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Local Institutions and Adaptive Forest Management in Ghana

James Mayers and E. Nii Ashie Kotey



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***Local Institutions and
Adaptive Forest Management in Ghana***

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James Mayers and E. Nii Ashie Kotey

Addresses:

**James Mayers, Forestry and Land Use Programme, International Institute for Environment and Development,
3 Endsleigh Street, London WC1H 0DD, UK.**

E. Nii Ashie Kotey, University of Ghana, Faculty of Law, PO Box 70, Legon, Ghana.

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Selected high forest tree species of Ghana

EXECUTIVE SUMMARY

Intense pressure on the remaining forest resources of many countries has stimulated rethinking on what forests should be for, and by whom they should be used. The Government of Ghana has initiated various activities in recent years which have created a process of reassessment of forest management in the light of: the poor resources available to government forest agencies; the inadequate assertion of control over logging; the poor rent capture from the timber industry; and the perceived pernicious degradation of the forest resource by rural communities.

This study aims to contribute to this rethinking process. It examines the existing pattern of forest management and policy at the local level in the tropical high forest (THF) zone of Ghana. Government has limited resources and capacity to fulfil its management role, yet despite widespread logging and quite dense populations in many parts of the THF zone, significant forest areas and resources remain. Who is looking after the forests, and why?

The paper examines: institutions of local government and traditional authority which are linked to forest use; district Forestry Department activities; concession-holders and other timber harvesters; and, the nature of the relationships between rural people, forest resources and the representatives of these institutions. The study used a combination of approaches including: direct assessment of forest condition; Participatory Rural Appraisal; in-depth interview; and literature review.

The extent, condition and usage of the forest resource is reviewed and the pattern of changing land use behind the 'frontier' of forest colonisation is outlined. The nature of land and tree tenure in the high forest zone is described and the latter identified as a major disincentive to timber tree nurturing and protection by farmers.

Six examples of adaptive forest management at the local level in apparently common situations in the Ghanaian THF zone are described. The cases cover:

- organisation for non-timber forest product use in forest reserves;
- planning for village monitoring of logging and control of non-timber forest product use;
- village fire prevention squads and protection of forest reserves;
- adaptation of the Forestry Department in response to inter-village organisation of women's leaf-gathering groups for sustaining yields of wrapping leaves;
- local solutions to illegal farming in a forest reserve; and
- some reasons for local success and failure of the taungya system¹.

Today there is virtually no significant area of closed canopy forest remaining outside the forest reserves. Yet, these unreserved areas in the THF zone are by no means devoid of forest resources. Land in the 'potential forest zone' is under a wide range of land uses in

¹ A system of forest plantations in which farmers plant seedlings and tend the trees in return for being allowed to cultivate crops for the first few years between the seedlings in the plantation.

the spectrum from farm to bush-fallow to secondary forest. Furthermore, cocoa cultivation is typically accompanied by considerable shade tree cover and these trees may be timber species. Indeed, over the last twenty years, this timber outside forest reserves has consistently represented between one third and two thirds of the total annual recorded timber harvest in Ghana. The pattern, prevalence and species composition of trees on farms is examined in relation to land use changes, farmer preferences and the implications for the timber industry.

Conclusions

Normative policies and laws notwithstanding, it appears that a range of groups with different interests and investments in the Ghanaian high forest zone can achieve working cooperation to the benefit of all parties, and the forest. The examples of past, present or suggested collaboration between communities, local institutions, foresters and timber harvesters can provide practical lessons and possibilities for further recognition and development of these forms of forest management.

In particular, the opportunity exists for development of forms of co-management which include the private sector. These include agreements, possibly developed to the level of contracts, between concession holders, forestry officers, landowners and village communities. These could be facilitated by district forestry offices and/or non-governmental organisations

At the village and concession level, agreements might include provisions for:

- fire prevention;
- forest boundary protection;
- non-timber forest product inventory by villagers;
- preferential rights to non-timber forest products for villages adjacent to forest reserves;
- village monitoring of concession holders and chainsaw operators;
- payments to farmers for tree growing and protection;
- off reserve tree inventory;
- seed collection and tree planting on and off reserves;
- road building and maintenance;
- environmental audits;
- setting of local fees, fines and compensation levels.

It is concluded that farm tree species prevalence and farmer preference is at odds with the current commercial species demands of the timber industry. However, if tree tenure conditions can be weighted more in favour of farmers, there is considerable potential for species, currently abundant and strongly favoured by farmers, to provide a sustainable basis for supplying both external markets and for indigenous agroforestry use and local cash benefit.

For those working the land outside reserves (as opposed to the traditional landowning authorities), the goal should be to assure full rights to timber trees. However, recognising that traditional authorities and local government may resist such proposals if their royalty

shares would diminish, interim solutions were proposed. These appear to be reflected in measures applied by the government in 1995 to control illegal felling outside forest reserves. These measures include pre-felling inspection procedures (involving the Forestry Department, loggers and community representatives); the issue of Conveyance certificates by the Forestry Department after post-felling inspections; and the right of farmers to decide whether and when timber trees can be felled on their farms. This enhances their ability to negotiate compensation agreements.

The incentives to manage resources, under any tenure setting, are centred on management and institutional capacities, appropriate enabling frameworks and co-management between local and central authorities. It is a question of institutions, and the structures within which they operate rather than the tenure and title themselves. The organisational and institutional requirements for local forest management include strong catalytic leaders, management abilities for pro-active planning and administration, fair and impartial distribution of benefits, sound accrual of savings and productive reinvestment, and negotiation of outside political and financial support while retaining internal consensus.

Few forest areas can be 'handed back' to communities. Few, if any 'communities' are or will soon be equipped politically, financially and technically to manage large areas of forests on their own. Times have changed since they last had that responsibility. Yet the cases outlined here show in particular that considerable local knowledge exists and that some foresters are ready to recognize and work with it. What is needed is courage from the government to sanction such work, and support over what will be a long haul.

Farmers have been shown to be responding to degradation in farm and fallow environments by increasing innovations. These innovations include a range of strategies involving increased use of regenerating tree species, particularly through managed pioneer fallow systems and indigenous agroforestry systems, which provide multiple products and soil enrichment. Together with the evidence of high interest in particular types of trees on farms described in this paper, there are clearly exciting avenues for the development of approaches combining agriculture with timber and tree product production.

At state level, a key way forward is to move from a concern with maximising the production of particular commodities, such as cocoa and timber, in the country as a whole, to a focus on maximizing utilisation of the diversity of resources within localities in accordance with the needs of the producers. This will require serious commitment to more decentralised institutions with the capacity to support: regeneration of local economies; diversification of agricultural markets and products; participation of communities in local planning; and building on existing adaptive resource management systems.

With regard to the latter, the trick will be to find the means for government to facilitate, provide technical information and guide the process to ensure that such local management will actually lead to sustainability. And to put the power of the state behind viable, locally generated regimes.

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Since the main part of this study was completed in 1993, there have been many important developments in forest management in Ghana. We refer to some of the main developments in the text and point to sources of further information on these.

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ACRONYMS

| | |
|-------|---|
| CDR | Committee for the Defence of the Revolution |
| CFMU | Collaborative Forest Management Unit |
| CRIG | Cocoa Research Institute of Ghana |
| DA | District Assembly |
| dbh | diameter at breast height |
| DFO | District Forestry Office or Officer |
| DS | Dry Semideciduous |
| DSFZ | Dry Semideciduous (Fire Zone subtype) |
| ERP | Economic Recovery Programme |
| FAO | Food and Agriculture Organisation of the United Nations |
| FD | Forestry Department |
| FG | Forest Guard |
| FMU | Forest Management Unit |
| FPIB | Forest Products Inspection Bureau |
| FVS | Fire Volunteer Squad |
| IIED | International Institute for Environment and Development |
| LKS | Lesser Known Species |
| ME | Moist Evergreen |
| MS | Moist Semideciduous |
| MSSE | Moist Semideciduous (South East subtype) |
| MSNW | Moist Semideciduous (North West subtype) |
| NIC | National Investigation Committee |
| NTFP | Non Timber Forest Product |
| ODA | Overseas Development Administration (of the UK) |
| PNDC | Provisional National Defence Council |
| PNDCL | Provisional National Defence Council Law |
| PRA | Participatory Rural Appraisal |
| SLNR | Secretary for Lands and Natural Resources |
| TDC | Town Development Committee |
| THF | Tropical high forest |
| TO | Technical Officer |
| WE | Wet Evergreen |

1. INTRODUCTION¹

Changing views on what and who forests are for

The rights and duty of governments to be the sole managers of forests is increasingly being questioned in Africa, as in other parts of the world (Stewart, 1985; Schmithüsen & de Montalembert, 1991). This often stems from a state's own recognition that it is unwilling or unable to resource its forest agencies sufficiently to manage according to its own prescriptions.

The need for action to combat deforestation was often the stated primary objective in the establishment by former colonial governments of forestry departments and forest reserves (Adeyoku, 1970; Guha, 1983; Millington, 1987). But, especially in the moist tropical forest zones, it was the rise of commercial forestry which resulted in this assumption of complete responsibility by the state (Westoby, 1985; Shepherd, 1992).

Under policies for commercial forestry the state has seen forest revenues as its legitimate right. The outflow of value from rural areas to business and government coffers was thought to benefit the rural poor in the provision of state services. However, in creating the conditions for commercial forestry, forest-based economic activities of rural communities had to be outlawed along with some of their subsistence activities. In this way, rural communities were deprived of livelihood sources so that 'national wealth' could be generated².

Forest areas thus had to be protected from all uses deemed incompatible with commercial forestry. This required that sufficient revenue be generated from industrial forestry to be made available to enforce the rules against would-be transgressors. For as long as there was a sufficient supply of land and forest outside forest reserves, this condition more or less held and foresters were able to frame their actions in protecting and managing the forest without the need to regard local communities as anything other than an impediment. Since in many countries there is now great pressure on the remaining forest resources, it is no longer possible to avoid asking what forests should be for, and by whom they should be used.

Forest management in Ghana - the government re-examines

The Government of Ghana has initiated various activities in recent years which have provided analysis and reassessment of policy and the nature of forest management interventions. A variety of identified problem areas have been under scrutiny in these

¹ Since the main part of this study was completed in 1993 there have been some important developments in forest management in Ghana. To aid identification of the references to these new developments or sources of further information, they are identified in the text with the use of square brackets [].

² Viz - the prominent FAO forester Jack Westoby's changing thesis of the role of forestry: in the 1960s he described it as an economic engine; but in the 1980s experience had changed his view and he regarded the imperative role of forestry to act as a social distributor (Westoby, 1987).

initiatives, including: the poor level of resources available to the Forestry Department; the inadequate assertion of control over logging; the poor rent capture from the timber industry; and the perceived pernicious degradation of the forest resource by rural communities.

This study aims to contribute to this rethinking process. It examines the existing pattern of forest management and policy at the local level in the tropical high forest (THF) zone of Ghana (Figure 1). Government has limited resources and capacity to fulfil its management role, yet despite widespread logging and quite dense populations in many parts of the THF zone, significant forest areas and resources remain. Who is looking after the forests, and why?

The paper looks at the institutions of local government and traditional authority which are linked to forest use; at district Forestry Department activities; at concession-holders and other timber harvesters; and at the nature of the relationships between rural people, forest resources and the representatives of these institutions.

The study formed part of a project undertaken during 1992 and 1993 by the Forestry Department (FD) of Ghana, in collaboration with the International Institute for Environment and Development (IIED) of the UK (FD/IIED, 1994). The project involved analysis of forest management in Ghana with the aim of designing a coherent and comprehensive system of incentives - economic, financial, institutional, legal and social - to progress towards sustainable management of the tropical high forest.

2. BACKGROUND: FOREST RESOURCES AND TENURE

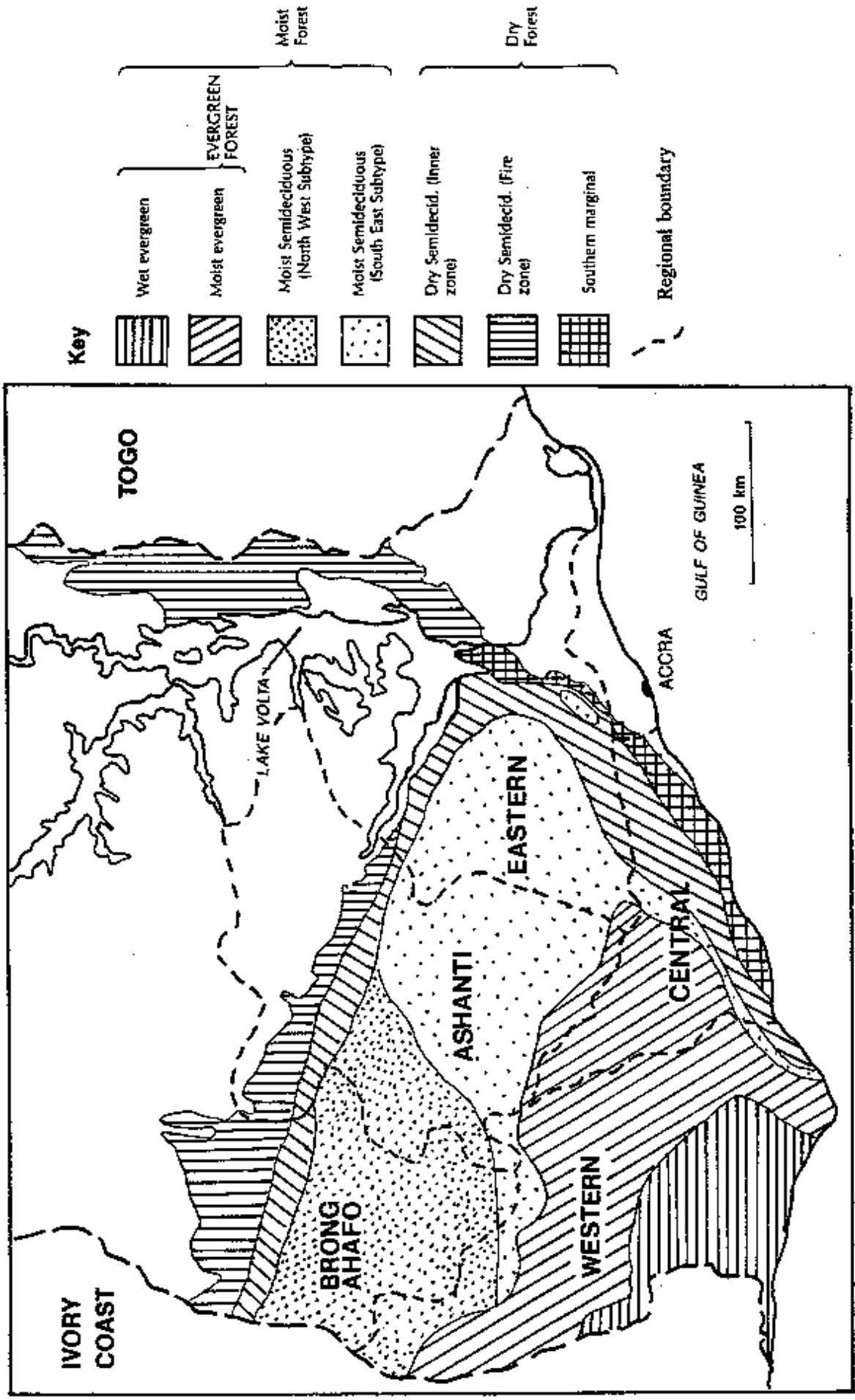
Ghana's Tropical High Forest Mosaic

Change in forest cover in Ghana over the years should not be seen as a one-way street to deforestation. On a timescale of centuries, various climatic and political changes have resulted in phases of forest reduction, regeneration and forest formation. Today, satellite imagery of the south of Ghana shows a mosaic of forest patches corresponding very closely to a map of the demarcated forest reserves set up by the colonial authorities in the 1930s and 1940s. There appears to be virtually no significant area of non-reserved closed canopy forest (Hawthorne and Abu Juam, 1993).

In the light of recent questioning of 'received wisdom' on the issue, the extent and timescale of deforestation before and after reservation deserves critical review (Fairhead and Leach, forthcoming). However, outside the forest reserves, substantial conversion of the natural tropical high forest (THF) to farmland has clearly taken place in recent decades. This has been legal, intentional and arguably necessary for economic development. Ghana has depended on these lands over the last sixty years for the country's major export earner - cocoa.

The implication of an archipelago of well protected forest islands in a sea of farmland is misleading however. The areas outside the forest reserves in the THF zone are by no means devoid of forest resources. Land in the potential 'forest zone' (Figure 1) is under

Figure 1: Southern Ghana, with "forest zones" and political regions. [Forest zones are described by Hall and Swaine (1981) as those with potential for a forest type - based on climatic and edaphic conditions]



a wide range of land uses in the spectrum from farm to bush-fallow to secondary forest. Furthermore, cocoa cultivation is typically accompanied by considerable shade tree cover and these trees may be timber species. Over the last twenty years, this timber outside forest reserves has consistently represented between one third and two thirds of the total annual recorded timber harvest in Ghana.

In addition, the condition of the reserves themselves varies widely. A recent analysis concluded that of the approximately 18,000 km² of forest reserves in the THF zone, some 9,000 km² is in reasonable condition and the remainder is 'mostly degraded or has no significant forest left' (Figure 2) (Hawthorne and Abu Juam, 1993). These authors note a general increase in forest disturbance from the wetter forest in the southwest of the THF zone, to the drier forest areas in the northeast, a consequence both of greater fire and logging damage. However, the condition of these reserves at the time of reservation is not comprehensively analyzed.

Land Use Changes - and the "Frontier"

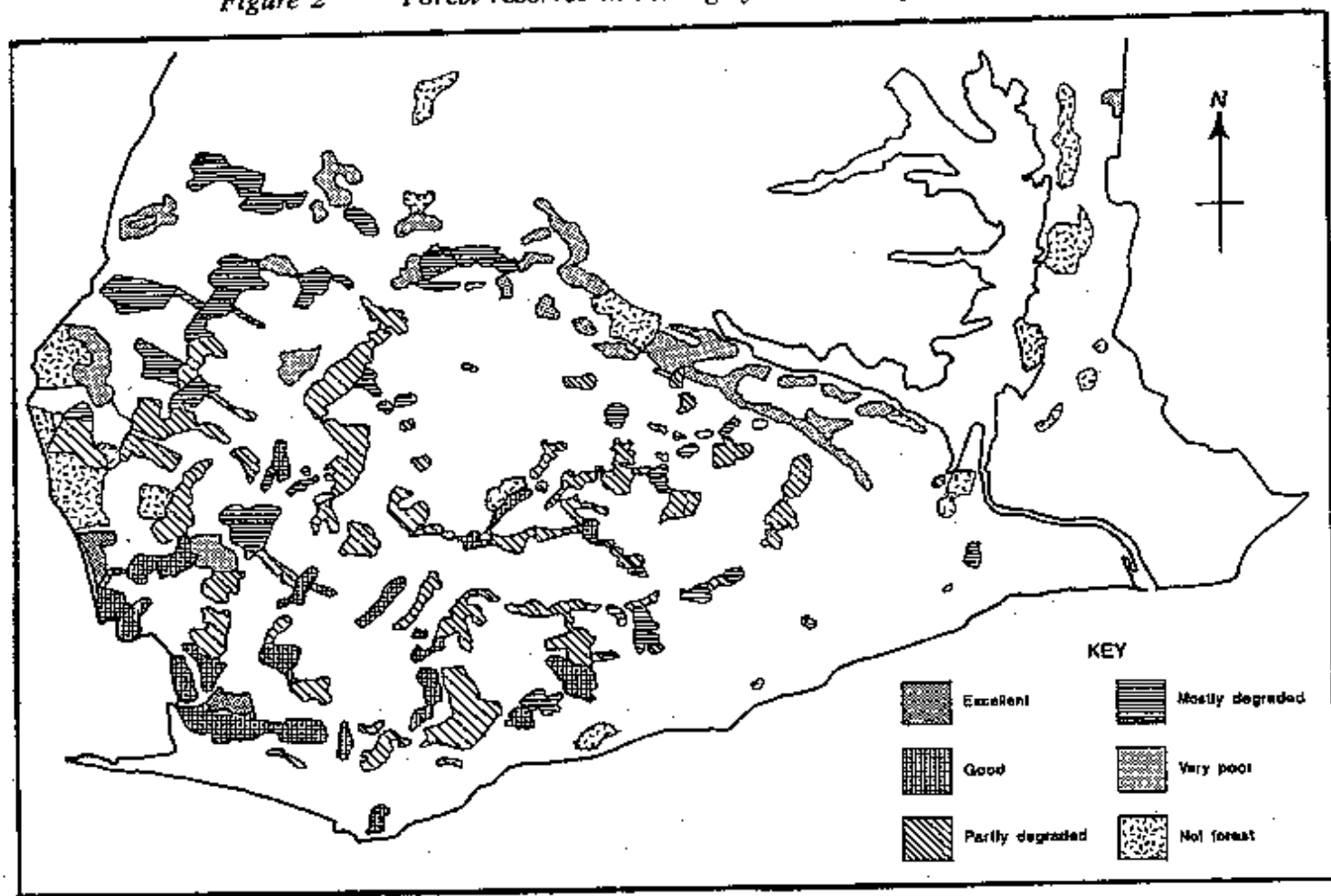
Areas of farm and fallow converted from unreserved THF however, host substantial forest resources but these are under increasing pressure. Decreasing yields of forest products from unreserved areas results in increasing exploitation pressure on the reserves.

In the central and eastern parts of the high forest zone, in the older cocoa growing areas of Ashanti, Eastern and Brong Ahafo Regions, population density is relatively high. Fallow areas are small and fallow periods, with the gradually increasing population, are getting shorter. During the 1970s and early 1980s, government policies to maximise revenue from cocoa led to low producer prices and subsequent neglect and over-aging of the cocoa stock. Cocoa diseases and droughts also hit at this time. The period culminated in the bushfires of 1983 which were exacerbated by the over-mature condition of cocoa trees. The fires led to a great reduction in the area under cocoa as well as destroying much forest reserve and remaining unreserved forest. Some farmers emigrated to the west and south.

The processes of forest and farmland degradation by fire, advancement of weed species and associated disruption of watersheds and stream flows has continued over the last decade in the northern "transitional belt" of the THF zone. In much of this area, and in many areas further south, fire continues to be the main agent of forest loss. For a period many farmers switched to concentrate on other crops (largely annuals) and some continue to favour this strategy. But the market for food crops is finite and prices fluctuate greatly. Cocoa thus returned as the only main option for many farmers. After a period of hesitation and a vigorous government extension campaign³, farmers have replanted much

³ Kojo Amanor (1994) describes how the government has little control over the internal marketing of food crops and identifies the economic interests of the state with cocoa. State policies tend to produce disincentives for food crop production in areas defined as lying within the cocoa belt, and incentives for the rehabilitation of cocoa. He goes on, "the economic interests of the state compound the marginalisation of old frontier districts, while the failure to take the long-term environmental and economic implications of state policy into account may lead to future crisis in the whole forest agrarian sector" (Amanor, 1994 p34).

Figure 2 Forest reserves in the high forest zone of Ghana



Notes: Reserve Conditions. Each reserve has been given a single score:

- 1 = EXCELLENT with few signs (<2%) of human disturbance (logging/farms) or fire damage, with a good canopy and virgin or late secondary forest throughout
- 2 = GOOD with <10% heavily disturbed. Logging damage restricted or light and well dispersed. Fire damage none or peripheral.
- 3 = SLIGHTLY DEGRADED. Obviously disturbed or degraded and usually patchy, but with good forest predominant. Max. 25% with serious scars and poor regeneration; max. 50% slightly disturbed, with broken upper canopy
- 4 = MOSTLY DEGRADED. Obviously disturbed and patchy, but with bad forest predominant; 25-50% serious scars but max. 75% of heavily disrupted canopy. Or forest lightly burnt throughout.
- 5 = VERY POOR. Forest with coherent canopy <25% (more than 3/4 disturbed), or more than half the forest with serious scars and poor or no forest regeneration; or almost all heavily burnt with conspicuous *Eupatorium* and other pioneers throughout.
- 6 = NO SIGNIFICANT FOREST LEFT: Almost all deforested with savanna, plantation or farm etc; <2% good forest; or 2-5% v. disturbed forest left; or 5-10% left in extremely poor condition e.g. as scattered trees or riverine fragments. Remnants with little chance of surviving 10 years.

Source: Hawthorne and Abu Jua (1993)

of the destroyed area with cocoa and with improved producer prices are likely to continue to do so on all but the permanently degraded lands.

The Western Region has for thirty years been an area of lower population density to which migrants from the north and east of Ghana have flocked. In this period, land was relatively plentiful and the Wassa and Sefwi people were grateful to gain tenants on the land to expand their cocoa. The influx of migrants continued after the fires of 1983 but by the late 1980s was declining to low levels. The increased population density in the area is likely to reduce fallow periods and there are very few blocks of unreserved forest remaining.

In his study of farmers' adaptation to changing environments and responses to land degradation in an area in the Eastern Region of Ghana, Amanor (1994) contends that much of southern Ghana can be seen as a 'despoiled frontier'. He uses the concept of the frontier primarily in relation to Ghana's historical, social and ecological experience of the effects of export crops, but in many ways the notion is of equal relevance to timber.

Frontiers represent first encounters between nature and society. People migrate to the new frontier with the hope of starting a new life. After a period of windfall profits, these areas usually become marginalised as the environment is degraded from intensified production and as settlers move to the new frontier beyond, which will be more profitable to exploit than solving the mounting environmental problems behind them. The expansionary nature of capital ensures that the potential of a windfall profit at the frontier is highlighted, but not the consequences - which capital does not have to bear as long as new frontiers exist. Many people have to remain in old frontier districts however, having to contend not only with environmental degradation, but with further marginalisation since development resources have moved to the new frontier areas (Amanor, 1994).

In Ghana, the Eastern Region districts producing the first major export cash crop, oil palm, were marginalized when forests in Southeast Asia were opened up for oil palm in the nineteenth century. A comparative advantage for cocoa was established in neighbouring areas in Ghana towards the end of the century and farmers responded to it. By the 1920's and 1930's, diseases of cocoa were devastating the Eastern Region cocoa belt. Amanor (1994) describes the 'frontier' having moved primarily into Ashanti Region in this period. As land became scarce in Ashanti and degradation increased, colonisation Western Region increased in the 1960s (Hill, 1963). This is now the major cocoa area and main area to which farmers and labourers migrate. The soils and ecology of the area are fragile however, and in many parts, problems have set in. Despite considerable governmental external support for the regeneration of cocoa growing, success is limited and an increasing proportion of farmers are looking for solutions outside cocoa (Table 1).

Forest Reserves and Sacred Groves

The Forestry Department was established in 1909 and most forest reserves were created in the 1920s and 1930s. Reserves were established on all major hills and watersheds and were explicitly defined to meet local needs for forest products, to create a suitable local climate for agriculture, especially cocoa production, and to safeguard water supplies (Foggie, 1962). Barrier and shelterbelt reserves were also established to hold back fires,

and to maintain local rainfall and humidity levels respectively. There are approximately 280 forest reserves in Ghana today, 214 of which are in the high forest zone (Figure 2), the remainder in the savanna zone.

