CHARCOAL BURNING IN THE KINTAMPO DISTRICTS: POLICIES, ENVIRONMENT AND LIVELIHOOD ISSUES

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edited and transcribed by
Kojo Amanor, Eric Osei and Kofi Gyampoh

CONTACT ADDRESS:
Prof Kojo Amanor,
DEAR Project Coordinator
Institute of African Studies
University of Ghana
Legon
Ghana
ksamano@ug.edu.gh

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INTRODUCTION

Over the last two years the Decentralised Environmental Action (DEAR) Project has been working in the Kintampo District promoting informed decision-making in natural resource and environmental policy. The DEAR Project is concerned with the lack of information and consultation used in planning processes. All too frequently environmental policy consists of directives that tell people what to do or ban certain activities, without a process of consultation and dialogue between policy makers and the users of resources, and without establishing a consensus. These policy directives are often implemented without any credible evidence, and an assumption that rural people do not know how to manage the environment and need to be told what to do.

In contrast with this position, the DEAR approach attempts to build a democratic framework for environmental policy that involves consultations between users of resource and policy makers (including both elected representatives and technical and administrative staff). Through consultation policymakers are able to learn about the perspectives, needs and interests of producers and users of resources, and the users are better able to understand policies and the policy options. Consultations result in better information and more realistic assessments of the situation in hand and the conditions on the ground.

To achieve more informed natural resource policy making the DEAR Project has been working with the District Assembly and the Area Council to develop ways of collecting information on natural resources, entering them into a database and using this in planning. The DEAR Project has also been working with natural resource-user groups, helping them to network and come together to reflect on their situation and articulate their perspectives on policies, and their demands. Within the Kintampo area the DEAR Project has been working with charcoal burners and yam farmers. These two groups were selected since they are the most important activities in the district, which generate the most revenues for the district assembly. But both groups tend to be highly marginalised, badly understood and poorly represented in policy decisions. Their activities are often portrayed as destroying the environment and they receive little support from the state. In the case of charcoal burning, there are often attempts to ban it, resulting in livelihood security for the practitioners. The DEAR project has set up platforms in which these users groups come together to air their perspectives and demands to policy makers and here the response of policy makers.

Working with charcoal burners on policy-oriented research

When we began working with charcoal burners, we realised that there were many assumptions about charcoal production which were not backed up by evidence, and which were at variance with the situation on the ground. We also realised that charcoal was a highly political issue within communities, with much polarisation between chiefs, elders, youths and assembly members.

Within policy circles charcoal burning was often presented as a necessary evil which was destroying the environment. Charcoal burners were portrayed as irresponsible youth who refused to go to farm and sought quick and easy money from cutting down trees indiscriminately. Charcoal burning was seen by policy makers as resulting in declining food production, and deforestation and desertification.

Research we began to conduct through interviewing charcoal burners in a number of settlements revealed a different situation. Charcoal was being produced by a large proportion of farmers, including women, youth but also well-established farmers with families. Charcoal provided an important supplementary income for many of these groups, which found agricultural production increasingly risky, and prices for crops declining in real terms as markets were increasingly controlled by a monopoly of powerful market traders. Capital realised from charcoal was often reinvested in farming and used for family support and social welfare, including the education of children and health provisions. Banning charcoal thus affects family welfare and hits the rural poor and the most vulnerable groups within society. It also undermines investment in agricultural production.

In the New Longoro area charcoal was largely produced from farm clearance and from old yam farms in which there were many small trees that had been burnt to provide staking material for the yams. Most farmers got charcoal from their own farm and fallow, since as citizens, they had rights to the fuelwood products of the land that they farmed. While they could also exploit charcoal in bush that was not being claimed by other farmers, this would involve them searching further for charcoal beyond farm lands, and involve them in travelling far from their farms. In the Babato area, this was slightly different. Many of the communities consisted of migrants, who had settled on the land a long time ago, and who were not recognised as citizens. In these areas chiefs gave them permission to farm in return for the payment of annual tribute. However, they also gave rights to exploit charcoal on the land to migrant charcoal burners. This enabled the migrant charcoal burners to fell trees in the fallows and farms of farmers. If farmers wanted to exploit charcoal from their own farms they were forced to negotiate with the charcoal burners. Nevertheless, the woods exploited for charcoal largely originated from trees on farms and fallows.

In contrast with the situation of deforestation presented by policy makers, farming activities often result in the preservation of many tree species that make good charcoal species. While many trees are cut in the process of farming, they frequently regenerate from coppice. Quite often regeneration results in more trees, since the one tree which was cut puts out many shoots that develop into several trees. Many farmers argue that although there are fewer large trees than in the past, there are many more small trees. They argue that the large trees have been cut for timber not charcoal, and it is this that has brought about the most significant decline of trees in the environment.

The DEAR Project set up several experiments with farmers to examine the processes of regeneration in farm and fallow land. These revealed that

most of the trees used for charcoal are common in the farm environment. They regenerate quickly, unlike timber trees, and are robust - when cut they regenerate vigorously, either from the stem, the base of the plant or along the roots. Many of these plants have some resistance to fire and some of them regenerate better when they are burnt. Farming practices often encourage regeneration and result in numerous coppices with fields. We also find that many farmers had developed good tree management practices that encouraged regeneration and often had conventions which assured that certain trees considered to have economic or other importance were not cut. In many settlements there were areas of community forests that were protected. Thus, there is a basis for establishing community management of charcoal production.

