Environmental policies and livelihoods in the forest margins of southern Ghana

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Abbreviations used

AR	Ashanti Region
BAR	Brong-Ahafo Region
Cedi	Ghana's currency. In 2001, during the survey, US$1 = Cedis 7,000.
CFC	Community Forest Committee
CFMC	Community Forestry Management Committee
CFMU	Collaborative Forest Management Unit, RMSC, FSD
CR	Central Region
CREMA	Community Resource Management Area
CRI	Crops Research Institute
CSIR	Council for Scientific and Industrial Research
DA	District Assembly
DEMC	District Environmental Management Committee
DFO	District Forest Officer
EC	Emulsifiable concentrate
EPA	Environmental Protection Agency
ER	Eastern Region
FC	Forestry Commission
FD	Forestry Department
FORUM	Forest Resources Utilisation and Management
FSD	Forest Services Division, FC
GACON	Ghana Association for Conservation of Nature
GSBA	Globally Significant Biodiversity Area
ha	Hectare
HFBAG	High Forest Biodiversity Advice Group
ITTO	International Tropical Timber Organisation
k	Thousand
LI	Legislative Instrument
ME	Ministry of Energy
MEST	Ministry of Environment, Science and Technology — now the Ministry of Environment and Science
MLF	Ministry of Lands and Forestry (and Mines)
MLGRD	Ministry of Local Government and Rural Development
MoFA	Ministry of Food and Agriculture
NEAP	National Environmental Action Plan
NGO	Non-Governmental Organisation

NRMP	Natural Resources Management Programme
NTFP	Non-Timber Forest Products
PAMAB	Protected Area Management Advisory Board
RMSC	Resource Management Support Centre, FSD
RUDEYA	Rural Development Youth Association
SRA	Social Responsibility Agreement
TUC	Timber Utilization Contract
ULV	Ultra low volume
WR	Western Region

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Summary

Introduction

The research project, *'Environmental policies and livelihoods in the forest margins of Brazil and Ghana'* commissioned by the UK Department for International Development (DFID) aimed to investigate the effect of natural resource policies on the livelihoods of forest margin dwellers in eastern Amazonia, Brazil and southern Ghana.

The objectives of the research were:

- To identify and interpret the linkages between current environmental policies being implemented in the forest-agriculture interface (FAI) and local livelihoods, in Brazil and Ghana.
- To derive lessons and guidelines for policy makers in Brazil and Ghana, as well as for those in DFID and other countries

This reports concerns the work in Ghana, based on field work in four communities of Ashanti and Brong-Ahafo Regions carried out in 2000 and 2001.

Research carried out

Information on policies was gathered through a review of existing documents and interviews with policy-makers and implementers in the key government agencies at national, regional and district levels.

To assess the livelihoods of forest-margin dwellers, an initial reconnaissance was carried out in three villages of Ashanti and Brong-Ahafo Regions, namely Aboabo No. 2, Adansi East District, Adiembra Nkwanta, Ejura-Sekyedumasi District, and Botenso, Wenchi District. This identified four activities as being particularly vulnerable to the effects of environmental policies — carpentry, chain-saw operating, charcoal making, and irrigated vegetable production.

Following that, a more detailed and formal survey of fifty-five households involved in the four occupations was conducted in the three villages already studied plus Tanoso, Techiman District — selected for its involvement in irrigated vegetable production.

In addition, an evaluation of a pilot programme of Community Forest Committees in the Districts of Dunkwa, Offinso and Nkoranza was commissioned, and carried out by the Collaborative Forest Management Unit.

The main findings of this research now follow.

Policy for natural resources in the forest margins of southern Ghana

There is no shortage of policy that aims to exercise stewardship of resources on behalf of society as a whole, both to stimulate human development and to conserve the environment. For example, as concerns the forested areas of southern Ghana, the country has policies for forestry protection and sustainable logging. It has measures to conserve wildlife and biodiversity. There are rules and regulations governing land use, such as burning and cultivation close to water courses. And there are policies governing the safe use of pesticides and water pollution.

Despite the wide range of policy objectives for environmental conservation, when policy is considered in terms of means, and above all, in terms of effective implementation, those policies that have an impact at field level are relatively few. This is because there are only a few agencies that have the staff and resources to implement policy, the main agency being the Forestry Commission. Indeed, with only a little simplification, it seems that just two areas of policy have substantial impact at field level.

One concerns commercial forestry. Much attention and effort has been directed to most aspects affecting the commercial timber industry, from the designation of forest reserves, to the allocation of timber contracts, and to monitoring and controlling the cutting, transport and sawing of logs. A large fraction of the resources of the Forestry Commission is devoted to these tasks.

The other area concerns local rules on resource use, such as those on bush burning, protection of river banks, and the use of dead wood to make charcoal. These may be incorporated in national policy statements, but most of them also reflect local concerns and local codes of practice. National declarations of intent aside, few if any additional resources are provided by central government to develop such codes or to implement them. They are left as matters for the District Assemblies. These bodies lack staff and budgets to enforce District by-laws and so depend mainly on the efforts of Unit Committees and other village bodies.

There appears to be widespread popular consent within villages to such rules, but in practice they are often breached whenever economic imperatives bind. Thus, for example, when vegetable producers need to irrigate their crops by hand, they often cultivate on river banks. Charcoal producers may use dead wood when readily available, but in the absence of this, they use live wood. When land needs to be cleared, the bush may be burnt without the necessary safeguards and precautions.

Some measures for forest protection, such as the ban on use of chainsaws to cur lumber, are also often ignored when they conflict with economic priorities.

Despite frequent pronouncements during the 1990s in favour of local participation in making policy affecting the use of natural resources, as seen, for example, in the 1994 Forest & Wildlife Policy, policy-making for the environment in southern Ghana remains highly centralised. The announced and intended moves towards local community engagement have been tentative. Communities may have the right to be consulted, and to be compensated for their stewardship of resources, but they are not given clear, priority rights over those resources. Actual implementation of these restricted forms of participation has been even more limited. Social Responsibility Agreements that represent the result of negotiations between loggers and those living in and close to the forests, it seems, continue to be drawn up largely out of sight of most of the rural population.

Central government still makes policy by declaration with little if any consultation. An example of this is the 1998 ban on chainsawing for commercial lumber, announced suddenly and with apparently no reference to the spirit of participation set out in the 1994 Policy.

Livelihoods in the forest margins

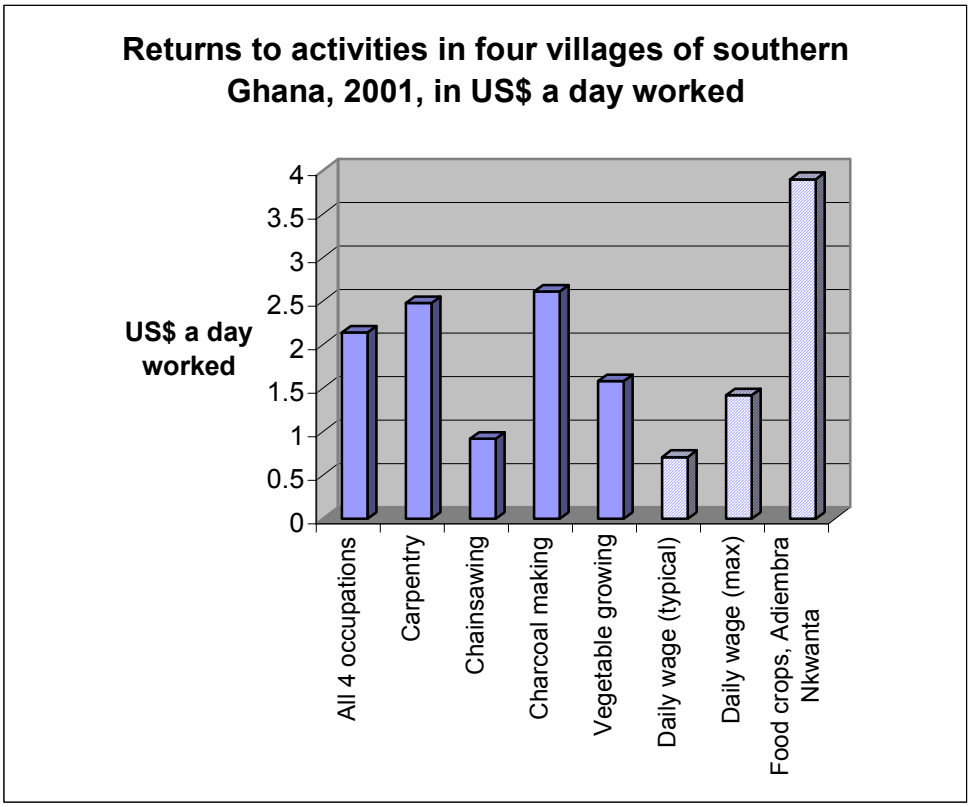
In the forest margins, livelihoods are built almost entirely on the use of local natural resources in farming, forestry, charcoal production, and hunting and gathering. Other activities were carried out either infrequently or else occupied only a small amount of time. Surprisingly slight involvement in labouring on other farms and in other occupations was found.

The key occupations that appear vulnerable to current environmental policies are carpentry, chainsaw operations, charcoal burning, and irrigated vegetable growing. In the four villages surveyed there was widespread involvement in one or other of these occupations, especially by settlers from the north, with almost half the households undertaking them.

That said, for most households, these occupations took up only a fraction of their labour time. There are some signs that the young tended to be more engaged than the older cohorts and that men depend on these jobs more than women do.

Returns to the four key occupations varied greatly, see Figure below, but with a median return of ¢15,000 a day [US$2.15], these compared reasonably well to other possibilities. They were for the most part better than daily wage rates in the villages, and not far short of

the estimated returns to growing food crops seen in the case of one village. Above all, the four occupations do not seem to be so badly rewarded as to be occupations of last resort.



Looking at the impact of environmental policy on these and other activities, there were mixed reports as shown in the following table.

Impacts on livelihoods of environmental policies

Affected occupations	**Policy and impact** **[Village in question in parentheses: AA=Aboabo AN=Adiembra Nkwanta BO=Botenso TO=Tanoso]**
	Ban on chainsawing for timber
Chain saw operators	Some lost income as services no longer required; some operators moved into farming while others have emigrated. Loss of income reduces capital for farming. But chainsaws still much used for cutting timber and lumber. [AA] Chainsawing of timber and lumber apparently ceased in TO.
Wood carriers	Lost wages from transporting sawn timber from fields to assembly points. [AA]
Sawn wood dealers	Lost income from reduced sales [AA]
Carpenters	Lack of sawn wood drives up price for furniture, doors, window frames — and hence: Less demand for construction works (new buildings), less demand for furniture [AA] In TO, carpenters have moved from using bush-cut lumber to sawmill wood (often rejects).
Masons	Less demand for services as mud houses (the most common) unable to stand rains for long without roofing; less people building because of higher

	prices for roofing timber [AA]
Charcoal makers	Production cut drastically, incomes down, as left-overs from felled trees no longer available for charcoal production. [AA] Little impact: chainsaw operators from Ejura visit to fell trees. [AN] Little impact: only 2 men so employed. [BO] Overall, reports that wood is increasingly difficult to find and that live wood is used.
Consumers of timber (Building, furniture)	Higher prices for products [AA]
	Bush fire controls
Farmers	Loss of crops prevented [AA], [AN], [BO] Improved soil fertility through organic matter conservation [AA], [AN], [BO]
Hunters	Less game caught since setting of fire makes catches easier (little adverse impact — few hunters and bullets also very expensive) [AA]
	Riverain protection
Farmers	[Farmers with fields by rivers] Little impact [AA] Little impact: a traditional practice [AN], [BO]
	Safe use of pesticides
Vegetable producers	Little impact — few people, no knowledge [AA] Little impact: follow old practices, no education [AN], [BO], [TO]
	Confinement of livestock
Livestock keepers	Little impact — livestock not important [AA], [BO] Little impact: livestock not contained [AN]

Source: Initial reconnaissance, survey data

Although the impacts reported were diverse, most policies had not had a substantial impact, with the exception of the 1998 ban on using chainsaws to cut commercial lumber. But even this measure seems to have had only a short-lived impact in reducing jobs in chainsawing and portering, and in pushing up the price of lumber and timber in the domestic market, to the detriment of carpenters and their customers. Subsequently, the evidence suggests that chainsawing continues where it is an essential component of rural livelihoods — as in the cases of cutting trees for carpentry lumber in Aboabo or in sawing timber to be made into charcoal in Adiembra Nkwanta. This pattern of continuity in defiance of policy seems reflected in the wider economy: supplies of chainsaw lumber carry on flowing to rural economies and the national market at volumes similar to those preceding the ban.

Hence the main finding in this study is that environmental policy has not had much impact on livelihoods in the forest margin communities, largely since so little policy is effectively and consistently implemented or enforced.

Conclusions

Does it matter what the impacts of environmental policy may be, when the policy is barely implemented at village level? It does, for the following reasons.

First, while policy is on the books but not enforced, it brings policy and government into disrepute. Moreover, although there may be widespread flouting of regulations, there will always be a legal basis to short-lived 'campaigns' of enforcement, drawing on government officers, police and security forces. Such are likely to be ineffective in the long term, socially inequitable, successful only in creating uncertainty and opportunities for corruption.

Second, there is a need for effective environmental policy. Without policy to safeguard the wider interests of society, valuable natural resources can be squandered to no great economic

gain and still less social equity. The issues are unlikely to go away as population builds up and, we hope, the economy grows. Policy is needed to deal with the issues. Moreover, policy formulation and implementation may be something that society needs to practice, to develop capacity. Put simply, if we cannot make some progress towards resolving today's environmental problems, what chance will there be of tackling the challenges of the future?

Third, since livelihoods in the forest margins depend so heavily on the use of local natural resources, they are vulnerable to changes in the environment and in environmental policy. Environmental policy thus matters, in both sustaining the resource base for rural livelihoods and in not riding roughshod over the livelihoods of local people. With regard to the latter, if restrictions on chainsaws, cultivation of riverine plots, and control of pesticides were rigorously applied, then the impact could be strong.

If then policy for managing the rural environment matters, there is a need to improve policy-making and its implementation. Making policy centrally, without popular consent, will always be extremely costly in staff and operating budgets. Given the lack of knowledge about the changes and processes in the environment of southern Ghana; even less knowledge of the impacts on livelihoods; and the absence of information on the preferences that local people might express on the balance between threats to the environment and their livelihoods — the chances of making good policy for local management of natural resources at central level is low.

The challenge, then, lies in decentralising policy processes and encouraging wider participation. The advantages of this are that it makes fuller use of local knowledge and insights, allows policy to be more flexible to local needs, is likely to avoid making big mistakes, and is less likely to ignore impacts on the livelihoods of those living in the rural areas. It also enhances local capacity for decision-making and is likely to make local feel that they 'own' the decisions made.

On other hand, it can lead to incoherent and uncoordinated policy and to policy made in almost complete absence of any accurate information and without the benefits of professional analysis. It may also lead to policy that represents the interests of local elites alone or those of the majority but without respect for the interests of minorities. It may allow policy to be populist but taking little account of wider realities.

There is clearly a delicate balance between centralised and decentralised policy making and implementation to be struck. At the moment, however, the balance is clearly in favour of the centre. Hence some shift towards a more decentralised and participatory approach should yield benefits.

Simple and clear models for doing this are not evident, so that a learning process is indicated. Signposts for this include:

a) The District Environmental Management Committees are moribund. They have a role to play in a more decentralised model: they need revitalising, including granting them legal recognition. They also need to be provided with resources. One possibility would be to allocate to them a percentage of stumpage fees on timber cut in the District.

b) The Community Forest Committees reviewed hold promise as policy forums and agents. But what is their role? Their prime role should be concerned with policy — that is, setting the local rules for the use of resources, rather than with operations such as running tree nurseries. And should the committees only be concerned with forests, or should they consider all local natural resources? Surely their remit should be widened. The CFCs might be institutionalised by becoming sub-committees of the already existing Unit Committees.

c) For those bodies that should represent the wider interests of society, including those of the marginalized and disadvantaged, the proposal made to adopt a '*livelihoods*

precautionary principle' — that when environmental policy may threaten livelihoods, then the presumption should caution against such policy — has much to recommend it.

d) If local actors are to have a voice in debates on the rural environment, and a stake in the outcomes of such debates, they need secure rights to the natural resources that sustain their livelihoods. At present most forest margin dwellers have access to the natural resources they need to carry out their preferred occupations. But those rights, often conferred by custom rather than law, could be lost if a centralised state decides to use its powers to clarify and simplify rights — in the belief that this will stimulate private enterprise and economic efficiency.

One *Introduction*

This research project, *'Environmental policies and livelihoods in the forest margins of Brazil and Ghana'* commissioned by the UK Department for International Development (DFID) through the Natural Resources Systems Programme of the Renewable Natural Resources programme, aimed to investigate the effect of natural resource policies on the livelihoods of forest margin dwellers in eastern Amazonia, Brazil and southern Ghana.

The objectives of the research were:

- To identify and interpret the linkages between current environmental policies being implemented in the forest-agriculture interface (FAI) and local livelihoods, in Brazil and Ghana.
- To derive lessons and guidelines for policy makers in Brazil and Ghana, as well as for those in DFID and other countries

To achieve these ends, field research was carried out in selected areas of eastern Amazonia, Brazil and of southern Ghana. Environmental policies affecting local livelihoods were documented. Surveys of varying degrees of formality were carried out to establish the main livelihoods of people living in the forest margins in the study areas, and to examine the impacts of environmental policies on key livelihood activities. The published literature on environmental policy and its effects on livelihoods on similar zones in other selected countries was reviewed to complement the field work.

The project began in April 2000 and ended in April 2002. It was implemented through the University of Reading in the UK in partnership with local research bodies, namely the *Crops Research Institute (CRI)* of the Council for Scientific and Industrial Research (CSIR) in Ghana, and *Programa Pobreza e Meio Ambiente na Amazonia: Poverty and Environment in Amazonia Programme (POEMA)* in Brazil.

This report deals with the work carried out in Ghana.

Field research in southern Ghana: Methodology

Objectives

The objectives of this phase were the following:

1. To identify the main economic activities undertaken by those living in or close to the forests of southern Ghana;
2. To identify constraints associated with such activities;
3. To identify how these activities impact on the environment;
4. To test the awareness or otherwise of local people of national and community level environmental policies and their level of enforcement and compliance; and,
5. To identify key livelihoods affected by such policies especially among the rural poor.

Methods

Participatory rural appraisal techniques in three communities

1. Selection of villages

To meet the objectives set out above, the following criteria were initially set for the selection of villages.

i) Settlements should be close to substantial areas of forest (close means 2 km, and substantial area implies at least 10 km^2 of forest)

ii) At least half the land area should be under primary or secondary forest

iii) Settlements should have a substantial number of households.

iv) The settlements should differ in terms of physical condition or market (road) access.

The locations were selected from among a list of possible villages identified on the basis of personal knowledge, reports of past studies, and maps. This was followed up with field visits to the identified communities to gather information that would help determine the suitability or otherwise of the communities for the study.

The settlements selected for the study were the following:

i) Aboabo No.2, in the Adansi East district of Ashanti Region

ii) Adiembra – Nkwanta in the Ejura – Sekyedumasi district of the Ashanti Region

iii) Botenso, in the Wenchi district of Brong-Ahafo Region

2. Interviewing procedure

The team was made up of six researchers comprising two agricultural economists, a rural sociologist and three agronomists used participatory rural appraisal (PRA) techniques to collect information during the period August-September 2000. A total of four days were spent in each community using a combination of methods including key informant interviews, focused group discussions, transact walk and mapping of physical resources and facilities.

The activities included a preliminary visit to meet with chiefs and other community leaders to confirm the appropriateness or otherwise of the community for the study and also book appointment for the actual study. The second day focused on PRA exercises like drawing of village map, transact walks, history of community and identification of main occupations by community inhabitants. This information was then used to disaggregate communities into various groups on the basis of factors such as gender, ownership of land, and occupations/livelihoods. The two other days involved focused group discussions and key informant interviews. At this stage, the team was divided into three, with each team made up of a social scientist and an agronomist.

One team visited the District Assembly and other relevant departments (Forestry Service, Ministry of Food and Agriculture) at the district capital on the final day. This was to enable the team to obtain information on the role of district departments in environmental policies.

Census of household composition and occupations

A census of all the households within the selected communities to identify the structure and composition of households, and the livelihoods engaged in by the household members. This was to provide quantitative measure of the importance of the environmentally sensitive occupations in the general livelihoods of the people.

A one-page questionnaire was designed to be completed for each household in the community. Teachers and assemblymen were used for the purpose. This had the advantage of reducing cost as well as achieving complete coverage by virtue of these enumerators residing within the communities.

One additional location, Tanoso-Techiman, was added to the list of communities at this stage because of the bias in favour of communities dominated by settlers (two out of the three) from the original selection. Only the western half of the village was covered for this location because of its relative vastness.

Formal survey of households involved in each of the key livelihood activities identified

A sample of households stratified on the basis of the four key livelihoods that are expected to have environmental policies impacting on, were selected from the four communities.

The target was to cover 15 households for each of these livelihoods. The number of households for each livelihood selected in each village was to be in proportion to the total number of households engaged in the respective livelihood in each village. However, it was difficult getting enough chainsaw operators to be interviewed. This was due to the tag of chainsaw operation being an "illegal activity", although the possession of a chainsaw is not necessarily illegal.

The number of households covered for each livelihood in each community was as follows.

Table 1.1: Households surveyed in the four study villages

	Carpentry	*Chainsaw operation*	*Charcoal production*	*Vegetable production*	*All livelihoods*
Aboabo No. 2	8	4	-	3	15
Adiembra-Nkwanta	-	-	16	-	16
Botenso	1	-	1	7	9
Tanoso-Techiman	5	5	-	5	15
All locations	***14***	***9***	***17***	***15***	***55***

This report

The rest of this report consists of five chapters. The second chapter reviews the published literature on livelihoods and the environment in southern Ghana. Following that, the policies devised and implemented are set out. Chapter Four reports on the village studies — the general characteristics of the four communities and the findings of the more detailed household survey. This is followed by an overview of community forest committees as an example of community level action on environmental policy that impacts on livelihoods. The final Chapter presents conclusions and sets out the implications for policy.

Two *Ghana: Literature on environmental policy in the forest margins*

Formally published literature on the environment in southern Ghana[1] may be divided by topic as follows:

- Interactions between rural people and their environment;
- Access to land and property rights to natural resources;
- Surveys of livelihoods that either depend on the environment or that have an environmental impact or both ;
- Forestry and forest policy studies; and,
- Other reviews of environmental policy in rural Ghana.

Before reviewing this literature, a few notes appear on the context of southern Ghana.

The context of environmental policy and livelihoods in southern Ghana

In the south of Ghana, forest and woodland is so prevalent that the history and economy of the region is one of life in the forest and its margins. The long-standing human settlement has been established around the use of forests for gathering, hunting and farming. That said, since the last quarter of the 19th century there has been increasing clearance of the forests,[2] for two reasons.

On the one hand, during the 20th century the population of southern Ghana increased by as much as ten times. Although some of that population increase has been absorbed by urbanisation, rural populations have risen and with that has come clearing of the forest for the production of food crops. Fields and secondary forest have come under increasingly frequent use and fallows have shortened. In some cases this has led to lower soil fertility and declining yields. Gyasi et al. (1995) document, with regret, these processes in Yensiso, Amanase and Sekesua to the north of Accra.

On the other hand, the promise of export earnings from oil palm, cocoa and logging has led to the conversion of forests for commercial ends.

Consequently, there is little left in southern Ghana of the original primary moist tropical forests — in 1992 it was estimated that just 15,000 km^2 of 'intact closed forest', or 7% of the area of Ghana, remained (IUCN, quoted in Kotey et al. 1998). Instead much of the landscape is a mosaic of secondary forest and fallows, and clearings for food crops, cocoa and oil palm plantations.

A feature of land use in the region is that most users of land do so on a small scale: relatively few farmers cultivate more than five ha of arable crops, or maintain more than 20 ha of tree crops. This arises from the nature of land tenure. With ownership of the land for the most part vested in the authority of the local chiefs who hold the land in trust for the community, and in some cases vested in family heads, land allocations are according to reasonable usufruct. Thus it is difficult to acquire large areas of land for extensive commercial planting, grazing or speculation.

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[1] There appear to be more studies concerned with the environment in northern Ghana where issues of land degradation and desertification attract particular attention.

