



DEVELOPING ECO-CHARCOAL CERTIFICATION TO FIGHT AGAINST DESERTIFICATION AND POVERTY IN THE AFRAM PLAINS

**BASELINE SURVEY REPORT ON EXISTING AND PAST
MANAGEMENT INTERVENTION POLICIES ON CHARCOAL
CERTIFICATION PROCESS**

2011

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1.0 BACKGROUND

The Ricerca Cooperazione is implementing a project in the Afram Plains with the aim of improving the standard of living of the people by implementing a number of actions focussed on agriculture, agro forestry, infrastructure development, and housing and income generation to enhance the sustainable livelihoods of framers by adopting among other more productive and environmental sound farming practices and culture. The project has shown that there is a growing degree of desertification and a progressive impoverishment of the population.

Transforming the charcoal production has been identified as one of the best strategies to curb the desertification process and address poverty. However it has been found that there are inadequate local policies and regulations to management the natural resources and support its rehabilitation; there are inadequate capabilities to manage the natural resource at the local level; low sustainability of economic activities and the interest of farmers in getting more involved in the charcoal production process.

1.1 Purpose of Report

The purpose of this report is to document a baseline survey on existing and past woodfuel management interventions, policies and certifications processes highlighting on the successes and failures and recommendations for effective eco-charcoal production in the Afram Plains. The report seeks to identify standards compatible with eco-charcoal processes by drawing on experiences from other countries to identify main elements that are to be contained in the charcoal certification. The study is intended to lay out a generic approach for the development and certified charcoal production and marketing in the Afram Plains. The outcome of the study is to guide the project and furthermore the main stakeholders involved, to produce charcoal in a more sustainable manner.

1.2 Methodology

This study was basically a desktop study supplemented by discussion with key stakeholders. Three types of data collection methods were used to allow for the triangulation of data. More specifically, data was collected through the review of documents, interviews (focus group and one-on-one) and by observation.

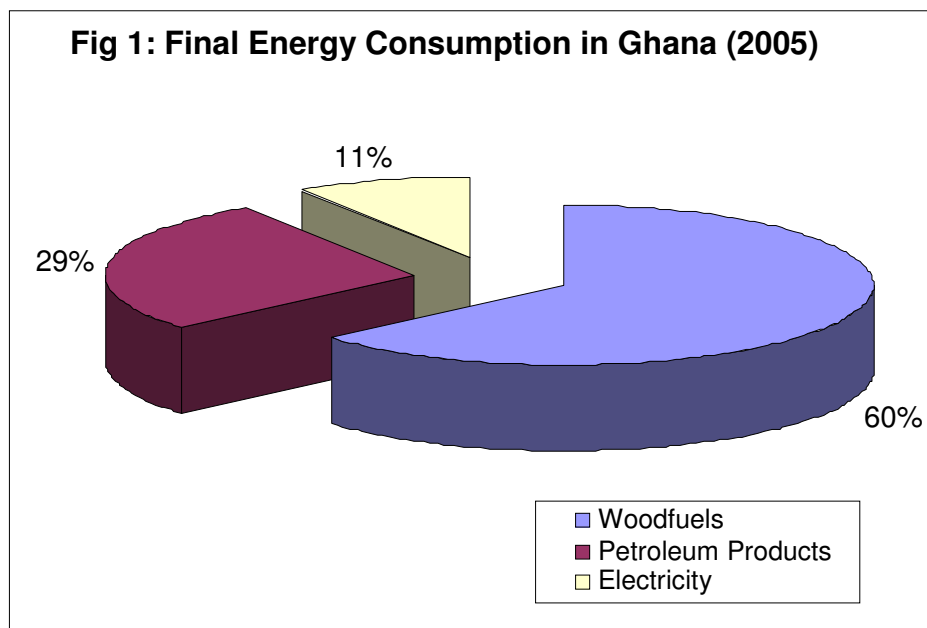
The study used four case studies of sustainable charcoal production. These countries were carefully chosen based on the following criteria a) country has similar ecological conditions; b) country has similar socio-economic characteristics; c) country has tried woodfuel certification on pilot basis, have upscale them but still being refined; d) woodfuel certification is practiced on both natural and planted forests.

2.0 POLICIES AND INSTITUTIONAL ARRANGEMENTS FOR WOODFUEL MANAGEMENT IN GHANA

2.1 Background

Ghana depends on woodfuels as its main source of energy consumption. The national energy sector is dominated by the supply, distribution and consumption of woodfuels mainly in the form of charcoal, firewood and to limited extent crop residues which are used mainly for cooking and heating in households and commercial/service sectors whilst at the same time providing energy for bread baking, palm oil processing, brewing of local drinks tobacco curing, tie and dye production, fish smoking and soap making amongst others within the informal industrial sector.

The total annual woodfuel consumption has been estimated to be between 14-16 million tonnes coming from between 25-28 million cubic metres of wood (Strategic Energy Plan, 2006). About 50 percent of the woodfuel supply is for the production of charcoal with the other part being used directly as firewood. The final energy consumption of woodfuels (charcoal, firewood and crop residues) constitute 60 percent of the national energy consumption, petroleum products which are imported covered 29 percent with electricity produced mainly from hydro and thermal sources taking 11 percent as indicated in figure 1 (Strategic National Energy Plan 2006-2020)



Source: Strategic National Energy Plan 2006

The main charcoal consuming areas are the urban areas notably Accra, Tema Takoradi-Sekondi and Kumasi. Whereas for firewood, the rural areas happen to be the major consuming centres.

The supplies of woodfuels have been mainly from the natural forests. Indeed more than 90 per cent of woodfuel consumed in Ghana has been estimated to be supplied from farmlands and natural forests within the transitional and savannah zones. The remaining 10 per cent is obtained from other sources including logging residues, sawmills and plantations or woodlots. (Strategic National Energy Plan, 2006).

2.2 Legal Aspects and Policies Influencing Charcoal Supply and Use in Ghana

2.2.1 Land and tree tenure systems in Ghana

Traditionally most forest reserves, and off-reserve areas, remain under customary land management. Around 85 percent of land in Ghana is administered through the traditional customary land management systems and the traditional authorities (paramountcies) hold the root (allodial) title to the land whilst usufruct rights are held by sub-chiefs and families¹. Traditional authorities and stool chiefs have rights to a share of benefits from timber royalties and forest lands. The forest policies of Ghana since colonial era has ensured that timber exploitation both on and off- reserved areas are carried out under a licensing regime. Surprisingly, the exploitation of non-timber forest products of which woodfuel (charcoal and firewood) are classified is unregulated. Woodfuels are considered as 'free common properties' that can be collected at any time anywhere.

Unlike timber, commercial woodfuel production is not under any licensing regime. There are no economic values to the tree species that are harvested to produce charcoal. No royalties are paid and operators pay for land rents although there some localised arrangement in some parts of the country where the land owners demand '*drinks*' before trees are harvested and converted into harvest and process the trees for charcoal and firewood.

2.2.2 National Woodfuel Policies

Ghana does not have a formal woodfuel policy neither does it have accurate and consistent data on woodfuels to guide policy formulation and planning. There are no comprehensive and consistent data on the stocks of woodfuels available in the country by each ecological zone neither are there any data on the levels of woodfuel consumption by the various sectors of the national economy. At the macro level, aggregate data are inferred from very weak database, which does not provide any meaningful basis for planning.

At the District levels there are no explicit statutory regulatory mechanisms to guide the woodfuel business. Although some District Assemblies have byelaws to regulate woodfuel marketing in the form of levies, the entire operations from production through transportation to marketing remain unregulated. Even where levies exist, the compliance and enforcement are very weak, less than 18 percent compliance rate (Savannah Resource Management Programme Report 2001).

2.2.3 Institutional Arrangement for managing woodfuels in Ghana

The woodfuel subsector seems to fall under three main ministries with none of them being responsible to the management and regulation of the industry. The supply of the woodfuels being a forest based activity falls under the Ministry of Lands and Natural Resources. According to its Mission Statement, the Forestry Commission (FC) is mandated to sustainably develop and manage the forest resources of the country both on and off reserve. In practical terms however, the FC sustainably promotes only timber to the neglect of woodfuels and other non-timber forest products. The Forest Services Division of the FC issues conveyance certificate to regulate the transportation of wood for charcoal and firewood. However, in the

¹ In Volta region land is controlled by families, while in the north, land management is undertaken through *tindama*.

Forest Reserves, green trees can only be cut for charcoal or firewood with the approval of the forest authorities, as legally defined in N.R.C.D. 243 as amended by Act 623 of 2002. By implication, the harvesting of trees outside gazetted Forest Reserves for charcoal production is without a license and does not flout any law. The producer can load it unto a truck and haul it to the market after paying the necessary conveyance fees to the FC and the District Assembly.

The supply side management of woodfuel falls under the mandate of the Ministry of Energy which is statutorily required to regulate all forms of energy including its imports and exports. So far the pre-occupation of the Energy Commission has been to issue license and regulate the export of charcoal. The Ministry of Energy has been promoting the production of efficient technologies for woodfuel production and use.

Although it has no legal mandate, the Ministry of Energy, through the Energy Commission has drafted a ***National Woodfuel Policy*** (July 2009).

The Ministry of Local Government and Rural Development through the District Assembly regulate the marketing of woodfuel through levies and taxes.

There is weak collaboration among the relevant institutions responsible for the supply of biomass feedstock especially on the development of woodlots and utilization of forest logging residue and sawmill off-cuts in the country. Institutional linkage in the research and development of efficient charcoal production and end use technologies is also weak and requires strengthening. There is the need to provide formal policies and regulations to support the development of an effective woodfuel market in the country.

2.3 Woodfuel Supply

The national woodfuel stocks and production estimates in the country are shown in table 1. The main source of woodfuel is from the savannah ecosystems. Charcoal productions are supplied from three main sources namely:

- *Wood surpluses from felling to clear new agricultural lands including rotational fallow systems;*
- *Fallen, dead branches and twigs picked off the ground;*
- *Harvesting of live trees directly for fuel either intensively (clear felling) or extensively (some form of selective harvesting) from uncultivated areas.*

Table 1 Estimated Woodfuel stocks in Ghana

Woodfuel Source	Area (million ha)	Woodfuel Stock (t/ha)	Total stock (Million tons)	Annual production (Mt/yr)	Availability coefficient	Accessibility coefficient	Wood Availability	
							Potential supply (Mt/yr)	Percentage
Savannah woodlands	10.5	30	315	7.65	0.75	0.7	6.096	33.85
High Forest	4.6	160	256	5.12	0.5	0.6	2.776	15.42
Mangrove	0.4	120	48	1.92	0.45	0.8	0.691	3.84
Plantations	0.075	50	4	0.15	1	1	0.15	1.0
Transitional zone Fallow lands	3.0	20	60	9	0.8	1	7.2	40
Others	2.256	100	225.60	4.20	0.6	0.95	1.094	6.1
TOTAL	2.363		908.6	28.04			18.007	100

Source: TEU Completion Report 2004

The dry woodland savannah, which has been severely degraded through years of exploitation for fuelwood, shifting cultivation practices and by annual uncontrolled bush fire,

provides the source of firewood, charcoal, construction materials, and non-timber products for both rural and urban population. The conditions of these woodlands continue to deteriorate through bushfires, a lack of management, protection, development resources and a practical plan for the future. This is compounded by the underlying poverty of the rural people. The problem is exacerbated by the historical southern focus of the Government and its donors in terms of investments in the forestry sector.