There are many advantages of building charcoal production on existing stocks of regenerating trees. It allows farmers to gain an income from what is essentially a by-product of farming, the preservation of trees, stumps and roots stocks for farming purposes, including for the maintenance of soil fertility, and staking materials for yams. It allows farmers to gain different incomes from the same land. It preserves biodiversity. A viable strategy for charcoal production would be to promote existing best practices in the management of trees on farms and fallows. However, this does not feature in existing policy frameworks. These assume that shifting cultivation is a problem and needs to be replaced by permanent cultivation using modern inputs. However, the record of permanent cultivation is not good in terms of preserving the environment. The environments in which permanent cultivation has developed are among the most treeless vegetations. Permanent cultivation involves the stumping of land to allow for tractor ploughing. Ploughing techniques often turn the subsoil over the fertile subsoil, which results in farmers having to use increasing amounts of chemical fertilisers to maintain soil fertility and productivity. While it is argued that permanent agriculture will preserve tree cover, since farmers will not have to shift from plot to plot, the scenario of farmers cultivating vast areas of on a permanent basis without any naturally occurring trees is not convincing as a form of sustainable agriculture. Clearly, if permanent cultivation is successful and profitable, farmers would want to expand the areas of cultivation, resulting in the increasing stumping of areas with natural vegetation and the rapid decline of remaining forests. This is not a hypothetical scenario, it occurs in many forested areas in Southeast Asia and Latin America, as a result of the uptake of green revolution technologies.

Tree plantations are also promoted by policy makers. They argue that farmers should plant trees to replace the ones they cut and that they should establish woodlots for charcoal. This assumes that the trees that are cut for charcoal do not regenerate. However, our research shows that most of the charcoal species regenerate vigorously from coppice regrowth and that coppice growth is faster than propagation from seeds, since it is from well-established root stocks that have adapted to stressful environments (in which trees are often attacked by fire) by being able to regenerate rapidly. Planting exotic fuelwood species will reduce the diversity within the landscape, since only a few exotic species are going to be planted for fuelwood in lines, and existing root stumps are going to be

destroyed to prevent them competing with the exotic woodlot species. Woodlot production will not be integrated with other farm processes, and charcoal burners will be removing land from food cultivation for fuelwood production. The existing way of farming allows many natural resource products to be taken from the same piece of land.

Most of these issues are not discussed in policy frameworks for charcoal. These develop very simple scenarios in which charcoal burners cut trees in forest land. The trees die and this results in a rapid decline in tree population. There is no attempt to identify the specific trees used in charcoal production, the existing densities of these trees, and the robustness of vulnerability of these trees and their capacity to regenerate. However, without examining these issues, there can be no proper monitoring of what is happening to the environment as a result of the activities of farmers and charcoal burners and other natural resource users. Without monitoring, there can be no proper policy planning process.

Transparency in natural resource policies

A major concern voiced by most charcoal burners in different areas and settlements was a lack of transparency in policies on charcoal. District administrations empowered or allowed chiefs to ban and control charcoal production. In the Kintampo district several village chiefs had introduced bans against charcoal production, and in other settlements bans were imposed from time to time or threats of introducing bans were introduced. This was used by chiefs to extract revenues from farmers. To get the ban lifted, the charcoal burners would either have to organise to make a collection of money for the chief, or come to an agreement to supply the chief with a percentage of their income from charcoal, such as ¢100,000 for every tractor load collected. Thus, charcoal burners were paying revenues to both the district authority and to the chiefs. The chiefs justified introducing bans on the basis that charcoal was destroying the environment or that the youth were abandoning food production to take up charcoal production and this was resulting in hunger and lack of food in their areas. However, the charcoal burners argued that in the past the chiefs used to get much money from migrant charcoal burners. As migrant burners were replaced by local farmer-charcoal burners, chiefs began to lose revenues since they could not impose fees on citizens who have rights farm and use fallow resources freely. The chiefs looked to new ways of forcing charcoal burners to provide them with revenues, and found that environmental concerns provided them with new ways of controlling charcoal burners. The charcoal burners were concerned that ad hoc bans and extraction of revenues was producing insecurity in their livelihood and giving charcoal burning a bad name. Charcoal burners were being victimised to extract revenues from them. The charcoal burners called for the district to intervene in regulating ways in which chiefs could make interventions and byelaws for charcoal burning. Clearly, there are many inconsistencies in the way in which in one paramount chieftaincy, charcoal burning can be banned in certain areas yet is open to exploitation in other settlements.

Networking
The DEAR Project initially carried out research in three settlements in the New Longoro Area. In these settlements relations were established with a core of charcoal burners, some of whom were involved in our research. They informed other charcoal burners in neighbouring settlements of what we were doing and meetings were held with this expanding network in the DEAR Centre in Kintampo. Meetings were held to discuss research findings and the various experiences of charcoal burners. At one of these meetings a number of the charcoal burners in the New Longoro area decided to form a charcoal burners association, with its headquarters at Asantekwa.

In the first meeting at the DEAR Centre in Kintampo on 24 July 2004 18 charcoal burners from 8 settlements participated. At this meeting some of the charcoal burners decided to form an association and elected an executive. This executive was different from the focal people we had been working on research activities and in organising the networks. Following this meetings were held in villages and the network extended to other villages. In the second workshop, held on 1st December 2004, 54 burners participated from 14 settlements. In the workshop of 17 February 2005 this rose to 73 charcoal burners from 17 settlements. At this point the numbers of people attending the workshop was becoming too large for effective dialogue. From this point onwards, the groups from the various settlements were responsible for organising their own meeting, and electing representatives to represent them at Dear meetings. The main activities in the workshop consisted of discussing policy issues, designing a poster and developing a programme of common demands from charcoal burners. Following the February 2005 meeting a two page statement was made of key demands raised by charcoal burners. This was distributed among the various settlements for discussion in the groups. On 17th May a meeting was held for the representatives from the community groups to discuss the statement. At this meeting the statement was further developed and summarised into a one page document of key demands of charcoal burners on policy makers.