[2] The World Bank estimates that during the 20th century, an average of 750 km^2 was deforested annually. Between 1955 and 1972, Ghana may have lost one third of its forest. Both data from Kotey et al (1998).

Interactions between rural people and their environment

Amanor (1994) reports a historical study of Manya Krobo. In this area of south-east Ghana, booms in the production of first oil palm, then cocoa led to increased settlement of the forest in the early part of 20th century. But by the 1960s the earliest areas of cocoa farming declined as diseases struck and soil fertility fell. Subsequently, the population has increasingly relied on producing food crops both for their own subsistence and for sale to the towns including Accra. Maintaining soil fertility under continuous cultivation was a key problem.

For Yensiso, Amanase, and Sekesua, Gyasi et al. (1995) studied change from 1960 to 1993. Population increase and the demand for land to farm has led to much removal of forest. Fallows have been reduced to 1-2 years, and some plots have seen continuous cropping since 1950. Consequently soil has become impoverished and crop yields have fallen, despite the use of chemical fertiliser and improved crop varieties. People were trying to intensify their cropping patterns — that had changed from producing oil palm and cocoa for export to specialised staple crops such as cassava and legumes for sale to Accra. But in doing so, farmers faced problems of poverty, land tenure and lacked technological capacity.

For two communities in the forest-savanna transition zone of Wenchi District, Afikorah-Danquah (1997) stresses the importance of institutions in providing incentives to conserve resources. He divided the community into the landholding Brong and the immigrants from the north. For the former, their land rights were relatively secure. They planted trees, maintained trees and allowed their regeneration through fallows.

Immigrants had less secure rights, and found that their rights to trees or non-timber resources may be restricted by landowners. They favoured tilling savanna sites, used a deep hoe, and tended to remove trees.

Insecure rights to trees, he argues, encouraged people to remove the trees and make charcoal.

Access to land and property rights to natural resources

The systems of collective and individual rights to land and trees that apply in southern Ghana have attracted considerable interest.

To simplify, in southern Ghana the majority of the land is held under longstanding custom, in which the chiefs hold the land on behalf of the community and allocate usufructory rights to members of the community. They may also award such rights to ‘settlers’, people arriving from other parts of Ghana. Rights to land are divided between those to arable land and those to forest trees. There are also secondary rights to use land, involving those with land rights either renting land or sharecropping their land with tenants.

Studies of customary tenure have tended to conclude that the system *‘is a dynamic one, capable of adapting, in good times, to favourable new economic opportunities.'* (Gyasi 1994, 392) Awanyo (1998) reports how in-migrants from further north gain access to forest lands in Western Region. Migrants are welcomed for clearing the forest and bush, for paying rents for their land, and for generally contributing to the local rural economy.

If the current systems of land tenure have their pluses, land rights are constantly subject to challenge. Considerable effort and ingenuity is thus invested in reaffirming and securing land rights. Awanyo (1998) tells how the in-migrants to Western Region are anxious to confirm the legitimacy of their rights to the land they have cleared and planted, which they do by maintaining permanent cultivation, mapping their fields, and assiduously paying annual rents to local chiefs. For a community in Ashanti Region, Berry (1997) recounts how rights to land were often ambiguous, both as to who had what rights and where the boundaries of different plots lay. In defining such rights, the recalling of history was a key resource.

None of these studies saw any conflict between insecurities of land rights and conservation of the land. Indeed, in Awanyo’s study fears of losing access to land led settlers to invest in

permanent tree crops and to maintain their cocoa groves — in marked contrast to what might be expected, namely a reluctance to make long-term investments on lands to which rights are insecure. On the contrary, customary tenure norms allow farmers continued access to any crop once planted. Thus, when farmers plant permanent crops, such as cocoa, they effectively establish long-term rights to use the land.

Surveys of occupations that either depend on the environment or that have an environmental impact or both

Remarkably few studies exist of occupations that may interact with the environment. The exceptions concern the utilization of non-timber forest products (NTFPs) and vegetable production, usually irrigated vegetables.

The gathering, processing and marketing of NTFPs (see Falconer 1992, Townson 1995) involves a wide range of products, including the distilling of akpeteshie (a gin based on palm wine), hunting of bushmeat, the collection of firewood, wrapping leaves, medicines and the weaving of baskets from fibres. The numbers of households involved appears large — Townson estimates over 200,000 households gaining some income from these activities. That said, the gathering, processing and trading of NTFPs tends to be supplementary activity to people's livelihoods, undertaken in the agricultural slack seasons and when there is an acute demand for cash.

Although some of these products may be inferior goods, most are not. With urbanisation the demand for them appears to be increasing. Bushmeat, for example, once a poor person's protein, has increasingly become relatively scarce and expensive, consumed mainly by those households with middle or higher incomes.

In the survey reported by Townson, two-thirds of respondents thought that their supplies of NTFPs had declined over the last 5 years. Declining supply was attributed to local people using more resources, to conversion of forest to farmland, and to losses to fires and weeds. Some changes in the environment, then, are affecting these occupations.

It is less clear, however, to what extent the gathering activities themselves contribute to changed environments. Given that many of those involved looked not so much to the forest but to fallows and fields for their supplies, it may be that the environmental impact is low.

The other occupation described in some detail is that of vegetable production. Warburton & Lyon (1995) report that before 1970, most vegetable production in Brong-Ahafo Region was small-scale, for domestic use. Commercial production of vegetables arose as a replacement for cocoa after the 1983 bush fires. The main environmental impact reported concerned the use of pesticides. Use of sprays is haphazard and unpredictable. At best farmers take advice from dealers and other farmers, but sprays are mixed, including the combination of EC and ULV formulations — with frequent recourse to subsidised cocoa insecticides such as lindane and propoxur. Cost tends to make farmers under-apply sprays. This study had no information on pollution from the chemicals.

Okali & Sumberg's (1999) study of tomato production in Pamdu, BAR, also describes the haphazard and hazardous use of pesticides. But it was beyond the means of this study to estimate environmental impacts of pesticide use. The authors also report on the District Assembly prohibition on cultivation within 50m of rivers. But this was not being applied to the dry season vegetable plots that were irrigated by hand buckets and located close to the watercourses. In this case, it seemed that village leaders and authorities turned a blind eye to such violations, since there were few feasible alternatives to cultivating by the streams in the dry season and the vegetables were the single most important income source for many people in the village.

Forestry and forest policy studies

Studies of natural resources policy (Kotey et alia 1998, Tufuor 1996) report how forest policy had until the 1990s marginalized local forest dwellers in favour of the interests of the timber industry. A review of the history of forest policy (Kotey et al. 1998) is summarised in Box 2.1.

Before the 1990s farmers had few rights over the trees on their fields and even fewer incentives to conserve them. Indeed, good quality timber trees standing on a field were a liability. The concession to cut them might be granted without the farmer's consent or knowledge, and when the contractor cut the tree, damage to crops was likely. Timber extraction was largely driven by the search for short-term profit with little investment in replanting cut forests.

Box 2.1: History of forest policy in Ghana prior to 1994

- **1874–1939**: The timber trade emerged, cocoa flourished, the Forestry Department (FD) was started, and reserves set aside in the high forest zone[3] mainly to protect watersheds and maintain climate and soils conducive to cocoa. Colonial rule strengthened the hand of chiefs. Reservation was negotiated with them. They also gave concessions to loggers, determined and collected royalties.
- **1940–53**: Although cocoa continued to be of interest, environmental considerations were reduced, non-timber forest products lost importance, and the interests of professional foresters and timber merchants grew. Elected District Councils marginalised chiefs from forest decisions: local interests were set aside as national factors took precedence.
- **1954–early 1990s**: the new government saw the chiefs as having sided with the opposition. By 1962 the government took formal control of land and trees. Foreign timber companies were replaced by a plethora of local companies who wielded sufficient influence to convince the government that the timber industry could drive development. Royalties were kept low. Promising stands of trees in the south-west were denominated Protected Timber Lands. But people feared these would be gazetted as reserves, and so chiefs and farmers colonised the areas leading to confrontations with the government. With structural adjustment, the resources of the FD were stretched, the local communities were marginalised with few rights and even fewer responsibilities, whereas the timber industry had over-capacity and was wasteful.
- To make matters worse, 1983 saw droughts and extensive bushfires. In the same year a structural adjustment package, the Economic Recovery Programme, was introduced. A central plank of the Programme was the encouragement of exports. To this end, a sectoral loan was granting to the logging industry to revitalise exports. As the timber processors restored their mills and enhanced capacity, they sought renewed supplies of logs and so put greater pressure on the forests.

[3] By 1998, the forest reserves of southern Ghana covered 17,700 km^2 ,or 20–25% of the 'high forest zone', of which 16,341 km^2 is under FD management (the rest is wildlife reserve) in 214 reserves. About half of this area is used for timber production. (Data from Kotey et al. 1998)

Source: Kotey et al. 1998, (Owusu 1998)

In the early 1990s, forestry policy entered a new stage as studies showed the defects of the timber-first emphasis. A major re-think of policy resulted in the 1994 Forest & Wildlife Policy. This has led to the FD introducing a new system of off-reserve controls that has increased royalties and reduced illegal felling. The policy, above all, resets the balance between forest management rights and responsibilities away from the timber industry and towards management by farmers and landholders. It allows more scope for local decisions. The FD is now charged with consulting with stakeholders other than the timber industry and becoming client-oriented. Policy changes since 1994 also included: reduction in annual allowable cut, temporary bans on exports of round logs; indexing timber royalties; and improved collection of royalties. Tertiary processing was to be encouraged.

Lessons to date show, according to Kotey et al. (1998), the value of: negotiation and collaboration, of using local knowledge and institutions, of developing local ways of dealing with conflicts; good information as prerequisite for policy-making, the potential of the FD staff to learn and adapt; and of the use of a mixture of incentives and regulations — information, markets and institutional incentives come first, the law is the ultimate recourse (and not the first).

Kotey et al. admit that much remained to be done, however promising the start made. Just how much remains is made evident in the Forestry Commission's (2001) review of the wood industry. This stated bluntly that: '*The choice of policies has failed to create the right incentives for improved efficiency and forest conservation at all levels of the Ghanaian forest sector.*' (viii) The analysis presented reports a timber industry with milling capacity at 5.1M m^3 a year and a total harvest of 3.72M m^3 a year, as compared to a annual allowable cut of just 1M m^3 a year. Milling efficiency remained low, despite the ban on the export of logs introduced after 1994. Most of the increased rents from the log export ban have been captured by processors. It seems that the ban has actually reduced GDP, but at existing prices, processing appears to add value. Resource rents are presently inequitably distributed.

The 1998 ban on using chainsaws to produce commercial lumber has been largely ineffective. This is not surprising since chain saw operations are well tuned to the local demand for cheap lumber, and respect local wishes for payment in advance of cutting, careful removal of timber, jobs, and local wood supplies.

Thus the study argues for the removal of the log export ban, to be replaced with log export quotas or taxes on exported logs, as well as decriminalising commercial chain sawing.

The review also reports that the official policy for Social Responsibility Agreements (SRA) between timber contractors and local communities stops short of providing people with what they want.

In general, the document sets out the need to move from a timber industry and Forestry Commission (FC) wedded to discretionary rights and corruption, to a forest policy where property rights are more slanted to resource owners, where matters are decided by the market, and where there is transparency and accountability in decision-making.

The FC's doubts about the effectiveness of policy towards local forest communities were reinforced by an internal review of SRAs concluded in mid 2001. This reported that *'there is little evidence of community participation in the SRA processes… The fundamental problem is whether the landowners' representatives' interests do reflect those of the wider community beyond the institutional stakeholders. This set of SRAs does not appear to go much beyond the previous practice of concessionaires in their dealings with chiefs and the traditional authorities; they simply formalise current practice. Unsurprisingly, therefore, in this sample of SRAs there appears to be a skewed distribution of benefits and responsibilities between stakeholders.'* (5) It argued that *'above all the FC should push for greater self-governance at*

the local level, encouraging the formation of 'Community Forestry Groups' as a central part of the responsibilities of a district manager. Proposed SRAs could be negotiated with community representatives, and monitoring provisions included.' (5)

These findings would have held few surprises for Brown (1999) who examined forest co-management for Ghana and the Cameroon. He stresses the very real difficulties of local communities participating effectively in forest management. These arise owing to the degree of social differentiation at local level and different interests of groups with varying rights to land and trees. He notes that forestry staff will have to learn new roles in social appraisal and negotiation. But even if they can make satisfactory local arrangements, since the issues of land ownership are so weighty, local agreements risk being overridden at national level. This suggests that resource allocation can only be effectively addressed at central level and with cross-departmental debate. Ultimately, the issues at stake are as much those of governance and power, as they are of forest management.

His assessment is not all pessimistic. He notes, for example, the advantages that Ghana enjoys in strongly-rooted traditional leadership, respect for forest reserves, awareness of the dangers of excessive forest clearance, and of the notably democratic local government that the country enjoys.

Other reviews of environmental policy in rural Ghana

Published reviews of environmental policy, other than those within policy documents (see Chapter 3), are few.

Porter & Young (1998) have reviewed the experience of decentralised environmental management in three Districts of coastal Ghana. In looking at the functioning of the District Environmental Management Committees (DEMCs), they found that these lacked budgets and staff and were largely ineffective. This was a pity since they also found that there was local concern about environmental change and depletion of local resources. Some sectors of the population had substantial environmental knowledge. '*There is a widespread tradition of resource management through the application of taboos and regulation of various kinds. However, these cannot cope with the pressures now being imposed and in many cases are no longer respected.*' (521) They conclude that getting effective local participation in environmental management is no easy matter.

Okali & Sumberg's study of irrigated farming in Pamdu reports that the community had a Land and Water Management Committee with a remit to consider bush fire control, tree planting, soil erosion control and soil fertility. MoFA staff talked readily of soil fertility decline in Pamdu, a perception that was shared by some farmers. But such expressed concerns generated resources from government and aid-donor funded programmes for the village, and hence they may be exaggerated. Little of the land was in fallow.

Pollution of the river by fertiliser and pesticides was possible, the same report noted, but there were no studies of water quality in local streams. There was similarly a lack of studies to show the effect of cultivation close to streams. In the absence of such evidence, the authors concluded that '*...interest in controlling land use adjacent to watercourses is being driven in large part by a kind of meta-narrative about environmental change and degradation, which has few apparent empirical links to actual situations in rural Ghana.*' (100)

They concluded that that environmental policy faced a central contradiction: that against an ever-greater emphasis on decentralisation and local management of natural resources, the agenda is increasingly a global one. Yet there is little collection of information locally to see what the impacts of policy are on local livelihoods. This leads the authors to call for a *'livelihoods precautionary principle'*, the first objective of which is not to put existing rural livelihoods at risk. Full account of the effects of actions needs to be taken by those outside of the local arena, they argue.

Summary

The published literature on environmental policy in southern Ghana appears scant. What little exists reveals concern over the consequences pressures on the natural resources arising from the actions of the poor and relatively poor struggling to construct livelihoods at little better than subsistence level, as well as from the profit-seeking of the timber companies.

Concern about environmental impact is one thing, data and evidence is another. Apart from estimates of forest clearance, not much has been published about environmental change and its consequences in southern Ghana. Given the great difficulties of collecting data sufficient to confirm most environmental processes, the lack of published evidence is not surprising.

Environmental policies appear in these studies as a mixture of local rules and regulations affecting bush fires and riverine cultivation and national policy, some or most of which cannot be enforced.

Recorded impacts on livelihoods of policies barely exist. Even in Okali & Sumberg's account of Pamdu village, environmental rules appear as a possible threat to the irrigated tomato fields, rather than a current constraint.

Three *Environmental policy for southern Ghana*

Defining environmental policy

Policy is what the state intends to do, as well as what it does. It consists of *Objectives* (Ends, Targets, Goals, Aims) and *Instruments* (Means, Activities). These may form part of a Plan or Strategy.

There are various ways that policy may be categorised — by the sector to which policy applies, by the reason for public intervention, by the level of government making and implementing policy, and by the type of policy instrument. Box 3.1 illustrates the last of these.

Box 3.1: Policy by type of instrument

Policy **instruments** can be seen as:

- Incentives: including
  - financial incentives — subsidies, tax breaks, grants, etc. — and penalties — — taxes, cesses, levies, charges, fees, etc.; or
  - through the provision of information, advice, technical ideas, education and encouragement;
- Rules and regulations:
  - prohibitions on specified actions,
  - obligations and requirements on specific actions
- Public investments: the spending of financial capital on
  - physical works, and
  - education and health care
- Institutional, by legally recognising or creating institutions (in the sense of the 'rules of the game') including institutions that:
  - Facilitate transactions (Establish rules of exchange, Provide information, Reduce risks);
  - Allocate property (Establish rights and claims, Maintain records, Inform non-owners, Decide between competing claims, Police and exclude);
  - Allow economies of scale (including collective and public action to produce public goods);
  - Reduce or reallocate risk;
  - Allow specialisation;
  - Internalise externalities.
- Governance: including empowerment, by the creation of means by which people may act for their common or single benefit; devices for resolving disputes and conflicts.

In Ghana, policy is codified through the following devices, in varying degrees of formality, as show in Table 3.1.

Table 3.1: Formal policy devices in Ghana

Device	Content, Power	Actors concerned
Policy Documents	Announce government policy: background, justification, aims, instruments. Do not have the force of law nor do they imply the deployment of resources — those come though other measures.	Published by Ministries and other state agencies. Drafted by advisers, usually after consultation with stakeholders.
Laws (Ordinance, Act, Bill, Decree) *and* *and*	Formally set out: o rules and regulations, o rights and obligations of citizens, o powers of the state to tax, levy and otherwise collect revenue as well as to disburse funds for specified purposes,	Proposed by the Executive and drafted by particular ministries and agencies, they need approval by Legislature.
Local By-Laws	o the powers that state agencies have in environmental matters, o establishment of specific government agencies. When contested, their precise interpretation may require clarification by the Judiciary. To have force of law, by-laws have to be gazetted nationally.	By-laws are drawn up by local government leaders and officials, subject to approval by District Assemblies and urban authorities.
Legislative Instruments (L.I.), Regulations	These give details of exactly how laws will be enacted, including levels of any taxes or fees. Without such detail, it is difficult to implement some measures set out in laws.	Drawn up by civil servants on behalf of ministers.
Guidelines and Codes of Practice	Guides to good practice. These aim to inform, create awareness, and encourage voluntary action in line with public aims. May have no legal force, although being able to show that a code has been followed may prove a point in law.	Produced by central state agencies.
Budgets, Programmes and Project Documents	Include formal statements of the allocation of funds for specified purposes. May give details of the instruments through which policy is carried out, including the responsibilities of different units of government, and means of coordination.	Drawn up by state agencies, on the basis of their constitutional powers. May involve donor funding and hence negotiations with donor agencies.

Given that between the statement of a particular policy and its translation into regulations (LIs) and projects there is much administrative work, it takes time for the details of policy to

emerge, let alone for this to be implemented. During that time there may be subsequent rounds of decision-making including reconsiderations and qualifications of previously announced policy, so that identifying policy as carried out is more complicated than might first be imagined.

Policies affecting natural resources in the forest margins of southern Ghana

Policies that affect the management of natural resources in the forest margins of Ghana constitute a sub-set of both environmental policies (policies, for example, that deal with the disposal of industrial effluents in urban areas are omitted here), as well as natural resources policies in general (in this case we are not interested in policies that apply to coastal lands or to semi-arid areas, for example). The natural resources that fall within the scope of this study include: forests, commons and waste lands, agricultural lands (fields, pastures and fallows), water courses (largely rivers and streams, since there are hardly any lakes to consider), and wildlife living within these areas.

How wide should the definition of policy for natural resources be? Should it include all policies that may indirectly affect the management of natural resources — see Appendix C for a classification of policies that can affect indirectly the use of rural natural resources — or just those that are specifically designed to have a direct effect on their management? Since including the former would potentially include the majority of government policy, the more restrictive definition of those directly affecting and directly designed to affect resource management has been adopted. Thus the types of policy set out in Table 3.2 are covered.

Table 3.2: Typical policies affecting natural resources in southern Ghana

Type of policy	Examples
Land use regulations in rural areas	Rules about farming within specified distances from watercourses, burning bush, about the application of pesticides and fertilisers in certain areas
Restrictions on access and exclusion of access rules	Rules that prevent people from having access to designated lands, or from using them in particular ways, or from settling on land. An important sub-set of land use regulations are those that declare particular areas to be forest reserves, conservation zones, national parks or the like, where there is strict control over settlement and use of resources
Controls on extraction and harvesting of resources	Regulations, permits and quotas that apply to logging, hunting, fishing; tapping of rubber; collection of nuts, fruits, fungi.
Rules on the disposal of wastes and effluents	Restrictions on the drainage of chemically- and biologically-contaminated waters into watercourses and groundwater; on the dumping or burning of waste material.
Incentives to encourage particular uses of land	Subsidies, grants, tax exemptions given for using land in a particular way (e.g. planting trees, maintaining livestock stocking densities, using organic chemicals, etc.).
Rules and regulations may be differentiated by area and land type, and by season	

Policies identified

Policy-making agencies

Despite efforts to decentralise government during the 1990s, power to make policy and funds to implement decisions remains concentrated in central government agencies. The following Table 3.3 lists the main agencies involved in natural resources policy making and implementation.

Table 3.3: Key organisations that formulate and implement natural resources management policy in southern Ghana

Ministry	Sub-entity
Min. Lands, Forests & Mines (MLF)	*Includes:* **Lands Commission** **Forestry Commission** Includes DFID-funded *Forest Sector Development Programme,* supported by a team of DFID-funded advisers. FC has four Divisions, namely: o Forest Products Inspection, o Timber Export Development, o Wildlife, and o Forestry Services (FSD). Within FSD, there are Departments: Operations—including the Regional and District Managers; Finance & Administration; Human Resources; Forestry School at Sunyani; and the *Resource Management Support Centre* (RMSC). The RMSC is the technical wing of FSD. Included under the RMSC is the Collaborative Forest Management Unit (CFMU), based in Kumasi. MLF is also the coordinating agency for the Natural Resource Management Project (NRMP). This involves the participation of MoFA, ME, MEST and MLGRD; and is supported by several donors including: World Bank (both through the IDA and GEF), African Development Bank, GTZ, Netherlands, Japan, Denmark, The European Commission as well as DFID.
Min. Environment, Science & Technology (MEST)	Made up of 4 Divisions: o Finance & Administration; o Human Resources Development; o Research, Statistics & Information Management; and o Policy, Planning, Monitoring & Evaluation MEST is responsible for the: **Environmental Protection Agency** Established under the Environmental Protection Agency Act No 490 of Dec 1994. This widened the remit of the earlier Environmental Protection Council founded in 1974 that had an advisory role. The EPA is responsible for Environmental Regulation and ensuring implementation of government policies on the environment. EPA advises ministries on standards and guidelines. 4 Divisions: o Support Services, including the Environmental Law Dept o Inter-sectoral Network, including Natural Resources Dept o Operations, including Environmental Assessment & Audit; and, o Regions — the EPA has offices in most Regions, including Ashanti, Kumasi and Brong-Ahafo, Sunyani The EPA was responsible for drawing up the National Environmental Action Plan (NEAP), 1994, was the lead agency for Ghana Environmental Resource Management Project (GERMP) that was

	meant to implement the NEAP.
Min. Food & Agriculture (MoFA)	Divided into Directorates, including: • Policy Planning, Monitoring and Evaluation • Statistics, Research and Information • Crop Services • Plant Protection and Regulatory Services • Extension Services • Women in Agriculture • Animal Production and Health • Agricultural Engineering Services **Irrigation Development Authority** (IDA) is an autonomous institution within MoFA with responsibility for the policies and development of watercourses for agricultural use.
Min. of Energy (ME)	Policies cover commercial fuels, but not 'traditional fuels', such as charcoal.
Min. Local Government & Regional Development (MLGRD)	Oversees regional, district and local government. In particular, MLGRD arranges for scrutiny and legal appraisal of District by laws, prior to their publication in the official gazette — at which point they have legal backing.
Regional government	Each Region has a **Regional Co-ordinating Council** presided over by a Regional Minister. The council is meant to coordinate the work of the regional offices of the central ministries and agencies.
District Assemblies (DA)	The DAs consist of an elected assembly, including some nominated members, and is headed by a District Executive (a central government nominee). The Assemblies have the power to levy some local taxes, pass by laws and implement some projects. They are also meant to coordinate and supervise the work of central government agencies in their Districts. By law, each DA has a set of sub-committees. One of these is concerned with environment health. The District Environment Management Committee (DEMC), set up under the GERMP in the early 1990s, is not however a legal requirement.