2.3.1 The Charcoal Business Enterprise

There are three groups of charcoal producers in the country:

- a) The first group are peasant farmers living in rural communities who produce the charcoal from the farms and convey them on bikes, donkey carts and head loads to the road side and rural markets for sale. In most cases these producers operate on small scale and build stocks for the buyers. The technology use in carbonization is simple earth mounds.
- b) The second groups of producers are full time small producers (mostly local farmers) that produce charcoal in commercial quantities and convey them to the urban markets or stock them at the village level in anticipation of buyers from the urban centre. Production is done on farms where they pay some token fees to the land owners. They pay transportation fees and market tolls as they convey their products to the markets.
- c) The third groups are Commercial Charcoal Dealers from the urban centres who hire *'professional producers'* produce the charcoal for the dealers. These producers usually acquire concessions from land owners, pay fees based on your negotiating skills and produce the charcoal. After deforesting and degrading an area, they move to other areas endowed with preferred tree species and pitch camp to produce charcoal. The producers usually pay some fees to the landowners before harvesting the trees.

2.3.2 Charcoal Producing and Landforms

Production Technology

Traditionally charcoal-production techniques have low efficiencies. With improved charcoal-making technologies, charcoal yields could significantly increase and made more cost competitive. While some improved charcoal production technologies have been tested and demonstrated in pilot projects, the use of these technologies are limited owing to the high initial capital cost. In addition, the seasonal charcoal producers find the improved charcoal technologies more time consuming in terms of monitoring of the production process which keeps them away from their normal farming activities.

From the spatial analysis, woodfuels are produced from three basic landuse areas as follows:

i. Degraded agricultural woodlands under permanent cultivation.

These areas have been totally cleared of trees and regeneration and are under permanent cultivation with very short fallow periods. Production of charcoal in these areas is very minimal. The woodfuel producers on these lands are farmers who either produced wood during land clearing or directly harvest small-sized trees or twigs from the fallow areas and carry them in small quantities for home use or stock them for future commercial use. Woodfuel production in these areas is an integral part of the subsistence survival strategy.

Commercial producers from outside the community are not interested in these areas. Both live and dead woods are produced as woodfuels.

ii. Shifting cultivation areas under short cycle fallow

These areas are partially cleared of trees, although regeneration remains, and is under shifting cultivation on short cycle fallow. Production of woodfuels in these areas is by both farmers and some local charcoal producers. Productions are more organized and often it is financed by wholesalers or sold regularly on the roadside markets. Woodfuels are produced from both dead woods and live-trees.

Although production of charcoal is intensive, the woodlands essentially retain their structure and remains as fallows lands for future agriculture expansion. In comparative terms, the communities have some element of control over the exploitation of woodlands in these areas since outsider cannot trespass to collect woodfuel without first consulting the owner of the land. Outside commercial woodfuel producers are not interested in these areas.

iii. Partially intact woodland under extensive woodfuel exploitation

These areas are partially 'intact woodlands' under intensive livestock grazing and woodfuel exploitation. The areas have intermediate to close woodland canopy and tree density is comparatively high. Woodfuels are produced in large quantities and the production areas, are further away from the settlement. These areas are often described as '*no-man's land*' since the community land owners do not have direct control on the harvesting and conveyance of charcoal. Most of the dead woods have disappeared and the live trees are harvested and left to dry before being transported or processed. Urban wholesalers usually hire labourers to enter directly into these areas to harvest wood and transport them to the market. Some charcoalers have also moved camp to produce charcoal in these areas without much restriction.

The landowning communities have no direct control over the production of charcoal in these areas neither do they have rules and guidelines to regulate the activities of woodfuel producers. Outsiders and commercial woodfuel producers are the main producers. They harvest wood needed and load them onto vehicles to the urban markets. On rare occasions token fees are paid to the landowners or chiefs before harvesting is done.

It is evident from the three production landforms that the system of harvesting and producing woodfuels remove any incentive for rural people to manage their local woodlands sustainably. The local communities do not see any point in either encouraging natural regeneration after harvesting or protecting the resource from fires or regulating the sizes of trees to be harvested, since that effort will benefit the outsiders more than the indigenes. This situation poses a challenge to sustainable woodland management principle being introduced.

2.3.3 End-use Technology

The traditional woodfuel stoves have low efficiencies and as well generate a lot of smoke in the cooking environment which leads to health hazards, especially respiratory diseases. The nationwide promotion of improved charcoal stoves such as Ahibenso and Gyapa could shave off wood demand by half. Although the improved stove is about 20 per cent more expensive than the traditional stoves, the expected savings on fuel cost is said to be significant to pay off on the investment of the improved stoves.

The charcoal business operates at low costs and there are not exceedingly high profits in any of the links of the chain. The most common end-use devices used for cooking are the traditional coal pot for charcoal users and the three stone stoves or open fire for firewood users with efficiencies of between 15% to 18% and 14% respectively. These efficiencies are agreeably very low thereby resulting in huge losses of energy.

The promotion and increased adoption of more efficient technologies for households would not only reduce charcoal and firewood consumption significantly but, reduce the household energy expenditure thereby making funds available for other relevant domestic activities

In the case of charcoal production, the process of conversion of wood to charcoal has an efficiency range of 14% to 20% depending on the traditional method applied. The most efficient is the Sissala method that is about 20%. Despite this seemingly high efficiency a lot of energy is lost during the conversion process. Improving on this will bring in its wake enormous savings in wood

2.4 Trading in Charcoal

2.4.1 Transportation

Charcoal and fuelwood are produced commercially far from the major consumption centres and are transported by road over distances of more than 100 kilometres. Many of the vehicles used in the transportation of woodfuel are relatively old and very often are overloaded thus posing great danger to other road users as well as causing deterioration of the road infrastructure. While road transport plays a very critical role in the woodfuel industry, there is the need to ensure it is done in a safe, efficient and reliable manner. In addition to the above, there are not dedicated vehicles for the transportation of charcoal. Even though regulations exist on the use of over aged vehicles and overloading of vehicles for the transportation of goods and petroleum products there is as yet no such specific regulation for transportation of charcoal.

2.4.2 Woodfuel markets

The sale of charcoal for many operators is but one of a host of livelihood survival strategies called upon to meet specific cash needs as a contingency in case crop failure or simply as opportunities present themselves. To others it is a full time business.

- Trade in charcoal can be roughly divided into two, but not necessarily exclusive areas: - the inter-regional and intra-regional trading. The inter-regional trade is dominated by medium to large-scale enterprises, which moves charcoal across regions to main consuming centres. From our field observations very strong inter-regional woodfuel trade exist between the Savannah zone and the main urban cities in Ghana. About 85 percent of the charcoal consumed in Kumasi, Accra and Tema metropolis are from the savannah and the transitional zones of Ashanti (Mampong Ejura districts) Brong Ahafo (Kintampo, Attebubu, Nkornza districts) and the Afram Plains, whilst the remaining 15 percent are from the coastal savannah ecosystem.
- The intra-regional trade is dominated by small to medium-scale enterprises, which move charcoal from within the regions mostly from the supplying villages to the consuming centres. In Accra, Kumasi, Tamale, Bolgatanga and Wa woodfuels are produced from within a radius of 10 km to supply the urban demand. This accounts for the degradation of land within these areas.

- Charcoal markets are uncommon in the rural areas because most households collect firewood from farms and in the wild to cater for their domestic energy needs. In the urban settings however, most households generally depend on the charcoal markets are dotted all over breaking bulk and selling at the small quantities. There are no standardized measurements for the sale of the products

Three forms of woodfuel markets are identified–

- sale of firewood and charcoal along major urban routes (small to medium scale)
- sale of firewood and charcoal in organized municipal/town markets (medium to large scale)
- sale of firewood and charcoal within residential areas (small scale)

The most common marketing channels from production-to-consumption system for charcoal is summarized in Fig 2. The woodfuel supply chain consists of feedstock owners, producers, dealers/transporters, bulk sellers, retailers and exporters. In the local market places, there are bulks and retail sale dedicated areas. Even though woodfuel is inflammable energy product there is no fire precautionary measure in place for bulk marketing and transportation.

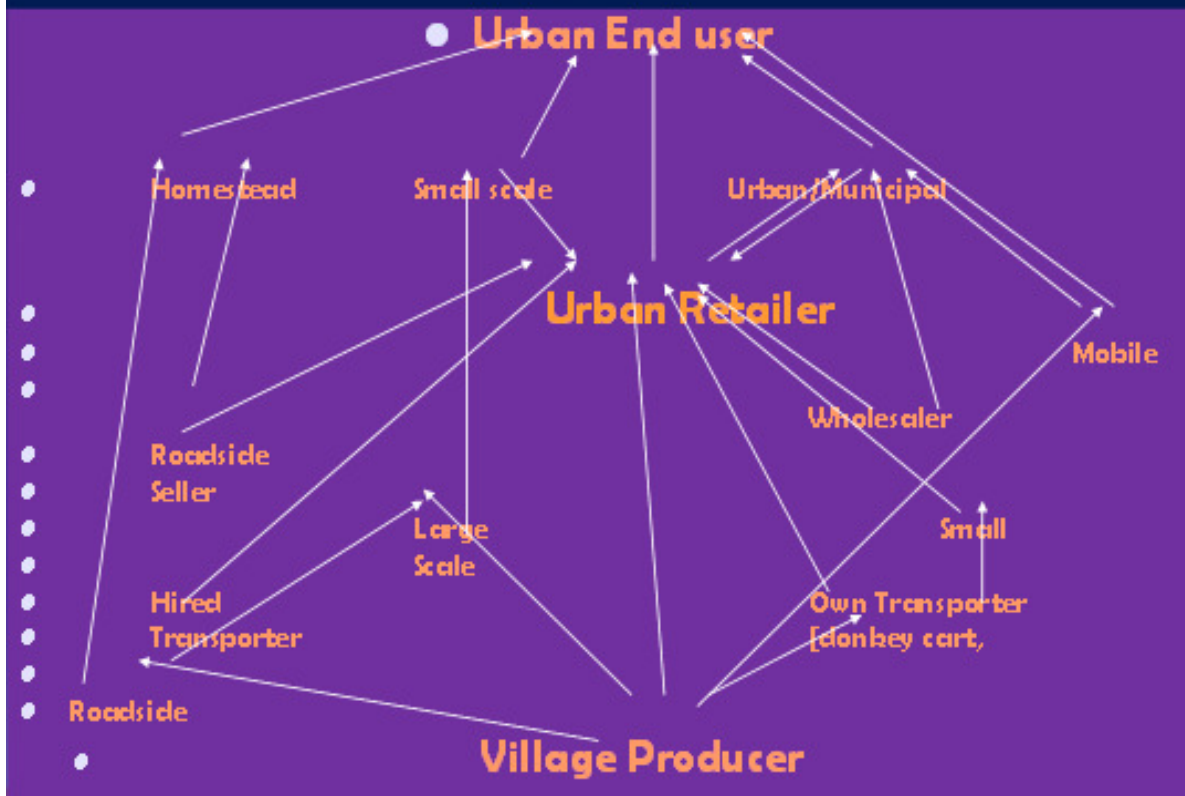
Access to data from the key players in the woodfuel industry is a challenge. In addition significant charcoal dust is created at the point of production and bulk sales points which could be captured and briquetted. During transport some dust is also created which is blown by wind into the environment. Proper bagging of the charcoal would have to be introduced to prevent the dust from blowing into the environment.