Developing platforms
The DEAR Project is committed to creating platforms that allow user of natural resources in the rural areas to discuss their perspectives, needs and policy concerns with policy makers and technical officers and democratic representatives involved in the implementation of policy. This workshop of 29 June 2005 forms a central activity in creating platforms for charcoal burners to air their needs and grievances. The objective of this workshop was to inform the district assembly and regional policy makers of the perspectives of charcoal burners.

The workshop consisted of three presentations followed by the presentation of the statement of charcoal burners. The first presentation by Kojo Amanor of the DEAR Project, reports on the main policy issues as seen through the perspectives of the research we conducted into charcoal production. The second paper by Kanton Tontie, reports on the experimentations on regeneration carried out by DEAR. The third presentation, by Mathew Kewa, the chairperson of the Kintampo Charcoal Burners Association (Mo Area), reports on the lack of representation of

charcoal burners in policy deliberations and the ways in which charcoal burners are often maligned and made the scapegoat for all the ills in the environment. Following discussions, the statement of charcoal burners was presented to the policy makers. The policy makers and technical officers were divided into working groups to consider the demands of the charcoal burners and report back.

These proceedings present the reports, the demands of charcoal burners, the discussions and the conclusions of the working groups of policy makers and implementers. The discussions reflect both the perspectives of the policy makers and of charcoal burners.

The workshop was a success in that the charcoal burners were effectively able to put across their case and argue it out with the policy makers and those in administration. However, the workshop failed to develop any real consensus on which policies on charcoal could be taken forward. Those in the administration continued to put forward views based on the old assumptions on which existing policies are based, and failed to consider the new evidence presented to them. This is reflected in the recommendations of working groups of the district assembly. The working groups continued to stick to their former positions and rejected the new evidence presented in the workshop.

In many ways this is to be expected, since conventional wisdom is often reinforced through institutional processes, through training workshops and institutional agendas. It is usually transmitted from higher level institutions to lower-level institutions. Donor institutions and international development policy centres often make assumptions about degradation and deforestation, which national agencies are encouraged to take up and implement in dogmatic policies. It is often difficult for staff working with communities to question these assumptions since this can be interpreted as arrogance and insubordination by their superiors.

Nevertheless, without any transformation within policy frameworks for natural resources and without policy being responsive to the needs and demands of those it claims to provide for, natural resource management policies will continue to fail and will continue to loose credibility among the majority of rural people.

To maintain credibility, policies that are implemented at the district must reflect the conditions on the ground and be able to respond to these. If they merely reaffirm assumptions within national policy processes and fail to respond to credible information from various localities, they are likely to worsen the situation rather than create avenues for development. It is necessary for national level policy institutions to provide support for more informed policy making initiatives at the district and local-level that reflect local needs and empower this lower administrative levels to communicate these needs and perspectives upwards. It is necessary for both international and national development agencies and donors to recognise that dominant environmental policies are frequently poorly thought out, based on shaky empirical evidence and assumptions about deforestation, desertification and land degradation. These reaffirm top-down communication of directives and undermine notions of popular

participation in natural resource management policy. It is necessary to build policy planning processes that are based on consultation with rural people, dialogue and evidence. It is necessary to create institutional structures that build effective monitoring of natural resources and consensus about policies.

Kojo Amanor
Dear Project Coordinator

CHARCOAL BURNING AND ENVIRONMENTAL POLICY

Kojo Amanor
DEAR Coordinator

Charcoal burning provides an important income for many rural communities in the Kintampo district. It is the most important revenue raised by the District Assembly in rural areas and for the Area Councils (the lowest level of decentralised administration). But charcoal burners cannot pursue their livelihoods with security. They are frequently portrayed in policy circles and in the national press as destroyers of the environment who act irresponsibly for "quick and easy money", and who destroy useful economic trees just to produce charcoal. In policy circles there are calls for charcoal burning to be banned. At present charcoal production is banned by some of the District Assemblies on the Afram Plains. In the late 1980s and early 1990s there was an attempt to ban charcoal in some of the districts of Brong Ahafo. Currently, charcoal is not banned by the District Assemblies in Brong Ahafo, but in many settlements chiefs have introduced bans against charcoal. Another strategy calls for charcoal burners to replace the exploitation of naturally regenerating trees with woodlots of fast growing exotic species that can be used for charcoal. However, the evidence that charcoal production destroys the environment is based on assumptions rather than on evidence. It is based on a misunderstanding of how charcoal is produced in rural communities. This should be of great concern, since charcoal is such an important income generator for rural people, the rural poor, and for Districts.

The importance of charcoal production in the Kintampo district

In the Kintampo North district revenues for charcoal are collected by the Area Councils (ACs). These revenues are shared into half between the ACs and the District Assembly. Table 1 presents revenues collected by the three Area Councils in Kintampo North. This shows that charcoal is the most important revenue generator. Over the last 4 years Charcoal has contributed to 60 percent of the revenues generated by Babato AC, 70 percent of the revenues of Kadelso AC and 76 percent of revenues of New Longoro AC. Charcoal produces more revenue and wealth than all farm crops put together.

Charcoal is very important for rural livelihoods in Kintampo North District. In a survey of 538 people in Asantekwa, which included 272 men and 266 women about 38 percent burned charcoal. This included 50 percent of men and 26 percent of women. Charcoal was most important for people in the 26-35 year bracket and the 36—45 year bracket. Over 50 percent of people aged between 26-35 burned charcoal and 55 percent of those between 35-46 burned charcoal. However, 30 percent of those aged over 45 also burned charcoal. Charcoal is thus an important revenue for all age groups within rural society. Charcoal is often portrayed to be an activity of irresponsible youth. This is not supported by the evidence. The most significant group of charcoal burners occurs among those who are settled with families.