Table 1: The Development of Land Use in the "Frontier Zones" of Southern Ghana

| "Frontier Zone" | Period of Increased Colonisation | Current Major Land Uses |
|---|--|--|
| Eastern Region and the "southern transition zone" (perceived to be transition from forest to savanna) | Early 19th century for oil palm. By late 19th century, primary cocoa region of Ghana. Cocoa disease devastated in 1930s | Food crop farming system centred on maize, cassava, oil palm and vegetables (pepper, tomato, okro and egg-plant). Increasing fires and "savannization" |
| Ashanti Region and Southern Brong-Ahafo Region | From the 1920s with the expansion of road transport infrastructure | Cocoa production. Problems with fire, weeds and disease. Increased reliance on hybrid seeds and other inputs. |
| Western Region | From the late 1960s, increasing colonisation began as majority of land elsewhere became alienated. Many still migrating to the zone | Despite fragile soils, the major cocoa area. Increasing deterioration of cocoa stock. Oil palm and rice also grown. |
| Brong-Ahafo Region (middle parts) and the "northern transition zone" | During the 1970s became the major food-producing zone for urban markets. Colonised primarily from northern Ghana. Movement today towards the Afram Plains to the east of the zone. | Smallholdings growing maize, yams, plantain, cassava, vegetables, cowpea, groundnuts and tobacco. Much fire and savanna increasing. |
| Eastern Region (western parts), Ashanti Region (southern parts), Central Region (northern parts) and Western Region (eastern parts) | From the 1970s, with the encouragement of policy measures and subsidies | The new oil palm belt. Capitalised commercial estates and smallholders with subsidized inputs and extension support. |

(Source: adapted from Amanor, 1994)

During the production of Forestry Department working plans, primarily in the 1950s, about 30% of the reserved area was designated 'protection working circle' and 70% 'production working circle'. However, with an increasing amount of the forest outside reserves destroyed and a rapidly expanding timber industry, many reserves which had previously served only a protective function came under management for timber production in the decades after the Second World War (Hawthorne and Abu Juam, 1993). It is only the physically unloggable forests which can be claimed to have been treated consistently as protection forest.

In addition to government reservation, throughout most of southern Ghana, small areas of intact or slightly degraded forest can be found that have been preserved for reasons connected to religious beliefs. There is considerable variation in the beliefs and prohibitions associated with such areas - known as 'sacred groves' - but the one prohibition common to all is that on the cutting of live trees. Testimony to the prohibition's effectiveness is found in the fact that sacred groves in forest reserves are often better preserved than other parts of the reserve (Norton, 1991). (The ways in which farmers and communities have managed forest resources is returned to in later sections). Outside reserves these small fragments of forest have a conservation significance far outweighing their diminutive size. For example, there are many sacred groves in the southern, northern and eastern margins of the THF zone which contain rare plant species. These groves have therefore added considerably to the protected area of forests of high genetic value which are poorly represented in state-managed forest reserves.

Timber and other major products

Of the approximately 126 forest tree species which grow to timber size, about 50 are currently considered merchantable, 23 of which are commercially important for logs, sawn timber or for processing into veneers and plywoods, or furniture (Francois, 1987). Of these, ten species accounted for 79% of total volume extracted in 1991 (FPIB data), with Wawa Triplochiton scleroxylon, alone constituting 41% and Odum Melicia excelsa 12%⁴. Forest inventory data from 1985 to 1988 indicate that Ghana's forest reserves then contained about 90 million m³ in commercial timber trees of loggable size, while the current annual timber harvest from all areas is about 1.2 million m³. There is no inventory information yet available for timber resources outside forest reserves.

Total forest revenue, primarily from timber fees, currently collected by the government annually is about US\$ 5.8 million. This compares to an estimated total annual stumpage value⁵ of US\$ 120 million (FD/IIED, 1994). The low proportion of stumpage value collected in forest fees represents a substantial 'gift' to the private sector⁶.

The timber resource implications of continuation of the current policy and practice were modelled by the FD/IIED study (FD/IIED, 1994). Some species are being harvested at sustainable levels or could be harvested at higher levels. It is predicted however that the harvest of the main currently commercial species from all areas will drop by 65% over the next 20 years if present practice continues. This reflects a near total collapse outside

⁴ In 1993, the extracted volumes of a number of species, particularly Ceiba pentandra and Antiaris toxicaria, previously harvested at relatively low levels, was greatly increased as new markets in the Middle East were found. Total roundwood harvest rose to 1.7 million m³ in 1993. Much of this extraction originates from the unreserved areas.

⁵ The stumpage value is defined as residual value of the timber after deducting from the log export price the costs of harvesting, transport to port and a working profit in logging. It therefore represents the maximum price a logger would be prepared to pay for the standing tree in a theoretical competitive market situation.

⁶ It is estimated that about 35% of this value is lost in wastage in the forest and timber mill.

reserves and a marked depletion within reserves. In the longer run however only very few of these species will avoid commercial extinction.

Forests contribute to all aspects of rural life providing food, fodder, fuel, medicine, building materials, and household items, as well as many more intangible benefits such as cultural symbols, ritual artifacts and sacred sites. In addition, trade in non-timber forest products (NTFPs) is an important economic activity in all corners of the high forest zone, involving a great number of people including gatherers, producers, and wholesale and retail traders, often operating within complex trading channels. Commonly traded NTFPs include:

- foods (snails, bushmeat, mushrooms, fruit and seeds);
- spices;
- chewsticks;
- chewing sponge;
- cola nut;
- charcoal;
- medicines;
- household goods (sponges, mortars, pestles, utensils, wooden trays, grinders, mats and baskets);
- food-wrapping leaves (Marantaceae); and,
- tool handles (Abbiw, 1990).

Falconer's (1991) study of NTFPs revealed the importance of farm and fallow forest areas as sources of NTFPs. Even where access to forest reserves is good, people tend to collect products from fallow and farm lands. Forest areas, essentially the reserves, are entered for rarer products such as medicines, canes and building materials unavailable on fallow lands. Furthermore, the NTFPs traded in significant quantity, such as bushmeat, canes, chewing sticks, food wrapping leaves and medicines, largely originate from reserves (Falconer 1992). These goods are far from being 'minor' forest products - they represent the economic mainstays of some villages and many households and often provide the only income source for poor or marginalized families or those temporarily in need during the hungry season or in poor farming years.

Bushmeat is consumed regularly by 75% of the Ghanaian population (Asibey, 1986). The Department of Game and Wildlife estimate that 80% of the rural population depend on game meat (Asibey, 1987). In the high forest zone, most species of mammal are eaten but the main bushmeat species in trade are all pests on farms⁷.

⁷ Most hunters, 76%, interviewed in Falconer's study claimed they caught their game on or at the periphery of farm fields compared with 24% who caught them in the forest (Falconer, 1992). Grasscutter Thryonomys swinderianus and Duikers Cephalophus spp. are the most commonly consumed. In one survey, it was found that over €12 million (\$202,000) worth of bushmeat was sold from a single market in Accra in 1985. Three-quarters of this trade involved the Grasscutter (Ntiama-Baidu, 1987). This reflects only a small fraction of the trade and does not indicate the full value of the resource to rural people; Falconer (1992) for example estimates that over 80% of hunters never take their catch to urban markets.

Canes, which form the stems of various climbing palm species are widely used to produce household and commercial goods. The most common products are baskets; Falconer (1992) estimated that over 90% of all households in southern Ghana owned an average of 3.4 baskets. The market for cane furniture is ever-increasing⁸.

Fuelwood and charcoal account for more than 75% of all energy consumed in Ghana and an even higher percentage of energy for household cooking and water heating in rural and urban areas alike (Owusu *et al*, 1989)⁹.

Most of the woodfuel requirement of rural households in the high forest zone is collected by women from farm and fallow lands. Generally it is not scarce although local scarcities arise due to the high fuelwood demands for processing of palm oil or distillation of 'akpeteshie' gin. The World Bank (1988) estimated that woodfuel consumption in Ghana was 15.9 million m³ in 1988, and will rise to 17 million m³ by the turn of the century. It was estimated that there will be a 0.7% per annum decline in wood availability in these years resulting in a fuelwood deficit of 11.6 million m³ by the year 2000. As noted this deficit will be primarily in the savanna and transitional zones. Wood resources will also become increasingly scarce outside forest reserves in the high forest zone, while pressure for wood from within reserves will intensify.

Assessment of the status of the NTFP resource is very difficult since the range of products exploited is so great and their sources so diverse. A limited NTFP inventory was instituted by the FD in 1991 to be carried out alongside the ongoing tree inventory in the forest reserves. NTFPs of key economic importance are also being included in the permanent sample plot programme¹⁰. This will provide basic information on the growth and productivity of selected species. There is currently no programme of assessment of NTFP resources on farm and fallow lands outside forest reserves. This study (see Methods) found great local variability in the use of NTFPs but a general perception of decline in availability of some NTFPs both inside and outside forest reserves. Those widely noted to have declined were: canes, chewing sticks and the forest bushmeat species.

Ownership of Forest Reserves

Customary tenure, with regard to the forest, essentially classified land into three types:

⁸ The quantities of cane involved are clearly immense. For example, Falconer (1992) estimated that 470,000 metres of raw cane, worth €3.7 million (\$10,000) entered Kumasi alone every month.

⁹ One study found that 84% of urban households depended on either woodfuel, charcoal or a combination of the two (Nketiah *et al*, 1988). The same study found that charcoal was the major fuel for 69% of urban Ghanaian households and estimated that this represented 480 thousand tonnes of charcoal consumed annually, which would require over five million m³ of wood to produce at current efficiencies (Nketiah *et al*, 1988). The bulk of this urban woodfuel, 80% according to Nketiah and Asibey (1989), originates in the savanna and transitional zones as a by-product of land cleared for agriculture.

¹⁰ The methods of NTFP assessment developed are described by Falconer in Carter (1995, forthcoming).

- *individual land*, drawn from the corporate customary law groups - stools (the symbols of chieftaincy) and clans - through usufruct rights;
- the forest area near a village settlement, perhaps within three to five miles of the village, which was regarded as *communally owned*;
- the more distant '*open access*' stool land which was used particularly for hunting, but over which there were no perceived ownership rights by members of the community.

The original establishment of the forest reserves took little account of the latter two categories, which were essentially merged as state managed land. This resulted first in a diminution and later an outlawing of the rights of communities and villagers near the reserve. In the first decades of reservation, some 'communal rights', mostly in the form of access to forest products, were admitted to nearby communities (permits were required from the FD but these were free). Later these rights were seen by the state to have been abused as forest products became increasingly commercialised with 'outsiders' apparently benefitting most. Rights were then further restricted by permits, levies and fines imposed by the FD (and the Game and Wildlife Department in the case of hunting). By this time responsible local attitudes towards forest protection and management had largely evaporated and the reserves could only be maintained through policing. Thus at the local level, forest reservation has modified tenure systems and resulted in a disincentive for those nearest to the resource to take responsibility for it.

The Forest Ordinance of 1927 vests in central government the power to constitute reserves on all land. In theory the constitution of an area as a forest reserve did not affect ownership of the land and forest. Management and control was however exercised by the Forestry Department on behalf of the government. This position was significantly modified by the Concessions Act, 1962. This provides that all timber resources, together with all land declared to be forest reserves or subject to timber concessions, are vested in the state in trust for the communities concerned. Prior to this, stools could grant timber concessions - but the ordinance transferred this power to government.

The Forest Protection Decree of 1974 prohibited a whole range of activities within reserves, and imposed criminal sanctions for any violation. Outlawed activities include:

- felling, uprooting, tapping or injuring any tree or timber;
- making a farm or erecting a building;
- obstructing any river, stream, canal or creek;
- hunting or shooting any game or wildlife;
- fishing, poisoning water or setting traps or snares; and,
- collecting, processing, conveying or removing any forest produce.

While the FD may grant some free permits to villagers near reserves to collect or extract NTFPs for their domestic use, all other use requires written permission from the FD, and payment of a fee. In effect, the 1974 Decree abolished most communal rights.

Most forest reserves however, remain under the formal ownership of the stools. In the THF zone, which is largely populated by Akan ethnic groups, these are lineage communities. In some reserves there are areas of outright alienation from the stool or clan

prior to reservation - usually to large private farmers. In addition, there are three reserves which have been compulsorily acquired by the State. The ownership of reserves, often divided between several stools, and the boundaries between adjoining owners are generally settled - although there are a few notable long-standing disputes.

Demographic change, facilitated by the land tenure system described below, has added a further dynamic in the use and management of the reserves, - many settlements near reserves have developed since the time of reservation and thus have no prior 'claim' on the land in the reserve.

Land Ownership Outside Reserves

The land tenure system is the result of three main influences: tradition; colonialism and the political, social and economic dynamic that it engendered; and post colonial policy. Traditional landholding authorities hold allodial (absolute) title to land on behalf of the people. A traditional landholding authority may be a paramount, divisional or sub-stool or a combination of these, depending on the mode of acquisition of the land and history of the people. Members of the landholding group have usufruct rights and may permanently appropriate a portion of land by 'permanent' development. Such land, for most practical purposes, belongs to the member and his interests are secure, inheritable and generally alienable.

Migrants acquire land by outright purchase, or more commonly by leasing under customary law. Tenancies for cash crop production (mostly cocoa, but also oil palm and coffee) generally lead to secure rights in land¹¹. A migrant may also obtain land on tenancy terms to farm food crops. In this case, although it is essentially a matter of contract, the land is not divided and generally only the produce of the farm is divided. Such tenants may be ejected by their landlords and have little incentive to plant and nurture trees. Many poorer migrants are in this position.

Tree Tenure

Across the tropical high forest zone, the general 'customary law' position is that assets 'found' on the land, not the result of identifiable labour, belong to the whole community and are held in trust and administered by the traditional authority (traditional councils and their sub-components - the stool chiefs).

The colonial system sought to provide a revenue base for the stool, and effectively changed the nature of the chief from the representative of collectivity to an individual with ownership rights. In theory timber trees are now owned by the landholding stools on whose land they stand. But this ownership is ambiguous. Presently rights in all timber

¹¹ Tenancy may be granted by the traditional authorities on 'abusa' terms - 2/3 of the produce to the farmer, 1/3 to the landholder - or by natives or migrant purchasers on 'abunu' terms - 1/2 to the farmer, 1/2 to the landholder. In this case, the tenant farmer plants and nurtures the cocoa or other cash crop, and the land is divided between the landholder and the tenant at some stage after the trees mature and start fruiting.

trees are vested in central government on behalf of the stools. Concessions are granted by central government with little or no input by stools, village communities and local authorities. Thereafter the concessionaire has an exclusive right to the trees.

Royalties and concession rent are fixed and collected by central government with little or *no input from these same stakeholders*. The FD has been responsible for the collection of the on-reserve revenue. The Lands Commission (see section 5.) collected the off-reserve revenue until September 1994 when this function was handed over to the FD. Royalties due to landowning stools are paid into accounts managed by the Administrator of Stool Lands and distributed to traditional authorities, district assemblies and stools according to a set formula.

In summary, a combination of colonial and post-colonial policy and legislation has resulted in a situation in which farmers, native and migrant, have few rights in timber trees on their lands and farms. Farmers have the right to use some timber trees for individual 'domestic' purposes¹², but have no right to sell timber trees on their lands, although in some places such 'sales' take place.

[Until recently, farmers did not receive any portion of royalties and had no legal right to be informed of, or to refuse, felling of trees by timber concession holders. Furthermore they suffered damage and destruction to their trees, crops and farms when timber trees were felled, and received little or no compensation. Lack of tree tenure was thus a major disincentive to *off-reserve timber tree planting and protection on farms and fallows*.

In 1995, following particularly heavy and illegal harvesting of the off-reserve resource, the Ministry of Lands and Forestry adopted and began implementing 'Interim Measures to Control Illegal Timber Harvesting Outside Forest Reserves'. A new consolidated Forest Act is also currently under consideration. These are major developments (see section 8.); the reader is referred to: FD (1994); FD (1995a) and Smith *et al* (1995).]

3. AIMS OF THE STUDY

Despite widespread logging, quite dense populations, and insufficient resources and capacity for government to adequately fulfil its management mandate, there are still significant forest areas and resources remaining in the Ghanaian THF zone. The goal of this study is to explain why this is.

The main assumption made is that normative policy, when only partially implemented, allows for various local arrangements to determine what actually happens to the forest resource. The aim is therefore to identify the nature of these arrangements, and ascertain whether workable actions at a national or local level could support them where they appear to be of net benefit to both the forests and people of Ghana.

¹² Under customary law there is no restriction on destroying or using trees, and subsequent legislation seeks only to prohibit the destruction or selling of *timber trees*.

To this end, objectives of the study were to generate information in three main areas:

- *local priorities and perceptions* of the roles and values of trees and forests, in particular of community roles in relation to forest reserves and timber trees outside reserves;
- *community responses* to existing policy, market and non-market incentives, including attitudes to timber rights and the distribution of revenues;
- *community interaction* with traditional authorities, local government, the Forestry Department, concessionaires and other institutions;
- *impacts of local governance structures* (traditional councils, district assemblies, district forest offices) on forests and forests resources, and their use by communities; and
- *dynamics of the local timber industry*, the timber companies at local level and the independent chainsaw operators.

4. METHODS USED IN THE STUDY

Ongoing initiatives, existing data and fieldwork priorities

Collation of existing documentation and liaison with relevant ongoing initiatives were the initial emphases of the project. On the basis of initial assessment of available information, field studies were planned in the following areas:

- with communities in the high forest zone;
- with local institutions having impact on forest use and management;
- with District Forestry Offices;
- with concession and non-concession timber harvesting operations and timber processing companies;
- basic assessment of forest condition and management practices in areas linked to the above groups.

Village Forestry Study

Analysis with communities in various locations around the high forest zone was undertaken. Fieldwork was carried out by a team of four between August and December 1992. Six villages near to different forest reserves were chosen. A Participatory Rural Appraisal (PRA) approach was adopted, which generated a great deal of information on the above topics and in some cases developed into a process of planning for activities to improve particular situations which groups in the village had identified¹³.

¹³ The PRA team was composed of two Technical Officers from the FD (both female) -involved in forestry programmes with a community focus in the high forest zone - the legal specialist and social/institutional specialist from the project study team (both male)

A workshop designed to train the field team in the PRA approach was held in Kumasi in July 1992. The workshop was organised by the field team and run by two trainers from IIED, which has a particular expertise in PRA. Participants included about 20 people from a range of national and local institutions with expertise and experience in forest resource use. These individuals and institutions were of key importance for the study in the later phases of the work, and all had expressed interest in the PRA approach. Over two weeks of village-based fieldwork and workshop sessions the group examined issues and PRA techniques and developed an appropriate approach for the field team.

PRA techniques found particularly useful by the field team included:

- semi-structured interviewing with focus groups and key informants;
- oral histories and historical profiles;
- transect walks;
- social maps;
- resource maps with resource flows and historical changes;
- planned future maps;
- matrix ranking and scoring;
- proportional divisions and pie diagrams;
- institutional venn diagrams; and,
- systems diagrams.

A preliminary selection of the study areas was made during the training workshop and was subsequently developed following discussions with various Forestry Department personnel. The study villages were chosen after selection of six forest reserves in the tropical high forest zone. The reserves were selected with an attempt to provide 'typical' rather than 'exceptional' cases, although coverage of the range of common reserve conditions and usages was also aimed at. Logging concession activity was also considered since it was proposed that project analysis of forest management and the timber trade should tie in with the village and local institution studies¹⁴.

Following discussions with the District Forest Officer in each area and a reconnaissance visit around the reserve, a village near each reserve was chosen. A basic selection criterion was that all villages had to be marked on the 1:50,000 Survey of Ghana map series (i.e. to have been of significant size in the 1960s and 1970s when the aerial surveys were carried out). Other positively influencing factors included the existence of a

¹⁴ The following criteria were used to conclude on the forest reserves selected :

- Geographical spread and forest ecological zone. It was aimed to get a spread across the 5 Regions and 7 ecological divisions of the high forest zone.
- Degree of multiple use, based on the (old) Forestry Department designation of Selection, Protection and Conversion Working Circles, and degree of NTFP use, if known.
- Level of logging concession activity. A range of size of companies and level of recent logging activity was aimed at.
- Population density in surrounding areas and level of encroachment, if any.

(former) taungya series¹⁵ in the reserve near to the village, an active logging concession in the area outside the reserve, or a strong relationship, good or bad, with the Forestry Department. Factors which the selection process tried to balance in the overall mix of study sites were the size and the social structure of the village. Table 2 shows the forest reserves selected, the reserve characteristics and the villages neighbouring them which were selected for the study.

Each field site was briefly assessed, in the company of a senior forester from the district, for the condition of the nearby forest and the nature of the land use both off and on reserve. All other information was generated by individual and group informants in the villages (without the presence of any departmental foresters).

In each village the chief and elders were visited some days before the PRA work to explain the mission, seek permission for carrying out the PRA in and around the village, agree on a date to start the work and gather some basic information about the village. In most villages the team also obtained the consent, or was asked to notify the local organising secretary, of the Committee for the Defence of the Revolution or 'Unit Committee' (see next section).

It was stressed that the village had not been singled out for special treatment - the study hoped to use it as an example of the type of village in the area as part of a larger study looking at the same issues in various places around the high forest zone¹⁶. After discussion, all villages approached gave consent for the work to be initiated.

In most cases, two or three days after the initial visit, the work began in the villages. A meeting with the chief or his representative, elders and prominent villagers always began the work¹⁷. After this initial meeting, the team was generally allowed to move freely in and around the village to talk. The team's approach was guided by a memorised checklist

¹⁵ Taungya, is a system of forest plantations in which farmers plant seedlings and tend the trees in return for being allowed to cultivate crops for the first few years, between the seedlings in the plantation. A taungya series is a series of plots allocated sequentially under the taungya system.

¹⁶ The team explained that the study would enable government to better understand their communities, but stressed that there could be no promises about particular government actions stemming from the results of the work. It was pointed out however that the analysis process which the team hoped to stimulate, might be of use to the villagers in developing their own plans for management of land and natural resources.

¹⁷ Before any serious talk began, the team offered the customary bottle of schnapps to the company. The chief's representative poured libation and asked for a blessing. Introductions from each of the team members and from villagers took place and were usually followed by the chief or his/her representative giving a general description of the village, its main features and occupations of villagers and surrounding population. Often this developed into map drawing in which prominent village members developed maps on land uses in the area or 'social maps' giving information about households in the village. In almost all cases this mapping by the village heads catalysed other 'focus groups' to develop maps later on, often with reasoning along the lines of "that is what they told you but this is the real story".

Table 2: Characteristics of forest reserves and neighbouring villages selected for the village forestry study and district forestry profiles

| | FOREST RESERVE | | | | | |
|--|----------------|-----------------|------------------|--------------|-------------|-------------------|
| | FURÉ | KROKO-SUA HILLS | DESIRI | BIRIM | ESUKAW-KAW | AFRAM HEAD-WATERS |
| Region | Western | Western | Brong-Ahafo | Eastern | Eastern | Ashanti |
| Forest District | Asankrangwa | Juabeso-Bia | Goaso | Akim-Oda | Mpraeso | Kumasi North |
| Forest Ecological Zone ¹ | WE | ME-MSNW | MSNW | MSSE | MSSE | DSFZ |
| FD multiple use (High, Medium, Low) | Low | High | Medium | Medium | Medium | High |
| NTFP use (High, Medium, Low) | Medium | Medium | High | Low | Low | High |
| Logging company size (Large, Medium, Small) | Large | Small | Small | Medium | Medium | Medium |
| Logging activity (High, Medium, Low) | Medium | Low | Low | Medium | High | Medium |
| Population density in surrounding area (High, Medium, Low) | Low | Medium | Medium | Medium | Medium | Medium |
| Encroachment (High, Medium, Low, Negligible) | Negligible | Low (farming) | High (farming) | Low (mining) | Negligible | Low (farming) |
| Neighbouring study village selected and population estimate ² | Fureso 440* | Mafia 1,900 | Abonsuaso 5,480* | Apoli 2,000* | Subriso 240 | Asuboi 600 |

Notes: Categories High to Low and Large to Small are relative to the other reserves in the sample.

¹ Forest zone categories as used by the Forestry Department Planning Branch (following Hall and Swaine 1981):

WE - Wet Evergreen

ME - Moist Evergreen

MSNW - Moist Semideciduous (North West subtype)

MSSE - Moist Semideciduous (South East subtype)

DSFZ - Dry Semideciduous (Fire Zone subtype)

² Average of estimates made by various informant groups in the study, some involving 'social mapping' exercises. Most of the estimates correlate quite well with village census data from 1984 from the Statistical Service, Accra

* Includes hamlets in outlying areas under the land considered to belong to the village.

of areas in which information was sought, and possible strategies and methods to address them. Cross-checking of information, by 'triangulation' from several sources and methods, was an objective throughout. There were generally few barriers to discussion, and in only one village was the team viewed with enough suspicion by the village leaders that a messenger was sent around to a number of households priming them with the 'answers' to give the team.

The village forestry study, combined with other sources of analysis¹⁸ and much discussion allowed general trends and issues to emerge and pictures to develop of the relationships between communities and forest resources, institutions and policies.

District forestry profiles

A 'profile' of the District Forestry Department in each location was also developed by the team, based on interview with District staff and review of available documents and records. This included analysis of the history of the forest reserve near to the study village from the Forestry Department viewpoint. In addition, interviews were held with a variety of people from local institutions and forest user groups: District Assemblies, Lands Commission Secretariat offices, Traditional Councils, Stool Chiefs, chainsaw and bushmill operators, and concession holders.

5. LOCAL INSTITUTIONS AND THE FOREST

Village Organisations and Forest Use

There are a wide variety of village level organisations which have an existing or potential impact on the use and management of forest resources. The relative importance and effectiveness of these bodies varies greatly between villages. All villages in the study have existing structures directly concerned with some aspect of forest resource management.

Organisations found in most villages, of direct relevance to the use of forest resources, include:

- traditional authorities - the chiefs and elders;
- more recent representations of formal governance - the District Assemblymen/women (only in the larger villages);
- so-called 'revolutionary organs' - Committees for the Defence of the Revolution (CDRs) and Mobisquads;
- Town Development Committees or Unit Committees - which often provide the linkage between the traditional authorities and the CDRs;

¹⁸ Including: Adomako *et al* (1987), Norton (1988, 1991), Nkyi (1989), Abbiw (1990), Falconer (1991, 1992a, 1992b), Antwi (1992), Statistical Service (1992), Jones *per comm.* (1993), Osei-Bonsu *pers comm.* (1993), CFMU (1993), Kotey (1993), and numerous Forestry Department *pers comm.*s, records, reports.

- nationally coordinated 31st December Women's Movement;
- producer unions - Cocoa Committees, Farmers' Associations, Distillers Unions, Market Women's Associations;
- mutual support groups and funeral committees;
- Taungya Committees (in villages beside reserves); and,
- Fire Volunteer Squads (except in the WE and ME zones).

Many villages have additional forms of organisation stimulated by the nature of a particular resource - e.g. the Marantaceae leaf collecting groups of Asuboi - or unique circumstances, such as the 'Admitted Farmers Committee' in Abonsuaso.

Chiefs and Elders. While some of the study villages - Fureso, Mafia and Apoli - had stool chiefs, others - Subriso, Abonsuaso and Asuboi - were headed by 'odikros' (village, sub-chiefs with little landholding responsibility). Land allocation and dispute resolution were the most widely expressed functions of the chief and his elders. The perceived importance of these traditional authorities in land and forest issues varied widely but generally the stool chiefs were more decisive and respected than the odikros. The stool chiefs are the only village institution to be formally involved in timber management as it is currently formulated, in that they receive a proportion of royalty revenue from both unreserved and (supposedly) reserved areas.