The Energy Commission has developed a provisional regulation prohibiting charcoal and firewood produced using wood directly from the forest for export. The major challenges confronting the marketing of woodfuel are:

- Inadequate data on woodfuel supply and demand.
- Disposal of charcoal dust.
- Improper handling and packaging
- Potential fire outbreak in bulk charcoal markets and transportation

Fig 2 Charcoal Supply and demand chain

Woodfuel Supply & Demand Chain



The woodfuel market is highly competitive market with large numbers of producers, transporters and sellers serving the urban market with little or no state regulation in practice.

2.5 Charcoal Taxations

Taxation of woodfuel in the country is not rationalised, as there are no specific regional or district regulations on the collection of charcoal taxes. However, with the promulgation of Local Government Act of 1994, the Forest Services Division 'Interim Measures to control Illegal Timber harvesting outside the forest Reserves' (which became effective in August 1, 1995) various forms of inchoate levies and fees on charcoal has been introduced by the District Assemblies, Forest Services Division and local Chiefs.

The various fees and rate charged for woodfuel trading in the area are disincentives to sustainable management of the woodlands.

2.6 Demand-Side

There is over reliance of woodfuel as household cooking fuel in the country. Over 90 percent of rural households depend on woodfuel for cooking. Charcoal on the other hand is the dominant cooking fuel used in the urban areas. About 61 percent of urban households use charcoal as their main fuel for cooking. LPG use in the country on the other hand accounts for only 4-6 percent of the residential sector. This is concentrated in the urban areas among the middle and higher income groups.

Factors such as unstable supply and inaccessible of LPG throughout the country have contributed to the bottlenecks in the widespread use of LPG. Besides these challenges in meeting the LPG demand, there is the issue of high cost of gas stove and its accessories.

2.7 Major Challenges in the production and marketing of Woodfuels in Ghana

- a) Production of commercial firewood and charcoal is an integral part of the survival strategy of most rural households, especially the poor. More than 80 percent of all the charcoal and commercial firewood producers are women. One of the reasons for this gender imbalance in the charcoal production sector is the fact that rural men have more access to more rewarding off-farm employment opportunities and, increasingly migrate (semi) permanently to the urban areas of the country creating labour shortages in the rural areas. This increased labour shortage has major implications for both food production and the concept of sustainable utilization of the woodland resource, as this requires more labour input than the existing utilization practices. If this trend is to be stopped employment opportunities have to be created in these areas for both men and (unmarried) women that generate enough income to make it worthwhile for people to stay. Micro projects and the creation of tangible short-term financial benefits from sustainable utilization become crucial tools.
- b) Current aggregate consumption of charcoal in the country is in all probability beyond sustainable harvesting levels of the indigenous woodlands. In the Northern Region, consumption of woodfuels is approximately 2% below overall sustainable harvesting levels. In the Upper East and Upper West regions the consumption is respectively 60% and 30% over sustainable harvesting levels. In the Upper East Region the relative scarcity has attracted firewood imports from Burkina Faso and Togo, whilst both Regions import charcoal from the Northern Region.
- c) If the current over production of indigenous wood for energy is to be brought more in line with sustainable harvesting levels four fundamental problems need to be solved:
 - The sustainable production of firewood and charcoal needs to be financially much more attractive than “unsustainable” production
 - The farm-gate price of commercial firewood and charcoal derived from indigenous trees needs to be increased
 - Food security and commercial fuelwood production are closely linked and as all woodlands serve as *potential* agricultural and grazing areas if and when necessary and feasible, interventions need to take these linkages into consideration.
 - The quality of the public sector service provision that enables with and assists in solving the above problems needs to be improved considerably.
- d) It is believed that these problems will be addressed most efficiently and effectively through the introduction of a *tax, control and reinvestment system* for commercial firewood and charcoal that uses the sustainable utilisation concept as a tool to alleviate poverty and increase the quality of the necessary service provision. Interventions on production, marketing and consumption level and micro-projects will have to be based upon this system and only implemented if and when producers and consumers demand such services using a participatory budget and management by consent approach.

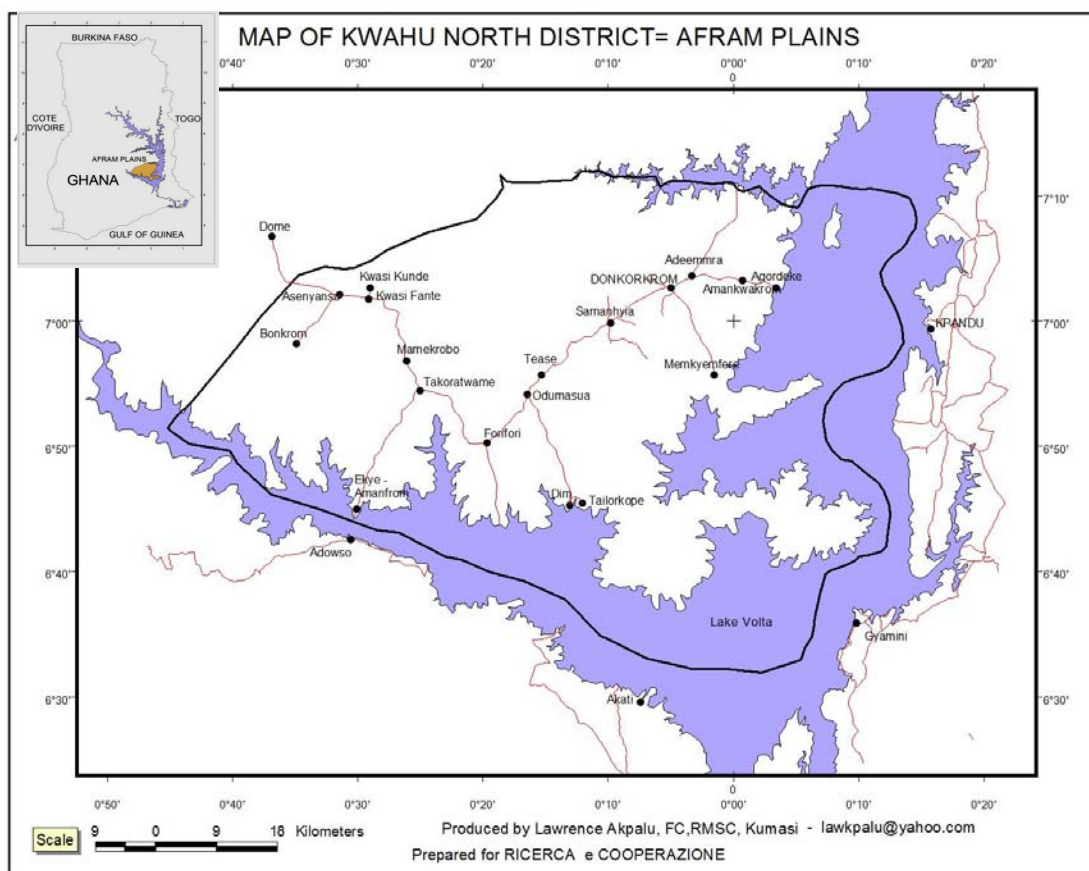
- e) Sustainable woodland management requires a certification system and hence sustainable production and marketing of woodfuels.

3.0 CHARCOAL PRODUCTION AND MANAGEMENT IN THE AFRAM PLAINS

3.1 Geographic Location

The Afram Plains falls under Kwahu North and south districts, in the Eastern Region. It covers 5,040 square km and lies between latitudes 6°40' and 7°10' North and longitudes 0°40' West and 0°10' East. Annual rainfall is about 1,900 mm depending on location. The rainy season goes from April to September. The dry season also lasts 6 months.

The total population of the district is estimated to be 162,000 with over 685 scattered villages and communities. The average annual population growth rate is 3.6 percent, which is very high, making it difficult for development projects with an environmental component to have a real long-lasting impact (Francois Reuter, 2009).



3.2 The Emergence of Charcoal Production in the Afram Plains

Prior to the inundation of the Volta Lake, the Afram Plains was a dense semi deciduous forest area; traditionally the hunting grounds of the Kwahus living on the Kwahu Ridge. The formation of the lake in the early 1960's witnessed major changes in the population composition and structure of the area as well as the vegetation cover. Fishermen migrants mostly Ewes displaced by the dam moved in to occupy the plains in order to continue their fishing business.

Farming migrants (mostly Krachis) also relocated in the Plains to continue yam farming. These people cleared large tracks of land for the yam² cultivation leaving dead trees behind. Since yam cannot grow in the shade of trees the farmers had to kill the trees, usually by setting a fire at their base.

The aftermath of the 1982 drought catalyzed the changed in morphology and ecology of the Afram Plains. Cocoa farms, once the mainstay of agriculture, was destroyed and partially opened up the canopy of the dense forests. The timber industry moved in logging for export in 1984, without any concern about sustainability although that theoretically is the backbone of sound forest management.

The Sissala migrant chacoalers also moved in the Plains to produce charcoal after degrading the northern and transitional zone of the Brong Ahafo. They are a tribe that have been living from charcoal production for generations. With no restrictions put on their activity in the Afram Plains more of them followed. When local people saw how profitable charcoal production was and how easily quick cash could be generated, they also went into this business, especially women.

Charcoal statistics for the Afram Plains

According to data compiled by Francois Reuters (2009), large quantities of charcoal leave the Afram Plains to various destinations, with Accra being the major one. The statistics compiled from Ekye Amanfrom to Adawso is shown in table 2.1

Table 2.1 Volume of Charcoal that leaves the Afram Plain (2002-5):

<i>Year</i>	<i>Number of bags</i>
2002	2,550,000
2003	2,650,000
2004	2,780,000
2005	2,850,000

Source: François Reuters (2009)

These figures are conservative as the district does not keep up to date records on the quantity of charcoal produced in the district.

3.3 Major Charcoal Stakeholders in the Afram Plains

There are three major stakeholder groups involved in charcoal production in the Afram Plains. These are a) government institutions, b) local land owners, and c) charcoal producers, sellers and transporters.

