotiate with logging companies and other international actors in their offices in Yaoundé. Nevertheless, agricultural use of the forest and farmers' claims on forested land are important factors in the fate of the forest. Forest- dwellers practice a slash-and-burn agriculture involving both food crops (manioc, plantain, maize, and groundnuts) and cash crops (coffee and cocoa). Food crops occupy an average of 0.7 hectare per Bantu family and 0.15 hectare per Baka family. Farmers cultivate some fields for a few years before leaving them fallow for five to ten years, or use a rotational system. Cash crops occupy an average of 1.3 hectare per family. Farmers do not use destructive techniques or cut trees with by chainsaws on a large scale (Ndoye and Kaimowitz, 1998). The land use pattern around a typical village may be divided into four zones. First, permanently cultivated land with plantain, coffee and cocoa fields and dispersed fruit trees; second, intercropping in a two-to-five year rotation where food crops such are cultivated together (Rivière, 1996); third, new rotational fields opened in old fallow lands or secondary forests; final, a more remote forest zone reserved for hunting, gathering, and fishing. Another important characteristic of the forest use is that it takes place within a specific cultural and motivational framework. The forest is seen as a resource base for food and health, on which their survival depends and forms an indivisible part of their life.

> *"The forest feeds us, cures, and protects. It supplies all our products, and houses our spiritual activities. It is our living environment and our feeding breast".*
>
> Farmer in Lomié (Bigombé, 1998)

Besides its function as a source of life, the forest also has spiritual value and is strongly associated with the ancestors. It is the stage for encounters between the living and the dead, and the place where rituals, cults and traditions are practiced (Bigombé and Magloire, 1998).

There is still controversy about the overall contribution of smallholder farming practices to forest destruction, and accurate data are lacking. The ecological footprint of an individual farmer in Cameroon is comparable to that of a traditional forest-dweller (one hectare cultivated per year) and farmers hardly use chainsaws or large-scale burning for clearing land (Sunderlin and Pokam, 1998). There are few empirical data other than those given by De Wachter (1997), who has described the agricultural system in the inhabited zones of the Dja reserve. His findings show that anthropogenic islands, fallow lands, mature secondary forests and mature cocoa fields are situated in a sea of old-growth vegetation. This agricultural patchwork is a consequence of the selection of the best soils, which are necessary for the cocoa fields, and the fact that areas of uncultivable hydromorphic soils are sometimes widespread. The way the land is used indicates a strong symbiosis between the forest and the forest dwellers' agricultural activities, and is characterized by De Wachter as sustainable an not leading to the depletion of any resources (*ibid.*).

The above findings might suggest that farming does not play a decisive role in deforestation. However, two macro-economic factors show that recent trends are increasing the agricultural impact on the aggregate level. Firstly, the gradual rural population increase causes additional forest clearing for agricultural purposes. Research results from Sunderlin and Pokam (1998) show that a considerable population build-up occurred in the forested areas between 1987 and 1997. One reason for this, of course, is national population growth, but another has been the economic crisis and the worsening of urban poverty, which has brought about 'return migration' to the rural and forest areas from which many townsfolk originate. The return migrants are mostly young people who have not made it in the city, and are returning to their families often impoverished and frustrated (*ibid.*).

Secondly, the macroeconomic situation with respect to Cameroon's cash crops has a decisive impact on farmers' land use. During the SAP period, government measures have liberalized the markets for cocoa and coffee and abolished price subsidies, credit, and extenstion. As a result, prices received by farmers have fallen by 40 percent in the case of cocoa and 60 percent in the case of Robusta coffee (Ndoye and Kaimowitz, 1998). This crisis has had an effect on land use patterns. In the first place, cocoa fields were abandoned and the farmers' search for alternative income sources resulted in increased food production (SNV, 1996). Food crops require substantial fallow areas, and therefore occupy relatively more arable land. An empirical study based on small surveys (see Ndoye and Kaimowitz, 1998) confirms this trend. The authors of the study hypothesize that expanded food crop cultivation might have led to a significant increase in forest clearing in the whole South of Cameroon, although no recent regional figures are available.

The price situation has improved since the CFA devaluation in 1994, and cash crops have once more become competitive on the world market. Consequently, cocoa production has increased. According to Ndoye and Kaimowitz (*ibid.*) farmers have typically intensified their production and revived abandoned cocoa fields, without encroaching on additional forest. Production of Robusta coffee has also revived, but it

is uncertain what relative impact the new more-intensive production (re-using abandoned fields and planting new coffee bushes) has had on the total cultivated area.[74]

Although most of the farmers' income is generated by cash-crop farming, the sale of non-timber products such as bush meat, palm wine, kola nuts, and wild mango also represents a substantial income source (Graziani, 1998).[75]The pressure on fauna, in particular, has increased dramatically because of the economic crisis and the improvements in accessibility brought about by the logging activities. In the last years, a shift from traditional to commercial hunting has been very noticeable in the East Province. The growing demand for bush meat in the urban centers gives forest-dwellers an opportunity to earn cash. They continue to hunt as before, but they sell today large part of the catch to urban traders causing a much higher pressure on wildlife than subsistence hunting would do. Their motivation is obvious: hunting can generate higher incomes than producing cocoa or coffee. Intermediaries from the city organize the hunting and the transport of game to urban markets. At the same time there is a clear link between poaching activities and the arrival of the logging industry. Logging plays the role of a catalyst for the commercial trade in bush meat. Duikers, giant pangolins, gorillas, chimpanzees, and elephants are among the animals that are slaughtered in timber concessions and sold for their meat or ivory. The drivers of the logging trucks earn extra money by taking along fresh meat to the markets in Bertoua or Yaoundé. Local demand has also increased, timber company personnel contracting villagers to supply the camps with fresh bush meat (Horta, 1992).

Traditional forest use and farming practices in Cameroon are a minor cause of forest disturbance. Agricultural expansion will only generate some level of forest fragmentation and vegetation changes. The problem only starts when one takes into consideration the interface between the local level and the regional and international level. A first example is the production of cash crops for the urban food markets of Yaoundé and Douala. This generates greater pressure on the forest in the coastal and central provinces than on the remote forest in the East province. Second, agribusiness companies, with plantations of oil palm, cocoa, and rubber, which are increasingly active to invest in the coastal and central provinces where road infrastructure is available and export harbors are near. Oil palm plantations are expanding nowadays due to high international prices and a strong national demand.[76]

The power balance and the role of the elite in local organization

The social structure of the villages in Southeast Cameroon is characterized by an absence of a rigid hierarchical structure. Relationships between rulers and people are not formalized with a multitude of authorities framing the village's political context. This fragmented structure, nevertheless, has been able to manage the

[18] Robusta coffee production increased from 50,000 tonnes in 1993-94 to 72,000 in 1995-96 and 105,000 in 1997. However, this is still under the level of 146,000 reached in 1987 (*Jeune Afrique Economie*, June 1998).

[75]Women often have a major role in managing the NTFP trade governing 90 percent of the estimated 1,100 NTFP traders in the 25 markets for which data were collected by Ndoye (1995).

[76] During my fieldwork, farmers and entrepreneurs were making plans to invest in oil palm plantations in Sangmelima and Lomié.

village and the forest without depleting resources for generations. But today it is a serious obstacle to effective resistance by the community against the logging companies' intrusion.

The village chief (*chef de village),* who is designated by the administrative authorities, is the official administrator of the village. He is in charge of executing official directives, but his formal legitimacy is rather symbolic. Inside the villages, the elite or patriarchs (*les chefs traditionnels)* are the real authority for the interpretation of customary rules (Andjembe, 1997). Their power, however, is nowadays increasingly challenged by young, educated people such as office workers and students who are taking the role of broker inside the villages (*élite moderne*) (Tchikangwa, 1997). Besides this local elite, the absent group of the *élite extérieure* also takes an important role in the village's power structure. Members of the latter group were born in the village but live in the urban centers, preserving their village ties through kin and clientelist relationships. They occupy a range of positions in business, the state bureaucracy, and politics (for instance, members of the president's party RDPC).[77] They provide the village with gifts and public infrastructure works, and help to secure jobs in the state apparatus for villagers. In return, the villagers provide them with a social security net and with electoral support for those who are involved in politics. The relationship between the *élite extérieure* and the local population remains delicate and can be damaged by accusations of corruption and witchcraft, inspired by local frustrations about lack of elite commitment and generosity (Graziani, 1998). The importance of this power play between different elites has been enhanced by logging of the timber stands around the villages. People belonging to the *élite extérieure* of forest villages are deeply involved in logging, either as holders of logging permits or as instigators of illegal exploitations. Members of the *élite moderne*, meanwhile, challenge their privileged position in an attempt to become *mangeurs* (eaters).

Other important local institutions include savings groups (*tontines*), rotational work groups, religious groups, and farming federations. None of these, however, has any local authority or mandate in matters of land allocation, resource access, or tenure litigation. So that for the moment they do not seem capable of helping manage the changes deriving from the loggers' presence in their forest.

The marginalization of the Baka pygmies

The pygmies of Central Africa are one of the last forest people in the world to maintain their traditional economy and lifestyle. Hunting and gathering has always supplied them with everything they need in the dense equatorial forests. The Baka are the largest pygmy group in Cameroon, numbering around 35,000 to 40,000 people in the Southeast; a smaller group, the Bagyeli lives near the coast (Luling and Kenrick, 1998). The majority of the Baka hardly speak French and their organizations are poorly represented at the policy-making level. Missionaries and recently some NGOs have assisted the Baka in promoting their own interest, but the

[77] The most important members of the *élite extérieure*, originating from the East and now living in Yaoundé, include ministers, deputies, senior army officers, civil servants, and employees at the presidential residence (Graziani, 1998).

overall picture is one of a marginalized population group, increasingly squeezed between Bantu villages and logging concessions.

The relationship between the Pygmies and the Bantu is organized around economic, social, and ancestral ties that are often hereditary between particular clans. Most Baka live in *campements*, a group of huts with less than one hundred inhabitants, located next to Bantu villages (on the roadside or sometimes behind the village on the edge of the forest). Baka plant small plots with maize, groundnuts, cassava and bananas, or exchange game for garden products. The Bantu dominate their economic activities and use Baka as cheap farm laborers and hunters of bush meat. Bantu control most trading activities and make Baka dependent on them for cash with which to buy cigarettes and alcohol. Most of the time this relationship takes the form of debt-peonage and exploitation, because the Bantu own most of the agricultural land. Despite their dependency, the Baka always retain an 'exit-option': in the event of a conflict with the Bantu, they leave their huts and migrate to another place in the forest, leaving the Bantu without a workforce (Mimboh, 1998).

Baka people today are semi-nomads in a transitional stage towards becoming sedentary. The replacement of their traditional huts (*mulundu*) by Bantu-style clay-dried houses is one indication of this process. Another is that their traditional seasonal stay in the forest (*molongo*) is becoming less frequent. The Baka have been especially hard-hit by recent timber exploitation in the East. Their food resource base is seriously threatened. Baka depend on hunting for much of their protein supply, but the noise of the logging machines makes animals flee. The important trees *moabi*, *manguier* and *bubinga* (supplying honey) and *ayous* and *sapelli* (supplying caterpillars) are also the sought after by the logging companies. As a Baka man explained:

> *"The moabi and the sapelli 'work' a lot for us; they give us oil, honey, and fruits. It is our 'gateau'(cake), and the bark is good as a cure when madness enters a person".*

The increasing antagonism over land and logging rights mostly ends with the surrender of the Baka, who prefer to avoid conflicts with the Bantu or the loggers and move to another area. This very movement, however, brings them into conflict with wildlife protection agencies such as the WWF, which considers it a threat to protected areas (Box 5.4). It is evident that the logging boom in the East province threatens the socio-cultural identity of these forest people. But Baka do not hide from the changing socio-cultural environment, and modern changes have gradually been penetrating their way of life for many years. They work, for instance, as prospectors for the logging companies, using their knowledge of the forest to mark exploitable trees (Verhagen and Enthoven, 1993). Another important source of cash income is the bush meat trade, which depends on the pygmies' hunting skills; young hunters are frequently hired for poaching. New social problems have arisen due to economic stratification and modernization; quarrels about theft due to the new concept of ownership; fights, alcoholism, prostitution and venereal diseases due to contacts with logging teams.

THE INTERNATIONAL DONOR COMMUNITY AND FOREST PROTECTION

International funding for forest protection

During the last decade, the international donor community has mobilized an impressive amount of money for wildlife management and the protection of the forest in Cameroon. Large projects such as the Korup national park, ECOFAC and Tropenbos, together with various other forms of bilateral and multilateral co-operation have involved a total of approximately 13 million US$ in aid money over ten years (*Mutations*, no. 208, 1999). The Netherlands have been the largest donor with US$ 4.1 million, followed by Canada, the UK and the EU (UNDP, 1996).[78] The Global Environmental Fund (GEF) is also an important financer of conservation projects in Cameroon. For the moment, international donors and the World Bank are the only strong actors demanding and committing their own resources to a more rationalized forestry sector and conservation policy. Their influence is limited, and international ideas and policy targets relating to forest protection have not yet established a grip on Cameroon's forest policy or the behavior of its people.

The examples of two protected areas (Boxes 5.5 and 5.6) show how the pattern of foreign funding for forest protection collides with the official policy of the government, which is directed towards the expansion of logging. But the collision is not just with official policy: the whole subject of forest protection and conservation of fauna is hardly an issue in Cameroon at any level. Forest-dwellers associate international actions for wildlife protection and against poaching with a lack of understanding of the cultural context and a denial of their right to economic development. People in South Cameroon consider bush meat as a traditional element of their daily meal and prefer it to beef and pork. On the subject of road construction in the forest too, local people have a down-to-earth opinion: no roads means no access to education, health care, and markets for agricultural products. François Bikoro, deputy-editor of Africa Express, echoes a widespread belief in Cameroon when he states:

> "*There is more than enough timber in Cameroon's forest. People want to know what they gain by conserving the forest. Industrialized countries have destroyed their forest and became developed. We want to do the same*" (*The Economist*, June 1999).

A declaration by MINEF minister Ondoa put it even more clearly:

> *"Conservation has to serve development"* (Press conference, March 1999).

[78] The Dutch government's decision to remove Cameroon from its list of countries to receive development aid in 1999 will limit Dutch funding in Cameroon considerably.

Box 5.4: The Lobeke Reserve[79]

The Lobeke area is a 220,000 ha dense lowland forest zone in Southeast Cameroon on the border with Central African Republic. Around 6,000 Bantu (Bangando) and 6,000 Baka live in the forest, while 13 international logging companies and four safari-hunting tourist companies are also active. Sporadically, commercial hunters, ivory traders, parrot trappers, and gold miners enter the area. Lobeke has one of the highest densities of forest elephants and western lowland gorillas in Central Africa (Stromayer and Ekobo, 1991).

The government has classified an undefined area as a reserved area for protection (*Zone Essentielle de Protection*), but has not implemented any concrete conservation measures. No real park management operates in Lobeke. The only protecting agencies, present in the field are the WWF and the German development agency GTZ, while EU funds being committed are trying to accelerate the conservation process. Logging companies represent the lead agencies, and their roads and operations have given rise to such boomtowns as Molondou, Kika and Libongo. MINEF limits itself to sporadic anti-poaching raids. The WWF tries to lobby in Yaoundé for an official protective status, and has appointed 20 forest guards to patrol the reserve (WWF, 1999). It has also delineated the borders of the conservation area, which has disturbed its relationship with the Baka. The Baka are afraid of the '*dobi dobi*', as they call the WWF. According to the Baka, the WWF places more value on animals than on them and wants to leave the Baka without meat, culture, and means to survive. "*Dobi-dobi*", stated one Baka, "*has bought the forest from the government, it is already their forest*" (Schmidt, 1998).

In 1999, the logging company SIBAF pulled out of the logging towns of Kika and Mambele. Almost half of Kika's 6,000-strong population left in the course of that year, making it a ghost town in the forest (Judah, 1999; *The Economist*, 26 June 1999).

MINEF has a division for forest conservation, and has officially issued decrees and regulations which on paper control poaching, restrict tree cutting, and delineate protected areas. However, MINEF puts a low priority on forest management and exerts little control in the field. Sporadically, seized bush meat and ivory is presented to the press; but most of the time the trade goes undisturbed. The problem is not in the first place one of funding. The availability of donor money for conservation and forest protection has led to the establishment of several projects in which MINEF plays the role of 'local counterpart'. Conservation policies remain secondary to the overall goal of further expanding the forestry sector. So local commitment is much more problematic than funding. As World Bank vice-president Ian Johnson stated during the Central Africa Forest Summit:

[79] The information on Lobeke is largely based on Davenporth (1998) and Curran (1996).

> *"Inadequate money and resources are not always the primary constraints; commitment, organization and policy are just as important. In Central Africa, externally funded projects for forest and natural resources represent a large amount of money. More than half of these resources remain unspent or are being spent very slowly due to the lack of national commitments".*

The nature protection organization WWF is the largest and most prominent organization in forest conservation in the East province. Cameroon is one of the showcases of WWF's Forest for Life Campaign,[80] and conservation activities focus on the protection of three specific areas in the East: Boumba Bek, Lobeke and Nki. For WWF conservation of wildlife, especially gorillas, chimpanzees, and forest elephants has a priority and is a worldwide publicity item. The WWF is confronted with the reality that most of the forest is claimed by the state and that the central elite is the main decisive factor in the fate of the forest. The WWF uses a strategy of compromise and collaboration, avoiding confrontations with state agencies in order to realize its conservation goals. WWF collaborators consider that there is still a long way to go, and that the first thing is to get forest protection on the political agenda (WWF, 1998).

The WWF has formed an alliance with the World Bank on forest conservation, which means that Cameroon must live up to its commitments to conserve and manage the forests responsibly in order to receive World Bank loans (World Bank-WWF, 1999). The discreet negotiations during the Yaoundé summit (see box 5.7) had little direct effect except that Central African presidents took the opportunity to gather green credentials. Presidents pledged conservation plans during various official meetings and in December 2000 a first Tri-National accord between Cameroon, the Republic of Congo and the Central African Republic covering a large border area of 28,000 km² became a reality (WWF, 2000). The establishment of a transnational park reflects a new awareness of the problematic side of relatively small protected areas such as the Dja reserve and Boumba Bek area in Cameroon, which are surrounded by logging concessions. Both areas resemble shrinking zoos, where the last large mammals seek refuge from hunters and loggers. If this Tri-national agreement becomes effective, it will result in the first large transnational park in Central Africa that is sealed off from logging. Political support, available donor money, and the collaboration of the local population will be critical if this promising initiative is to succeed.

[80] The WWF launched its worldwide their 'Forests for Life Campaign', which promotes the establishment of protected areas in 1998 (WWF, 1998).

Box 5.5 : The Dja reserve

The Dja reserve is the most prominent conservation area in Cameroon's forest and its 526,000 ha enclose an immense biological diversity including over a hundred mammal, 320 bird and uncountable plant species. It provides the habitats for several endangered species including the western lowland gorilla, chimpanzee, forest elephant, bongo, and duiker (Klein and Van der Wal, 1998). Estimates give a population of around a thousand forest elephants and two thousand gorillas (de Wachter, 1997). In 1993, the EU started the ECOFAC project in collaboration with MINEF and IUCN to focus on wildlife management and conservation in Dja (*Moabi*, no. 6, 1997).

There are 37 villages inside the park boundaries with a total of around 5,000 inhabitants. Another seventy neighboring villages, with 25,000 people, are dependent on the resources of the park for their daily survival. The population density in the inhabited areas northwest and northeast of the park is limited to four inhabitants/km² (Tchikangwa, 1997). The people concerned belong to six ethnic groups. ECOFAC allows those who live inside the park limits to continue with traditional hunting and gathering, fishing and long-fallow shifting cultivation. ECOFAC's strategy is to halt the negative trend of poaching by using a 'compensation' and 'income generating' approach. This involves providing direct benefits for local people by financing infrastructure works and creating employment. ECOFAC has plans for a zoning of the reserve, whereby the central heartland will enjoy strict protection while a surrounding buffer zone is subject to traditional use rights for the local population (Tchikangwa, 1997; interviews with ECOFAC staff).

Hunting is for the moment the greatest threat to the biodiversity in the park. The number of commercial hunters operating with snares has increased dramatically over the last years, a trend enhanced by the logging roads at the borders of the park. Regulations prohibit commercial poaching, and ECOFAC has trained a local staff of twenty armed eco-guards to patrol inside the park. Confrontations with hunters have already ended several times in shooting. Local people consider hunting and selling the meat as a means of survival clearly distinct from commercial poaching. ECOFAC, on the other hand, believes that selling to intermediaries is common practice among local hunters (interviews with ECOFAC staff).

In recent years, logging companies have approached the limits of the reserve in the north and east of the reserve, especially around Lomié. Today, seven logging companies are extracting timber around the reserve. A few years ago, a Lebanese company started to build a sawmill right on the edge of the park without respecting existing regulations. The outcry from international conservation organizations in the country resulted in a prohibition by MINEF and the displacement of the sawmill.

World Bank efforts to improve efficiency in the forestry sector

The lucrative logging industry has given rise to rent-seeking strategies inside all government agencies. In order to limit opportunistic hazards, the World Bank has

tried to establish an institutional framework to keep bureaucratic transaction costs as low as possible and so boost the country's fiscal revenues. The Bank pleads for 'transparency' in all government agencies and procedures. This concept of 'good governance' is the opposite of what the Bank itself calls 'obscure' measurements, a euphemism for clientelist relationships and corruption. The World Bank also swears by the 'principle of one account', by market mechanisms and by the need to minimize inappropriate interference in the economy. Despite the obstacles to such an approach, the bargaining power of the Bank is such that donors' wishes are translated into national regulations and partly executed by the administration for a period of time.