Policies, programmes and projects for natural resource management

Table 3.4 sets out the main policy documentation found and Table 3.5 the principal programmes and projects affecting natural resource management.

Table 3.4: Key policy documents for natural resource management

Date	***Title***	***Notes***
1990	*Control and Prevention of Bushfires Law (PNDCL 192)*	Shifted emphasis from punishment of offenders to regulation and prevention through education and organisation of early farming burning by District Assemblies
1993	Forestry Commission Act (Act 453)	Established the Forestry Commission, superseded by 1999 Act

1994	Ghana National Environmental Action Plan (NEAP) Vol 2: Technical Background Papers by the Six Working Groups—edited by Prof. Ebenezer Laing Has 6 main parts, on: o Mining, Industry and Hazardous Chemicals o Marine & Coastal Ecosystems o Human Settlements o **Forestry & Wildlife** o **Land Management** o **Water Management**	Environmental Protection Council 325 pp there are also: Vol 1 Environmental Action Plan; Vol 3 Draft Recommended Legislation; Vol 4 Supplementary Reports
1994	Environmental Protection Agency Act (Act 490)	Establishes the EPA.
1994	Forest and Wildlife Policy	Ministry of Lands and Forestry Key document that signals Ghana's commitment to forestry that serves more than just the timber industry and is sustainably managed.
1994	Trees & Timber Amendment Act (Act 493)	Provides for the bi-annual renewal of property marks and the use of levies and other forest fees in the regulation of the timber trade: increases the levies in the export of logs and the fees for renewal of property marks.
1995	Interim Measures to Control Illegal Timber Harvesting Outside Forest Reserves	Introduces the farmer's right of veto and payment of compensation for crop damage. More control on felling of trees off-reserve.
1995	Vision 2020, MoFA	Sets out aims of agricultural policy.
1996	Forestry Development Master Plan	Drawn up by Forestry Commission
1996	Pesticides Control and Management Act, Act 528	All pesticides must be registered and classified. All those dealing in pesticides must be licensed.
1996	Water Resources Commission Act (522)	Establishes the Commission.
1997	Timber Resources Management Act (547)	Introduces Timber Utilisation Contracts (TUC) for any timber harvesting. Obliges timber concession holders to negotiate with local communities to produce Social Responsibility Agreements (SRA) that stipulate social projects and public infrastructure to be provided to the community.
1997	Accelerated Agricultural Growth & Development Strategy, 1997	MoFA
1998	Timber Resource Management	

	Act	
1998	Timber Resources Management Regulations, LI 1649	Covers the procedures for the grant of timber rights, sets timber stumpage fees and contract area rent, and the registration and use of chain saws.
1999	National Land Policy, (ex. Draft Land Policy 09/08/96)	Lands Commission, Ministry of Lands and Forestry Sets out the intent of fostering equity and security of access to land, and its sustainable management. Also declares as protected areas: o Forest reserves, strict game reserves, national parks, wildlife sanctuaries, etc.; and o Slopes of 30 degrees or more, and areas within 50–100m of the low watermarks of permanent water sources.
1999	Environmental Assessment Regulation, LI 1652	Defines those activities for which an environmental permit is needed [does not cover farming of areas under 40 ha], and the procedures necessary [preliminary environmental report, environment impact statement] to obtain the permit (has to be renewed annually).
1999	Forestry Commission Act, 1999 (NB: This replaced the proposed 1998 *Forest Service Bill)*	Establishes the current FC with its four Divisions.
	National Action Plan on Desertification	
2001	*Crop Protection Policy, First Draft Sept 2000; revised May 2001*	

Source: Project work as well as Kotey et al. 1998

Table 3.5: Main projects and programmes concerned with natural resource management

Project or Programme	***Notes***
Ghana Environmental Resource Management Project [GERMP] 1993–98	To support the implementation of the NEAP. Helped establish the EPA.
National Resources Management Programme [NRMP] 1999–09	Min Lands, Forestry & Mines coordinates. Includes MoFA, ME, MEST, MLGRD, MoH. Coordinated via a Programme Coordination Unit (PCU). 1999 for 10 years. Total budget US$89M. Main donors: IDA/GEF, DFID, DANIDA, EU, WFP. Meant to implement the 1996–2020 Forestry Development Master

Phases: 99–02: Initiation 03–06: Acceleration 07–10: Institutionalisation	Plan NRMP is a portfolio programme embracing specific projects, many of them donor-funded and assisted. Consists of 5 components: o High Forest: includes policy and legislative reforms, building capacity within the FC, drawing up Forest Reserve Management Plans for 12 Reserves and a National Forest Plan, Off-Reserve forest management, Forest Management Information System (mapping, inventories, GIS), Forest Plantation Development Centre at Ejisu (AR) to encourage planting up forests, bush fire management in transitional zone, and wood industry development including certification. o Savanna (includes DANIDA's 'Support to Traditional Energy Marketing' Project 99–01). Sets up the Savannah Resource Management Centre at Tamale. o Wildlife o Biodiversity Conservation in High Forest Zone o Coordination of Environmental Management o Programme Coordination & Financial Management IDA will use, for the first time in Africa, 'Adaptable Programme Lending' in its support of NRMP.
Agricultural Services Sector Investment Programme [AGSSIP]	MoFA. Implements the *Accelerated Agricultural Growth & Development Strategy, 1997*
Capacity 21	Programme to encourage planting up of woodlots for fuel and charcoal.
Pilot Management of Off-Reserve Forests	ITTO-supported programme. Pilot in 13 communities in the Districts of Offinso (AR), Dunkwa (CR), and Nkoranza (BAR). Sets up Community Forest Committees.
Pilot Collaborative Management of Reserves with local communities	Pilot sites are Sunyani (BAR) and Begoro (ER) Districts.
Model Programme for SRA	Sefwi-Wiawso District (WR). Several communities. Rapid disbursement of payments to communities. Only beginning in 2001.
District Forest (Management) Plans	District Assemblies are meant to draw these up with the Forestry Department—not known if any have been produced to date. There should also be management plans for forest reserves—suspected that not yet done in all cases.

In addition to these policies and programmes, there are local rules and norms on use of natural resources. These include measures that affect:

- Bush-burning — communities are concerned about bush fires getting out of control and destroying crops, homes and other property. In response there are rules to restrict the setting of fires for hunting game, and norms on the timing of any burning — with

early burns favoured. Burning of bush after clearing land is not frowned upon if it is controlled burning; the requirement of the unit committees is that community fire prevention and fighting volunteers should be present during burning to ensure that the burning is controlled. Some farmers go around this regulation by ensuring that at least one member of the household is a member of the committee. The presence of this household member on the field satisfies the requirement;

- The use of dead wood to make charcoal, instead of cutting living wood;
- Planting close to watercourses where it appears that there is a longstanding norm that a 50m fringe on the banks of rivers would be left uncultivated.

These norms often enjoy widespread local consent and are enforced through local authority structures, including local leaders and Unit Committees. Some of these measures may further be codified within DA by-laws.

Three policies deserve a closer look: forestry policy overall, the ban on using chainsaws to produce commercial lumber, and the prohibition on cultivation close to river banks.

Forest policy

Much of natural resources policy in the forest margins affects commercial timber and the logging industry. Formerly policy focused on the actions and interests of powerful stakeholders — the timber companies, chiefs, etc.; from 1994 more attention has been paid to local communities. The principal justification for this change was that previous policy was ineffective in conserving forests outside of the reserves.

Despite the new Forest & Wildlife Policy dating from 1994, official implementation of community management of forests only began in 1998 with the formation of Community Forest Committees (CFCs) in thirteen communities in three pilot Districts — Dunkwa, CR, Offinso, AR and Nkoranza, BAR.[4]

Forest policy is marked by three contrasts in emphasis. One, forest policy emphasises trees and timber, for which there are data, analysis and detailed measures. In contrast, forest policy pays much less attention to non-timber forest products.

Two, although the indirect benefits of forestry — nutrient recycling, water resource maintenance, biodiversity, etc. — are recognised,[5] not much policy attention has been given to them other than maintaining Protected Areas within the Reserves. The NRMP may be developing these interests.

Three, although the 1994 Forest and Wildlife Policy recommends participation and involving a wide range of stakeholders in decision-making, the instinct to command and control via central, top-down declarations persists. A good example is LI 1649 of 1998 that severely restricts the use of chainsaws.

The ban on the use of chain saws

The law (Ministry of Lands & Forestry, Republic of Ghana, 1998, Timber Resources Management Regulations, 1998, L.I. 1649) states:

[4] There are also some NGO and local community initiatives for community management of forests.

[5] And has long been recognized: in the early 20th century, policy-makers were concerned to maintain the forest to provide a suitably cool micro-climate for cocoa stands.

- All chainsaws have to be registered annually with the DA. Those used for felling trees have to be simultaneously registered with the District Forestry Office, the DFO to give a registration number that has to be marked on logs felled.
- Unregistered chainsaws cannot be used for felling or converting timber, and no landowner should allow the use of an unregistered chainsaw for felling or sawing timber on their land.
- '*(1) No person shall use a chainsaw whether registered or unregistered, to convert timber into lumber or other forest products for sale, exchange or any commercial purpose. (2) No person shall sell or buy timber products to which subregulation (1) applies.*'

The **justification** for this measure is stated as:

> (a) To reduce the domestic supply of lumber so as to conserve forest. The FC estimates (FC 2001) that of the total round-wood harvest of 3.72M m^3 of wood in 1999, chainsaw lumber made up 1.67M m^3, or 46% of the total harvest, and
>
> (b) To improve the efficiency of timber milling and cut down on waste. Sawmills were estimated to convert timber to lumber at 39%, whereas the estimate for chainsaws was 27%.

Whatever the merits of this ban, there appears to be little formal analysis to consider the feasibility of implementing it, or to consider its impact on groups living in the forest margins. For example, in estimating the efficiency of conversion of timber by chain saws, no account is taken of the value to forest communities of the 'waste' off-cuts that apparently are a major source of raw material for village carpenters and for charcoal burners.

Impact of the ban: verbal reports suggest that in towns and cities the supply of lumber cut by chainsaws was initially much reduced, driving up the price of construction timber. But subsequent data suggest that the rise in prices for chainsaw lumber may have been short-lived, with only a very small reduction in the differences in prices between sawmilled and chainsawed lumber on the domestic market.[6] By 1999, the price of domestic lumber from chain saws was only a little above 1997 price when expressed in constant 1999 Cedis.

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[6] FC data show the following price trends for domestic lumber:

	Chain-Sawn (Retail Prices)				**Sawmill, (Wholesale Prices)**			
Per m^2	Odum	Dahoma	Mixed Redwoods	Wawa	Odum	Dahoma	Mixed Redwoods	Wawa
In Cedis, 000s								
1995	293	113	113	91	383	225	225	135
1997	450	248	248	180	563	360	360	225
1998	563	338	338	203	630	405	405	270
1999	585	383	383	270	720	540	540	360
In US$, nominal								
1995	244	94	94	75	319	187	187	112
1997	219	121	121	88	274	176	176	110
1998	240	144	144	86	269	173	172	115
1999	187	123	123	87	231	173	173	115
In Cedis, 1999 (deflated by CPI)								
1995	749	288	288	232	979	576	576	345

In the rural areas, it seems likely that chain saw use continues at previous levels for local purposes — tree felling, production of lumber for village use, conversion of trees for charcoal burning, etc. The main effect may have been to increase the costs of using the chain saws, since either bribes must be paid to officials, or the work has to be done at night.

Cultivation close to stream banks

The 1999 National Lands Policy states that no cultivation should take place within 100m of the high-water mark of streams.

It is not known whether this rule is incorporated in any law or LI. Similarly, it is not known who is responsible for enforcing and policing the rule and what penalties may apply for infringing the rule.

Justification: No written justification for this was seen. Those who have verbally mentioned this regulation have referred to the aims of controlling erosion and of ensuring flows in watercourses. The measure may also allow more silt to be trapped by riverine vegetation and reduce the flows of effluents (including excess fertiliser, herbicide and pesticide) into watercourses.

This sounds reasonable. What is less clear is the origin of the width of 100m. Indeed, some district officials and local elders believe the regulation affects 50m, not 100m. But why 50m or 100m and not, say, 5m?

Similarly, how is a 'water course' defined? If the measure were applied not only to rivers but also to small streams, then presumably the 100m borders would occupy a substantial fraction of the landscape and seriously reduce the area that could be legally farmed.

Causal observation suggests that the ban is applied as a guideline for good practice, but one that can be openly flouted when there are good economic reasons to do so — as applies when vegetable growers using hand bucket irrigation open their plots on the banks of rivers. There was no evidence found or heard of anyone having to abandon a riverside plot owing to the implementation of this restriction.

Policy: an interpretation

The main policies, their origins and justification

The main policies affecting natural resource management in the forest margins of Ghana concern:

- The forest industry — demarcation of reserves, allocation of timber extraction rights, codes for logging, plantation (and reforestation of logged-out areas), control of the use of chainsaws, and initiatives for collaborative and community forest management;

1997	614	338	338	246	768	492	492	307
1998	624	375	375	225	699	450	449	300
1999	585	383	383	270	720	540	540	360

Chainsaw lumber prices, retail, as percentage of sawmill lumber prices, wholesale

1995	76%	50%	50%	67%
1997	80%	69%	69%	80%
1998	89%	83%	83%	75%
1999	81%	71%	71%	75%

- Conservation of farming lands and water flows — regulations on planting close to streams, bush burning; and,
- Pesticides — their control and safe handling.

What does this list leave out? There is little about rural water pollution.[7] Little or no policy applies to Non-Timber Forest Products (NTFPs) and in particular charcoal production and trading. The annual cut for charcoal is large compared to that for the timber industry,[8] but the only control over charcoal is in the granting of permits and the levying of charges on bags produced. Both these raise revenue for local authorities, and do not seem to be applied as a way to control levels of production and marketing of charcoal.

Indirect forest benefits — biodiversity, carbon storage, etc. — largely escape policy attention. Conserving biodiversity forms part of the NRMP,[9] but seems to respond largely to international conventions and the concerns of donors with only limited echo in government activity at national, regional or district levels.

The centralisation of policy-making

Policy seems to be formulated largely at national level. The District Assemblies and regional bodies only take the initiative on matters such as river-side planting, bush-burning, and regulating the keeping of livestock close to human settlement. Otherwise their involvement with environmental policy is largely as a channel to implement national decisions.

An exception here may be the Brong-Ahafo Region initiative to address the problem of the drying of the River Tano.

Box 3.3: Regional policy-making, the case of the River Tano

Alarmed at the unusual and (perhaps) unprecedented drying up of the River Tano at Sunyani in the dry season of the first quarter of 2001, causing water shortages for the town of Sunyani, the Regional Co-ordinating Council for Brong-Ahafo set up a committee to examine the problem. The committee of some 15 persons, chaired by the Deputy Regional Minister or the Regional Co-ordinator, comprised the senior government servants of the regional offices for Brong-Ahafo in Sunyani. Representatives included those from MoFA, FSD, Lands Commission, Stools, etc.

By May 2001 they had made their deliberations, including consulting with chiefs in the Tano River basin upstream of Sunyani, and drafted a project.

The project proposal document argues that the drying of the river can be attributed to clearance of forest and bush in the catchment and the cultivation of lands close to the banks of the river and its tributaries. Few details are offered as to how this (admittedly plausible) link works, nor are formal data either on flows within the river or land use in the river basin presented.

The project proposes that the banks of the river to a depth of 100m, and its tributaries to 30m, be surveyed and marked by pillars. The marked river-side area, 874 km long, will then

[7] The Water Resources Commission Act of 1996 creates a body to regulate use of water and explicitly grants powers by LI to control pollution. It is not known if any such LI on levels of rural water pollution has subsequently been enacted.

[8] Estimated at 12M m^3 a year, in comparison to 3.72M m^3 for the timber industry (Forestry Commission 2001).

[9] Phase One of the NRMP allocates US$2.3M for the protection of Special Biological Protection Areas.

be reforested. Some catchments in the headwaters of the basin will also be protected and reforested.

Costs of the project, to be implemented over 5 years, reach ¢12.6 billion (US$1.8M). Included are the costs of

- surveying and pillaring,
- the employment of no less than 170 forest guards,
- five tree nurseries,
- replanting, and
- compensation for those working riverine plots (as well as annual rents to chiefs for the use of protected lands).

Also included are funds for socio-economic studies of the impacts of the measures.

By September 2001, support was being sought for the project from central government, prior to looking for funds — presumably for a scheme of such cost, some donor funding would be involved.

Two features of this experience to date stand out:

- One, the livelihoods of local people who may find their fields taken over by this project have only been taken into account to the extent that the project involves some (unspecified) compensation payments for them. To be sure, local chiefs have been consulted, but how much they are prepared to represent the interests of all the population of their stools is a moot point; and,
- Two, the mechanisms of causation have not apparently been fully investigated, so that one cannot be sure that the measures proposed will have the desired effect of ensuring adequate year-round flows in the river basin; and still less, that the proposed measures may be an efficient way to bring about this end. Given the lack of existing information on the environment of the basin and the lack of staff and budgets to undertake studies, the absence of firm evidence on which to take decisions is understandable. But that does not remove the risk that the proposed activities may be ineffective or inefficient.

Policy implementation

The degree of policy implementation reflects, intentionally or otherwise, the economic importance of different interests.

Regulations affecting logging for commercial use are apparently largely implemented. Certainly considerable numbers of staff and resources are allocated to implement this policy. Indeed, this is one of the main functions of the forestry service. Reserves are demarcated and policed. Timber Utilization Contracts have been allotted and negotiated. Stumpage fees are collected. Logs are inspected and marked.

Less is known about the Social Responsibility Agreements (SRA) between logging companies and communities and about how fees are channelled back to communities. An early internal review of some 30 such agreements carried out by the Forestry Commission and published in July 2001 indicated that little has been done to identify community stakeholders and their needs other than to negotiate with chiefs and traditional authorities — wider participation in drafting the SRAs appears to have been minimal. Benefits were skewed towards the interests of the landowners. It is not clear how the value of the SRA had been computed. Timetables of payments were not indicated, nor were the costs inflation-proofed. Some SRAs mention the employment of youths, but no details of wages or other conditions were offered. The SRAs said nothing about monitoring, or about renegotiating SRAs.

Indeed the review went as far as to comment that *'The basic weakness of the Act is that the option of allowing communities to manage forest reserves themselves is not included. The continuing lack of sufficient property rights for forest-edge (forest reserve) or dependent communities (off-reserve forest areas) can only be partially addressed through SRAs.'*

The chainsaw restrictions represent drastic action decreed centrally. Support for this measure in the rural communities affected reportedly varies from mild approval to outright hostility in communities, hostility arising where chain saw operators have been seen as useful in preparing timber for charcoal burning or in removing trees on farmlands so as to avoid their being logged out by concessionaires. The rules are taken seriously by the FC and other official agencies. But they cannot be effectively policed owing to the large area that may potentially be affected, and to the difficulty in asking not-very-well-paid staff to police an economically costly restriction which chain saw operators may circumvent by bribery or intimidation of government staff. Hence the restrictions, impressively clear in the official government gazette, turn out to be much less effective in the field. Indeed, in undermining the integrity of forestry staff and others, and in general undermining respect for the regulations of central government, the restrictions may be counter-productive.

The restrictions on cultivation close to watercourses have been announced, but do not seem to have been codified. Consequently, it is not clear who should implement the measure and what sanctions might apply to offenders. Where the rules, and others of similar nature such as curbs on burning the bush, have become part of local conventions, the lack of formal codes does not matter — they are respected. But in practice, the rules are applied only where it seems that it is convenient to do so. When they go against an economic imperative, they may be openly flouted, as with the case of tomato growers at Tanoso who were seen to be cultivating tomato fields right up to the river's edge. This shows admirable flexibility, but if this is how the restriction is applied in effect, then it would be better to describe it as a code of good practice, rather than as a rule or regulation.

Four *Livelihoods sensitive to economic policy*

The study villages

Selection

To meet the research objectives, the following criteria were initially set for the selection of villages (particularly to satisfy the term "forest-agriculture interface"):

- Settlements should be close to substantial areas of forest (close means 2 km, and substantial area implies at least 10 km^2 of forest);
- At least half the land area should be under primary or secondary forest; and,
- Settlements should be recent ones, opened on previously forested lands (recent means within the last 30 years).

It was also desirable that the settlements should have a substantial number of households and differ in terms of physical condition or market (road) access.

Communities satisfying the above criteria were more likely to have livelihoods that would be affected by environmental policies. The particular environmental policies that could have substantial impact on the rural economy were those relating to forest resources.

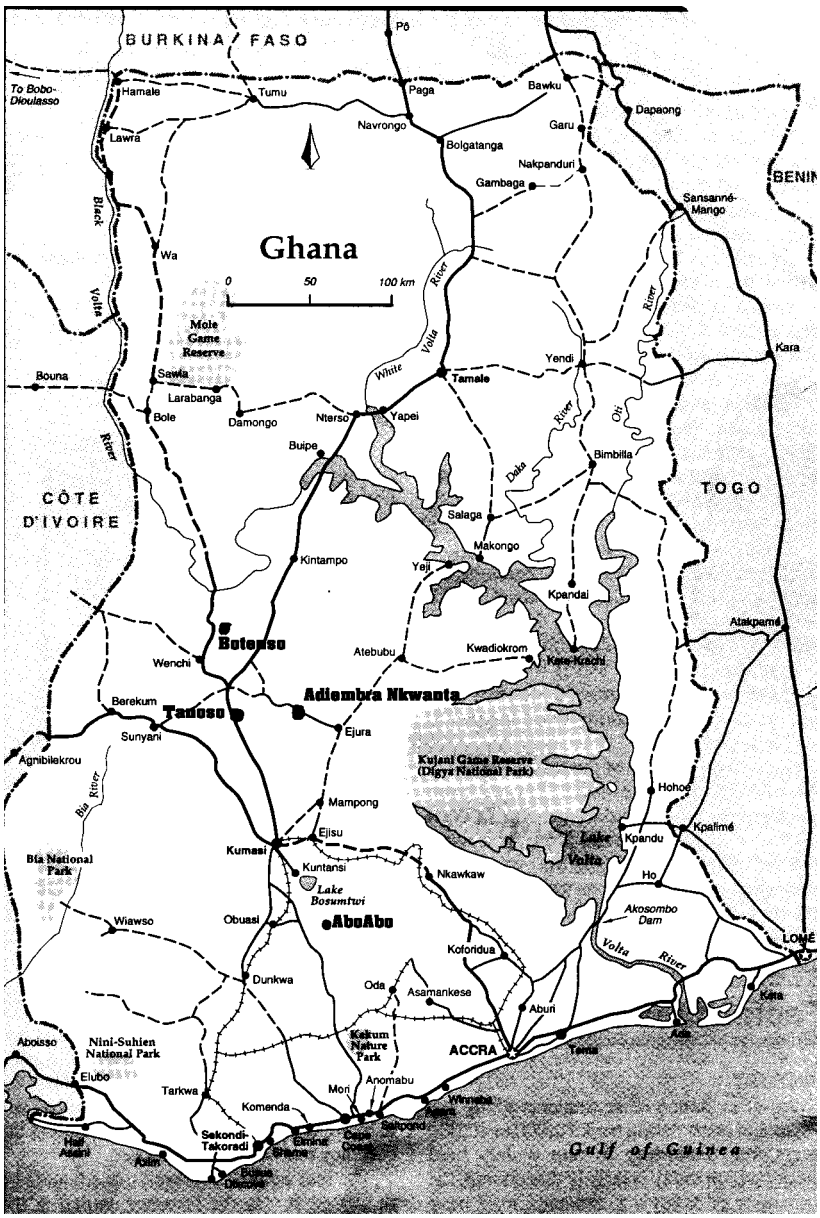
Locations were selected from a list of possible villages identified on the basis of personal knowledge, reports of past studies, and maps. This was followed up with field visits to the identified communities to gather information that would help determine the suitability or otherwise of the communities for the study. None of the communities identified initially could meet all the criteria, the main stumbling block being the age of settlement since most communities had their origins in the 1950s or earlier. Large-scale movements of people to pioneer settlements have not occurred in the recent past. New settlers in the forest margins tend to locate in existing settlements that are relatively recent, but typically 40 to 60 years old.