Royalty revenue to the stool chiefs in the Study villages ranged from zero to 9151,000 (about US\$ 410) per year. There was little evidence that stool chiefs carried out any action to ensure the survival and growth of timber trees on farms although in some cases they have prevented farmers from felling trees so that concessionaires can harvest them. It is likely that increased royalty levels (from an increased level of exploitation in the area, an increase in the ability to collect revenue due, and/or an increase in the royalty values themselves) would do little to change this situation. Most villagers stated that the current royalty shares were generally retained by the chiefs for their own expenditure. They did not generally begrudge the chiefs this money but some thought that the situation would change in the future. In Mafia for example, a group thought that future royalty payments would benefit the wider village community through the influence of the Unit Committees.

District Assembly Representatives. The villages of Mafia, Abonsuaso and Apoli each had an elected 'assemblyman/woman'. In the latter two villages the representative was not regarded as a powerful figure in the village, but in Mafia the Assemblyman was seen to have had a lot of influence in the District Assembly (see below) and had brought benefits to the village in the form of school buildings and a woodlot project. Generally, there is a gulf in village perception between on the one hand, the assemblyman, who is seen as 'one of us', and on the other the District Assembly, represented by the District Secretary, far away in the District capital.

Committees for Defence of the Revolution (CDRs) and Mobisquads. All villages in the study had CDRs, only one claimed to have an active 'mobisquad'. These bodies were set up in the early and middle 1980s in response to government directives. Larger villages e.g. Abonsuaso, had several CDR 'units' and villages come under Zonal Organising Assistants. The CDR generally organises the communal labour lists in a village. CDR

members were usually appointed in a town meeting but there was often considerable political pressure from outside to appoint certain individuals. The CDRs were often described in the village as 'the PNDC government's watch dogs' and 'village policemen', and as representatives of the PNDC they were certainly active in the December 1992 elections. Since 1993 the role of the 'revolutionary organs' has generally been downplayed by central government, with varying effect at the local level.

Town Development Committees and Unit Committees. Most villages had one or the other of these bodies. Membership was usually a combination of those elected in a village meeting and those appointed by the chief and elders. They were generally popular and seen as the mechanism for development in the community. Typically they used communal labour and instituted village fundraising to build schools, clinics, wells and latrines. TDCs or Unit Committees in some villages, e.g. Mafia had plans for the management of forest resources for village benefit.

Farmers Committees. In some villages where the TDC or Unit Committee was weak or non-existent, e.g. Fureso, a Farmers Committee or Association assumed a similar role. In other cases they existed in tandem. The major contribution of the farmers' group in all villages was its capacity to raise money through local taxes on cocoa, communal farms or hired out work teams. The Fureso Farmers' Committee developed ideas about village management of NTFPs.

Fire Volunteer Squads. Of the study villages, only in Fureso, in the wet evergreen forest zone southern Western Region, were the fires of 1983 not mentioned as a key event in the history of the village. In many of the central and northern areas of the high forest zone fire is the dominant causal factor in the changing use of land. Fire Volunteer Squads have been formed and operate in most areas. Of all environmental issues, fire seems to be the one which has stimulated the highest degree of consensus and organisation.

Fire Volunteer Squads have been encouraged by government and some have received a little training from National Fire Service representatives from the larger towns. Some FVS consider themselves responsible to the zonal organising assistant of the CDR but others are independent. Common actions of the FVS were to compulsorily supervise (for a fee) farm clearance, palm wine tapping and distilling, and to levy fines for breaking rules about the timing of fires. In Asuboi, in the 'fire zone', the organisational imperatives of the problem have led to a strong FVS which communicates with squads in other nearby villages and has proposals for collaboration with the FD and the Fire Service on forest and farm protection and tree-belt planting (see case study, below). In Apoli, there was no FVS but villagers were reported to have assisted the forest guards in fire control on the reserve in return for use of some NTFPs and continued harvesting of food crops from the taungya area.

Village Views of Forest Reserves

During the project fieldwork, farmers in villages near forest reserves often drew maps of their area showing the forest reserve almost enveloping the village, despite the fact that the FD's boundary line ran straight in the vicinity of the village and the reserve did not physically surround the village. The villages expressing the greatest need for more

productive land were the ones which perceived the reserve as 'enveloping' them most. Clearly, whether good or bad, the presence and perception of the forest reserve is strong (Figure 3).

Benefits derived from up to 70 years of state-managed logging (the earliest reserves in this study were demarcated in the 1920s) were thought by most villagers to be meagre. These benefits mentioned ranged from construction of a road (which was often part paid for by the villagers and always involved their own labour) to provision of construction materials for the village school or clinic. These benefits were sporadic, ad hoc and generally small. In the villages with stool chiefs (ie. major, long-established villages), some recalled the 'drinks' received on agreement with a concessionaire, but nobody could remember when the chief had last received any royalties from logging in the reserve.

Most villagers stated that they are supposed to pay for a FD permit before NTFPs are collected from the reserve, although they felt they were allowed a few products for the household. It was evident in some villages that the majority of NTFPs used in the village come from farm, fallow and secondary bush lands rather than the reserves. Asuboi village was an exception, but perhaps a common one in the 'transition zone' where fire had cleared much of the off-reserve farm and fallow areas, leaving unproductive, weed-inundated areas and an increased need to obtain household NTFPs from the reserve.

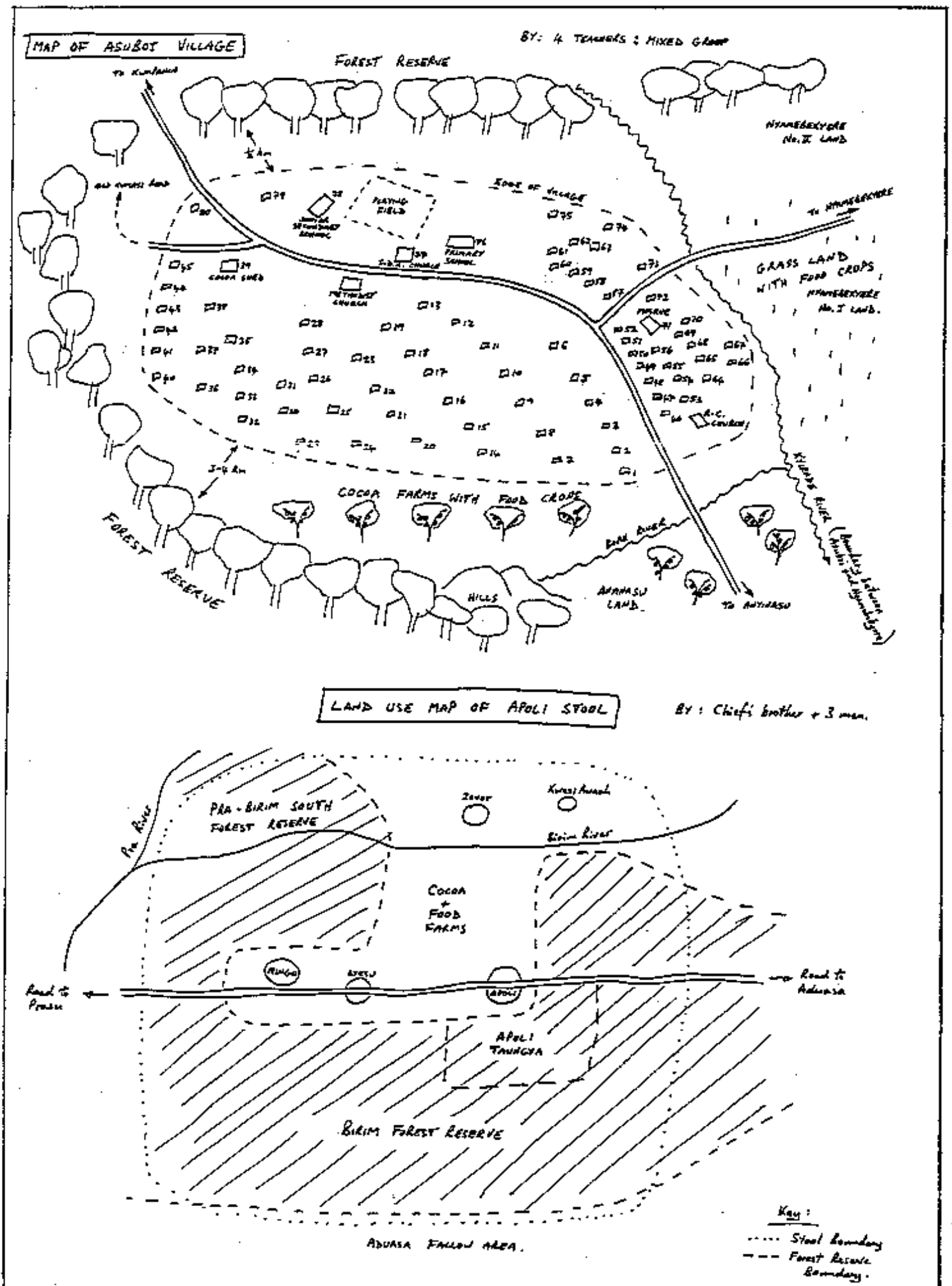
Village Views of the Forestry Department

The main source of supply for NTFPs traded in significant quantity (e.g. canes in Fureso, bushmeat in Mafia and Marantaceae leaves in Asuboi), is the reserves. Villagers harvesting NTFPs for household use only, often get some of their needs from the reserves. In both cases, the FD permits formally bought (and in FD records) cover a only tiny fraction of the products harvested.

The low profile of the FD in most villages explains the lack of permits for NTFPs. The high costs in time and money of travelling to a distant District Forestry Office to buy a permit for a product which can be found near the village mean that even the most law-abiding do not bother. Those concerned with marketing the NTFPs in distant places, such as the cane collectors in the Fureso area, may feel more need to obtain permits for the purposes of checkpoint inspection, but given the fact that in theory such products could have been obtained from areas outside reserves, the incentive to do so is still weak.

Considering that the essence of the relationship is one of foresters as policemen and villagers as notional thieves, the opinions of villagers about the FD were generally good, and never hostile. Where the relationship was good, there was often an ongoing project which brought the FD and the village together. Often this was taungya (see Example 6, below). In Mafia there was a village woodlot project which had the cooperation of FD staff. The 'relaxed' attitude of FD staff towards NTFP permits was appreciated in some villages. In Apoli the resident Forest Guard accepted the good cooperation he received from the villagers in the re-planting of failed taungya areas and in clearing his section of the reserve boundary in return for free and fairly liberal harvesting of NTFPs for village use.

Figure 3 Village maps showing enveloping forest reserves



In Subriso and Abonsuaso some FD staff had on occasion collected money from villagers as payment for taking no action in response, in the former case, to the tapping of palm trees in the reserve, and in the latter case, to development of illegal farms in the reserve. In Fureso there had never been very much contact with FD staff; a Forest Guard was occasionally seen clearing the reserve boundary line but generally the villagers regarded the FD with indifference.

Since the abandoning in the 1960s of the original communal rights admitted in forest reserves, FD staff have not been asked to enhance (or even consider) rural welfare, to think about the forest product needs of villagers or to cooperate with village social structures. It is therefore remarkable where they have done so and, given the low pay levels of FD staff, not surprising when they have done so for reasons of personal gain. In some cases however - in taungya systems, NTFP use and fire management - some genuinely cooperative FD-village relationships have emerged (see Examples 3, 4 and 6, below).

Role of District Forestry Offices

The FD is the lead executing and operational agency responsible for forest management, protection and development. In practice the major management effort by the FD in the high forest zone is geared towards control of logging, revenue collection and protection of the forest reserves, with the former receiving the bulk of the FD's attention. The major routine function carried out by the FD to protect forest reserves is the clearing of boundary lines. Other activities may arise from or augment this: apprehension of illegal timber or non-timber harvesters, control of illegal miners or farmers, and the establishment and maintenance of fire breaks.

The District Forestry Office is the essential operating unit of the Forestry Department¹⁹. The areas of forest over which DFOs have responsibility and the staff allocated to them varies quite widely (Table 3).

Control and monitoring of NTFP extraction is limited to the issuing of permits and collection of fees for NTFPs harvested from forest reserves. The fees are set by the DFOs on the basis of periodic reviews of wholesale market prices. There are large variations for the same product from District to District, and there is no allowance for seasonal variations. Collection rates are very low in a situation in which users run only a

¹⁹ There are currently 53 Forest Districts in Ghana, 24 of these in the high forest zone. These Districts lie within 10 Regions, of which five are in the high forest zone, each with a Regional Forest Office. The District Forest Officer (DFO) is supported by varying numbers of Technical Officers, Forest Guards and labourers. Technical Officers (TOs) are usually assigned responsibility for particular reserves or Forest Management Units (consisting of groups of reserves to a total area of about 500 km²), for managing nurseries or plantations, for supervision of stock surveys and fire break establishment, or are retained at the district office for report-writing, preparation of control forms, yield allocations and drawings. Forest Guards (FGs) are primarily responsible for reserve boundary clearing, inspections (NTFP permits, encroachments), felling checks, nursery and plantation work. Labourers normally work under the supervision of TOs in plantation work and stock surveys and under FGs on clearing boundary lines.

BOX 1

District Forest Officers' Evolving Views on Other Forest Stakeholders

District Forest Officers have a great deal of responsibility in making government's control of forest resources operational. They also have a wide range of viewpoints and ideas, on other forest users and on how forest resources should be managed, some of which go well beyond the boundaries of the current rules. The following selection from interviews during 1992/93 with about 10 DFOs, and a number of other senior FD staff, while clearly not fully representative, does seem to reflect a range of commonly held opinions. Names are withheld for the purposes of this paper.

On concessionaires

- *"Concessionaires do not respect farmers enough here. Farmers do not have the legal right to stop them taking the trees on their land, although there is a decree which nobody pays attention to" (Economic Plants Protection Decree - AFRC Decree 47, 1979).*
- *"Concessionaires could take on more responsibility. In some areas we allow them to make their own stock surveys with FD checking. They should also be involved in reserve boundary clearing and tree planting since they know the seedlings, etc."*

On farmers and timber trees

- *"Action should be taken against farmers who cut timber trees. District Bylaws are needed for this."*
- *"A farmer who has looked after a timber tree for many years should get some benefit when it is felled. This payment should be made on the spot by the concessionaire. If possible, the payments should be phased over the life of the tree rather than just at the time of felling, so that farmers would be prepared to let saplings grow up and see some benefit themselves, as well as passing on something to their children."*
- *"A portion of timber royalties should go to the farmer who works the land on which the tree is located - he can share it with the landowner. A farmer would be more able to press for his allocation from an independent chainsaw operator and could even confiscate the planks. It would be more difficult to enforce in the case of a concession holder extracting logs."*
- *"A farmer should own any trees on his farm because he looks after them. He should get the benefit of the value of the tree, not just from the royalty. If farmers received something for the trees they would not destroy them and you will see many more trees on cocoa farms. Farmers hate Wawa (*Triplochiton scleroxylon*) though."*
- *"When cocoa was first introduced, farmers did not want to plant it since they thought it was a long term prospect. The same occurred more recently with teak - farmers did not believe they would see the benefits, yet teak is now beginning to catch on as a cash crop. Given security, farmers can take a long term view."*

...continued

Box 1 (continued)

On relations with forest boundary villages

- *"Communities beside reserves benefit more than those further away. But they do not realise they are benefiting from wrapping leaves etc, so we must educate them. If we were to exclude strangers and allow locals to extract forest products how would we know who was who?"*
- *"Beyond keeping friendly relations with villages, the Forestry Department should not try to involve villagers any further because they will just cut down the forest."*
- *"If there was good trust between Forestry and villages, and between villagers themselves, it could be possible to give more responsibility them. To get to this level of trust we need to have low permit prices and a greater speed and ease of giving permits."*
- *"Villagers can help us regulate by informing us if someone is over-harvesting timber or NTFPs. We tell them that the Forestry staff are few and so they should help us, which they do. But if they have much responsibility they will have problems - they will use the power to settle their own scores."*
- *"Contracts could be given to villages near forest reserves for planting trees and maintaining boundary lines in these areas. These could be financed from logging revenues from the reserve."*

On users of non-timber forest products (NTFPs)

- *"We cannot give total control of NTFPs in reserves to the communities - look at the unreserved areas, there has been no control there."*
- *"A lot of hunting is going on which the FD will never be able to control. The FD has to bring it out into the open by encouraging the formation of hunter's associations in villages. The FD should assist by making it easier to issue permits to these groups."*
- *"The Forest Inventory Programme of the Planning Branch has started incorporating a number of NTFP measures on sample plots in inventory work. Based on this information it should be possible to set basic maximum harvesting levels of NTFPs to ensure sustainable yields. The FD could then give management guidelines, including upper limits of NTFP extraction, to communities with stool lands in forest reserves. The community would have a Forest Guard assigned to monitor the system but would otherwise make its own rules. This would keep the value of the NTFPs more local and stop outsiders from extracting all the benefits."*
- *"All NTFPs should be locally managed. The local communities know how to harvest these products sustainably and they will do so if given the authority. Communities by forest reserves should be encouraged to form cooperatives. The FD could issue permits to this group only for the local area of forest reserve, for a token fee. The cooperative would be free to sell the products to outsiders, but such outsiders would not be given permits by the FD. This will increase the value of the forest to the local people."*

small risk of being caught. An equivalent of US\$ 20,000 per annum was raised in the period 1989 to 1991 for the whole of Ghana (FD records).

Table 3: Forestry Department Staff Strength In Selected Forest Districts In the High Forest Zone

| Forest district | Total area of forest district | Total area of forest reserve in district | Total staff strength | Area of reserve/ total staff | Average staff per F.M.U. | Length of reserve boundary# per forest guard |
|-----------------|-------------------------------|--|----------------------|------------------------------|--------------------------|--|
| Asankrangwa | 3577km ² | 915km ² | 72 | 13 km ² | 19 | 17.8 km |
| Goaso | ? | 990km ² | 140 | 7 km ² | 57 | 12.5 km |
| Kumasi North | 1768km ² | 729km ² | 162 | 5 km ² | 75 | ? |
| Juabeso-Bia | 3825km ² | 2150km ² | 72 | 30 km ² | 13 | 18.9 km |
| Akim Oda | 3540km ² | 395km ² | 193 | 2 km ² | 53 | 7.2 km |
| Mpraeso | 7166km ² * | 476km ² | 116 | 4 km ² | 44 | ? |

Notes: # Includes internal (admitted farms) and external boundaries

* Of this total, 2162km² is in the high forest zone

Source: District Forestry Officers interviewed in this study

Chainsaw Operators and Bush Millers

[Until recently, the impact of independent chainsaw operators and portable saw-millers could be broadly characterised as follows:

Independent chainsaw operators and bushmillers accounted for a significant proportion of trees felled outside reserves and in some cases were (illegally) active inside reserves. Concessionaires were often unaware that independent chainsaw operators are active in their concession. Most chainsaw operators, unlike concessionaires, convert the trees they fell into lumber on the spot. The lumber can be easily disbursed and the majority evaded detection by the forest inspectors' road-side check system. Much of the royalty 'missed' by the Lands Commission (see below) was to the benefit of chainsaw operators or bushmillers.

Chainsaw operators were preferred by farmers to loggers since there was little extraction disturbance and the farmers were in a much better position to arrange compensation or some other payment because they could demand or confiscate some of the lumber (see section 7).

In addition to royalty payments, permits were required from the FD before felling. In 1991 the government introduced new regulations which required all chainsaw operators to register, with a fee, with the District Assembly and have their equipment inspected and approved by the District Forestry Office. (There are no formal controls on chainsaw sales).

The scheme has had mixed success in terms of monitoring and regulating chainsaw operators. It was estimated that in most forest districts no more than half of the active chainsaws are registered. Furthermore, it was widely reported that chainsaw operators, even those paying some royalty, fell more than the number of trees permitted. The issue of off-reserve timber at harvesting came to a head in 1994 when excessive and often speculative felling reached levels unacceptable to government. Following the recommendations of a Working Group, led by the FD with representation from a range of stakeholder groups, a comprehensive set of 'interim measures' on timber felling controls outside reserves, and on benefits to farmers, communities and landowners, were introduced in July 1995. A long term strategy for sustaining timber production outside reserves, including the development of a new consolidated Forest Act is currently under consideration (FD, 1994; FD, 1995a; Smith *et al.*, 1995).]

Concession-Holders

Commercial forestry in Ghana as it was practised in the first half of the century, was controlled almost entirely by large British companies. However under the Nkrumah administration, the Government successfully promoted small to medium-sized Ghanaian timber enterprises and the number and size of concessions allocated to foreign firms was reduced. Of the 102 concessions granted through the Ministry of Lands and Natural Resources between 1961-71, only two went to foreign companies.

The results were dramatic. Average concession size decreased from 686 km² to 41 km² over the same years. By 1967, concession rights had been issued for 75% of the forest reserves and for all the unreserved forest; and the number of firms involved had risen from 121 to 361 (Martin, 1990). Most foreign interests were nationalized or transferred into Ghanaian interests during the early 1970s. However when confronted by the global recession of the late 1970s and early 1980s, the public sector became too weak to guarantee further investment and other necessary inputs into the timber industry.

As a consequence of these factors and the overvalued exchange rate, the Ghanaian timber industry all but collapsed. Many Ghanaian companies, despite government loans, found it increasingly difficult to compete in international markets. As a result, foreign influence and capital (particularly Lebanese) began to increase its share of timber production. In 1984, the government embarked on the Economic Recovery Programme (ERP), which in the timber industry gradually resulted in increased capacity utilisation and export performance.

A number of companies operating in the timber sector were subject to criminal investigation by the National Investigations Committee (NIC) in the late 1980s/early 1990s. The NIC process exposed illegal activities in parts of the industry, including smuggling, tax evasion, fraudulent invoicing, non-payment of timber royalties, violation of foreign currency regulations, corruption and bribery (Bentsi-Enchili, 1989). The legitimate sectors of the industry complain that the effects of the NIC process hamper their ability to operate at all levels.

In 1993, FD records showed that there were 675 extant concessions (237 in reserves, 438 outside reserves) and about 250 companies actively involved in primary logging activities.

Many of these are small-scale Ghanaian owned companies employing less than 10 persons. It is estimated that 50% to 70% of the timber harvest originates from these small companies (General Woods, 1993). Commonly concessionaires do not possess the equipment or capital required to work their concessions and come to an agreement with a third party. The majority of value from the timber industry is captured by the timber millers rather than companies only involved in logging. Ghanaians of Lebanese descent dominate the ownership and management of the milling industry and the 'vertically integrated' companies which both log and mill. In addition, there are eight enterprises either wholly or partially owned by the state. They include some of the biggest integrated firms in the industry, controlling about a third of forest concessions in the country and accounting for about a quarter of the total timber and wood products exports. Most of these state-owned corporations are programmed to be privatised.

Legislation effectively provided concessionaires with a free hand unfettered by the complication of the rights of others. Outside the reserves, the impact of farmers not having rights over trees encouraged concessionaires to harvest the trees as fast as possible before the farmer cut them down. Coupled with the lack of control over exploitation, this has devastated the off-reserve resource.

In addition, low forest fees have sent out a signal that the resource is in abundant supply. This has resulted in an excess demand for concessions, and the proliferation of informal payments which attempt to either legally (e.g. payments to stools and communities) or illegally secure them. The present timber royalty system has encouraged concessionaires to 'high-grade'²⁰ the forest, and provides no encouragement for the harvest of more abundant 'lesser known species' (LKS). This is because royalties are too low to allow differential rates to have any impact on a decision to exploit one species or another.

Lands Commission

The Lands Commission is a semi-autonomous government body which has, since 1969, been responsible for the management of all state lands and administers title deeds, registers and other records on lands. The collection and disbursement of revenues from 'stool lands' is also the responsibility of the Lands Commission. Until recently, stool land revenue collectors in the districts collected royalties and rent in respect of timber felling rights outside reserves, and the Commission also disburses 'shareable' revenue from the reserves²¹. In many districts the disbursement of significant revenue shares has been somewhat sporadic, despite concerted timber exploitation in these districts.

²⁰ High-grading is a timber harvesting practice in which only the most valuable species are selected. The system may be low intensity, but often damage to the remaining non-logged stand is considerable. It may also lead to genetic deterioration of the stock.

²¹ The revenue is currently disbursed according to a formula, established under the Fourth Republican Constitution (January 1993), for the distribution of "stool land revenue". Under this formula, the Administrator of Stool Lands receives 10%, and the remainder is shared as follows: District Assembly - 55%; Traditional Authority - 20%; and Landholding Stool - 25%.

Verification and certification by the FD is supposed to take place prior to payment of fees and felling, but in practice the FD is often ignored by off-reserve concession holders and chainsaw operators. The Lands Commission revenue collectors are few in number (below ten in most districts) and generally immobile. Inspections were the exception rather than the rule and most of the royalties appeared to be slipping through the system. In 1988 the ODA appraisal mission for the Forest Inventory and Management Project estimated that only 25% of royalties outside reserves were being collected.

Although the FD in theory had full management responsibility for outside reserve areas, the fact that the Lands Commission was until recently the broker for revenues resulted in minimal management outside reserves. Since Lands Commission officers tended not to have the technical or logistical ability to check on numbers and species of trees felled, and the FD had no financial incentive to do so, concessionaires and chainsaw operators were in practice able to avoid payments and disregard felling controls.

[The transfer in 1994 of responsibility for off-reserve revenue collection to the FD, and the 'Interim Measures' to control harvesting outside reserves instituted in 1995 provide the basis, and the challenge, for the FD to address the situation.]

District Assemblies

In an effort to implement the PNDC government's often stated desire to decentralize development planning and administration to a local level, 110 District Assemblies (DAs) were formally inaugurated in 1988. The DAs replaced the old District Councils and consist of elected representatives from all the towns and villages of the district, and a number of executive and other positions appointed by central government.

The DAs were urged²² to take an active role in: ensuring the enforcement of bush-fire laws²³; initiating tree-planting campaigns; regulating chainsaw operators; setting aside district reserves and plantations; terracing and planting denuded hillsides and prohibiting clearing and cultivation of riversides. In their capacity to pass local by-laws and construct development programmes, some DAs have been active in the above-mentioned areas; many others however have seen the timber industry and, increasingly, NTFP exploitation purely as a source of revenue and support.

The FD is one of 22 departments theoretically decentralised since 1988 under local government laws²⁴. This gives the DAs responsibility for preparation, administration and

²² District Assemblies Inauguration Address by the Chairman of the Provisional National Defence Council, Ft. Lt. J.J.Rawlings, 1988, quoted in Abwoi (1989)

²³ The Control and Prevention of Bushfires Law, 1990 (PNDCL 229) enjoins District Assemblies to establish a Bush Fire Control Sub-committee whose functions should include programmes for controlled and supervised early burning and public education.

²⁴ The Local Government Law, 1988 (PNDCL 207) and the Local Government Act, 1994 (Act 456)

control of budgets and for appointment of staff of the decentralised departments. These provisions are yet to be implemented in respect of the FD, and many other departments.

Cooperation between District Forestry Offices and DAs varies greatly and it is the relative ability of the DFOs to foster cooperation which largely explains the varied effectiveness of DAs in forestry matters. The concession allocation process demands the comments rather than the approval of the DA; this tends to lead to poor cooperation. In some districts however, the DA is active in preventing the continuing operations of timber companies with significant royalty arrears and the monitoring of trucks and machinery.

DAs are also becoming increasingly involved with on-reserve matters. Some DAs have applied for their own timber concessions while others make bilateral agreements with timber contractors. In Desiri Forest Reserve, three DAs benefitted for two years from the sale of farm produce from illegal farms after the CDRs and Civil Defence Organisation had evicted the farmers in 1989 (see case study, below).