Table 1 Area Council Revenues in Kintampo North
(in cedis)

BABATOKUMA AREA COUNCIL						
Year	**charcoal**	**farm produce**	**market**	**others**	**total**	**% of charcoal**
2000	36,268,800	5,813,500	6,896,500	2,120,000	51,099,800	**70.98**
2001	30,863,000	11,365,000	8,162,000	1,563,000	51,953,500	**59.41**
2002	50,192,000	28,724,000	11,494,000	679,500	91,089,500	**60.78**
2003	51,020,000	27,448,000	7,998,000	878,000	87,344,000	**58.41**
2004	57,824,000	49,349,000	8,533,000	2,186,000	117,892,000	**49.10**
TOTAL	226,167,800	122,699,500	43,083,500	7,426,500	399,378,800	**59.73**

KADELSO AREA COUNCIL						
Year	**charcoal**	**farm produce**	**cattle**	**others**	**total**	**% of charcoal**
2000	12,966,000	6,940,620	4,127,000	3,532,100	27,565,720	**47.04**
2001	13,567,000	4,249,500	4,361,000	150,000	22,327,500	**60.76**
2002	25,862,000	5,984,000			31,846,000	**81.21**
2003	50,041,000	8,049,000	2,457,000		60,547,000	**82.65**
2004	79,493,000	17,942,000	5,000,000	40,000	102,475,000	**77.57**
TOTAL	181,929,000	43,165,120	15,945,000	3,722,100	244,761,220	**69.86**

NEW LONGORO AREA COUNCIL					
Year	**Charcoal**	**farm produce**	**Others**	**total**	**% of charcoal**
2000	25,921,710	8,319,000	2,183,900	36,424,610	**71.17**
2001	18,718,000	8,243,000	2,366,000	29,327,000	**63.83**
2002	28,742,000	6,358,000		35,100,000	**81.89**
2003	63,621,000	8,188,000	2,448,000	74,257,000	**85.66**
2004	75,493,000	18,677,000	5,040,000	99,210,000	**76.09**
TOTAL	212,495,710	49,785,000	12,037,900	274,318,610	**75.89**

Most charcoal is taken from farmland. At Asantekwa about seventy percent of charcoal burners gain their charcoal from their farmland, including 66 percent of men and 74 percent of women. Many of those exploiting charcoal in bush exploited it on their own fallow land. Only 2 percent of charcoal burners do not farm. Charcoal is integrated with farming and most charcoal burners gain their charcoal from their farmland. Although charcoal burners can get charcoal from uncultivated bush, farms and fallows give individuals secure access and rights to charcoal. High densities of trees are also found on yam farms, because they are deliberately preserved by the farmers. Yam farmers in the Kintampo district usually stake their yams on small trees. The trees are often burnt, to prevent them competing with the yams and casting a shade over their vines. The burnt trunks and branches are used for charcoal and the trees usually regenerate putting out new coppices rapidly. The burnt trunks are used for charcoal production after the harvest of the yams. There are often more trees in the yam farming areas in the farming areas than in uncultivated areas. Charcoal production is usually integrated with yam farming and charcoal is a by product of yam production. The majority of trees used for charcoal production are taken from farms: they are dead wood from farm clearance. Charcoal burners prefer dead wood, since if they fell green trees they usually have to wait for them to dry before processing into charcoal.

In the Asantekwa area most production is on a small scale. 72 percent of charcoal producers estimate that they produce less than 100 bags a year (see table 2).

Table 2. Scale of annual production of charcoal at Asantekwa

No of bags of charcoal produced	Percentage of men	Percentage of women	Percentage of all producers
1-50 bags	34	47	38
51-100 bags	34	34	34
101-200 bags	16	14	16
200-400 bags	7	3	5
Over 400 bags	10	3	7
Number of farmers	134	73	207

Most people value charcoal production for producing "quick" money. Charcoal production enables a significant sum of capital to be realised within a few weeks that can meet a purpose such as paying school fees, hospital fees, and funeral expenses. The money to be raised from charcoal production can be planned unlike with farming. The charcoal burner knows exactly how much charcoal they will gain from the quantity of wood they cut. In contrast, farmers have to wait several months before their crops mature, the yield is dependent on weather conditions and other factors which cannot be easily determined in advanced, and the price paid by traders also fluctuates.

In settlements such as Asantekwa, charcoal burning is one of a number of livelihood options that supplements farming. The capital raised from charcoal is often invested in farming, for hiring labour for land clearance and weeding. Charcoal plays an important role in people's livelihoods and in generating incomes.

In Asantekwa the majority of charcoal burners are locals. In the survey 43 percent of locals and 20 percent of migrants burn charcoal. In the New Longoro area charcoal burning is largely produced by local farming people. However, this has not always been the case. The original charcoal burners were Zabrama from Niger. Sissala people learned charcoal burning from them and became the major charcoal burners from the 1950s as the Zabrama relocated into retailing of charcoal and other commodities in the urban areas. The Sissala dominated the charcoal trade until the 1990s by which time many indigenous farmers in the communities in Brong Ahafo had learned how to produce charcoal from the Sissala and began taking it up as an alternative livelihood activity. Charcoal production has expanded as food crop markets become increasingly dominated by large market traders who can control market access and prices. Rural producers are still able to transport their charcoal to large urban markets and engage in direct selling unlike in food crop markets which are controlled by large market traders.