The World Bank started to put Cameroon's economic housekeeping on the right track ten years ago. For the forestry sector, the new 1994 forestry code was a decisive step. World Bank officials were pleased with this law, which for the first time increased the fiscal pressure on the timber sector and stimulated the development of a national processing industry. The World Bank has won some battles in the forestry sector during its period of intervention. A first major breakthrough has been the establishment of the FOB value (Free on Board) as a tax base in order to have real prices, according to market fluctuations. The introduction of the auction system for concessions appeared at first sight to be another victory for the World Bank. In practice, however, the administration has continued to allocate concessions according to clientelist ties rather than granting them to the highest bidder. In addition, another clear demand of the World Bank, the central budget principle requiring the collection of revenues by one agency with full control, could not be pushed through completely. This principle is intended to end the earmarking for 'special funds', which in the past were synonyms for obscure committees where officials 'ate' the budget. A further strong demand of the World Bank was contained in a hard-fought clause on community forestry. The implementation of this clause, however, has remained extremely slow and revealed much unwillingness on the part of MINEF to give community forestry a place in the zoning plan.

The World Bank included a chapter on the forestry sector in the Third Structural Adjustment Credit for Cameroon of 1998 (a US$ 180,000,000 program). The first concern was to translate increased timber production into correspondingly higher tax incomes via auction systems and higher fees (World Bank, 1998). MINEF watered down the most crucial conditions regarding the bidding process during the process of implementation, and the World Bank backed down on forest issues in order to achieve the general goal of national economic recovery (Brunner and Ekoko, 2000). It seems to be a strategy of the authorities in Cameroon to agree with stricter forestry regulations proposed as conditions for loans, but afterwards to reject or not fully comply with them. Several development workers have raised the question whether it still is worthwhile and wise to continue giving loans for forest protection and MINEF capacity building. In the mid-1990s the Netherlands were by far the most important donor for forest protection, and the poor results have certainly influenced the Dutch government's decision to remove Cameroon from the list of countries eligible for development co-operation.

Box 5.6 : The Forest Summit in Yaoundé

The WWF organized the first Forest Conservation Summit for Central-Africa in March 1999, assembling high officials from Cameroon, Congo Brazzaville, CAR, Gabon and Equatorial Guinea for the first regional debate on forest protection (WWF, 1999). The preceding working sessions for experts in January were dominated by political statements obscuring the real agenda of the participants. They boiled down to general and loose recommendations, although they sometimes shed light on participants' real agendas. One recommendation explicitly proposed a considerable expansion of the road network in the forest to promote logging production, rural development, and ecotourism. Participants mentioned in passing that sustainable logging was desirable, but this most critical point was not developed further (Workshop report, 27 Jan. 1999). Only a few delegations attended the expert meeting on the first day; Congo and the Democratic Republic of Congo had sent no delegations at all. After an hour's discussion about the election of the meeting's president, the recommendations from the previous expert meeting were talked through without significant additions. After the lunch, half of the participants had left and the session was finished without any clear statement or new elements.

The actual summit took place the next day in the presence of heads of sate and international dignitaries. Again it did not lead to any solid decision or agreement. The Yaoundé declaration was a watered-down statement of general conservation principles, with no mention of any new specific protected area. It did not show any concrete governmental commitment. The only clear statement concerned the need for more international donor money for conservation. The non-official press used the opportunity to criticize the government's forest policy, calling it a sell-out of the national forest (*Messager*, 15 March 1999).

The WWF evaluated the summit as a strong political signal that forest conservation was an important issue for heads of state in Central Africa, and that conservation had been recognized as a key policy issue (WWF, 1999). In December 2000, the WWF could celebrate a major success with the signing of the Sangha Tri-National accord between Cameroon, the Republic of Congo, and the Central African Republic. This accord concerned the collaborative management of a 28,000-km² stretch of forest in the Congo Basin, and announced the establishment of a network of protected areas linking three national parks - Lobeke in Cameroon, Dzanga-Ndoki in the Central African Republic, and the Nouabala-Ndoki in the Republic of Congo (WWF, 2000).

Some intellectuals in Cameroon have also expressed mixed feelings about the international concern for forest management and forest conservation. On the one hand, circles of journalists and writers, including Cameroon's famous writer Mongo Beti, file complaints against *la braderie de la forêt Camerounaise* (the Cameroon's forest sell-out) organized by the ruling elite (interview with Beti in *Génération* nr. 15, 1994). The private press accuses the corrupt authorities of selling Cameroon's natural heritage at a bargain price (Friends of the Earth, 1997). At the same time, however, they are also cynical about World Bank loans and donor money for forest

protection. Crying 'eco-colonialism' they denounce the hypocrisy of experts and international NGOs in securing their share of the generous funding without really addressing the problem of democracy or the misery of forest dwellers.

> *"Les blancs se considèrent des experts en matière de la forêt en Cameroun, mais la plupart du temps, ils se cassent la figure. La loi et les règles en Cameroun, ça ne vaut rien. Le Cameroun reste le Cameroun! "*
>
> *"Whites [officials and consultants] consider themselves experts on forest issues in Cameroon, but most of the time they make fools of themselves. Laws and regulations have no value here; Cameroon remains Cameroon!"*
>
> Anonymous lecturer in environmental law, Yaoundé

The forest policies of the European Union and France

The EU is an important donor in Cameroon, producing development aid from the European Development Fund (EDF) and numerous projects for forest protection. The European representatives generally use diplomatic language when promoting forest protection in combination with economic development and restrict themselves to mentioning the small successes of the past and not the numerous failures. On rare occasions, they do level charges about clientelist policies in the forestry sector and the lack of transparency and political will on the Cameroonian side. One memorandum complained about "the important discrepancy between the pertinent rules of the national [forest] legislation and daily practice going against a good forest and biodiversity management". It was illustrated concretely by "the irregular attribution of logging permits, MINEF's blocking of projects for certification, community forestry and zoning, and the slaughter of large mammals without judicial prosecution" (EU memorandum, 1999).

The EU sometimes conducts an ambiguous policy towards the issue of forest protection when this is combined with rural and economic development. The European Development Fund (EDF) is actively involved in the country's transport sector with annual financial accords for infrastructure of US$ 80,000,000 that stimulate the expansion of the logging sector. Much of this money is used to build roads, which contribute to the increased logging pressure on the forest. Conservation efforts, meanwhile, are financed by other EU departments, giving rise to striking paradoxes when two projects collide in the forest; an example is the case of the road to Lomié (see box 5.7).

Box 5.7 : EU road financing in Lomié

In 1997, there was much controversy about EU financing for road rehabilitation in Eastern Cameroon. A 128-km road runs from Abong Mbang to Lomié, on the edge of Dja Biosphere Reserve. The northern part of this road was maintained by the logging company Pallisco, the remaining 50 km to Lomié by the state using 600,000 Euro from the EU Stabex fund.[81] A few kilometers from Lomié, the ECOFAC project in the Dja reserve was the EUs most prestigious conservation program in Central Africa. Activists protested because they had gathered evidence that the road had enhanced logging activities in the area and poaching in the Dja Reserve. The British NGO Rainforest Foundation led the criticism, and a BBC documentary showed the cleared forest and the poaching of gorillas. Footage of a dying baby gorilla, which mother killed by poachers, made a lasting impression in the European media.

The European Commission defended the project by stressing that road improvement was part of a much broader infrastructure project for the whole country. The rehabilitation of the Lomié road would facilitate cash crop marketing and was therefore an appropriate recipient of Stabex money. It was also designed to bring an end to the isolation of the local population (Pilip Lowe, European Commission's Director for development in *Interpress Service*, 12-6-98). The local population in Lomié was pleased with the project and bitter toward the conservation activists who tried to oppose it: "*They deny us development and would like to see Lomié isolated in order to protect some monkeys. In the mean time, we can drive hours along a terrible road just to reach a hospital or get our coffee and cocoa sold*".

NGOs used the Lomié road as a showcase to file a complaint against EU subsidies that harm tropical forests. They criticized the fact that the EU referred to the interests of the local population to justify the project, while the majority of the vehicles using the road were logging trucks. A direct result of this action was that the EU subsequently conducted more serious environmental impact assessments for road construction. It also stimulated debate in Brussels about the accountability of EU development money. The case, however, got out of proportion, given that this was a very cheap road improvement project of just 50 km, of which little remained after two years due to the constant traffic of overloaded logging trucks. At the same time, logging companies further to the East have constructed hundreds of kilometers of penetrating roads with much more devastating effects for the forest. The role of French politics and funding in this timber expansion is manifest, but apparently too difficult to attack for Western NGOs, who have no strong foothold in France.

France has played an important role in the recent development of the logging industry in Cameroon. Cameroon is France's second-largest trading partner in French speaking Africa, and there are strong political ties between the two countries

[81] The Stabex fund of the European Union finances projects in ACP countries to reach a degree of stabilization in their earnings through the export of commodities.

(Brunner and Ekoko, 2000). French companies control the highest political levels and all the strategic economic sectors, including oil production, logging, agriculture, and telecommunications (for more details, see Agir ici-Survie, 1995; 1996). French logging companies are an important part of the *alliance Franco-Africaine* of politics and business in Cameroon. These companies control a large part of the logging concessions and have a dominant role in the timber processing industry in the country (Baud, 1998). During the last years, France has put considerable pressure on the forestry department and on influential politicians in order to safeguard French companies' interests. In 1994, French authorities withheld support for the World Bank's conditions in the draft of the new forestry code for fear of upsetting the major French logging companies (Brunner and Ekoko, 2000). In the same year, the French government cancelled half of Cameroon's debt to France (US$ 10,000,000) in exchange for more privileges and fewer restrictions for French companies in the forestry sector. These 'debt for logging swaps' as Pearce (1994) called them, were widely believed to reflect the business interests of the Mitterrand family in French logging companies operating in Cameroon (Agir-ici-Survie, 1996).

INITIATIVES FOR SUSTAINABLE FOREST MANAGEMENT

Community forestry

The 1994 law included a provision for the designation of community forests of up to 5,000 hectares. This is the first time that local people in Cameroon have been able to obtain usufruct rights to small pieces of forest according to the official legal code. However, these community forests are restricted to the 'non-permanent forest zone' which is open to human occupation, agroforestry, and timber extraction. It consists of the area within 5 km on each side of the roads, and is a very small part of the forest in comparison with the 'permanent forest zone' that is open for logging concessions (Figure 5.1). When MINEF approves a proposal, it entrusts to a community the ability to manage, conserve, and extract forest products for the benefit of that community. All options are open, including timber extraction by means of an SSV, by concession, or by personal authorization. An important restriction in the legal formula of implies that there is no village ownership of the forest; the state remains the exclusive owner, and can revoke the community's usufruct right at any moment.

The government has always been opposed to non-industrial forest use, but acceded to this measure under heavy pressure from the World Bank. There has been much confusion about the procedures for application and approval and MINEF delayed and postponed the formulation of requirements for years. Another major obstacle is that villagers have to negotiate with the MINEF authorities in Yaoundé and pay for forest inventories, which must be carried out before the forest services come in with free technical assistance. NGOs try to help local communities overcome these problems, but experience continuous sabotage and unwillingness on the part of MINEF personnel

> *"MINEF is a group of forest engineers thinking in terms of cubic meters of timber and how much they pay. They consider these* forêts communautaires *as a pain in the back, and try to sabotage the whole procedure as much as they can".*
>
> Foreign aid worker in Yaoundé

The truth of these allegations was confirmed in 1999 when the special department for community forestry (financed by DFID) was not included in the new MINEF organizational structure (interview with Bill Garber in *Bubinga* no. 8, 1999). Even after strong donor protests, MINEF unhesitatingly went ahead with this snub to the concept and the backers of community forestry.

Community forestry is a totally new concept in Cameroon, and there are major difficulties in introducing it in a setting with a poorly sensitized local population and uninterested authorities. The existing regulations have been developed without consultation with the population, and the format of the management plans is weak and without clearly defined user rights. Another obstacle is the complicated status of the local power structure in the new procedure, which the legal code neglects entirely. The procedure presupposes a consensus inside the community about the management of the area, and makes no allowance for the kind of conflicting customary claims which can spark off conflicts in any village (Kwegueng, 1998; Djeumo, 1998).

In 1997, two community forests were legally recognized in Bengbis and in Abong-Mbang. In both cases the local elite dominated the project, without representing the various villages in the area and with the primary purpose of cashing in on the royalties from anticipated logging activities. A number of conflicts arose, fuelled by political intrigues and jealousy. Consequently, the contracts signed with logging companies led to conflicts over the division of the revenues (Pénélon, 1997; Salla, 1998). For the most part, what enthusiasm for community forests among villagers results from discontent over the distribution of logging revenues and the damaging results of logging for the forest in their backyard. It is a mainly pragmatic reaction directed at earning money from logging and having a say in how logging companies operate (Klein and Owono, 1997). For the moment, villagers have to rely on a logging company to extract the timber, because they lack the means and skills to do so themselves. The loggers, for their part, are eager to conclude contracts with villagers because they know that community forests will experience little harassment from MINEF. At the same time, however, community forestry also poses problems for loggers in so far as it obliges them to meet local demands; villagers have a strong and direct interest in ensuring that logging in a community forest is done without harming trees which provide locally important extractive products.

The SNV project has organized several communities around Lomié to set up a community forestry scheme. One of the difficulties faced here is that of reconciling the various local lineages, village heads, and elites within a cultural context that requires consensus and mutual control (Klein and Owono, 1997). In August 2000,

15,000 hectares of forest were allocated to five villages around Lomié as community forests (*Messager*, 1-9-00), the first ever to be legally recognized in Cameroon.

Box 5.8 : The visit of the préfet *to the village of Ngola (East province) on the occasion of the establishment of a council forest*[82] *(February, 1999)*

After hours of delay, the *préfet* and his entourage of guards and secretaries arrived in the small town of Lomié together with the MINEF district official. First they went to the SNV office in Lomié to cash their allowances. The head of SNV explained: *"This is the only way to get them here, you pay them; otherwise they simply do not come, and the official recognition of the council forests will be delayed indefinitely"*. Then the caravan of four-wheel drive cars roared into the *brousse* to the remote village of Ngola 50 km away, just a few clay huts lost in the forest. Everything was prepared to give the *préfet* a warm welcome. After the traditional songs and dances, the *préfet* took his place in one of the armchairs and the village chiefs sat down around him. Everybody else stood around nearby except the Baka women and children, who watched the scene from a distance of 30 m.

With authority and firmness, the *préfet* explained how 20,000 ha of forest would become the first council forest of Cameroon. The two municipalities of Lomié and Messok happened to be located inside an area designated for council forests according to MINEF's zoning plan. They were therefore allowed to make a management plan for their forest, to choose which activities would take place there, and enjoy exclusive benefit of the resulting revenues. Everybody knew that this meant, in the first place, the money from logging. Then the village chiefs of Messok started to complain: *"Why does Lomié receive a much larger part of the council forest than Messok?"* The *préfet* explained calmly: *"The zoning plan was made by MINEF in Yaoundé and has decided it that way, you can see how it is on the map"*. There was no further discussion. The next delicate issue, that of the division of the royalties from logging activities between the two municipalities, was handily avoided by the *préfet*, who stated simply that it was still too early to discuss the question as yet.

When the *préfet* finally asked whether anybody had any objections to the continuation of the procedure, and was getting ready to leave, the Baka chief on the last bench was prodded by his kin into raising his finger. A burst of laughter followed when he started to stutter nervously: *"We Baka are afraid that we can no longer use the forest, what will happen with to us?"* The *préfet* reassured him: *" The Baka too are citizens of Cameroon, with the same rights as others. All villagers will continue to have the right to use the forest as they did before,* alors il n' y a pas de problème". Then the caravan left for the house of the mayor where the visitors took dinner. One of the foreign logging companies, intent on maintaining good contacts with the municipality in order to be the first to obtain a logging contract in the council forest had provided the beer. It was whispered that several prospecting teams had already entered the forest to assess timber values.

[82] The zoning plan has demarcated a few areas as 'council forests', which belong to the municipalities. For these areas, the municipality is competent to draw up a management plan and to receive forest

The experiment raised high expectations, but also questions as to whether this kind of community forestry is a viable option. All villages but one have started to negotiate with logging companies regarding the extraction of valuable trees. The only exception was a village with a Baka majority that so far has been determined to use its forest only for the extraction of non-timber products and for hunting (*Messager*, 1-9-00).

> *"Since we started the procedure to obtain a community forest, people have begun to see the future of the forest as their own responsibility. They will have the right to make decisions and to collect revenues. It does not mean that they will immediately manage it in a sustainable way. Probably they will log it as quick as possible; but then that is their own choice, and it is not up to us to decide the fate of their forest."*
>
> SNV aid worker in Lomié

Timber certification in Cameroon

Collaboration between the logging sector and the sustainable forest lobby is still insignificant in Cameroon. In contrast to EU development programs financed by the EDF, EU conservation projects are reluctant to commit funding for forest conservation in areas where logging companies operate. The Forest Protocol of the Lomé Convention restricts EU funding mainly to small community-based logging operations. The same holds for the GEF fund, which selects only protected areas to the exclusion of forests designated for timber production (Kiekens, 1999b). This is understandable from a conservation viewpoint, but impedes the necessary and in the long run probably inevitable collaboration between the logging sector and conservation initiatives. It also reflects caution on the part of an EU bureaucracy that has already received enough criticism of its development projects in the forest. At this moment, the promotion of timber certification is the only serious path towards sustainable logging that is being followed by the EU and other donors.

WWF Belgium took the initiative in setting up a timber certification program for Cameroon by founding Club 1997, a forum consisting of WWF Belgium together with 60 Belgian timber importers. A National Working Group was established and in 1997 this group developed criteria and indicators for sustainable forest harvesting, based on those recommendations by the Forest Steward Council (FSC)(WWF, 1997a). The procedure for testing compliance with these criteria and issuing certificates, however, has not yet been finalized. In the face of this delay, European timber importers now want to speed up the procedure in order to offer the long-announced certified timber to their customers. Their pressure brings with it the danger that criteria may be softened in order to get quick results (Verbelen, 1999). At this point, the fundamental issue is whether the concept of certification is realizable in the Cameroonian political setting. Certification is weighed down by the

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revenues.

same problems of corruption, inefficiency and lack of political will which plague other efforts to organize and monitor the logging industry (Box 5.9).

Opinions and forecasts regarding certification are divided in Central Africa. Some consultants and NGOs, following the official EU standpoint consider it the best available instrument for promoting sustainable logging in the region and are prepared to invest money in it. WWF Cameroon, which organizes the process of certification in the country, still believes that the implementation of the FSC criteria can mark the beginning of a sustainable forest management (Plouvier, 1997; 1998; Plouvier and Roux, 1997).

A number of experts and workers in the field in Cameroon, on the other hand, stress the limited effectiveness of certification (Nguiffo, 1998b). They point out that to date there have been no positive experiences and no practical field experiments with certification in Africa. In their opinion, timber certification will remain a marginal instrument in African forest conservation. Only a very small part of Cameroon's timber exports in any case, go to certification-sensitive markets in western Europe, while most go to southern Europe and Asia, where certification is not an issue for consumers. The skeptics warn against confusing certification with forest management; for them, a more realistic solution lies in the more efficient management of the logging process (Bouvard, 1998; Kiekens, 1999b).

Box 5.9: Meeting of the National Working Group in charge of the timber certification process in Cameroon (Yaoundé, January 1999).

Since 1995, the European Union has provided US$ 2.1 million to the WWF for the establishment of a timber certification program in the Congo Basin by the year 2001. Cameroon has received a large part of this money and efforts concentrate on the translation of the general FSC criteria into the national context and the establishment of pilot projects (Tropics, 1999). A National Working Group has been operative since 1996, but its mandate is still obscure and it is not officially recognized as a FSC working group (Verbelen, 1999). The problem is that the translation of the FSC criteria into the national context has resulted in lower standards. The composition of the working group is unbalanced: MINEF exerts too much influence and tries to control part of the funds, while forest dwellers are poorly represented.

During one of the regular meetings, the discussion was limited entirely to the assignment of consultation jobs and the administration of funds. The whole meeting was a game of cat-and-mouse between the WWF representatives, who are the bookkeepers, and the other members who wanted to control the funding. Not one word was said about certification or starting pilot projects. No minutes were kept and no clear decisions were made. *"This kind of meeting has been held every month for the last three years. People participate because they receive per diem allowances. The only issue that counts is who gets how much money"* (anonymous observer of the National Working Group).

Loggers themselves do not actively participate in certification. Some European logging companies in Cameroon, it is true, are showing interest, but even they are still hesitant to take concrete steps. European companies realize that in the future, product labeling may be an important marketing tool as consumers become increasingly well-informed and more demanding. Whether they actually invest in it, however, depends on the evolution of markets and consumer behavior. Another reason for their hesitation, perhaps the most decisive one, is the question of how realistic is it to attempt timber certification in the Cameroonian social-political context. They fear that it will either cost a lot of money, or not become operative at all, or both.

> *"We encourage every certification initiative, but we remain vigilant and will not go along with any expensive procedure which leads to a worthless certificate that can easily be set off by activists".*
>
> Jean-Jacques Landrot, secretary-general of the Inter-African Forest Industries Association (IFIA)

THE FATE OF THE FOREST

Whether the current process of logging in Cameroon will cause the complete disappearance of the old-growth forest depends more on the future strategies of local people and of Cameroon's rulers, than on the activities of the logging companies themselves. Government policy is decisive in directing loggers' activities either to a grab-and-run strategy or to more sustainable harvesting. The commitment of the authorities is also decisive when it comes to efficiently allocating the abundant donor money available for forest management in the field. Local people exposed to logging likewise play a concrete role in the fate of the forest. They can decide, for instance, to incorporate the loggers' money, machines, and expertise into their own mode of production.

The boom-to-bust logging scenario

Today, logging in Cameroon is edging towards the most remote areas in the East. It appears that this wave of selective logging for precious timber is unstoppable and can count on the support of powerful actors. In the first place, MINEF's forestry policy is clearly directed towards supporting the expansion of this sector. The political elite and major business interests in the country, secondly, are in full agreement. In addition, the World Bank recognizes the importance of logging revenues for bolstering Cameroon's state budget and boosting its economic development.

The survival of the forest as a whole is not threatened by a single logging cycle. The direct impact will be limited to the most valuable species which, however, may become so scarce that natural regeneration is nearly impossible, as Debroux (1998) has shown for the moabi tree. Trees can regenerate and the skidders' tracks and cleared spots will be thick bush once more in a few years time. If the forest receives

enough time to regenerate, the next cycle of logging can be carried out after 30 to 40 years, depending on the species and the required diameter. A crucial condition is that after logging no new destructive activities are undertaken in the forest. As far as the East Province is concerned, there is no evidence as yet of activities such as the conversion of forest into agricultural land. There is no advancing agricultural frontier of migrant farmers who use the logging roads to penetrate the forest and burn the vegetation. Cattle ranching and large plantations likewise, are almost absent from the south of Cameroon. Although there is some ranching in other parts of the country, livestock production in the humid forest is negligible due to the presence of large tsetse-infested zones (Amelung and Diehl, 1992). The only serious ecological damage is the poaching that follows in the wake of the logging companies and is depleting large mammal species.