Revenue allocated to the DAs from the Administrator of Stool Lands cannot be used for normal running costs and is reserved for development projects. Timber revenues (to date almost entirely from off-reserve lands) can represent a significant source of income in some Districts in the high forest zone, (two typical DAs in 1992 each received C\$5 million (US\$11,000) and estimated this to be 20-30% of their development budgets). However, expenditure of this income on forestry related programmes is generally limited.

Traditional Councils and Stool Chiefs

Traditional Councils are bodies composed around a Paramount Chief and consist of a number of Stools and Chiefs. The Traditional Councils and Stools, through a combination of customary and statutory law, are generally the landholding authorities in the high forest zone. As described earlier, government assumes the right to exercise all control of timber tree exploitation despite customary and general law 'ownership' of timber trees resting with the Stools.

Since 1962, concession allocation policy has also required little or no input by Stools and local authorities. Chiefs do however receive some unofficial payments from concessionaires. At the time when the application for a concession is signed a modest 'drinks' payment is made by the applicant. Later, depending on the value of the concession, the contractor will make contributions, negotiated with the chiefs, during the period he is working the concession. The contributions, in cash or often in building materials, are used for a diverse range of purposes, some genuine 'community' endeavours such as the construction of new school buildings or markets, and some more directly connected with the Stool itself such as the restoration or construction of the Chief's palace (see above).

Legislation turned traditional authorities into passive and marginalized recipients of insignificant and irregular shares of revenue, with no formal decision-making role in any aspect of forest management (including fixing of fees, concession allocation, etc.), despite their legal position as owners. The intermediary roles of the FD (on-reserve) and the Lands Commission Secretariat (off-reserve) on behalf of the traditional authorities

alienated both landowner and farmer from the resource and, in some cases, resulted in conflict and tension. As a result of the low and irregular nature of payments, Stool chiefs have often shown a willingness to 'sell' or rent out areas of both reserve (illegally) and off-reserve forest for alternative land uses, especially in the Western Region.

[The momentum for policy change evident in the introduction of the 'Interim Measures' in July 1995 and the current consideration of legislation revision (see section 8.), may gradually lead to a reverse in these trends.]

6. ADAPTIVE FOREST MANAGEMENT - SOME EXAMPLES

The following sections are examples of local level forest management or adaptive responses by local forest resource users to outside interventions. The first two examples illustrate apparently common types of actions and ideas for forest management amongst communities near forest reserves. Examples 3,4 and 5 describe more locally specific circumstances which have produced forest management action and ideas. These three cases display a range of characteristics also common in the high forest zone. Example 6 is a synthesis of findings from a number of villages and local level institutions on a major issues in forest reserves - the taungya system.

Example 1. Forest Resources, Alcohol and Organisation

Subriso is a village of about 60 households in the Moist Semideciduous (South East Subtype) forest zone, about 1.5km to the west of Esukawkaw Forest Reserve in Eastern Region. Apart from a few small admitted farms (total 0.7km²), the whole reserve (122km²) is designated Production Forest. Despite this designation, plots for taungya were allocated for a number of years, particularly after the 1983 fires which caused much devastation both in and around the reserve (Figure 4). One of the three small taungya series was located adjacent to Subriso.

Villagers mentioned the good relations with the FD when the taungya system was operating. Since the last taungya allocation was made in 1990, there has been little contact with FD officers. Women regarded the period when the village had taungya as very productive. Since it was stopped they perceive a shortage of food in Subriso.

One group stated that even though the forest reserve is not open to them, because permits for NTFPs require too much travel to obtain, it is of benefit because:

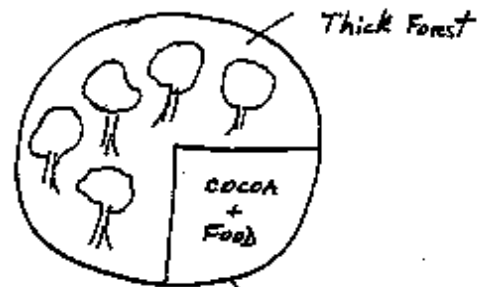
- it provides a windbreak, makes rainfall more likely and protects streams;
- trees growing on the edge of the forest provide useful products; and
- farms near the forest get bushmeat, "because if the animals come out of the forest they are blinded by the light and lose their way".

Figure 4 Land use changes in Subriso

By: Group of women

1971

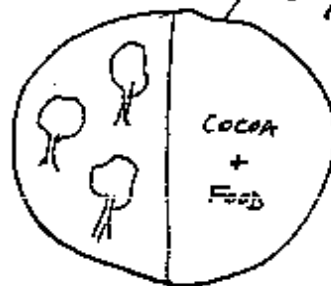
"We were planting only Tetch Quarshia cocoa in those days, which took 5 years to bear. We only needed small areas for food because the soil was very productive."



= all Subriso land (not the forest reserve).

1976

"We planted up a lot of land with the Agic cocoa which bears after only 2 years."



1981

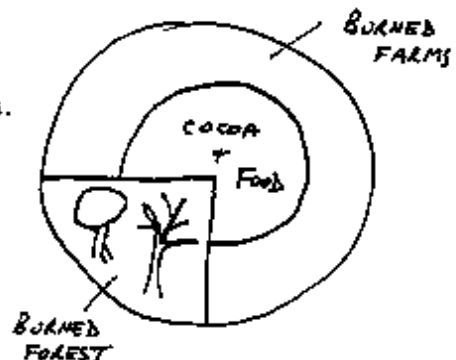
"During this time, after burning and planting, we only had to weed one time before harvesting all our food."



1983

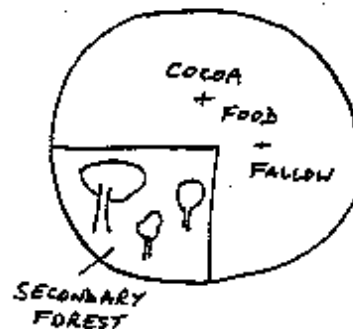
After the bushfires.

"The fires came from Teawia and Tweapease sides. More than half of all the farms in Subriso were burned. The undergrowth in the forest was burned."



1992

"We have cut most of the dead trees for firewood. You see as many big trees on farms as in the secondary forest now. Akyempong weed is what we are fighting now - we have to weed 4 or 5 times before harvesting now. We have re-planted cocoa but in smaller patches - the land is not so good since the fires."



Despite the perceived distance of the FD, care is taken in recognising the rules:

"The men go into the forest reserve for raphia palm for wine tapping and roofing leaves. They are supposed to get permits but the Forestry office is too far away. If there were no permits or Forestry people we would like to collect pestles, sponges, wrapping leaves and firewood from the forest. We get all these things from outside the reserve but they are better inside.

"Sometimes strangers come here with permits, they usually take more than they are allowed. It would be much better if we were the ones to look after the reserve, they would get permission from us and we would check on them." - Woman farmer/trader

Akpeteshie distilling

The village of Subriso was estimated to have 14 to 22 independent distillers of 'akpeteshie' (palm alcohol). The Subriso Branch of the Akpeteshie Distillers Union has 24 members and has its own elected chairman, secretary and treasurer. Each member pays the Union ₵2,500 per year and is also supposed to register with the District Assembly in Abirem, paying a further fee of ₵5,000²⁵. The Union is compulsory and helps when there is a funeral or a member has a sick child, etc. There are other branches in the nearby villages.

The sap - 'palm wine' - of both raphia palm and oil palm can be used. Raphia palms are far more common than oil palm in the area although some farmers have started planting oil palm. A raphia palm is tapped upright whilst oil palm is felled prior to tapping. The oil palm is preferred for palm wine tapping if it is available, but raphia grows quickly on farm and fallow and is the mainstay of the local tappers' work.

The tappers negotiate with the farmer and normally pay about ₵500 for a raphia tree and ₵450-500 for oil palm. Some tapping teams operate in the forest reserve and claim to pay the FD ₵900 for raphia palm and ₵800 for oil palm. The FD give them 'pillars' (blocks) within which they take out the raphia trees they have paid for and firewood for distilling. The equipment is set up within the reserve. Esukawkaw was reckoned to have a particularly plentiful supply of raphia palm.

A 'distilling permit' for a further ₵3,000 is also required from the FD when distillers first start up in the reserve. Many of the distillers are known to the Forest Guards who allow them to cut the trees before paying. District Forest Office records however show very little revenue generated from palm in Esukawkaw, so it appears that a local arrangement with the Forest Guard is the norm.

To give an idea of a fairly 'typical' village's use of palm trees and scale of production, the following estimates were made based on information from several groups in Subriso:

²⁵ In 1993, the exchange rate averaged about 620 Cedis (¢) to 1 US dollar

- One raphia palm can produce for four weeks to three months. A distilling unit (from one to four people) tap on average 8 trees per month which give 150 gallons of palm wine. This amount when distilled produces 20 gallons of akpeteshie. Based on the finding that very few trees from the forest reserve are bought officially from the FD and assuming that the Forest Guard charges something himself, then an average tree costs ₦500. Therefore, monthly costs of trees per distilling unit = ₦4,000).
- Prices for akpeteshie range from ₦1,250 to ₦1,750 per gallon depending on the season - there are fewer distillers active in the rainy season so the price rises. (Therefore, monthly gross per distilling unit = ₦25,000 in the dry season, ₦35,000 in the wet season).
- Of the average estimated 18 distillers in Subriso, half were thought to continue distilling throughout the year whilst half distil only in the dry season. Therefore annually in Subriso:
 - Gallons of akpeteshie produced = 3,240
 - Palm trees exploited (including perhaps 400 from the forest reserve) = 1,296
 - Gross returns = ₦4,590,000 (about US\$ 12,500)

Buyers come to Subriso from Nkawkaw (a big commercial town in mid Eastern Region) and elsewhere, transportation costs for the distillers are thus insignificant. The distillers producing only in the dry season are mostly working alone whilst the others have average labour costs annually of about ₦180,000. Some distillers do not own their own equipment and split the proceeds equally with the owner.

The distillers claimed not to mind that the government should charge for usage of the forest since the reserve "belongs to government". It was said that the Forest Guards instruct them to be careful with fire and not to take guns into the reserve. The Guards have also told them that if a timber tree is felled in a distiller's block, the distiller will be held responsible. However, the informants admitted that the Guards were rarely to be found in Subriso. It was thought by several informant groups that the Subriso branch of the Distillers Union could form an agreement with the FD and could regulate and monitor the activities of its members in the reserve.

Women's groups and forest products

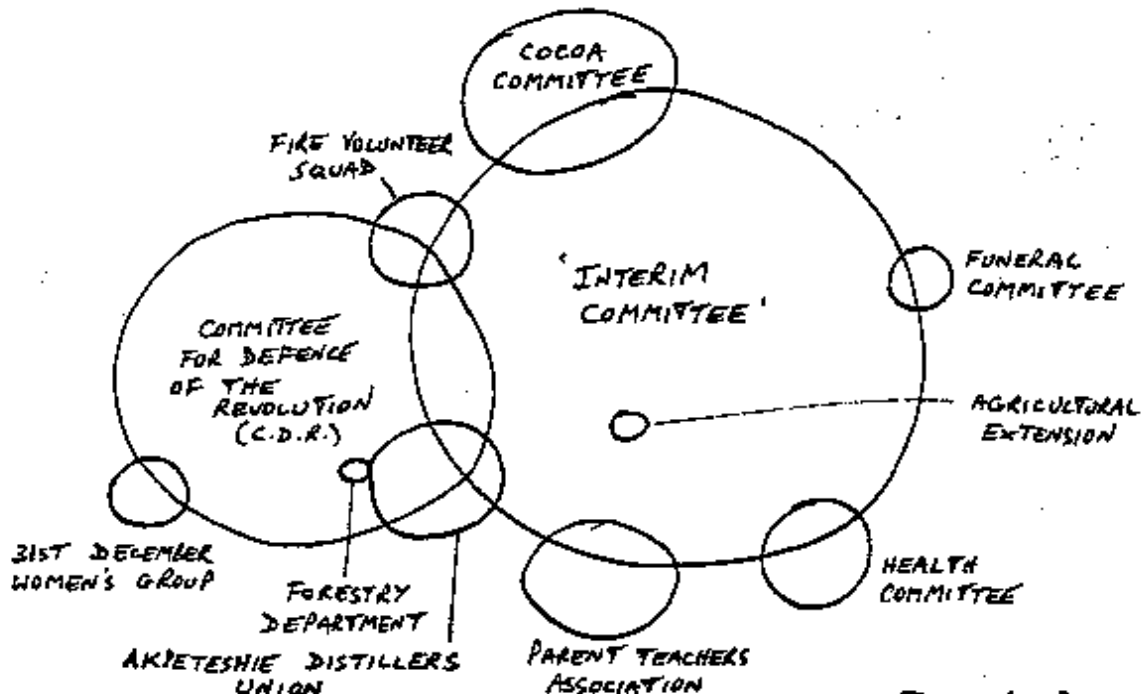
The position of the chief was weak in Subriso, as was linkage to institutions outside of the village. Within the village there were quite strong organisations, some of which, like the akpeteshie distillers, were linked or could be linked with NTFP management. Figure 5 shows the relative importance of various village organisations, as perceived by a mixed group of men. As noted in the figure, a group of women saw the situation rather differently.

Women in the village clearly saw the need for access to a variety of NTFPs from the reserve, since off-reserve lands were more degraded than they used to be. The women also see the need for controlled harvesting of these resources and one group suggested

Figure 5 Subriso: institutions and organisations

By: Group of six men

"The 'Interim Committee' is the Interim Chief and the Elders. They oversee village affairs and solve land problems. The Odikro (village chief) has gone to Wassa for a while."



(Drawn by focus group)

"The CDR organises communal labour. The Cocoa Committee taxes cocoa farmers 1kg. from each bag of cocoa for the cocoa shed and other village projects. The PTA, Health Committee and Funeral Committee each have farms to raise money. The Interim Committee looks at the accounts of all these groups. We only started the Fire Squad last year.

"The Agriculture people don't help us enough and the Forestry people only used to come when there was taungya. The Forestry Technical Officer just talked with the CDR about who should have taungya. Why give him a bigger circle - he did not give us enough land."

By: Group of six women

"We only have the Elders and Acting Odikro because we are a small village. The Odikro was overthrown by us because he was always slapping people.

"The three most important organisations here are the Farmers' Union, Mobisquad (neither mentioned by the men) and the 31st December Women's Group. The CDR and the Cocoa Committee are just for men.

"We used to have good relations with Forestry when we had taungya, but not any more. We are not allowed in the forest and they don't come here."

that they had the organisational ability to enforce rules about who could harvest, how much, and when:

"We have always stopped fires from reaching the forest reserve. We want the forest there. If we are given the power to control the use of these forest products we will do it well.

"Pestles, sponges, wrapping leaves and all these products are collected and used by women, so it must be women who control this use of the forests. We will organise ourselves and look for strong leaders. We would all go to the forest at the same time so that we can see that all are obeying the rules." - Traditional Birth Attendant

The group noted that if given the chance, they would collect many other products from the forest reserve which were not available or plentiful outside. Fish from the forest rivers which do not dry up, bushmeat, and other plant and animal foods were emphasised as of particular importance for children in the dry season when they otherwise got very weak. The women stated that the forest must remain as forest for these products to be there.

In summary, the example illustrates a 'typical' forest-edge village's strong dependence on the forest for NTFPs and, formerly, as a source of agricultural land (through taungya). Palm-alcohol distilling is a major source of income in the village and, although the village regards Forestry Department officers as of minor importance for decision-making about land and forest resources in comparison to village institutions, there appears to be a firm local basis for a workable agreement between Forestry Department and villagers for access to the reserve and harvest of NTFPs.

[*Information sources:* Groups and individuals in and around Subriso; and the District Forestry Officer, Mpraeso.]

Example 2. Planning for Forest Product Management

Fureso is in the Wet Evergreen forest zone of southern Western Region. It lies one kilometre north of Fure Forest Reserve beside the Fure River, at the termination of a 20km road from Prestea, the last third of which is in very poor condition. There are about 50 houses in the village itself, and a number of outlying hamlets.

The Fureso Chief, or Odikro - Nana Pomaa, was the decision-making body with regard to land allocations, disputes and customs. She linked to the divisional chief - Nana Gyasehene, and Paramount Chief - Nana Omanhene. The Omanhene last came to Fureso in 1969.

A Farmer's Committee, consisting of 8 men representing various ethnic groups (currently Fanti x 3, Wassa x 2, Ningo, Ewe and Ashanti) is active in the village. This Committee had initiated a number of projects and most people in the village agreed that little in the

way of "development activities" occurred without it. The Committee had a "Five-Year Plan" which covered the construction of the school, the near completion of the cocoa shed, and outlined plans for a clinic and repairs to the road. The Committee relied on communal labour, the list for which was kept by the Secretary of the local Committee for the Defence of the Revolution. The members of the Committee were nominated by the elders, elected by a town meeting of all adult men and women, and approved by the Chief. The last such election was six years ago.

Villagers saw a number of problems with the use of forest resources in their area, including: 'strangers' coming in to harvest NTFPs, particularly canes, from the area of the forest reserve "belonging to Fureso"; timber contractors paying no compensation to farmers for tree harvesting; and the lack of benefit from timber harvesting in the reserve.

A variety of maps and diagrams were produced by groups of: Farmers Committee members; the Fureso Chief and elders; NTFP users; and farmers. Figure 6 represents an attempt by the field team to bring together some of the issues from these groups. A version of this diagram was discussed with a mixed group in Fureso, and refined with them.

Proposals from the groups included:

- the FD should set levels for NTFP extraction from the part of the forest reserve near Fureso;
- the Farmers Committee should regulate and manage this, with FD monitoring;
- the Farmers Committee should charge 'strangers' for NTFPs from the Fureso reserve;
- timber trees should command a fixed fee payable direct to the farmer which should be enforced by the Farmers Committee in addition to NTFP fees from 'strangers' for forest products from Fureso land;
- the Farmers Committee could be involved in checking the stumps of timber extracted from the reserve on behalf of the Amuni Stool (the land owner) in return for a share of the royalty benefits.

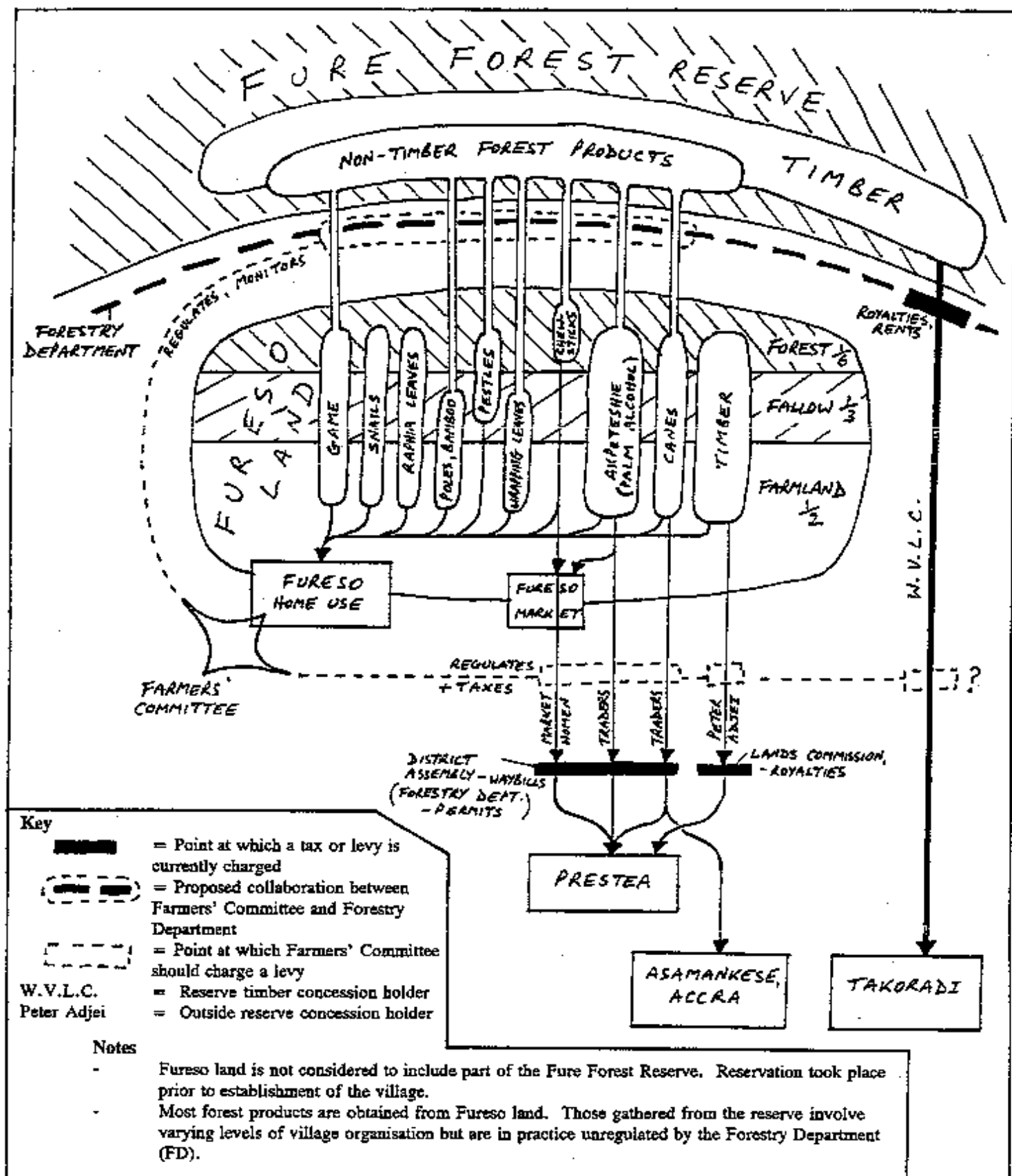
The example suggests that there is a considerable wealth of ideas and interest amongst villagers, about how, if given the chance, their institutions could share rights and responsibilities for management of forest products with the Forestry Department and the local timber industry. Their proposals deserve consideration particularly because they are based on comprehensive local knowledge of the resource.

[*Information sources:* Members of the Fureso Farmers Committee; the Fureso Chief and elders; NTFP users; and farmers.]

Example 3. Fire Squads and the Forest Reserve

Asuboi is in the Dry Semideciduous (Fire zone) (DSFZ) forest, the "transition zone", on the northern boundary of the Afram Headwaters forest reserve in the north of Ashanti Region. The land and forest around Asuboi have undergone major changes as a result of

Figure 6 Local ideas for forest product management, Fureso (based on various focus group discussions and diagrams drawn by villagers)



bush-fires over the last ten years. Formerly, the majority of farmland was under cocoa, but today, whilst the area under cocoa is slowly increasing again, it occupies perhaps half of the cultivated land. A large area of land to the north-west of the village hosts very few trees and is invaded by the tall "hyideé" grass. The reserve appeared to be particularly degraded by fire in this northern portion near Asuboi, although there were patches of closed high forest.

The 1983 fires caused severe damage to cocoa and food crop farms. Since then there has been an annual threat from fires, those of 1985 and 1991 being quite severe. Much land is now open grassland upon which fires are almost impossible to stop once started.

Some of the villagers worked together to fight the fire in 1983 but it was so fierce they were largely ineffective. In 1985 the government advised them to form a fire fighting group and in that year a member of the Fire service from Kumasi provided some initial training in fire fighting techniques. By 1991, there were 30 volunteers in the squad.

A number of rules were initiated by the squad including a ban on cooking or making fires on the farm between December and March (the driest part of the year), and fines (up to c5,000) for carrying matches outside the village during this period. If a fire is sighted, the village 'gong-gong' is beaten and the squad attempt to mobilise as many villagers as possible. All contribute to cutting vegetation-free traces, about 9 feet wide in the line of passage of the fire, and the squad members beat out the fire around the traces using palm branches. But if the wind is strong the fire will cross the traces unless they are made wider and more numerous, requiring much more labour.

The fire usually comes from the Sekyire Odumasi direction (from the north) where there is much combustible grass, "Akyempong" (*Chromolaena odorata*)²⁶ and crop residues. If Asuboi hears that the fire has reached Anyinasu, then it may have reached Asuboi before they have time to act. The Fire Squad is supposed to cover an area five miles by five miles. There are now squads in all the major neighbouring villages (Anyinasu - 5 miles away, Sekyire Odumasi - 9 miles away, Nyamebekyere Nos.I and II - 4 miles away, and Kwapanin - 6 miles away), and there is an understanding that the Asuboi squad will meet each of these half way.

In 1983, the fire spread throughout the forest, destroying the crops in the taungya area and even some of the fire-resistant teak. In 1985, although the Fire Squad had only just started operating it was able to prevent the fire from spreading to some of the local secondary forest areas in the reserve and to the taungya. The reasons for taking some action in the forest at that time were ranked by the Fire Squad Chairman in the following descending order of priority:

²⁶ *Chromolaena odorata* was introduced into Ghana by the University of Ghana Botanical Gardens and has spread beyond its perimeters throughout the forest area of Ghana (Abbiw, 1990). It gained its local name when it began to be noticed by farmers as a serious coloniser during the Akyempong government in Ghana. It grows to a height of two metres and spreads vigorously throughout farm and fallow land, dominating the undergrowth and preventing germination of the forest seed bank. Some farmers value its soil enriching properties but other farmers have noticed the disappearance of many forest herbs and shrubs since the coming of 'akyempong' (Amanor, 1994).

- *"to protect the taungya areas for our food and to prevent the spread of fire to our own farms;*
- *to protect the seedlings planted on the newer taungya areas because we will not otherwise get a new allocation of taungya land. (The taungya allocations had officially stopped in 1984);*
- *to protect the forest for the rainfall and the river watershed on which Asuboi depends;*
- *to protect the wrapping leaf collecting areas because many women rely on these for a source of income in this area." - Fire Squad Chairman.*

Thus, while the clear priority in the major fire years was to protect farms, some action seems to have been taken by the village to protect the forest for their own interest. This interest was heightened while allocations of land for taungya were being made, but is still evident in the form of food harvested from the old taungya areas, environmental stability, and NTFP supplies.

Nevertheless, the first priority remains the farm and in a year of bad fires there is little time or labour available for the forest:

"As for the forest, it is for the government and if there are bad fires it doesn't matter if it burns, we will save our farms first". - Fire Squad Chairman

Despite success from 1986 to 1990 in preventing fires spreading from the Sekyire Odumasi and Anyinasu areas, the morale of the Fire Squad is low. Three Volunteers were burned to death in a nearby village in 1991 and "the government has done nothing". Fire Service staff have not visited the area since 1987.

Actions suggested which would improve the effectiveness of fire fighting were:

- training of the Fire Squad and increased cooperation from the Fire Service;
- allocation of new taungya;
- increase the levying of fines by the Fire Squad and use the funds to buy some equipment;
- external support from the FD for tools which will help both farming and fire-fighting.

Another idea, developed independently by two groups, was to construct a belt of trees which retard fire by providing little litter, and/or by being fire resistant in themselves. They proposed that a mixed species belt should be planted between Asuboi and Sekyire Odumasi. Teak is not appropriate because although fire resistant, its leaves are large and highly combustible on the ground. The informants proposed two native trees and two exotics:

- Wamma Ricinodendron heudelotii - stunts undergrowth and is also thought to generate moisture;
- Kataweni Pseudospondias microcarpa - fire resistant and is in leaf in the dry season, producing little litter. However, the tree only grows well in swampy areas;

- "York" Bousinatia papaverivera (named locally after the expatriate who first planted it in the reserve) - very quick growing, sheds little litter and shades out undergrowth. It was also thought to generate moisture under its canopy. The tree in itself is not fire-resistant but regenerates very quickly. It is a pest amongst teak in the reserve and could become a pest on farms. As a firebreak tree in grassland it might be effective;
- "Milk Bush" Thevetia peruviana - fire-resistant and produces little litter.