Access to charcoal resources and types of production

In the Kintampo district, three distinct types of charcoal production occur. The first type, characterised by Asantekwa, largely consists of small scale production by local farmers, who are citizens rather than migrants, and who have secure access to farmland and have rights to exploit natural resources freely. The second type of settlements is characterised of areas in which migrant farmers are dominant. These migrants may have settled in the Kintampo district for generations. While many of these settlers have been born within these settlements in Kintampo, they are still regarded as migrants and hold their rights to land as migrants rather than locals. They pay annual tithes to the chiefs. They do not hold secure rights to their land and the chiefs and their caretakers can sell the rights to exploit charcoal to a third party of specialised charcoal burners. Within these settlements, those wishing to exploit charcoal cannot do it freely and they have to pay sums of money to the chiefs for charcoal and gain permission. Professional migrant charcoal burners gain a "concession" in which to exploit charcoal, which can include the land of farmers. They purchase these rights from the traditional authorities. In the Dawadawa and Atta Akura area of the Babato AC settled migrant farming communities pay ¢100,000 per tractor load of charcoal transported to market to the chiefs. If the charcoal on their land has been given out to professional charcoal burners the farmer has to get permission from the charcoal burners to exploit the trees for charcoal, and the fees for charcoal extraction are paid to the professional burner (professional burners are those who specialise in charcoal production and move from area to area gaining permits from chiefs to exploit charcoal from large areas of land). The third area is characterised by large expanses of unsettled wilderness areas in which there is little farming, such as the Agege area. The chiefs give out large concessions to professional burners who exploit large areas with various types of labour. Frequently the permit holders contracts parts of the concession to other burners on share contract arrangements. Advance fees are paid to the chiefs and when the charcoal is sold the rest of the payment is made. The fees are closely guarded and those involved are reluctant to reveal the cost of the arrangements.

Environmental degradation, chiefs and bans on charcoal

In policy circles and in the press, charcoal is portrayed as an undesirable activity that destroys the environment. Charcoal burners are portrayed as cutting down economic trees for charcoal. The bad image that has been given to charcoal burners enables chiefs to manipulate charcoal burners and extract monies from them. In many settlements in the Kintampo North district chiefs have introduced bans on charcoal or threaten to introduce bans. They argue that they are doing this because the charcoal burners are destroying the environment. But there is no consistent policy on banning charcoal. For instance, in the Mo traditional area, bans on charcoal exist in some settlements, threats of bans occur in others, and in other areas there is no ban on charcoal. In the Agege area, where large scale professional burners operate, there are no bans on charcoal. Bans usually occur in settlements in which charcoal burners are not paying the chiefs revenues for extracting charcoal, or where the chiefs are not happy with the sums they are receiving. They threat to introduce a ban is a way of gaining revenues or of increasing the revenues. When the chiefs

threaten to ban charcoal, the charcoal burners usually have to collect some money to appease them so that they can continue burning, or they negotiate to establish a fee for charcoal exploitation. In areas where charcoal is dominated by local people's the chiefs cannot set fees for them to exploit charcoal since as citizens they have rights to use the natural resources on their lands. But the chiefs are conscious of the fact that if the farmers were not burning charcoal on their farms they could sell the rights to migrant charcoal burners, as happened in the past. In this situation, the chiefs manipulate concerns about the environment to introduce local byelaws that ban charcoal. If the local people wish to continue burning charcoal or wish for peace in which charcoal production can continue without political problems they have to "find something for the chief".

This results in inconsistent policies, in which different byelaws introduced by chiefs on charcoal production operate in different areas of the same traditional area. The difference in the byelaws do not reflect the extent of deforestation, but political factors concerned with the ability of chiefs to control their subjects and extract monies or "rents" and "tribute" from them. These kinds of developments are not good because they encourage corruption. They hinder the economic development of the area for the narrow selfish objectives of chiefs. They create the impression that charcoal production is destroying the environment and give charcoal burners a bad name. District authorities often support the chiefs because they believe that the chiefs are protecting the environment, or because they believe the activities of rural people need to be controlled.

This again hinders the economic development of the area, and creates a lack of trust in policy makers who are seeing as hindering the activities of rural people rather than creating supportive development structures. There should be a consistent policy on charcoal. If chiefs are to ban charcoal, then charcoal should be banned in all the settlements under a traditional authority. Chiefs should not be able to ban charcoal in some settlements and let its production in other settlements, according to the monies they have received from charcoal burners.

Does charcoal burning destroy the environment?

Research which we have been carrying out with some of the farmers suggests that charcoal burning does not destroy the environment. Charcoal burners are selective in cutting charcoal. They do not cut every single tree in the fields where they cut wood. They only cut certain species that are good for charcoal, and only species which have grown sufficiently. Most of the species used for charcoal are common. They are hardy species. They regenerate rapidly from coppice. Within a period of 6-10 years they are able to regenerate to a size in which they can be again exploited. The effect of charcoal burning on the environment cannot be separated from yam farming. Most of the trees used for charcoal are exploited on farms where the trees are cut or burned during land clearance. Yam farmers, in particular, need areas in which there are many trees to make their yam farms. They preserve large numbers of trees on their farms which they burn and then use for staking yams. After the yams have been harvested the burnt trees are used for charcoal. Some of the settlements in the Kintampo area have community forests in which large numbers of trees can be found. These are not exploited even in

areas in which there are many charcoal burners. Mansie, for instance, has a large community forest, on the old settlement site in which the most common tree is Kane (*Anogeissus leiocarpus*), which is considered to be the best charcoal species.

Charcoal woodlots are not a viable solution

Some policy makers advocate that charcoal producers should be made to plant woodlots for charcoal rather than cutting green trees in the bush. This strategy misunderstands how charcoal is produced at present. A large amount of charcoal originates from farm clearance. Charcoal is not produced by clear felling areas of all their vegetation. However, if woodlots are going to be established this will involve the clear felling of the fields in which they occur. All the trees would have to be cut, stumped and killed to make way for the panting of neat rows of plantation species. No trees would regenerate under the plantations. Plantations would result in replacing the diversity of species that occur with single fast growing species that only have value as fuelwood. Many of the species that exist in farmers fallow have many different uses. Plantations would only work in areas in which there has been serious degradation, in which trees no longer exist and have been replaced by grass. These are not the conditions that we find in the Kintampo district, in which most of the vegetation consists of small to medium woody parkland trees. Promoting the preservation of coppice regrowth and fallow management in this environment is a better strategy than developing plantations. If the trees are carefully managed this may result in the preservation of a well-wooded environment in the future. Preserving coppice will result in a diversity of different species that are at different stages of growth, and which are adapted to conditions of stress within the environment. Many of the natural trees are able to withstand outbreaks of fire and respond to cutting by coppicing. Through working among these trees for many centuries farmers have evolved techniques of managing them that work, and the trees are able to withstand the practices of farmers.