A 'boom-to-bust logging scenario' in the short term might look positive from the viewpoint of sustainable forest management. It would give Cameroon the possibility of cashing in on its timber wealth and using the resulting revenues to develop the country in other ways before protecting the forest until the next harvesting cycle. Conservation agencies such as the WWF and IUCN concentrate their conservation efforts on a few biodiversity hot spots such as the Dja Reserve and the three parks in the East (Nki, Boumba Bek and Lobeke). Once these parks are sealed off from the skidders on their search for valuable trees, roadbuilding and future extraction are less likely. The contemporary forestry sector has many of the characteristics of an enclave economy, generating few backward or forward linkages for Cameroon's economy. According to the boom-to-bust scenario, many villages will turn into ghost towns when the logging boom is over – a pattern familiar from similar boom-to-bust cycles involving products like rubber, gold, and cocoa. This prospect underlies sentiments common among villagers: *"Let's cash the money now, the companies are here now and there are enough trees in the forest"*. Government agencies, for their part, use the boom-to-bust scenario to justify their massive promotion of the forestry sector today. They claim that logging will end when the valuable species of today are harvested, and that the forest will then be left alone without having suffered substantial damage. Logging companies, meanwhile, use the scenario as a warning against too much government intervention. If the government, they say, decides to rationalize and monitor strictly according to international standards, and at the same time continues with its 'politics of the belly', logging operations and investments will no longer be feasible for foreign companies, which will pull out and move to neighboring countries with a more indulgent forest regime.

Threats to the forests

The short-term future as described above may look harmless for the forest, but it is the long-term evolution of the forestry sector, and its links with other sectors and actors, which will be crucial. The normal business strategy of the logging industry is to re-enter the logged-over forest in search of less valuable species, unless this is prevented by state regulations. Such a prevention, however, is not likely to happen, because Cameroon's politicians do not want to kill the goose that lays the golden

eggs. MINEF has already taken concrete measures to enable loggers to extend their activities by lowering taxes on the extraction of less valuable species and on timber extracted in the remote East province. The extraction of as many species as possible (a trend introduced by Asian companies) results in a severe forest degradation from which recovery is problematic in the face of fires, soil erosion, and weed invasions.

The logging companies also have a tendency to subcontract more and more activities to Cameroonian counterparts. This is creating potential for a locally-based extraction economy whereby local people participate in tree felling. Cameroon's forests contain an enormous stock of timber, of which only a fraction has so far been extracted. What remains can become a major source of income for a mostly young rural population that has few other economic options for the future. It is likely that the local population will not sit and wait for new 'whites' to come once the current wave of foreign companies leave. They will be eager to take over the felling process once these visitors have left the scene. The turning point occurs when chainsaws come within the purchasing capacity of local people. At this point, felling will occur without any planning in almost every area that is sufficiently accessible. The consequence of this broadening of the timber industry will be a larger supply of raw logs. Such an ecological doomsday scenario has already been realized in countries such as the Philippines, Malaysia, and Indonesia.

In Cameroon, for the moment, it is still theoretically simple to monitor the few large foreign companies; once a large part of the local population becomes involved in extracting timber, and starts to sell boards and logs at the sawmill gates, the sector gets out of control. In such a situation, monitoring becomes nearly impossible due to the scattered and small-scale nature of the activities. Selective cutting is inevitably followed by an army of small loggers who clean up the less valuable species. Moreover, because forest-dwellers have few other opportunities for wage labor, they are willing to work for very low wages, which makes economic price instruments in the forestry sector less effective. The spread of locally-based timber extraction is perhaps the most dangerous scenario for Cameroon's forests in the next 20 years.

The government's eagerness to promote the establishment of timber processing plants in Cameroon is another threat to the forest. The log export ban forces logging companies to set up sawmills and other industrial activities for converting timber into such products as plywood, paper and furniture. The growing capacity of this processing industry means that it requires more raw high-value timber every day, and inevitably secondary species are also used because of their lower price and relatively abundance. The overall result is a massive intensification of timber extraction, resulting in the clearcutting of large tracts of forest; In Ghana and Ivory Coast, land deforested in this way has become degraded bush (Karsenty, 1998).

Today's selective logging industry can also become a trailblazer for the conversion of forest into agro-industrial plantations of oil palm, cocoa, or coffee. The Asian logging companies operating in Cameroon could certainly become a lead agency in this sense since they are part of larger concerns which have already invested heavily in Southeast Asian oil palm plantations. This is most likely to happen in the Southwest, where much forest has already been cleared and transport is cheap. In the Eastern province, where most soils are not suitable for agriculture

and transport is more difficult, plantation development is unlikely for the foreseeable future (Hoogeveen and Soest, 1993).

Besides the large-scale actors mentioned above, daily gnawing at the forest fringe for charcoal production and small-scale cash crop cultivation continues. Every year, thousands of farmers burn patches of forest to transform them into cultivated land. With the Cameroonian population growth rate now standing at 2.8 percent, the number of forest-dwellers will rise considerably in the future (Hoogeveen and Soest, 1993; UNDP, 1999a). Another reason to expect is the recent trend of return migration to rural villages. Future economic developments will determine whether urban life looses yet more of its attraction for young people, or whether recovery pulls people back out of the forest areas into the towns. The role of urbanization and the urban-rural interface, in combination with the availability of credit, markets, and agricultural knowledge, will determine whether a real agricultural frontier develops.

Hoogeveen and Soest (1993) discern three factors that will influence the attractiveness of the forest. Firstly, prices for cash crops (coffee, cocoa, and oil palm) and food crops will determine the profitability of agriculture in the forest. Secondly, governmental policy is decisive for the organization of agricultural exports, price-fixing, and the expansion of the road network in the forest. Finally, the availability of arable land for young people in regions other than the humid forest will control migration flows. A counterbalancing factor for possible conversion to the forest is the current cultural setting of forest dwellers, who still consider the trees and the forest as part of their livelihood.

CONCLUDING REMARKS

Logging companies are the lead actors of the different extractive activities in Cameroon's forests. Their selective cutting practice employed at present has a relatively small impact on forest regeneration. They dominate timber extraction and concentrate on the large stands of valuable timber in the remote East province. French companies, backed by the diplomatic assistance of French authorities, have a privileged position in negotiations with state agencies. Asian logging companies are the new emerging actors operating in the Southwest. They clearcut large areas in order to obtain as much timber as possible for the growing pulp and plywood markets in Southeast Asia and China.

Government policy towards Cameroon's logging industry is primarily concerned with the expansion of the sector and the maximization of earnings from timber resources. Monitoring and control are marked by a lack of standard procedures and rampant corruption. The political elite profits most from timber revenues, while the public treasury receives only a moderate share. This has become a system permeating all layers of the forestry business, including the forestry department, the officials in charge, and the local authorities.

The local population largely excluded from this rent-seeking, tries to get grip on a small part of the timber resources, by means of direct negotiations with the logging companies. A new and interesting development is that local people now

charge a small tax at the logging site, which the logging company pays in cash to the village. The Bantu villagers and Pygmies in the East are 'actors in transition' and have a key position in determining the fate of the forest. Their traditional and sustainable way of farming and their balanced relationship with the forest, have come under pressure as a result of recent developments. Property rights to the forest and the cash income from logging are now the dominant political issues in every forest village in the East. Logging roads connect those villages to markets for agricultural and forest products, while the timber industry introduces cash in the villages. All this is changing drastically their way of life.

International donor agencies have been promoting community forestry, forest conservation and wildlife management. Gradually these forest management tools have gained a foothold, but they are still fighting an uphill battle. An important problem remains the lack of political will or public support for forest management. Western concepts of efficient forest management and wildlife protection conflict with the aspirations and visions of politicians and local people. The World Bank has formulated concrete measures for a stricter organization of the logging sector, and has even made these preconditions for participation in its structural lending program. Consequently, the administration has reformed its forest policy and initiated a new forestry law. In the field of forest protection and wildlife management, the WWF is a leading actor and has made efforts to set up effective park management in a few 'hot spots' in the East province.

The whole discussion about forest management is new in Cameroon, and its acceptance will require time and slow adaptation. For the moment, a consensus between the major players on sustainable use and benefit-sharing in the logging industry is still far away. The signing of an tri-national accord on a transnational park in East Cameroon is a rare bright beacon of hope in the Congo Basin, which otherwise remains a heart of darkness for sustainable forest management.

CHAPTER VI

KEY ACTORS AND DEFORESTATION FORCES: THE THREE CASES COMPARED

INTRODUCTION

Each of the preceding case study chapters began by presenting a road cut through the forest with the purpose of extracting resources and colonizing the area. The histories of these roads and the way the surrounding forest is exploited have been used to explain the various options and motivations that people have to encroach on forest land. This chapter examines in which way the theories outlined in Chapter 2 are applicable to these deforestation activities. While the similarities can often be explained by similar economic patterns, many of the differences are due to variations in socio-cultural and political conditions. These particularities are diverse and culture-bound, but also touch on general and fundamental issues such as the legitimacy of power in frontier areas and the control of valuable resources.

The analysis of the different actors in the last three chapters has already revealed the particularities of stakeholders in the frontier areas. In what follows, the aim is to describe the differentiation in each actor category (table 6.1) and to identify the trends that may shed light on future developments in the Amazon and Congo basins.

THE THREE ROADS IN PERSPECTIVE

The Rio Preto in Brazil

The westbound logging road that runs from Marabá towards the Indian territories deep in the forest cuts through the three zones of a colonization frontier. Logging and mining companies are the spearhead of the colonization converting the forest into an extraction zone for valuable timber and minerals. Together with official infrastructure projects deep in the forest (penetration roads and dams), these lead agencies have attracted migrants and triggered the development of a zone of extensive land use. In this extensive zone, the forest is burned during every dry spell and gradually converted into a desert-like land. At the same time the zone itself advances rapidly into the forest: firstly because it is constantly pulled into the extraction zone due to the available space and opportunities, and secondly because it is pushed in that direction by large estate owners in the intensive zone through the medium of rising land prices and rural violence. This intensive land use zone, which advances behind the extensive zone, includes agribusiness enterprises (for instance: dairy farms, cattle ranches, and soybean plantations) initially established in the oldest colonized areas.

	Traditional forest dwellers	Small peasants	Intermediaries and traders	Capital investors and corporations	Government agencies		International donors
Extractive land use = The pioneer frontier zone	-Traditional agriculture -Hunting and gathering -Communal forestland *Pygmies (Cameroon)* *Huaorani (Ecuador)* *Kayapó (Brazil)*	-Extractive economy -Wage labor in the extractive economy -Slash-and-burn agriculture for food crops -Reciprocal labor obligations between households *Pioneer colonists along Rio Preto*	-Supply manufactured goods and credit for pioneer colonists -Monopolistic power -Transport and trading of extractive products *Mahogany loggers at the Rio Preto*	-Leading agencies in the extractive timber / mineral economy -No investment yet in land due to absence of law and order *Oil companies in Ecuador* *Loggers in Cameroon*	-Official colonization schemes -Most state agencies are absent -Military forces are present to protect the extractive economy *Ecuadorian Amazon*		- Loans for infrastructure and resource extraction **GEF funds in Cameroon** -Nature conservation projects that aim to protect the still unspoiled fauna and flora *ECOFAC and WWF in Cameroon* *DGIS project in Ecuador*
Extensive land use = The consolidating zone	-Cultural and social transition -Adaptation to a money economy *Villagers in Cameroon* *Quichua along Via Auca*	-Slash-and-burn agriculture for food and cash crops -Off-farm wage opportunities -Use of wage labor in agriculture *Colonists along Via Auca*	-Emerging markets weaken their monopolizing power in trading -Investing in agriculture, ranching, and speculation *Timber traders along Rio Preto*	-Investment in land for speculation or agricultural production -Start of land concentration *Speculators along Rio Preto* *Oil palm plantations near Coca*	**Municipality** -Orientation towards frontier expansion *Coca, Marabá*	**Central state agencies** -Supplies infrastructure credit and land tenure *INCRA*	-NGO projects for nature conservation in combination with sustainable development *agroforestry project in Coca*
Intensive land use = The closed frontier zone	-Acculturated groups -Integration in the modern economy -Revenues from the state and international donors *Quichua close to Puyo* *Gaviões near Marabá*	-Integration into modern agriculture or expulsion followed by migration -Wage labor opportunities *Landless peasants in Marabá*	-Trading in competitive markets -Becoming large estate owners *Traders in urban centers as Marabá*	-Agribusiness and plantation agriculture *Soybean industry near Marabá*	**Municipality** -Intensification of agriculture and infrastructure *Marabá*	**Central state agencies** -Law enforcement -Credit for large estates *SUDAM*	-Credit for intensification -Projects for regeneration of degraded land, tree plantations *Soybean pole around Marabá*

Table 6.1: Main characteristics of the actors involved in the three zones of the tropical frontier

The via Auca in Ecuador

A journey from the Andean highlands to the lowland tropical forest indicates how the oil extraction zone advances deeper in the *Oriente* with spontaneous colonization in its wake. The older colonization zones on the tropical slopes of the Andes show signs of agricultural intensification, including fruit cultivation (*naranjilla)* and dairy farms. The fields around the town of Coca and further eastwards represent an extensive land-use zone of fifty-hectare plots with low-yielding coffee bushes and pastures with low carrying capacities. The town of Coca is the place where the *via Auca* heads southbound into the closed forest. This road is the gateway to the most recently colonized zone, and on both sides of it colonists gnaw at the forest fringe. Secondary forest, nevertheless, has the opportunity to mature on some cleared land. The pace of forest conversion is relatively slow compared to the Brazilian frontier. At the end of the road, the Indian reserve and nearby Yasuní park block further colonization. Pioneer colonists, who have nothing to lose, invade the land and squat in the restricted zones sparking off conflicts with Indians and park rangers. Oil companies have official permission to extract oil in these restricted areas and have already constructed penetration roads in the park and the reserve.

The road to Lomié in Cameroon

Cameroon's tropical forest can be considered as one big extraction zone where foreign logging companies fell the most valuable species for the international timber market. If we investigate the road to Lomié more differentiation becomes visible. Asian logging companies are felling a large number of tree species in areas close to the city of Yaoundé and the road to Douala. It is not yet an intensive timber zone in the sense that no costly investments have yet been made in tree plantations. The reason for this is that further down the road plenty of new concessions are available where it is relatively cheap to extract. Along the last part of the road to Lomié, a combination of EU road improvement aid and new logging operations has resulted in accelerated forest destruction over the last few years. The area beyond Lomié marks the beginning of a zone of selective cutting where logging companies concentrate on high-value species. This zone stretches to the borders with the CAR and Gabon, where the degree of forest degradation is low.

Intensive land use is restricted to a few export crop plantations in the Southwest region, which result in permanent removal of the tree cover. In large parts of the eastern zone, forest-dwellers use the forest for hunting and gathering and practice extensive farming around their villages. Their activities do not lead directly to large-scale and permanent clearing, but are still direct threats to the unique wildlife of the region. The total impact of logging, farming and hunting is relatively low in comparison with Ecuador and Brazil. Cameroon finds itself in a stage of forest use that can be compared to the situation in the Amazon 30 years ago, when lead agencies were only just beginning their march into the Amazon forests.

These general patterns of changing land use demonstrate how forest conversion takes place, but not why and by whom it is done. The following sections will deal with the direct and underlying forces involved.

INDIGENOUS PEOPLE IN TRANSITION

Indians in the Ecuadorian and Brazilian Amazon

The indigenous population of the Amazon Basin numbers today about one million people scattered over nine countries.[83] They constitute less than five percent of the total population of the whole Amazon, which is mainly populated by rural settlers and urbanized colonists (Henley, 1996). Activists and international donors often justify their particular interest in indigenous using the argument that these are particularly vulnerable and therefore require protection against the modern civilization that is destroying their forest livelihood. Up to a certain point that has been true; donors, nevertheless, too often idealize them as a homogenous group of traditional forest stewards with a clear commitment to sustainable forest management.

The facts presented in Chapter 4 on the Quichua of the Ecuadorian Amazon indicate that depletion of some resources is characteristic of forest dwellers' forest use once population pressure increases and guns and chainsaws become available. The high population growth of the Quichua means that they are outgrowing their forest territories, resulting in depletion of resources such as game. They are now switching to the cultivation of cash crops and the production of livestock production in order to earn money and maintain a sufficient protein intake. However, the Indians' adoption of the title 'guardians of the forest' is not completely unjustified. For the time being, Indians in Ecuador and Brazil are still powerful enough to prevent further colonization of forest in their territories and react with fierce violence against squatting pioneer colonists. They clear relatively less of their forest territories than do colonists, and consider a large remnant forest area as essential for the purpose of gathering forest products and hunting game.

The most striking trend among the Indian communities in the Ecuadorian *Oriente* is the marketing of their image as 'noble savages'. Their leaders have rapidly learned the white men's discourse on forest protection and indigenous issues and are now skilled at acquiring funding from international NGOs. At the same time they guide Western tourists on jungle tours, demanding inflated prices for food and photo opportunities. The resulting income is spent mainly on the conspicuous consumption of alcohol and consumer goods, which does not coincide with the Western idea of how community money should be spent. In the same way, the Kayapó in Brazil allow the extraction of mahogany and gold in their forest territory to earn cash for modern commodities. They justify this choice in terms of their right to self-determination and the urgent need to protect their communities from extinction. This reality is in sharp contrast with their image in the international media, according to which the Kayapó are the voice of indigenous protest against the destruction of the Amazon.[84]

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[83] The question of which groups fall in to the indigenous category is more a political than an anthropological issue. The fact is that in the Ecuadorian Amazon all Indian groups both autochthonous and immigrant call themselves *indigenas* and are considered as such by the authorities to distinguish them from the colonists.

[84] The Kayapó became famous after rock singer Sting took them on a tour through the US and Europe in the 1980s to draw attention for the destruction of the Amazon. Their colorful body paintings have been the subject of many documentaries, books, and exhibitions.

Bantu and Pygmies in Cameroon's forest

Several hundred thousand forest-dwellers live in Cameroon's tropical forest, including some 40,000 pygmies and a much larger number of Bantu. For the Bantu, agriculture is the most important economic activity after the extraction of NTFPs, and it requires access to forest land. Due to the expansion of logging activities, these forest-dwellers feel an urgent need to demarcate the forest near their villages in order to claim a share of the extracted timber. For the time being, they practice traditional shifting cultivation with a long fallow and do not cause severe forest destruction.

Pygmies are very mobile, and the extraction of forest resources is crucial for their livelihood. They represent the most vulnerable element of the population in the forest areas is now being opened for logging. In contrast with the Bantu, who demand compensation, Pygmies practice avoidance tactics and passive resistance in the face of the current logging boom. This puts them at a disadvantage in their struggle for user rights and weakens their position in negotiations with the authorities over acquiring forest territory. On the other hand, their way of life in the forest still features a high degree of 'noble savagery' which is now being discovered by NGOs and may lead to support and funding.

Land for the guardians of the forest

For all forest-dwellers, claiming sovereignty over their territory is the first and most decisive step to continuing a livelihood based on freely available forest resources. The Ecuadorian Indians are the most advanced in this respects, while in Brazil many Indian groups still have to acquire legal rights to their land and delineate its boundaries. Forest-dwellers in Cameroon are at an even more preliminary stage of this process, obtaining only small strips of land along the roads while almost all the remaining forest belongs exclusively to the central state and is open for logging or strict conservation.

Indians in the Amazon have obtained officially recognized forest territories over a period of ten years. Demarcation is not yet complete, but a long way has been covered since the time that Indians were completely unprotected against the colonization frontier. In the Ecuadorian case, the final allocation of large tracts of forest to the Indians occurred relatively smoothly after a phase of protests, marches, and international pressure. Most of the Indian leaders in the Brazilian and Ecuadorian Amazon have realized the importance of demarcation in order to protect their territory against ranchers, loggers, and gold-seekers.

In all three of the case studies, however, final decisions regarding who may or may not exploit valuable resources remain the exclusive competence of the central states that also obtain the largest share of the revenues. Some minor local compensation is arranged with logging and oil companies. When forest-dwellers attempt to take advantage of official provisions for benefit sharing, the central government often imposes its authority and hits back. When OPIP started to claim petrodollars in Ecuador, for instance, officials put an end to the dialogue and isolated the organization (Fernanda, 1997). In Brazil, the federal court prohibited the selling of mahogany from Indian territory in 1989. In Cameroon and many of the neighboring

states, forest-dwellers have very little decision-making power regarding the fate of the forest and only receive a fraction of the timber revenues. It is very likely that this situation together with rural population growth in Central Africa, will lead in the future to conflicts and to a rising cry for the legalization of local usufruct rights.

- In Cameroon, villagers are now in a first stage of gaining control of the forest, realizing that the delineation of their territory is a prerequisite for negotiations with the authorities and the logging companies about the money to be earned from logging. The current legal situation, whereby the forest belongs almost entirely to the state, is becoming an issue of fierce debate.
- Kayapó Indians in the Brazilian Amazon have already delineated their community land rights and are defending them against intruders. Their isolated position in the forest enables them to continue to live their own life and control to a certain degree the influx of strangers.
- Among the Quichua Indians in Ecuador, community rights are giving way to individual land ownership. Individuals demand that communal land be divided into private plots and copy the land-use of their neighboring colonists by selling the land, clearing it for pasture, or using it to grow crops such as *naranjilla*.