Figure 7, developed from several diagrams made by groups in Asuboi, shows the paths of the major fires in 1983, 1985 and 1991; the extent of damage to farm and forest; the effects of actions taken in the past to fight the fires; the linkages between the leaf-gathering groups; and the proposed actions for the future.

The groups proposed that the Fire Squad would talk with the CDR-Town Development Committee "Unit" and the Chief to mobilise the village for the work and that communal labour should be used. They requested that the FD provide suggestions as to other species which might be planted, provide some assistance with seedlings, and provide a letter supporting the initiative so that discussions can begin with Sekyire Odumasi.

Asuboi appears to have developed village structures capable of having an impact on the effects of fire on both farm and forest land. The FD could benefit from supporting such organisational structures both directly through protection of the forest and indirectly through establishing a supportive relationship with the community.

[*Information sources:* Groups and individuals in Asuboi including: the Fire Squad Chairman; Chief and elders; and cocoa farmers.]

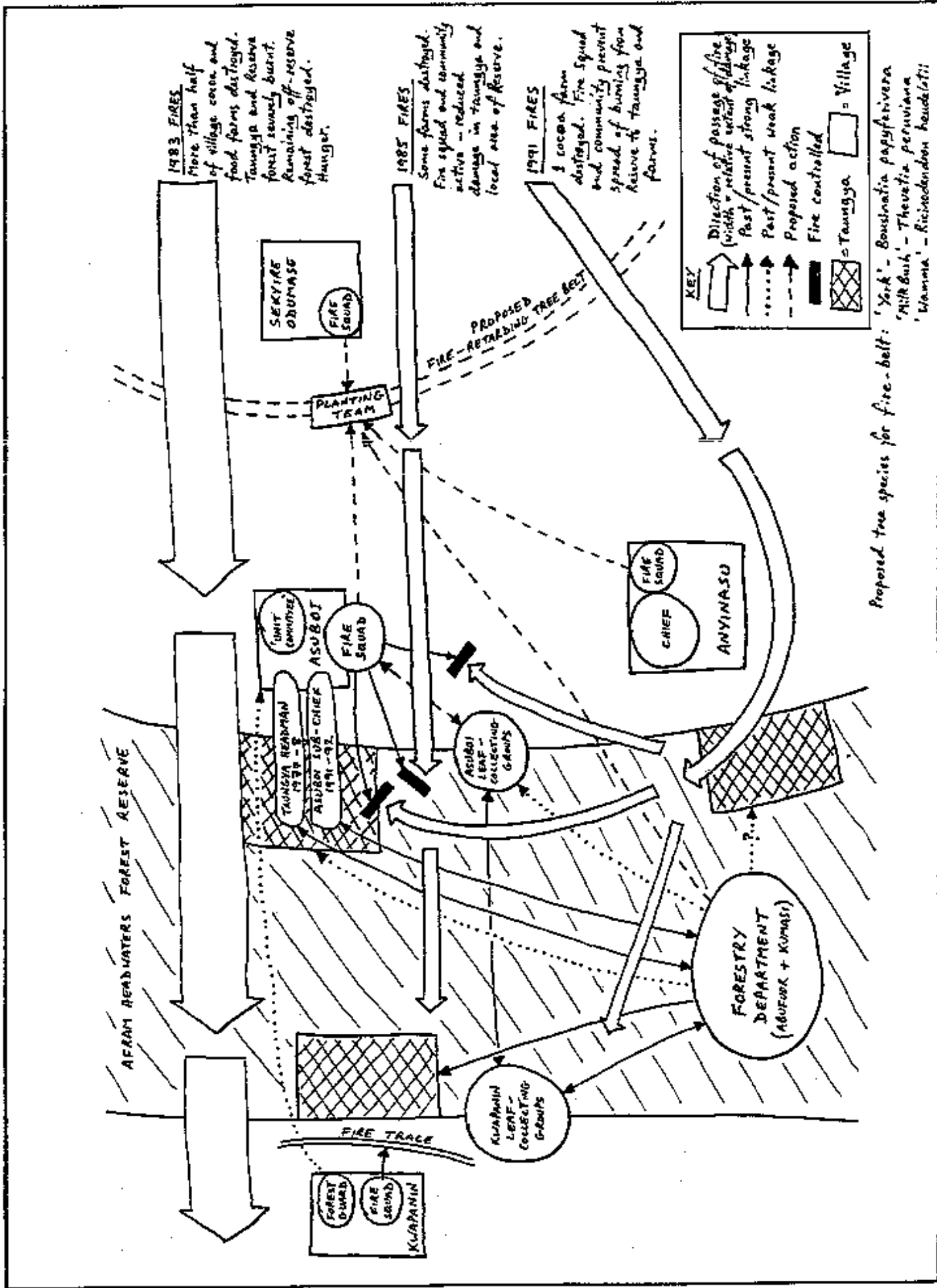
Example 4. Leaf Gatherers and the Forestry Department

[This example is reproduced with permission from: Newsletter 1, February 1993, Collaborative Forest Management Unit, Planning Branch, Forestry Department, PO Box 1457, Kumasi, Ghana.]

Every morning in Kwapanin, a community on the southern boundary of the Afram Headwaters Forest Reserve, the women of the village walk 10 to 12 miles into the forest to collect the Marantaceae leaves ('awurom'). They visit several sites a day returning home when they have collected as much as they can carry. These leaves have been supporting the majority of Kwapanin households since 1983, when their food farms, cocoa, cola nut and oil palm were destroyed in the devastating bushfires.

In 1990 a study looking at the uses of NTFPs (Falconer, 1991) highlighted some of the problems the gatherers had with the FD's permit system and pointed to the potential for working with them to improve the system. The women felt that they could not afford the permit at certain times in the year when market prices were low. They said they could not estimate the quantity which they would collect in a month, that they could not afford to come to Kumasi for a permit, and that to do so would be a real hassle as the road from the village was bad and transport difficult. In addition, irregularities in the permit system

Figure 7 Institutions, fire and forest at Asuboi: local perceptions of past linkages and proposed action (based on various maps and diagrams drawn by villagers)



soured the relationship between these women and the FD. At this time relations between the FD staff and the village fold were not very good and there was a general atmosphere of mutual mistrust between them. Many were afraid of Forestry Officials, fearing that as they had done with the taungya system, they would prevent them from gathering.

After discussions with these women a pilot initiative was launched by the FD's Planning Branch in 1991.

The *objectives* of the experiment were:

- to study the importance of Marantaceae leaf gathering in the livelihood of women and children;
- to improve upon and maintain cordial relations between the FD staff and the rural folk on the periphery of the Reserve;
- to assess whether these communities would conduct themselves responsibly if allowed free unrestricted access to the Reserve to exercise their communal rights for leaf gathering;
- to learn about the Marantaceae leaf resource and its potential for exploitation.

Using the contacts made during the NTFP pilot study in Kwapanin, a small Planning Branch team worked with the leaf-gatherers here who then helped the team to make contact with gatherers in the other villages surrounding the reserve. In each village the gatherers are organised into a group with a head spokesperson (or queen mother). In all 535 free permits were issued in seven villages surrounding the Reserve for the collection of Marantaceae leaves for a trial period from July until the end of December 1991.

Collection sites and resource management

Marantaceae are perennial herbaceous plants which grow on the forest floor. They are found most commonly and densely in disturbed sites, in swamps and in moderately burnt forests. They are also found in bush fallow areas and abandoned cocoa farms. During the dry season supplies on bush fallow dwindle and people tend to rely on supplies in forest areas. They do not thrive in areas which have been severely or repeatedly burned, nor do they survive under Teak.

The leaf gatherers have about 10 sites in the Reserve. They harvest from these sites in rotation, allowing 1 to 3 months for the site to regenerate before returning to it. After the leaves from one area have been exhausted they move on to several others. During the dry season the sites are left to regenerate for 2-3 months while in the rainy season they return after 3 to 4 weeks. Immature leaves are not collected as traders do not accept them and amongst themselves the gatherers believe that harvesting immature leaves would destroy the future crop. Women from the different villages surrounding the Reserve go to the same sites in the Reserve. There is no system of proprietary rights, thus women from one village have no advantage over women from another.

The collection sites are areas where either 'Ntrentrema' or 'Aworomo' (two of the marketed leaf types) are found in dense patches. Subsequent visits to the forest with the gatherers revealed that they have tried to protect the sites from bushfires and invading

'Akyempong' weed. They cut out (or stamp down) any invading 'Akyempong' weed and in at least one instance cleared a fire trace near one site to protect it from a bushfire. A few gatherers have also experimented with planting the seeds near the collection sites to expand the area. They claim that they can harvest the leaves one year after planting.

Mode of gathering, preservation and sale

Women usually go gathering in groups, as they do not like being in the forest on their own. There is a keen sense of competition between the women who try to get into the Reserve early in the mornings so as to be the first group at a collection site. In some cases, women pool and divide their day's harvest.

Most full time gatherers go collecting four times in a week. Generally they do not gather on taboo days, or market days. The closest collection site to Kwapanin is about 6 miles, the farthest is three and a half hours walk and distances between sites range from between two and six miles.

Sometimes the leaves are sold immediately to local food sellers and to traders who live in the village. At other times they are kept until the market day at nearby Abofour where they are sold to traders who come up from Kumasi. Some women also take the leaves directly to Kumasi for sale.

The leaves are tied into bundles of 30 to 60 leaves and these are then tied into larger units called 'temas' bales (or headloads). The tying is generally done at home in the evenings. The leaves are stored in a cool shaded place and if necessary occasionally sprinkled with water to keep them moist.

Village-based institutions

The leaf gatherers in all the villages are organised into an 'association' with a queen mother chosen from among themselves to be the spokesperson for the group. In each village, women also form groups to go leaf gathering. Cordial relations exist between the collection groups and a member from one group may join a different group when going collecting.

Meetings are held monthly within the village to discuss matters concerning their collection sites, prices, the quantity and types of leaves being collected, transport to market centres (Abofour and Kumasi) and relations with the Forestry Department.

The queen mother of the group convenes and presides over the monthly meetings. She appoints one of the women to collect monthly dues. These monies are used to contribute to a member who loses a relative, or gifts are sometime presented to the chiefs or 'odikro'.

Importance of leaf gathering to villagers' livelihoods

After the 1983 bushfires the majority of village women in Kwapanin were left with few alternatives to leaf gathering which now provides a major source of livelihood for

approximately 75% of them and consequently the majority of households. The majority of women collect on a full-time basis, whereas children tend to collect part-time at weekends and during school holidays.

For many of the village women leaf gathering provides the main source of income throughout the year. For others it supplements their household income. Thus, if a woman is ill her family suffers as she provides the only cash. It is especially important during much of the dry season and during the early rains as often these women are the sole breadwinners at this time.

Women spend these monies on their children: mainly to buy medicines, to pay for education, clothing and buying breakfast for them before meals are prepared later in the day for the entire family. Most women also use some of these monies to pay for 'by-day' farm labour. Older children spend it on their own personal needs, school children use the money mainly for food and for books and school fees.

Discussion of the opportunities for collaborative forest management

The pilot study helped to generate interest in forest protection. For example, in December 1991 the villages of Hiayeya mobilised themselves to put off a bushfire that was threatening the reserve. In previous years they were unwilling to do this for fear of being accused of starting the bushfires. The villagers were obviously anxious to prevent the destruction of the leaf gathering sites from being consumed by the fires.

The experimental free permits also helped to warm relations between the Forest Guards and the villagers. The Forest Guards were pleased with the behaviour of the villagers and the leaf collectors in the Reserve. The villagers were happy that the FD had after all their interests and needs at heart.

The leaf gathering organisation was able to successfully control their members with regard to their exploitation in the reserve. On several occasions people who did not have permission to be in the reserve were sent away by the leaf gatherers, and on one occasion a firewood collector from Kumasi was sent to see the FD before being allowed into the reserve by the villagers.

The rural communities in the seven villages demonstrated clearly that they were capable of conducting themselves responsibly in the Reserve. Fears that the experimental free permits would result in villagers engaging in all kinds of unlawful activities proved unfounded. They never infringed on any forest laws during the study. There is therefore every indication that given the right kind of incentive, advice and encouragement, the rural communities dependent of forest products would cooperate with the FD for the management and protection of our Reserves.

The rotational system of leaf collection appears to maintain commercially exploitable levels of supply. While the resource does seem to survive well under heavy exploitation, several issues need to be investigated so as to plan for their management.

Information is needed on ways of identifying exploitable populations - large and dense clumps. Does the regular harvesting of the leaves help to maintain commercially viable populations? What factors have served to produce dense clumps of leaves in the forest? Are there any plantation species which would allow for the integration with leaves? Where the leaf resource is dwindling, could the boundary areas of forests be actively managed for NTFPs such as leaves.

The exploitation of Marantaceae leaves presents an opportunity for collaborative management. The leaves are harvested with no apparent damage to the forest. They regenerate quickly. There is a steady demand for the product and there are a large number of people with an interest in sustaining their exploitation.

Example 5. Local Solutions to Illegal Farming in a Forest Reserve

A number of reserves in the high forest zone are particularly noted for the conflict between farmers and foresters which characterises their recent history (Boateng, 1994; Mayers & Kotey, forthcoming). Desiri Forest Reserve contains a large number of farms, most of which are illegal. Of the nine reserves in Goaso Forest District, only Desiri is seriously encroached upon. Desiri's history is clearly different from the others. Observation up to two kilometres into the reserve near the villages of Abonsuaso on the north eastern corner and Mankesim on the western side in 1992 showed the forest to be in very poor condition, with only patches of broken canopy forest between the farms and fallow. There was a school and a cocoa buying and storage shed, built in 1987, in the reserve on the Abonsuaso side.

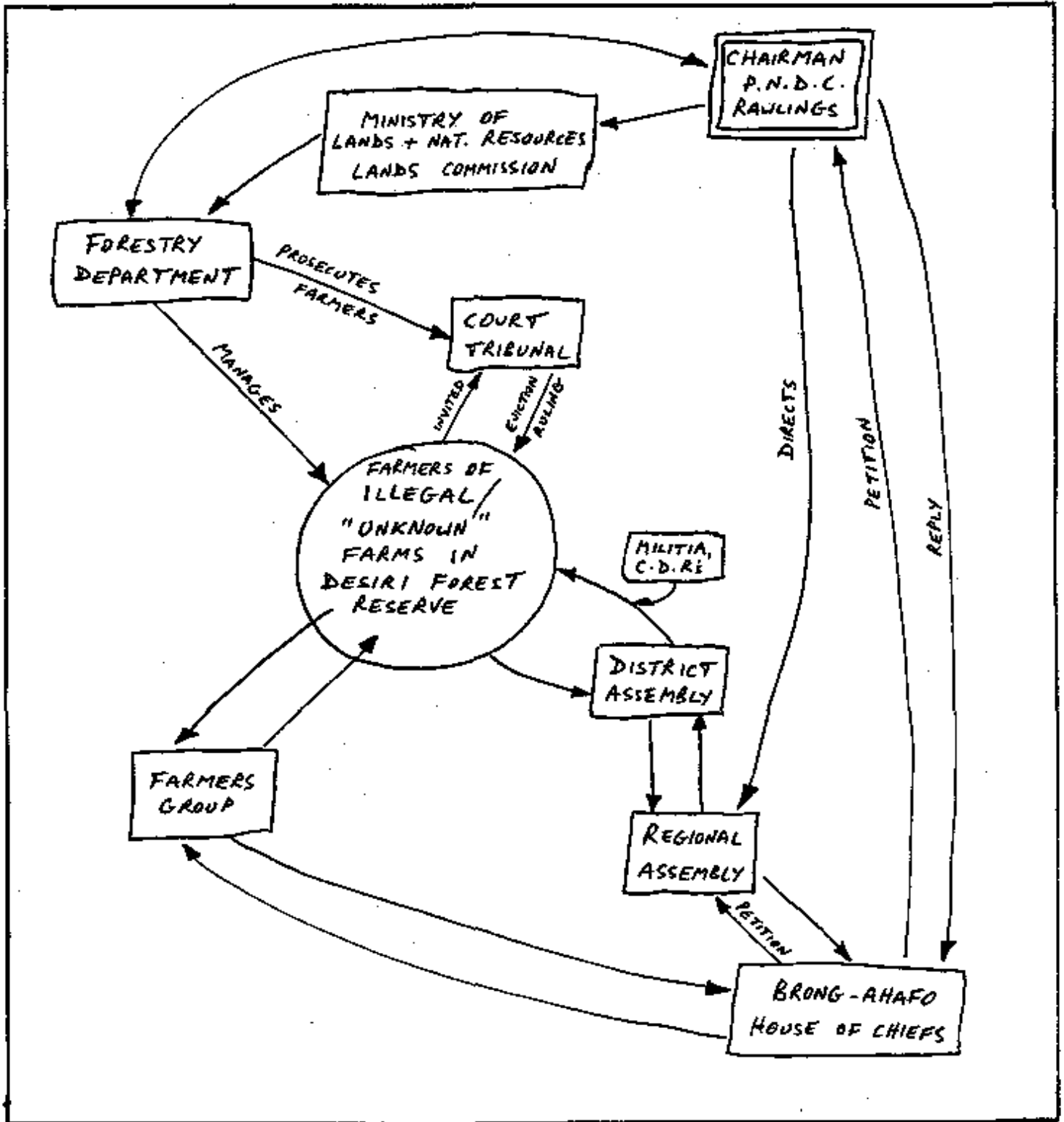
This case study describes the history of illegal farming in Desiri and the ways in which central government directives leading to dramatic but fitful action seem to have both stimulated, but also sporadically blocked, promising local level adaptive forest management strategies. It also describes some pragmatic views about possible long term solutions to the 'encroachment problem'.

Some of these views emerged in a workshop session involving a range of local institutional representatives, including two of the major protagonists in the Desiri dispute - the local District Forestry Officer and the local Chief Farmer. The group allowed the discussion to be opened up and heated debate produced a diagrammatic representation of recent decision-making and conflict resolving actions (Figure 8). During this study, possible solutions to the impasse emerged which, originating from a range of opposing sources, were surprisingly similar.

Controlling the farmers in Desiri - sporadic government attempts over 30 years.

Desiri Forest Reserve was proposed and demarcated in 1954, about 10 years later than most of the other reserves in the area. In the five years prior to reserve establishment, some grants of land were made by the Hiahene (a divisional chief of the Asantehene in Kumasi) in what later became the reserve. In 1955 a FD committee admitted 100 surveyed farms - totalling 7.5km² (1,281 acres).

Figure 8 Recent conflict making and conflict resolving decisions at Desiri Forest Reserve (drawn by a group of field officers from local institutions after field work)



In 1961 there was an attempt to destroy extensions which had been made to the 1954 admitted farms. The farmers petitioned government and a Legislative Instrument was passed admitting the extensions plus 20 new farms as at 1961 (totalling 2,285 acres). The reserve was re-surveyed in 1967/68 and a number of extensions (1,220 acres) to the original admitted farms were surveyed along with a number of farms not originally admitted - termed "unknown farms" (261 acres).

In the 1970s, the Regional Forestry Officer decided that all the farmers, admitted or otherwise, should plant trees around the edges of their farms, with seedlings provided by the FD. This does not appear to have met with much success.

About 13 of the 120 admitted farms are in the Abonsuaso area of the reserve. According to some informants, there may be up to 700 illegal farms in the reserve as well as illegal extensions to some of the admitted farms. Some claim that not all the farms existing at the time of reservation were surveyed and admitted. Furthermore, only the areas of worked farm, not the total areas allocated by the Hiahene were admitted.

The FD and its staff was widely blamed by the villagers for the encroachment and illegal farming in the reserve. FD staff were said to have collected money from illegal farmers, even to have allocated land to some.

A range of reasons were given by villagers for the wide extent of farming in Desiri:

- the reserve was demarcated too close to the village, thus preventing expansion. The reserve should have been demarcated to exclude most of the farms which were at the edges;
- there were more farms in the reserve than were admitted, and these were bound to expand;
- these original farmers were all migrants and had bought the land outright from the Hiahene. They have always objected to reservation;
- corruption, ineptitude and inefficiency by FD staff;
- indecision by Central Government.

Reasons given by the District Forest Officer (DFO) included:

- there were so many farmers in the area at the time of reservation, more than any other reserve in the area;
- penalties for illegal farming were always unrealistic;
- some FD staff 'sold' areas for farming in the reserve;
- part of Desiri is an administrative-political district of Ashanti Region (including the area near Abonsuaso) whilst the whole reserve comes under Goaso Forest District in Brong-Ahafo Region. The Ashanti farmers have never thought that they have anything to do with Brong-Ahafo.

The original reserve map and subsequent partial surveys of the farms show the predominance of admitted farms and subsequent 'unknown' and 'illegal' farms to be in the Ashanti portion, while the remaining farms are more widely scattered in the east and north of the reserve.

In 1987 there appeared to be an agreement amongst government authorities that the illegal farmers should either agree to have their farms gradually planted up with tree seedlings, or lose them entirely²⁷. There were also several cases of successful prosecutions in the Ashanti and Brong-Ahafo Regional Public Tribunals during 1987 and 1988. The fines however, were very small.

In February 1989 the decision was taken to eject all illegal farmers from the reserve²⁸. The newly established District Assemblies moved to stop all farming, lawful and unlawful, in the reserve, and along with the Committees for the Defence of the Revolution (CDRs) and the Civil Defence Organisation, forcibly evicted most of the farmers.

"They even beat the (FD) people who tried to go and collect their food crops" - Daughter of 'Queen Mother'. (As in many places, some locally-stationed FD staff farmed alongside villagers in areas allocated for taungya).

For two years the District Assemblies were in charge of the cocoa and food crop farms in the reserve. The Assemblies on the Brong-Ahafo side were said to have sold about €50 million worth of cocoa from the reserve during this period. There were also reports of the Assembly harvesting some timber.

The farmers in the meantime had lodged an appeal and in 1990 the Appeals Tribunal in Accra found in their favour. The PNDC government was apparently not satisfied and in January 1991 ordered the suspension of the judgement of the Brong-Ahafo Regional Public Tribunal and the Appeals Tribunal in Accra. The FD was ordered, for the first time it seems, to join with the District Assemblies in managing the reserve and the farms until the Secretary for Justice had studied the judgements and given his recommendations.

During 1991 and 1992 the FD carried out re-demarkation of the admitted farms, using the 1961 data, and 'admitted' a total of 2285 acres. The survey team faced hostility from farmers, some of whose farms were extended well beyond recognition of the 1961 boundaries. New pillars placed by the team were frequently dug up by the farmers.

Meanwhile an 'Admitted Farms Association' was formed amongst the farmers on the Ashanti side, under the leadership of one of the original admitted farmers, a former soldier, apparently with connections to high office in the armed forces.

Events started to move back in favour of the farmers. In June 1991 a press release was made by the PNDC Secretary 'pardonning' the original 120 admitted farmers in Desiri. The farmers were required to sign bond forms, with a copy to the District Assembly and

²⁷ Letter from the Chief Conservator of Forests to the Regional Forestry Officer of Brong-Ahafo Region noting discussions between the PNDC Secretary for Ashanti Region and the PNDC Secretary for Lands and Natural Resources, March 1987

²⁸ The PNDC Regional Secretary for Ashanti noted the instructions in a letter to the PNDC Secretary for Lands and Natural Resources (SLNR), February 1989. The PNDC SLNR had noted, February 1989 that the Brong Ahafo side had done well to "ward off trespassers" but the Ashanti side had not

the DFO, stating that they would abide by the rules. By September 1991, 98 of them had done so.

In April 1992, the DFO for Goaso was 'invited' to Accra to discuss the Desiri situation with the Force Sgt. Major and Organising Assistant of the Armed Forces Committee for the Defence of the Revolution. In the same month the PNDC government announced that all farmers in Desiri should continue farming pending full re-surveys and judgement in all cases.

To date, such an intensive survey of all 'illegal and unknown' is yet to be initiated. Neither has Desiri become one of the reserves subject to 'Operation Halt' - a programme with sporadic central government support for eviction and reforestation of all illegal farms, to date limited to the 'invaded' reserves of Western Region.

Taungya in Desiri

The FD management plan for Desiri, written in the 1960s, designated the whole reserve Conversion Working Circle (*ie* with the medium-term goal of harvesting all merchantable natural timber and gradually converting the area to plantation). Thus, from the time of reservation, Desiri was not regarded as a reserve with high forest quality.

Taungya was allocated between 1978 and 1985 in 93 different series, mostly in the north-east, the north-west and the eastern side of the reserve. Each series was allocated between 1 and 8 acres per year, with most allocations being made between 1982 and 1985. The total amount officially allocated was 1,173 acres; but it is likely that the actual amount was far greater:

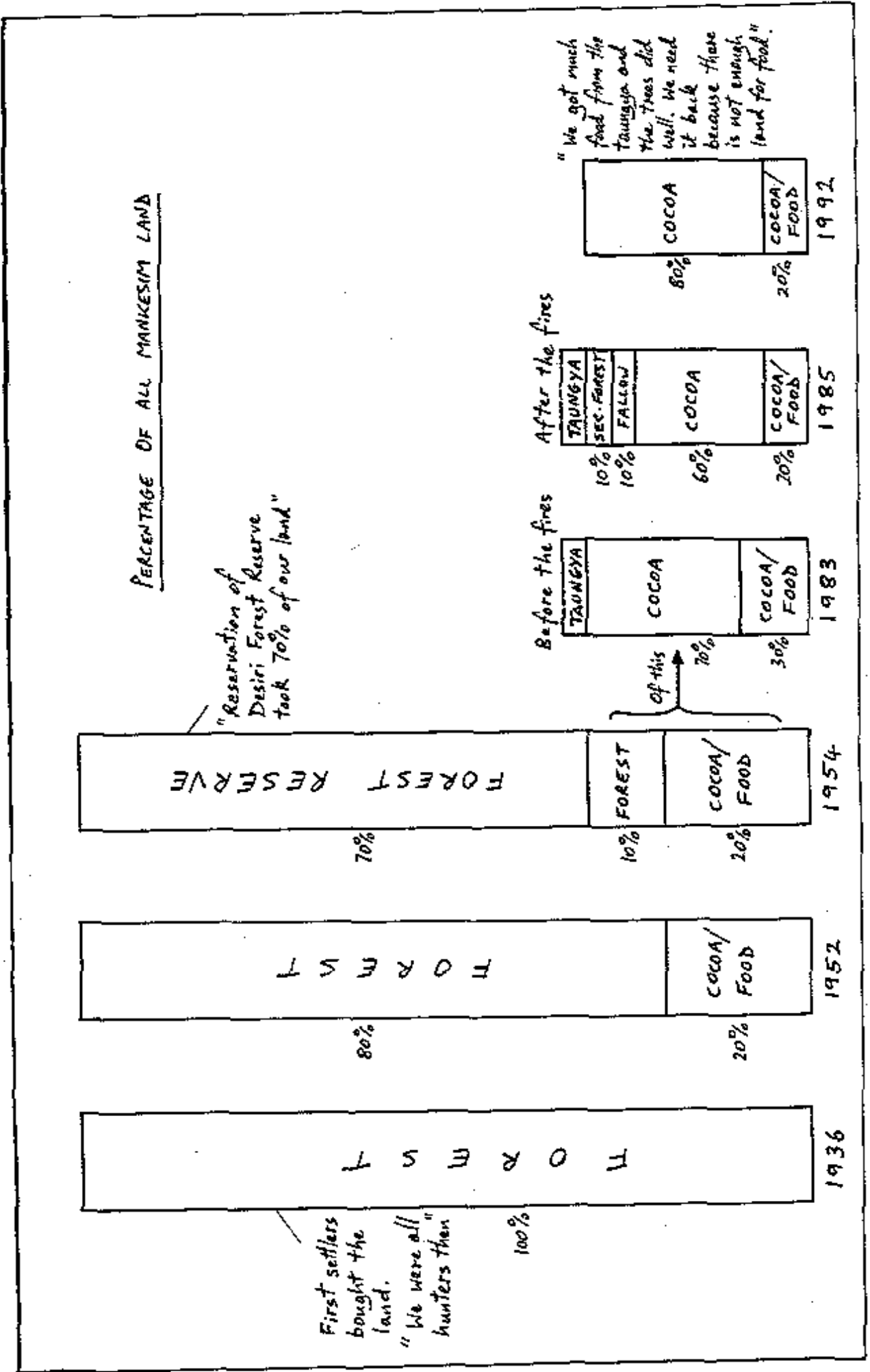
"Technical Officers were told to allocate 3 acres but often allocated up to 10 acres" - DFO, Goaso.