Little research exists on the nature of the environment and its regeneration in the Kintampo district or in similar environments. Policies are made based on assumptions of deforestation and desertification without evidence to back the assertions. Environmental policies are frequently influenced by political interests rather than evidence. Policies are based on a mistrust of rural people and farmers rather than on seeking to further their interests and develop the best of their practices. While policy makers are adamant that charcoal burning destroys the environment these assertions are not backed up by credible research, or the monitoring of charcoal production and the environment. District authorities do not even have data on the main species that are used in charcoal production. The inventory stocks of the Forestry Service cover timber species, not those species used in charcoal production. The Forestry Service has not conducted credible research on charcoal burning. Yet charcoal burning is one of the most important economic activities in the Kintampo North district.

Local controls and codes of conduct

In many settlements farmers and charcoal burners have evolved codes of conduct that inform the burning of charcoal. It is understood that

charcoal burners cannot burn anywhere, including on other people's fallow land. They cannot burn trees that are defined locally to have other important economic uses that lead to them being preserved. Thus, in many places in the savanna and transitional zone it is understood that charcoal burners should not burn *Parkia biglobosa* (dawadawa, locust bean) trees and *Vitellaria paradoxa* (shea nut trees). When a few charcoal burners do evade these codes of conduct the issues is taken up and it can be reported to the traditional authority or the assembly member for action to be taken against the culprit. This has been taken up by the media and distorted, to argue that charcoal burners are so unenlightened as to kill economic trees. However, in reality it is the same charcoal burners (who are also usually farmers) who have given economic value to these trees and use them within their households. It is not the state, or the Forestry Service who have discovered value in these and other trees of local importance. The economic trees that are recognised vary from area to area depending upon taste and cultural values. In areas where the trees are recognised as important they are preserved in large quantities by the farming population. When they are not recognised as important they are not preserved by the local population. Other local codes relate to the felling of trees on stream banks and watercourses. While many of these practices are also regulated by the state they often originate with the communities, and the communities put pressure on state organisations to enforce the practices. Farmers have also evolved many management practices for trees, which help their regeneration.

The way forward

Charcoal burners and farmers have considerable knowledge of the environment. This arises from the fact that they work among the trees from day to day. They have developed production systems that work because they understand how the environment works. From this it follows that farmers and charcoal burners have knowledge that can be of use to policy makers and can also help them in collecting information and making policies. In many settlements farmers already have rules and codes of conduct that inform the use of natural resources. For instance economic trees of local significance are frequently protected from felling by charcoal burners, such as shea nut and dawadawa.

In some settlements the traditional authorities uphold these codes of conducts. But in others, chiefs evade them and are personally involved in timber felling and give lands out to chainsaw operators. They violate regulations or twist them to extract personal benefit. Since they are not held accountable there is a large temptation for them to exploit natural resources for their own personal advantage at the expense of the community.

Instead of introducing bans against charcoal or encouraging chiefs to ban charcoal, local producers, farmers and charcoal burners should be encouraged to come together to establish a forum where they discuss the management of charcoal, develop best practices for its production, and create local guidelines for the management of trees. These will vary from settlement to settlement, since conditions vary. What may be important local trees in one area with economic use may not be used in another area. Promoting good management practices that generate secure

livelihoods makes more sense than criminalising the income-generating activities of the rural poor. There is little hard evidence or proof that the practice of charcoal burning is resulting in rapid deforestation or desertification. Local communicates can be used by policy makers to help them in monitoring the impact of deforestation on the environment. Much of our research that looks at the effects of farming and charcoal burning on the environment has been carried out in collaboration with farmers and charcoal burners.

Figure 1 Old yam farms provide a lot of wood for charcoal

REGENERATION ON FALLOW AND FARM LAND

Kanton Tontie
Dear Project

In looking at the impact of farming practices and charcoal burning on regeneration of the environment we realised that little research had been carried out on the parkland environments of the transitional and savanna zone. Claims that charcoal burning results in deforestation are rarely backed up by detailed studies of the impact of charcoal on regeneration at specific sites, or of studies of regeneration. Therefore, we cannot rely on existing research to understand regeneration. We needed to develop our own research. However, we were faced by a number of constraints, of which the most pressing was lack of time. We had to base our results on two years of collection of data – the duration of our project. To come to an understanding of regeneration we decided to work with farmers and charcoal burners in conducting the research. We held discussion with farmers on the history of land use on particular plots, the last date the plot was cleared, the species that were preserved and users' estimates of the age of trees based on their recollections.

Research activities

The study was made up of three parts. In the first part we took quadrates in the bush and measurement of girth size of trees at chest level. The second component of the research involved taking quadrates on farms and in fallow land or of whole farms, and carrying out inventories of the incidences of tree species present, the nature of coppices, the number of coppices, with the collaboration of the farmers and charcoal burners. Our discussions with the farmers and charcoal burners were focused on the history of land use within the plots; the last date the plot was cleared; the species that were preserved; and the user's own estimates of the age of trees based on their recollection of when they felled the trees or cleared the land. The third research activity was to carry out experiments in cutting various species of trees at different heights on common land, based on the heights that farmers and charcoal burners cut trees, and to observe the nature of their regeneration.