The Kayapó in Brazil have received twelve million hectares of land for a group of approximately six thousand people (2,000 hectares per person). The reserve of the 1,200 Huaorani in Ecuador covers 679,000 hectares (560 hectares per person). These two cases have sparked off criticism from the broader civil society in both countries and violent reactions from neighboring Indian groups and colonists, who received less land and sometimes even none at all. This debate touches on the general issue of absolute rights for a minority that have consequences for the living conditions of a larger part of the population. Neutral estimates of the minimum area that these forest dwellers need to continue their way of life are difficult to obtain and must vary in any case according to local conditions. For Amazonian Indians practicing slash-and-burn agriculture combined with hunting and gathering, Grenand and Laveleye (1997) estimate the required forest area at 160 ha/ person. In Central Africa, Joiris (1997) mentions 2 ha/person for forest-dwellers practicing agriculture and 100 ha/person for traditional hunter-gatherers, while adding that the majority of the forest dwelling groups use an area between these two extremes. In the above-mentioned cases in Ecuador and Brazil, the facts indicate that political lobbying and international exposure have been much more decisive in determining the total area of the territories allocated than have technical criteria for sustainable forest use.

FOREST COLONISTS: VICTIMS OR VILLAINS

Around 20,000 households and a handful of large *fazendeiros* around Marabá are gradually converting closed forest into shrubland. In Ecuador, an estimated 15,000 colonist families have squatted along oil roads in the two northern provinces and are gradually converting forest to pasture. An intriguing question is what makes this category of farmers so elusive for policy measures and why can conservation efforts not withstand the pressure from these actor groups?

Firstly, changing land use patterns and continuous regional migrations mean that colonists along the forest fringe in Ecuador and Brazil are not easy to lump in a single category. In reality, they combine elements of both stereotypes that characterize the scientific debate on smallholder colonists along tropical frontiers. On the one hand, political ecologists contend that colonists are victims, who are at the mercy of powerful groups and have no decision power about valuable resources. Collins (1986) states that ecological deterioration is not rooted in peasant farming systems, but in the larger socio-economic environment, which includes marketing structures, credit policies, and land tenure. This perspective has created the image of a poor and pitiful group of colonists trapped in a poverty spiral without exit options. And indeed, facts from both frontiers show that some colonists are trapped in a situation of increasing indebtedness and poor living conditions.

On the other hand, a number of publications and statements characterize small-scale farming as the most important cause of deforestation. They stress the 'clearing mentality' of an uncontrolled stream of migrants who settle on the forest frontier. Colonists choose to slash-and-burn new patches of forest every year, and are not willing to make long-term investments in proper forest management or intensive agriculture on a permanent plot. Even when NGO projects and official regulations offer them opportunities to switch to long-term, sustainable methods, they avoid doing so.

This ongoing debate makes clear that colonists have a whole range of possible land use practices and that there motivations can be manifold. This makes them a moving target for governmental departments, NGOs, and international donors that want to assist them with expertise. Often, well-intended official measures and so-called sustainable agricultural development projects miss their goal and can not provide this group of people with adequate support and assistance to put them on the track of sustainable forest management (see Richards, 1997).

Itinerant farming along the Ecuadorian and Brazilian frontiers

Colonists in Ecuador's *Oriente* are confronted with the physical constraints of a harsh environment and practice extensive farming. Every year, they clear additional parts of their land while abandoning already cleared plots. At first sight, it seems that these smallholders are caught up in the poverty trap that curtails their agricultural potential and forces them to move deeper into the forest. For a small category of very poor and marginalized colonists, this is an illustration of Durham's second deforestation cycle (Chapter 2). The opportunity cost of their labor is very low, and they have nothing to lose. For the majority of colonists, however, itinerant farming is only a transitional stage at the beginning of their arrival. They improve their farms by clearing the forest and then sell the land at a profit, investing their money in better-situated farms which make possible higher incomes from husbandry. Authors like Pichón (1996) and Pijnenburg (1991) have found evidence in Ecuador that much land abandonment in frontier areas is fuelled by this mechanism of capital accumulation and selling opportunities.

Moran (1989) has made an important remark concerning this clearing strategy in relation to the Brazilian frontier. He states that many peasants' first concern is to

remain on the land and to earn income by using it. Only in extreme conditions of indebtedness and lack of other possibilities will unfortunate and brave colonists push the pioneer frontier further into the forest. The remote forest zone is a hostile environment associated with hardship and infested with malaria. If at all possible, peasants prefer to develop a farm in a fixed location and to improve their livelihood gradually. High mobility can be a deliberately chosen strategy at certain times, but is not always driven by accumulation and speculation.

In South Pará, social stratification is marked among the colonists than in Ecuador and enables us to distinguish different groups that clear and sell land. The largest group consists of smallholders who move to another location. Those that are able to accumulate capital by selling the land can afford to buy new land located near a road or town. The unfortunate ones, who are chased off their land or receive low prices, move further into pioneer zones where land prices are still lower. A smaller group stops farming and tries to make a living in urban centers or in trading. The decision whether to buy new land or stop farming depends on the specific characteristics of the household concerned (for instance, financial situation and family life-cycle), but even more on the socio-economic situation on the frontier.

In both regions, off-farm labor opportunities greatly increase the mobility of labor. Young colonists switch easily between farming and wage labor in the oil industry in Ecuador or the mining and logging sector in South Pará. This results in high intra-regional migration, low investment in permanent cropping, and short-term perspectives.

Underlying forces stimulating colonists to clear forest

The decision to become 'itinerant farmers' using slash-and-burn techniques is not as obvious as often stated in deforestation theories. It depends on the availability of non-agricultural income assistance during the early years of settlement. An oil company supplying jobs, a timber merchant buying trees, and NGOs providing loans are examples of such additional income sources in Ecuador and Brazil. In this context, deforestation has a contingent nature, occurring in fits and starts depending on a certain set of conditions characterized by the activities of lead agencies and growth coalitions.

When we compare the situation in Ecuador with that in Brazil, prospects in Ecuador may seem to be more positive for forest conservation. In contrast to other parts of the Amazon, there is no sign of massive burning or large-scale cattle ranching; the oil industry does open up the forest, but does not push pioneer farmers deeper into it. One might conclude that the impact of the colonists in Ecuador is not so devastating, since they clear less forest per year. Nevertheless, this is mostly due to the lack of a pronounced dry season for burning and the more restricted availability of chainsaws (because logging is not so predominant in Ecuador as along the Brazilian frontier). In South Pará, by contrast, all factors run counter to a transition of smallholders towards intensification. The dry season facilitates burning and the longer distances combined with impassable roads make cash cropping unprofitable; and socio-political environment is unfavorable. Anarchy and violence have created a climate of insecurity in which households see little benefit in trying to establish a permanent farm on one particular plot.

The impact of the second-wave colonists around Coca and Marabá on the land market and the way smallholders clear their plots can hardly be overemphasized. Wealthy people such as merchants, doctors, and lawyers from Marabá have invested in ranches and plantations. The popularity of animal husbandry is reflected in the higher prices that pastures fetch compared to agricultural land. In both frontier areas, smallholders clear forest with the intention of eventually selling to these investors.

Land prices are in the first place a reflection of accessibility which is determined by road conditions and transport costs. In Marabá, the land around the town is clearly divided into different price rings. Land prices range from US$ 100 per hectare close to the town along accessible roads; to US$ 5 per hectare in the isolated pioneer zones. Within each ring, prices are further differentiated according to the legal status of the land and its physical conditions.

LEAD AGENCIES: TRAILBLAZERS FOR FOREST ENCROACHMENT

It is a powerful cliché: a corporate company bulldozes with heavy equipment through the closed forest in search of valuable minerals and timber, destroying ancient trees and making the way open for colonists. The data presented above show that for many places this is a fairly accurate reflection of reality. Large companies played a major role in facilitating the colonization of many tracts of closed forests in Ecuador (foreign oil companies), South Pará (the mining company CVRD and mahogany loggers), and Cameroon (French logging companies). These are authentic lead agencies in the sense defined by Rudel (Chapter 2). Yet things have changed in recent decades. Nowadays, companies that operate at the forest fringe are often confronted with an empowered local population or other actors who claim the land and its resources. These local actors increasingly use the companies' presence in their strategy to obtain access to land, credit, and international attention. Corporate companies become new players that need to gain a foothold in a complex local setting and maneuver diplomatically to balance their goals against the demands of local people. At the same time, they also need to attend to their interests at the national level where central states control their concessions and collect taxes. For the large companies, the international level is a third battlefield where they have to defend their public image against vigilant and environmentally concerned consumers and shareholders.

This new trend does not mean the defeat or eclipse of large private companies, which continue to make profits and in most cases posses enough capital to outspend every kind of opposition to their business interests. They are an important actor behind the scenes in policy decisions regarding the use of resources at the frontier, and they have a large stake in future trends. In the following paragraphs, which focus on logging companies in Brazil and Cameroon and palm oil plantations in Ecuador, the aim is to assess the role of big business in forest destruction and the development of forest frontiers.

Loggers and frontier dynamics

Forest areas with valuable tree species may experience three sequences of logging activities corresponding to Von Thünen's three land use zones. In the first stage,

logging is organized as a purely extractive industry in natural forests. Companies concentrate on the selective cutting of a few valuable species that are transported to distant processing facilities. Local people typically participate in extraction only as chainsaw operators for the companies that have entered their forest. The high costs of road construction and transport to export markets mean that the vast majority of the trees cannot be used and are left standing. This is still the current situation in the eastern part of Cameroon and the more inaccessible parts of the Ecuadorian *Oriente*. In the Brazilian Amazon, this highly selective cutting only occurs in the most isolated areas and the Indian reserves.

In the second stage, operations are still largely extractive, but depletion of the most valuable species forces loggers to seek less profitable types of timber instead. Subsequently, investments in sawmills slowly establish a national processing industry. The increasing processing capacity of local sawmills requires more logs and, together with decreasing costs of transport to local sawmills, makes possible the exploitation of the less valuable species. At that stage, local companies enter the logging business and use the existing roads to clear these secondary species in the logged-over forest. Gradually, local people become actors in the logging sector and sell their timber to large companies or to the sawmills. The latter buy at the gate, and the role of timber traders as intermediaries becomes crucial. This is the typical situation around Marabá in Brazil and Coca in Ecuador, where local people operate in the forests and middlemen arrange transport to the sawmills. The big difference between the two cases is that market outlets in the *Oriente* are very limited, and transport further afield is only profitable for the most valuable species such as cedar. In South Pará, the processing industry is more developed after the pioneer years of mahogany extraction and better access to urban centers means a much more constant demand.

In the final stage when the forest is logged-over, all large-diameter species are cut and the remaining vegetation is used for fuelwood or charcoal in nearby towns. Forest patches remain only on steep hills and protected private land. This is characteristic of an old frontier zone, where the closed forest has almost entirely disappeared and where investments in tree plantations near sawmills become cost-effective due to the high costs of transport for timber from the old-growth forest far away. Logging now becomes a fully organized harvesting system involving much investment and expertise. This turning point occurs when species enter the stage of 'commercial extinction' and plantations become profitable instead; common plantation timber species include teak (*Tectona grandis*) and various types of mahogany species. [85] Long-term investment in plantations of these high-quality species has been profitable for a long time in Southeast Asia (ITTO, 1997). In Brazil, the turning point has almost been reached for the oldest frontiers, such as Parágominas, but the enormous supply of cheap timber from the closed forest means that massive investments in timber plantations are not yet commercially justifiable.

[85] Commercial extinction refers to the point at which a species, although it still exists in the wild, becomes so scarce that its extraction is no longer profitable. Commercial extinction always precedes biological extinction.

Lead agencies and their interaction with forest dwellers

The information in the three case studies demonstrates that most lead agencies are not trailblazers in an inaccessible forest as Rudel (1993) states. Forest-dwellers have already lived for generations in most of the forests where they operate. This makes them 'users by permission' of the landowners, who demand compensation for the extraction of timber or other resources. The main impact of these companies turns out to be an enlargement of economic options for local people in terms of cash crop cultivation, permanent accessibility, and seasonal labor opportunities. At the same time, roads and cash create opportunities for youngsters to move to frontier towns. In the eyes of most forest dwellers, lead agencies pull them from the isolated zones to new and dynamic activities in the pioneer and consolidating zones.

- In Ecuador, Quichua communities demand of oil companies that the jobs of clearing seismic lines and building roads on their territory must be reserved exclusively for them.
- Along the Rio Preto road in Brazil, men with jobs in a sawmill considered themselves fortunate and were outraged when an IBAMA raid closed the sawmill because of illegal logging.
- Around Lomié in Cameroon, excitement raged through local communities when cash from logging operations poured into the villages for the first time ever.

These facts may serve to correct the image of large companies rolling into closed forests with an army of colonists in their wake. In terms of forest destruction, lead agencies are becoming less 'initiators of the forest destruction' and more 'catalysts of frontier development'. The empowerment of many local groups has meant that lead agencies need to negotiate access rights with local people and cope with their demands. On many occasions, lead agencies and local people form coalitions to exploit the forest. If both parties benefit, a *modus vivendi* is reached whereby forest dwellers assist companies in extracting forest resources.

An quite different scenario evolves when the extraction of certain resources conflicts with their use by forest-dwellers or causes detrimental side effects for local people. Loggers felling moabi trees in Cameroon, gold miners destroying indigenous land in Brazil, and oil companies polluting rivers and private land in Ecuador have all evoked protests and violent conflicts. In Cameroon, forest dwellers do not yet have the capacity to collaborate in logging, and a row about unpaid beer can trigger a blockade of logging trucks. In Ecuador, confrontation is a last expedient for those intent on obtaining compensation from, and sharing the benefits of, the oil industry. These examples indicate that protests and blockades are reactions by forest-dwellers who lack the means to claim a share in the benefits. The semblance of reciprocity between lead agencies and local people is often very fragile, and both parties' commitment is based on short-term interests. When conflict escalates, forest dwellers may switch camps and become stewards of the forest, even asking for assistance from environmental activists to speed up forest protection in their area.

- In Ecuador, local people who had worked for Texaco for many years claimed compensation for the hazardous effects of oil pollution after the company stopped it activities.
- Xikrin Indians in South Pará realized that continuing to allow mahogany loggers inside their reserve would mean the end of their community; at this point they designed a sustainable management plan.
- When the two first 'community forest projects' in Cameroon appeared to be set up by the local elite in order to pocket the timber revenues, local people protested fiercely about forest destruction.

In the typical forest setting in Cameroon and Ecuador, loggers and oil companies have to decide carefully whether 'to buy the village or not'. Foreign logging companies in Cameroon's forest bet simultaneously on diverse stakeholders and try to keep the villagers as friends in order to avoid road blockades. In Ecuador, oil companies pay indemnities to landowners and partly accede to local demands. They are generous with outboard motors, not least because they know that Indians will become dependent on them for the relatively expensive fuel. They have also hired local leaders to help establish close relationships with the community. It is a common strategy to co-opt and institutionalize local stakeholders and activist groups by paying them as consultants (see Mayers and Bass, 1998). Missionaries in Ecuador, ironically, used the same techniques to neutralize the last Indian resistance out of a genuine concern for the Indians' welfare. It is true that it was impossible to stop the oil exploitation, but the price has appeared high in relation to the benefits. Many Indian communities have lost large parts of their territories in exchange for machetes and outboard motors.

The protests and road blockades undertaken by local people in Cameroon and Ecuador contrast with the smooth integration of the timber extraction in Brazil, where logging is one of the cornerstones of the rural economy and the most important job supplier. The rare roadblocks in Brazil are mostly directed against what is perceived as overly strict control by the forestry department IBAMA. Forest protection is not an issue in Brazil's frontier communities. The *madeireiros* are inextricably intertwined with the local economy and have become the patrons of the isolated frontier areas, so that local people are said 'to eat out of their hand'. This social relationship between loggers and colonists fits into the traditional patron-client pattern of debt peonage (*aviamento*) that has dominated the Amazon since the rubber era a century ago.

A proposed solution for the unstable relationship between lead agencies and local people is the establishment of legally organized long-term concessions. Certain of staying in one place for twenty years or more, companies would quickly see the need to make long-term investments in infrastructure and human resources. Unfortunately, the mobility of transnational companies contributes to habits of refraining from long-term investments, since they always want to retain the option of pulling out after a few years. Oil companies in Ecuador come and go depending on where business opportunities are the brightest. In Cameroon, many loggers have threatened to move to Gabon, the CAR or Congo if the new forestry code were ever to be applied with rigor. A major obstacle to the implementation of strict concession rules is that many coun-

tries are involved in bidding wars with neighboring countries, so that overly strict rules in one country drive investors into the arms of more indulgent neighbors.

Asian logging companies: new actors in Brazil and Cameroon

In both Cameroon and Brazil, large Asian companies have become active in the logging sector during the 1990s. These multinationals from Malaysia, Korea, China and Taiwan have provoked mixed feelings of suspicion, excitement, and paranoia. State rulers have high expectations, seeing them as large investors with the financial capacity to develop an efficient local processing industry which will generate jobs and add value to raw timber. Local people are in the first place suspicious toward these 'little men from the East', who do not speak their language and 'only smile'. NGOs and international activists cry blue murder and predict doomsday scenarios for the Amazon and Congo basins if these companies start to fell trees. Amid all this commotion, relevant issues to investigate are the legal and political conditions in the countries where they operate, their previous records, and their business strategies.

Asian loggers in Brazil

In Amazonas and Pará, Asian companies have obtained control over an estimated six million hectares of old-growth forest and have bought several obsolete sawmill units that were on the brink of failure. Major players include the WTK Group, Samling, Mingo, and Rimbunan Hijau. State officials invited them to invest in the logging. The climate changed when the press and public opinion in Brazil made objections and warned of the 'internationalization' of the Amazon forest. A parliamentary investigative commission did a complete overhaul of these companies' activities and ascertained a series of irregularities in their logging operations, permits, and land titles. The federal department IBAMA has reacted with large fines (*Liberal*, 10-5-99). The government of the state of Amazonas put a hold on Asian investment projects and companies from China and Malaysia have been fined for illegal logging (RAN internet page, 1998).

When the Asian companies started to invest in the Amazon, their strategy was firstly to get control of large tracts of forest before establishing a processing industry. Soon they were confronted with a chaotic land situation and a hostile reaction from the majority of the population, which complicated their operations. With the Asian crisis in 1998, they have put most of their plans into cold storage. At the present time it seems that the Asians have chosen another strategy: they establish joint ventures with local log suppliers which take care of log extraction, while specializing in processing and export trading themselves.

Asian loggers in Cameroon

At the end of 1997, Malaysian logging companies controlled around five million hectares in the Congo Basin, of which three million were in Gabon, more than one million in Congo, and some 700,000 hectares in the CAR (Karsenty, 1999b). In Cameroon, the exact amount is difficult to assess due to the transitional state of the concession regulations. Asian firms have set up joint ventures with the political elite and are especially active in the Northwest province of Cameroon close both to ports

and to forests which still contain species suitable for pulp and plywood. These companies have already had a major impact on Cameroon's exports. In the space of five years, the bulk of the export flow has switched from Europe to the Far East, especially China. The activities of these logging companies have been hampered by the crisis in their home countries in 1998, but now seem to be picking up speed again. French loggers in Cameroon have reacted to this Asian offensive with enhanced lobbying in Yaoundé aimed at preserving their privileged position. French logging companies such as Thanry and Boloré have operated in Cameroon since colonial times. They are characterized by family-based structures and limited capital, and control a small segment of the high-value timber market in Europe.

Most of the Asian companies involved have a bad environmental record in their own countries. They have been among the main perpetrators of the clearcutting in Malaysia and Kalimantan, resulting in severe forest destruction. These companies are conglomerates with investments in all kinds of industries, including timber, paper, and plantation crops (WRM, 1999). A characteristic feature is the enormous speed with which they can work due to the large amounts of capital they can mobilize. Rapid and capital-intensive exploitation is only viable if there are large concessions and no other competitors in the area. Malaysian companies, in fact, seem to have a strategy of worldwide control over large logging concessions. Tropical timber from natural forests will become scarcer in the course of the next 10 to 20 years, and then will possess increasingly lucrative strongholds in the last remaining large tropical forest zones.

Agribusiness at the forest fringe

The term agribusiness has bad connotation among forest conservationists, being associated with capitalist forces stimulating massive destruction and transforming natural forest into tracts of mono-cultivation involving exotic species and excessive use of pesticides. Advocates of agribusiness, meanwhile, underline their high productivity and ability to produce added value, provide jobs, and stimulate the development of backward regions. The purpose of this section is to examine oil palm plantations in Ecuador and soybean farms in South Pará, comparing their performance with respect to sustainability and environmental friendliness with that of smallholder farm units.

After a period of failed planned colonization schemes in the 1970s, official policies in Ecuador and Brazil have encouraged the arrival of private companies on the assumption that these will enhance economic development in the countryside. The facts from the old frontier zones of Parágominas and the environs of Marabá in the Brazilian Amazon have indicated that an intensification process is gaining pace on formerly idle grasslands. Large estate owners have begun to invest in intensive livestock and soybean production. This new agribusiness activity is developing on large farms where extensive cattle ranching was previously the dominant land use. Production, increasingly is organized according to industrial methods. Higher land prices, better infrastructure, and efficiency requirements result in concentration and intensification. The problem is that the tropical conditions make mono-cropping a recipe for soil depletion and natural hazards; only massive inputs of fertilizers and other chemical products can make this type of farming viable.

In Ecuador, two oil palm companies are active in a zone of extensive land use some 50 kilometers away from where pioneer colonists encroach on forest. Although the introduction of these plantations requires the clear-cutting of old-growth forest, it leads to an intensive agricultural regime with a high productivity. This is more sustainable than the extensive farming practices of the neighboring colonists. The socio-economic impact of this agribusiness complex, however, is negative, although it could be otherwise if things were better organized. A decently paid job on the plantation, for instance, could be a stable income source for a large group of colonist families that would then be pulled away from further forest encroachment. As it stands, these companies have not taken the opportunity to become lead agents for a stable economic development in the region, and nor have the authorities encouraged them to do so.

These oil palm companies, indeed, even act as lead agencies for newly arriving colonists. Paying wages below the regional average, they attract poor migrants from the *Costa* consider plantation work as a first step on the path of acquiring a *finca*. In order to bypass social security payments and trade union requirements, secondly, they employ labor only on a short-term, high-turnover basis. Increasing use of pesticides, and the effluents of the polluting processing plant, have meanwhile affected nearby rivers and soils on which people rely for drinking water and food cultivation (Grefa, 1986; Ortiz and Varea, 1995).