3.3.1 Government Institutions

The Kwahu North District Assembly

The District Assembly levy taxes on charcoal sold in the market and have also enacted byelaws that regulate charcoal production in the district. The District Assembly's environmental bye laws focuses greatly on charcoal production as the leading cause of loss of forest in the District. The bye laws however is not against charcoal production but rather seeks to generate revenue from the activities. It is not known how much revenue is generated annually from taxes on charcoal. However in the District, a tax of 10Gp or 20Gp is

² Yam (*Dioscorea rotundata*) is a light demanding vine with a large tuber, one of the major staples in many parts of Ghana. It takes so many nutrients out of the soil that farmers have to wait about ten years before growing a crop on the same piece of land

levied on every bag of charcoal that comes into the market or transported away from the District.

The Assembly is very much aware and concerned about the environmental consequences of charcoal production and has been collaborating with agencies that are seeking to mitigate the situation. The 20Gp levied on a bag of charcoal is supposed to be one of the measures put in place by the Assemblies to discourage charcoal production. A bag of charcoal is sold for between GH¢3.50 and GH¢5.00 by the charcoal producers. The tax of 20Gp therefore represents about 6% of the price of charcoal sold by producers.

Forestry Services Division

The Forestry Services Division (FSD) is the leading government body responsible for regulating the use of forest resources in Ghana. The FSD concentrates its work in designated forest reserves with almost no attention to areas outside forest reserves. There are no specific programmes to regulate the activities of charcoal producers or traders. However, chainsaw operators have to register their chainsaws with the FSD and receive certification before they can use them. Charcoal producers frequently require the services of chainsaw operators to fell the trees for them. Some have their own chainsaws. The FSD also grants conveyance permits to enable the charcoal to be transported outside the district.

3.3.2 Local Land Owners

Chiefs and landowners

Chiefs and land owners play a crucial role in the charcoal trade. They are the first points of contact by migrant charcoal producers who are the large scale production of charcoal. The chiefs and land owners sell the trees in an area to the charcoal producers and also give them stay permits in the community. The amount charged per unit area of land varies between communities and depends on the tree density. It is also subject to the bargaining abilities of each party.

In the simplest situation, the land owner chares GHC200.00 per pole of land (0.75 ha) or is entitled to 2 bags of charcoal out of every 10 bags produced (i.e. 20%). Chiefs exercise a greater authority over settlers and can play a leading role in regulating charcoal production methods.

3.3.3 Charcoal producers and transporters

Charcoal producers

Three categories of charcoal producers are identified in the district: .

Category 1: Migrants producers in groups known as “gangs” will approach chiefs and landowners for a piece of land. They buy the trees from the chiefs and landowners. They are, by far, the leading producers of charcoal. They often practice charcoal production as a full time job and are often from the Sissala tribe.

Category 2: Indigenes in groups. These are individuals from the community who, most often have a right to land and do not need to approach any landowner or community leader for land. Most people in this category practice charcoal production as a supporting job to their main jobs which most often is farming.

Category 3: Individuals. These are the least producers of charcoal. They practice on a subsistence basis and mostly seasonal. They most often practice charcoal production after the farming season. They gather dead wood on the farm that was cleared in the process of preparing their farms or stakes that have been used on yam mounds.

Roadside sellers

Roadside sellers gather charcoal in large quantities from different producers by the sides of major roads. The roadside seller may gather the charcoal themselves from community to community or wait for the producers to come and sell to them. Some roadside sellers also engage in the production as well. Most roadside sellers are well connected in terms of the people supplying the charcoal and clients. They can pre-finance the production process and dictate the price for the producers.

Market women

Market women are those who sell in the market in smaller units (e.g. heaps, in basins, in baskets and in black polythene bags). Market women live in close association with charcoal producers in the communities. They buy in large quantities just like roadside sellers and store in market places where they sell out in smaller units over time.

3.4 Major challenges for charcoal producers in the Afram Plains

Charcoal production is now a major activity in the Afram Plains dominated by both the Sissalas and the indigenes. According to RC quarterly magazine the proximity of Accra and Tema and the relatively well developed infrastructure makes the Afram Plains a preferred area to supply charcoal to Accra and Tema Metropolis.

Like the rest of the country, the production and marketing of charcoal in the Afram Plains is unregulated. The producers usually acquire lands from the land owners and harvest trees to produce charcoal using the sisala production technology. From a densely forested area the Afram Plains is gradually being transformed into a dry savannah ecosystem where grasses dominate, with a few scattered trees and few intact forests along the northern part of the plains. Wildlife population according to the local inhabitant has dwindled.

The major challenges facing the charcoal production in the district include the following:

- a) Right to land by charcoal producers and transport from the production sites to roadsides or market places. Most of the charcoal burners who are engaged on a full time basis are settlers and have no right to land and the much needed trees for charcoal. Their status does not allow any responsible attitude towards the forest.
- b) Transporting charcoal from the production sites is very difficult in the rainy season. The paths to such places are often flooded and muddy, making vehicular movement almost impossible.
- c) The production process is very much labour intensive and requires capital. Scarcity of trees has increased the distance producers have to move to get suitable wood and the radius of area required for one earth mound. More hands are therefore required. The services of chainsaw operators are also sought to fell the trees.
- d) None-availability and high turnover of sacks.
- e) Bushfires. Grasses are very important in the production process. They are used to separate the wood from the soil and also help in starting the fire. When the grasses are burnt, then producers have to walk long distances to gather grasses.
- f) Frequent accusations and threats that bushfires are caused by charcoal producers.
- g) Although there is a decline in suitable wood, there is increasing demand for charcoal. Production varies between rainy season and dry season.

h) During the rainy season the number of people producing more than 20 bags per week doubles that for dry season. Local government bye laws prevent the felling of live trees for charcoal in most places. Charcoal burners in some cases will therefore utilize dead wood resulting from conversion of forests into farmlands. This in part explains the high level of production in the rainy season. It is also easier to raise earth mounds in the rainy season because the earth is moist. There is also more thatch available in the rainy season for forming a layer between the wood and the soil.

3.5 Vision for sustainable charcoal supply in the Afram Plains

A sustained charcoal supply to meet the ever-increasing demand for charcoal with minimal environmental degradation will require a comprehensive management system that recognizes the role of communities as vital one. It will also require a sustained commitment from government and civil society organizations acting in concert to empower communities and vulnerable groups in particular and recognition for the role local communities in natural resources management.

The production and sale of charcoal will have to be done in a more organized manner that ensures that the production process is done in an environmentally responsible manner and that those in the trade are not subjected to unfair trade from middlemen. Minimal income generation by charcoal producers due to strong influence of merchant and large-scale retailers who pre-finance the production process has been identified as a leading cause of high charcoal production and its accompanied environmental consequences.

From this analysis, the vision for ecological supply and demand of charcoal will have to adopt a certification process that will ensure greater responsibility and capacity for environmental management by local communities through efficient and environmentally conscious charcoal production while ensuring equity in the charcoal trade. This will require creating awareness at community level on the need for certification, creating a platform for negotiating charcoal production and trading issues between communities, District Assemblies, Forestry Services Division and other government stakeholders established, legitimizing the tree tenure arrangement being put in place at the district.

Box 1 The Draft National Woodfuel Policy

In consideration on the need to promote better management of woodfuel supply particularly, from the natural forest or woodlots through effective policies in order to achieve sustainable use of the resource. The policy has been designed to ensure sustainability of biomass resource by addressing the following challenging needs:

- a) Sustainability of sources of supply;
- b) Production of efficient technologies for woodfuel production and use;
- c) Substitution of traditional woodfuels with more modern fuels like LPG
- d) Efficiency in the transportation of woodfuel;
- e) Improved packaging and marketing; and
- f) Strong coordination in institutional and regulatory arrangements.

The policy objectives and strategies in respect of these challenges are:

Feed Stock: Sustainable Supply and Production Of Woodfuel

Policy Objective

To promote and ensure sound management as well as expansion of the country's natural forest for sustainable supply of woodfuel.

Policy Strategies

- Prepare an inventory of woodfuel resources in Ghana
- Identify, survey, map, assess and register the potential woodfuel resource stock outside the forest reserves in collaboration with Traditional Authorities (TAs), District Assemblies (DAs) and Forest Service Division (FSD).
- Support FSD and Agricultural Extension Units of Ministry of Food and Agriculture to create awareness on the need for sustainable supply, production and utilization of woodfuel.
- Support Non-Governmental Organisations (NGOs) and Community-Based Organisations (CBOs) to create awareness for the development and management of suitable woodfuel species.
- Encourage timber concessionaires to utilise forest and sawmill off-cuts for woodfuel production.
- Collaborate with FSD to enforce regulations on the control of fringe communities in the harvesting and sale of the woodfuel in the forest reserve.
- Enact legislation to register and licence all commercial woodfuel operators (suppliers, producers and sellers) by the DA and FSD to be given exclusive trading rights;
- Establish standards and operational procedures for woodfuel operators; (noncompliance to these would attract the necessary sanctions)
- Create, develop and maintain a data bank and resource documentation centre for woodfuel at district (DAs / FSDs), regional and national levels.
- Identify and provide incentives (financial and non-financial) for the development of woodlots in savannah and transitional zones under international funding protocols such as the Desertification Fund and Clean Development Mechanism (CDM) Fund
- The DAs should liaise with traditional authorities to educate and release land to prospective individuals (especially women) and groups for woodfuel woodlots and plantation establishment.

TECHNOLOGY: EFFICIENT CONVERSION AND UTILIZATION OF WOODFUEL

Policy Objectives:

To introduce:

- new and innovative ways of producing woodfuel more efficiently and cost effectively.
- More efficient but less expensive woodfuel cook stoves.
- Capacity building for improved cook stoves manufactures.

Policy Strategies

- Energy Commission should provide technical assistance and funding for programmes to transfer improved carbonization technologies and higher levels of efficiency in the production, distribution and use of woodfuel.
- Strengthen through technical assistance existing institutions for testing and certification of improved production and end use technologies for woodfuel.
- Liaise and coordinate with relevant governmental and non-governmental agencies to train artisans in the production of improved stoves
- Licence or register commercial charcoal producers to enable the EC to support them to adopt improved production technologies.
- Create public awareness on energy efficiency and conservation practices and health impacts (especially on women) in the use of woodfuel.
- Provide logistical support for the Agricultural Extension Officers to expand technical assistance and the creation of awareness on the adoption of improved carbonization technologies to charcoal producers.

TRANSPORTATION

Policy Objective

To regulate the quality, quantity, and ensure safe transportation of woodfuel.

Policy Strategies

- EC in collaboration with other relevant stakeholders to issue conveyance permit to dealers and transporters of commercial woodfuel.
- EC in collaboration with the Motor Traffic Unit of the Ghana Police Service to compel all vehicles conveying woodfuel to conform to the appropriate regulations of the Road Traffic Act 2004, Act 683 (Road Traffic Regulation 2006) i.e. axle load, vehicle height etc.
- EC in collaboration with DA to establish a monitoring and evaluation framework for capturing relevant data relating to the transportation of woodfuel at the district level.
- EC in collaboration with Forestry Commission to put in place regulations, monitor and ensure that feedstock for export charcoal come from wood residues and/or forest plantations.