On each stole, stump or on roots the number of coppices were counted and their girth sizes and length measured, using a tape measure and a 200 centimetre graduated stick. The tape measure was used to measure the girth size and length of the coppices and the coppicing stocks, while the graduated stick was used to measure the length of tall coppices. The girth sizes of coppices were measured at the height of 2 centimetres from the base while the girth size of the coppicing stocks were measured at the height of 20 centimetres from the ground. The girth sizes of trees preserved on farms were measured at chest level. We also picked Geographical Positioning System (GPS) points on all the farms that were worked on, so that we could return to observe these trees at a later date.

The dominant species on farms and fallows

Regeneration on relatively new farms tends to be higher than on farms that have been farmed over a long duration of time. The most common trees preserved on farms included *Vitellaria paradoxa (*som*)*, *Parkia biglobosa* (sol), *Nauclea latifolia* (kankano), *Lophira lanceolata* (kerebente), *Daniellia oliveri* (cham), *Cassia sieberiana* (Dimbal), *Anogeissus leiocarpus* (koola/kane), *Terminalia macroptera* (sasu)*, Ficus exasperata* (pru), *Pterocarpus erinaceous* (Twima), *Detarium microcarpum* (nam), *Pseudocedrela kotschyi* (borgor). Most of these species are valued by farmers for their uses have been preserved because of this.

The main tree species exploited for charcoal include *Anogeissus leiocarpus*, *Terminalia macroptera*, *Burkea Africana* (hinla), *Pterocarpus erinaceous*, *Pericopsis latifolia* (holonga), *Phyllanthus discoides* (yereyere), Manilkara multinervis (bul) , *Cassia sieberiana*, *Hymenocardia laxiflora* (dasuema), *Pseudocedrela kotschi*, *Detarium microcarpum*, *Lophira lanceolata* (kerebente) and *Lannea acida* (tsetsew). While some farmers and charcoal burners think that some of these species are becoming scarce in other areas they are thought to be numerous. In many farming areas there are numerous small trees consisting of these species, partly a result of farming practice that encourage coppice regrowth.

The most prolific coppicers are *Ficus exasperata* (pru), *Nauclea latifolia* (kankano), *Pseudocedrela kotschyi*, *Burkea africana*, and *Pericopsis laxiflora.* The dominant charcoal burning species are quite often prolific coppicers.

Most of the stumps of felled or burnt trees on farms regenerate from coppice. There are three types of coppice: basal (which regenerates from the base of the tree, stem(which regenerates on the trunk of the tree and root (which regenerates from the roots). Many trees regenerate from a combination of two or all three types of coppice (that is to say basal and stem, or basal and root, stem and basal or basal, root and stem). The most common type of regeneration is through basal coppicing. However, many basal coppices were originally root coppices which due to the cutting of roots with hoes or cutlass during weeding in subsequent years where then separated into individual basal coppices.

Regeneration on farms that are abandoned after one or two years tends to be good with numerous coppices, but when the farms are continuously cultivated for several years there are fewer coppices. Most the trees preserved on farms tend to be economic trees that are valued by farmers for their fruits, wood, medicinal properties or their fuelwood and charcoal properties.

Figure 1 Root coppice

Figure 2 Stem coppice

Figure 3 Basal coppice

Rate of regeneration

Farmers were divided on their perception of the length of time it takes for trees to regenerate or the fallow to regenerate to its original level. Some estimated that it took between 7-15 years and other between 15-20 years. This clearly depends upon management practice and what is perceived to be good regeneration. Farmers with larger land can fallow it longer than farmers with smaller plots. However, all farmers were agreed that the rate of regeneration is not only determined by the duration of fallowing but by other factors. This includes weather patterns; the soil type; the topology of the area (valley bottom, slope or hill top); and

incidence of bush fires. Regeneration also depends upon the number of buds on the stems of trees, the age of the stumps, and previous patterns of clearing.

Peter Mensah and Kojo Baffoe Alhassan estimated that their farms had previously laid fallow for 15 years. On Mensah's farms the existing tree species in one quadrat of 20m*20m were measured. This consisted of 95 trees made up of 14 tree species. On Alahassan's farm all the trees on one acre were measured, consisting of 426 trees consisting of 28 species.

Quadrates taken on Mr. Mensah's farm and a total inventory of tree species and their girth sizes measured at chest level on Mr. Alhassan's farm tend to support the latter view. According to the original farmers the number of years these 2 farms were left to fallow was 15 years. So these 2 farms provided us with an insight into the rate of regeneration of tree species over 15 years.

Buoyekuma's old yam farm had lain fallow for a period of 8 years. On the acre that made up this farm 220 trees were counted consisting of 33 species.

Table 1 shows rates of regeneration for species on these two farms. All these are burnt trees on old yams. While most of these trees will die and put out new coppice, they indicate the extent of regeneration before the farm was cleared. The wide range in girth sizes achieved by trees in the same fallow, illustrates the complexity of factors influencing regeneration. However, the regeneration on the eight year fallow, shows that many trees have began to reach a respectable size by this period.

Table 1 Rates of regeneration on different farms

Farmer	Length of fallow	Species (local name – Mo)	No of trees	Range of girth (cm)	Average girth (cm)
Kojo Baffoe Alhassan	15	*Lophira lanceolata* (krebente)	223	12-41	28
		Terminalia macroptera (sasu)	100	14-65	32
		Burkea africana (hinla)	42	15-50	29
		Cassia sieberiana (dimbal)	26	17-53	32
		Hymenocardia laxiflora (dahwema)	116	11-34	22
		Parinari curatellifolia (balapano)	14	19-32	26
		Pseudocedrela kotschyi (borgor)	12	20-38	25
		Crossopteryx febrifuga (ayifronto)	11	17-52	25
		Pericopsis laxiflora (holonga)	9	17-51	30
		Ficus exasperate (pru)	5	18-40	28
		Detarium microcarpum (nam)	4	17-57	32
		Daniellia oliveri (cham)	4	27-127	76
		Lannea acida (tsetsew)	3	31-36	33
Peter Mensah	15	*Anogeissus leiocarpus* (koola)	35	12-69	26
		Terminalia macroptera (sasu)		14-40	24
		Pterocarpus erinaceous (twima)		16-43	31
		Ficus exasperate (pru)		10-30	18
		Morinda lucida (konkroma)	3	14-19	16
		Phyllanthus discoides (yereyere)	3	18-20	19
		Parinari curatellifolia (balapano)	2	13-14	14
Boyekuma	8	*Phyllanthus discoides* (yereyere)	54	7-29	11
		Detarium microcarpum (nam)	35	9-47	18
		Cassia sieberiana (dimbal)	33	11-33	19
		Terminalia macroptera (sasu)	16	9-37	17
		Hymenocardia laxiflora (dahwema)	11	10-22	13
		Lannea acida (tsetsew)	9	6-42	23
		Nauclea latifolia (kankano)	7	5-40	13
		Combretum micrantha (pamparo)	3	12-15	14