The settlements selected for the study were the following:

- Aboabo No.2, Adansi East District of Ashanti Region, located 22 km off the Kumasi-Cape Coast road;
- Adiembra Nkwanta, Ejura-Sekyedumasi District of Ashanti Region, located 18 km from Ejura on the Ejura – Nkoranza road;
- Botenso, Wenchi District of Brong-Ahafo Region, located 8 km from Nchiraa (itself accessible by gravel road from the Wenchi–Wa road); and,
- Tanoso, Techiman District of Brong-Ahafo Region, located 16 km south of Techiman on the main Kumasi–Tamale highway.

The location of the study villages are shown in Figure 4.1.

Figure 4.1: Location of the study villages



General description of the study villages

Detailed descriptions of three of the villages appear in Appendix A. Table 4.1 summarises the characteristics of the study villages.

Table 4.1: Characteristics of study villages in relation to selection criteria

	Aboabo No.2	Adiembra Nkwanta	Botenso	Tanoso Techiman
Agro-ecology	Forest	Forest-Guinea savannah transition	Forest-Guinea savannah transition	Forest-Guinea savannah transition
Distance from nearest market	60 km from Obuasi	18 km from Ejura	8 km from Nchiraa	10 km from Techiman
Road condition	22 km gravel road off major Kumasi-Cape Coast highway; difficult access during rainy season	12 km gravel road off Kumasi-Ejura highway; motorable throughout the year	8 km rough track accessible by four-wheel drive vehicle; difficult access throughout the year	On major Kumasi-Tamale highway
Facilities	Electricity, water (bore hole) Education up to JSS	None, except primary school which is poorly staffed JSS at nearby village (about 5 km away)	None, except primary school which is poorly staffed JSS at Nchiraa	Electricity, water Education up to JSS; SSS at Techiman
Economic potential	Overall assessment: High for agriculture; high for timber; moderate for non-timber forest products; and moderate for off-farm Good natural resource base for agriculture; motorable road but difficult to use in wet season	Overall assessment: Moderate to high for agriculture; low for timber and non-timber forest products; and low for off-farm Most land owned by an agricultural company (Ejura Farms), but farmers have access to its use; motorable road links village to	Overall assessment: Low to high for farm; low to moderate for timber; low for non-timber forest products; and low for off-farm Good natural resource base for agriculture but poor access to market	Overall assessment: High for farm; low to moderate for timber; low for non-timber forest products; and off-farm Close to Techiman, major market centre linking south and north Ghana Irrigation facility, but currently out of service

		markets		service

Table 4.1 (continued): Characteristics of study villages in relation to selection criteria

	Aboabo No.2	Adiembra Nkwanta	Botenso	Tanoso Techiman
Closeness to substantial areas of forest	Located within a substantial amount of dense forest, including a forest reserve	On the edge (within 2 km) of secondary forest; timber species almost depleted but trees available used for charcoal production	Located within secondary forest; timber species almost depleted	Located within secondary forest with patches of grassland
Area under primary or secondary forest	Over half the land under secondary forest	Surrounded by low dense (depleted) forest	Surrounded by low dense (depleted) forest	Surrounded by low dense (depleted) forest
Residence status	Predominantly indigenous; settlers mostly from other parts of Ashanti Region, and others from northern Ghana	Settlers, predominantly from northern Ghana	Two distinct sections; the larger section with settlers mostly from northern Ghana, and smaller section from Nchiraa, where the original landowners are settled	Predominantly indigenous
Land tenancy	Family ownership (free access) for indigenous, and sharecropping for settlers	Renting from Ejura chief, and free access to Ejura Farms land	Family ownership (free access) and some renting for indigenous, and renting for settlers	Family ownership (free access) and some renting for indigenous, and renting for settlers
Period settled	More than 100 years, but rapid expansion in the last 40 years; the most recently settled community in the area and still receiving migrants	Current settlers started arriving in the late 1960s from northern Ghana to engage in food crop farming, particularly maize	Served as a settlement for a few households from Nchiraa (the land belongs to this town) until inflow of settlers from northern Ghana in	More than 100 years, but rapid inflow of migrants in the past 40 years with the upgrading of the road as the major highway linking the south and north of the

			1970.	country

Source: Participatory rural appraisal data

Major problems perceived

Table 4.2 lists the main problems reported during the initial surveys in three of the four communities.

Table 4.2: Major problems perceived

	Aboabo, Females	***Aboabo, Males***	***Adiembra Nkwanta, Females***	***Adiembra Nkwanta, Males***	***Botenso, Females***	***Botenso, Males***
1st	Lack of credit facilities	Lack of credit facilities	Lack of credit facilities	Farms in deep valleys, so problem of transporting produce from farm to village-market. Most of suitable lands taken over by Ejura farms.	Poor road (60%)	Poor road (60%)
2nd	Lack of employment opportunities	Lack of employment opportunities	Lack of appropriate technologies for farming — no extension services	Water sources located far from the village: much energy and time spent obtaining water for domestic use.	No health facility (20%)	Limited schooling — no JSS (20%)
3rd	Poor access road	Poor access road	Transportation of farm produce to village is tedious as it is head-loaded over long distances	Prices dictated by traders who also buy at bush weight	Lack of market place (10%)	Low soil fertility (20%)
4th	Inadequate water supply (only two boreholes)	High cost of purchased inputs	Main source of water-spring is located 1 km away from the village and so difficult to carry water to village especially in the night.	Lack of credit facilities	Lack of credit facilities (10%)	
5th	Lack of medical officer for the clinic	Lack of medical officer for the clinic	Lack of public toilet.	Suitable trees for charcoal increasingly scarce. Have to travel long distances to obtain wood at high transport cost.	Lack of paid work	
6th	Lack of good toilet facilities (KVIP)	Lack of good toilet facilities (KVIP)	Low agricultural productivity.	Lack of teachers. Most trained teachers refuse posting to village; government has stopped recruitment of pupil teachers who could fill the gap.	Lack of potable water — no borehole	

7th	Lack of teachers	Lack of teachers	High cost of hiring chainsaw operators to cut wood for charcoal.		Limited schooling — no JSS	
8th	Unavailability of market structures	Unavailability of market structures	Lack of off farm employment aside of farming and charcoal burning.			
9th			No birth control. Frequent births do not give women enough time to attend to other productive activities.			
10th			Low prices of farm produce dictated by traders			

Source: Initial reconnaissance

The main problems cited are dominated by concerns over roads and the cost of transporting products, lack of access to credit, and problems of schools, health facilities, water supply, and toilets. Less frequently mentioned were lack of jobs and the prices of inputs and outputs.

Replies that saw problems in the deficiencies of highly visible infrastructure and services were, perhaps, to be expected. What may surprise is the prominence of the more intangible item of credit. Whether this reflects a need for credit for consumption to balance household budgets between spending and earning, or whether this indicates that respondents were frustrated in their plans for investment in production, is not known. In any case, irrespective of the motive for which credit is desired, it reduces the pressure on household cash.

Household characteristics in the study villages

A census was carried out of the whole community in three cases, and of a portion in the case of the large village of Tanoso. Altogether 533 households were covered, see Table 4.3.

The villages were distinct in terms of their origins. The great majority of the population of Aboabo were native to the area, with a few settler households from other parts of southern Ghana. Tanoso was also largely a community of indigenous people, with some settlers from the north. In contrast, Adiembra Nkwanta and Botenso were dominated by settlers, almost all from the north of the country.

Table 4.3: Demographic features of the villages surveyed

	Total	Aboabo	Adiembra Nkwanta	Botenso	Tanoso
Total	N=533	N=300	N=59	N=68	N=106
Household members, total	3434	2142	299	365	628
Household members, mean	6.44	7.14	5.07	5.37	5.92
Household members, std dvn	3.81	4.22	3.42	2.60	2.92

Household members, median	6	6	5	5.5	6
% Adults Non-resident	19%	22%	16%	11%	13%
Ratio: Adult males: Adults females	99%	97%	143%	111%	86%
% Population as children	38%	38%	40%	43%	38%
Native	N=356	N=256		N=6	N=94
Household members, total	2525	1930	.	25	570
Household members, mean	7.10	7.54		4.17	6.09
Household members, std dvn	3.97	4.23		2.04	2.94
Household members, median	6	7		4.5	6
% Adults Non-resident	20%	22%		0%	14%
Ratio: Adult males: Adults females	93%	94%		200%	86%
% Population as children	37%	38%		16%	37%
Settler	N=177	N=44	N=59	N=62	N=12
Household members, total	909	212	299	340	58
Household members, mean	5.14	4.82	5.07	5.48	4.83
Household members, std dvn	3.10	3.38	3.42	2.63	2.69
Household members, median	5	4	5	5.5	4
% Adults Non-resident	14%	17%	16%	12%	6%
Ratio: Adult males: Adults females	119%	125%	143%	104%	79%
% Population as children	41%	37%	40%	45%	41%

Source Census data

These differences were reflected in the demographic detail of the communities. Average household size was 6.5 for the whole population, but indigenous households were a little larger, at 7 persons, than the settler households at 5 persons. Overall 20% of adults were non-resident, but this fraction tended to be higher amongst the native than the settler households. The native households also had more adult females than men, a situation that was reversed in the settler households.

Table 4.4: Female headed households

Village	Aboabo	Adiembra	Botenso	Tanoso	***Total***
Female	100	3	4	40	***147***
Male	200	56	64	66	***386***
Total	***300***	***59***	***68***	***106***	***533***

Source: Census data

There was also a notable contrast in the incidence of female-headed households, see Table 4.4. In Aboabo and Tanoso one third or more of households were headed by females: in Adiembra and Botenso, less than one in fifteen households had female heads.

Village livelihoods: the main occupations

Table 4.5 shows the main activities undertaken in the communities studied , while Table 4.5 adds some quantitative detail to this description, based on a survey of a sample of the households.

Table 4.5: Major economic activities seen in the study villages

	Traditional farming (in order of importance)	***Non-traditional or emerging farming (in order of importance)***	***Non-farm***
Aboabo No 2			
Male (elderly)	Cocoa Cocoyam Plantain Cassava Maize		
Male (youth)	Cocoa Cocoyam Plantain Cassava Maize	Oil palm (since 1998) Rice (since 1996) Vegetables	Logging Carpentry (Building, Furniture) Masonry Charcoal production Hunting Charcoal production
Female	Cocoyam Plantain Cassava Maize Cocoa		Trading Dressmaking Hairdressing
Adiembra Nkwanta	***Traditional farming (in order of importance)***	***Non-traditional or emerging farming (in order of importance)***	***Non-farm***
Male	Maize (100%) Yam (100%) Cassava (100%) Groundnut (90%) Cowpea (30%) Sorghum (20%) Rice (10%)		Charcoal
Female	Maize (100%)		Charcoal
Botenso			
Indigenous male	Yam Cassava Maize	Cashew Teak Tobacco Vegetables	
Settler male	Yam Cassava Maize Sorghum	Vegetables	
Settler female	No fields of their own; worked on fields of spouses		
Tanoso			
Male	Cassava	Vegetables (mainly tomato)	Carpentry

	Yam	tomato)	Trading
	Maize		
Female	Cassava	Vegetables (mainly tomato)	Trading (mainly foodstuff)
	Maize		

Source: Initial reconnaissance of villages

Livelihoods were centred on agriculture. The great majority of the households were engaged in cultivating food crops, and for most of them, this was their main source of income. Vegetable production was the second most common occupation. Some households also had tree crops or livestock, but these were rarely the mainstays of their livelihoods.

After farming, the principal occupations were charcoal making, artisan work (mostly carpentry), and small-scale trading.

Other occupations and income sources were relatively rare. Quite remarkable here is just how few households worked for others, either on farms or on other jobs. Given that crop farmers typically hire in labour at peak periods, from where does this labour come? The answer may well be that much of the hired labour used on fields comes from seasonal migrants who do not form part of the village population.

Two points stand out. One is the high degree to which the households were self-employed, independent of labour markets, and the emphasis they placed on producing their own food.

The second point is the extent to which livelihoods were constructed around the use of local natural resources — above all, land, water, and trees.

Table 4.6: Work undertaken and income sources, surveyed households

No cases = 55	***Head of household***		***Others in household***	
Work	***Engaged***	***Ranked 1st or 2nd***	***Engaged***	***Ranked 1st or 2nd***
Food Crops	92.7%	81.8%	67.3%	65.5%
Vegetables	49.1%	40.0%	32.7%	29.1%
Tree Crops	7.3%	1.8%	5.5%	0.0%
Livestock	14.5%	3.6%	5.5%	3.6%
Farm Labour	3.6%	0.0%		
Non-Farm Labour	5.5%	1.8%		
Charcoal	30.9%	29.1%	20.0%	16.4%
Small Trading	14.5%	3.6%	9.1%	7.3%
Trading			1.8%	1.8%
Artisan	29.1%	25.5%	3.6%	3.6%
Services	5.5%	3.6%	1.8%	1.8%
Business	1.8%	0.0%	1.8%	0.0%
Salaried Job	3.6%	1.8%		
Income				
Food Crops	87.3%	74.5%	60.0%	56.4%
Vegetables	45.5%	34.5%	27.3%	25.5%
Tree Crops	5.5%	3.6%	5.5%	5.5%
Livestock	10.9%	1.8%	7.3%	1.8%

Farm Labour	3.6%	1.8%		
Non-Farm Labour	5.5%	1.8%		
Charcoal	30.9%	30.9%	21.8%	18.2%
Small Trading	12.7%	5.5%	10.9%	9.1%
Trading			1.8%	1.8%
Artisan	27.3%	25.5%	3.6%	3.6%
Services	5.5%	3.6%		
Business	1.8%	0.0%		
Salaried Job	3.6%	1.8%	3.6%	1.8%
Govt Payments	3.6%	1.8%	1.8%	1.8%

Source: Survey data

Incidence of occupations most affected by environmental policies

Of the population of the communities surveyed, almost half the households were engaged in one or more of the key occupations identified as vulnerable to environmental policies, see Table 4.7. Vegetable production was by far the most widespread of the occupations. By village, the two with the highest concentration of households engaged in these occupations were Botenso and Tanoso, by virtue of the number of vegetable growers in each community. In Adiembra, almost 60% of the households produced charcoal. Only in Aboabo was there limited participation in the key occupations. Settlers, much in evidence in vegetable growing and charcoal-making, were more likely to undertake environmentally sensitive occupations than the native households.

Table 4.7: Incidence of occupations most affected by environmental policies

	Total		***Aboabo***		***Adiembra***		***Botenso***		***Tanoso***	
Total		%		%		%		%		%
Cases	***532***		***300***		***59***		***68***		***105***	
Charcoal makers	45	8%	1	0%	35	59%	7	10%	2	2%
Vegetable producers	195	37 %	32	11 %	1	2%	65	96%	97	92%
Chainsaw operators	15	3%	9	3%	0	0%	3	4%	3	3%
Carpenters	33	6%	12	4%	0	0%	4	6%	17	16%
Any of four	250	47 %	48	16 %	35	59%	66	97%	101	95%
Natives										
Cases	***353***		***256***				***6***		***93***	
Charcoal makers	3	1%	1	0%			1	17%	1	1%
Vegetable producers	121	34 %	30	12 %			6	100 %	85	91%
Chainsaw operators	11	3%	8	3%				0%	3	3%
Carpenters	25	7%	9	4%				0%	16	17%
Any of four	138	39 %	43	17 %			6	100 %	89	95%
Settlers										

Cases	*177*		*44*		*59*		*62*		*12*	
Charcoal makers	42	24 %		0%	35	59%	6	10%	1	8%
Vegetable producers	74	42 %	2	5%	1	2%	59	95%	12	100%
Chainsaw operators	4	2%	1	2%		0%	3	5%		0%
Carpenters	8	5%	3	7%		0%	4	6%	1	8%
Any of four	112	63 %	5	11 %	35	59%	60	97%	12	100%

Source: Census data

Environmental policies in the study villages

Awareness, perceptions and enforcement of policies

Table 4.8 summarises the awareness, perceptions and degree of enforcement of environmental policies seen in three of the four communities.

In all three settlements, people were well aware of the existence of policies and regulations, with the exception of those applying to the safe use of pesticides.

Perceptions and enforcement varied. The ban on chain saw use was typically seen as bad since it harmed local livelihoods. In these cases, enforcement was left to the FD that found it difficult to enforce and complained that punishments were not sufficient to deter chainsaw operators. In Botenso, however, the ban was welcomed since the settlers who made up the bulk of the population had no control over the trees on their land and feared crop damage from illegal chainsawing.

Bush fire and riverain planting regulations were widely seen as good and were enforced, partly through educational campaigns by the Fires Service and District Assemblies, but mainly through village authorities such as Unit Committees and elders. In one case, however, that of bush fires in Adiembra Nkwanta, the fires were set by hunters from outside the community over whom the local population had no control. The locals complained that the hunters had permits issued by the District Assembly. The inability to prevent group hunting was probably linked to the poverty and low status of the settlers of Adiembra, compared to wealthier indigenes with political connections.

Table 4.8: Awareness, perceptions and enforcement of environmental policies and regulations

Policy and community	***Awareness***	***Perception of policy by majority***	***Enforcement***	
			District	***Community***
Ban on timber felling (with chain saw) without permit				
Aboabo No.2	High	Bad	By Forestry Service; personnel find it difficult. Punishment for offenders not enough to deter others	Not interested in enforcement; farmers not consulted on timber tree management
Adiembra Nkwanta	High	Bad	By Forestry Service; personnel find it difficult. Punishment for offenders not enough to deter others	Not interested in enforcement; adverse impact on livelihood
Botenso	High	Good	By Forestry Service	Settlers who constitute the bulk of the population no control over timber species
Bush fire control				
Aboabo No. 2	High	Good	By Fire Service through educational programmes	Enforced; education as well as sanctions for offenders
Adiembra Nkwanta	High	Good	By Fire Service through educational programmes	Enforced within community, but outsiders over whom there is no control cause bush fires through group hunting
Botenso	High	Good	By Fire Service through educational programmes	Enforced within community by Unit Committee
Hunting (no group hunting)				
Aboabo No. 2	High	Good	Education by District Assembly	No group hunting
Adiembra Nkwanta	High	Good	Education by District Assembly	Not able to enforce as those engaged in it do not reside in the village
Botenso	High	Good	Education by District Assembly	No group hunting

Table 4.8 (Continued): Awareness, perceptions and enforcement of environmental policies and regulations

Policy and community	***Awareness***	***Perception of policy by majority***	***Enforcement***	
			District	***Community***
Riverain protection				
Aboabo No. 2	High	Good	Education by District Assembly	Enforced; traditional customs pre-dated policy
Adiembra Nkwanta	High	Good	Education by District Assembly	Enforced; traditional customs pre-dated policy
Botenso	High	Good	Education by District Assembly	Enforced; traditional customs pre-dated policy
Safe use of pesticides				
Aboabo No. 2	Low	Not much information to use to judge	Not enforced; MOFA responsible through extension	No knowledge
Adiembra Nkwanta	Low	None	Not enforced; MOFA responsible through extension	No impact
Botenso	Fair	Good	Not enforced; MOFA responsible through extension	Self-regulation
Confinement of livestock				
Aboabo No. 2	High	No strong views (not an important activity)	By environmental health personnel of District Assembly	Unit Committee expected to enforce
Adiembra Nkwanta	High	Bad	By environmental health personnel of District Assembly	Unit Committee expected to enforce but not enforced
Botenso	High	Good	By environmental health personnel of District Assembly	Unit Committee expected to enforce but not regarded as a threat
Dead wood for charcoal				
Aboabo No. 2	High	Not effective due to scarcity of dead wood, which would otherwise be preferred.	No bylaw to back policy	No enforcement

Adiembra Nkwanta	High	Not effective; dead wood not available	Draft bylaw; not yet legally operational	No enforcement
Botenso	High	Not effective due to scarcity of dead wood, which would otherwise be preferred.	Draft bylaw; not yet legally operational Promotion of wood lots as alternative source of wood	No enforcement

Source: Reconnaissance surveys

Only in Botenso was there any recognition of pesticides regulations and here there was acceptance of these, with locals claiming that they did follow codes in response to extension messages. Otherwise, these rules were unknown and unenforced.

Bans on group hunting were seen as good. Since no locals went hunting in groups, there was nothing to enforce. The exception to this was the problem with outsiders hunting in groups in Adeimbra Nkwanta, as noted.

Rules to confine livestock were seen as unimportant in Aboabo, reflecting the lack of livestock in that community, as bad in Adiembra and as good in Botenso. Perceptions seem to correlate with the presence or absence of significant numbers of livestock. Enforcement was mainly local and depended on local perceptions.

Finally, regulations that charcoal should be made from dead wood was well known, but seen as ineffective. Charcoal was made from living wood, but only since the otherwise preferred dead wood was scarce. The rule was not enforced.

In summary, three points stand out. First, in most cases and most communities, people were aware of the existence of controls on the use of natural resources. Second, perceptions varied largely according to the effect of the policies on livelihoods — see below. Where the rules were likely to protect crops, people were in favour. When they prevented or made more difficult an important activity, the rules were opposed. Third, enforcement was only effective when implemented through village structures with community backing. Otherwise, the efforts of central government agencies and even the District Assemblies were widely ignored when they ran counter to village interests.

Environmental impacts on livelihoods perceived

Discussions with residents in three villages provided a list of perceived impacts of environmental policies on livelihoods, as outlined in Table 4.9.

Table 4.9: Impacts on livelihoods of environmental policies

	Policy and impact **[Village in question in parentheses: AA=Aboabo AN=Adiembra Nkwanta BO=Botenso]**
Affected occupations	***Ban on chainsawing for timber***
Chain saw operators	Lost income as services no longer required; some moved into farming while others have emigrated. Loss of income reduces capital for farming [AA]
Wood carriers	Lost wages from transporting sawn timber from fields to assembly points [AA]
Sawn wood dealers	Lost income from reduced sales [AA]
Carpenters	Lack of sawn wood drives up price for furniture, doors, window frames — and hence: Less demand for construction works (new buildings) Less demand for furniture [AA]
Masons	Less demand for services as mud houses (the most common) unable to stand rains for long without roofing; less people building because of higher prices for roofing timber [AA]
Charcoal makers	Production cut drastically, incomes down, as left-overs from felled trees no longer available for charcoal production [AA] Little impact: operators from Ejura visit to fell trees [AN] Little impact: only 2 men so employed [BO]
Consumers of	Higher prices for products [AA]

timber (Building, furniture)	

Table 4.9 (Con'd)

	Bush fire controls
Farmers	Loss of crops prevented [AA], [AN], [BO] Improved soil fertility through organic matter conservation [AA], [AN], [BO]
Hunters	Less game caught since setting of fire makes catches easier (little adverse impact — few hunters and bullets also very expensive) [AA]
	Riverain protection
Farmers	[Farmers with fields by rivers] Little impact [AA] Little impact: a traditional practice [AN], [BO]
	Safe use of pesticides
Vegetable producers	Little impact — few people, no knowledge [AA] Little impact: follow old practices, no education [AN], [BO]
	Confinement of livestock
Livestock keepers	Little impact — livestock not important [AA], [BO] Little impact: livestock not contained [AN]

Source: Initial reconnaissance

The main impact recorded in the initial reconnaissance survey was that of the ban on chainsawing for timber in Aboabo. The ban had directly affected ten young men directly engaged in chainsawing and those they employed as porters. Indirectly, it had raised the price of sawn lumber, with adverse effects on furniture makers and construction work. It had also deprived charcoal burners of cheap off-cuts.

In other cases, there had been little or no impact from environmental policies since they had either not been enforced or potentially vulnerable livelihoods were few.

Four key occupations vulnerable to environmental policies

Employment and earnings in the four occupations

Table 4.10 shows the number of days worked and typical earnings arising from the four selected occupations. In total, the four jobs offered an average of 152 days work a year, but a median of just 34 days work. Thus many of the jobs generated in these occupations were strictly part- time. There were more days worked in carpentry and chainsawing a year than in charcoal burning or vegetable growing.

Patterns were highly uneven, as can be seen by the very high standard deviations. The sample was thus heterogeneous by degree of involvement, with just a few households heavily engaged in one or other of the four occupations while the majority were only partially or even marginally engaged.