These examples from Brazil and Ecuador make it clear that agribusiness in itself is not a threat to the forest as a whole. Intensification is a logical and promising activity on older colonization frontiers where most of the forest is already cleared. The crucial problem lies in locating and delineating the zone in which agribusiness may develop and the social and environmental conditions under which it operates. Palm plantations employing cheap seasonal migrants along Ecuador's forest fringe represent a destructive lead agency enabling pioneer colonists to survive the first difficult years of colonization. Soybean plantations that can expand indefinitely towards pioneer zones represent a threat to smallholders in Brazil and accelerate the advance of the frontier. Strict regulations and close monitoring are necessary to make here and the difficulties involved in achieving these form the theme of the next chapter.

STATE POWER AND POLICY DILEMMAS

A range of policies affects forest management often providing the explanatory link between proximate and underlying causes of deforestation. As the three preceding chapters have shown, some governments consider tropical forests simply as cheap extraction zones that can be exploited for the benefit of the economic and political core of the country. Central authorities seem to stimulate the encroachment on forest land without interest in regulating environmental costs or providing public services in frontier regions. The following paragraphs concerning land use, property rights, and forestry control demonstrate that authorities are often confronted with complex policy dilemmas, and act under pressure from powerful constituencies and pressure groups.

Property rights in Ecuador's and Brazil's forest[86]

A crucial dilemma for the central state in Ecuador and Brazil is whether to grant exclusive land rights to stakeholders in the forest. The discussion here operates at two levels. One is the question of whether forest areas should be granted to indigenous minorities, or to colonists has been discussed in the previous sections. The other is that of whether frontier land should belong to poor smallholders or large estate owners. Regarding the latter issue, broadly speaking there are three different ways to improve peasant land access and curb land concentration:

(1) Forest colonization through official colonization schemes and spontaneous settlement; this has been a much-used policy in Ecuador and Brazil throughout the last 30 years.
(2) An official agrarian reform executed by a government department that buys out large estate owners and redistributes their land to landless farmers. This is a top-down approach, and has been implemented in Brazil several times since 1986 with little success. Beneficiaries of the land reform often tend to sell their newly-obtained plots after only a few years, and land ownership concentration starts again (the so called '*indústria de posse*').
(3) A land purchase/distribution program makes possible much more flexibility and puts the initiative in the hands of the farmers, as the examples of FEPP in Ecuador and the 'land bank' initiative in Brazil confirm. It enables the organizing entity to lay down environmental or social conditions for the acquisition of credit or deeds in order to avoid tragedies of the commons or free-rider syndromes, and appears to be the most balanced way of organizing land issues.

The discussion about colonists' land use strategies in the previous sections has indicated that security of tenure and sustainable farming are not always linked. In the most isolated frontier areas, usufruct or management rights may often be more important than ownership of the land. In pioneer zones, a titled property increases the value of the land and transforms it into an asset that can be converted into cash. It fuels a brisk land market like that which can be observed in all frontier areas in the Amazon. The Brazilian case demonstrates that it is counterproductive to grant individual land rights to colonists whose strategy is valorizing the land by transforming it into pastureland. In that context an official title only increases the value of the land and makes it easier to sell. Land deeds, therefore, are like paper used to cover fire once the frontier is geared towards expansion. Only if colonists possess fertile soils and are dedicated to farming with access to extension services and credit facilities, tenure security can stimulate permanent agricultural production on one plot.

Governmental capacity at state and local level

Facts from Ecuador and Brazil suggest that the influence of state regulations declines with distance from the center of power. In isolated extractive areas,

[86] In Cameroon, almost the entire forest is state-owned. There is no governmental commitment for granting land to forest-dwellers and the legal procedure for registration is very onerous and costly (see section 5.2.3).

establishing state institutions is prohibitively costly and difficult. The role of state agencies is limited to facilitating further development by means of road and infrastructure construction; the resulting processes are not monitored. In Ecuador, the state is personified by the military forces that are in charge of protecting the strategic oil industry and carrying out anti-guerrilla and anti-narcotics operations. In Brazil, investments at the pioneer frontier made to open the forest for mining, logging, and agribusiness act as a safety valve to release pressure in areas with poor and landless peasants. It is characteristic of national policy-making that central governments show little concern for the local needs of rural people and indigenous forest-dwellers.

The cattle disease 'aftosis' is still present in the Ecuadorian and Brazilian Amazon. This might seem fortunate from a conservationist's viewpoint, since it blocks the export of meat to large markets in Europe and the US and consequently slows down the conversion of forest into pasture. This could change dramatically if the Amazon were to become aftosis-free, in which case and a new 'hamburger connection' would appear. For the moment, this possibility is still distant due to regular outbreaks of aftosis in all Amazon frontier areas. Nevertheless, a closer look at the root cause of this persistent pest problem reveals a general incapacity of policy-makers to tackle any kind of problem at the forest frontier.

Government departments in Ecuador and Brazil are at pains to combat aftosis and invest massively in vaccination campaigns (Box 4.4). Large ranchers are aware of the opportunities opened up by an aftosis-free herd, and local farmers' associations advise their members to vaccinate and explain that local meat prices will increase substantially if export is possible. Everybody seems to have an interest in solving the problem. Only the small peasants in remote pioneer zones lack that information, or the necessary capital. Many do not vaccinate their animals, and continue to contaminate cattle markets with their livestock.

The aftosis problem in the Amazon shows a close parallel with the issue of forest management. Every cow represents approximately one hectare of forest cleared. Governmental incapacity to tackle this particular problem at the pioneer frontier is illustrative for the way life goes on in this outlaw zone, and reveals one of the main obstacles for sustainable land use in the Amazon. If policy-makers are not able to reach the cows or their owners despite an obvious win-win situation for all, how can governments then be able to monitor the much more tricky regulation of the land on which these cows graze? Large parts of the Brazilian Amazon can be considered as an open-access area, where loggers and local people can fell trees as they want. State agencies are not in a position to decide what resources to protect or how to regulate resource use. An additional obstacle to an effective control is that state authorities are not capable of monopolizing the legitimate use of force in the Amazon. In the rural areas of Southern Pará, *pistoleiros* represent the ultimate armed authority and can imposes their own rules. The incapacity of institutions has already been exposed several times in Ecuador and Brazil, to the extent that the civil state abdicates power and shifts administrative control to the military. Militarizing forest zones is no sustainable solution: troops can effectively prevent conflict escalation or fill a power vacuum, but in the long-term, their use to protect frontier areas seems

unrealistic and too costly, because they are not trained or motivated to do it as a their main task.

Given the limited power of the state on the periphery, the question arises whether authority should not be devolved to municipal and local authorities. It is often suggested that one reason for the failure of forest management is the high degree of centralization in decision-making. Many studies recommend the decentralization of power to regional authorities and local branches of the forestry department. In Brazil, elaborated plans already exist to transfer timber control and monitoring authority to the states.[87] In Marabá, however, local institutions have proven incompetent to take over these powers and in the forests of Ecuador and Cameroon the situation is probably similar. Moreover, the presence of powerful foreign oil and logging companies whose budget and manpower resources outstrip those of small municipalities, threatens to transform forest regions into miniature 'banana republics' if too much autonomy is granted.

Patronage politics and tropical forests

An easily drawn conclusion from the data chapters is that public agencies in the three frontier areas do not function optimally. Inexperienced and unmotivated staff and chronic budgetary problems are often mentioned as reasons for this. Weak interdepartmental communication also results in poor collaboration between agencies, and sometimes even in sabotage of each others' policies, as in the case of INCRA and IBAMA in Brazil. In addition, a number of 'perverse' mechanisms restrict governmental capacities.

In all three cases, central states have usurped full ownership over valuable resources and respond to local objections with opaque and small-scale compensation policies. In Ecuador, minerals in the subsoil are state-owned and generate a third of the state budget, while the landowner can claim only a minimal compensation for drilling. In Cameroon, the forest belongs almost entirely to the state and local people negotiate small compensations in kind. In Brazil, the mining company CVRD earns millions of dollars in South Pará while the local population lives in total misery. This situation has important consequences for forest management in general and the sustainable use of forest resources in particular. Policy measures concentrate on granting concessions and stimulating vertical integration of the industry without paying much attention to local needs and the monitoring of activities in the forest.

The data from the field have also indicated that corruption occurs in all countries and at all bureaucratic levels. At the local level, officials turn a blind eye to illegal activities in the forest in exchange for bribes. At the national level, the political elite intervenes for personal enrichment in the processing of logging permits, land titles, and mining concessions. For the purpose of this analysis, it is less important how corruption functions than why it is omnipresent and apparently persistent (some critics even call it 'endemic') in the three countries. The origin of this problem is not just a matter of the poor ethical standards or incompetence of the agencies involved in forest management. In frontier areas, the combination of illegal forest extraction with

[87] According to these plans, the forestry department IBAMA will be transformed into a federal umbrella agency in charge of forest protection, interstate issues, and the export of timber to other countries.

corruption is lucrative for state rulers and powerful socio-political forces at the national level stimulate it.

Corruption in Cameroon and Ecuador

The reality of bribery and lack of proper forest management in Cameroon cannot be explained in terms of a gradual diminution of state power with increasing distance from the center. The central state apparently considers it sufficient to control strategic sectors such as the timber export port of Douala and the granting of logging concessions in Yaoundé. Once outside the headquarters of MINEF, a wild jungle begins in which he who has the largest chainsaw cuts most. Moreover, teams of officials from Yaoundé regularly control even the most remote logging areas south of Yokadouma at the border with Gabon and the CAR in order to extort money from logging companies. It is notable that Ecuadorian politicians and journalists often call decisions about the oil industry and forest policy 'political decisions', a term used to imply corruption as opposed to the cost-benefit rationality of a 'technical decision'. There is a strong feeling that negotiation with all parties about logging will never lead to a consensus acceptable to all. In this light INEFAN's sporadic repressive measures seem to be the only way to make some progress (Box 4.6).

The facts from Cameroon and Ecuador indicate that the central state does not have a truly balanced policy to curb illegal logging, oil pollution, and further forest encroachment. Political authority often depends on leaders' business contacts and reflects clan politics whereby politicians, businessmen, and local strongmen use the political process to vie for control over the economy. This leads to embezzlement, insider trading, and preferential treatment in the granting of licenses, the typical situation, according to Yates (1996), in 'rentier states'.[88] Rentier states refuse to maximize their capacity to tax the exploitation of their own forest resources due to the political rules of the game. This is evident in Cameroon with its 'politics of the belly. In Ecuador too, the central bureaucracy is satisfied with a relatively small share of the revenues from timber and oil for the national treasury and leaves in place a parallel system of collusion and bribes. Concession contracts are granted more as an expression of gratitude than as a reflection of cost-benefit analysis. Oil companies in Ecuador have obtained unduly favorable contracts, and logging companies in Cameroon pay relatively low fees.

State control in Brazil

In Brasilia, the federal bureaucratic system is given to policy inconsistencies which reflect two conflicting issues. On the one side, there is the intention to stop illegal logging, to enact agro-ecological zoning and land titling to indigenous people. On the other side, state departments are inclined to expand colonization, large-scale projects and resource extraction. The underlying cause of these conflicting policies lies in the political fault lines in Brazilian society between rich and poor, South and North, rural and urban.

[88] Rentier states: small states that depend for a large part of their revenues from the activities of foreign companies extracting resources from their territory.

Since president Cardoso came to power, he has regularly shown real commitment to tackling the Amazon's serious socio-economic and environmental problems. On other occasions, he has retracted these most decisive measures (Box 3.8). Many ambiguities can be explained as an attempt to gain at the same time legitimacy and to offset national and international criticism. Next to that, there were also strategic goals to use the colonization schemes in the Amazon as stopgaps for the growing number of urban poor and the pressure for significant land reform.

Inside the Brazilian Amazon, the real problem lies much more at the state and municipal level. In South Pará, small groups of *fazendeiros* and *madeireiros* have organized what Olson (1982) calls 'distributional coalitions'. They represent the greatest economic power at the local level, dominating municipal politics and countering with violence, intimidation, and embezzlement every governmental attempt to monitor and regularize timber felling and forest burning. With their mobilization capacity and power, they have already penetrated state institutions to such an extent that they can obtain monopoly rents from credit, or infrastructure works that the federal government distributes along the frontier. In this situation, decentralization means that the federal authorities in Brasilia surrender control over land allocation, road construction, and 'law and order' in frontier areas into the hands of a powerful regional elite.

Forestry departments

Government forestry departments in the three countries have traditionally been designed to exploit the public forest in such a way that it generates a constant supply of timber for sale and profits for the national treasury. In the 1980s, part of their policy was directed towards strict conservation of forest reserves in accordance with advice and funding of conservation agencies. In the last decade, these departments have also launched initiatives to involve forest-dwellers and other forest users in forest management. The mixing of all these different priorities has brought about contradictory policies that contribute to the image of ill-performing forestry agencies.

- MINEF in Cameroon gives logging companies a free hand and has designated most of the forest as an exclusive logging zone. Other areas such as the Dja reserve are strictly protected (at least on paper), leaving local people with only some small stretches of land along the roads.
- Conflicting interests are rampant inside IBAMA in Brazil and INEFAN in Ecuador. Both departments get their budgets partly from the granting of logging concessions and partly from the strict conservation and management of national parks.

The three forestry departments all have to deal with similar problems of insufficient staff and logistics, budget cuts, and officials accepting bribes. These problems are responsible for many distortions their functioning, but there is also a more fundamental difficulty related to the way forest officials operate: in all three cases, the *apparatsjik* syndrome has become entrenched in the minds of local officials. Many restrict their activities to deskwork and use their competence to fine small fry offenders and exert

over-control on trivial issues. This kind of distortion has sparked off feelings of distrust and even hatred among the local population, complicating collaboration on crucial issues such as co-management of national parks, efficient tree felling, and forest zoning.

- In Ecuador, INEFAN fined people in Coca who kept caged parrots in their homes without the necessary permit, while trucks full of illegal timber ran freely through the same street.
- In Brazil, IBAMA confiscated unregistered chainsaws from poor peasants who had bought them on credit in order to clear trees from their own land, while entire logging teams, operating illegally with trucks and skidders in the same area, were not bothered.
- In Cameroon, MINEF officials in the field spent most of the day extorting money from foreign logging companies operating in their sector.

In the same vein, federal forestry departments do not have legitimacy either with the public or with other officials. One consequence of this alienation is that forest policy inevitably takes on a repressive character because other ways of collaborating are not developed. Over--active and even genuinely dedicated officials may be subject to reprisals from the local population as in Marabá where one of the staff officials whom I interviewed was shot dead in 1998. In Ecuador, INEFAN is not really capable of imposing forestry regulations in the *Oriente*. The military forces consider these regulations to be outside their purview and restrict their control to the flow of petro-dollars. Timber for them, is not a strategic resource, illegal logging and the smuggling of wood to Colombia are tackled only sporadically.

International agencies and scholars have produced many elaborated studies on forestry taxes and regulations, and have stressed the importance of combining neutral fiscal policies with environmental taxation (for an overview see Karsenty, 1998).[89] The greatest obstacle for the implementation of these instruments is the existing system of administrative monitoring in most tropical countries (Karsenty, 1999). Pricing mechanisms for concessions depend on the availability of information about trees, values, and timber markets, but this information is not systematically available or regularly updated in either Ecuador, Brazil, or Cameroon. Moreover, there is evidence from Cameroon that a high degree of discretionary power and legal obscurity helps officials to extort money. In Brazil and Ecuador, the logging industry is crucial for the regional economy and strict regulations are impossible to enforce for weak forestry departments that are confronted with a local economy dominated by logging.

Some commentators call for high-technology solutions to the problem of forest destruction. Technically speaking, such solutions are now available both in Brazil (satellite surveillance) and in Cameroon (SGS's proposal for a track system with bar coded logs). Expertise is not the major bottleneck; what is missing is the will to exert

[89] Green or environmental taxation is imposed for the sake of its incentive effects, as opposed to the orthodox use of taxation to provide for the state budget without affecting behavior patterns (fiscal neutrality).

control effectively on the ground. State rulers prefer costly high-tech inspection devices to physical enforcement in the field; This is one more illustration of their incapacity and unwillingness to exert power in the frontier areas where forest encroachment is taking place.

THE INTERNATIONAL DONOR COMMUNITY: WATCHDOG FOR THE FOREST

Environmental non-governmental organizations (ENGOs)

Environmental NGOs have dramatically stimulated the debate on tropical deforestation, transforming it into an international issue. However, many of these organizations concentrate too much on relieving the pain, rather than curing the disease that is responsible for deforestation. Their pleas to stop illegal logging, oil exploitation, mining, road construction, and cattle ranching, largely blame multinationals and large-estate owners. As activists, these ENGOs pretend to preach universal values regarding forest protection, nature equilibrium, and sustainability. Their appeal to higher values should not divert attention from the important point that this kind of forest destruction is supported by sovereign states that want to develop and by local people who have to survive.

Luhmann (1986) characterizes this kind of communication by environmental movements as part of their 'fear communication', the function of which is to alarm society. In that sense, they have an important task in Western countries to sensitize public opinion and put pressure on politicians and policy makers. These strategies are functional and should not be judged morally. However, ENGOs should remain that way and not aspire to decide the future of large tracts of forests. Their perception is biased, their representation of the facts is one-dimensional and oversimplified, and they are seldom legitimate representatives of the groups and interests involved in a specific forest area. The case of the American organization NRDC, which claimed to act as a representative of the Huaorani Indians in Ecuador was tragic evidence of this.

For most activist ENGOs (for instance, RAN, EDF, and Friends of the Earth) the tropical forest is a Garden of Eden containing a treasure of biodiversity; it is also an exclusive playground for indigenous groups with traditional lifestyles. They largely ignore the interests of colonists and readily put all blame on large companies and governments. Their strategies focus on the empowerment of indigenous or local communities in order to defend their rights against rent-seeking elites and international mineral and logging companies.

Sometimes these activists are correct that fighting 'green guerrilla' for forest-dwellers is the only way to obtain real influence and decision-making power in the face of centralist policies and powerful external actors. At the present time this approach is dominant in the Ecuadorian Amazon, where attempts at consensus and negotiation have resulted only in a further disadvantagement of the weakest group. Indians have learned that they get locked into lingering talks without obtaining concrete benefits, and therefore, choose instead for confrontation with oil companies and government institutions.

A more moderate view is present in international organizations such as the WWF, which considers forest protection as a political arena encompassing conflict-

ing interests. In some strategically chosen cases, a consensus can be reached through negotiations toward various forms of co-management and win-win scenario. But this approach only succeeds sporadically, whereas its advocates tends to see it as a ready-made solution in all cases. In practice its effect may well be to water down restrictions on forest use to the point of surrendering to powerful interest groups in order to maintain the peace, in which case the forest continues to lose ground.

World Bank forest policy

In the last ten years, the World Bank has begun including loan conditions related to forestry into its Structural Adjustment Loans (SALs). In 1998, it has forged a coalition with the WWF, the so-called forest alliance, to work jointly on protected areas and forest certification. The goal is to establish coalitions of forest interest groups inside tropical countries, and to develop new methods of sustainable management. It is hoped that 100,000,000 hectares of certified tropical forest will exist by 2005 (World Bank-WWF, 1999). These are crucial developments, the results of which can be looked at in more detail in the cases of Brazil and Cameroon.

Seymour and Dubash (1999) have investigated how loan conditions have played out in Cameroon. The World Bank used 'conditionality' to states to adopt rules designed to improve logging practices, reduce opportunities for corruption, and make logging companies pay more to the treasury and to local communities. This arm-twisting, however, has proven much harder than originally foreseen. The Bank has had difficulty getting governments even to write down new forestry laws and regulations, let alone to implement them. The Bank had a unique chance to press for reform when Cameroon's rulers desperately needed money to handle the economic and political crisis. At this point, according to Seymour and Dubash, it over-played its hand. Every new loan included strict forestry conditions, but Cameroon's state rulers were consistently able to water them down to soft clauses with enough loopholes to keep their 'politics of the belly' running. When the economic situation improved, the government stopped paying attention to the Bank's demands and in due course pressures also mounted within the Bank to ease up on the conditions. World Bank officials have expressed their discontent with the pace of the changes, but surprisingly have continued to grant the agreed loans after some delays. The reason may well be a trivial one: the World Bank is in the first place a 'lending' institution.

In Brazil, the World Bank is closely involved in the implementation of PPG-7 a project which has already spent around US$ 100,000,000 in many sectors in the Brazilian Amazon. Fragmentation of interests and investments, combined with an impracticably broad and ambitious goal (mitigating deforestation in the whole Brazilian Amazon) has made PPG-7 top-down project consuming millions of dollars without having significant impact on the ground. The World Bank collaborates closely with the federal government and officials in Brasilia are willing to implement environmental policies. Many of the bottlenecks, however, are situated at the state and municipal levels, where powerful actors involved in deforestation pull the strings.

A recent development in the Bank's policy is its current attempt to change its policy of refusing loans for any kind of logging projects in natural tropical forests. There has been loud criticism from the logging sector about the Bank's inability to stimulate sustainable activities in old-growth forests.[90] Business people argue that the Bank's ban on commercial initiatives for sustainable harvesting blocks initiatives that want to make logging operations more sustainable. Conservationists strongly oppose any attempt to water down the current regulation, which they see as aimed at obtaining finance for business interests. They rightly point to the lack of concrete examples of commercial logging companies operating in tropical countries with a commitment to sustainable logging. Nevertheless, Bank officials seem to be acting in the genuine belief that the only way the agency can clean up the forest industry is to engage it.

Amid all these controversies and opposing interests, the Bank must work closely with local groups, conservationists, logging companies, and national authorities in order to adjust and improve forest policy reforms. Such cooperation requires a flexible approach and a long-term commitment to building a constituency for reforms. This is the only way to bring about lasting reforms that involve the type of gradual changes in institutions and thinking which are needed if there is to be any chance of success on the ground. The alliance with the WWF is a promising sign and marks a considerable change from the situation in the 1980s when the World Bank routinely financed road infrastructure and dams in tropical forest areas. In relation to the recent lifting of the ban on loans for logging in natural forests, which seems promising to me, the new Bank policies should never turn back the clock, but rather should remain open to promising business initiatives.