Coppice experiments

To gain an insight into the coppicing abilities of trees a number of species were selected, which were some of the most popular charcoal species. These were cut at different heights to explore their coppicing ability. The sites were situated on common land close to the settlement and where continuously exploited for charcoal, fuelwood for domestic consumption, and browse. In Asantekwa two different sites were established. One was more prone to fire and during the dry season many of the coppices were burnt. The other site was a grazing ground for cattle and sheep and

browsing kept the grass low preventing the build up of fuels and the spread of fire. Trees on the grazing site were not much affected by dry season bush fire, while in the other site many of the experimental coppices were burnt.

The trees which coppiced the fastest include *Pterocarpus erinaceous*, *Anogeissus leiocarpus, Burkea Africana*, and *Terminalia macroptera*. The fastest coppicer is *Pterocarpus erinaceous* which puts out new coppice growth within a week. However, those trees that exhibit the fastest growth of coppice in length are often characterised by fairly slow gain in girth size. Trees with harder and thicker bark often exhibit slower initial coppice regeneration, but later regenerate faster. Thus, *Detarium microcarpum*, after a slow start, regenerates faster than the early starters.

The number of coppices put out by a tree is partly determined by the number of buds on the stem and the ability of species to protect its buds. For instance, there are two varieties of *Anogeissus leiocarpus* - one has a thin smooth bark and the other has a rough thick bark. Those with the rough bark tend to put out more coppices and have more active buds than those with the smooth bark. Species with rough backs tend to regenerate more slowly initially, but later overtake those with smooth barks.

Some tree species have a large number of buds while others have fewer buds. In some species the buds are relatively evenly distributed on the stem while in others the buds may be concentrated at specific points. Species such as *Burkea Africana*, *Terminalia macroptera* and smooth bark *Anogeissus leiocarpus* have fewer buds on the lower portions of their trunks. If these trees are cut low then most of the buds that these trees depend on for regeneration will be removed. The capacity or these trees to regenerate depends upon the few remaining buds on the lower trunk and these may sometimes fail, resulting in the death of the stump.

Contrary to expectation, the rate of regeneration after being cut does not depend upon the height at which the stump is cut. In many instances trees cut low developed more vigorous coppice than those cut high. Coppices cut high up the stem tend to develop into branches while those cut low put out basal coppices that can form new trees. In many instances, the coppices of stoles cut low develop into individual trees, resulting in a larger number of trees replacing the original one. The height at which trees are pollarded or coppiced reflect management practices. Yam farmers who want tall stems without a large canopy cut trees high up the stem. Charcoal burners who want large stems and biomass cut low. Most of the tree stumps tend to put out coppices that develop into individual trees when they are cut at a height of less than 50cm. Most trees cut above this height put out coppices that develop into branches. The girth of the original stole also affects coppice regrowth. Larger stump girths tend to regenerate faster and more vigorously than smaller stump girths.

Stumps at the site which was not much affected by bush fire tended to maintain their old coppice and put out few new ones. Those at the site affected by bush fires experienced high mortality. However, fire

encouraged rapid new coppice regrowth and the rate of regrowth from the burnt stole often exceeded the cut stoles that were not burnt within a few months. A number of trees that had diseased coppice or poor coppice regrowth produced healthy and vigorous coppice after fire, resulting in improved regeneration. For a number of species fire has a positive impact on coppicing ability. Thus, rates of regeneration are complex, and often stress may encourage more rapid regeneration than before the stress. However, fire can also have adverse effects on the regeneration of some trees. Because of the complex of events in the life of a tree, regeneration is not necessarily directly related to years of fallowing.

Building on Farmer Management Practices: The way forward

Many farmers and charcoal burners have considerable knowledge of trees and have developed good management practices. Many farmers preserve small trees on their land. These trees are often cut at a high height above one metre or pruned by lopping off their branches. These practices enable the trees to be preserved without interfering with yam production. These trees are often used to stake yams. After the farm is fallowed they continue to regenerate rapidly. This practice enables a rapid regeneration of the fallow and enables farmers to return to the land for cultivation earlier.

Farmers also nurture, protect and preserve the saplings of trees they value. Weeding techniques are often used that encourage rapid coppice regrowth. Cutting roots or scraping them with a cutlass or hoe can encourage rapid and numerous coppice regrowth. economic trees. Cutting and weeding techniques are used that encourage rapid regeneration of trees. Farmers often develop bans against cutting valuable economic trees such as the shea nut and dawadawa trees. Charcoal burners have also developed techniques for cutting trees that minimise damage and encourage regeneration. Sissala charcoal burners at Dawadawa cut tree stumps in the form of a V shape. This minimises damage to the stem and the buds on the bark. It prevents bruising, the bark tearing, and prevents damage to the buds.

Figure 4 V-section with basal coppice behind

Many of the best practices can be extended to other farmers and charcoal burners. Instead of maligning charcoal burners and farmers many of their best practices can be built upon for sustainable management of the environment.