Average daily earnings were just over ¢25k (US$3.55), but the median was just ¢15k (US$2.14). Variations were again great. Those between communities largely reflected the degree to which they were engaged in the different occupations. Charcoal burning emerged as the best rewarded of the four occupations, chainsaw operations as the least well rewarded — although the data for chainsaws has to be treated with scepticism, given the reluctance of operators to admit to earnings from activities that were illegal or semi-legal at best.

Perhaps the most interesting finding from the earnings is how well they compare to daily rural wage labour rates, that varied between a mode of ¢5k a day with some reports of ¢10k a day applying.

Table 4.10: Employment and earnings in four occupations

		Total	*Aboabo*	*Adiembra*	*Botenso*	*Tanoso*
Total	***Valid N***	***N=55***	***N=16***	***N=15***	***N=11***	***N=13***
Annual days worked in all four	Mean	152	252	146	32	136
	Std Dev.	391	644	242	17	275
	Median	34	57	19	28	41
Average return to labour, Cedis/Day	Mean	25,427	13,689	23,614	42,063	27,889
	Std Dev.	43,075	38,848	22,020	53,046	55,717
	Median	15,094	14,170	15,094	21,254	11,106
Annual income 4 occ, Cedis '000s	Mean	4,606	4,610	5,776	1,639	5,761
	Std Dev.	14,428	16,443	18,501	3,139	13,418
	Median	441	807	389	558	480
Carpentry	Valid N	N=14	N=8		N=1	N=5
Annual days worked	Mean	337	445	.	21	228
	Std Dev.	715	892	.	.	451
	Median	49	131	.	21	34
Average return to labour, Cedis/Day	Mean	18,772	18,111	.	21,254	19,335
	Std Dev.	11,916	10,775	.	.	15,985
	Median	17,454	17,066	.	21,254	15,777
Annual income from 4 occ, Cedis k	Mean	9,473	10,409	.	441	9,783
	Std Dev.	19,939	21,649	.	.	21,204
	Median	887	1,907	.	441	414
Chainsaw	Valid N	N=9	N=5			N=4
Annual days worked	Mean	103	89	.	.	120
	Std Dev.	78	99	.	.	48
	Median	96	56	.	.	96
Average return to labour, Cedis/Day	Mean	15,026	14,293	.	.	15,943
	Std Dev.	49,991	69,920	.	.	11,990
	Median	6,500	-9,250	.	.	14,969
Annual income from 4 occ, Cedis k	Mean	-122	-1,997	.	.	2,222
	Std Dev.	5,962	7,554	.	.	2,350
	Median	624	-259	.	.	1,437
Charcoal	Valid N	N=17		N=15	N=2	
Annual days worked	Mean	133	.	146	37	.
	Std Dev.	230	.	242	30	.
	Median	19	.	19	37	.
Average return to labour, Cedis/Day	Mean	33,997	.	23,614	111,871	.
	Std Dev.	44,701	.	22,020	106,944	.

	Median	18,400	.	15,094	111,871	.
Annual income from 4 occ, Cedis k	Mean	5,770	.	5,776	5,727	.
	Std Dev.	17,401	.	18,506	7,279	.
	Median	416	.	389	5,727	.

Table 4.10: Employment and earnings in four occupations (con'd)

		Total	*Aboabo*	*Adiembra*	*Botenso*	*Tanoso*
Vegetable production	Valid N	N=15	N=3		N=8	N=4
Annual days worked	Mean	29	12	.	33	36
	Std Dev.	21	8	.	16	32
	Median	25	15	.	29	29
Average return to labour, Cedis/Day	Mean	28,166	891	.	27,212	50,529
	Std Dev.	55,697	28,455	.	26,074	104,581
	Median	11,160	13,340	.	15,045	8,233
Annual income from 4 occ, Cedis k	Mean	1,581	161	.	767	4,272
	Std Dev.	4,232	238	.	810	8,281
	Median	378	200	.	544	250

Source: Survey data

Incomes from the four occupations averaged over ¢4.6M (US$655), but again with wide variation, so that the median amount was ¢420,000 (US$63). The largest total annual incomes came from carpentry and chainsaws, reflecting the greater number of days worked in these occupations.

If the earnings from the four occupations were modest, they were almost entirely cash earnings. Given that other key activities such as food crops mainly generated value in kind, the four occupations in question generated a disproportionate amount of cash income.

Carpentry

Fourteen carpenters were surveyed, eight from Aboabo, six from Tanoso, and one from Botenso.

Table 4.11: Characteristics of carpenters

		Aboabo	Adiembra	**Botenso**	**Tanoso**	**Total**
15-29 yrs	Male	7		1	4	12
30-49 yrs	Male				1	1
50 yrs>	Male	1				1
	No Schooling			1		1
	Primary	8			5	13
	Secondary					
	Settler	2		1		3
	Native	6			5	11
	Total	**8**		**1**	**5**	**14**

Source: Survey data

The carpenters were mostly young men, with primary schooling. The lack of older carpenters reflects the rise of carpentry as a specialised trade in the villages. This responds in part to increasing local demand for furniture as well as the availability of training in carpentry.

Table 4.12: Carpentry, economics

Village	*Work days in a week*	*No of tools*	*Total labour, days, year*	*Total value raw material, Cedis*	*Total value of production), Cedis*	*Net return to labour (less material costs only), Cedis/day*
All						
Median	5	15	49	1,089,900	1,914,500	17,454
IQ Range	*0.75*	*23*	*202*	*4,142,500*	*6,458,750*	*10,929*
Average	4.57	21	337	10,125,736	19,598,931	18,772
Std Deviation	*1.28*	*14*	*714*	*20,321,594*	*39,805,349*	*11,916*
Aboabo						
Median	5	15	130	4,292,500	5,595,000	15,000
IQ Range	*0.5*	*23*	*236*	*7,743,350*	*14,476,500*	*11,860*
Average	4.8	22	489	10,286,400	21,823,143	17,965
Std Deviation	*0.69*	*14*	*954*	*17,777,915*	*40,871,292*	*11,630*
Tanoso						
Median	5	15	34	632,000	1,073,028	19,131
IQ Range	*1.5*	*14*	*62*	*1,269,000*	*2,395,000*	*7,447*
Average	4.00	19	185	9,965,071	17,374,718	19,580
Std Deviation	*1.53*	*15*	*377*	*24,055,098*	*41,844,993*	*13,073*

Source: Survey data

Most of the carpenters claimed to work five days a week, with an average of 337 days worked annually. The median number of days reported, however, was just 49 —with very wide variations in the number of days worked. The carpenters of Aboabo had markedly more days work than those in Tanoso. On average, the carpenters produced goods worth almost ¢20M (US$2,855) a year; although the median value was far less, at ¢5.6M (US$800). Again, the total production was higher in Aboabo than in Tanoso.

Returns to carpentry were similar in both communities, with an overall average of ¢18,770 (US$2.70) a day. This was far more than the daily wage typically paid to farm labourers of ¢5k.

Sources of wood and changes in production

Table 4.13: Carpentry, changes in activity over last three years

	More work			**Less work**		
	First important	*Second important*	*Third important*	*First important*	*Second important*	*Third important*
Domestic furniture	6	1	0	2	4	1
School & Office furniture	2	2	0	0	1	1
Construction	4	0	1	7	2	0
Repairs	1	2	1	4	5	0
Other (Coffins)	0	1	0	0	0	0

Source: Survey data

Table 4.13 suggests that there has been, for most carpenters, an increase in the production of domestic, school and office furniture. In contrast, the amount of time spent on construction and repairs has declined for most of the respondents. That said, the patterns reveal quite different movements for different carpenters.

Table 4.14: Carpentry, sources of wood and changes during the last three years

	Source of wood today				*Source of wood three years ago*			
	% bush cut	*% sawmill lumber*	*% sawmill reject*	*% other*	*% bush cut*	*% sawmill lumber*	*% sawmill reject*	*% other*
All								
Median	20	0	25	0	70	0	0	0
IQ Range	*100*	*37.5*	*57.5*	*0*	*77.5*	*32.5*	*7.5*	*0*
Average	43	16	33	6	60	18	15	0
Std Deviation	*47*	*22*	*36*	*24*	*40*	*31*	*32*	*0*
Aboabo								
Median	60	0	0	0	50	0	0	0
IQ Range	*100*	*10*	*50*	*0*	*80*	*50*	*10*	*0*
Average	52	11	27	10	44	23	21	0
Std Deviation	*47*	*20*	*40*	*30*	*41*	*36*	*39*	*0*
Tanoso								
Median	0	30	50		100	0	0	
IQ Range	*50*	*40*	*20*		*20*	*0*	*0*	
Average	30	26	44		88	8	4	
Std Deviation	*45*	*26*	*27*		*18*	*13*	*9*	

Source: Survey data

The main source of wood was that cut in the bush, with an average of 43% of the wood used — more in the case of Aboabo, less for Tanoso, as might be expected given the closeness of the former village to the forest. Sawmill rejects were the most important source for the carpenters of Tanoso. Only a small amount of the wood used came from sawmilled lumber.

Marked changes in wood sources were reported. In Tanoso, there had been a major move from bush cut timber to that coming from sawmills, mainly as rejects but also as lumber. This might be attributed to the impact of the restrictions on chainsawing and to proximity to the sawmills at Techiman that provided an alternative source of wood in the form of off-cuts and waste.

In Aboabo, however, the trend was the reverse, with more bush-cut timber used and less use of sawmilled lumber. This move surprises, not only because of the restrictions on the use of chainsaws, but also because the presence of forest guards in the community that should make

implementation of restrictions effective. Indeed, this data runs counter to that collected during the initial reconnaissance when it was reported that carpentry had suffered from increasing cost of wood following the chainsaw ban. A possible resolution of this seemingly contradictory information is that the qualitative reports deal with the immediate consequences of the ban, but that since 1998, the chainsaws have returned and wood is as available as ever it was.

Chainsaw operators

Just nine chainsaw operators were interviewed, four from Tanoso and five from Aboabo.

Table 4.15: Characteristics of chainsaw operators

		Aboabo	Adiembra Botenso	Tanoso	Total
15-29 yrs	Male	2		1	3
30-49 yrs	Male	3		3	6
50 yrs>	Male				
	No Schooling	1			1
	Primary	4		4	8
	Secondary				
	Settler	3		3	7
	Native	2		1	2
	Total	**5**		**4**	**9**

Source: Survey data

The chainsaw operators were exclusively male, all aged under 50 years. None had secondary education.

Economics of chainsaws

Four of the chainsaws were owner-operated, three were hired by the operator, and in two cases the interviewees were directly employed by the owner of the chainsaw. Data was collected on the use of the saws *before* the restrictions were imposed.

Table 4.16: Economics of chainsaw operators — before restrictions

	Unit	Average	*Std Dvn*	Median
Wet Season				
Weeks worked		10	7	8
Gross income	Cedis	3,921,429	3,641,412	1,800,000
Labour days	Days	53	45	32
Returns to labour	Cedis/Day	17,821	47,838	9,375
Dry Season				
Weeks worked		14	5	16
Gross income	Cedis	4,957,143	4,532,791	4,800,000
Labour days	Days	79	37	96
Returns to labour	Cedis/Da	-815	54,458	6,500

	y			
All year				
Total labour, year round	Days	103	78	96
Returns to labour, year round	Cedis/Day	27,257	57,476	18,500

Source: Survey data

Note: Labour days reported are those for the respondent only. In most cases, the operator would also have hired an assistant, so the saw generated twice the labour days indicated in this table.

Chainsaw operators had worked an average of 103 days a year with the saw, with more work in the dry season than in the wet. Returns reported were highly variable. On average they were more than ¢27k (US$3.85) a day, but with a lower median value.

Changes in use of the chainsaw

Table 4.17 shows the reported previous and current uses of the chainsaws.

Table 4.17: Changes in the use of chainsaws

Ranking:		**Total**		**Aboabo**		**Tanoso**	
	Count	1st or 2nd	No mention	1st or 2nd	No mention	1st or 2nd	No mention
Wet season use before restrictions							
Farm clearing	9	4	3	3	1	1	2
Firewood cutting	9	2	6	0	4	2	2
Tree cutting for charcoal	9	0	6	0	3	0	3
Tree cutting for timber	9	3	5	3	1	0	4
Tree cutting for lumber	9	3	5	3	1	0	4
Other	9	1	7	1	4	0	3
Wet season use after restrictions							
Farm clearing	9	2	7	2	3	0	4
Firewood cutting	9	1	7	1	3	0	4
Tree cutting for charcoal	9	0	7	0	3	0	4
Tree cutting for timber	9	2	7	2	3	0	4
Tree cutting for lumber	9	0	9	0	5	0	4
Other	9	0	9	0	5	0	4
Dry season use before restrictions							
Farm clearing	9	3	4	1	4	2	0
Firewood cutting	9	3	5	1	4	2	1
Tree cutting for charcoal	9	1	5	0	4	1	1
Tree cutting for timber	9	5	3	2	2	3	1
Tree cutting for lumber	9	2	5	1	3	1	2
Other	9	0	8	0	5	0	3
Dry season use after restrictions							

Farm clearing	9	3	6	1	4	2	2
Firewood cutting	9	4	5	1	4	3	1
Tree cutting for charcoal	9	1	4	0	3	1	1
Tree cutting for timber	9	2	6	2	3	0	3
Tree cutting for lumber	9	1	8	1	4	0	4
Other	9	0	9	0	5	0	4

Source: Survey data

During the wet season, the chainsaws had been used both to clear farms and to extract fuelwood, as well as to cut timber and lumber — the latter being particularly the case in Aboabo. After the restrictions, use of the saws continued for farm clearing and fuelwood in Aboabo, but was much curtailed in Tanoso.

For the dry season, the pattern of use and change for Aboabo was similar to that for the wet season. For Tanoso, however, there had been much more use of the saws in the dry season both for farm clearing and extraction of fuelwood as well as to cut timber and lumber. After the restrictions, the saws have reportedly only been used for farm clearing and firewood cutting.

Understanding of the legal restrictions on chainsaw use

Table 4.18: Understanding of restrictions on chainsaw use

	Restrictions on farm clearing	Restrictions on cutting for firewood	Restrictions on cutting for charcoal	Restrictions on cutting for timber	Restrictions on cutting for lumber	Restrictions on other activity
Outright Ban	1	4	5	6	7	1
Permit required	6	5	2	3	2	0
None	0	0	2	0	0	0
No idea/Can't tell	2	0	0	0	0	0

Source: Survey data

Almost all chainsaw operators were aware of restrictions on the use of the saws. There was, however, considerably mixed understanding as to whether activities were banned outright or whether they were subject to a permit. Only on cutting of timber and lumber was there a clear

majority realising that this was banned, and only for clearing of farm land was there the widespread belief that a permit was necessary.

Opinions on restrictions were more consistent in Tanoso than in Aboabo, where there were marked differences of understandings.

Table 4.19: Understanding of who enforces regulations

	Enforcement of restrictions on farm clearing	Enforcement of restrictions on cutting for firewood	Enforcement of restrictions on cutting for charcoal	Enforcement of restrictions on cutting for timber	Enforcement of restrictions on cutting for lumber
Forestry Department	6	7	7	8	8
District Assembly	0	1	0	0	0
Unit Committee	1	1	0	0	0
Traditional authority	0	0	0	0	0
Security service	0	2	2	1	1
No idea/Can't tell	2	0	1	0	0

Source: Survey

There was widespread understanding that the regulations were enforced by the Forestry Service. Some also thought that security forces were also involved. Notably, very few believed that local authorities, in the form of the District Assemblies or the Unit Committees, had anything to do with enforcing the rules.

Charcoal production

There were 17 charcoal producers surveyed, 15 from Adiembra Nkwanta and two from Botenso.

Table 4.20: Characteristics of charcoal makers

		Aboabo	**Adiembra**	**Botenso**	Tanoso	**Total**
15-29 yrs	Male		3			3
30-49 yrs	Male		4	1		5
	Female		5			5
50 yrs>	Male		4			4
	No Schooling		8			8
	Primary		4	1		5
	Secondary		4			4
	Settler		14	1		15
	Native		2			2

Total	**16**	**1**	**17**

Source: Survey data

Charcoal burners came from all age groups, with a slight bias to the middle-aged. They were mostly men, but the seventeen include five females. Educationally, the charcoal producers came from across the spectrum from no schooling to those with secondary education. Although the majority had not been to school, since almost all the charcoal makers were from Adiembra Nkwanta and the community was entirely made up of settlers from the north of Ghana, the preponderance of the unschooled is unsurprising.

Economic returns to charcoal

Table 4.21: Household economics of charcoal production

	Annual		***Wet Season***		***Dry Season***	
No observations	17		15		17	
	Median	***IQ Range***	**Median**	***IQ Range***	**Median**	***IQ Range***
Bags produced/household	40	*275*	20	*190*	30	*84*
Total value charcoal sold, Cedis	232,000	*1,620,000*	120,000	*1,140,000*	168,000	*470,400*
Household Labour, Days	19	*95*	8	*26*	12	*67*
Labour days/Bag	0.50	*0.33*	0.54	*0.32*	0.50	*0.50*
Returns per Bag, Cedis	9,200	*7,227*	9,200	*8,091*	11,200	*9,400*
Returns per Day of Household Labour, Cedis	18,400	*25,491*	18,400	*27,407*	22,400	*29,938*
Two Main Crops						
No observations	15					
Area tilled, acres	2.50	*3.00*				
Area tilled, ha	1.01	*1.21*				
Household Labour, Days	28	*23*				
Gross value production, Cedis	740,000	*860,000*				
Returns per Day of Household Labour, Cedis	27,500	*29,958*				

Source: Survey data

Charcoal producers typically made 40 bags (of 35-50 kg[10]) of charcoal a year, and devoted just 19 days to the task. Sales were worth ¢232k (US$33) a household at the median, but with very large variations amongst the producers surveyed. The return per day was just over ¢18k (US$2.55). This compares well to the rates paid for day labouring of around ¢5k a day.

Charcoal production tended to be seasonal, with most producers spending more time making charcoal in the dry season. Somewhat surprisingly, the returns to charcoal making appeared higher in the dry season — despite the premium applying to selling charcoal in the wet season when less is supplied to the market and prices increase.

For the producers surveyed, charcoal making took up less time than they spent on their main field crops, produced just over one third the total value represented by the crops, and

[10] See UNDP/National Energy Board 1988, Table 4.2. Typical weights of maxi bags supplied from Ejura to Kumasi or Accra.

returned less for every day worked. That said, the advantage of charcoal was that all the output was sold so generating cash. Most of the crops were consumed at home and did not generate cash.

Sources of wood and changes seen in charcoal production

Table 4.22: Charcoal Production, wood sources and changes

		Total	*Yes*	*No*
Wet season wood distance, km Median (IQ Range)	2 (1.5)			
Wet season, dead wood use		15	15	0
Wet season, live wood use		15	9	6
Wet, timber waste cut use		15	0	15
Wet season, other wood use		15	0	15
Wet season wood payment?		15	2	13
Wet season wood source same 3 years ago?		15	1	14
Change in wet season source last 3 yrs		15		
➢ Less wood than before			10	
➢ Travel longer distances than before			3	
➢ Use more live wood than before			1	
Dry season wood distance, km Median (IQ Range)	2 (1.5)			
Dry season, dead wood use		17	17	0
Dry season, live wood use		17	9	8
Dry season, timber waste cut use		17	0	17
Dry season, other wood use		17	0	17
Dry season wood payment?		17	2	15
Dry season wood source same 3 years ago?		17	1	16
Change in dry season wood source in last 3 years		17		
➢ Less wood than before			13	
➢ Travel longer distances than before			2	
➢ Use more live wood than before			1	

Source: Survey data

During both the wet and dry seasons, all producers used dead wood to make charcoal, and 60% or more cut live wood as well. No use was made of timber waste in the two communities where charcoal was made.

Almost all producers reported that their sources of wood in both seasons had changed over the preceding three years. They complained that there was less wood available than before, and a few added that they had to travel further to find wood. One producer admitted to using more live wood than before.

Vegetable Production

Fifteen vegetable producers were surveyed, from three villages with the exception of Adiembra, see Table 4.23. The vegetable producers were recruited from all age groups, with a slight bias to the middle aged who made up nine of the 15. Men were the majority, women making up one third of the producers. By education, almost half had no schooling but this may represent nothing more than the preponderance of growers from Botenso, a settler community with relatively low levels of formal education.

Table 4.23: Characteristics of vegetable growers

		Aboabo	Adiembra	Botenso	Tanoso	Total
15-29 yrs	Male			2		2
	Female				1	1
30-49 yrs	Male	1		4		5
	Female	2			2	4
50 yrs>	Male			2		2
	Female				1	1
	No Schooling	1		4	2	7
	Primary	1		3	2	6
	Secondary	1		1		2
	Settler	1		7	2	10
	Native	2		1	2	5
	Total	**3**		**8**	**4**	**15**

Source: Survey data

Table 4.24: Vegetable producers surveyed

Village		Aboabo	Botenso	Tanoso	Total
Cases	Wet	3	6	5	14
	Dry	4	2	4	10
	Total	4	6	5	15
Area (Acres)	Wet	6.00	6.00	9.00	21.00
	Dry	6.00	0.75	7.50	14.25
	Gross	12.00	6.75	16.50	35.25
Wet Season Location					
Home Garden	Cases	0	1	0	1
>100m from water course	Cases	2	5	4	11
Other	Cases	1	0	1	2
Home Garden	Area	0.00	0.50	0.00	0.50
>100m from water course	Area	4.00	5.50	4.00	13.50
Other	Area	2.00	0.00	5.00	7.00
Dry Season Location					
Home Garden	Cases	0	1	0	1
>100m from water course	Cases	3	1	4	8
<100m from water course	Cases	1	0	0	1
Home Garden	Area	0.00	0.25	0.00	0.25
>100m from water course	Area	5.00	0.50	7.50	13.00
<100m from water course	Area	1.00	0.00	0.00	1.00
Dry Season water source					
Well	Cases	3	1	0	4
River, Valley					
	Cases	1	1	1	3
Rain	Cases	0	0	3	3
Well	Area	5.00	0.25	0.00	5.25
River, Valley	Area	1.00	0.50	0.50	2.00
Rain	Area	0.00	0.00	7.00	7.00

Source: Survey data

Fifteen vegetable producers were surveyed, from three of the villages. In total they cultivated a gross area of over 35 acres. There were more producers and a larger total area worked during the wet season, than during the dry season. Most wet season plots were located over 100m from a water course. In the dry season, the majority of plots were more than 100m from water courses, and depended variously on irrigation water from wells and rivers, and on rain water (in the case of Tanoso) for moisture.

Vegetables: Production economics

Table 4.25 summarises the returns to vegetable production. A breakdown by village appears in Appendix B, Table B1. Most producers cultivated plots of less than 0.50 ha, in both wet and dry seasons. For the whole year, the average value of production was more than ¢2M (US$285), although the median value was ¢690k (US$70).

The most important crop was tomato, making up almost two-thirds of the total value. The pattern of cropping varied by season and village. Most of the tomato crop was grown in the wet season in Botenso and Tanoso. Pepper, garden egg and okra were the other main crops. Growers in Aboabo produced the full range of crops in both seasons. In marked contrast, those in Tanoso specialised in tomatoes during the wet and pepper in the dry seasons.

Producing vegetables involved substantial cash payments for hired labour, seed, fertiliser, chemicals, and, less commonly for water and land preparation.

Although vegetable production is relatively labour intensive, given the small areas cultivated the average household used just 29 days all year for this activity, supplemented by another 29 days of hired labour. Median amounts of labour were even less.

The returns to production showed an average gross margin of ¢898k (US$130) a ha in the wet season, and ¢845k (US$120) a ha in the dry season. Median values were less. Gross margins were highly variable. In the wet season, four out of 14 producers made a loss; in the dry season two out of ten growers made a loss. On the other hand, in five out of 24 harvests recorded, the gross margin per hectare exceeded ¢1M (US$145).

Returns to household labour in vegetable growing were also highly variable. The average return was over ¢36k (US$5.14) a day in each season, well in excess of the typical rural labour hiring rate of ¢5k a day. Median values were again lower, at ¢13k (US$1.85) and ¢19k (US$2.70) a day for the wet and dry seasons.