Concentrating on existing or potential hot spots

The adequate allocation of international funding to fight tropical deforestation is always difficult to assess and does not follow strict criteria of efficiency or effectiveness. The international community needs to reflect critically and continuously on which location should have priority and what kind of actions should be undertaken. The traditional approach looks for the worst cases with the highest rates of deforestation, the so called 'deforestation hot spots', and tries to mitigate the destructive forces operating at those places. However, researchers of the European TREES project who have mapped these hot spots claim that by that stage pressures to clear the forests have already become too strong to be countered and argue that conservation efforts should concentrate instead on places that are still 'cold spots' with a large probability to become 'hot' (Pearce, 1998). Along many frontiers, the underlying social and economic forces driving deforestation are so overwhelming that the chance of success for management plans are close to zero. Resources would, therefore, be used more effectively if they were deployed proactively and focused on preserving threatened forest areas where the natural vegetation is still intact. The same shift in thinking has occurred spontaneously among some conservation projects in Brazil, Ecuador and Cameroon.

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[90] Community-based forestry project are excluded from this loan restriction on the basis that they can be appraised on their specific social, economic and environmental merits.

- Along the burning forest frontiers of South Pará, environmental NGOs and projects keep a low profile because the tense social situation and the massive strong forces for deforestation make an integrated conservation policy impossible. The planning department IDESP has also wisely bypassed South Pará in the search for pilot study areas in the framework of the ZEE zoning plan, realizing that such studies would only exacerbate land conflicts.
- In Cameroon, the WWF concentrates its conservation efforts on three remote areas in the East that are relatively well preserved. The aim is to establish an effective park management before more logging roads open these areas. In the Dja reserve, ECOFAC seems to be fighting an uphill battle against poaching. This forest area has become a "hunting hot spot" surrounded by people and roads. A tactical retreat might be the best solution.

An extrapolation of the hot spot/cold spot dilemma to the global level leads to the question whether it is better to give priority to the Congo basin and leave the Amazon to its own devices. Global concern, international arrangements and diplomatic issues would in practice make such a radical strategy impossible to execute, but as an academic exercise it is still instructive to compare the effectiveness of each dollar spent in the 'Amazonia hot spot' and the 'Congo Basin cold spot'. The PPG-7 project in the Brazilian Amazon has spent US$ 100,000,000 while deforestation figures in the Amazon continue to hit record highs. The whole ECOFAC project for Central Africa has cost Euro 42 million between 1992 and 2000, and has made a start with conservation in Cameroon, the Central African Republic, Gabon, and Equatorial Guinea. In Cameroon, ECOFAC is perhaps not so successful in curbing poaching, but no trees are felled inside the Dja reserve. It looks, then, as if for every dollar spent in the Amazon to protect it from burning, several hectares of forest can be put under an effective protective regime in the Congo Basin.

It looks as if the colonization frontier in the Amazon is too long and too inaccessible for proper management and monitoring. Protective agencies are fighting an uphill battle against the large and numerous destructive actors operating along this thousand kilometers long frontier of burning forests. The Congo Basin, on the other hand, represents a relatively clear picture of a handful of large logging companies that could be forced by means of fines, taxes or certification to change their felling practices. However, this purely economic calculus of costs and benefits does not take into account political readiness to act and to cooperate. On that point the Congo Basin, and Cameroon in particular, have a bad reputation. The 'politics of the belly' has produced a predatory state policy that shows very little concern for the public interest in general and for forest protection in particular. Conservation efforts have to look for other partners and mechanisms than state institutions and bilateral aid programs. Whatever the choice for cold or warm spots, it always boils down to assessing the effectiveness of a concrete measure on the spot. The next chapter, therefore, discusses the issue further in the concrete context of examples from the field.

CHAPTER VII

FOREST PROTECTION AND SUSTAINABLE FOREST MANAGEMENT

INTRODUCTION

Reducing the rate of tropical deforestation can follow two directions. The first is a top-down path of national and international policy measures and consumer behavior in developed countries, with an important role for ENGOs. The goal here is to tackle the main causes and mechanisms of deforestation by a combination of corrective measures (regulations, fines, bans, and certificates) and positive instruments (green funds and subsidies, conservation projects, and international donor money). The second strategy is to developing community solutions that work from the grass-roots level upward, gathering the critical mass to generate sustainable management of forest resources. In an ideal situation there is a direct link between these two styles of intervention with exchanges of ideas and support forging alliances among the different actors involved.

This chapter will not attempt an exhaustive analysis of popular policy instruments, concentrating in stead on a few important alternatives to deforestation that are relevant to my three case studies. The aim is to develop a deeper insight into how initiatives have matured, which roles the different actors play, and where improvements are still possible in Ecuador, Brazil and Cameroon. Underlying all these alternatives is a loosely defined concept of sustainable resource use in tropical forests.[91] The debate on this concept lies beyond the scope of this study and will not be discussed further. The Kyoto agreement sees forests as carbon sinks, while the WWF and Greenpeace focus on conserving the planet's biological biodiversity in tropical moist forests, and poor colonists in the forest see trees as an obstacle for farming. This chapter will demonstrate how the alternatives of proper forest management, mostly emanating out from the international donor community, have resonated so far in the forest environments of Cameroon, Ecuador, and Brazil.

ENVIRONMENTAL ZONING AND PROTECTED AREAS

Agro-ecological zoning

The presence of different land use zones along forest frontiers leads automatically to the use of agro-ecological zoning to regulate forest use and avoid conflicts between agricultural development and biodiversity conservation. Zoning tends to encourage

[91] In general terms, nature-society relations should support the continuation of forest-use systems in order to maintain current living standards (Smith *et al.*, 1995). In practice, sustainability boils down to the ecosystem's ability to maintain its basic structure despite human interference. Key dimensions of this ability are the resilience to rebound quickly from human interference, and the flexibility to adapt to perturbations (Holling, 1986).

development in areas which have already been colonized for long periods, while restricting land use in ecologically sensitive areas in isolated zones (Lele *et al.*, 2000). As long as zoning means the promotion of development by means of infrastructure, local user groups tend to make no objections. However, zoning requirements involving land use restrictions are much more problematic (Nitsch, 1994).

More flexible solutions have been proposed to overcome the drawback of low participation and unwillingness of local actors to cooperate. An example is the idea of Transferable Development Rights (TDRs) which allow for substitutability of land use zones between neighboring areas and provide incentives for compliance (Chomitz, 1999). TDRs allow negotiations between land users of redrawing the boundaries of land-use zones and provide financial rewards for those who protect resources. Ideally, they result in the conservation of forest land with low agricultural potential by offering financial compensation to the affected landholders.

Fundamentally, the zoning instrument always requires a 'command-and-control' approach, based on monitoring and punitive sanctions in the field, in order to be effective. This proves to be the most serious obstacle to effective zoning in tropical frontier areas. The prohibitive elements of a zoning plan are difficult to enforce in remote and marginal forest areas with poorly developed institutions of government. As long as central authorities are reluctant or unable to police zoning negotiations, little will be changed by the construction of digital maps in offices.

The experiences from the field recorded in this study have not provided much evidence for successful zoning to date. The large zoning plan PLANAFLORO in Rondônia in the Brazilian Amazon, financed by the World Bank, has proven unsuccessful. The even larger integrated zoning plan for the whole Brazilian Amazon ZEE has also had great difficulty getting a foothold at the regional level. State authorities and municipalities are not willing to curb the advance of the colonization frontier in exchange for forest protection. The fundamental problem is that local groups demand more roads to improve the accessibility of their area, and wish to shift restrictions on forest use to other areas. This 'not in my backyard' syndrome is particularly strong in Southern Pará, where local authorities support colonization and oppose IBAMA's inspections, protected areas, and indigenous reserves.

In Cameroon, an important task of the Tropenbos Research Project was to prepare Forest Management Plans as part of an integrated land use plan for the area around Kribi and Campo Ma'an. The implementation of the plan proved too complicated in a national political setting that showed no commitment to planning.

These examples perhaps indicate that zoning is not effective for protecting forests that are already in the reach of the logging teams, but is appropriate for protecting the last forest patches in a older frontier area once such a zone has come within the range of planning departments that are able and willing to exert control.

Park management and protected areas

During the 1980s, the view that virgin forests should be preserved intact gave way to beliefs in sustainable forest management and co-management involving local people. The latter criticized the 'fences and fines' approach that excluded them from

national parks designed according to administrative blueprints without prior local consultation. In the 1990s, however, this more participatory management style did not yield much success. Wells and Brandon (1993) reviewed 23 projects in Africa, Asia, and Latin America and found that very few could be regarded as successful. The main problem remained that of enlisting the necessary cooperation from local communities.

Gradually, however, results have become more promising. Bruner's (2001) recent assessment of 93 protected areas has provided concrete evidence of effectiveness. The majority of the parks examined by Bruner have been successful at stopping land clearing, and to a lesser degree also at mitigating logging, hunting, burning, and grazing. Park effectiveness correlates with basic management activities such as enforcement, boundary demarcation, and direct compensation to local communities.

This endorses the hypothesis that park management can be a suitable instrument for protecting tropical biodiversity when sufficient management capacity and field enforcement are available. These preconditions require substantial and long-term commitments to maintaining operational park rangers in remote forest areas. Central states are very reluctant to allocate the necessary resources, leaving the initiative to international donors. Their attitude is effectively that if the developed countries want pristine rainforests filled with giant trees and animals, then the developed countries should pay for them.

To counter forest degradation and destruction, traditional park management still appears the most suitable instrument. Today, all park management projects realize the need to combine forest protection in one area with the enhancement of earnings for local people in the surrounding buffer zone. This include the promotion of sustainable agriculture and sustainable harvesting of forest products, often in combination with nature-based ecotourism (Southgate, 1998). Different park management regimes exist: strict biological reserves, extractive reserves, and indigenous reserves. The problem remains that even when central agencies install appropriate policies, poor implementation and local reluctance to enforce constrain proper management (Grainger, 1993).

In Cameroon's Dja reserve, which had a protected status since French colonial times, the ECOFAC park management and local people have visibly divergent interests (Box 5.4). Forest-dwellers consider the wildlife as a protein source, while the EU-funded project puts priority on protecting the last remaining large wild mammals. The national parks Cuyabeno and Yasuní in Ecuador are under continuous pressure from advancing colonization frontiers, and even from indigenous groups extending their hunting grounds. In Brazil, Indian reserves are the subject of much controversy concerning the felling of mahogany; Chapter 3 has indicated the involvement of the Kayapó Indians in this controversy.

Inside the park boundaries in these three countries, nevertheless, most of the trees are still standing. This endorses Bruner's contention that despite all the problems and conflicts over the use of resources, massive cutting usually stops at the borders of the parks even when it continues in the surrounding non-protected forest. Parks with guards cannot guarantee 100 percent protection, but that they are

still much better than regional zoning plans drawn on maps and inadequately enforced.

CERTIFICATION OF TROPICAL TIMBER

The international discourse

Since the Rio conference in 1992, 'criteria and indicators' for the sustainable management of forests have been developed and gradually put into practice. ITTO was one of the first organizations to develop a set of directives, and since then a range of other initiatives has been started.[92] This growing interest in timber certification has already culminated in the first sustainable timber loads becoming available in Europe and the United States. Certification seems to have a bright future in a world where customers in the first world seem to be able to set standards for companies operating in tropical forest.

The leading organization in the field is the NGO 'Forest Stewardship Council' (FSC). Forest products bearing the 'FSC label' have to meet this organization's standards of forest stewardship as defined in its 'Principles and Criteria for Forest Management'. In 2000, FSC has certified twenty million hectares forest, of which one million hectares is tropical natural forest.[93] This FSC certificate not only indicates sustainable harvesting of timber, but also compliance with norms for environmental, socio-cultural and management/monitoring aspects, assessing issues of biodiversity conservation, property rights, social rights, and the protection of indigenous people.

A fundamental question is whether patches of natural tropical forest will be effectively preserved from logging, because consumers in the first world are willing to pay more for labeled timber. There is still much controversy about the appropriateness of this instrument as a way of tackling the problem of uncontrolled logging. The FSC has to cope with some inherent problems. Firstly, the whole certification system is based on a system of civil law involving contracts between logging companies that stay only a few years at any given site. Standards are set by non-governmental bodies, and largely exclude national authorities. Secondly, the structure of the international timber market with its large range of raw materials and unprocessed and finished products, complicates the task of tracking down the origins of tropical veneer and plywood in finished products. Finally, the market share of certified timber is limited to a few sensitive markets in western Europe, where a minority is willing to pay more for certified timber.

Advocates defend certification as a win-win scenario for both loggers and the forest. They argue that building critical mass in tropical countries for massive certification is the way ahead for natural forest management, and many support a

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[92] Proposals for 'Criteria and Indicators' have been developed by the IUCN; the Rainforest Alliance; the African Timber Organization (ATO) in Central Africa in collaboration with the research institute CIFOR; and the World Resource Institute (in its Tarapoto Proposal for Amazonian forests).

[93] Natural tropical forests with an FSC certificate are mostly situated in Bolivia (884,000 ha). The majority of the 20 million hectares certified forests are industrial tree plantations in temperate zones (FSC, 2000).

'phased certification' that allows softer requirements at an early stage. An argument in favor of this approach is that certification is strategically a very good instrument for starting up the necessary collaboration between the timber industry and conservationists. For too long these blocks have simply opposed each other, which has done the forest no good. Timber extraction will continue and is an important economic activity in forest areas. Conservationists should therefore act strategically: if they cannot beat the logging industry, they should set up joint ventures with it in the form of certification schemes. In Western countries, the availability of an alternative could also positively influence consumer preferences and increase the market share of labeled timber. Ultimately, certification could become a basic business requirement for the whole timber-producing industry (Plouvier and Roux, 1997).

Critics, however, consider certification only as a complementary instrument for forest protection in transitional zones adjacent to sealed-off areas closed to logging. Certification cannot contribute to stopping the penetration of cut-and-run logging companies that operate without any management plans in remote old-growth forests where no formal law and order reigns. Critics warn, too, against undue optimism; current certification aspirations, they say, are unrealistic and at the same time give logging companies an alibi to continue opening up closed forests.

In addition, the limited market share of certified timber in relation to the total volume of wood extracted from natural forests mean that certification can never be a panacea for destructive logging. Many experts do not believe in a gradual growth of the market share of labeled timber up to a level at which certification would become a necessity for the whole industry. In any case, it would probably take so much time to establish fully-fledged certification programs that by then logging companies would already have opened all remaining closed forests in the Congo Basin and in the Amazon (Kiekens, 1997 and 1999).

Experiences from the field

After a failed attempt in Gabon, Cameroon is now the most advanced country in Africa as far as timber certification is concerned.[94] The WWF started the initiative in Cameroon, and the European Union has joined the cause with substantial funding. Box 5.9 has indicated that the committee in charge of formulating national FSC norms did not function properly. Among its members, there was surprisingly little interest in certifying trees and much more in boosting the level of international funding. Secondly and more seriously, logging companies in Cameroon currently use certification as an alibi to allow them to continue with their cut-and-run logging in the natural forests, which is still much more profitable than making heavy and long-term investments in certification. The result for Cameroon is that the EU pays millions of Euros for a certification structure which is unable to get a foothold in the forest because of a total lack of local support. In the mean time, logging teams march deeper into the forest and there are not inadequate means to protect the areas in Boumba Bek and Nki, which

[94] The only FSC certificate that has really existed in Central Africa was issued in 1996 to the French company Leroy in Gabon. A year later, the certificate was withdrawn after evidence of unsustainable harvesting methods was gathered by environmental groups in Leroy's concession (Nguiffo, 1998b).

need urgent protection against encroachment. These facts are strong indications that certification is not the best strategic approach for the Congo Basin at this stage.

In Pará, illegal logging dominates and neither sustainable logging nor certification is an issue at all. The reason for this is the clearing mentality mentioned earlier, and the fact that there is still too much easily accessible forest left along the colonization frontier. The only existing certified forests are situated in the neighboring state of Amazonas, where a company called Precious Woods exploits an 80,000-hectare certified stand. The envisaged annual production of sustainable harvested wood is 25,000 to 30,000 cubic meters. The company's logging practices cost some 30 percent more than the traditional methods and a Swiss NGO covers the extra costs (Van der Wiel, 2000). Recently, the Gethal company invested one million US dollars with a view to obtain a FSC certificate for another 40,000 hectares natural forest in Amazonas.

These examples from Southern Cameroon and the state of Pará demonstrate that certification initiatives have great difficulty in getting off the ground, not only because of initial problems but also due to structural drawbacks. Phased certification is no solution, because both areas still have too much natural forest which is open to powerful outside encroachers and few weak local actors with an interest in long-term management. On the other hand, the forests of the state of Amazonas in Brazil (a cold spot in terms of deforestation) are still largely untouched and timber exploitation is in the first stage of selective logging, hampered by long distances and inaccessibility. At this stage starting with certification is effective, because it creates a standard among pioneer companies to which newcomers must adapt if local policy makers force them to. In that case, new investors must adopt FSC certification which can become a benchmark condition for the granting concessions in Amazonas.

REDUCED IMPACT LOGGING

General principles and international efforts

Sustainable logging practices require timber harvests that do not exceed rates of tree regrowth, so that the regeneration capacity of a tract of forest does not deteriorate and the habitat, regulatory, and production functions of the forest are preserved. With this principle as their starting point, research institutes and international organizations have designed criteria for efficient logging.[95] These include selective logging and the use of long rotations depending on the specific regeneration period of the trees concerned. Logging should be staggered so that at any one time, different areas are at different stages of disturbance (WRI, 1992).

In order to make the general goals of sustainable forest use more concrete, the principles of Reduced Impact Logging (RIL) offer a starting point for forestry agencies to work out practical regulations. Scholars contend that RIL is economically feasible in the long term and brings significant conservation benefits. This technology focuses on appropriate harvesting planning in order to reduce wastage

[95] Examples include Tropenbos in Guyana, CELOS in Suriname, CIFOR, the World Resource Institute, and the ITTO (for an overview see Haworth and Counsell, 1999).

costs and improve efficiency in the different stages of the felling process (Kiekens, 1999).[96] Important principles of RIL are directional felling in order to minimize the damage both to the log and to the residual stand, and the careful planning of roads and skid trails in order to limit their width and density.

Logging realities in the three countries

Bowles *et al.* (1998) contend that international policies of the ITTO and the FAO have stimulated the opening of large tracts of forest without guaranteeing sustainable management in the long term. These policies are ultimately counter productive and represent an excuse for many tropical countries to continue covertly with the expansion of unsustainable forest industries. At the same time, advocates of more legislation argue that the sector can be controlled and guided by fine-tuning taxes, tariffs, and government regulations. Deep in the forests of Cameroon and Brazil, however, there are no incentives for forest management, and loggers do not invest in this, because they have no long-term exploitation goals.

The facts from both countries have also revealed that official control of logging activities in the extractive zone is ineffective. Forestry agencies have little capacity and few incentives to exert control in that area. In Brazil, there is an informal local economy made up of smallholders selling standing timber to local entrepreneurs; at the end of the line, a sawmill buys at the gate. In Cameroon, large European and Asian logging companies are amendable to control and have the capacity to adopt sustainable techniques if oblige to do so. However, the leasing (*affermage*) and subcontracting of logging activities are so widespread that Cameroon's forestry department would be unable to get a grip on the sector even if it ever wanted to.

What means of organizing forest management, then, are realistically available in these countries at this stage? In the first place; a complete ban on commercial logging in recently opened forest zones, policed among other means by permanent checkpoints along the main roads. This will not stop illegal timber transport completely, because people will bypass the main roads. However, it will increase transport costs to such a level that logging in remote areas is no longer profitable. In Ecuador, a checkpoint on the river Coca and the recently created teams of *vigilancia verde* have functioned relatively well with support from the military forces (Box 4.6). In Pará, checkpoints of the state tax departments already exist along the main roads and adding IBAMA staff to them might be an effective measure. In Cameroon, the only road out of the East province has several checkpoints where officials are already very effective in soliciting bribes. The question there is to turn their energy and dedication towards the public interest.

For the zones that are open to logging according to a proper zoning plan, forestry departments should agree on national standards of efficient logging. This is more effective and has more potential for success, but at he same time promises less than the FSC criteria. The national system should reward efficient companies with

[96] Harvest planning implies large-scale mapping taking into account commercial species, diameters, local forest types, soils, climate, slopes, hydrology, and so on. The harvest plan selects an equilibrium between the lowest environmental impact and the highest timber harvest, and proposes roads, skid trails, stream crossings, and buffer zones accordingly.

lower taxes and punish ruthless loggers with higher dues and with fines. In the end, the impact of logging will be limited to a smaller area and consequently leave more areas for conservation. Additionally, more efficient logging in the concession areas should allow more rapid forest regeneration. Nevertheless, an important condition for the kind of forest management proposed here is a willingness of state rulers to tackle the problem of illegal logging effectively. There are indications that the Brazilian federal state does try to curb illegal logging, but lacks the capacity to do so in the remote pioneer frontiers. Cameroon has a relatively surveyable forest zone with few roads, but state rulers seem to lack the willingness to adopt sustainable forest management. For Ecuadorian politicians in Quito, the *Oriente* is about oil, and timber has a low priority; but the new Ministry of Environment seemed dedicated to tackling the problem.

ALTERNATIVE TYPES OF LAND AND FOREST USE

Intensification and agroforestry

Agroforestry systems have proven to be a viable and sustainable option on small plots in tropical conditions alongside to silviculture and intensive cattle raising for meat and dairy products. These land use options function well in old colonization frontiers where long-term investments is attractive given extension services, credit facilities, law and order, and secure property rights. Soybean planters in South Pará prefer to use the idle grassland rather than clear forest on remote plots along the pioneer front where property rights are not defined and transport precarious.

For recently opened frontiers like the environs of the *via Auca* in the Ecuadorian Amazon, the pioneer areas along the *rio Preto* road and the zone of frenetic logging activities in East Cameroon, intensification is not a sustainable solution. Official loans and NGO projects for improving agricultural production and farming techniques have proven to be ineffective. The agroforestry project in Coca collapsed once the donors left and along the colonization frontier in Brazil, credit is used for forest clearing rather than for intensifying production on permanently cultivated land.