Like all other farmers, the taungya farmers were evicted in 1989. Officers from the District Assembly and the CDRs harvested food from the taungya farms alongside the illegal farms during this period.

Much of the taungya area was a failure in terms of the success of tree seedlings. Many villagers in Abonsuaso also regarded the taungya as of little benefit to them since it was badly organised on both FD and village sides, and the allocations were dominated by certain individuals and groups, leaving others disenchanted.

The Mankesim taungya series however, on the Western side of the reserve, was described by the DFO and the FD Plantations Officer as the most successful taungya in Desiri and Goaso District as a whole. The plantation, largely of Opronon *Mansonia altissima*, is in an observably healthy condition. The reasons for the success seem to be the widely supported local organisational structure and good collaborative relations with the FD (see Example 6 on Taungya, below). Figure 9 shows a perception of land use changes, reservation and taungya by a mixed group in Mankesim village.

Figure 9 Land use changes at Mankesim (drawn by a mixed group)



The Mankesim taungya was examined by a group of representatives of local institutions during the PRA workshop in July 1992. They produced a diagram representing some of the issues of the successful taungya in a spatial context (Figure 10).

Current local forest management responses

There currently appears to be two broad levels of organisation of the Desiri illegal farmers. In the Ashanti Region part, where the farms are the most concentrated, the Admitted Farmers Association is strong and active. In the Brong-Ahafo Region part, which covers about three quarters of the reserve, farms are less numerous and more widely spaced, and the farmers meet to 'advise themselves' and to chose individuals to negotiate on their behalf but do not as yet come together to undertake joint action.

However, many of the farmers on both sides of the reserve recognise that the only way to prevent eviction and thus protect their farms and livelihoods is by checking further encroachment and illegal farming. The Admitted Farmer's Association state this as their main objective. The association has decided that no farmer should make any further extension to his farm, and nobody should clear and burn any new areas. To check extension and unlawful encroachment the association organises patrols. It was also said to enforce rules on fire prevention and had stopped chainsaw operators from felling trees (illegally) in the reserve. Several illegal farmers interviewed in the reserve agreed with the objective and activities of the association and many of them attend meetings of the association.

"Our Association is organised for communal labour. We are very vigilant and can stop any new farms. Now both the admitted farms and the illegal farmers do not want any further expansion of farms". - Beninois cocoa farmer in the reserve.

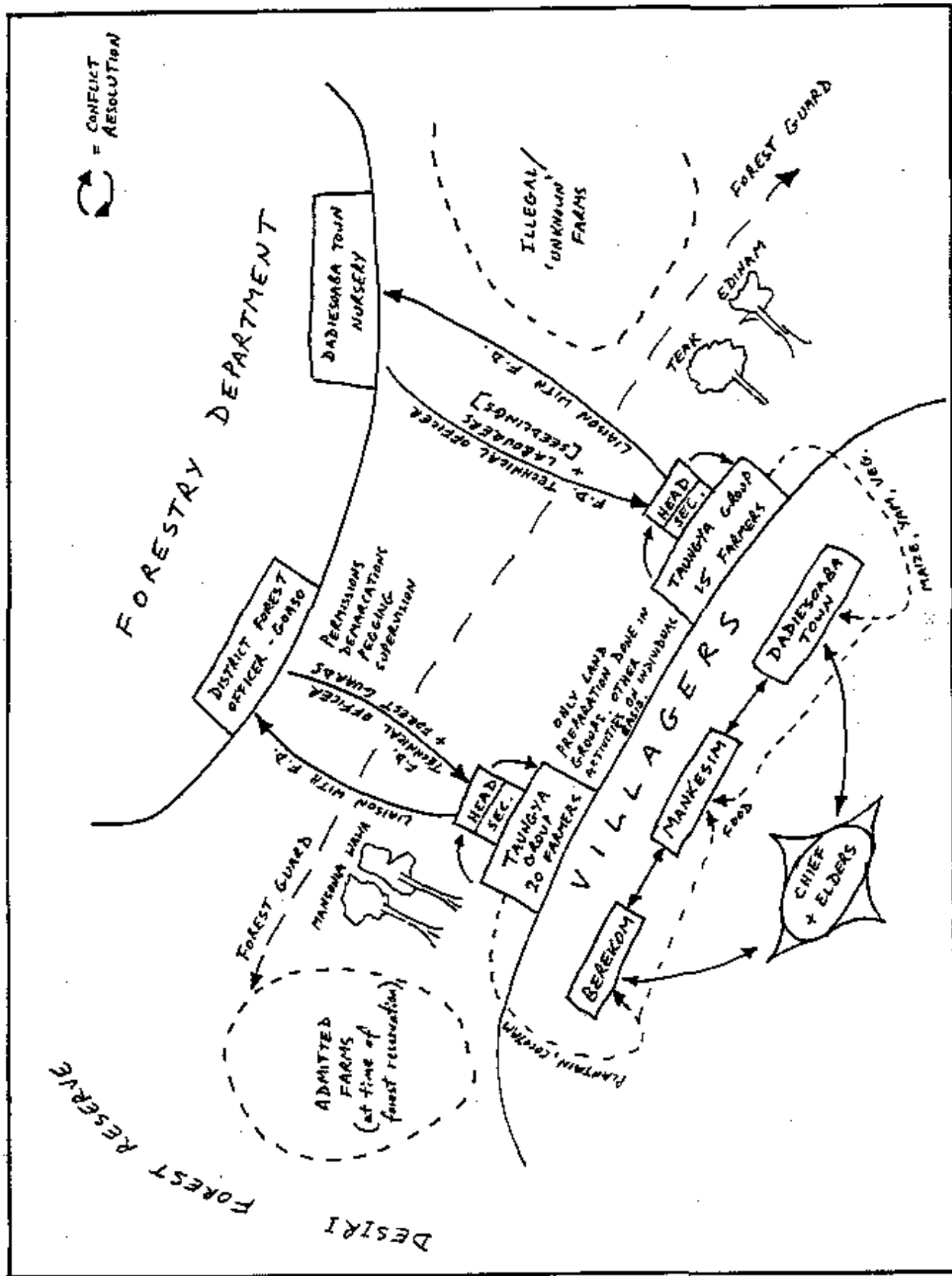
The stimulus to organise in this way certainly seems to have come from the period of eviction starting in 1989.

"We have been given this second opportunity by God's grace, we don't want to give the government the opportunity to evict us a second time because we will lose everything". - 'Chief Hunter'/cocoa farmer (lives in the reserve).

Yet it is unlikely that the farmers would now be cooperating with the FD if the latter had been the driving force behind the evictions. The DFO and some FD staff have worked hard since before 1989 to establish constructive relations with the local farmers. Indeed in Abonsuaso, various informants described how the FD was only a reluctant actor in the eviction of farmers and occupation of farms in the reserve. Certainly, amongst the illegal farmers spoken to there appears to be a level of respect for the FD staff which was not to be found amongst the 'invaded' reserves of Western Region (Boateng, 1994; Mayers & Kotey, in prep).

"Relations between us - the farmers - and the Forestry Department are now fine. The District Forestry Officer has transferred his workers who were harassing farmers - cutting down their palm trees and so on. He also consults with the farmers before taking any action" - Chief Farmer, Group B, Goaso.

Figure 10 Taungya issues and relationships, Mankesim (drawn by a group of field officers from local institutions after fieldwork in Mankesim)



Practical proposals from the farmers

The view of the great majority of informants in the villages and in the reserve, was that Desiri cannot be maintained with the present boundaries. The DFO agreed that supervision and patrol is very difficult. Many farmers suggested that some farms in the middle of the reserve be relocated to the edges and the reserve then be redemarcated to exclude as many of the farms as possible.

"The farms are all near the edge of the forest (drawing on the ground) so the boundary should be moved back. Some farmers will have to move, but because they have all been scared by being evicted, they will respect it". - Old cocoa farmer.

One group in Abonsuaso, which included the local FD forest guard and various farmers drew a map of the pattern of farms in the reserve which seemed to reflect well the secondary information known to the study team. The group then proposed a solution based on gradually moving farmers out of the less damaged part of the reserve and excising the most farmed area - about a quarter of the reserve. It was proposed that the Admitted Farmers Association and a more 'formalised' organisation of farmers from the Brong-Ahafo side, should work with the FD in gradually planting up the cocoa farms, starting in the middle of the reserve. An additional feature of the proposal was that those farmers moved should be allowed to participate in new taungya schemes which should be organised in a similar way to the successful taungya areas which were known about by the group (the Mankesim area was one of those referred to). A map was produced showing the present situation and the proposal (Figure 11).

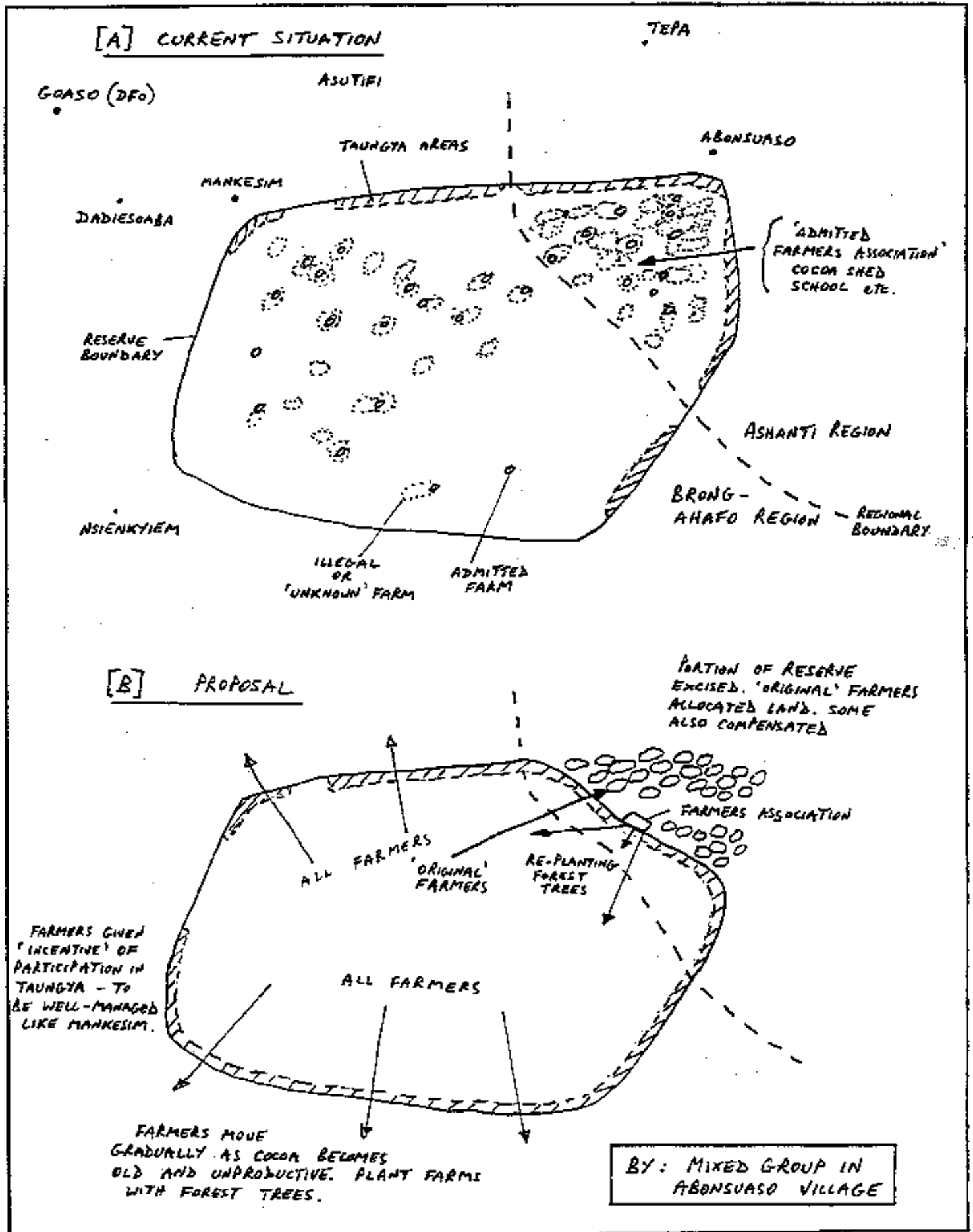
The Goaso B Chief Farmer proposed a variation on this theme in the presence of the DFO:

"I think the only way of solving the problem would be to move the farmers from where they are more scattered to where there are only patches of forest left, resettle them, and compensate them. They should move the scattered farms to the Tepa (Ashanti) side where there is a concentration of farms, supply them with seedlings, give them about twice the land they are leaving, and put this land outside the reserve before doing the final demarcation. I think if it is properly organised, the farmers will agree to move." - Chief Farmer, Group B, Goaso.

Villagers without farms in the reserve are also of the opinion that they should be involved in management of the reserve and propose that they assist the FD. Citing the benefits which the forest provides him as protection of water supplies and bushmeat (hunting was reported to have been particularly good during the period when the farmers were ejected), one farmer said:

"We want some forest to pass on to our grandchildren, and there is not much left. We can patrol the forest and make arrests if the government gives us the responsibility". - Cocoa farmer, former taungya farmer

Figure 11 Farming in Desiri Forest Reserve



Another farmer agreed, foretelling the consequences if some progress was not made soon:

"We will form a new group to look after the forest because we want our children to benefit from the forest too. We have already decided this in Abonsuaso, the Town Development Committee and CDR have discussed this. The government needs to give us the authority to protect the forest. The Forestry Department should help us - but seriously, not like before. If we don't get this soon we will all have to join the illegal farmers, or we will lose out". - Abusa farmer

[*Information sources:* Groups and individuals in and around Abonsuaso and Mankesim villages; DFO Goaso Forest District; Chief Farmer, Group B, Goaso; District Administrative Officer, Tepa District Assembly; Workshop grouping of local institutional representatives; Forestry Department files, Accra and Kumasi.]

Example 6. Taungya - Much Failure and Some Success

With the exception of Fureso, all the communities worked with in this study had, at some stage in the 1960s through to the late 1980s, been allocated areas in the reserve for practising the taungya system. The forest allocated for taungya was supposedly part of the Conversion Working Circle of each forest reserve (*ie* that part designated for conversion to plantation following initial logging). In practice however, parts of the Selection Working Circle (*eg* Subriso) and even Protection Working Circle (*eg* Mafia) were allocated for taungya.

During the period that the system operated it was an important, in some areas crucial, source of food supply and an important livelihood source. In some areas (*eg* Apoli and Asuboi) most of the farmland off-reserve was planted up with cocoa and permanent crops to a greater extent as a result of food crop needs being fulfilled from the taungya areas.

In terms of the survival of the trees planted on the taungya areas, success varied from place to place and from year to year within a taungya series. Of the study villages: the Mafia taungya (1988-90) was a complete failure; Abonsuaso (1980-88) showed a very low success rate; Subriso (1978-90) and Asuboi (1978-83, 1991-92) showed some good and some poor years, and; Mankesim (near Abonsuaso) (1980-85) and Apoli (1968-78) appeared to have been largely successful.

A major causal factor in the successful taungya sites seems to have been the level of demand - the higher the better. Examples of the high forest being cleared only for the land to be abandoned through lack of interest are not limited to this study only. Another major factor in successful taungya series was the strong level of village organisation for taungya management. Both the Apoli and Mankesim cases had similar organisational forms:

- taungya groups consisted of about 15 farmers drawn from mixed origins. The elders or a village meeting decided that only those villagers would be nominated to farm in the taungya who were, (a) willing to incur the costs of planting and looking after trees in the taungya, and (b) good farmers;

- each group was lead by a Taungya Headman, who provided liaison between farmers and the FD;
- the Headman arbitrated among members of the group, while issues between farmers of different hamlets were arbitrated by the elders headed by the village chief;
- members of a group pooled their labour to prepare the land, but thereafter pursued their farming and tree planting on an individual basis.

The successful taungyas had an organisational structure which felt that the reputation and good name of the village was at stake and took collective responsibility for ensuring compliance with the terms of the taungya as set by the FD.

The other factors which appear to have been responsible for successful taungya were:

- adequate supervision by FD staff in site demarcation, pegging, planting and monitoring;
- a relatively small area under taungya at one time;
- new areas allocated only when existing areas are well planted;
- appropriate tree species for local conditions (Wawa, Teak and Cedrella odurata were the most common successful species), and an adequate and timely supply of planting material (nurseries should be nearby).

Following the widespread failure of the taungya system (for the understandable lack of some of the above factors), new taungya allocations stopped in all areas in the late 1980s. Re-planting of failed areas, predominantly by FD staff, has been carried out since then in some areas. In a small number of areas (including Asuboi) old failed areas of taungya have been re-allocated under the taungya system (in the case of Asuboi the Headman has been made to sign a bond accepting personal responsibility if it fails).

In the past, taungya was the most important link between communities, forest reserves and the FD. It was the one area in which foresters were acting as extension agents and facilitators rather than guards and policemen. The discrediting of the taungya system in the view of most national level foresters and policy makers should not be allowed to mask the successes of the relatively small number of cases in which the conditions were right. These successes were the result of good cooperation between village organisations and the FD at a very local level. The possibility of selective re-introduction of a taungya system along the lines described above, should be maintained. Furthermore this type of cooperation is still visible and represents a key area to build on in the transition to better forester-village relations necessary for the future integrity of the forest estate.

7. TREES ON FARM LAND

Tree Prevalence and Farmer Preference

The dominant farming system in the high forest zone is land rotation with bush-fallow. Cocoa cultivation, and to a much lesser extent, oil palm, coffee and coconut production

have brought much of the land under more permanent agriculture but a mixed cropping system involving spatial rotation is still the norm. Within this system, depending on the relative availability of tree resources outside the farm, the farmer may decide to keep certain trees on the farm for the products they provide or their cultural significance. But it is the positive and negative interactions of trees with the various ages and combinations of crops which really determines the species composition and density of trees found on farms.

There are broadly three types of trees on farms: those that are left standing because the work required to remove them is too great, those that are tolerated because they have few negative effects on crops, and those that are actively planted or tended.

For many farmers, maximising the area devoted to cocoa cultivation remains a major objective, despite declining income returns from cocoa in recent years. In many areas this means re-planting, patch by patch, old cocoa which has either gone beyond its productive life or been destroyed by fire (particularly in the MS and DS zones). In other areas old fallow and even high forest is being converted (primarily in the WE and ME zones). In both cases, all but the very largest trees are felled in land clearing. Food crops are then planted for two or three seasons and a variety of pioneer tree species allowed to regenerate. The cocoa seed or seedlings are put in under this low shade cover which may also include plantain. The less desired shade trees are gradually thinned from the farm over the course of the cocoa's growth thereby allowing the desired species to form a high canopy of light shade. The newer cocoa hybrids are widely reported by farmers to require less shade than the older varieties.

The main trees observed on cocoa farms during line transects in the six villages in this study are shown in Table 4. The transects covered varying distances through cocoa farms and varying ranges of cocoa condition, from old weed-infested unproductive cocoa areas through productive mixtures of old and re-planted cocoa, to larger areas of well-weeded hybrid, both old and young (Figure 12). The latter tended to have patches of food crops interspersed. Trees over about 20cm diameter-at-breast-height (dbh) within about 10 metres either side of the transect line were recorded. Table 4. combines all types of cocoa farm.

The *range* of tree species found on cocoa farms appears to be a little higher in the MS zones compared to the other zones. The *density* of the shade trees managed by farmers seems to relate to the particular soil and climate conditions of the area. There appear to be generally more shade trees used in the drier DS and MS zones than in the wetter ME and WE zones.

The tree numbers from the transect work, which gave rough 20-metre strip width records of trees over about 20cm dbh, suggest that shade tree densities on cocoa farms may range from about 20 to 80 trees per hectare. The indications are that the highest density is found in the MS forest zone, followed by the DS, ME and WE forest zones.

In a more rigorous analysis, Nkyi (1989) measured numbers of tree stems, basal areas of both live and cut trees, and crown cover percentages of live trees per hectare. He did not

Table 4. Tree species (over 20cm dbh) more commonly and less commonly encountered during transects on cocoa farm lands near villages in this study. (Latin names used, see Appendix for common and trade names.) In descending order of prevalence.

| WE ¹ | ME ² | MSNW ³ | MSSE ⁴ | DSFZ ⁵ |
|----------------------------------|------------------------------------|---------------------------------|----------------------------------|---------------------------------|
| More common | | | | |
| <i>Piptadeniastrum africanum</i> | <i>Ceiba pentandra</i> | <i>Elaeis guineensis</i> | <i>Elaeis guineensis</i> | <i>Ficus capensis</i> |
| <i>Terminalia superba</i> | <i>Cola gigantea</i> | <i>Ficus capensis</i> | <i>Ficus exasperata</i> | <i>Ceiba pentandra</i> |
| <i>Ceiba pentandra</i> | <i>Terminalia superba</i> | <i>Ficus exasperata</i> | <i>Antiaris toxicaria</i> | <i>Alstonia boonoi</i> |
| <i>Albizia zygia</i> | <i>Triplochiton scleroxylon</i> | <i>Terminalia superba</i> | <i>Albizia zygia</i> | <i>Ricinodendron heudelotii</i> |
| <i>Terminalia ivorensis</i> | <i>Terminalia ivorensis</i> | <i>Ceiba pentandra</i> | <i>Alstonia boonoi</i> | <i>Spathodea campanulata</i> |
| | <i>Alstonia boonoi</i> | <i>Alstonia boonoi</i> | <i>Ricinodendron heudelotii</i> | <i>Antiaris toxicaria</i> |
| | <i>Artocarpus communis</i> | <i>Mangifera indica</i> | <i>Rauvolfia vomitoria</i> | |
| | <i>Funtumia elastica</i> | <i>Citrus sinensis</i> | <i>Mangifera indica</i> | |
| | <i>Milicia excelsa</i> | <i>Triplochiton scleroxylon</i> | <i>Ceiba pentandra</i> | |
| | | <i>Sterculia tranguantha</i> | <i>Celtis mildbraedii</i> | |
| | | | <i>Triplochiton scleroxylon</i> | |
| | | | <i>Pterygota macrocarpa</i> | |
| | | | <i>Petersianthus macrocarpus</i> | |
| | | | <i>Sterculia rhinopetala</i> | |
| | | | <i>Pyrenanthus angolensis</i> | |
| | | | <i>Khaya</i> spp. | |
| Less common | | | | |
| <i>Funtumia elastica</i> | <i>Pseudospondias microcarpa</i> | <i>Antiaris toxicaria</i> | <i>Spathodea campanulata</i> | <i>Mangifera indica</i> |
| <i>Ficus exasperata</i> | <i>Celtis mildbraedii</i> | <i>Celtis mildbraedii</i> | <i>Terminalia superba</i> | <i>Citrus sinensis</i> |
| <i>Ricinodendron heudelotii</i> | <i>Distemonanthus benthamianus</i> | <i>Cola gigantea</i> | <i>Milicia excelsa</i> | <i>Persea americana</i> |
| <i>Khaya</i> spp. | <i>Zanthoxylum gillettii</i> | <i>Persea americana</i> | <i>Sterculia tranguantha</i> | <i>Terminalia superba</i> |
| <i>Milicia excelsa</i> | <i>Pyrenanthus angolensis</i> | <i>Ricinodendron heudelotii</i> | <i>Trichilia monadelpha</i> | <i>Sterculia tranguantha</i> |
| <i>Amphimas pterocarpoides</i> | <i>Petersianthus macrocarpus</i> | <i>Spathodea campanulata</i> | <i>Cola gigantea</i> | <i>Milicia excelsa</i> |
| <i>Pyrenanthus angolensis</i> | <i>Piptadeniastrum africanum</i> | <i>Nauclea diderichii</i> | <i>Nesogordonia papaverifera</i> | <i>Albizia ferruginea</i> |
| <i>Hertiera utilis</i> | <i>Antiaris toxicaria</i> | | <i>Citrus sinensis</i> | |
| | <i>Khaya</i> spp. | | <i>Cyclocarpus gabunensis</i> | |

Notes:

¹ WE = Wet Evergreen forest zone, transects near Fureso village

² ME = Moist Evergreen forest zone, transects near Mafia village

³ MSNW = Moist Semideciduous (North West Subtype) forest zone, transects near Abonsuaso village

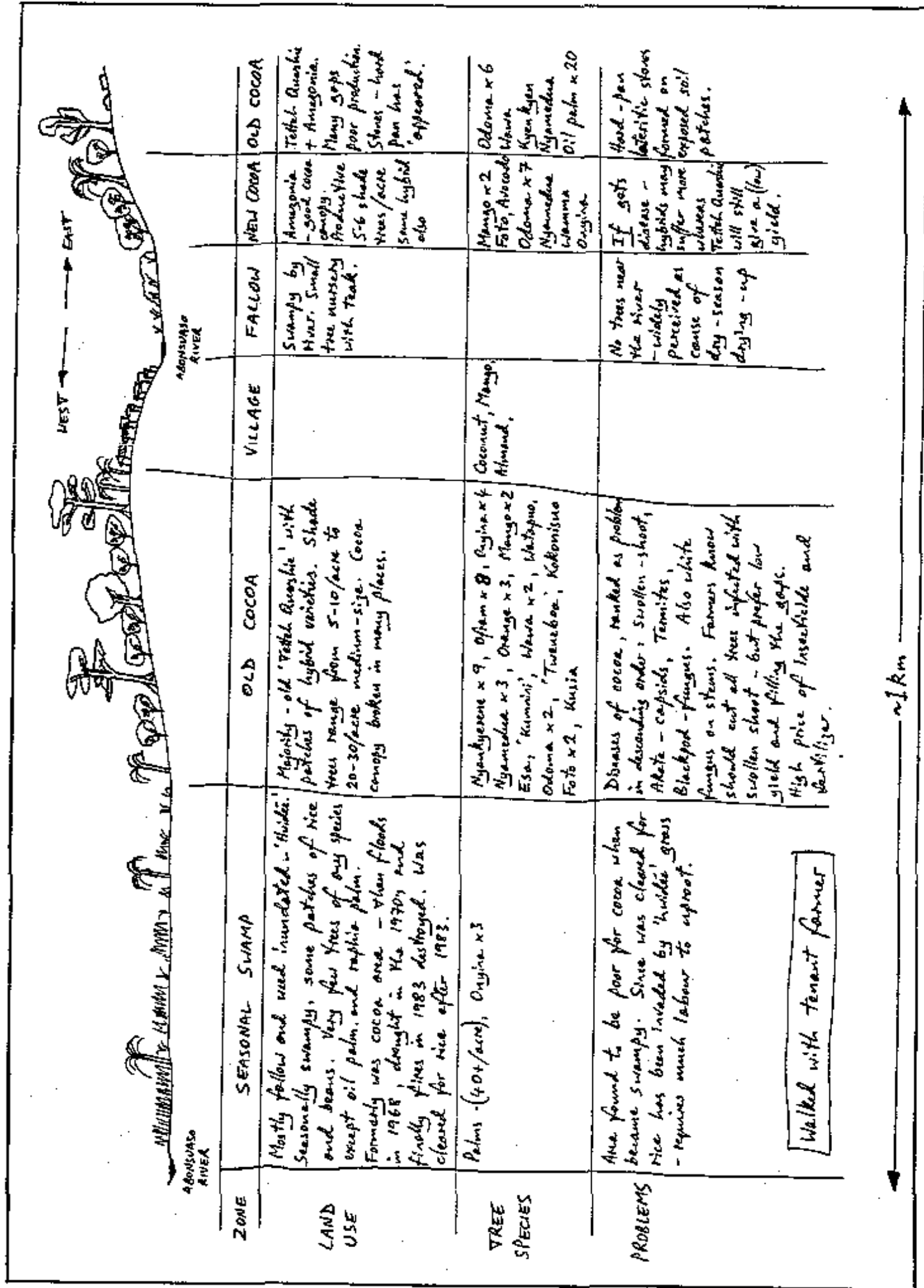
⁴ MSSE = Moist Semideciduous (South East Subtype) forest zone, transects near Apoli and Subriso villages

⁵ DS = Dry Semideciduous (Fire Zone) forest zone, transects near Asuboi village

(Zones after Hall and Swaine, 1981)

The information for this table, and the tables from this study which follow, is derived from PRAs in 8 villages in the high forest zone. A variety of methods involving individuals and groups were used. We believe the information in the tables is generally reliable, but do not claim and statistical validity.