MARKETING

Policy objectives:

- To develop a comprehensive database for woodfuel supply and demand.
- To minimize charcoal dust creation, environmental and health impacts.
- To control fire outbreaks in the production and handling of charcoal.

Policy Strategies

- Enact LIs and bye laws for the recycle or compacting of charcoal dust into briquettes, etc.
- Create awareness on health impacts of inhaling charcoal dust and other particulate matter and promote the use of protective mask for commercial handling of charcoal.
- Enact LIs and bye laws for improved packaging and labeling of charcoal.
- Enforce safety regulations in the production, transportation and marketing of charcoal.
- Enact regulations for sustainable supply of woodfuel to both local and export markets.

DEMAND-SIDE

Policy objective

To increase LPG penetration rate to 50 percent by 2015.

Policy Strategies

- EC should develop new policy strategies for the promotion of LPG for the residential and commercial sectors.
- EC should develop plans and programmes for the use of natural gas from the Jubilee Oil Field in the residential and commercial sectors.
- Vigorously promote the use of LPG as residential and commercial fuel.
- Improve access to LPG in the country by supporting measures aim at widening LPG distribution network to increase access for rural dwellers.
- Reduce subsidy on LPG and redirect it to subsidize LPG-related appliances for the poor.
- NPA should grant licences for more LPG filling plants to be opened in the country.
- Increase LPG production at the refinery.
- Expand production of domestic LPG cylinders.
- The Energy Commission and the National Petroleum Authority should design financial packages to support fabrication of single and double LPG burners.

INSTITUTIONAL DEVELOPMENT

Policy Objectives:

- EC to serve as the institution to coordinate and manage the development and use of woodfuels in the country.
- Mobilize both the private sector at the formal and informal as well as micro, small, medium and large scale levels to provide quality manufacturing of equipment and plant as well as service delivery.

Policy Strategies

- Provide policy guidelines for implementation of carbonization technology as part of the management of forest concessions.

- Provide policy guidelines for incorporation as part of the management of forest concessions.
- Enact LIs and regulations on charcoal production, transportation and marketing.
- Provide funding for technical training and enterprise development services for the private sector operators.
- Intensify inspection of charcoal production, transportation and marketing facilities in consultation with Metropolitan, Municipal and District Authorities (MMDAs).

4. CASE STUDY OF ECO-CHARCOAL CERTIFICATION IN AFRICA

This case study relied solely on secondary information available from different sources, i.e. published reports and documents from the internet and academic/research libraries, individual researchers, government forestry agencies. There was no collection of primary data for the purpose of this study.

The case studies used data from environment similar to the Ghanaian situation, thus the situation in Tanzania, Burkina Faso, Nepal and Brazil were analyzed to draw inferences to guide the formulation of eco-charcoal certification for the Afram Plains.

4.1 *Woodfuel Certification Projects In Tanzania*

4.1.1 Background

Tanzania is located in the Eastern Africa and has a total area of about 94.5 million ha out of which 88.6 million ha is covered by landmass and the rest is inland water. Forests cover about 34 million hectare of the total land area. There are 13.9 million hectares of declared forest reserves in a country of which 12.3 million (81.5%) are under central government and the rest under local governments (district/town or city councils) and private ownership. Village Forest Reserves cover about 3 million ha. These are under Collaborative Forests Management (CBFM) an initiative that was introduced in Tanzania in the early 1980's with some experiences of success stories from Nepal and India. The practice has been legitimized by an act of parliament through the Forest Act of 2002. Most of the CBFM forests are demarcated as part of village general land. Thus they are also called village forest reserves. There are more than 9,000 villages in Tanzania but currently CBFM is confined to only a few.

Apart from the aforesaid different forest management regimes in place, current statistics also reveal that the remaining forest area in general land is about 18 million ha. These forests are "open access" characterized with insecure land tenure, shifting cultivation, harvesting for woodfuel, poles and timber, and heavy pressure for conversion to other competing land uses, such as agriculture, livestock grazing, settlements, industrial development in addition to wildfires. The rate of deforestation in Tanzania which is estimated at more than 500,000 hectares per annum is mostly impacting such general land forests. On the other hand reforestation and aforestation activities by private and local communities are also done in general land areas. Therefore there is a room for much more sustainable forest management activities that may alter the observed high rate of deforestation in the country. Forest certification therefore offered a better control for forest exploitation for both reserved and unreserved forests in the country.

4.1.2 Woodfuel Certification Projects

There are few woodfuel projects established in Tanzania targeted to produce sustainable eco- charcoal. These are The Ruvu Fuelwood Pilot Project and The Maseyu Eco-Charcoal

The Ruvu Fuelwood Pilot Project

The Ruvu Fuelwood Pilot Project (RFPP) which started in 2000 is located in North Ruvu Forest Reserve, about 60 km west of Dar es Salaam. Being a production forest, closer and accessible to Dar es Salaam, North Ruvu Forest Reserve which covers a total 67, 000 ha was

a victim of severe degradation due to woodfuel exploitation for the urban population. About 80 per cent of Dar es Salaam city population depended on woodfuel as a first choice domestic energy. The main goal of the project was to promote sustainable forest resources management, through increasing forest regeneration and forest products to meet rural and urban primary energy requirements, while providing realistic economic base for the communities surrounding the forest reserve

Under special agreement with Government about 1,900 ha of the reserved was released to 670 households for the production of sustainable woodfuel to feed the increasing urban demand. Of these, 3 ha plots was allotted to each household to planted woodfuel species under agroforestry technology. The participating villages are Kongowe Msangani, Mkuza, and Mwendapole.

The farmers planted potential woodfuel tree species like *Acacia crassicarpa*, *A mangium*, *Brachystea kirkii*, *Khaya anthotheca*, *casuarinas equisetifolia*, *Senna seamea*, and *Eucalyptus terreticornis*. Insitu conservation of *Afzelia quanzensis*, *Dalbergia melanoxylon*, *Jurbernardia magnistipula*, and *Khaya anthotheca*. The average production in farmer managed plots was 6.3m³/ha/yr compared to 0.96 m³/ha/yr in non managed areas. The project trained farmers on growing woodfuel trees, how to make charcoal kilns and production of firewood stoves. Between 2000 and 2004 a total of 1,240,000 trees of different species were planted (Kaale 2005). This was essentially a participatory intervention.

The Maseyu Eco-Charcoal

Maseyu is a village 40 km from Morogoro on the Dar es Salaam highway in an area where the production of charcoal is a major business with a long tradition. The production of Maseyu Eco-Charcoal had two goals: The improvement of the livelihood of the producers of charcoal and the sustainable use of wood as an important natural resource.

These two goals were achieved by:

1. **Tree nursing and woodland management:** to ensure sustainable production and thereby the source of income trees are being nursed continuously to replace the wood used for charcoal
2. **Efficient production:** with improved brick kilns less wood is needed to produce the same amount of charcoal (3-4 tonnes of wood per tonne of charcoal)
3. **Marketing:** sustainable Eco-Charcoal sold directly to big consumers and in special places (e.g. hotels, supermarkets), assuring a better remuneration of the producers. The intent to help shifting charcoal business from the informal to the formal sector of Tanzania's economy is an important additional goal of this initiative.

In February 2006, 40 villagers from Maseyu were organised in two charcoal groups to nurse and plant 80,000 trees, most of them indigenous Mgunga (*Acacia polyacantha*). Burned bricks were made locally and the first improved half-orange-shaped kiln was built in which carbonization trials started in October 2006. The project aimed at 5 charcoal groups operating 5-10 kilns. The eventual goal of the project was to certify the charcoal production from the project.

4.1.3 The Promotion of Eco-charcoal in Tanzania

To achieve the Eco-Charcoal in Tanzania under the two projects, the following were put in place:

- a. Promotion of commercial production of woodfuel by local community groups. Local stakeholder groups were encouraged to invest in woodfuel production. Examples were the Maseyu village and the Wami-Mbiki Society, a community based organization of 24 villages with the goals of sustainable wildlife management and improvement of well being in its communities. Organisations like Energy for Sustainable Development Africa (ESDA) provided the technical backstopping.
- b. Reorientation of private companies that utilize woodfuel to invest commercial production under sustainable management. The *TANWAT (Tanganyika Wattle Company)* for example was encouraged to invest in 8,000 hectares of wattle trees, 4,000 hectares of pine and 1,000 hectares of eucalyptus.
- c. The country adopted the production of certified charcoal in Tanzania especially products on the Dar es Salaam markets

4.1.4 The Criteria and Indicators of charcoal certification in Tanzania

The managers of woodfuel adopted certification to guide woodfuel production in Tanzania. Thematic areas were used in setting the criteria and indicators for charcoal certification in Tanzania. It encompassed charcoal from both plantations and natural forests. The proposed Criteria and Indicators (C&I) for sustainable production of woodfuel were sourced from the following:

- The Analysis of sustainable fuelwood and charcoal production systems in Nepal (Bhattarai and Shrestha 2007)
- The Tarapoto Proposal of Criteria and Indicators for Sustainability of the Amazon Forest (ACT, 1995)
- International Tropical Timber Organization (ITTO) (Anon. 1998 a)
- African Timber Organization (ATO) (Anon. 1998 b)
- The CIFOR Criteria and Indicators Generic Template (CIFOR, 1999)
- Criteria and Indicators for SADC countries within the framework of the Dry-Zone Africa Process (Anon. 1999)

The implementation of C&I developed for the product involved several stakeholders. Similarly rigorous consultations were made during the preparation of C&I. In Tanzania, the final C&I for woodfuel were compiled by an appointed committee of stakeholders assigned to refine the draft C&I based on the studies in addition to identification of activities for each indicator (Tang, 2001). This was a necessary step for the Tanzanian for the final document to be acceptable to relevant stakeholders. The detailed C&I for Tanzania is shown in box 1

4.1.5. Constraints for woodfuel certification in Tanzania

The implementation of the woodfuel certification in Tanzania was clouded with challenges. The following were the limitations to the woodfuel certification process:

- a. Lack of proper management plans

As is the case with most developing countries there was no reliable data on forest extent, characteristics, and growth and yield because national forest inventory was not carried out due to limited capacity in terms of number of staff and finance. This has led to poor forest management because of lack of data for making

informed management decisions. The Tanzania forest policy (URT, 1998) and its forest act (URT, 2002) clearly stipulate the need for proper forest management based on specific forest management plans but except for private forests there was hardly a forest reserve with a proper management plan. This affected the certification process.

b. Insecure land tenure

Long-term tenure and use rights to the land and forest resources are required for the forest certification. In Tanzania, most of the land is under local communities with customary tenure or use right but not formally surveyed and mapped. As such sometimes land may be set aside by the government for other uses including establishment of private forests. When such circumstances happen, disputes of substantial magnitude involving a significant number of interests normally occur. This may affect the certification process unless clear evidence of long-term forestland use rights (e.g. land title, customary rights, or lease agreements) is demonstrated. It is required that local communities with legal or customary tenure or use rights shall maintain control, to the extent necessary to protect their rights or resources, over forest operations unless they delegate control with free and informed consent to other agencies.

c. Lack of local certifying agencies

Worldwide certifications generally have had support from local and international NGOs, government and bilateral aid organizations. However, in Tanzania currently there are no local supporting organizations for the certification process. Lack of local organizations means additional costs for the certification process, as it has to be carried out by expatriates. The costs of certification include both direct assessment costs as well as indirect costs to improve management practices and to meet certification requirements. Such costs are high and a burden for any small-scale enterprise. In this respect, woodland management for charcoal production will be difficult to cover these costs. This is the case with most community based forest management projects and small private forestlands. Economies of scale do not favour any of these operations and appropriate solutions will need to be found for each of them. Equally important at the national level, certification initiatives and associated standard setting processes facilitate a redefinition of roles and responsibilities with regard to forest management. However, there is so far no clearly developed national or regional forest certification systems based on broad stakeholder consensus and acceptance. This to a greater extent will limit certification process in Tanzania.

d. Uncertainty of the market for certified woodfuel

Experiences with forest certification show that contrary to expectations frequently raised by NGOs and donors, certification has no mechanism to facilitate consistent access to the market potential for certified products. The certification, as it has been structured to date, reinforces an existing trend which is for forestry products to try to enter international markets. This requires the creation of higher order regional processing and marketing structures, as well as closer links with industry.