Table 4.25: Economics of vegetable production

Wet Season	Unit	Average	Std Dvn	Median
No of cases		14		
Area	ha	0.61	0.48	0.40
Gross Value Production	Cedis	1,441,007	3,485,387	465,050
Gross Value Production	Cedis/ha	1,612,579	1,625,322	1,303,435
% Gross Value in Tomato	%	69%	42%	100%
Fertiliser Use	Bags/ha	4.6	4.0	3.6
Costs of Production, net of Labour	Cedis	166,768	163,314	135,000
Costs of Production less Lab	Cedis/ha	298,502	205,015	323,697
Household Labour	Days	23	18	18
Hired Labour	Days	15	18	8
Total Labour Use	Days/ha	75	39	69
Hired Labour Rate	Cedis/Day	5,607	1,666	5,000
Gross margin	Cedis/ha	897,852	1,558,855	560,909
Return to Household Labour	Cedis/Day	36,356	67,850	12,776
Dry Season				
No of cases		10		
Area	ha	0.58	0.56	0.40
Gross Value Production	Cedis	987,500	1,362,398	392,500
Gross Value Production	Cedis/ha	1,472,696	957,246	1,216,951
% Gross Value in Tomato	%	31%	42%	10%
Fertiliser Use	Bags/ha	2.2	3.1	1.2
Costs of Production, net of Labour	Cedis	147,300	259,667	62,500
Costs of Production less Lab	Cedis/ha	269,706	341,373	123,548
Household Labour	Days	12	9	9
Hired Labour	Days	23	24	12
Total Labour Use	Days/ha	71	32	64
Hired Labour Rate	Cedis/Day	5,300	2,163	5,000
Gross margin	Cedis/ha	844,650	1,064,734	563,380
Return to Household Labour	Cedis/Day	37,580	55,709	19,417
Year Total				
No of cases		15		
Gross Area	ha	0.95	0.96	0.61
Gross Value Production	Cedis	2,003,273	4,496,181	690,000
% Gross Value in Tomato	%	58%	36%	63%
Costs of Production, net of Labour	Cedis	253,850	301,179	157,000
Household Labour	Days	29	21	25
Hired Labour	Days	29	37	13

Gross margin	Cedis/ha	710,488	1,096,806	223,211
Return to Household Labour	Cedis/Day	28,166	55,697	11,160

Source: Survey data

Use of chemicals

Crop protection chemicals were widely used in the wet season, when only four out of 14 growers did not spray their crop (see Table B2 for details). The most common chemical was *Kocide* (see Table B3 for technical details of these pesticides). Applied to all crops, nine out of ten users applied it against insects — despite its intended use as a fungicide, five against disease and fungus. Seven growers sprayed *Dithane*, mainly on tomatoes and garden eggs, as an insecticide — again, it is meant to be a fungicide. Four producers applied *Karate* as an insecticide across all vegetables. There were also three users of unspecified 'poison', and one each of 'DDT', *Sumithion* and *Thiodan* — all as insecticides.

Fewer growers applied chemicals in the dry season, only five out of ten spraying their dry season crops. *Kocide* and *Karate* were the two main chemicals applied, usually as insecticides across the range of crops being grown.

In both seasons, rates of application reported were highly variable. This may reflect inaccurate reporting, but may also be the result of chemicals being applied as and when either cash permitted their purchase or insects were observed in the fields.

Chemicals were obtained almost equally from shops and stores (mostly for Aboabo and Tanoso), and from the market (Botenso). Karate was bought by the litre. *Kocide* was usually bought by the sachet, while *Dithane* was obtained almost equally in litres or sachets.

Prices reported were often highly divergent, especially in the case of sachets. Some of the variation may represent the different costs applying in different places. But some of this may be reporting and recall errors. And some may arise from different units of measure, since many retailers repackage chemicals into smaller units using containers that are not of standard measure.

Asked about changes in the use of chemicals over the last three years, almost all respondents replied that there had been no change in their application.

Five *Community Forest Committees (CFC)*

This Chapter summarises the report of an additional study of community forest management that was commissioned.[11]

Background to CFC

A Collaborative Forest Management Unit (CFMU) was set up in the then Planning Department (now Resource Management Support Centre, RMSC) of the Forestry Commission in 1993 to develop and help institutionalise collaborative forest management systems. The Unit adopted a learning process approach, recognising the need for consultations amongst relevant stakeholders for determination of strategies to combat problems. From 1997 to 2000, the CFMU implemented a three-year ITTO sponsored project, on *'Piloting Collaborative Systems in Off-Reserve Forest Areas in Southern Ghana'*. Subsequently responsibility to support the CFCs have been handed to the DFOs. CFMU staff visits once a quarter.

This is not the only experience with CFCs in Ghana. Other programmes include:

- The Community Resource Management Area (CREMA) and Protected Area Management Advisory Board (PAMAB) under the Wildlife Division, FC, in Western Region;
- Community Forest Management Committees (CFMC) under the Forest Resources Utilisation and Management (FORUM) project in Volta Region
- High Forest Biodiversity Advisory Groups (HFBAG) under the Biodiversity Component of the NRMP around selected Globally Significant Biodiversity Areas (GSBA);
- Rural Development Youth Association (RUDEYA), an environmental NGO, has formed committees in Nkawie District to help with community forestry programmes in the district.
- Sacred Grove Management Committees have been established for some sacred groves by Ghana Association for Conservation of Nature (GACON), an NGO.

In July 1998, thirteen CFCs were formed in three Districts, as shown in Table 5.1. Each community selected seven to eleven members with one or more representatives from: (1) the chief, (2) landowners (family heads), (3) farmers, (4) women, (5) youth and (6) forest user groups. Local staff of public bodies such as the police, Ministry of Food & Agriculture, Forestry, and other similar organisations were co-opted as non-officio members of the CFC. District Assembly members and Unit Committee chairpersons are automatic members of the CFCs with full voting rights.

Table 5.1: the CFCs studied

Dunkwa District, Central Region	*Offinso District, Ashanti Region*	*Nkoranza District, Brong-Ahafo Region*
o Diaso	o Koforidua	o Donkronkwanta 1and 2
o Bethlehem	o Samproso	o Chiradeso
o Ntom,	o Anyinasuso	o Asuano

[11] Collaborative Forest Management Unit, 2001, Evaluation Of Pilot Community Forest Committees In Ghana, **Draft Report**, Resource Management Support Centre, Forest Services Division, Forestry Commission

o Nkronua	o Kayera	o Nkwaease
o Amobakar		

The CFCs were then offered basic training on forestry regulations, practices and modalities for carrying out their work. During the training workshop for the CFCs they were given in depth knowledge about forestry procedures, permit systems and conveyance certificates required for the utilisation of forest resources. Thus they are able to check permits, conveyance certificates and log markings. The CFCs should be an independent body and effectively monitor the operations of FSD and the timber merchants.

At a workshop in Kumasi in April 1999, the Minister for Lands and Forestry inaugurated the committees thus offering them acceptability at the national level. Certificates and identity cards endorsed by the Chief Conservator of Forests were issued out to the members to enable them to discharge their duties. Paraphernalia such as identifying uniforms were issued thus offering them distinctive identity within the communities. The provision of T-shirts and ID cards, certificates bags motivated them to do their work since it meant recognition by the FSD and their communities.

During the project phase the CFCs were given money for transport and feeding any time they had to attend meetings and workshops. Field equipment provided included Wellington boots, cutlasses and nursery tools. Training had been provided by FSD and ITTO project staff at workshops, practical sessions, field visits and demonstrations.

The evaluation carried out and its findings

All thirteen CFCs were reviewed. Secondary information on the CFCs at the selected sites was inspected, including guidelines on CFCs, livelihood survey reports, and field and training reports on the CFCs.

At each site, thirteen respondents comprising three executives and four ordinary members of the CFCs and six members of the community including a chief or his elder were interviewed . Local FSD staff available at the sites were also interviewed.

In areas where there were timber operations, discussions were held with the timber operators to find out the impact of the CFCs on their activities and how they had contributed to the development of the communities.

After interviewing individuals, community meetings were held to confirm results of the interviews and to find out the communities' perception about CFCs and other socio-economic issues. CFC members, community members and FSD staff were present at these meetings.

Questionnaires were designed to capture information from the CFC members, some members of the communities, forest users and FSD staff in the district. Subsequently it became clear that there were gaps in the information collected, so that a second questionnaire was then developed to gather additional information on incomes generated and the felt impacts of the activities of the CFC. Five respondents were interviewed at each site.

The CFCs and their functioning

The CFCs have tended to have more members than originally planned. Members are a mixture of elected and nominated persons, with appointments for four years in most cases. There seems to be a general willingness to belong to a CFC.

In Dunkwa there have been complaints about selection and requests for the FSD to supervise future elections.

The CFCs are meant to interact with communities and FSD. They were meant to meet monthly and to report to open meetings of the community at least once a quarter. In fact they met once very two weeks and discussed issues as shown in the following table.

Table 5.2: Issues discussed by the CFCs

Site	*Issues discussed*
Dunkwa	Community Education (prevention of wildfires and forest protection Prevention of illegal activities Targets and seed collection for nurseries Funds for running CFC programmes How to assist farmers to get compensation Allocation of work to members Market for seedlings produced
Offinso	Nursery Activities Plantation establishment Forest protection on and off reserve Community Education (community involvement) How to effectively monitor forestry activities such as illegal activities Fundraising options Market for seedlings produced
Nkoranza	Plantation establishment Prevention of bushfires particularly in dry season Prevention of charcoal production with live trees Nursery establishment and distribution of free seedlings Protection of water bodies Market for seedlings produced

Community forums had been held. Links to DAs operate via Assembly members being part of CFCs.

Problems in the functioning of the CFCs reported included:

- There is no legal backing for the CFCs: they have no formal legal status and there has been at least one case where a timber contractor refused to discuss with the CFC since the later was not legally constituted;
- Inadequate surveillance by FSD staff due to frequent transfers and change of officers at the site;
- Some of the CFCs are not accountable to their communities and some members of the executive have not accounted for money spent to all members of the CFC — including one case of a chair who has not accounted for funds;
- Some communities want the CFCs members changed because at the time of selection the assembly men selected their favourite people (of certain political parties);
- Infighting within some CFCs; and,
- Constitutions prepared by CFCs not being used.

Activities of the CFCs

The respondents at all sites stated the following as the main reason why there was the need for the formation of CFCs:

- Prevention and creation of awareness of the effects of illegal timber operations;

- Establishment of nurseries and plantations to generate some income from sale of seedlings, and to encourage communities to go into tree planting as a long term benefit;
- Prevent bush fires and the use of live trees for charcoal production;
- Educate communities about the need to protect the forest and retention of trees in farms and all other forestry issues;
- Protection of water bodies and to serve as wind-breaks; and,
- To assist FSD in forest rehabilitation

Some of the main roles and activities reported included:

- Checking on chainsawing and illegal cutting in Offinso;
- Negotiating for compensation for farmers for crop damage by timber contractors in Dunkwa;
- Seedling production, replanting and bush fire control in Nkoranza.

All the CFCs established nurseries. Most of these went to plantations. Accounting for fees from seedling sales has been loose. Although a demand survey was carried out during the first year it was not done for subsequent years. The market for seedlings produced at almost all the sites has not been good

Some 78 ha of plantations have been planted up. Widespread interest in plantations as an income earner has been expressed.

Non-timber forest products (NTFP) were of interest, see Table 5.3, with credit and the need for technical know-how seen as the main limitations.

Table 5.3: NTFP enterprises preferred by the communities

Site	*Very High Preference*	*High Preference*	*Medium Preference*
Dunkwa	Snail farming	Black pepper & mushroom cultivation	Pestle plantation & rattan production
Offinso	Snail farming	Black pepper cultivation and processing	Rattan production & handicraft
Nkoranza	Mushroom cultivation	Snail farming	Black pepper production

Negotiating SRAs

At Nkoranza only one TUC was in the process of being awarded and it emerged that the community permitted the CFCs to take active part in the negotiation and endorsement of the accompanying SRA.

At the Dunkwa sites, where as many as six TUCs were under processing, only one CFC took part in limited negotiations on the SRA. The community attested to the fact that by that limited involvement the community was better off as the CFC was able to negotiate for highly desirable projects.

There was no indication of TUCs being processed at the Offinso site even though timber contractors were active in the area and apparently working on temporary permits.

Thus, the CFCs were generally not entering into the negotiations for SRAs, despite widespread agreement in the communities that the CFCs should have this role.

Conclusions

The CFCs appear to have gained community acceptance, even if they lack legal backing. As with so many local organisations, there are the seemingly inevitable problems with representation, accounting and honesty in some cases.

The roles of the CFCs are not always clear. Are they meant to represent local opinion in policy-making and negotiations, or are they meant to be active promoters and implementers of forest-based projects, or both?

The experience recorded above seems to show the CFCs to have made most progress with the latter role, rather than the former. This is worrying, since the idea of strengthening local governance of forestry was a prime motive to establish the CFCs. The way in which the Committees have been sidelined in the negotiations of SRAs is similar to the experience reported by the Forestry Commission in their brief overview of SRAs (see Chapter 3).

Even with the latter, productive function, there are problems with marketing seedlings and running nurseries on commercial lines. Moreover, requests for regular visits by FSD staff, free seedlings, a guaranteed market for seedlings, credits or grants to help them expand plantations and purchase nursery equipment, and for extra training in nursery establishment suggest that the CFCs may slip into dependence on the FSD to carry out such functions.

Six *Conclusions and discussion*

Summary of the main points and discussion

Policy for natural resources in the forest margins of southern Ghana

There is no shortage of policy documents that recommend natural resource management that exercises stewardship of resources on behalf of society as a whole, stimulates human development and conserves the environment. Satisfying these diverse objectives is no simple matter. It is made all the more challenging when the economy of southern Ghana is based so heavily on the direct use of natural resources, and when the rural population that is a prime direct user continues to grow relatively quickly.

That said, when environmental policy for the forest-agriculture interface is considered in terms of means and instruments rather than laudable aims, and above all in terms of effective implementation, policy narrows sharply. Indeed, with only a little simplification, there are only two areas of policy that have impact at field level.

One concerns commercial forestry. Much attention and effort has been directed to most aspects affecting the commercial timber industry, from the designation of reserves, to the allocation of timber contracts, and to monitoring and controlling the cutting, transport and sawing of logs. A large fraction of the resources of the Forestry Commission is devoted to these tasks. Consequently there is capacity to implement policy, notwithstanding the shortcomings of that implementation.

The other area concerns local rules on resource use, such as those on bush burning, protection of river banks, and the use of dead wood to make charcoal. Measures concerning these may be incorporated in national policy statements, but most of them seem to arise from local concerns and local codes of practice. National declarations aside, few if any additional resources are provided by central government to develop such codes or to implement them. They are left as matters for the District Assemblies. These bodies too lack staff and budgets to enforce District by-laws and so depend mainly on the efforts of Unit Committees and other village bodies.

There appears to be widespread popular consent to such rules, but in practice they are often breached whenever economic imperatives bind. Thus, the bush is burned with or without safeguards when people need to clear land, river banks are planted when vegetable crops need irrigation and there is no ready alternative to watering by hand, and live wood is cut for charcoal when dead wood is exhausted.

Thus it seems that measures designed to conserve natural resources are often likely to be set aside when they conflict with economic priorities, be they of the timber industry or of villagers.

Despite the pronouncements in favour of local participation during the 1990s, above all those in the 1994 Forest & Wildlife Policy, policy-making for the environment in southern Ghana remains highly centralised. The announced and intended moves towards local community engagement have been tentative. Communities have the right to be consulted, and to be compensated for their stewardship of resources, but they are not given clear, priority rights over those resources. Actual implementation of these restricted forms of participation has been even more limited. SRAs, it seems, continue to be drawn up largely out of sight of most of the rural population.

As if this were not enough, central government still makes policy by declaration with little if any consultation. An example of this is the 1998 ban on chainsawing for commercial

lumber, announced suddenly and with apparently no reference to the spirit of participation set out in the 1994 Policy.

Reflecting and contributing to these patterns is the weakness of implementation capacity for environmental policy at local level. Local authorities can neither make policy nor implement it, thanks to lack of trained staff and budgets, in comparison to the large geographical areas they cover and the many and dispersed actors concerned with natural resources.

Hence it is no surprise that most of the policy objectives for the environment found in policy documents do not translate into effective policy at village level. In the field, it seems, only some parts of forest policy are respected and enforced. Most of the rest remains as good intentions.

Livelihoods in forest margins of southern Ghana

In the forest margins, livelihoods are built almost entirely on the use of local natural resources in farming, forestry, charcoal production, hunting and gathering, with little else of any consequence taking place. If the apparent absence of a larger rural non-farm economy surprises, then even more so is the marked insignificance of labouring in the households surveyed. The large majority of households depended first and foremost on their own labour to carry out their own household enterprises.

The key occupations that appear vulnerable to current environmental policies are carpentry, chainsaw operations, charcoal burning, and irrigated vegetable growing. In the four villages, surveyed, there was widespread involvement in one or other of these occupations, especially by settlers from the north.

That said, for most households, these occupations take up only a fraction of their labour time. There are some signs that the young tend to be more engaged than the older cohorts and that men depend on these jobs more than women do.

Returns to the four key occupations vary greatly, but with an average return of ¢25,000 a day [US$3.60] (median ¢15,000 [US$2.15]), these compare reasonably well to farming. They do not seem to be so badly rewarded as to be occupations of last resort.

The impact of environmental policy on these four occupations is summarised in Table 6.1

Table 6.1: Changes and impacts of environmental policies

Carpentry	Mixed impacts. In Tanoso clear evidence of a move from bush-cut to sawmill wood (usually rejects). In Aboabo, the reverse appears to apply, as more bush-cut lumber is used. Nationally, increase in price of bush-cut lumber in 1998, but prices down again by 1999.
Chainsaws	Mixed impacts. In Tanoso, chainsawing of timber and lumber apparently ceased, but some use of saws in the dry season to clear farms and cut fuelwood. In Aboabo, chainsaws still much used for cutting timber and lumber.
Charcoal	Consistent reports that wood is more difficult to obtain. Two-thirds of producers admit to using live wood.
Vegetables	No changes in use of chemicals evident.

By and large, environmental policy has had little impact on the four occupations examined. There is some contradiction in the evidence on the impact of chainsawing in Aboabo between the survey data and the more qualitative insights from the initial reconnaissance. But apart from this, it seems that policy has had only the slightest effect on livelihoods.

Overall

To date, and in the last five years, environmental policy has had little impact on livelihoods in the forest margins. That, however, is largely since national policy, and even district rules, are not, and perhaps cannot, be implemented locally.

Should we worry about policy that is not implemented in any case? Yes, actually, we should — for the following reasons.

First, while policy is on the books but not enforced, there will always be a legal basis to 'campaigns' of enforcement, drawing on government officers, police and security forces. Such campaigns are necessarily short-lived since staff have other matters to attend, so they are unlikely to be effective in the longer term. But when they are applied they can disrupt the local economy, constitute a sudden high tax on activity, and be socially inequitable. The very possibility of campaigns being carried out introduces uncertainty to activities that may be technically illegal, but which are widely seen as legitimate.

Second, there are matters of principle and practice. The environmental stakes are high. Without policy to safeguard the wider interests of society, valuable natural resources can be squandered to no great economic gain and still less social equity. The issues are unlikely to go away as population builds up and, we hope, the economy grows. Policy is needed to deal with the issues.

Moreover, policy formulation and implementation may be something that society needs to practice, to develop capacity. Put simply, if we cannot make some progress towards resolving today's environmental problems, what chance will there be of tackling the challenges of the future?

Third, since livelihoods in the forest margins depend so heavily on the use of local natural resources, they are vulnerable to changes in the environment and in environmental policy. Environmental policy thus matters, in both sustaining the resource base for rural livelihoods and in not riding roughshod over the livelihoods of local people. With regard to the latter, if restrictions on chainsaws, cultivation of riverine plots, and control of pesticides were rigorously applied, then the impact could be strong.

If policy for managing the rural environment matters, then there is a need to improve policy-making and its implementation. The following considerations arise:

1. Enforcing environmental policy made centrally, regionally or even at district level without local popular consent will always be extremely costly in staff and operating budgets, however wise the policy may be;
2. Making policy centrally has the virtue of being able to take into consideration the widest interests of society, including those of current and future generations. It also has the advantage of being relatively simple. But such policy requires much information about environmental processes and about the livelihoods of the people affected. When information is scarce, the ability of the centre to make the 'right' decisions is limited;
3. Relatively little is known with any degree of scientific certainty about environmental change in southern Ghana. Comparable data through time exist on areas under forest, off-take of timber, the climate, the prevalence of some species of wildlife — but on little else. Given the complexity of natural systems, this implies that for many processes, we have only a vague outline of what may be happening;
4. If we know relatively little about environmental change, then the costs and benefits of such change are even less understood. It is difficult to establish the degree to which livelihoods depend on particular resources and environmental conditions and even more difficult to predict or model the consequences of changes in natural resources on such livelihoods, given the considerable adaptability of human response; and,

5. Finally there is the problem of understanding how different stakeholders assess the costs and benefits of whatever consequences arise from environmental change and arriving at general agreement over what is desirable. This is particularly acute when significant stakeholders are marginalized from public debates, since they are illiterate, live in remote areas and otherwise lack the organisation and skills to participate effectively.

The overriding challenge, then, in improved policy-making and implementation lies in decentralising the processes and encouraging wider participation. The advantages of this are that it makes fuller use of local knowledge and insights, allows policy to be more flexible to local needs, is likely to avoid making big mistakes, and is less likely to ignore impacts on the livelihoods of those living in the rural areas. On other hand, it can lead to incoherent and uncoordinated policy and to policy made in almost complete absence of any accurate information and without the benefits of professional analysis. It may also lead to policy that represents the interests of local elites alone or those of the majority but without respect for the interests of minorities. It may allow policy to be populist but taking little account of wider realities.

There is clearly a delicate balance between centralised and decentralised policy making and implementation to be struck. At the moment, however, the balance is clearly in favour of the centre. Hence some shift towards a more decentralised and participatory approach should yield benefits.

Simple and clear models for doing this are not evident, so that a learning process is indicated. Signposts for this include:

a) The DEMCs of the DAs are moribund. It is hard to imagine that they do not have a role to play in a more decentralised model.

b) The CFCs reviewed hold promise as community forums and agents. But questions arise about their status and role — are they concerned with policy, or are they operational entities? Surely the prime role of the CFCs lies with policy, not with operations. Other bodies — private sector, FC, NGOs, etc. can run nurseries, but they cannot assume local governance. And should they be purely forest committees, or should they consider all natural resources? Widening their remit to cover a broader spectrum of environmental concerns would also reduce their dependence on the FC and the understandable tendency of the FC to see them as bodies to assist the FC, rather than being agents of village interests that may at times have to oppose the FC.

c) For those bodies that should represent the wider interests of society, including those of the marginalized and disadvantaged, the proposal made to adopt a '*livelihoods precautionary principle*' (see Okali & Sumberg 1999) has much to recommend it.

d) If local actors are to have a voice in debates on the rural environment, and a stake in the outcomes of such debates, they need secure rights to the natural resources that sustain their livelihoods. At present most forest margin dwellers have access to the natural resources they need to carry out their preferred occupations. But those rights, often conferred by custom rather than law, could be lost if a centralised state decides to use its powers to clarify and simplify rights — in the belief that this will stimulate private enterprise and economic efficiency.

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APPENDIX A: PORTRAITS OF THREE VILLAGES

Aboabo No.2 (Adansi East District of Ashanti Region)

The study area

History of settlement

The original people at Aboabo No. 2 originated from Denkyira Mbrayem in the Central Region. They settled at the present location about three generations ago. Before settling here, their ancestors had settled in at least two other locations in the Ashanti Region as a result of the movements that characterised wars between different tribes in the period up to the nineteenth century. They settled at Bodwesango prior to their movement to the present location. From there, the then chief settled them at the current site, which is part of the stool land over which the Bodwesango chief has control. The name Aboabo was taken from the name of the river, which runs through the village. The settlement is bounded by forest reserves to the north and south.

Facilities and social infrastructure within the village

The community is typically rural, and this reflected in the services available. The main services and social infrastructure are as follows:

i) Schools: There are two each of primary and junior secondary schools. The village used to have only primary level education until 1966 when a middle school was established. Before this period pupils attended middle school at Brofoyedu (18 km).

ii) Health facility: There is a clinic which, is manned by a Midwife and so serious medical cases are referred to either Bekwai (50 km) or Obuasi (60 km).

iii) Water: The village also has two boreholes from where they draw their water. The community sometimes uses water from a river, but this has become less important with the provision of boreholes; people whose farms are located close to the river normally fetch water from it for use on the farms..

iv) Churches: The village is well endowed as far as churches are concerned; there were 13 as at the time of the study. Major churches include Catholic, SDA, Methodist, Pentecost, and Deeper Life. There is also Islam.