The underlying reason for this is that colonists at tropical frontiers have a tendency to expand and extensify their land use. They use the available knowledge, capital, and farm inputs to accelerate the conversion of remnant forest areas into arable land. At the same time, pioneer colonists will invest their profits in buying additional land at the frontier and clearing it for extensive farming. This means that the consequences of a single agricultural policy can diverge dramatically depending on whether that policy is applied to farmers with a productive strategy, or to those with a speculative strategy. Agricultural improvement projects may encourage productive farmers to refrain from going deeper into the forest, but have the opposite effect on poor itinerant farmers used to occupy and clear forest or land speculators intended on expanding their holdings. To tackle the land-grabbing strategies of this latter group, proper planning and law enforcement are necessary in order to delineate areas open for agriculture and areas of forest conservation.

This scenario has become reality in the buffer zones of the Yasuní Park in Ecuador and the Dja Reserve in Cameroon. Both projects for agricultural intensification and

wildlife protection were started with money from international donors (the DGIS project in Ecuador and ECOFAC in Cameroon). One might question the appropriateness of the agricultural intensification component of the project in areas that still belong to the pioneer zone where there is an abundance of forest and where labor, expertise, and capital are the scarce factors of production. It appears obvious that the colonists in Ecuador apply credit rather for the expansionary purpose with which they are familiar rather than choosing for the difficult path of intensified production. Forest-dwellers in Cameroon use roads improved with project money to transport more bush meat and more quickly to urban markets. Meanwhile, the forestry departments in both countries were extremely weak, when it came to enforcing park limits. It is probable that the impact of these projects will only last as long as funding is available, and that in the long run they accelerate frontier development and forest destruction.

Community forestry

International organizations and governments are increasingly considering and supporting participatory forest management and community forestry. The challenge is to enable forest dwellers to benefit from forest resources that can improve their livelihoods, without depleting the resource base. The main objective is to build local-level capacity for sustainable development by enabling local communities to design and elaborate their own development activities with international assistance and funding (FAO, 2001).

In Cameroon, the current development of community forestry has been stimulated by the new forestry law. The five community forests around Lomié established with assistance of SNV are embedded in a community-based consensus. However, community forestry is not synonymous with forest conservation. All the actors involved are aware that villagers will give foreign logging companies the right to start felling in their newly obtained community forests. The prospect of earning ready money from their forest is a unique opportunity for these people to improve their poor living conditions. The only exception is the village where Baka pygmies are a majority, and where so far the forest has been reserved for hunting and gathering. The real test will come, when the neighboring villages start to receive cash, and people will realize the opportunity cost of preserving the forest.

Some lessons can be learned from this concrete example. Three main prerequisites are necessary in order to make forest dwellers stewards for forest protection. Firstly, well-defined regulations must designate exactly who will be in charge of managing the forest territory in order to avoid abuses. Secondly, the successful project needs to offer direct cash rewards for guarding and preserving the forest. These are necessary in order to satisfy immediate needs and to improve living conditions. Third, institutional and political empowerment of the forest communities is necessary to secure their position in future negotiations with competing actors and governments.

Extraction of Non-Timber Forest Products

The harvesting of Non-Timber Forest Products (NTFPs) have widely been considered as a means of generating income for poor forest-dwellers and protecting the

forest. Several studies have concentrated on estimating the economic value of the NTFPs present in tropical forests, and have confirmed that this is large.[97] Such an approach, however, is somewhat oversimplified. The environmental and economic assessment of NTFP harvesting requires more than a Net-Present-Value (NVP) analysis; it should also include harvesting techniques, product demand, and accessibility in order to ascertain whether NTFP extraction is economically viable and environmentally sustainable (Anderson *et al.*, 1999). This study has indicated that the Von Thünen zone to which the forest area in question belongs is a general indicator for determining whether NTFP harvesting has a chance of withstanding the pressure from logging companies and advancing agricultural frontiers.

In Cameroon's tropical forest, NTFP extraction is substantial to forest-dwellers and represents an important income source.[98] Activities related to NTFPs generate modest incomes mainly for women, who do the gathering, processing, and trading on local markets. These activities leave most of the trees standing and do not normally represent a direct threat to the forest. However, Perez et *al.* (1999) found evidence of mounting pressure on the forest resource base due to NTFP harvesting. Besides these minor impacts, a crucial question is whether this sector is able to compete with expanding logging activities once the chainsaw teams start operating near a village. In the case of the moabi tree, which is both an important source of NTFPs and a commercial timber species, the situation in the area around Dimako indicated that the limited protest of villagers was not able to stop the logging companies from felling. Moreover, the new tax that villagers receive for every tree felled in neighboring forests may represent a major blow for the future of NTFPs. This tax generates cash for poor forest-dwellers, who will not consider foregoing the immediate benefits of logging royalties in exchange for continuous but marginal benefits from NTFP harvesting. In recent years the village men who take the significant decisions have only taken into account the millions of CFAs available from logging companies, and have told the women to look for NTFPs somewhere else.

In the space of thirty years, Brazil nut harvesting has almost entirely disappeared around Marabá, which once supplied the largest part of the international market. In this area of rapid frontier movement and powerful deforestation forces, profits from the seasonal harvesting of nuts could no longer compete with the high prices paid for cleared land and the subsidies available for cattle ranching. In some remote areas of the Brazilian Amazon the federal government has officially delineated extractive reserves, mostly for rubber. Today, these reserves have to contend with the declining market price of latex and the lure of more remunerative, activities such as logging, gold prospecting, and the urban informal sector. As rubber tappers exchange their precarious living conditions in remote forested areas for the shanty-

[97] A much cited study is that of Peters *et al.* (1989) who calculate an NPV of US$ 6,330 for all NTFPs found on a hectare of tropical forest near Iquitos, a town with an important NTFP market in the Peruvian Amazon.

[98] In this section, we will concentrate on the trees and not on the growing pressure on wildlife. Bush meat represents a major protein source for the growing rural and urban population, and at the present pace wildlife will disappear from most of the inhabited forest areas in Cameroon in the next twenty years.

towns of the capital regional cities, the reserves become increasingly depopulated (Hall, 1996).

These examples show that NTFP extraction is only a viable alternative if transport and marketing are appropriately organized and embedded in an institutional framework. Without these necessary conditions, it represents a marginal activity for a small number of forest-dwellers in isolated areas. As soon as roads and markets make possible the timber extraction and the production of cash crops, most forest-dwellers switch to these more remunerative activities.

CONCLUSIONS

Tropical forests are seriously threatened. Fifteen million hectares are destroyed annually worldwide and the last large, intact forests in the Amazon and Congo Basin are now at stake. Despite joint efforts in the last decades, international donor agencies and national governments have not been able to tackle this environmental problem. The direct culprits are easily detectable, but holding slash-and-burn farmers and logging teams responsible for deforestation is like blaming soldiers for a war. Everybody agrees that tropical deforestation is a multi-layered problem with a whole range of economic, social, and political causes.

This comparative study has focused on the actors involved in three countries. The overall picture is gloomy. In the Brazilian Amazon, logging teams in search of mahogany are extending roads deeper into the closed forest, threatening Indian territories. The loggers collaborate closely with migrant farmers who transform logged-over forest into pasture. Colonists do not establish permanent farms, but sell or abandon their land after a few years. Eventually the cleared land ends up in the hands of large estate owners, who obtain subsidies to use it for ranching or agri-business. In Ecuador, oil companies construct roads in the forest and the authorities enable colonists to squat on public land and establish small farms producing coffee and cattle. Large groups of Indians also live in the same forest and the rapid land use changes force them to claim their own land and engage in similar practices. In Cameroon, foreign logging companies get a free hand from the state to extract valuable trees without proper monitoring. Loggers confront Bantu and Pygmy forest dwellers with official concession papers that allow them to cut trees in what they consider as 'their forest'.

An important force underlying the continuing process of forest destruction is the economic principle of frontier expansion, which is based on Von Thünen's simple principle that land use patterns reflect distance to markets and the related transport costs. For a tropical frontier area, the model results in three zones that mark the transition from an isolated closed forest to an intensive agricultural zone that is fully integrated in the national economy.

The remote old-growth forest where timber and minerals are still abundant marks the extraction zone. The forest here has an open-access character; this is the zone where loggers in Brazil extract mahogany deep in the indigenous reserves, where oil companies in Ecuador drill new wells, and where loggers in Cameroon fell the most valuable trees for export. The timber industry in the extraction zone is in the first stage of development and concentrates on very limited numbers of valuable species. Land is abundant and cheap; smallholders squat on the sparsely populated extraction frontier, practice subsistence farming, and earn money with jobs in extractive industries such as oil drilling and logging. The Indians in the Amazon and the Bantu and Pygmy in Cameroon have been confronted with a wave

of extractive activity that brings road links to urban centers, consumer goods, labor opportunities, and a cash economy in order to withstand these pressures, they have to adapt their way of life drastically.

The next zone is one of extensive but consolidating land use zone where most of the forest conversion takes place. In Brazil this is where most of the forest fires occur, as smallholders transform logged-over forest into pasture. In Ecuador this zone corresponds with areas close to older oil roads where farmers can easily sell cash crops and cattle to urban markets. Farmers in these areas have a range of opportunities to determine their own land use strategy and attempt to accumulate capital. They move frequently from plot to plot and engage in trading, off-farm work, and small-scale logging activities.

In longer-colonized areas, thirdly, a zone of intensive agriculture lies next to market centers. Here the last remaining forest patches are transformed into agricultural land. Land use is dominated by dairy farms in Ecuador, and by soybean plantations in Brazil. Once the frontier is closed and land use intensifies further, most of the closed forest has already gone and only small patches remain scattered in an open landscape. The gradual growth of road infrastructure, market opportunities, and government services enables these areas to become integrated in the national economy. Residual logging activities, as in Cameroon Southwest province may concentrate on the last remaining species; alternatively the surviving woodland may be used for fuelwood and charcoal as in South Pará.

Differentiating the frontier into three land-use zones makes it possible to qualify several common assumptions about tropical deforestation. One such assumption is that selective logging only causes a low degree of forest disturbance. The facts from Brazil have shown that selective logging of mahogany is typically first stage of a process which leads to comprehensive clearance. The static image of high-tech machinery just removing a few trees, and then disappearing without a trace, is misleading. Logging always involves consecutive cutting cycles and the establishment of a timber industry in which local people gradually become engaged. In most cases, the forest is already inhabited or claimed prior to logging; by building roads which make the export of timber economically feasible, the logging companies catalyze an ultimately self-sustaining deforestation process. Sawmills are established and a local processing industry evolves; in Parágominas (Brazil), what 30 years ago was a remote old-growth forest area is now a center of the sawmill industry. Cameroon today is a replica of the Brazilian Amazon 20 years ago. Policy measures should concentrate on sealing off isolated areas from selective logging while they are still untouched.

An important observation from the Brazilian and Ecuadorian frontiers is that colonists follow a 'two steps forward, one step back' pattern rather than a straightforward movement ever deeper into the forest. Another is that frontier movement is not so usually caused by poor farmers caught in a poverty trap which leaves them no option other than to clear forest. Many colonists have a clear strategy when they burn the forest annually. They consider colonization at the forest fringe as a stage in an accumulation strategy designed to provide them with upward social mobility. After they have accumulated capital by clearing the forest and selling the land, they invest their money elsewhere, often in the longer-colonized zones. In combination

with the high spatial mobility of colonists, the lack of accessible markets, and the limited presence of state authorities at the forest fringe, this strategy frustrates policies designed to enable farmers to invest in permanent-field farming.

Large-scale ranching activities and agribusinesses are present everywhere in the Amazon and conservationists have traditionally considered them major agents of deforestation. Their actual activities in Brazil's intensive land use zones, however, require a revision of this judgement. Around Marabá, big landowners are now starting to invest in dairy farms and soybean plantations. This is classic land use intensification, and it happens mainly on formerly cleared land that has been left idle. Whether such intensification increases the pressure on land in the extractive and extensive zones depends less on large landowners' agricultural activities, than on how the state authorities allocate infrastructure and subsidies. In Ecuador, dairy farms and oil palm plantations near the town of Coca generate production and jobs on permanent plots. These activities come closer to 'agricultural sustainability' than those of the neighboring smallholders, who practice itinerant farming. These two cases demonstrate that where economic conditions favor intensive land use, large-scale estates and agribusinesses are not intrinsically threats to the forest.

In all three countries, traditional forest dwellers who are confronted with an advancing agricultural frontier have adopted economic activities and land use techniques similar to those of neighboring colonists. In Cameroon, Pygmies are engaged in commercial poaching. In Brazil, Kayapó Indians sell mahogany trees illegally from their reserves. In Ecuador, Quichua and Huaorani Indians collaborate with oil companies. Forest-dwellers clearly, are not intrinsically 'guardians of the forest'. If international donors wish to confer this task upon them, they have to be aware that such communities usually desire access to goods and services once roads end their isolation. Any role for them in forest protection is therefore contingent on a supply of cash sufficient to satisfy their immediate needs, and on the provision of health care, education, political empowerment, and land titles.

National policies and governmental activities often stimulate frontier expansion and are seldom well designed to protect tropical forests. In the Amazon, the state subsidizes colonization via infrastructure development while the forest zones requiring most protection are deprived of protective state control and monitoring. In Brazil, logging activities and forest burning are rampant at the forest fringe; in Ecuador, the expanding oil industry opens the forest for colonists. When export interests are at stake, however, central states are able to impose their authority in isolated areas. Military forces in Ecuador's oil provinces are effective in safe-guarding oil production, and officials from Yaoundé are able to extort money from foreign logging companies even in the most isolated regions of Cameroon. The lack of proper forest management, then, is a matter not of the state's capacities, but of its priorities. This, in turn, is closely related to the problem of collusion and the dominant role of central state elites with lucrative business interests in forest resources.

A Thünenian categorization of the frontier into different land use zones has enabled us to differentiate forest clearance, but this is a deterministic model based on purely economic criteria. Data from the field show that in reality, important

contrasts exist between different tropical frontier situations. In many publications, deforestation is attributed to general causes such as poverty, inequality, population growth, and state malfunction. To differentiate between these causes and find out which other underlying factors are involved, insight into the socio-political and cultural setting of deforestation in each country is essential.

In both Amazonian cases, frontier dynamics are strongly related to economic cycles, state policies, and population growth in other areas, which are all important push factors for migration and which regulate the speed with which the frontier advances. But while pricing, state policies and population pressure directly influence how many hectares are cleared and how fast, the small numbers of people directly involved in clearing enormous forest areas also reveal an internal micro-economic dynamic: the colonists are able to accumulate capital by clearing forest and sell land for profit. Sustainable alternatives such as agricultural intensification and agro-ecological zoning are not effective in an expanding frontier zone, because the forest is abundant. Colonists who are used to move and encroach on new forest land remain 'moving targets' for all the well-intentioned projects and international donor initiatives.

Structural inequalities are most dramatic in the Brazilian Amazon where the unequal land distribution is partly responsible for land conflicts, speculation, and the expansion of itinerant farming into unoccupied forest zones. Large estate ownership and patronage systems have deep roots in the South American tradition. Local politics are an expression of these dominant forces in society, and support forms of frontier development based on agribusiness, the mining industry, and tree plantations. Grassroots initiatives by farmers and landless peasants, on the other hand, are gradually starting to have an impact. Although the main concern in such initiatives is social justice, environmental issues are also on the agenda.

In Ecuador, politicians in the capital Quito consider the remote *Oriente* mainly as an extraction zone for oil, Ecuador's most important source of foreign exchange. The state oil company Petroecuador and the military forces promote a frontier expansion led by foreign oil companies, which build the roads along which colonists squat. Most of the royalties are siphoned to the national treasury, and the *Oriente* as a whole is characterized by poor infrastructure and services. The outcome of this political priority is a lack of a coordinated policy to stabilize the agricultural frontier and assist colonists in intensifying their land use on a permanent plot.

In Cameroon it is a small part of the ruling elite, together with a handful of foreign logging companies, that keeps a system of uncontrolled tree felling in place. Forestry functions in accordance with Cameroon's characteristic 'politics of the belly', a system based on collusion between state and private interests. The purpose is personal enrichment through the issue of logging concessions. Funds for proposed sustainable techniques, such as reduced-impact logging and certification are counterproductive in this context and only represent more foreign money that feeds the corrupt system.

Considering these underlying patterns, it does not seem likely that there will soon be an end to the advance of the frontier in Brazil, the expansion of the oil industry in Ecuador's forests, or the proliferation of logging in Cameroon. In all three cases, powerful actors support activities that push extraction activities ever

deeper into the forest; local people, moreover, make their living from the same activities. This study's focus on the forces of deforestation has resulted in a gloomy picture of the fate of the forest in the three countries. Considering this and the dramatic statistics on global deforestation, it seems certain that substantial areas of forest in Brazil, Ecuador and Cameroon will continue to disappear in the course of the next 30 years.

Global deforestation figures, on the other hand, often need to be scaled down, because they do not take into account the important process of forest regeneration. Large areas that have been reckoned as cleared and burned revert to secondary forest after several years of fallow. In the political sphere too, there are nuances and exceptions: governmental agencies that succeed in putting a hold on deforestation, and indigenous communities which withstand the onslaught of colonization and keep their territories forested. Those Indians in Ecuador and Brazil who fall into the latter category are a happy few who have enjoyed assistance from NGOs, financial compensations from important lead agencies, strong local leadership, and a good embeddedness in indigenous umbrella organizations. All these factors together have enabled them to defend their interests not only physically along their territorial borders, but also politically at municipal, state, and international level.

There have been some important policy successes that will have a long-term impact. In Brazil, the efforts of state agencies such as IBAMA and INCRA have tightened controls and boosted fines on illegal logging and burning; they have also increased the costs of land speculation, fraud, and unproductive farming for large estate owners. In Ecuador the ECORAE fund, financed with oil revenues, is an instrument which could potentially become the motor for sustainable development of the oil provinces. In Cameroon, World Bank pressure has gradually made an impact on an opaque forest policy system, making it possible to push through a new forestry law.

Nature conservation efforts are underway in all three countries; certain areas have obtained a durable status as protected forest and show considerably less deforestation than the adjacent land. In Ecuador the centers, at least of the Cuyabeno and Yasuní parks are still largely untouched. In Pará, some areas controlled by the mining company CVRD are effectively protected and the large forest territory of the Kayapó Indians is free of colonists. In Cameroon, WWF has secured protected status for important areas in the East province.

Donors should try to implement sustainable measures that take into account the large-scale economic realities and the Thünenian zones of the areas in which they work. Intensification programs for farms and tree plantations may be successful in longer-colonized areas, thereby taking pressure off the zones of extensive land use and extractive activities. Certification efforts appear to be more effective in forest zones where logging is not yet organized on a basis of collaboration between large companies and local people. Agro-ecological zoning works only in long settled-areas where proper control and monitoring are available. Pure conservation and the delineating of park boundaries seem to be more effective at the forest fringe, and are more appropriate than agricultural intensification initiatives in areas with an abundance of land.

A general lesson to be learned from the case studies is that in the international struggle against tropical deforestation, total victory is not at present a realistic aim. Even with sound strategic thinking and knowledge of the agendas of all parties involved, only a few battles can be won. Hope lies in the knowledge that the destructive forces will loose some of their economic strength and the protective forces will become more concentrated as the frontier of destruction advances and the remaining forests shrink. In the long run, a combination of financial inputs, political insight, strategic coalitions, and good timing may make a new equilibrium possible.

GLOSSARY

affermage — Contract between a Cameroon concession holder and a foreign logging company that leaves the felling of trees to the company, while the company holder touches a commission.

aviamento — Credit system established by the rubber industry supplying utensils and food products in exchange for payment in kind. It is a combination of consumers and production credit, where the patron controls the access of resources.

bancada — Caucus in the federal congress that attends the interests of its constituency. The most important *bancadas* are the *ruralistas* (large estate owners), *empresários* (business companies), and *sindicalistas* (employees).

bilik — The ancestral places in the forest, as a reminder of the migration path of the kin.

blitze — Raid by the forestry department IBAMA in order to seize illegally cut timber.

caboclo — Mixed blood descendant of Indians, Europeans, and Africans, who live in the Amazon lowland (*várzea*) and are considered semi-indigenous people.

cachaça — Rum made of sugarcane

cahier de charges — Contract between a logger and the local community about compensations for the logging activities.

castanhal, -ais — Brazil nut grove – Brazil nut tree

chacra — Forest garden cultivated by Amazon Indians who practice horticulture

chevauchement — The practice of straddling, when an official or politician abuses his official position for business activities.

colono — Colonist from the coastal or Andean provinces who have migrated to the *Oriente*.

compañía — General name used by the forest dwellers to refer to an oil company.

comuna — Indigenous community of several families living in the forest.

cooperativa — Group of colonists, organized in an legal association, necessary to obtain a legal land title from IERAC.

écrémage — 'Skimming' or selective logging

élite extérieure — Elite living in urban centers with clientelist ties in their village of origin.

escritura	Legal title on a piece of land in Ecuador
dobi dobi	Pygmies' denomination of WWF. Vernacular pronunciation of the first two letters of the English acronym WWF.
favela	Shantytown around urban centers in Brazil.
fazenda	Ranch or large holding measuring between 200 to 50,000 ha.
fazendeiro	Owner of a *fazenda*, large estate owner
finca	Farm of 50 ha carved out by IERAC, 250 m long and 2000 m deep.
forêt communautaire	Community forest areas
garimpeiro	Small-scale gold miner
grilagem	General term for forged land titles and fraudulent land sales.
guia de movilización	Transport permit issued by INEFAN for timber.
indígena	Indian in Ecuador
indústria de posse	Land rights industry, where farmers occupy land only in order to gain cash income from selling the land or receiving support from INCRA.
invasión	Invaded land by squatters on the outskirts of frontier towns, characterized by extreme poor living conditions.
latifundio	Large estate, often including large unused areas owned by the land class elite.
levantamiento:	Indigenous uprising in 1990, when Indians in Ecuador blocked roads and marched to Quito to demand political rights and the adjudication of land.
línea	Dirt road parallel to a paved oil road. The first *línea* is situated 2 km behind the first strip of farms along the road. The second *línea* 2 km behind the second strip of farms, etc.
madeireiro	Generic term for logging companies and timber traders in Brazil.
maderero	Generic term for logging companies and timber traders in Ecuador.
mètre cube	Local tax of CFA 1,000 per cubic meter of timber that is logged in a *vente de coupe* and paid directly to the local community.
minifundio	Farm units which are too small to support a family when farming is done extensively. More frequently, they are defined as farms with five hectares or less.
molongo	Seasonal stay of Pygmies during three to four months throughout the forest at the beginning of the rainy season, during which they live as traditional hunters-gatherers.
monte	The virgin forest in inaccessible areas, or the remnant forest on a farmers land.
mulundu	The traditional Pygmy huts in the form of an igloo, made of branches and leaves.