The lack of domestic markets for certified products is especially problematic for forest enterprises. Because certification is at an early stage in its development as a market tool, certified markets still represent a high risk for most forest enterprises. This could be minimized by developing certification trade networks in different parts of the world and retail companies. However large-scale industrial

producers are more likely to be able to provide the needed quantities and qualities to out-compete small scale enterprises.

e. Lack of awareness among stakeholders

Forest certification is still a new concept in Tanzania. As such effort are needed to raise awareness among deferent stakeholders including foresters, environmental and conservation organisations, loggers, forest dwellers, research and academic institutions, social and human rights advocacy groups, indigenous communities, development and aid organisations, government representatives, timber trade dealers and associations, and concerned individuals. It is also important not to forget groups which are often excluded from decision making processes such as underrepresented social and ethnic groups, women, youth, rural communities, land owners, and foresters.

BOX 1: CRITERIA AND INDICATORS OF CHARCOAL CERTIFICATION IN TANZANIA

PRINCIPLE 1. POLICY, PLANNING AND INSTITUTIONAL FRAMEWORK

This principle involves the government commitment to support sustainable forest management in harmony with national and international laws and policies

Criterion 1.1. Government commitment to support sustainable forest management for woodfuel production

Indicators:

- *Appropriate political and legal framework that stimulates sustainable development*
- *Clear and focused policy statements supporting sustainable forest management*
- *Existence of a forestry service in charge of the management of all the forests, with adequate staffing to fulfil its mandate*

Criterion 1.2. Policy formulation and implementation are carried out in a participatory manner.

Indicators:

- *Existence of a mechanism for enhancing participatory policy formulation*
- *Existence of multi-sectoral interactions during policy formulation and implementation*
- *Regularity of meetings, discussions and other forums for which records of minutes of meetings prepared and made available*
- *Policy statements in non-forestry sectors (e.g. Agriculture, Energy, Fisheries) that recognizes and supports sustainable forest management for woodfuel production*

Criterion 1.3: Recognition of international laws and conventions addressing forestry and other environmental issues

Indicators:

- *Capacity to represent the country to international instruments and conventions to which the country is part of (e.g. ILO, CITES, ITTO, FAO, ATO, UNCED)*
- *Compliance of government circulars and directives to provisions of international laws*

Criterion 1.4. Extent of the forest resource well defined

Indicators:

- *There exists a map showing the boundaries of the forests.*
- *The boundaries of the forests estate are well marked on the field.*
- *Areas and percentages of forest lands and non forest land that produce woodfuel, in relation to total land area are known*
- *No evidence of forest encroachment*

Criterion 1.5 Effective structure for the promotion of private forestry and trees outside the forests (ToF)**Indicators:**

- *Effective institutional support for commercial production of woodfuel from private forestry and TOF*
- *Existence of inter-sectoral coordination between sectors related to forestry*

PRINCIPLE 2: CONSERVATION OF BIODIVERSITY AND MAINTENANCE OF ECOSYSTEM FOR ENVIRONMENTAL PROTECTION ENHANCED**Criterion 2.1 Conservation of biodiversity in natural and planted forests at all tenure levels (e.g. government forests, private forests, community forests)****Indicators:**

- *Diversity of habitat in terms of flora and fauna maintained*
- *Identification of endangered, rare and threatened species that should be exempted from woodfuel production*
- *Identification and zonation of biodiversity hotspots of flora and fauna that should be protected from any disturbance*
- *Species richness maintained*
- *Other specific management activities in place to conserve biodiversity of special biological interest, such as seed trees, nesting sites, niches and keystone species*

Criterion 2.2 Ecosystem and protective functions of the forest maintained**Indicators:**

- *Special provisions for the protection of sensitive areas, plains, stream banks, steep slopes should be defined*
- *Erosion and other forms of soil degradation are minimized (sensitive areas identified and appropriate control measures applied)*
- *Soil and water restoration programs are implemented when necessary*

Criterion 2.3 Forest health and vitality maintained or improved

Forest condition and health can be affected by a variety of human actions and natural occurrences, from air pollution, fire, flooding and storms to insects and disease.

Indicators:

- *Absence of damaging human activities such as: encroachment, agriculture, roads, mining, dams, unplanned fire, nomadic grazing, illegal exploitation, inappropriate harvesting practices, hunting, and other forms of forest damage such as change in hydrological regime, pollution, introduction of harmful exotic plant and animal species.*
- *Degree of forest damage by natural causes: wild fire, drought, storms or natural catastrophes, pests and diseases, and other natural causes*
- *Existence of procedures to prevent/control: fires, diseases and pests*

PRINCIPLE 3 SOCIO-ECONOMIC FUNCTIONS ARE SUSTAINED

Criterion 3.1 Improved incomes through sustainable production and consumption of woodfuel

Indicators:

- *Employment generation from woodfuel production activities in relation to total national employment.*
- *Average per capita income in different woodfuel production activities.*
- *Efficiency and competitiveness of woodfuel production and processing systems*
- *This includes improved kiln efficiency and minimization of waste through briquetting in charcoal making.*
- *Economic profitability of management of the forests for woodfuel production.*
- *Sustainable production, consumption and extraction of woodfuel.*

Criterion 3.2. Investment and Economic Growth in the Forest Sector

Indicators:

- *Annual investment in woodfuel plantations, sustainable forest management and conservation in relation to total forest sector investment.*
- *Aggregate value of sustainable woodfuel production.*
- *Rate of return on investment on sustainable production of woodfuel, compared with rates of return in other sources of energy, considering all costs and benefits.*

Criterion 3.3 Enhanced Cultural, and Social Values

Indicators

- *Level of reduction of drudgery for women and children as a result of sustainable availability of woodfuel*
- *Level of participation of local populations in the management and in the benefits generated by woodfuel production activities.*
- *Absence of activities that compromise human culture*

PRINCIPLE 4: FOREST (WOOD ENERGY) RESOURCE MANAGEMENT INCREASES BENEFITS THROUGH BETTER FOREST MANAGEMENT

Criterion 4.1 Effective local management in place for maintaining and assessing the forest (wood energy) resources.

Indicators:

- *Ownership and use rights to resources are clear and respected*
- *Rules and norms of resources use are successfully enforced and monitored (existence of rules and norms, patrolling, incidences of violation of rules, number of forest offence cases registered, etc).*
- *Effective and accepted conflict management mechanisms in place (number of cases resolved).*
- *Access to forest (wood energy) resources is perceived locally to be fair (deprived and poor users get fair concession, access to woodfuel and NTFP, evidence of discussion in meetings on access to resources, attendance of gender, class, and ethnicity in meetings).*
- *Local people feel secure about their access to forest resources, including woodfuels.*

Criterion. 4.2 Stakeholders get equitable share from the benefits of forest (wood energy) resource management.

Indicators:

- *Mechanisms for equitable benefit sharing are developed and implemented (local people express satisfaction on the benefits received)*
- *Employment opportunities exist for poor and deprived users (number of such people involved in carpentry works, livestock rearing, fuelwood collection for trade, charcoal making and other income raising activities).*

Criterion 4.3 All production forests under different systems of management be considered as means of livelihood by rural communities

Indicators:

- *The above people invest significant amount of time and efforts in wood energy resource management.*
- *Destruction of natural resources by the local people is rare.*
- *Maximum utilization of the productive national forests (all types) by local forestry stakeholders.*

PRINCIPLE 5: YIELD AND QUALITY OF DESIRED FORESTRY GOODS AND SERVICES ARE SUSTAINABLE

Criterion 5.1 Forest management units are implemented on the basis of legal ownership, scientific forestry practices and recognized traditional rights.

Indicators:

- *Forest management takes place on the basis of inventory information and relevant silvicultural practices.*
- *Information on the identity, location and population of communities living in the vicinity of the managed forests exist*

Criterion 5.2 Management plans are detailed and clearly documented.

Indicators:

- *Management objectives (both long-and short-term) are clearly stated reflecting the condition of forest, expressed public interest of the forestry goods and services, and the local forest users needs.*
- *Harvesting plans are in place taking into consideration available stock and capacity of forest staff to monitor operations.*
- *Forest Working Plan is comprehensive (identifies boundaries, provide inventory of resources, protection, includes management and utilization plans, biodiversity hot spots and cultural and conservation areas).*
- *Appropriate involvement of stakeholders in Management Plan preparation and takes into account all components and functions of the forest (i.e. timber, woodfuel, NTFP etc).*
- *Yield regulation by area and/or volume is prescribed in Forest Harvesting Plan (allowable cuts, minimum exploitable diameter, number of trees or total volume to be harvested per year etc).*
- *Silvicultural systems are prescribed and are appropriate to forest types.*
- *Prescribed harvesting systems and equipment match the condition of forest in order to reduce impact.*
- *Forest Management/Harvesting Plan is periodically revised and approved by the*

Director of Forestry and Beekeeping

- *Programs and estimated costs of forest management activities are covered in the Management Plan on a priority basis.*

Criterion 5.3 Effective monitoring system is implemented

Indicators:

- *Mechanisms for monitoring and evaluation are clearly described in the Forest Working/Operational Plan, including chain of custody monitoring of products.*
- *Documentation and record of all forest management and forest activities are kept in forms that enable monitoring, also for product tracking during transportation and transformation*

Criterion 5.4 Costs and benefits from all types of forests are properly accounted for, distributed and shared among relevant stakeholders

Indicators:

Mechanisms for sale and/or equitable distribution of forest products (including woodfuels) to relevant stakeholders are clearly described in the Harvesting Plan
Re-investment of the benefits from forestry management for forestry development.