Facilities connecting community to the outside world

The village is located 22 km off the Kumasi – Cape Coast highway. An unpaved road links the village to the highway. The condition of the road is generally poor, particularly during the rainy season when portions of the road are slippery and dangerous to ply. However, during periods when timber logs have to be transported to the sawmills in Kumasi and other urban centres, timber contractors carry out maintenance work on the road to facilitate the movement of logs. Only one taxi and one cargo truck are regularly based in and operate from the village. Vehicles based elsewhere operate between the village and major towns during market days.

There is a weekly market every Friday when traders come from larger towns such as Obuasi, Fumso and Mankessim, which are located within a radius of 80 km. While some of the traders come in to buy foodstuffs from the village, others bring in food items such as fish, vegetables and condiments, and non-food items such as clothing to sell. Due to the poor and ever deteriorating nature of the route trading activities have gone down considerably in recent times.

Major economic activities

The major economic activities in the community are summarised in Table A.1. The community members may be categorised on the basis of elderly male, young male and female with respect to economic activities.

Table A.1 Major economic activities at Aboabo No.2, Adansi East District

	Male (elderly)	***Male (youth)***	***Female***
Traditional farming (in order of importance)	Cocoa Cocoyam Plantain Cassava Maize	Cocoa Cocoyam Plantain Cassava Maize	Cocoyam Plantain Cassava Maize Cocoa
Non-traditional/ emerging farming (in order of importance)		Oil palm (since 1998) Rice (since 1996) Vegetables	
Non-farm		Logging Carpentry (building, Furniture) Masonry Charcoal production Hunting Charcoal production	Trading Dressmaking Hairdressing

Farming is the major economic activity in the community, with every household is engaged in crop production to at least provide part of food requirements. Non-farm activities though were important to young male and female. The specific farm and non-farm activities engaged in by each gender group are presented below. The activities of large-scale timber companies with concessions in the area also have impact on the environment and livelihoods of the people.

Farming

There was similarity in the range of traditional crops grown by all sections of the community. The traditional food crops grown were cocoyam, plantain, cassava, and maize. Cocoa is a traditionally important tree crop, which was mentioned as being most important of all the traditional crops (food and tree) by both male groups. In contrast, food crops were more important to women than cocoa. Oil palm, rice and vegetables (principally tomatoes) have recently become important, and these crops are cultivated young men. The introduction of rice and vegetable production was on the basis of its perceived high economic returns. The young men cited the example of their colleagues at Pipiiso (located 6 km away on the road linking the village to the Kumasi-Cape Coast road) purchasing vehicles or building houses from income earned in rice production.

Cocoa has experienced a decline, but it is still a very important source of household income, as well as serving as a security crop. Almost all households have cocoa farms. Cocoa farms are also normally established by men (with assistance from spouses), but some women also have their own cocoa farms.

The declining trend is being reversed as young men have gone into the cultivation of the crop. This reversal of the trend started within the last five years, and this is a departure from what used to be the case. About four out of every five young men now owned a cocoa farm. Limited opportunities outside farming explain the increased importance of cocoa to young men. Oil palm production (as distinct from volunteer oil palm trees found in fields) is also emerging as an important activity among the young men. Currently, only about 5% of then are known to have such farms. The attraction of oil palm lies in its more regular flow of income while also serving as a security crop similar to cocoa.

Farming is always on the mixed cropping system. The man clears the land to plant his cocoa. The woman puts in the food crops, namely cassava, cocoyam plantain and maize and has control over the crops they put in. In cases where women have their own farms, they would have to hire their own labourers for the land clearing and other activities on the farm.

Non-farm activities

With the exception of trading, the non-farm economic activities tended to be related to gender. Even in trading, there is some form of gender effect. The men only engage in local petty trade in provisions, while the women trade in this as well as clothing, fish and foodstuff. The trade in foodstuff is the most important. This has to do with the importance of farming in the rural economy. Women traders (some of whom reside outside the village) bring in fish and meat from big market centres such as Mankessim in the Central Region (100 km away) and Obuasi (40 km away); and yam from Techiman (180 km away) in Brong Ahafo Region. Local women traders act as middlemen for traders from outside (also mostly women) who travel to the village on market days to buy foodstuff produced here to sell in the big towns. About 10% of women in the village engaged in one form of trading or the other.

Carpentry and masonry are the most common artisan work among the young men. Women engaged in dressmaking and hairdressing.

Charcoal burning was emerging as an activity of great economic importance until the last year when the law regulating tree felling (to check the depletion of trees) came into force. Sissalas settlers, who originate from the Upper West Region, introduced this activity into the community. These migrant charcoal producers normally move settlements in search for areas with abundant trees suited for charcoal production. A few of the indigenous people also joined this trade. It is currently not an important activity.

Timber companies operating in the village hire some of the local young men on temporary basis to supplement their own staff, which they bring to the village. Other salaried workers in the village, who are few in number, include teachers, nurses, staff of the Produce Buying Company (PBC) of Cocoa Board, and the forest reserve guard. Most of them are only temporary settlers.

Individual lumbering was of great importance in the village until the law on timber species. This in turn has affected other economic activities like carpentry that make use of lumber from trees cut by the individual operators. Masonry in the village has also been affected as the shortage of timber products for window and door frames and roofing has become difficult to access. “Even trees for pestles are not allowed to be cut”, commented the chief of the village. Discussions with officials of the Forestry Service revealed that the restrictions on exploitation of non-timber forest products such as pestle applied to the forest reserve and was meant do check abuses.

Hunting was no longer a significant activity as it used to be in the past because of the unavailability of the games, which is a consequence of the high rate of deforestation. In addition, the high cost of bullets made it an unattractive economic activity.

Operations of big timber companies and agriculture

The operations of timber contractors holding concessions or permits have not benefited the community beyond the few young men who are contracted on temporarily basis. The 1994 Forestry Plan of Ghana seeks to encourage participation by farmers and land owners in whose fields timber species occur in the exploitation of timber, particularly in determining compensation for damage caused to crops. However, this seemed not to be the case in Aboabo No.2 where timber companies still cut timber without consultation and/or compensation. This was one reason why the activities of chain saw operators though illegal and wasteful, were sustained. Farmers preferred to sell timber species on their fields to chainsaw operators. These chain saw operators paid for the right to fell the trees to individual land owners on whose fields the trees occurred (though the trees are legally vested in the state), and caused minimum damage to fields since they cut the timber into pieces on site. The current mode of operations that ignores the interest of farmers also discourage the tending of young trees that would otherwise mature into timber species on their fields to prevent future destruction by timber companies.

Environmental policies and livelihoods affected in the village

Awareness, perceptions and enforcement

Table A.2 is a summary of the community's awareness and perceptions of environmental policies that have potential impact on the rural economy. It also shows how the policies are enforced at the district and local levels.

Table A.2 Awareness, perceptions and enforcement of environmental policies, Aboabo No.2

Policy	*Awareness*	*Perception of policy by majority*	*Enforcement*	
			District	*Community*
National				
Ban on timber felling (with chain saw) without permit	High	Bad	By Forestry Service; personnel find it difficult. Punishment for offenders not enough to deter others	Not interested in enforcement; farmers not consulted on timber tree management
Bush fire control	High	Good	By Fire Service through educational programmes	Enforced; education as well as sanctions for offenders
Hunting (no group hunting)	High	Good	Education by District Assembly	No group hunting

Riverain protection	High	Good	Education by District Assembly	Enforced; traditional customs pre-dated policy
Safe use of pesticides	Low	Not much information to use to judge	Not enforced; MOFA responsible through extension	No knowledge
Confinement of livestock	High	No strong views (not an important activity)	By environmental health personnel of District Assembly	Unit Committee expected to enforce

The community is aware of government polices on forestry such as the ban on chainsaw operators, bush fire control, and riverain protection. The exception was the safe use of pesticides (for vegetable production). The low awareness of the safe use of pesticides is due to the virtual absence of extension work in general. Also, the fact that vegetable production is a new activity in the village means that farmers engaged in it are not able to learn from others. All that they know is that some agro-chemicals have to be sprayed on tomato in order to protect it from insect damage.

They mentioned that there is now rampant drying of watercourse especially during the dry season due to clearing of the forest. Community members were in the past restrained from clearing forest around river courses because of the strong influence of traditional norms and beliefs. It was considered a taboo to clear forest around river courses. Modernisation with the attendant breakdown of traditional values and authority has resulted in the clearing of such forest without attracting sanctions. The tendency to associate traditional norms and values has perhaps contributed to the flouting of the regulations since the practice of traditional religion is almost extinct in the community.

In general policies that do not have immediate adverse effect on livelihoods are perceived to be good and that they do rather enhance livelihoods. For example, everyone is aware of the disastrous effect of bush fire.

The policy on the ban on the operations of chain saw operators is perceived to be bad. From the society's point of view, the policy seeks to protect the environment to sustain future economic activities, and also to reduce wastage (recovery of timber by chain saw operators is lower, compared to that of timber companies with sawmills). The community members also appreciate the need to protect the forest to sustain activities that depend on this resource. However, the cost to individuals engaged in activities that rely on this resource was considered high.

Environmental policies and their impact on livelihoods

The livelihoods affected by environmental policies and their impact are shown in Table A.3. The policy that has had significant impact on livelihoods is the ban on the activities of chain saw operators. This policy and its impact are, therefore, discussed below.

Table A.3 Livelihoods affected by environmental policies and their impact

Policy	Livelihoods affected	Impact
Ban on timber felling (with chain saw) without permit	Chain saw operators	Lost income as services no longer required; some moved into farming while others have emigrated
	Wood carriers	Lost wages from transporting sawn timber from fields to assembly points
	Sawn wood dealers	Lost income from reduced sales
	Carpenters	Lack of sawn wood for furniture
		Less demand to provide services on construction works (new buildings) as wood for door and window frames more expensive
	Masons	Less demand for furniture since less people able to afford higher prices resulting from wood shortage
		Less demand for services as the mud houses (the most commonly demanded) not able to stand rains for long without roofing; less people building because of higher prices for roofing timber
	Charcoal producers	Flourishing charcoal production drastically and, therefore, incomes declined as left-over from felled trees which is the major source of material for charcoal production no longer available
	Consumers of wood products (construction timber, furniture)	Higher prices for products

Table A.3 (continued) Livelihoods affected by environmental policies and their impact

Policy	Livelihoods affected	Impact
Bush fire control	Farmers Hunters	Loss of crops prevented Improved soil fertility through organic matter conservation Less game since setting of fire makes catches easier (little adverse impact - few hunters and bullets also very expensive)
Hunting (no group hunting)	None	No impact
Riverain protection	Farmers with fields lying close to river	Little impact
Safe use of pesticides	Vegetable producers	Little impact (few people, no knowledge)
Confinement of livestock	Livestock farmers	Little impact (livestock not important)

Policy on chain saw operations

What is perceived to be a government policy banning small-scale operators whose normal mode of operation is through the use of the chain saw for felling timber species does not exactly reflect the policy and the law regulating it. The policy requires that timber can only be harvested with permit since the resource is a state asset, and also bans the use of chainsaw to convert timber logs into lumber because of the associated inefficiency and waste. In most cases, chainsaw operators do not apply for these permits, and therefore fell the logs illegally. In addition, the chainsaw operators do not sell to sawmills but tend to convert the logs to lumber themselves because the felling of the tree itself is an illegal activity. The prohibition on farmers or landowners selling or harvesting timber species on their fields is explained by the fact of the resource not belonging to them. As the policy stands now, only registered timber firms are able to satisfy the requirements.

Impact of policy

Ten young men whose main source of livelihood was the chain saw business were reported to have gone into full-time farming. It would, therefore, appear that the policy has only made people switch jobs, and not totally deprived them of livelihood. However, the chainsaw business was a major source of capital for farming activities in a community with no credit facilities. The operations of the chain saw operators also provided income to other youth in the village who were engaged in carting the wood from the field into the village and for prospective buyers, apart from the supply of wood for furniture and construction. In addition, leftover from chain saw operations also acted as inputs for the charcoal business.

Wood which hitherto was obtained at minimal cost locally now has to be purchased from Obuasi (40 km away) on a road which is partly inaccessible during heavy rains. The high cost of wood coupled with high cost of cement was perceived to have slowed down private and community construction projects. For example it was mentioned that a mason who could get four building contracts per year in the past will now be lucky to get one every two years.

There was the acknowledgement that there were some daring chainsaw operators. The risk involved has resulted in higher prices of lumber.

Major constraints that affect economic activities in the village

Apart from constraints associated with the environmental polices like the ban on chain saw operators discussed above eight other constraints were identified by the community as affecting economic development within the village. They are as follows.

i) Lack of credit facilities

ii) Lack of employment opportunities

iii) Poor access road

iv) High cost of purchased inputs (elderly male and young adult male)

iv) Inadequate water supply (only two boreholes for the whole community)

v) Lack of medical officer for the clinic

vi) Lack of good toilet facilities (KVIP)

vii) Lack of teachers

viii) Unavailability of market structures

Lack of credit facilities within the community was ranked as the number one problem followed by the poor nature of the road linking the village to the outside world and lack of employment opportunities. The high cost of purchased inputs was mentioned by only the male (both elderly and young). In reality, some these constraints are related. For example, the poor road access could be a contributory factor to the problem of lack of employment opportunities as there is limited interaction between the village and market centres. Credit facilities may not contribute much to the people's livelihoods unless it could be used for an economic activity with returns that are high enough to pay for the cost of capital. The cost of institutional credit was in excess of 45% per annum in 2000, excluding risk and transaction costs.

The high cost of farm inputs has an impact on the environment through a reduction in use. It has the positive impact of reducing the risk of contamination of the environment and food (caused especially by pesticide use). On the other hand, higher fertiliser price could lead to less continuous cropping and, therefore, more destruction of the forest.

Adiembra Nkwanta (Ejura-Sekyedumsi District of Ashanti Region)

The study area

History of settlement

The current settlement dates back to 1970 when settlers from northern Ghana moved in to cultivate maize. Prior to that, settlers from other parts of the region inhabited the area at a settlement close to the current one to undertake cocoa farming at that time was dense forest. These first settlers abandoned cocoa farming in the 1960s as a result of devastation of the cocoa farms by the swollen shoot disease. Because of the primary interest in coco, these settlers left to open up new land for cocoa in the forest areas of Brong Ahafo and Western regions. On the other hand, the current settlers have interest in food crops. Food crops such as cassava, yam, groundnuts and cowpea have been added to maize in the cropping system with time. The settlers farm on land belonging to the Ejura stool, as well as the part of land belonging to Ejura Farms, a commercial company, that is not in use by the company. An annual token fee is paid to the chief of Ejura for use of stool land, while no payments are made for the use of Ejura Farms land, but with the understanding that they would make the land available anytime the company had need of it.

One of the major changes that have affected economic activities, especially agricultural production in the village is the acquisition of large tract of land by Ejura Farms. This has significantly reduced the area available for farming by the inhabitants. It was estimated that there has been a reduction of typical total farm sizes from 8 acres to 2 acres largely as a result of this.

The area has now turned from forest to a transition between forest and savanna over the last 40 years of human activities in the village with only few timber species scattered within the vegetation.

Facilities and social infrastructure within the village

The village currently has only one primary school and so pupils have to travel to Bayere Nkwanta (8 km from the village) or Ejura, the district capital (19km away) to continue the three-year junior secondary school part of basic level education.

There is currently no electricity, pipe borne water, police station nor clinic in the village. The nearest clinic is at Homako, which is about 6 km away. Major health cases are referred to the district hospital at Ejura.

Facilities connecting community to the outside world

This settlement is located 19 km from Ejura on the Ejura –Nkoranza road and it is the last village on the Ashanti Region side of the boundary between the Ashanti and Brong-Ahafo regions. Though the road from Ejura to Nkoransa is unpaved it is nevertheless motorable throughout the year. No vehicle that is permanently based in the village but there is regular vehicular flow because Ejura and Nkoranza are both district capitals.

The major marketing centre is the district capital (Ejura), where there is weekly market days every Monday. Traders from outside (principally Ejura) occasionally visit the village to purchase their produce as and when necessary.

Major economic activities

Agriculture and charcoal burning are the main economic activities engaged by the inhabitants of Adiembra Nkwranta (Table A.4). A few people engage in hunting but it was stressed that it was too insignificant to have any impact on their livelihoods. Rather, it is hunters from Ejura

who usually come to the area during the dry season, and their activities are considered to be an invasion, which they were powerless to stop. Their activities destroy the vegetation some times including their farms with fire to facilities their hunting activities. These group hunters usually claim that the District Assembly had issued them with permits, but they are unable to verify the genuineness or other wise of such permits. Interviews at the District Assembly did not reveal that there is an official policy to issue out permits for group hunting.

Table A.4 Major economic activities at Adiembra Nkwanta, Ejura-Sekodumasi District

	Male		***Female***	
	Crop	***% of farmers***	***Crop***	***% of farmers***
Traditional farming (in order of importance)	Maize	100	Maize	100
	Yam	100		
	Cassava	100		
	Groundnut	90		
	Cowpea	80		
	Sorghum	60		
	Rice	10		
Non-farm	Charcoal production		Charcoal production	

Farming

Major crops grown are maize, yam and cassava, which are grown by all farmers and groundnuts and cowpea, which are cultivated by nine and eight out of every ten farmers respectively. Six out of ten farmers grow sorghum, and one out of ten grow rice. Women concentrate on maize.

The major form of farming is the bush fallow system where a piece of land is cleared and cultivated for 3-4 years. It is then allowed to fallow for 3-5 years before it is cultivated again. There is little or no use of fertiliser because it is too expensive in relation to their resources. The last time they applied input was around 1994 when they were supplied on credit by Sasakawa Global 2000 for maize production. The consequence is declining crop yields. In fact, the emergence of other crops in addition to maize is the increasing importance of rotation in maintaining soil fertility in the absence of fertiliser use and increasing continuous cropping.

There was the claim that farming has become less profitable over the years as a result of the declining yields and the fall in the real price of maize, the most important crop over the years. As a result, all farmers now engage in charcoal burning as a survival strategy. Charcoal is considered to provide more regular and certain income.

Non-farm activities: Charcoal burning

Among all the three communities selected for this study it was only at Adiembra Nkwanta that charcoal burning had become a major economic activity. For this community, charcoal production is "a major environmentally degrading activity but a necessary survival strategy".

Almost all the inhabitants in the village engage in it. It was equally important to both men and women. Both dead and live trees are cut down for charcoal. The first phase of this project identified fuel wood production and especially charcoal burning as the number one environmental problem in Ghana and therefore required further investigation.

Charcoal burning and agricultural production in the village

Apart from the Sissalas (numbering about eight at the time of this study) who came down purposively to burn charcoal all others came down either to establish their own farms or sell their labour for cash. The farming population has come to realise the benefits of charcoal burning and have all joined in the business though on a smaller scale. Earlier Sissala settlers acquired concessions from the Ejura chief for their charcoal business but have since migrated to other areas due to dwindling wood supplies. The current charcoal producers are organised in labour-exchange (nnoboa) groups to help each other in turns to obtain wood from uncultivated fields.

It is interesting to note that, though all of them were engaged in charcoal burning, none of them wanted to be classified as such. They all considered charcoal business as inferior and degrading and did not want their families back in the North to know that that was the business they were now engaged in. They said they were forced into it in order to survive since agriculture has become less profitable.

History of charcoal burning in Ghana

In Ghana, the Sissala tribe with their district capital at Tumu in the Upper West Region is well noted for charcoal burning activities throughout the country. All other tribes actually learnt the trade from them as they are classified as professional charcoal burners and usually engage in it as a full time job.

From the studies carried out among the Sissalas in two of the study communities, Adiembra Nkwanta and Botenso, two schools of thought emerged as to how the Sissalas came to be so much involved in charcoal burning. Both schools of thought were based on information handed down through oral history from generation to generation For the purposes of this write up, we shall designate the two schools as the Adiembra Nkwanta and Botenso schools of thought respectively.

a) The Adiembra-Nkwanta school of thought

This school believes that charcoal burning was actually introduced into Ghana by the Zambarima and Gawu tribes from Mali, Niger and Algeria who used to burn charcoal on a limited scale. In those days people migrated from the north where the rainfall is unimodal and unreliable with fragile soils, to settle and farm in the south where the rainfall is biamodal and the soil relatively more fertile. A Sissala man, who came down south many years ago to farm made friends with the Zambarima and Gawu people who introduced him to the charcoal burning business. This Sissala man returned to the North after only three months with a lot of money and property like bicycles and clothes which people engaged in farming could only obtain after 2 – 4 years of work. The success story of this man attracted more Sissalas to travel down south with him to learn the trade and it has since become very popular among them. When the Sissalas took up to burning of charcoal in the hinterlands, the Zambarimas and Gawus left and settled in the cities like Kumasi and Accra where they acted as wholesalers by gathering supplies from all over the producing centres from Sissala and other producers to resell to city retailers.

b) The Botenso school of thought

According to this school, their grand parent came down south and met a Grushie man from the Upper-East region who was burning charcoal and teamed up with him. Later a quarrel broke out between the two of them and Grushie man left the job for the Sissala and this has been the history behind the two tribes being playmates. The Sissalas have since carried on with the trade.

Though it is not easy to verify which of these stories is likely to be true, common sense will support the Adiembra Nkwanta school of thought since a mere quarrel should not let one

leave a lucrative business. There is no reason to expect that the originator of the activity could not carry on with it after breaking up with an "apprentice".

Financial attraction of charcoal production

The perceived quicker and reliable return to charcoal production was illustrated as follows. With a relatively low capital requirement an axe, cutlass, hoe and occasionally hiring a chain saw for ⊄60,000.00, the whole process of charcoal production is completed in 2-3 weeks. One can produce between 20-50 bags of charcoal within this period giving a gross of ⊄180,000.00 - ⊄450,000.00 (at a price of ⊄9,000.00 /maxi-bag at the village). On the other hand, the production of maize takes at least 4 months to harvest with uncertain weather, rent payment, high cost of inputs such as labour, seed, etc. With an average yield of about 5 bags (at ⊄45,000.00 at the time of the study) to give a gross revenue of ⊄225,000.00. This explains the attraction of charcoal burning in spite of the degradation it causes to the environment, which the people are aware of. For example, it was mentioned that parts of the field where charcoal is burnt are unable to support any crop production for 3 years, apart from the rapid loss of vegetation.

Money realised from charcoal burning is not only used for catering for the family but also for hiring labour for farming. Most farmers have very little or nothing to sell between March and August when maize harvest begins, and it is charcoal that help fill the gap. The peak period for charcoal burning is during the major raining season particularly between July and September, which also coincides with the peak of the farming season. It was explained that charcoal prices always peak at this time of the year when most major charcoal burning areas become inaccessible resulting in generally low supply of charcoal to the market. They take advantage of their location on an accessible road to reap relatively higher prices.

Most of these people withdraw during the dry season when a lot of charcoal is off loaded into the market from those areas which were not accessible during the rainy season and hence resulting in a glut and low market prices. For example a maxi-bag of charcoal which was selling between ⊄3,000.00 and ⊄4,000.00 in April sold at ⊄9,000.00 in September.

It is also during the period of scarcity in the rainy season that wholesalers are able to pay cash upon delivery. It sometimes takes 2–4 weeks to get paid during the dry season upon delivery in Kumasi and Accra respectively.

Rates of turnover and transport charges

Individual professional burners load on the average one truck with a volume of 300-350 maxi-bags every 3-4 weeks and at least one truck loads every week from the village to Accra or Kumasi. Large trucks with a capacity of 300-350 bags charged ⊄3,700.00/bag while smaller trucks with capacity of 100– 50 bags charged ⊄4,000.00/bag from the village to Accra. These charges vary with changes in fuel prices. Transport charges from Adiembra to Kumasi is ⊄2,000.00 per bag regardless of truck capacity.

According to the dealers the national demand for charcoal has tripled over the last 3 years. This can be attributed to increasing urbanisation and the ever soaring prices of other sources of fuel like electricity and liquefied petroleum gas. Even middle income earners use charcoal for their cooking.