Figure 12 Example of a transect diagram from Abonsuaso village



find any significant differences in tree density over all types of permanent crop (primarily cocoa) farms across the three forest zones (ME, MS and DS) he studied in Ashanti Region. However there were differences between these zones in the tree densities found on arable farms, with the basal area least in the MS forest zone.

Table 5 shows the trees Nkyi found most prevalent on farmland (combining permanent crop and arable crop) in the various forest zones.

Table 5: Prevalence of trees on farms in three forest zones in Ashanti Region (in descending order of prevalence)

| ME | MS | DS |
|----------------------------------|---------------------------------|-------------------------------|
| <i>Celtis mildbraedii</i> | <i>Albizia zygia</i> | <i>Ceiba pentandra</i> |
| <i>Ceiba pentandra</i> | <i>Funtumia elastica</i> | <i>Albizia zygia</i> |
| <i>Nesogordonia papaverifera</i> | <i>Sterculia trangacantha</i> | <i>Alstonia boonei</i> |
| <i>Ficus exasperata</i> | <i>Alstonia boonei</i> | <i>Sterculia trangacantha</i> |
| <i>Triplochiton scleroxylon</i> | <i>Triplochiton scleroxylon</i> | <i>Ficus capensis</i> |
| | <i>Celtis mildbraedii</i> | <i>Cola gigantea</i> |
| | | <i>Antiaris toxicaria</i> |

See Table 3 for notes

Source: Adapted from Nkyi (1989)

On fallow regrowth vegetation, Nkyi found Okoro to be the most abundant tree in the MS and DS zones. In the ME zone, *Ficus exasperata* (Nyankyerene) was the most prevalent, followed by *Albizia zygia* (Okoro). Other species such as *Sterculia trangacantha* (Sofu), *Funtumia elastica* (Funtum), *Rauvolfia vomitoria* (Kakapenpen), *Alstonia boonei* (Nyamedua) and Nyankyerene are prevalent in bushfallow lands in all zones. The Leguminosae is noted as the predominant family in all zones. He also noted the relative scarcity of *Triplochiton scleroxylon* (Wawa) and the almost complete absence of *Milicia excelsa* (Odum) in the DS zone, the forest zone for which Odum is floristically characteristic (Nkyi 1989).

The transects also covered a mixture of food crop and fallow areas. Generally, many fewer trees were found on areas of farms used for food crops compared to cocoa although particular trees are prized for their positive qualities and some for very particular associations such as *Nyankyerene* which is widely favoured grown with plantain, but not with maize. Such a tree may therefore be cut during initial clearance for the first season crop (e.g. maize) and left to coppice for its beneficial interaction with the second or third season crops (e.g. plantain). There appeared to be little difference between the zones in the density of trees found on food farms although the need for trees expressed by farmers was greatest in the DS zone and least in the WE zone.

The trees found on fallow areas varied according to the age of the fallow and the forest zone. Generally the older fallow hosted a similar range of species as cocoa farms but a slightly higher prevalence of oil and raphia palm and planted trees, particularly orange,

avocado and mango. Many farmers in the MS and DS zone villages stated that the fallows have not regenerated well in recent years. The bush fires of 1983 and subsequent years, and the degradation of fallows from 'akyempong' weed Chromolaena odorata, and 'hwdie' grass Cyperus sp., is certainly a major problem in some of these areas.

Quite a wide variety of individual informants and groups gave their opinions about trees in this study. Farmers in the same village sometimes had different opinions about trees but in general there was much agreement. Between areas, the types of positive attributes varied. For example, those in the MS and DS zones stressed more often than those in the ME and WE the advantages of trees which are known to moisten the soil, by exudation of water through the leaves or roots, and to minimize dehydration of the soil during a drought.

Trees which have high crowns, avoiding interference with the crops, and those with shallow crowns, which do not shade excessively, are commonly preferred. Trees with deep roots are also appreciated since they compete less with the crops and may be less likely to fall and destroy crops. Other trees are noted for the quality of mulching material and soil enrichment provided by their leaves, fruits and seeds. Negative attributes of trees include: liability to drop large branches, pest and disease harbouring, dense shade and competition with crops for soil nutrients and moisture.

Table 6 provides a generalised summary of the 'good' and 'bad' trees described by the various individual informants and groups in this study. The focus of most farmers was on cocoa farms so only those opinions are synthesised in the table.

Farmers' opinions about trees were also studied by Nkyi. Table 7 shows the species he found to be particularly favoured and disfavoured in the existing farming systems of the three zones he studied.

In all zones Nkyi found that trees such as Ceiba pentandra (Onyina), Ficus capensis (Odoma) and Ricinodendron heudelotii (Wamma) were highly favoured for their large amount of easily decomposed litterfall (although in this study, there is mixed opinion amongst farmers - with some trees like Onyina featuring in both 'good' and 'bad' lists). In contrast Celtis mildbraedii (Esa), Wawa, Piptadeniastrum africanum (Dahoma), and Cyclodiscus gabunensis (Denya) are not favoured due to adverse effects on both microsites and crop yields (Table 8).

Farmers' decisions about shade trees over cocoa are particularly linked to the relative seriousness of the three major diseases of cocoa in their area. Cocoa Swollen Shoot Virus is the first of these. Although it can occur throughout the high forest zone, it has always been most pronounced in the east of the area, where over the years it has considerably reduced the viability of cocoa. The disease was first seen in the 1920s but was only recognised as a serious problem in the 1940s. The disease is carried by mealybugs and can gradually devastate entire farms. The only effective treatment so far developed is amputation - clearing of entire farms, cocoa and shade trees. This has generally been carried out, with the farmer's consent, by Ministry of Agriculture staff and with some success at containing outbreaks within defined areas. Since the disease is slow and

Table 6: 'Good Trees' and 'Bad Trees' on cocoa farms - indications from this study. (The top three in each list were the most mentioned):

| WE ¹ | ME ² | MSNW ³ | MSSE ⁴ | DSFZ ⁵ |
|--|----------------------------|--------------------------|----------------------------|--------------------------|
| <i>Most commonly mentioned 'Good Trees'</i> | | | | |
| Terminalia ivorensis | Milicia excelsa | Pycnanthus angolensis | Alstonia boonei | Ceiba pentandra |
| Ceiba pentandra | Khaya spp. | Khaya spp. | Rauvolfia vomitoria | Milicia excelsa |
| Terminalia superba | Ceiba pentandra | Milicia excelsa | Khaya spp. | Khaya spp. |
| Khaya spp. | Terminalia ivorensis | Triplochiton scleroxylon | Trichilia monadelpha | Citrus sinensis |
| Ficus capensis | Citrus sinensis | Ficus capensis | Milicia excelsa | Persea americana |
| <i>Quite commonly mentioned 'Good Trees'</i> | | | | |
| Tieghemella heckelii | Elaeis guineensis | Ricinodendron heudelotii | Celtis mildbraedii | Rauvolfia vomitoria |
| Milicia excelsa | Persea americana | Ceiba pentandra | Spathodea campanulata | Ficus capensis |
| Ficus exasperata | Terminalia superba | | Ceiba pentandra | Pycnanthus angolensis |
| Rauvolfia vomitoria | Ficus exasperata | | Ricinodendron heudelotii | Ricinodendron heudelotii |
| Albizia adianthifolia | Rauvolfia vomitoria | | Daniellia ogea/ thurifera | Terminalia superba |
| | Holarrhena floribunda | | Terminalia ivorensis | Mangifera indica |
| | Raphia hookeri | | Entandophragma cylindricum | Sterculia trangacantha |
| | Entandophragma cylindricum | | Ficus capensis | Spathodea campanulata |
| <i>Most commonly mentioned 'Bad Trees'</i> | | | | |
| Piptadeniastrum africanum | Triplochiton scleroxylon | Ficus exasperata | Triplochiton scleroxylon | Alstonia boonei |
| Ficus capensis | Celtis mildbraedii | Sterculia trangacantha | Cola gigantea | Ficus exasperata |
| <i>Quite commonly mentioned 'Bad Trees'</i> | | | | |
| Klainedoxa gabonensis | Ceiba pentandra | | Piptadeniastrum africanum | Triplochiton scleroxylon |
| Heritiera utilis | Terminalia superba | | Cyclodiscus gabunensis | Terminalia gabunensis |
| | Ficus capensis | | Terminalia ivorensis | Antiaris toxicaria |
| | | | | Funtumia elastica |

See Table 3 for notes

Table 7: The most favoured and disfavoured trees in the existing farming systems of three forest zones in Ashanti Region from a study by Nkyi

| ME | MS | DS |
|----------------------------------|---------------------------------|---------------------------------|
| <i>Favoured:</i> | | |
| <i>Ceiba pentandra</i> | <i>Albizia zygia</i> | <i>Ceiba pentandra</i> |
| <i>Ricinodendron heudelotii</i> | <i>Ricinodendron heudelotii</i> | <i>Ricinodendron heudelotii</i> |
| <i>Ficus capensis</i> | <i>Ceiba pentandra</i> | <i>Ficus capensis</i> |
| <i>Milicia excelsa</i> | <i>Ficus capensis</i> | <i>Sterculia tringacantha</i> |
| <i>Spathodea campanulata</i> | <i>Spathodea campanulata</i> | <i>Milicia excelsa</i> |
| | <i>Ficus exasperata</i> | <i>Alstonia boonei</i> |
| <i>Disfavoured:</i> | | |
| <i>Cyclodiscus gabunensis</i> | <i>Triplochiton scleroxylon</i> | <i>Cyclodiscus gabunensis</i> |
| <i>Piptadeniastrum africanum</i> | <i>Celtis mildbraedii</i> | <i>Cola gigantea</i> |
| <i>Celtis mildbraedii</i> | <i>Cyclodiscus gabunensis</i> | <i>Triplochiton scleroxylon</i> |
| <i>Ficus exasperata</i> | <i>Cola gigantea</i> | <i>Celtis mildbraedii</i> |
| <i>Triplochiton scleroxylon</i> | <i>Ceiba pentandra</i> | <i>Pycnanthus angolensis</i> |

See Table 3 for notes

Source: Adapted from Nkyi (1989)

insidious however, farmers often prefer not to volunteer the destruction of their farm and live with the disease for a while, which may result in infection of neighbouring farms.

Some trees are known by the Cocoa Research Institute of Ghana (CRIG) to harbour the mealybugs and their avoidance on cocoa farms is recommended. (Some of the trees on the CRIG 'blacklist', eg. *Cola gigantea* (Watapuo), were also described as a disease carrier by a number of farmers in different locations in this study). CRIG also provides a list of recommended shade trees on cocoa. All the recommended trees are currently economic timber species.

The second major disease of cocoa is from capsids or 'Akate'. Capsids are found all over the cocoa growing areas of Ghana and cause significant crop loss. The disease is particularly bad when the cocoa canopy is opened up or is patchy. Felling trees on cocoafarms can thus cause serious outbreaks. Effective pesticide is available but the dosages required are high and few farmers can afford the CRIG recommended rate of spraying - four times per year whether capsids are present or not.

The third major disease is Black Pod. This is a soil borne fungus with two strains *Phytophthora palmivora* and *P. megacaria*, the former is quite widespread in Ghana but less serious (it commonly claims about 10% of the crop, [Osie-Bonsu, 1993]) than the latter which is a major problem in the 'transitional zone' of northern Ashanti Region and Brong Ahafo Region as well as in the Volta Region. The disease came from Togo in the 1970s

Table 8: Farmer-opinion of trees on farms noted in two other studies

| |
|--|
| <p>'Good Trees' with cocoa:</p> <p>Citrus sinensis, Ficus capensis, Sterculia tringacantha, Persea americana, Ricinodendron heudelotii, Bombax buonopozense, Ceiba pentandra, Terminalia superba, Alstonia boonei, Spathodea campanulata and Albizia zygia¹</p> <p>Zanthoxylum gillettii, Ceiba pentandra, Spathodea campanulata, Milicia excelsa and Albizia zygia²</p> <p>'Good Trees' for soil moisture:</p> <p>Ficus exasperata, Ceiba pentandra, Antiaris toxicaria, Spathodea campanulata, Ficus capensis, Carica papaya, Bombax buonopozense²</p> <p>'Bad Trees' with cocoa:</p> <p>Triplochiton scleroxylon, Trichilia monadelpha, Cyclodiscus gabunensis, Rauvolfia vomitoria, Terminalia ivorensis, Ficus exasperata, Celtis mildbraedii, Antiaris toxicaria, Distemonanthus benthamianus, Khaya spp, Elaeis guineensis, Nesogordonia papaverifera, Mangifera indica, Cola gigantea, Milicia excelsa, Entandrophragma angolensis, Funtumia elastica, Pycnanthus angolensis and about 15 others¹</p> <p>'Bad Trees' generally:</p> <p>Cola gigantea, Pycnanthus angolensis and Terminalia superba²</p> |
|--|

Sources 1 From a preliminary survey carried out by the Cocoa Research Institute of Ghana amongst many farmers in various locations in Offinso District, Ashanti Region in 1992 (primarily in the MSNW zone, with the northern portion reaching into the DS zone). (Jones, 1993 pers comm)

2 From a study by Falconer of the importance of non-timber forest products in the rural economies of southern Ghana (various locations in Ashanti Region, primarily MS). (Falconer, 1992)

and is still spreading south. The disease thrives in heavy shade conditions, so the prescription is to remove shade trees. Felling of shade trees however stimulates the capsid problem so pesticide spraying is also needed and the overall expense is very high.

The CRIG position in general is that farmers have too many shade trees²⁹ and the recommended regime is of "medium shade" (25-30 trees/ha) with good maintenance and pesticide spraying (Adomako et al, 1987). However it is clear (and noted by CRIG staff), that in practice most farms host a much higher density of shade than this and apply only sparing and infrequent amounts of pesticide. It seems likely that in future, farmers will increasingly respond to recommendations to reduce shade density, particularly where *P. megacaria* is a problem. Research is however needed, both to develop low cost pest management and to discover the basis of what appears, at least in part, to be a disease limiting shade management strategy by farmers.

This information can be looked at in relation to the demands of the timber industry. Twenty timber species together constituted 1,132,075 m³ (92%) of the total 1,229,433 m³ officially extracted species from reserved and un-reserved areas in 1991. These top twenty species are listed in descending order of volume extracted in Table 9. The table

²⁹ The Head of the Agronomy Department at CRIG described 13-18 trees/ha as "low shade", 25-30 trees/ha "medium shade" and 30-38 trees/ha "high shade" (Osei-Bonsu, 1993 pers comm.)

also presents a 'top 20' species most prevalent on farms from all zones, derived from information in Nkyi (1989) and this study. Lastly a farmers' preference 'top 20' is included, derived from information in Nkyi (1989), Falconer (1992), from Jones (1993) and this study. The table is only indicative and should be treated with much caution. The tree prevalence and preference lists, in amalgamating all forest vegetation zones, mask the important differences between zones and the effects of farmer preference relative to the natural density of particular species. These two lists are also biased towards Ashanti Region, whereas the timber volume extracted originates from all areas.

The inventory, satellite and aerial survey work begun by the FD will provide much needed information about unreserved forest and tree resources in the coming years. Farmers clearly have opinions on a great many more tree species than are listed here. More study is needed on farmer decision-making and practice with regard to timber and non-timber trees. Some tentative conclusions can however be made on the information presented here:

- The future supply of many key timber species outside forest reserves may be very limited. Of the trees currently exploited most, only Ceiba pentandra (Onyina) is both common on farmlands in all forest zones and popular amongst farmers. Onyina is favoured mainly for its abundant and fast decaying litterfall which seems to improve the soil. Irvine (1960, quoted in Nkyi, 1989) reports that seeds of Onyina have a very good manurial value because of their high nitrogen, phosphorous and potassium content. The tree also provides suitable shade for a variety of crops. Its future as an economic species looks good. Terminalia superba (Ofram) is also relatively common and favoured although apparently less so in the MS zone.
- Triplochiton scleroxylon (Wawa) has consistently represented three to four tenths of all timber volume exploited in recent years and much of this comes from outside forest reserves. Indeed, forest products inspection data show that the vast majority of Wawa felled is currently from unreserved areas. Given its unique importance and medium prevalence, particularly in the MS and ME zones, the apparent dislike for Wawa by farmers should be of great concern to the timber industry. Particularly on food crop farms, the many lateral roots of Wawa lead to persistent dry soil around its base and low crop yields in the vicinity. It is slightly more suitable as a shade tree on cocoa farms although farmers generally disfavour it relative to other species. Those that are in favour generally emphasise the government's protection of the tree for timber and the possibility that the farmer himself will benefit from the timber, either by cutting it (illegally) himself or striking a deal with a chainsaw operator. The position of Wawa suggests that the time may be fast approaching when, unless farmers are given a positive incentive to look after them, there will be little successful regeneration of Wawa and other disliked timber species outside reserves.
- Milicia excelsa/regia (Odum) is also currently of crucial importance to the timber industry, but is relatively scarce on farmland in most areas, particularly in the DS zone where it is supposedly a characteristic dominant species in the natural forest.

Table 9: A comparison of the 'top 20' species: (a) logged; (b) prevalent on farms outside forest reserves; and (c) preferred by farmers in the high forest zone of Ghana. Listed in descending order. (Asterisks refer to a species' 'star' category - see notes below).

| (a) Logged in 1991 ¹ | (b) Prevalence on farms ² | (c) Farmers preference ³ |
|---------------------------------|--------------------------------------|-------------------------------------|
| ***Triplochiton scleroxylon | **Ceiba pentandra | **Ceiba pentandra |
| ***Milicia excelsa | * Alstonia boonei | Ficus capensis |
| ***Khaya spp. | * Albizia zygia | Spathodea campanulata |
| ***Entandophragma cylindricum | Ficus exasperata | ***Milicia excelsa |
| ***Pterygota macrocarpa | ***Triplochiton scleroxylon | * Albizia zygia |
| ***Entandophragma angolense | * Celtis mildbraedii | Ficus exasperata |
| **Ceiba pentandra | Ficus capensis | * Ricinodendron heudelotii |
| **Piptadeniastrum africanum | **Antiaris toxicaria | * Alstonia boonei |
| ***Aningeria spp. | * Terminalia superba | * Terminalia superba |
| * Terminalia superba | * Ricinodendron heudelotii | Bombax buonopozense |
| ***Tieghemella heckelii | Sterculia tringacantha | Sterculia tringacantha |
| * Pycnanthus angolensis | Funtumia elastica | Rauvolfia vomitoria |
| **Terminalia ivorensis | **Terminalia ivorensis | Zanthoxylum gillettii |
| ***Albizia ferruginea | * Nesogordonia papaverifera | ***Khaya spp. |
| ***Entandophragma utile | Cola gigantea | ***Entandophragma cylindricum |
| **Antiaris toxicaria | Rauvolfia vomitoria | **Antiaris toxicaria |
| ***Nauclea diderichii | * Pycnanthus angolensis | Trichilia monadelphica |
| **Afzelia africana | **Piptadeniastrum africanum | * Albizia adanthifolia |
| **Heritiera utilis | Spathodea campanulata | * Pycnanthus angolensis |
| **Lophira alata | * Albizia adanthifolia | **Terminalia ivorensis |

Notes: Hawthorne and Abu Juan (1993) developed a classification of species in trade, according to current harvest levels set against standing volume, as a sub-section of a larger classification of all forest plant species according to criteria of biological rarity. In this classification, each species is assigned a "Star" category based on its rarity in Ghana and internationally, with subsidiary consideration of the ecology and taxonomy of the species. Red Star species are of concern because of degree of exploitation. The Red Star species are further sub-divided into Scarlet Red, Normal Red and Pink Red in order of decreasing degree of exploitation relative to the standing crop. All Red Star species are at least relatively common in terms of biological rarity - indeed that is what allows them to become widely traded timber species. However, exploitation of Scarlet and Normal Red Star species may undermine their status as commodities. Green Star species follow the Red Star category; these are the species which are not currently in commercial trade and are of no particular conservation concern. Thus, in the table: *** Scarlet Red Star species; ** Normal Red Star species; * Pink Red Star species; the remaining species in the table are Green Star Species. The classification was revised by Wong (1994).

Sources:

- 1 Forests Product Inspection Bureau (FPiB) 1991.
- 2 Derived from information in Nkyi (1989) and this study.
- 3 Derived from information in Nkyi (1989), Falconer (1992), from A. Jones, Technical Cooperation Officer, Cocoa Research Institute of Ghana (pers comm.), and this study

The fact however that farmers favour Odum for its appropriate shade on cocoa and good mulching characteristics of its litterfall, lends support to the idea that some timber species would be actively nurtured by farmers if given the right incentive. Khaya sp. (Mahogany) and Entandophragma cylindricum (Sapele) are in a similar position.

- Of the remaining important timber trees the pattern seems to be of relative scarcity on farms and few positive characteristics from the farmer's viewpoint. Furthermore, a few species, Piptadeniastrum africanum (Dahoma) in particular, but also Terminalia ivorensis (Emire), Pycnanthus angolensis (Otie) and Entandophragma angolense (Edinam) are actively disliked.
- Albizia zygia (Okoro) and Alstonia booneii (Nyamedua) have been exported in small quantity in the past but are not currently significant species in Ghana's timber trade. Since they are both common and largely favoured by farmers in all zones however, there is great potential for a considerably higher sustainable yield from farm lands. Okoro produces much litterfall which provides good mulching material to enhance soil fertility. It is also a preferred firewood and fodder species and coppices well. Nyamedua improves the moisture levels in the soil within its vicinity by exudation from the leaves. It is also liked for its light and well-spread crown and narrow buttresses and for the large amounts of fast-decaying litterfall.
- In focusing on agroforestry systems which could improve shifting agriculture, a focus on some of the indigenous species which are well suited to shortening fallow phases may be productive. Okoro (and two others in the Albizia genus - A. adianthifolia Pampena and A. ferruginea Awiemfosamina), together with Funtumia elastica (Funtum), Sterculia trangacantha (Foto) and Ofram would all coppice freely if stumps are protected on the food farm, while planting other useful species before abandoning the farm to fallow would hasten woody regrowth, speed up soil restoration and alter the tree composition in the direction of more valued and productive species.

These pioneer species have a fast rate of growth and nutrient cycling through rapid turnover of leaves. The dominant Leguminosae family, many of which have the capacity to fix nitrogen in the soil, offer a great choice of woody species. In particular, the Albizia genus (especially Okoro which appears to predominate in many areas) could well provide good returns to a research effort designed at both farm and fallow tree regeneration improvement and long term farm-grown timber production.

- Attempts at finding timber markets for the currently un-utilised Nyankyerene Ficus exasperata, Odoma Ficus capensis and Wamma Ricinodendron heudeloti would also find support in the favourable ratings given by farmers. Nyankyerene is favoured on some farms for its litterfall, fodder and high quality firewood but is sometimes disliked in association with particular food crops and cocoa for its water retention capacity. Odoma and Wamma are considered suitable shade species for cocoa and are widely appreciated for the provision of litterfall and ability to improve soil moisture. Odoma also provides palatable fodder.

Timber Trees and Compensation for Logging Damage on Farms

Timber exploitation and the law regarding rights to trees are key determinants of the pattern of trees found on farms. The desire of farmers to abide by the law and protect all timber trees growing on their farms on behalf of the landowning stools is in proportion to the benefit they may receive or the penalty they may incur through doing or not doing so. In this study there was much variation between areas in perception of timber trees. In general however, the farmers in those areas in which a concession holder is, or has been, active tend to have more negative views about timber trees than those in areas where none has been active. In these areas individual chainsaw operators may be active with whom farmers can make more beneficial deals.

Villages with divisional chiefs of the landowning stool, such as Apoli and Mafia, are in a position to receive some benefits from timber concessions. Applications for concessions are sent by the FD (or until recently, for unreserved areas, the Lands Commission Secretariat) to the Chief for his comments. The applicant later obtains the signed consent of the chief and his elders. "Drink" of about ₵10-20,000 is provided by the applicant for this. The Chief will later expect his 10% share of the royalties when the concession starts operating. Some chiefs are quite active in protecting their interests:

"If the former chief saw that you had cut down timber trees he would threaten to take the land from you". - Cocoa farmer, Asuboi.

"The new chief hides things from the village. When the new contractor came (taking over the local off-reserve concession), there should have been a town meeting to decide what we want from her, but the chief made the arrangement directly without consultation." - Abusa farmer, Abonsuaso

Some concessionaires have been pressured into significant provision of assistance to villages. In Apoli for example, Birim Timbers (off-reserve concession holder) gave 50 bags of cement, ₵100,000 and some nails for the Junior Secondary School Workshop. Coppon Sawmills (concession holder in nearby Birim Forest Reserve) provided boards for the roofing. This was a one-off gesture however and typical of the ad hoc relationship between concessionaires and villages.

"The town has got nothing from the timber companies except the road, with its bad bridges, from Glikstens. The Chief may have got something at times but there has been no help with buildings or anything." - Secretary of Unit Committee, Mafia

Amongst farmers, views on logging companies generally range from ambivalence to antipathy:

"The last time Adjei (off-reserve concession holder) destroyed some cocoa of mine, I complained. He said that if I didn't take care he was going to have me imprisoned until the end of his concession." - Secretary of Farmers' Committee, Fureso

"Peprah (the off-reserve concession holder) doesn't pay any good compensation when he fells trees on our farms. He might pay €2-3,000 to fell a tree. This is against the agreement he made with us when he first came about 11 years ago. So now we try to destroy as many trees as we can before he can come to take them."
- Young farmer, Subriso

"The trees that are being felled now were not there originally but have grown up since we first made our farms. We have looked after them but sometimes the timber contractors make roads through our farm and don't even pay us compensation for the damage. They should pay for trees felled on a farm. We need to organise to fight against these acts by the contractors." - Old man, Subriso

Loggers frequently gain access to timber trees on farms without the consent of the farmer, cause destruction to crops and avoid payment of compensation. A timber tree brought down on a mature cocoa farm might damage 30 to 50 cocoa trees. Perhaps half of these will not produce for a year or two, but will recover, while the other half are destroyed. Farmers are generally more in favour of timber trees being felled on fallows or land being cleared for crops. Some concessionaires are able to accommodate this to some extent, but most want to log everything available in a particular area at one time.