Criterion 5.5 Promotion of user and environment friendly wood energy technologies, government initiatives of R & D on woody and non-woody biomass based modern energy applications

Indicators:

- *List of environment friendly modern wood energy technologies relevant to Tanzania.*
- *Priority R & D areas in modern wood energy applications (i.e. technologies and end-uses).*
- *Priority R & D areas in non-wood biomass based modern energy applications (i.e. technologies and end-uses).*

PRINCIPLE 6: TECHNOLOGIES USED FOR CHARCOAL MAKING ARE EFFICIENT (PRODUCE HIGHER OUTPUT), NON-HAZARDOUS TO CHARCOAL MAKERS AND LEAST POLLUTING TO THE ENVIRONMENT

Criterion 6.1 Fuelwood supply sources are sustainable and the supply is legal

Indicators:

- *Supply sources (national forests) are under sustainable management.*
- *Fuelwood procurement is legal with payment of royalty fee, taxes etc.*
- *Record of every batch of fuelwood purchase, charcoal production and trade maintained, including number of people employed by gender and ethnic group.*

Criterion 6.2 Inventory of charcoal making technologies currently in use, assessment of their average efficiency and selection of efficient models

Indicators:

- *List of prevailing charcoal making technologies*
- *Average efficiency of common technologies assessed (record/report, fuelwood input to charcoal output ratio).*
- *List of tested efficient modals for promotion.*

Criterion 6.3 Implementation of Harvesting Plan is effective i.e. according to Tanzania Forest regulations (Government Notice No. 70 of 09/06/2006)

Indicators:

- *Charcoal production is undertaken in the approved area*
- *The trees used have been selected as provided under the district harvesting plan*
- *The charcoal is prepared in the manner provided in the harvesting plans*

Criterion 6.3 Assessment of health and the environmental impacts of common charcoal making technologies**Indicators:**

- *Health related complaint and cost of medication to the charcoal makers, transporters and traders.*
- *Analysis of chemical constituents of the smoke emitted out of the chimney/exhaust pipe of charcoal kilns/pits, including green house gases (GHG) such as carbon dioxide and methane, and health damaging emissions (HDE) such as particulates and sulphur dioxide).*

Criterion 6.4 Field-testing, demonstration and extension of efficient charcoal making technology to directly relevant occupational group(s)**Indicators:**

- *Different types of models tested and demonstrated in the field*
- *Selection of accepted models and efficiency*
- *Extension program for dissemination and training*
- *Continuation of R & D for further improvement*

Criterion 6.5 Guidelines for quality control of charcoal produced**Indicators:**

- *Species used*
- *Particle size*
- *Packaging – type of bags, weight*
- *Labels*

4.1.6 Conclusions

The concept of certification is new to Tanzania. There is evidence of only one project, Kilombero Forest Limited which is striving to develop CDM (Clean Development Mechanism) the year 2000 whereby certification is one of the basic requirements in order to qualify for carbon credits. To date the goal has not been achieved, probably indicating the complexity of the process.

Among the woodfuel projects, it is only the Maseyu Eco-Charcoal, which has a clear objective of achieving certification of her future charcoal, but they also face the obvious uncertainty of market. Certified charcoal is obviously going to be expensive.

4.2 Case Study Two: Sustainable Woodfuel Production in Burkina Faso

4.2.1 Background

Burkina Faso is a landlocked Sudanese and Sahelian country situated in the heart of West Africa. It is located between north of latitude 9°20' and 15°3', east of longitude 2°20' and

west of longitude 5°3. With an area of 274 200 km², the country is limited in the east by Niger, in the north and north-west by Mali, in the south by Ghana, in the south-west by Côte-d'Ivoire, in the south-east by Benin and Togo.

Burkina Faso is divided into 45 provinces, each under the leadership of one (1) Haut Commissaire (highest ranking political and administrative official of the province). The provinces are divided into districts under the authority of prefects. Districts are sub-divided into villages led by Traditional Chiefs. The whole country has a total of 355 districts and 8 500 villages

Vegetation Cover

The main current phytogeographic features of Burkina Faso are: a) the Sahelian domain: it is arid and covers the northern part of the country with a rainfall < 600 mm; b) the Sudanese domain: it is less arid and covers the rest of the country and receives a rainfall >700 mm. The vegetation of the Sahelian domain is a grassy, bushy, shrubby and thicket steppe usually quite sparse. Ligneous species may come together locally to form more or less penetrable bushes. The Sudanese savannahs gradually take over the steppe formations. At the same time that the herbaceous ground cover fills out higher the ligneous species increase.

The customary land system

The customary land system is almost the same everywhere in Burkina Faso. It is based on the collective ownership of land. The collective ownership of land is exercised by the land custodian (known as Tengsoba for the Mossi, Tarfolo for the Sénoufo, Susunnbaso tinibaso for the Bwaba etc. (OUEDRAOGO S. 1993). In all customs the land custodian is the closest descendant of the first settler. In this capacity, he administers the land patrimony of the group in the interest of all the community. He distributes land or he authorises land use, following the indispensable rites, by households and individuals that require it and in accordance with their needs. Thus, the applicant acquires a user right, which must not be mistaken for ownership right in the Western sense of the term. However, after the death of the applicant his heirs will settle and exploit the same land without the land custodian intervening anew. This land is available for the whole community for any possible use in case no heir claims it. Land is given provisionally to strangers (non-natives) even if this provision may be permanent. Therefore the right accorded to the stranger is precarious, hence the notion of land insecurity for migrants. In this case, land is simply lent, often following royalties in kind or performances of various services. Security imperatives require that the applicant be first socially integrated. However, except in rare cases, land cannot be refused to an applicant according customary law. Therefore the customary land system is complex in practice.

Economy

Burkina Faso is one of the poorest countries in the world. About 56 percent of the population lives on less than US\$1.25 per day and over 81 percent live on less than US\$2 per day (UNDP, 2009). Agricultural productivity is generally low. In the northern parts of the country, agriculture and other land-use activities are threatened by decreased rainfall and recurring droughts. Forestry is deemed one of the sectors most vulnerable to changes in climate because of its direct dependence on rainfall and temperature and its importance for the rural population as well as the country as a whole (Burkina Faso, 2007).

4.2.2 A threatened resource

The country has a low and declining forest cover. About 21 percent of the national territory is defined as forest (FAO, 2010a). In addition, trees are an important element on agricultural lands. Even the most conservative estimates suggest deforestation rates of about 0.2 percent a year (FAO, 2010b) while some calculations suggest it may be as high as 1.5 percent a year (Burkina Faso, 2007). The processes of deforestation are uneven (Wardell et al., 2003). While some forests are cut, other lands are abandoned or left fallow, allowing for regeneration of the tree cover. What works as a driver of deforestation in one region may not be the same across the country.

Woodfuels are the most important energy source, constituting 85 percent of energy consumption (AGRECO, 2006). Several attempts have been made by the government and international donors to organize forest management in order to ensure a sustainable supply of woodfuels to the larger cities. Woodfuel production is an important source of income. This opens the opportunity for creating systems where forests are locally managed against conditional payments so as to conserve and enhance carbon stock.



Fig 2: Truck Load of Woodfuel in Ouagadougou

4.2.3 Production and Management of Woodfuels

The production of woodfuel is controlled by the state and the Ministry of Environment, which is organized like a police force is responsible. You need to purchase permit from the Ministry before you can produce woodfuel. In the countryside, wood is collected mainly by women, who carry it to their village, pile it next to their houses or at the roadside, and carry it to the markets, from where it is transported by truck to the urban areas. They have to buy a licence from the local bureau of the Ministry of the Environment, which costs 600 CFA/month, nearly one Euro.

Producers of woodfuel have been organised into groups and the can purchase the license and produce charcoal. The licence is in the form of empty sacks which allows you to produce according to the quantity of sacks purchased. Energy district forest area has an annual quota of trees that can be purchased to produce charcoal. If the quota is exceeded then production cannot continue.

Every official permit is embossed with name and photograph of the holder which allows you to transport and market the woodfuel. The permit is renewed annually, with a copy kept in the official registers. Without the permit the charcoal is confiscated, the vehicle impounded and the person has to pay a fine between 20,000 and 1,000,000 F CFA, or face imprisonment. The Ministry of Environment sells charcoal to the public. Presently (2009) the price for a large bag in the capital Ouagadougou is 2,000 F CFA. If the customers do not

bring an empty bag, they have to pay an additional 250 F CFA. The Ministry itself produces charcoal with its own labour force.

Apart from that there are private individuals who produce charcoal with a Government permit, renewable yearly. They sell the charcoal in the open market: a large bag costs about 6,000 F CFA – the range is anywhere between 4,000 and 7,500 F CFA, without the cost of the bag which is an additional 400 F CFA.

4.3 Case Study: Sustainable Charcoal Production In Nepal

4.3.1 Background of Nepal

Traditional biomass fuels contribute directly to the energy supply as well as in the livelihoods of the great number of people in Nepal. Virtually all people in the rural areas relied on traditional biomass fuels, primarily fuelwood for meeting their domestic cooking and heating energy needs. Some of them were also depending on fuelwood for domestic lighting. For many of them, there was no choice but to continue the use of traditional fuels for domestic energy. Similarly, the urban poor could also not afford to use the imported commercial fuels for cooking and heating and had to rely on dried biomass, primarily fuelwood, for meeting their cooking energy needs. Therefore, majority of the Nepalese people have been using and will continue to use the dried biomass fuels for energy for many years to come.

4.3.2 Woodfuel Production and Supply Systems

In Nepal, the most important woodfuel production sources included national forests under different types of management, under government forestry department, by forest users group (FUG) of local community forest (CF) or by lessee of leasehold forests, etc. Besides, private forests and trees on non-forest lands (TOF) also contribute to both traded and non-traded woodfuel supplies in many areas. The priority of any forest owner, manager or developer would therefore, be to dispose of their forest and tree products at a highest possible price in the market, be that product from private, community or public sources.

The present demand of woodfuel was primarily for traditional applications (for cooking and heating). The type of fuels used for these purposes was mainly fuelwood and a limited amount of charcoal, only for specific end uses. Most of the households self-collected the woodfuel they used for free at production sources. Some users use hired labour for collection but invariably without payment of stumpage fee or government royalty. Which means, a major share of the woodfuel consumed in the country therefore, did not pass through any formal or informal marketing channels.

Three institutions in the public sector, namely the District Forest Products Supply Committees (DFPSC) under Department of Forests (DoF), the Forest Products Development Board (FPDB) and the Timber Corporation of Nepal (TCN), both under Ministry of Forests and Soil Conservation (MFSC), are the key players in the production and supply of woodfuels in the markets. Currently, none of these institutions produce or sell charcoal in the country.

Currently, most of the fuelwood consumed in the country is by rural households and in traditional industries, which is totally a new scenario compared with the situation about two decades ago. Then, even the urban households depended on fuelwood for domestic cooking. However, in recent years the urban households have rapidly been switching over to alternative commercial energy, primarily LPG and kerosene for cooking and heating.