In spite of this increased demand for the commodity and the soaring prices even the professional Sissala burners believe they can never get rich by burning charcoal. They believe "the money burns like the charcoal and so cannot stay in their hands".

Major constraints facing charcoal production

1. Unsuitable lands. Most available wood is located on soils, which are no longer suitable for the burning of charcoal. Charcoal heaps covered with clayey soil for example results in low charcoal yield as most of the wood rather burns into ashes.
2. Low supply of chainsaw services/operators: Chainsaws are still used in cutting wood for charcoal in this area. High demand for the few available at Ejura sometimes lead to delays of 2-3 weeks and thereby result in high transport cost as one has to follow up several times before he is served. The ban on chainsaw operators has however not affected the charcoal business in this area. This may be explained by the fact that the ban is in relation to timber species.
3. Water logged areas can only be worked during the dry season and therefore affect volumes traded.
4. Dwindling supplies if wood suitable for the production of charcoal. This is considered as the most important constraint. Earlier activities of original Sissala settlers who obtained concessions for feeling trees for charcoal have depleted most of the suitable species. Producers now have to travel longer distance to obtain wood resulting in high assembling cost. For example people hired to carry charcoal from the hinterlands to the roadside charge ¢1,000.00 per maxibag for distances of more than 2 km and ¢800.00 if less. These charges are however directly related to the prevailing price of charcoal at any point in time.

Environmental policies and livelihoods affected in the village

Awareness, perceptions and enforcement

The results were similar to that of Aboabo No.2 (see Table A.5). Even though there is little or no illegal felling of known timber species in this community, the perception that the ban on chainsaw applied to all tree species made community members see it as bad.

The District Assembly has a policy that dead wood should be used for charcoal production. This is not effective since the reason why fresh wood used is the scarcity of dead wood, which would otherwise be preferred

Table A.5 Awareness, perceptions and enforcement of environmental policies, Adiembra Nkwanta

Policy	*Awareness*	*Perception of policy by majority*	*Enforcement*	
			District	*Community*
National				
Ban on timber felling (with chain saw) without permit	High	Bad	By Forestry Service; personnel find it difficult to implement.	Not enforced
Bush fire control	High	Good	By Fire Service through educational programmes	Enforced within community, but outsiders over whom there is no control cause bush fires through group hunting

Hunting (no group hunting)	High	Good	Education by District Assembly	Not able to enforce as those engaged in it do not reside in the village
Riverain protection	High	Good	Education by District Assembly	Enforced; traditional customs pre-dated policy
Safe use of pesticides	Low	None	Not enforced; MOFA responsible through extension	No impact
Confinement of livestock	High	Bad	By environmental health personnel of District Assembly	Unit Committee expected to enforce but not enforced
District Assembly				
Dead wood for charcoal	High	Not effective	Draft bylaw; not yet legally operational	No enforcement

Environmental policies and their impact on livelihoods

The impact of environmental policies on livelihoods is presented in Table A.6. Although the restrictions on chainsaw use has been interpreted to cover trees for charcoal, there has been little impact on charcoal production, an activity that use live wood as raw material.

There has been success in controlling bush fire. Farmers indicated that this has prevented loss of long maturing crops such as cassava to fire. In addition, the control has improved soil fertility through organic matter build-up, which would not have been possible if burnt by fire.

The policies on riverain protection and safe use of insecticide have hardly had impact on farming, as they are not implemented. Livestock are not confined, but this does not pose a threat to the environment because it is not an important economic activity.

Table A.6 Livelihoods affected by environmental policies and their impact at Adiembra Nkwanta

Policy	*Livelihoods affected*	*Impact*
Ban on tree felling (by chain saw operators)	Charcoal production	Little impact; operators (from Ejura) visit the village to fell trees for charcoal producers

		producers
Bush fire control	Farmers	Loss of crops prevented Improved soil fertility through organic matter conservation
Riverain protection	Farmers with fields lying close to river	Little impact (a traditional practice)
Safe use of pesticides	Vegetable farmers	Little impact (follow old practices; no education)
Confinement of livestock	Livestock farmers	Little impact (livestock not confined)

Major constraints that affect economic activities in the village

Since farming and charcoal burning constitute the main sources of livelihood in the village most of the constraints identified had to do with these. Constraints were identified separately by men and women group within the village to capture gender difference.

Major constraints identified by women

1. Lack of credit facilities.
2. Lack of appropriate technologies for farming-no extension services.
3. Transportation of farm produce to the village is tedious as it has to be done by head over long distances.
4. Main source of water- spring is located 1 km away from the village and so difficult to carry water to village especially in the night.
5. Lack of public toilet.
6. Low agricultural productivity.
7. High cost of hiring chainsaw operators to cut wood for charcoal.
8. Lack of off farm employment aside of farming and charcoal burning.
9. No birth control- quick and frequent births do not give women enough time to attend to other productive activities.
10. Low prices of farm produce dictated by traders

Major constraints identified by men

1. Transporting produce from farms in deep valleys to the village; most of the suitable lands by acquired by Ejura Farms.
2. Source of water for domestic use located far from the village and so a lot of energy and time is spent obtaining it.

3. Prices dictated by traders who also buy at weights far in excess (of up to 50%) of standard weight.
4. Lack of credit facilities
5. Suitable tree species for charcoal increasingly becoming scarce.
6. Lack of teachers: Most trained teachers refuse posting to the village and coupled with the restrictions on recruitment of pupil teachers who could have filled the gap.

Botenso (Wenchi District of Brong Ahafo Region)

The study area

Botenso consists of a major settlement, as well as several small ones (some of which have just one compound). The major settlement has two distinct parts. The indigenous people inhabit the older and smaller part (with about five compounds), while settlers inhabit the more recent and larger part. The land belongs to Nchiraa (8 km away), and the natives who reside in the village originally came from Nchiraa, and they maintain links with their families there. There are also others who reside at Nchiraa owning farms here to which they commute regularly to work on them.

History of settlement

The original settlement was one compound whose occupant was there as a custodian of a stream that was perceived to make barren women fertile. The rapid expansion of the settlement occurred in the early 1970s. The expansion was traced to the movement to the village in 1968 of a settler (he is still an active farmer), who in turn attracted others. The large expanse of land (which at that time was dense primary forest) was primarily responsible for this attraction. There was also the abundance of bush meat. The area has now turned from forest to transition vegetation. Farming is partly responsible, but the farmers put much of the blame on timber companies that operated here and Sissalas who settled there to produce charcoal and left only after depleting prime species for charcoal.

Timber felling was very active here in the mid-1970s, when large companies were said to be operating here. Charcoal production reached a peak in the mid-1980s, but declined in the 1990s. As yam farmers moved into virgin land, there was less wood for charcoal production. The introduction of chainsaw into economic activities was identified as a major factor that led to the fast depletion of the soil. Loggers, charcoal producers and farmers all relied on the services of chain saw operators. In farming, it made it possible for large tracts of land to be cleared for farming.

The major type of land tenancy is hiring stool land from the chief of Nchiraa or from indigenous families with excess land. The preference is for stool land, since once a fixed rent is paid (renewed annually), one could clear any land area that he could manage. Sometimes, however, settlers are compelled to hire land from a family, in which case the rent payable depends on the size of the field hired out.

Facilities and social infrastructure within the village

The village has only one primary school. Pupils continue with their junior secondary school education at Nchiraa. Such pupils whose parents are indigenous move to settle with other family members at Nchiraa, but those of settlers have to make daily return trips on foot. There is currently no electricity, pipe borne water, police station nor clinic in the village. The nearest clinic is at Nchiraa, but this can attend to only minor cases because of poor staffing, including the absence of a medical officer. Major health cases are referred to the district hospital at Wenchi.

Facilities connecting the community to the outside world

There is difficult road access throughout the year. There has been no maintenance work since the road linking the village to other communities was constructed about 30 years ago. The road, which was supposed to link Nchiraa to Kintampo through the village, is now a tract, which even four-wheel drive vehicles find it difficult to reach. The farmers themselves use communal labour to carry out maintenance works to facilitate the movement of their food produce to the markets at Nchiraa (8 km) and Subinso (14 km). There are no vehicles plying

the route. The farmers themselves arrange for vehicles to cart their produce. In other cases, traders from outside hire vehicles from the market centres to cart purchased produce from the village.

Major economic activities

The major economic activities are shown in Table A.7 for the identified groups of people with similar livelihoods. Agriculture, principally food crop farming, is currently the only important activity. Women do not have farms of their own, but assist their husbands. Female-head households are not common. This is expected in a community dominated by first generation settlers. Non-farm activities are not of any economic importance now. Only two people (men) are engaged in charcoal production. Hunting is now more of a hobby among a few people rather than a serious economic activity. Carpentry and petty trading are carried out, but the demand for the products of this trade is too low to have significant impact on livelihoods. Most households buy their provisions from the market centres.

Table A.7 Major economic activities at Botenso, Wenchi District

	Indigenous male	***Settler male***	***Settler female***
Traditional farming (in order of importance)	Yam Cassava Maize	Yam Cassava Maize Sorghum	No fields of their own; worked on fields of spouses
Non-traditional farming (in order of importance)	Cashew Teak Tobacco Vegetables	Vegetables	

Note: Tobacco farmers reside at Nchiraa

The major crops grown by both the indigenous and settlers, in order of importance, are yam, cassava and maize. All households produce these crops. These crops are normally cropped together as a system. Both groups of male produce vegetables on a small scale. Vegetable (mainly tomato) production, when introduced some 20 years ago, was perceived to have a high potential. However, the ever-worsening condition of the road, which made the movement of this perishable produce difficult, has made it impossible for the crop to gain importance.

Apart from the general trend among the indigenous people and settlers, there are some differences. The settlers produce sorghum, a staple crop in northern Ghana from where most of them emigrated. In contrast, the indigenous people plant tree crops (cashew and teak). This difference is explained by land tenure. While the indigenous people. By virtue of owning the land have permanent right over their fields, the settlers do not have that permanent right, in spite of the fact that they could crop on stool land rented from the Nchiraa chief for as long as they did not relent on their obligations. In addition, because they are in the village to farm, all their resources is channelled into that activity.

The tree crops are cropped primarily because of their economic value, but they could have positive impact on the environment. The emergence of teak as an economic activity is linked to the tobacco production. The British American Company (BAT) promoted the planting of teak, and in turn buys wood harvested from the tree to sell to tobacco farmers to use for the curing of tobacco.

Environmental policies and livelihoods affected in the village

Awareness, perceptions and enforcement

The responses on the awareness, perceptions and enforcement of environmental policies are summarised in Table A8. There is high awareness among the people of the environmental policies. The exception is the safe use of agro-chemicals.

The ban on the activities of chain saw operators is perceived to be good because it protects their farming through a better environment. The settlers, who are in the majority, are mostly farmers with no right to timber species on their fields even in those days when people could fell trees from their fields without fear of arrest. In addition they had all to gain, as this policy would spare their crops from being destroyed by activities which would not bring in any benefits. They, however, find themselves powerless to enforce the policy. With respect to enforcement, much of it is by the communities themselves.

There are no problems enforcing the policies mostly because of the perceived benefits (bush fire control, riverain protection) or that the activities affected are not a significant part of the people's livelihood (timber felling, charcoal production, hunting).

Environmental policies and their impact on livelihoods

With the exception of bush fire control, which has positive impact on livelihoods, there is currently little impact of the other environmental policies — see Table A9. This is because only a few people engage in those activities on which the policies (particularly the regulation of the activities of chain saw operators). In addition, people in the community do not make much use of products from felled timber. For example, the common housing types constructed do not require timber much products.

Table A.8 Awareness, perceptions and enforcement of environmental policies at Botenso, Wenchi District

Policy	*Awareness*	*Perception of policy by majority*	*Enforcement*	
			District	*Community*
National				
Ban on timber felling (with chain saw) without permit	High	Good	By Forestry Service	Settlers who constitute the bulk of the population no control over timber species
Bush fire control	High	Good	By Fire Service through educational programmes	Enforced within community by Unit Committee
Hunting (no group hunting)	High	Good	Education by District Assembly through Unit Committee	Not much to enforce since no group hunting
Riverain protection	High	Good	Education by District Assembly	Enforced; traditional customs pre-dated policy
Safe use of pesticides	Fair	Good	MOFA	Self-regulation

			responsible through extension	
Confinement of livestock	High	Good	By environmental health personnel of District Assembly	Unit Committee expected to enforce but not regarded as a threat
District Assembly				
Dead wood for charcoal	High	Not effective since the reason why fresh wood used is the scarcity of dead wood, which would otherwise be preferred.	Draft bylaw; not yet legally operational	No enforcement

Table A.9 Livelihoods affected by environmental policies and their impact at Botenso, Wenchi District

Policy	*Livelihoods affected*	*Impact*
Ban on tree felling (by chain saw operators)	Charcoal production	Little impact; only two people (men) engaged in activity
Bush fire control	Farmers	Loss of crops prevented Improved soil fertility through organic matter conservation
Riverain protection	Farmers with fields lying close to river	Little impact (a traditional practice)
Safe use of pesticides	Vegetable producers	Little impact (follow old practices; no education)
Confinement of livestock	Livestock farmers	Little impact (livestock not confined)

Major constraints that affect economic activities in the village

The groups were requested to list all the major constraints. They were then asked to score by distributing ten objects among the identified constraints in proportion to the importance of the problem. For the general constraints, both male groups had similar opinions. They were, however, asked to rank the constraints separately with respect to farming because of differences in this activity. With respect to general constraints and problems militating against their livelihoods, the poor road access was the most important for both men and women (Table A10).

Table A.10 General constraints/problems (in order of importance) at Botenso, Wenchi District

Male		*Female*	
Constraint/problem	***Score (%)***	***Constraint/problem***	***Score (%)***
Poor road	60	Poor road	60
Limited school facility (no JSS)	20	No health facility	20
Weed/low soil fertility	20	Lack of market place	10
		Lack of credit	10
		Lack of salary work	0
		Lack of potable water (bore hole)*	0
		Limited school facility (no JSS)	0

* Four attempts to sink borehole failed because of the hydrogeology

The constraints in farming were similar for the two male groups, except that the indigenous farmers identified additional problems that related to the production of tree crops in which they were engaged (Table A11). The constraints identified by the women, however, were in some way different from the men's. In that in addition to what had been identified by their male counterparts (note that they work on the same field), they identified lack of credit, limited access to tractor services and the neglect of women in extension.

Table A.11 Farming constraints (in order of importance) at Botenso, Wenchi District

Indigenous male	*Settler male*	*Settler female*
Marketing of farm produce (linked to poor road)	Marketing of farm produce (linked to poor road)	Marketing of farm produce (linked to poor road)
Soils/weeds	Soils/weeds	Weed (spear grass)
High cost of purchased inputs	High cost of purchased inputs	Lack of credit
Lack of planting material (for tree crops)		High cost of purchased inputs
Bush fire (destroy young tree crops)		Limited access to tractor services
		Neglect of women in extension

APPENDIX B: ADDITIONAL TABLES

Table B1: Vegetable producers, economics

		Total			Aboabo			Botenso			Tanoso		
	Unit	Average	Std Dvn	Median	Average	Std Dvn	Median	Average	Std Dvn	Median	Average	Std Dvn	Median
Wet Season	No of cases	14			2			8			4		
Area	ha	0.61	0.48	0.40	0.81	0.00	0.81	0.43	0.25	0.40	0.86	0.82	0.61
Gross Value Production	Cedis	1,441,007	3,485,387	465,050	720,050	551,473	720,050	573,000	290,385	650,000	3,537,500	6,642,801	302,500
Gross Value Production	Cedis/ha	1,612,579	1,625,322	1,303,435	889,610	681,335	889,610	1,471,460	737,476	1,359,031	2,256,301	3,011,545	1,148,999
% Gross Value in Tomato	%	69%	42%	100%	15%	9%	15%	80%	35%	100%	75%	50%	100%
Fertiliser Use	Bags/ha	4.6	4.0	3.6	0.9	0.4	0.9	4.7	3.0	4.3	6.1	6.0	4.2
Costs of Production, net of Labour	Cedis	166,768	163,314	135,000	195,500	163,342	195,500	128,656	75,825	148,500	228,625	289,383	98,750
Costs of Production less Lab	Cedis/ha	298,502	205,015	323,697	241,537	201,806	241,537	330,569	249,695	281,072	262,849	128,385	323,697
Household Labour	Days	23	18	18	10	0	10	28	19	21	21	19	15
Hired Labour	Days	15	18	8	49	19	49	4	4	3	19	12	16
Total Labour Use	Days/ha	75	39	69	72	24	72	82	46	73	63	36	57
Hired Labour Rate	Cedis/Day	5,607	1,666	5,000	5,000	0	5,000	4,938	1,084	5,000	7,250	2,062	7,000
Gross margin	Cedis/ha	897,852	1,558,855	560,909	286,694	361,591	286,694	730,325	637,195	760,440	1,538,485	2,944,165	190,264
Return to Household Labour	Cedis/Day	36,356	67,850	12,776	28,205	29,267	28,205	25,027	27,476	14,330	63,089	128,695	8,930
Dry Season	No of cases	10			3			4			3		
Area	ha	0.58	0.56	0.40	0.54	0.23	0.40	0.33	0.32	0.20	0.94	0.93	0.40
Gross Value Production	Cedis	987,500	1,362,398	392,500	631,667	417,562	445,000	765,000	862,187	485,000	1,640,000	2,477,014	240,000
Gross Value Production	Cedis/ha	1,472,696	957,246	1,216,951	1,103,698	265,653	1,099,580	2,038,547	1,157,844	1,902,644	1,087,225	987,150	593,032
% Gross Value in Tomato	%	31%	42%	10%	37%	29%	22%	50%	58%	50%	0%	0%	0%
Fertiliser Use	Bags/ha	2.2	3.1	1.2	1.6	0.7	1.2	3.1	4.7	1.2	1.6	2.9	0.0
Costs of Production, net of Labour	Cedis	147,300	259,667	62,500	398,667	400,400	170,000	61,250	60,052	62,500	10,667	10,066	12,000
Costs of Production less Lab	Cedis/ha	269,706	341,373	123,548	630,508	375,250	420,064	191,500	226,805	123,548	13,178	15,098	9,884
Household Labour	Days	12	9	9	5	3	5	10	5	9	20	11	19
Hired Labour	Days	23	24	12	52	21	54	5	4	4	19	14	14
Total Labour Use	Days/ha	71	32	64	109	28	99	56	19	57	54	19	59
Hired Labour Rate	Cedis/Day	5,300	2,163	5,000	5,000	0	5,000	4,000	2,708	5,000	7,333	577	7,000
Gross margin	Cedis/ha	844,650	1,064,734	563,380	(70,423)	278,264	(186,558)	1,649,988	907,668	1,525,822	685,940	1,094,206	79,071
Return to Household Labour	Cedis/Day	37,580	55,709	19,417	(6,847)	28,980	(13,875)	62,052	49,876	57,917	49,378	70,904	8,684

Year Total	No of cases	15			3			8			4		
Gross Area	ha	0.95	0.96	0.61	1.08	0.62	1.21	0.59	0.45	0.40	1.57	1.66	0.81
Gross Value Production	Cedis	2,003,273	4,496,181	690,000	1,111,700	984,162	775,100	955,500	905,069	725,000	4,767,500	8,824,523	512,500
% Gross Value in Tomato	%	58%	36%	63%	36%	30%	22%	71%	38%	87%	48%	33%	59%
Costs of Production, net of Labour	Cedis	253,850	301,179	157,000	529,000	558,474	250,000	159,281	107,820	148,500	236,625	297,155	104,750
Household Labour	Days	29	21	25	12	8	15	33	16	29	36	32	29
Hired Labour	Days	29	37	13	84	43	65	6	6	7	33	25	23
Gross margin	Cedis/ha	710,488	1,096,806	223,211	3,048	240,956	103,039	836,602	665,474	766,000	988,839	1,973,753	86,278
Return to Household Labour	Cedis/Day	28,166	55,697	11,160	891	28,455	13,340	27,212	26,074	15,044	50,529	104,582	8,233

Table B2: Vegetable producers, use of chemicals

	No of users				*Rates of use*					*Which crops*						*Against what*			*Change, last 3 yrs*		*Source*			*Presentation*		*Price (Cedi k)*	
Chemical	*Total*	*Aboabo*	*Botenso*	*Tanoso*	*Rate of use*	*Unit of use*	*Rate of use*	*Unit of use*	*Application*	*Tomato*	*Garden egg*	*Pepper*	*Okra*	*Other*	*Insect*	*Fungus*	*Disease*	*No*	*Yes*	*Market*	*Store*	*Other*	*Litre*	*Sachet*	*Litre*	*Sachet*
Wet Season																										
Cases	14	3	6	5																						
Karate	4	1	3	0	0.5, 1(2), 4	lit/ac			Spray	4	2	1	1	1	4	1	1	4	0	3 (BO)	1 (AA)		4		15 (AA), 60 (BO)	
Kocide	10	2	5	3	0.5, 4	lit/ac	1, 2 (2), 2.5, 5.5, 6, 8	sach/ac	Spray	9	4	1	2	1	9	2	3	8	0	6	4		2	7	2.5, 20	1.5, 3 (3), 4 (2), 10, 16
Dithane	7	0	4	3	1, 2, 4	lit/ac	1, 4 (2), 6	sach/ac	Spray	6	2	0	0	0	7	1		7	0	5	2		3	4	4 (3)	1 (3), 16
Poison	3	0	0	3	1, 2, 5	lit/ac			Spray	2		1			2			1	0	1	2		3		4 (3)	
Other	3	2	1	0						3	2	2	2	1	3			3	0	1	1	1	3			
No Use	4	1	0	2																						
Dry Season																										
Cases	10	4	2	4																						
Karate	3	2	1	0	0.5, 1, 2	lit/ac			Spray	3	1	1	2	1	3			3	0	2	1		3		15, 30, 60	
Kocide	4	3	1	0	8	lit/ac	1, 2.5, 10	sach/ac	Spray	2	3	1	3	1	2	1		2	1	2	2		1	3	2.5	1, 10, 20
Other	2	2	0	0					Spray						2			1	0		1	1	2			
No Use	5	1	1	3																						

Source: Survey data

Table B3: Technical details of pesticides reported

Brand Name	***Intended use***	***Active Chemicals***
Karate	Insecticide	Lambda-cyhalothrin
Thiodan	Insecticide	Endosulfan
Sumithion	Insecticide	Fenetrothian
Dithane	Fungicide	Mancozeb
Kocide	Fungicide	Copper hydroxide

Source: Warburton & Lyon 1995

APPENDIX C: POLICIES THAT AFFECT NATURAL RESOURCE MANAGEMENT INDIRECTLY

Policies	**Act through**	**Effect on natural resource management**
Macroeconomic policies: interest rates, (exchange rate), fiscal balance	Aggregate demand Inflation rate	Through level of economic activity: high economic activity tends to mean increasing use of natural resources Inflation can make land and trees valuable as a hedge to preserve asset values
Exchange rate	Ratio of domestic to international prices	Degree of incentive to export industries, such as cash crops, logging or tourism
Taxes and subsidies	Absolute and relative prices of affected items	Taxes on products may depress level of particular land uses. Taxes on inputs affect technology used in farming. Subsidies usually apply to inputs and influence technology.
Spending on public infrastructure, especially roads	Reduces costs of transport	Encourages use of previously-remote natural resources. Encourages production and harvesting of goods with low value-to-weight ratios.
Spending on people: education, health	Enhances people's ability and capacity. Increases the returns to labour, increases opportunity costs of labour, especially unskilled labour.	May allow the use of more sophisticated techniques. May encourage mechanisation. People may abandon activities offering low returns (e.g. some gathering activities, charcoal making, etc.)
Land tenure policy and legislation	Distribution of ownership Security of tenure	May make secure tenure dependent on particular land use (e.g. only cleared land may be titled) May encourage investment in long-term measures for conservation of resources
Banking and credit policy	Quantity and price of capital, changes relative costs of factors of production Transactions costs in (rural) financial markets	May affect technology of land use May allow increased investment in machinery, fencing, buildings, etc.
Technology	Level and direction of spending on public research	Technology of land use Ability to conserve resources Incentives to use resources previously of little economic value

Note: There are other interactions. For example, the growth of the economy affects labour demand and wages. It may also affect settlement as growth encourages urbanisation. These affect natural resources on both the supply side (more jobs, higher wages reduces labour supply for natural resource-based activities) and the demand side (increased consumption of some products and services derived from natural resources).