Compensation paid per tree felled by off-reserve concession holders in the study sites ranged from: nothing in the past in Fureso and Mafia; up to a maximum of €5,000 in Subriso and Abonsuaso; up to €20,000 in Asuboi; and between €5,000 and €40,000 in Apoli. In Fureso the issue of compensation in the past has only been a strong issue with some farmers since many others are keen to get rid of most large trees no matter what is on the farm.

In general, the concessionaires were more likely to make compensation payments if the village had a stool chief than if the village had a caretaker chief or sub-chief (Odikro). The number of stool chiefs under a paramount chief depends on its particular history.

Most chainsaw operators (unlike off-reserve concessionaires) convert the trees they fell into lumber on the spot. The log extraction disturbance of the logger is not encountered in this case and the farmers are in a much better position to arrange compensation or some other payment since they can demand or confiscate some of the lumber. In some cases farmers actually 'sell' trees to the chainsaw operators.

"I am going to look for a chainsaw operator to fell some of the trees. I will not pay anybody for the trees, because it is on my farm and is my property, it is nothing to do with the Chief. I will make planks, the operator will get one third of the proceeds or planks, I will get one third myself and the remainder will pay for petrol and transport for the operator". - Pig-keeper, Mafia

The line between compensation for damage to trees or crops and the actual price for the timber trees is blurred in these instances. Farmers in the study villages generally received between €10,000 and €15,000 in cash or lumber when chainsaw operators felled on their farms, although a few received more where they were able to press their case that extensive damage was done to the farm.

Chainsaw operators based in the study villages (particularly in Abonsuaso) showed a mixed knowledge of the regulations regarding registration with District Assemblies and the FD, although all claimed that the machine owners were paying the appropriate royalties (although again there were differences as to which body this should be paid to). The following indicates the generally unhindered way in which chainsaw operators can work:

"Some of the Odum (the prime species for chainsaw operators in all sites) comes from farms but most comes from the forest reserve. It is more peaceful in the reserve, the farmers there are illegal anyway so you do not have to pay them. If you are unlucky you may get caught by the Forest Guard who will say you have stolen from government land and that you will be fined three times the C43,000 due for the tree. You have to see the Forest Guard about this." - Chainsaw operators from Asamankese, Abonsuaso

When asked questions about the conditions under which they would allow to grow or plant more trees on their farms, villagers had a variety of responses. Many however concluded that the trees they currently leave on cocoa farms are sufficient and any increase would cause them to suffer. Those in the WE and ME forest zones were particularly reluctant to countenance the possibility of more trees on their farms:

"There is a forest near here with plenty of trees for the government. There is nothing government can do to make us keep more trees on our farms. Even if I was given C20,000 to C50,000 per tree I would not want many in my young cocoa farm. When the cocoa trees are old and about to die I would be willing to have the existing trees felled and to allow more to grow or be planted. I think the other farmers would agree with me". - Chief Farmer, Fureso

In Mafia (ME zone), where farmers were specifically asked what type of incentive they would need to let more timber trees grow to maturity on their cocoa farms, answers were all in the form of cash payments at the time of felling - from C100,000 to C500,000 per tree. The reasons given were:

- in this wet area, the cocoa will suffer while the tree is there;
- many cocoa trees will be destroyed when the timber tree is felled; and,
- the hybrid cocoa, if well looked after, can be very productive over 20 to 30 years, so each cocoa tree is worth about C100,000. The area which the timber tree will affect and the damage it will cause on felling will cause a loss of more than C500,000 on a good cocoa farm.

'Willingness to accept' in the other villages also generally centred on the need for financial reward, although levels were more modest - C20,000 was a typical suggested figure for the amount a farmer should receive upon felling of a timber tree. There were various ideas as to whether this amount should be paid as a proportion of the royalty already levied, or a new fee payable directly from the logger/chainsaw operator to the farmer.

Trees on Farms - a Growing Concern

The resolution of the local debate about the 'willingness to accept' timber trees is intricately tied to the issue of tree tenure. For example, a group of farmers in Mankesim concluded that they would certainly be interested in planting more trees on their farms if they owned them themselves, but that at present all except fruit trees were only of benefit to government. Farmers in Apoli did not think that they would ever be permitted to own timber trees so were reluctant to do more than tolerate the ones needed for shade on cocoa.

As described in an earlier section, farmers have no formal rights to timber trees and receive negligible benefits from commercial timber utilization either in direct payments from loggers or indirectly from shares in the revenues. Recruitment by logging companies of local workers, contributions to community projects and provision of transport etc, varies widely but appears to be generally perceived in villages as of minimal benefit. Thus there is often a net disincentive to protect and nurture timber trees in that the costs to the farmer may not only include the 'bad' qualities of pest harbouring and competition with crops but also the eventual damage to crops from felling. These may far outweigh the benefits from tree products, 'good' qualities of shade, soil and microclimate functions and eventual compensation for felling damage.

It appears that farm tree species prevalence and farmer preference is at odds with the current commercial species demands of the timber industry. However, if tree tenure conditions can be weighted more in favour of farmers, there is considerable potential for species, currently abundant and strongly favoured by farmers, to provide a sustainable basis for supplying both external markets and for indigenous agroforestry use and local cash benefit. [These issues are beginning to be addressed through the 'Interim Measures', being implemented since July 1995, and legislative revisions under consideration - (see section 8).]

8. CONCLUSIONS AND WAYS FORWARD

Normative policies and laws notwithstanding, it appears that a range of groups with different interests and investments in the Ghanaian high forest zone can achieve working cooperation to the benefit of all parties, and the forest. The examples of past, present or suggested collaboration between communities, local institutions, foresters and timber harvesters can provide practical lessons and possibilities for further recognition and development of these forms of forest management.

Sharing loads and benefits

Some of these possibilities lie in forms of community forestry - whereby local government foresters and communities are given the formal go-ahead to build on some of the mutually beneficial, but until now officially disapproved of, working relationships which have developed. The Forestry Department (FD) in recent years has made an important start through establishment of the Rural Forestry Division and Collaborative

Forest Management Unit (CFMU). The latter became operational in 1993 with the broad aim to explore and develop the potential for local people to be involved in forest management.

[Since 1993, the CFMU has developed information and analysis in a range of areas, and has considerably strengthened the capacity of the FD to address local people's needs in forest management activities. The CFMU has also explored and developed various collaborative approaches in the management of both timber resources and NTFPs, and piloted the management of blocks of forest by landowning communities (FD, 1995a)]

Various ideas for participatory forest management - and the economic and institutional implications - are under discussion in Ghana. Given the high value of the forest resource, and the high impact, yet incomplete control, of the timber industry in the high forest zone, further investigation is needed of the possibilities which exist to build on nascent relationships with concession-holders and other timber harvesters.

In particular, the opportunity exists for development of forms of co-management which include the private sector. These include agreements, possibly developed to the level of contracts, between concession holders, forestry officers, landowners and village communities. These could be facilitated by district forestry offices and/or non-governmental organisations (Box 2).

The FD would have to enter into such sharing arrangements on an experimental basis initially. A number of key gaps exist in its capacity which institutional initiatives like the CFMU and Rural Forestry Division have begun to address, notably: staff trained to develop productive relationships with local communities; legal, economic and institutional expertise; the recognition and assessment of multiple benefit systems from forest reserves; and the research and development capacity to engineer such plans and agreements. There are also encouraging signs that sections of the forest industry is interested in the approach, and the likelihood is increasing that approval for such experimentation will be given at central government level.

[Plans for institutional reforms in the key agencies of the forest sector have been under discussion since 1994. The proposed reforms have major implications for FD capacity development and will be the subject of government initiatives with donor support from 1996 (FD, 1995b).]

Trees for farmers

In this paper we have described how legal restrictions on ownership and harvesting of trees created the very conditions they sought to prevent. Farmers who are not sure of their rights to trees will either harvest them quickly or neglect them. Farmers who see timber trees as a liability will not think twice before destroying them. While the government alone is the formal steward of forest resources, forest degradation is likely to remain rapid. Reluctance to involve the farmer on the grounds of conservation is unsupportable. Experience from a variety of locations shows that where ownership in the sense of rights to harvest and sell trees is secure, farmers plant more and harvest less than

BOX 2

Potential Benefits of Co-Management of Forests in Ghana

Forms of co-management could be based on firm understandings or agreements developed through negotiation between concession holders, forestry officers, landowners and village communities. These could be facilitated by district forestry offices and/or non-governmental organisations (FD/IIED, 1994).

At the village and concession level agreements might include provisions for:

- fire prevention;
- forest boundary protection;
- NTFP inventory by villagers;
- preferential rights to NTFPs for villages adjacent to forest reserves;
- village monitoring of concessionaires and chainsaw operators;
- payments to farmers for tree growing and protection;
- off reserve tree inventory;
- seed collection and tree planting on and off reserves;
- road building and maintenance;
- environmental audits;
- setting of local fees, fines and compensation levels.

Additional benefits to village communities from such agreements could include:

- strengthened or improved community institutions;
- timely and transparent timber royalty payments; and,
- enhanced employment opportunities.

Industry might benefit through:

- enhanced dialogue with government foresters and village communities;
- reduction of unfair competition;
- enhanced protection of the reserve timber resource (better boundaries, improved fire fighting, reduced agricultural conversion);
- enhanced fiscal benefits and access to additional resources consequent on favourable environmental audits; and,
- enhanced protection, growth and stocks of off-reserve timber.

The Forestry Department would also benefit from:

- reduction in onerous and often unsuccessful policing activities;
- improved planning and monitoring capability; and,
- improved capacity and operating resources.

expected (eg. Chambers and Leach, 1990; in Asia - Poffenburger, 1990; in Latin America - Cabarle, 1991; and in Zimbabwe - Nhira & Fortmann, 1993).

For those working the land outside reserves (as opposed to the traditional landowning authorities), the goal should be to assure full rights to timber trees. However, recognising that traditional authorities and local government will resist any suggestion that farmers might benefit at the expense of their royalty shares, interim solutions were proposed by the FD/IIED study. These included a farmer's right of refusal for timber tree felling; direct payments to farmers from concession holders and chainsaw operators at the time of felling; improved compensation for felling damage; and approval of felling plans by the District Forestry Offices before off reserve felling can take place at all.

[Following a process of broad-based consultation during 1994/95, measures have been introduced which reflect and develop these ideas. The 'Interim Measures to Control Illegal Timber Harvesting Outside Forest Reserves' include pre-felling inspection procedures (involving the FD, loggers and community representatives); the calculation of felling quotas, by the FD using the best information available, and their allocation to Districts; the issuing of felling permits by the FD; and the issue of Conveyance certificates by the FD after post-felling inspections. Another key feature is that farmers should have the right to decide whether and when timber trees can be felled on their farms. This enhances their ability to negotiate compensation agreements (FD, 1994; FD, 1995a; FD 1995b; Smith *et al* 1995).]

The institutional challenge

It is not simply a question of formal change in the tree tenure system however. 'The incentives to manage resources, under any tenure setting, are centred on management and institutional capacities, appropriate enabling frameworks and co-management between local and central authorities. It is a question of institutions, and the structures within which they operate rather than the tenure and title themselves' (Scoones & Matosé, 1993).

While the need for public participation in policy and planning processes is gaining increasing acceptance, the challenges may turn out to be greater at a local level. Traditional councils, stool chiefs and other vested interests will have to be part of the negotiating process or they will present major obstacles in the community. Weak community institutions themselves may slow progress to more concerted forms of organisation.

The organisational and institutional requirements for local forest management include strong catalytic leaders, management abilities for pro-active planning and administration, fair and impartial distribution of benefits, sound accrual of savings and productive reinvestment, and negotiation of outside political and financial support while retaining internal consensus.

Few forest areas can be 'handed back' to communities. Few, if any 'communities' are or will soon be equipped politically, financially and technically to manage large areas of forests on their own. Times have changed since they last had that responsibility. Yet the cases outlined here show in particular that considerable local knowledge exists and that

some foresters are ready to recognize and work with it. What is needed is courage from the government to sanction such work, and support for it over what will be a long haul.

The forest industry will need to accept a far greater responsibility for the resource if current predictions of the extinction rate of key economic species are to be averted. Industry's reliance on exploitative operations and quick returns can be curbed only by incentives and disincentives from both organised communities and government action. Both inspired government foresters and enlightened private sector investment need to be found.

Innovation behind the frontier

Amanor has described how farmers in his study area are responding to degradation in farm and fallow environments by increasing innovations. These innovations include a range of strategies involving increased use of regenerating tree species, particularly through managed pioneer fallow systems and indigenous agroforestry systems, which provide multiple products and soil enrichment (Amanor, 1994). In Guinea, Fairhead and Leach have shown how 'relic forest outliers' in the savannas of Kissidougou prefecture are not relics at all, but are gradually established and enriched around villages which were initially sited in savanna. They suggest that these forests are the product of settlement and active vegetation management (and tree planting) by inhabitants (Fairhead and Leach, forthcoming). Such studies need to be widely imitated since innovation and adaptation of this type is not widely recognised, especially by those in government. Together with the evidence of high interest in particular types of trees on farms described in this paper however, there are clearly exciting avenues for the development of approaches combining agriculture with timber and tree product production.

At state level, a key way forward is to move from a concern with maximising the production of particular commodities, such as cocoa and timber, in the country as a whole, to a focus on maximizing utilisation of the diversity of resources within localities in accordance with the needs of the producers. This would require serious commitment to more decentralised institutions with the capacity to support: regeneration of local economies; diversification of agricultural markets and products; participation of communities in local planning; and building on existing adaptive resource management systems.

Adaptive forest management, under locally evolved and enforced rules, is constantly evolving in Ghana. Increasingly, the Government is finding ways to facilitate rather than ignore the process. The trick will be to find the means for government to facilitate, provide technical information and guide the process to ensure that such local management will actually lead to sustainability. And to put the power of the state behind viable, locally generated regimes.

BOX 3

Building on Progress in Local Forest Management

Ghana has a head start on many countries in the pursuit of sustainable forest management. It has: a network of managed forest reserves; reasonably effective downstream controls on logging; vibrant community institutions; and, traditional and modern local government structures providing the means for signals to be sent both up to national levels and down to local levels.

Some positive processes of change have also been underway in the last few years in Ghana. In the following list, major sources of information on progress made are referred to in square brackets []:

- rationalisation and coordination of formal forest policy structures [MLF, 1994; Smith *et al.*, 1995]
- redistribution of tasks between the Forestry Department and the private sector [FD, 1995b]
- raising of forest fees and the introduction of differential log export levies on some timber species [work based on recent data suggests that log export bans on some species may still have a role (UK Forestry Commission, 1995)]
- increasing the operational effectiveness of the control of logging [FD, 1994; FD, 1995b]
- competitive concession allocation [discussion of a Bill to revise the Concession Act 1962]
- updating and revising the protected forest areas and the practice of fine-grained protection [Hawthorne and Abu-Juam, 1993; FIMP, 1994]
- experimentation with various forms of collaborative forest management between communities and the Forestry Department [FD, 1995a]
- discussion about timber trees on farmland [FD, 1994; FD, 1995a]

The above processes need sustained support. In addition, this study identified further policy options in 1993, some of which have been reflected in subsequent developments, which are again referred to in square brackets in the following list:

Policy process options

- Mechanisms be institutionalised for deepening participation in the review, formulation and implementation of policies which affect forests. Such mechanisms should be cross-sectoral, participatory, yet strategic. Various types of forum and discussion might be involved, which in combination would enable negotiation and decision-making amongst institutions and stakeholders across the "horizontal" spectrum (range of sectors and interests) and the "vertical" levels (national, regional, district and community). This would create more widely-owned policy processes, and thus policy outcomes that are integrated with other sectors, and workable in practice
- District level negotiation and agreements on shared rights and responsibilities - involving traditional councils, district assemblies, district forest offices, concessionaires and community representatives

...continued

Box 3 (continued)

- Adaptive local projects as learning vehicles for improving policies. These should involve concession-holders, chainsaw operators and non-governmental groups in addition to foresters and community institutions
- Environmental audits of forest management in concessions. Social criteria should be included in audits, as well as in concession allocation policy. Rewards (eg access to more concession areas, extension of concession tenure) and penalties (eg fines, withdrawal of concession tenure) should be linked to audit results. [This has been reflected in discussions about national standards for sustainable forest management, and the potential for forest certification schemes]
- Farmer rights to fees for timber trees on farmland [Addressed in part by the 'interim measures' (FD, 1994)]

Institutional options

- Improved management structures and employment conditions of government forest service. [Planning is in advanced stages for a major focus on institutional reform (FD, 1995b)]
- Coordination of downstream control structures and removal of unnecessary regulation and fees on forest industry
- Support capacity in government, private sector and communities for joint confidence, competence and interest to manage forests and forest resources over the long term. [Plans for institutional reform emphasise development of workable systems for management of the national forest estate, facilitative roles for foresters and devolvement of some productive roles to the private sector and NGOs]
- Realistic sanctions and effective enforcement by foresters and the judicial system [Plans for a new consolidated forest laws are under consideration]
- Compensation to farmers for farm damage from logging, enforced on a district basis [Addressed in part by the 'interim measures' (FD, 1994)]

Community involvement

- Farmer and village institutions develop role in monitoring of logging and independent chainsaw operators. [Addressed in part by the 'interim measures' (FD, 1994)]
- Village meetings to discuss, formulate and approve felling plans for local concessions, with the attendance of the district forest office. [Addressed in part by the 'interim measures' (FD, 1994)]
- NTFPs in forest reserves managed by communities [FD, 1995a]
- Co-management of forests at village and concession level in forest reserves and unreserved areas, between concessionaires, district forest offices and communities (see text)

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APPENDIX

SELECTED HIGH FOREST TREE SPECIES OF GHANA

| <u>LATIN NAME</u> | <u>LOCAL NAME</u> | <u>ALTERNATIVE NAMES</u> |
|---------------------------------|-------------------|--------------------------------------|
| | BAKUNINI | |
| ** Afrosorsalisia afzelii | PAPAO | Apa, Apal, Afzelia |
| * Afzelia bella/africana | PAMPENA | |
| *** Albizia adianthifolia | AWIEMFOSAMINA | |
| *** Albizia ferruginea | oKORA-AKOA | |
| * Albizia glaberrima | oKORO | Atanza |
| * Albizia zygia | SINURO | |
| * Alstonia boonei | YAYA | Lati |
| * Amphinas pterocarpoides | ASANFINA | Asamfona |
| *** Aningeria spp. | KoKoTE | |
| * Anopyxis klaineana | KYEN-KYEN | Ako |
| ** Antiaris toxicaria | APROKUMA | |
| ** Antrocaryon nigraster | KROBODUA | |
| * Balanites wilsoniana | KWATAFOMPABOA | Tetekon, Limbali |
| * Blighia spp | AKYE | |
| ** Bombax brevicauspe | ONYINAKoBEN | West African Bombax |
| * Bombax buonopozense | AKONKODIE | Akata |
| Bussea occidentalis | KOTORePre | |
| Calpocalyx brevibracteatus | ATROTRe | |
| ** Canarium schwinfurthii | BEDIWOMUA | Aile |
| *** Ceiba pentandra | ONYINA | Fromoger |
| Celtis adolfi-friderici | ESAKOSUA | |
| * Celtis mildbraedii/zenkeri | ESA | Ohia, Akosika, Chia |
| Celtis wightii | PREMPRESA | |
| Chidlwia sanguinea | ABABIMA | |
| ** Chrysophilum giganteum | AKASAA | Adasema, Akatio |
| /subnundun/albidum | | |
| ** Chrysophyllum perpulchrum | ATABENE | |
| ** Chrysophyllum pruniforme | DUATADWE | |
| Cleistopholis pateas | NGONENKYENE | |
| Cola gigantea | WATAPUO | |
| Copaifera salikounda | ENTEDUA | Bubinga |
| Cordia nilenii/platythyrsa | TWENEBOA | |
| * Coryanthe pachyceras | PAMPENAMA | |
| Coula edulis | BoDWUE | |
| * Cylicodiscus gabunensis | DENYAo | Okan |
| * Cynometra ananta | ANANTA | |
| Dacryodes klaineana | ADWEA | |
| **** Daniellia ogea/thurifera | HYEDUA | Sopi, Faro, Gun/Niger, Copal |
| * Dialium aubrevillei | DUABANKYE | |
| Diopyros sanza-ninika | SANZA-MULIKA | Kusibiri, African Ebony, Flintark |
| ** Distenonanthus benthanianus | BONSAMDUA | Avan, Movingui |
| Duboscia viridiflora | AKOKORAGYEHINI | |
| **** Entandophragma angolense | EDINAM | Gedunohor, Tiana |
| ** Entandophragma candollei | PENKWA-AKOA | Onu, Kossipo, Ceda-Kokote |
| **** Entandophragma cylindricum | PENKWA | Sapele |
| **** Entandophragma utile | EFOoBRODEDWO | Utile, Sipo |

| | | |
|--------------------------------------|----------------|----------------------------------|
| * Erythrophleum spp. | PoTRoDOM | oDon, Missanda, Tali |
| Erthoxylum anaii | PEPEANINI | |
| Ficus spp (non-stranglers) | DOMINI | |
| Ficus capensis | ODOMA | |
| Ficus exasperata | NYANKYERENE | Domini |
| Funtumia elastica | FUNTUM | |
| Gibertiodendron spp. | TETEKON | |
| ** Guarea cedrata | KWABOHORO | Scented Guarea, Bosse |
| *** Guarea thompsonii | KWADWUMA | Black Guarea, Bosse |
| **** Guibortia ehie | ANOKYE-HYEDUA | Black Hyedua, Anazakoue, Ovangol |
| Hannaia klaineana | FOTIE | |
| ** Heretiera utilis | NYANKOM | Niangon |
| Hezalobus crispiflorus | DUABAHA | |
| * Holoptelea grandis | NAKWA | |
| Honalium letestui | ESONONANKOROMA | |
| Honalium stipulaceum /dewev. | oWEBIRIBI | |
| Irvingia gabonensis | ABESEBUO | |
| *** Khaya spp. | | Mahogany |
| **** Khaya anthotheca/ grandifoliola | KRUMBEN | African Mahogany, Akajou |
| **** Khaya ivorensis | DUBINI | Mahogany |
| * Klaindixa gabonensis | KROMA | |
| * Lannea welwitschii | KUMANINI | |
| Lonchocarpus sericeus | SANTE | |
| ** Lophira alata | KAKU | Ekki, Azobe |
| ** Lovoia trichilioides | DUBINIBIRI | African Walnut |
| * Mammecia africana | BOMPAGYA | Pegya |
| ** Mansonia altissima | OPRONO | Mansonia, Bete |
| Maranthes spp | AFAM etc. | |
| Margaritaria discoidea | PEPEA | |
| **** Milicia excelsa/regia | ODUM | Iroko, Chlorophora |
| Mitragyna ciliata/stipulosa | SUBAHA | Abura, Bahai |
| Monodora nyristica | WEDEABA | |
| * Morus mesozygia | WoNTon | |
| **** Nauclea diderrichii | KUSIA | Opepe, Bilinga |
| * Nesogordonia papaverifera | DANTA | Kotibe |
| * Ongokea gore | BODWE | |
| Pachypodanthium staudtii | KUMDWIE | |
| Panda oleosa | KOKROBOBA | |
| * Parinari exelsa | AFAM | |
| * Parkia bicolor | ASOMA | |
| Parkia filicoidea | ASOMA-NUA | |
| Pentaclethra macrophylla | ATAA | |
| **** Pericopsis elata | KOKRODUA | Afrommosia, Asanela |
| * Petersianthus macrocarpus | ESIA | |
| Phyllocosnus africanus | AKoKORABEDITOA | |
| ** Piptadeniastrum africanum | DAHOMA | Dabema |
| Protomegaharia stapfiana | AGYAHERE | |
| Pseudospondias microcarpa | KATAWANI | |
| Pteleopsis hylodendron | KWAE-KANE | |
| **** Pterygota macrocarpa | KYEREYE | Koto |
| * Pycnanthus angolensis | OTIE | Illomba |
| Rauvolfia vomitoria | KAKAPENPEN | |
| * Ricinodendron heudelotii | WAMA | |
| Scottellia klaineana | TIABUTUO | |

| | | | |
|-----|-------------------------------|-------------------------------------|----------------------|
| | Spathodea campanulata | KOKONISUO | Spathodea |
| | Sterculia oblonga | oHAA | |
| * | Sterculia rhinopetala | WAWABIMA | |
| | Sterculia tragacantha | SOFO | |
| | Stereospermum acuminatissimum | ESONO-TOKWAKOFUO | |
| * | Strombosia glaucescens | AFEMA | |
| | Tabernaeanontana spp. | oBANAWA | |
| | Talbotiella gentii | TAKOROWANUA | |
| ** | Terminalia ivorensis | EMIRE | Idigbo, Framire |
| * | Terminalia superba | oFRAM | Afara |
| *** | Tieghemella heckelii | BAKU | Makore, Bakure |
| | Treculia africana | BR _e BR _e TIM | |
| | Trichilia monadelpha | TANDURO | |
| | Trichilia prieuriana | KAKADIKURO | |
| * | Trichilia tesamanii | TANURONINI | |
| | Trilepisium madagascariense | OKURE | |
| *** | Triplochiton scleroxylon | WAWA | Obeche, Sanha, Ayous |
| * | Turraeanthus africanus | APAPAYE | Avodire |
| | Uapaca guineensis | KONTAN | |
| | Xylia evansii | ABOBABEMA | |
| | Zanthoxylum spp | OYAA/OKUO | |

Notes:

- *** Scarlet Red Star species
 - ** Normal Red Star species
 - * Pink Red Star species
- remaining species in the table are Green Star Species

This classification, developed by Hawthorne and Abu Juam (1993) and revised by Wong (1994), is of species in trade, according to current harvest levels set against standing volume, as a sub-section of a larger classification of all forest plant species according to criteria of biological rarity. In this classification, each species is assigned a "Star" category based on its rarity in Ghana and internationally, with subsidiary consideration of the ecology and taxonomy of the species. Red Star species are of concern because of degree of exploitation. The Red Star species are further sub-divided into Scarlet Red, Normal Red and Pink Red in order of decreasing degree of exploitation relative to the standing crop. All Red Star species are at least relatively common in terms of biological rarity - indeed that is what allows them to become widely traded timber species. However, exploitation of Scarlet and Normal Red Star species may undermine their status as commodities. Green Star species follow the Red Star category; these are the species which are not currently in commercial trade and are of no particular conservation concern.

Other non-high forest species mentioned in the text:

| | |
|------------------|--------------|
| Citrus sinensis | Orange |
| Mangifera indica | Mango |
| Persea americana | Avocado pear |

IIED's Forestry and Land Use Programme

The Programme addresses needs for productivity, sustainability and equity in forestry and land use. Its research and capacity-strengthening work focuses at the national level in developing countries. It involves:

- **policy processes:** supporting participation of multiple interests in policy analysis, formulation and monitoring
- **sustainability assessment** of forest management and use
- **capacity development** of governments, NGOs and communities for sustainable forest management
- **the development and monitoring of incentives** for sustainable forest management.

Forestry and Land Use Programme
International Institute for Environment & Development
3 Endsleigh Street
London WC1H 0DD
UK
Tel: +44 171 388 2117
Fax: +44 171 388 2826
Email: liedforestry@gh.apc.org