Oriente	The East, referring to Ecuador's Eastern Amazon region.
paro	Road blockade organized by the local population.
plan de manejo	Timber harvesting plan, to be approved by INEFAN.
regalía	During colonial times, the crown's share of products being exploited. Synonym for royalty payment.
permit de récuperation	Timber harvesting rights in forests that are cleared for cropping and road construction or in logged-over forests to collect abandoned logs.
politique du ventre	'Politics of the belly', concept of Bayart to indicate Cameroon's political system based on patronage and clientelism.
posse	Judicial situation of a landholder without legal title and only a usufruct right.
Real	Brazil's new currency. R$ 1 = US$ 1.2 during the fieldwork..
repasse	Re-entry of a logging company in a logged-over forest.
roça	Crop field (rice, cassava) cleared with slash-and-burn.
sem-terra	landless peasant, member of MST movement.
Sucre	Ecuador's currency during the fieldwork. Sucres 3,500 = US$ 1 in 1996.
tenue de palabres	Informal talk between logging companies and local strongmen about a settlement of compensations for a village.
terra firme	Upland forest in Brazil that is not seasonally flooded in contrast to flooded *várzea*.
tierra baldía	Land that had no private owner or has been uncultivated for more than ten years is considered *baldío* (idle) according to the land property law in Brazil.
tontine	A rotating savings and credit association whose members agree to make periodic savings payments into a fund which is allocated to a different member of the group each time the savings are collected.
vente de coupe	Sale of Standing Volume (SSV), forest concession of 2,500 ha in the non-permanent forest zone.
várzea	Seasonally flooded forest in the floodplain along the lower Amazon river.

ABBREVIATIONS

ACP	African, Caribbean, and Pacific (countries included in the Lomé convention)
AIMEX	Associação das Industrias Madeireiras Exportadores do Pará
AIMA	Asociación de Industriales de Madereros del Ecuador
APFT	Avenir des Peuples des Forêts Tropicales
API	Aménagement Pilote Intégré
ATO - OAB	African Timber Organization - Organisation Africaine des Bois
BNF	Banco Nacional de Fomento
CAR	Central African Republic
CAT	Centro Agro-ecológico do Tocantins
CED	Centre pour l'Environnement et le Développement
CESR	Center for Economic and Social Rights
CFA	Communauté Financière d'Afrique. Cameroon's currency: CFA 600 = US$ 1
CFD	Caisse Française de Développement
CNBB	Conferência Nacional dos Bispos do Brasil
COFENAC	Consejo Cafetelero Nacional
CONFENIAE	Confederación de Nacionalidades Indígenas de la Amazonía Ecuatoriana
CPT	Comissão Pastoral da Terra
CVRD	Companhia Vale do Rio Doce
DRC	Democratic Republic of Congo (former Zaïre)
ECOFAC	Programme Ecosystèmes forestiers d'Afrique Centrale
ECORAE	Instituto de Ecodesarrollo de la Región Amazonica Ecuatoriana
EDF	European Development Fund
EIA	Environmental Impact Assessment
EMATER	Empresa de Assistência Técnica e Extensão Rural
FASE	Federação de Orgãos para Assistência Social e Educativo
FCUNAE	Federación de Comunas de la Unión de Nativos de la Amazonía Ecuatoriana
FEPP	Fondo Ecuatoriano Populorum Progressio
FETAGRI	Federação dos Trabalhadores na Agricultura do Pará e Amapá

FICSHA	Federación Indigena de Comunas Shuar de la Amazonía
FLOPEC	Flota Petrolera Ecuatoriana
FMU	Forest Management Unit
FNO	Fundo Constitucional de Financiamento do Norte
FNS	Fundo Nacional de Sáude
FOB	Free on Board (value of the timber before shipping and after custom duties)
FSC	Forest Stewardship Council
FUNAI	Fundação Nacional do Indio
GATT	General Agreement on Trade and Tariffs
GEF	Global Environmental Facility
GDP	General Domestic Product
GIC	Groupement d'Initiative Commune
GTZ	Gesellschaft für Technische Zusammenarbeit
IBAMA	Instituto Brasileiro de Meio Ambiente e Recursos Naturais Renováveis
IBGE	Instituto Brasileiro de Geografia e Estatística
IDB	Inter-American Development Bank
IDESP	Instituto do Desenvolvimento Econômico-Social do Pará
IERAC	Instituto Ecuatoriano de Reforma Agraria y Colonización
IFIA	Interafrican Forest Industries Association
IMAZON	Instituto do Homem e Meio Ambiente da Amazônia
IMF	International Monetary Fund
INCRA	Instituto Nacional de Colonização e Reforma Agrária
INDA	Instituto Nacional de Desarrollo Agrario
INEC	Instituto Nacional de Estadísticas y Censos
INEFAN	Instituto Ecuatoriano Forestal y de Areas Naturales y Vida Silvestre
INIAP	Instituto Nacional de Investigaciones Agropecuarias
INPE	Instituto Nacional de Pesquisas Espaciais
ITERPA	Instituto de Terras do Pará
ITR	Imposto Territorial Rural
ITTO	International Tropical Timber Organization
IUCN	International Union for Conservation and Nature
LASAT	Laboratorio Sócio-Agronômico de Tocantins
MA	Ministerio del Ambiente
MMA	Ministério do Meio Ambiente
MAG	Ministerio de Agricultura y Ganadería
MINAGRI	Ministère de l'Agriculture
MINEF	Ministère de l'Environnement et des Forêts
MINEFI	Ministère de l'Economie et des Finances
MST	Movimento dos Sem Terra

NAEA	Núcleo de Altos Estudos Amazônicos
NRDC	National Resources Defense Council
NTFP	Non-Timber Forest Products
OPIP	Organización de Pueblos Indígenas de Pastaza
PATRA	Proyecto Técnico para la Recuperación Ambiental
PETRAMAZ	Explotación Petrolífera y Desarrollo Sostenible en la Amazonía Ecuatoriana
PLANAFLORO	Projeto de Manejo dos Recursos Naturais da Rondônia
POLOAMAZONIA	Programa dos Polos Agropecuarios e Agrominerais de Amazônia
PPG-7	Pilot Program of the seven most industrialized countries
PROCERA	Programa de Crédito Especial da Reforma Agrária
PRODEPEC	Programa de Apoio ão Desenvolvimento da Pecuária
PRORURAL	Programa de Apoio à Produção Familiar Rural
PROFORS	Programa Forestal Sucumbíos
PT	Partido dos Trabalhadores
RAN	Rainforest Action Network
RDPC	Rassemblement Démocratique du Peuple Camerounais
SAE	Secretaria de Assuntos Estratégicos
SAP	Structural Adjustment Plan
SESA	Servicio Ecuatoriano de Sanidad
SGS	Société Générale de Surveillance
SESPA	Secrataria Executiva de Saúde Pública
SETRAN	Secretaria Executiva de Transportes do Pará
SIL	Summer Institute for Linguistics
SNV	Stichting Nederlandse Vrijwillgers (Dutch Volunteers Organization)
SSV	Sales of Standing Volume (ventes de coupe)
SUDAM	Superintendência do Desenvolvimento de Amazônia
TDA	Título da Dívida Agrária
TIC	Taxe Informelle aux Communautés villageoises
TFAP	Tropical Forest Action Plan
TREES	Tropical Ecosystem Environment Observations by Satellites
UDR	União Democrática Ruralista
UNEP	United Nations Environmental Program
USAID	United States Agency for International Development
WWF	World Wide Fund for Nature
ZEE	Zoneamento Ecológico-Econômico

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SAMENVATTING

Jaarlijks verdwijnen er vijftien miljoen hectares bos wereldwijd. De directe oorzaken zijn bekend: boeren die het bos kappen en branden voor landbouwgrond, houtfirma's die de waardevolste houtsoorten kappen, en grootgrondbezitters die bos omzetten in weidegrond of plantages. Het beeld wordt complexer wanneer men de onderliggende oorzaken en mechanismen wil verklaren. Dan wordt duidelijk dat het probleem van ontbossing geworteld is in de sociaal-economisch en politieke context. Mogelijke oplossingen van duurzaam bosgebruik situeren zich op dat dieperliggende niveau.

Deze vergelijkende studie over tropische ontbossing in Brazilië, Ecuador en Kameroen gaat op zoek naar de achterliggende actoren en schetst een somber beeld van de toestand van het bos. In Brazilië zoeken houtfirma's naar mahoniehout in Indianenreservaten en kolonisten branden elk jaar grote stukken bos voor kleinschalige landbouw en grootschalige veeteelt of sojaplantages. In Ecuador zijn het internationale oliemaatschappijen die na 30 jaar olieontginning het bos hebben ontsloten met wegen en kolonisten toegang verschaffen tot een stuk land in het bos. Kameroen kent op dit moment een expanderende houtsector die doorstoot naar de meest geïsoleerde gebieden, waar mens en dier nog niet zijn voorbereid op de komst van kettingzagen.

Dit eerste globale beeld verhult een patroon dat zichtbaar wordt als men het gebied doorkruist en analyseert met het geografische model van Von Thünen (1826-1879) over landgebruik. Drie cirkelvormige landgebruikzones schuiven op vanuit een urbaan gebied naar het bos en zetten de wildernis geleidelijk om in landbouw- of weidegrond. Ten eerste, een cirkel met intensief landgebruik rondom urbane gebieden waar de agro-industrie grootschalig investeert en produceert; vervolgens, een cirkel met extensief landgebruik die het landbouwfront omvat waar kleine boeren het bos kappen en branden; tot slot, de extractiezone in de meest geïsoleerde bosgebieden waar bedrijven zich toeleggen op de exploitatie van hout en mineralen.

Het kolonisatiefront rondom de stad Marabá in de Braziliaanse Amazone vertoont dit patroon het duidelijkst. Soja wordt verbouwd rondom de stad en is een gewas dat veel investering vereist. De extensieve veeteelt bevindt zich in de zone daarachter en wordt gevolgd door het landbouwfront op enkel honderden kilometers van de stad waar arme kolonisten het bos opruimen en land verkopen als weidegrond aan de grootgrondbezitters. Dieper in het Braziliaanse Amazonewoud, dat twintig procent is geslonken in de laatste veertig jaar, leven nog kleine groepen Indianen wiens territorium bedreigd wordt door houtkappers en het oprukkende kolonisatiefront. De overheid heeft dit proces gestimuleerd door een combinatie van grootschalige projecten (wegen, dammen, en mijnbouwprojecten) en subsidies voor kolonisatie en veeteelt vanuit de idee dat het gebied 'ontwikkeld' moest worden. Op dit moment, is

de regio rondom Marabá gekenmerkt door armoede, een extreme ongelijke verdeling van het land, en conflicten over land en hout tussen Indianen, een groep van verarmde kolonisten en een kleine elite van grootgrondbezitters.

De situatie in het noorden van de Ecuadoriaanse Amazone wordt gedomineerd door de olie-extractie die het bos heeft opengelegd met ver strekkende gevolgen: rondom de olieputten is er vervuiling van de bodem en rivieren opgetreden, terwijl kleine boeren zich hebben gevestigd langs de nieuw aangelegde wegen en het bos hebben gekoloniseerd. Ze verbouwen er koffie en hoeden wat vee, maar verdienen een groot deel van hun inkomen uit loonarbeid voor één van de vele oliemaatschappijen. De groepen Indianen leven voornamelijk langs de rivieren en hebben zich geleidelijk aangepast aan deze kolonisatie. De ontbossing is er minder omvangrijk dan in Brazilië, want de oliemaatschappijen zijn niet geïnteresseerd in de bomen en de kolonisten beschikken niet over de middelen om het bos te kappen. Toch is de toekomst van het bos bedreigd, want olie is de grootste inkomstenbron voor de centrale overheid en de exploratie naar nieuwe olievelden in de laatste stukken ongerept bos gaat onverminderd voort. Dit betekent dat nieuwe wegen worden aangelegd die het hele Ecuadoriaanse Amazonegebied zullen ontsluiten.

In Kameroen is de houtexploitatie de drijvende factor achter de geleidelijke opening van het bos, waar Pygmeeën en Bantu leven van kleinschalige landbouw, jacht en de extractie van bosproducten. Buitenlandse houtbedrijven beperken zich voornamelijk tot de selectieve kap van enkele waardevolle houtsoorten en daarom is de ontbossing nog relatief gering. De grootste bedreiging komt van corrupte machthebbers die zich niet bekommeren om het bos en de bewoners en het zo snel mogelijk proberen om te zetten in kapconcessies. Organisaties als WWF trachten de overheid te bewegen enkele waardevolle ecologische gebieden te vrijwaren van kap.

Als men de situatie aan de drie ontbossingfronten analyseert, vallen een aantal opvallende parallellen en verschillen op in de manier waarop de betrokken actoren het bos ontginnen en controle uitoefenen over de natuurlijke hulpbronnen.

Bosbewoners worden vaak geassocieerd met duurzaam beheer en gezien als rentmeesters van de natuur en inheemse groepen krijgen daarom vaak steun van internationale donoren voor de bescherming van hun rechten. Het eerste belangrijke punt is de afbakening van hun gebieden, die de Indianen in Ecuador en Brazilië hebben afgedwongen na jaren van politieke strijd met centrale overheden en conflicten met kolonisten. Ze zijn weliswaar betrokken in de ontginning van het bos, maar de kaalslag houdt meestal wel op bij de grens van hun gebied. In Kameroen is het proces van gebiedsafbakening nog niet op gang gekomen en de politieke elite organiseert de 'uitverkoop' van het bos aan buitenlandse kapbedrijven. Een recente ontwikkeling is dat de lokale bevolking nu een graantje gaat meepikken van de houtkap in de vorm van een lokale belasting die de houtfirma's direct aan de lokale dorpen betalen. Het gevolg op korte termijn is dat de kap nu nog sneller gaat rondom de dorpen, maar het opent wel de deur voor inspraak van de lokale bevolking in het beheer van het bos, wat een noodzakelijke voorwaarde is voor duurzaam beheer op lange termijn.

De Indianen, zowel de Quichua in Ecuador als de Kayapo in Brazilië, hebben zich voldoende 'empowered' en hebben afspraken gemaakt om een deel van de inkomsten uit de ontginning van hout, olie, ecotoerisme en donorgeld direct in

handen te krijgen. Dit beeld van de onderhandelende en berekenende bosbewoner strookt misschien niet helemaal met de mythe van de 'nobele wilde', maar het is de enige manier waarop deze groepen in staat zijn om een plaats op te eisen in de snel veranderende realiteit aan de bosrand.

De kap van tropisch hout wordt vaak afgeschilderd als een zeer selectief proces dat slechts enkele waardevolle bomen per hectare kapt en dus niet verantwoordelijk is voor de vernietiging van het regenwoud. Opeenvolgende teams met kettingzagen dunnen het bos geleidelijk uit en kappen één voor één de beste houtsoorten eruit en openen de deur voor de landbouwkolonisatie.

In de Amazone, zijn kolonisten slechts zelden arme en radeloze migranten met als enige optie kappen en branden die steeds dieper het bos in trekken. De meeste kolonisten migreren naar de bosrand met een duidelijke strategie om kapitaal te accumuleren. Omzetten van bos in weidegrond aan een bewegend landbouwfront verhoogt de waarde van het stuk grond en stelt hen in staat om hun grond met winst te verkopen aan veeboeren. Deze accumulatie strategie maakt beleid erg moeilijk, want mogelijke beleidsmaatregelen voor duurzaam landgebruik zoals goedkoop krediet en het verschaffen van landtitels, werken hier averechts.

De agro-industrie die opereert langs de bosrand en monoculturen aanlegt, wordt vaak afgeschilderd als een grootschalige vernieler van bos. De snel uitbreidende sojaplantages in Mato Grosso en Zuid-Pará maken echter duidelijk dat zij braakliggende weilanden in cultuur brengen die al tientallen jaren geleden zijn ontstaan door het kappen van het bos. Deze investeringen veroorzaken dus geen bijkomende ontbossing, integendeel, ze brengen onproductief land in cultuur.

De overheid blijft in gebreke in de drie landen wat betreft het uitoefenen van beleid en controle over het beheer van bossen. De Ecuadoriaanse regering beschouwt de Amazoneprovincies als een extractieplaats voor olie, die een derde van de staatsinkomsten oplevert, en bekommert zich weinig om de kolonisten en Indianen in het gebied. De Amazonebevolking wordt steeds mondiger en dwingt haar deel van de oliedollars af via blokkades. In Brazilië is er op federaal niveau veel ten goede veranderd in de afgelopen jaren, maar de vele decreten leiden tot weinig resultaat in het veld. Dat is ook voor een deel het gevolg van de tegenwerking door de belangenvertegenwoordigers van de houtindustrie en de veeteelt die op statelijk en lokaal niveau de politiek manipuleren. In Kameroen controleert een kleine elite de toekenning van kapconcessies en verrijkt zich zonder dat er een duidelijk engagement is om de kap te reguleren en duurzaam te maken.

De Wereldbank is wel in staat geweest om nieuwe leningen te koppelen aan beter bosbeheer en dat heeft de sector in elk geval doorzichtiger en efficiënter gemaakt.

De grote uitdaging voor internationale donoren en Niet-Gouvermentele Organisaties die actief zijn op milieubeleid is om in dit kluwen van actoren projecten op te zetten die effectief bos gaan beschermen op lange termijn. De belangrijkste instrumenten voor bosbeheer die men als oplossing ziet voor het ontbossingprobleem zijn op een of andere manier tot uitvoering gebracht in de drie landen. De resultaten zijn wisselend en geven inzicht in waar het mis gaat en waar er nog terrein gewonnen kan worden.

Het opzetten van een certificeringprogramma voor duurzaam gekapt hout in Kameroen verloopt erg moeizaam en gaat gebukt onder de gebrekkige regelgeving en corruptie. In Brazilië zijn de eerste stukken bos gecertificeerd in de staat Amazonas, die nog niet onderdeel is van het kolonisatiefront.

De nationale parken en beschermde bosgebieden in de drie landen staan onder zware druk van oprukkende kolonisten. Nergens is de bosdienst in staat om de parken effectief te beschermen. Enkel Indianengroepen of mijnbedrijven in de Amazone, die fysiek aanwezig zijn en een belang hebben bij het afschermen van hun gebied, zijn de enige actoren in het veld die het front van kappende en brandende kolonisten op afstand te houden.

Projecten die intensivering van de landbouw, systemen van agroforestry, of de extractie van niet-hout bosproducten proberen te stimuleren, verlopen erg moeizaam in de Amazone. Het probleem is dat ze kampen met een gebrek aan motivatie bij kolonisten die geen heil zien in arbeid te investeren in intensieve teelten op schrale akkers, terwijl er nog zoveel bos gemakkelijk gekapt kan worden dat meteen akkerland oplevert. Op plaatsen waar er een potentieel is voor niet-hout bosproducten vormen de hoge transportkosten, gebrek aan marketing en infrastructuur de obstakels voor duurzame ontwikkeling.

In Kameroen is men begonnen met het formaliseren van het lokaal beheer van bos rondom dorpen. Het proces staat nog in de kinderschoenen, maar betekent in elk geval een eerste stap van een verandering van het machtshebbers die alleen maar denken in termen van productiebos voor hardhout.

De huidige situatie van het tropische bos is verre van rooskleurig in deze drie landen, maar de grootschalige ontginning in Brazilië is zeker dramatischer dan in Ecuador, waar de bosexploitatie kleinschalig is. Op termijn ziet het ernaar uit dat het kolonisatiefront in Brazilië actief zal blijven, terwijl het in Ecuador bepalend zal zijn wanneer de olie uitgeput raakt en de kolonisten naar andere inkomsten moeten gaan zoeken. Kameroen is een geval apart in de zin dat er geen sprake is van een kolonisatiefront, maar slechts van een expanderende houtsector. Als de ontginning afneemt eens de belangrijkste houtsoorten zijn gekapt, zal de bosdegradatie niet onomkeerbaar zijn. Echter, wanneer er een lokale houtverwerkende industrie zal ontstaan kan dat leiden tot algehele kap van het bos op lange termijn.

De economische belangen zijn erg groot en teveel mensen moeten dagelijks hun inkomsten halen uit de ontginning van het bos. Daarom moet men concluderen dat men de teloorgang van grote delen van het tropische woud in de deze drie landen niet kan tegengehouden. Wel kan de internationale gemeenschap in samenwerking met overheden en lokale groepen strategische gebieden kiezen om ze effectief beschermen.

CURRICULUM VITAE

Herwig Cleuren was born in Tongeren, Belgium on January 6, 1969. He studied Law at the University of Leuven and after a final year at the Law faculty of the University of Salamanca, he graduated in 1992.

In the same year, he enrolled in the Faculty of Cultural Anthropology and Sociology of the Universiteit Leiden. He concentrated on Latin America and Africa and followed the study path of Development Sociology. Between 1994 and 1995, he worked as a research assistant investigating cultural characteristics of Turkish and Moroccan Muslim immigrants in the Netherlands. He conducted his first fieldwork in Costa Rica in 1995 investigating the country's tourism policy and the environmental and social impact of eco-tourism around the Manuel Antonio National Park.

He graduated in January 1996 and started as a junior research fellow at the Centre of Environmental Studies (CML) of Universiteit Leiden. Between 1996 and 1999, he conducted fieldwork for his Ph.D. thesis in the Ecuadorian and Brazilian Amazon and in Cameroon's tropical forest. In 2000, a period of fieldwork in Sumatra focused on forest dynamics around the town of Bangko in the light of the ongoing political changes in Indonesia. At CML, he was involved in the CML courses on Environment and Development and gave guest lectures on forest dynamics and environmental analysis tools at several other universities.

In 2000, he also participated in a training course on sustainable bamboo management and processing techniques for small-scale bamboo enterprises in Hangzhou Province, China and in 2001 he started work as a policy associate expert at the International Network for Bamboo and Rattan (INBAR) in Beijing. He is now in charge of INBAR's regional office for Latin America and the Caribbean in Guayaquil, Ecuador.