Mostly these households in newly emerging market places, alongside of newly built roads, small towns and district headquarters not yet connected with road seemed dependent on fuelwood for meeting their energy needs for cooking, heating and also for cooking cattle feed. The other end uses were heat application for agro and food processing. Some of the woodfuel used by these users were supplied through formal or informal marketing channels.

Applicability of certification in Nepal

In the recent past, two initiatives of forest certification were undertaken for the certification of important forest products of community forests, primarily for initiating sustainable management of community forests and for promoting the trade of forest products derived from it for income generation to the local people in rural areas. Nepal developed specific set of criteria and indicators at the national level for the certification of community forestry and leasehold forestry management with the forest user groups under the guidance of Center for International Forestry Research (CIFOR).

Criteria and indicators for certification of woodfuel production systems

The philosophy of forest certification entails that products of forests traded in the markets come from sustainable managed forest fulfilling economic, ecological and social concerns. Therefore, certification was viewed as a tool for verifying forest management that complied with a series of internationally accepted standards. The objectives of the forest certification was to provide assurance to consumers that their purchases of forest products are not contributing to the destruction of natural forests either locally or globally.

A thorough review of the past forest certification in Nepal as well as the standard criteria and indicators identified and set at both international and regional level has identified six principles, 24 criteria and 84 indicators for initiating sustainable management of productive national forests under the public domain. This included primarily the government-managed national forests and forest plantations, and the community forests.

Review of findings

- The wood energy resources for the production of direct woodfuels in Nepal primarily included the national forests under different types of management. It included both natural growths as well as forest plantations. It was noted that direct woodfuels derived from the national forests such as government-managed forests and community for trade, remained in the same order of magnitude as that obtained and sold from the TOF.
- This study suggests that the term “certification” could not be viewed solely as certification of the tree products such as timber, woodfuels or NTFP, but certification of overall management of the forest. And it means, until and unless forests are managed according to the principles of SFM that qualify for certification of forest management system, certification of only the products of forests such as woodfuel will not be possible.
- Certification of the sustainable woodfuel production systems and the trade of certified woodfuel, primarily the direct woodfuels produced as by-products of forest harvesting, thinning or pruning, from government-managed national forests and forest plantations, as well as from FUG-managed community forests seemed possible to

consider at the FMU level. But it will require a simultaneous certification of both production sources and the production process, which means the certification of forests (or wood energy resources) for initiation of sustainable management, and the certification of important forest products, including direct woodfuels for its sustainable production for trade in local markets or for export.

- The standards (parameters) to be applied for certification of government managed national forests and forest plantations and CF and for certification of specific forest products produced from these sources depend solely on the criteria and indicators (C&I) that will be developed and applied at the national and FMU levels. As achievement of SFM is a long-term commitment and takes considerable period of time, no productive function of forests can be halted indefinitely. Therefore, a rational strategy would be to identify the parameters of SFM within the country, including principles of forest management, and criteria and indicators for monitoring the move towards it. But these parameters should incorporate all common elements of C&I developed at the regional and international levels for promoting SFM globally. Development and institutionalization of national standards of SFM is a cumbersome process, which requires the participation of important stakeholders, as well as a consensus agreement applicable for a long time. But as a stopgap measure, until a full-flagged national forest certification standard is put into implementation, development of principles, criteria and indicators for monitoring sustainable production of specific products like fuelwood and charcoal from public production sources for trade seems a reasonable approach for the short-term approach.
- Besides, the principles, criteria and indicators developed for the certification of government-managed national forests and forest plantations and CF and for the certification of sustainable production of direct woodfuels produced from these sources for trade, would not be applicable for the certification of direct woodfuels produced from the private forests and TOF due to already stated reasons. Similarly, the stated principles, criteria and indicators would not be suitable for the certification of sustainable production of indirect woodfuels and recovered woodfuels from all sources, and also for the certification sustainable charcoal production for promoting the trade of certified charcoal. In order to certify these woodfuels for trade, a separate “chain of custody” monitoring system has been proposed for adoption. Under this process the production and flow of these products will be tracked during transformation and transportation.
- Experience suggested that a cheap, practical, simple and feasible means of forest certification of international standard did not exist in Nepal. This made it not only difficult but also unaffordable to implement the FSC level of standards prerequisite for all government and community managed forests without outside financial and technical assistance.
- In order to institutionalize SFM in Nepal, interested stakeholders have recently formed an ad hoc national working group under the umbrella of Nepal Foresters' Association (NFA), which would coordinate the national initiatives of forest certification. The ad hoc national working group was established with representation from relevant stakeholders from GOs, NGOs and private sectors.

4.4 Case Study 4 Sustainable Charcoal Production in Brazil

Charcoal has been used as a source of thermal energy since the beginning of the steel industry in Brazil. Charcoal is used in the production of metallic iron from ore. Due to non-existence of sulphur in its composition, charcoal improves the quality of pig iron and steel produced. This phenomenon allows the steel industry to command attractive prices. Today, Brazil produces about 10 million tons of pig iron using charcoal, 60% are exported, generating an income of US\$ 2.0 billion per year.

4.4.1 Charcoal Supply and Demand in Brazil

Energy use has been growing rapidly in Brazil. Total energy consumption nearly doubled between 1975 and 2000. Energy consumption per capita increased by 60% and energy consumption per unit of Gross Domestic Product (GDP) increased by 22%. Rapid industrialization, high growth in some energy-intensive industries i.e. aluminium and steel production, and the increasing residential and commercial energy services are among the main causes of increased energy use and energy intensity (TOLMASQUIM *et al.*, 1998).

Total primary energy supply (TPES) grew in average around 2.5% per year in the last 20 years. This number is slightly higher than the annual economic growth rate of 2.1% during this period. Energy policy in Brazil in the last three decades attempted to reduce the country's dependence on foreign energy supplies and stimulate the development of domestic energy sources, mainly from hydrocarbons.

According to the Ministry of Mines and Energy, 13% or 28.4Mtoe (2005) of Total primary energy supply is provided by woodfuels (Brasil, 2006). This is almost at the same level with the rate supplied by hydropower generation. Despite the importance of woodfuels in the energy mix, the demand for woodfuels steadily decreased from 1970 to 2000. In 2004 however, the trend reversed as woodfuel demand rose to the level similar to that during the 1980's.

In the last six years, charcoal demand has remained constant particularly in the residential sector. This represents 8.3% of total consumption. It is estimated that in this sector, 635.8 thousand houses or 1.3% of national total, consume charcoal for cooking (circa 2003) at practically equal levels in urban and rural areas.

Charcoal in Brazil is primarily produced from native forests and also from the planted forests. In 1990, 60.3% of Brazil's charcoal production came from native forests and in 2005, this percentage decreased to 53.0%, (Associação Mineira de Silvicultura – AMS).

4.4.2 Certification of charcoal Production in Brazil

Charcoal produced in Brazil is of industrial scale. The process involves carbonization of wood in poorly mechanized masonry kilns highly dependent on human labour. Despite the traditional procedures, according to IBGE (2006) commercial charcoal revenue earned in Brazil amounted to 5.5 million tons in 2005 which generated US\$ 785 millions in sales. These charcoal were obtained from both native forests (52.8%) and forestry plantation (47.2%). Brazil does not have a separate certification programme for charcoal production due to its commercial nature, charcoal production is certified alongside the timber production process. There is a chain of custody that supports the sustainable production of charcoal.

4.4.3 Evolution of the certification movement in Brazil

Market drivers. The certified forest segment in Brazil began to emerge in the late 1990s, in response to several principal market drivers. Firstly, consumer concern for the environmental impacts of pulp and paper production stimulated technical shifts in the global industry (IIED, 1996). These consumer concerns were played through to the industrial plantation segment in Brazil when environmentalists raised consumer awareness of the controversial impacts of eucalyptus plantations on watersheds and biodiversity, and of child labor and near slavery in plantations and charcoal manufacturing (Ibid). Export of timber from Amazon deforestation also raised consumer alarm. Such concerns were dramatized by Greenpeace blockades of pulp exports by a leading Brazilian manufacturer and of Amazon timber on its way to a regional plywood enterprise on the eve of the Rio Earth Summit in 1992.

Secondly, corporate response to societal demands for sustainable development has increasingly been to perceive this as a market convention, affecting the parameters for competition in an ever more global market. To effectively compete for market share in this globalized context, industries must pursue new technological pathways and seek mutually beneficial relations with neighbouring communities (Vinha, 2000). This emerging market convention has not gone unnoticed by the wood products industry in Brazil, which has gone out of its way to rebuild its image as environmentally and socially responsible. This is particularly true of the pulp and paper and industrial charcoal segment which were the first to adopt FSC certification norms. Some firms in this group became interested in certification of their forests to enable them to more easily market sawn wood to diversify production.

Finally, the wood products sector now admits that it must reflect its sustainable image in tangible changes in production technology and particularly in sustainable forest management, and that the only way to communicate such change to promote consumer confidence is through independent external audits and certification. In response to consumer preoccupations and buyer pressures in importing nations, the pulp and paper and plywood industries initially took the lead in adoption of ISO 14.000 environmental management norms. It later was quick to adopt FSC plantation forest management and chain of custody certification standards, once market leaders took the initiative to raise the bar.

Certification organizations and progress. Simultaneous with the elaboration of national criteria, several FSC-accredited forest certifiers launched their activities in Brazil. Imaflora, a Brazilian NGO based in São Paulo, led the field through association with the Rainforest Alliance SmartWood^{cm} program headquartered in New York City. Imaflora was soon joined by Brazilian affiliates of Scientific Conservation Systems (SCS), based in Oakland, California and of the Société Generale de Surveillance (SGS), whose Qualifor Program for forest certification is headquartered in South Africa. All three certifiers provide services both to native forest and plantation segments, and all certify both forest management and the chain of custody of forest products. Some criticism has been laid on the costs of certification that may arise from undue concentration in this services sector. Experience shows, however, that the charges for the certification review process are usually far lower than those associated with the upgrading of logging procedures and legal commitments necessary to meet certification standards (May & Veiga, 2000).

As of October 2002, plantation forests on 822 thousand hectares have been certified in Brazil according to FSC criteria, corresponding to the operations of 18 companies whose holdings comprise nearly 20% of the total estimated area planted in pine, eucalyptus and teak in Brazil. In the Amazon and Atlantic Forests, 10 companies and community organizations have obtained certification for their management activities on a total of over 358 thousand hectares (www.fsc.org.br).

Trends in FSC certification of forest product chains of custody indicate exponential growth since initiation of FSC activities in Brazil in 1997. Of the 109 companies certified along these lines today, 24 fabricate these products from native forest species, and include plywood and panels, designer furniture, knife handles, musical instruments, non-timber forest products (medicinal plants and hearts of palm, for example) and fiber hammocks. Plantation products are no less diverse, ranging from sustainably produced charcoal to doors and windows, furniture, handles for tools and utensils, blocks and panels.

5.0 LESSON LEARNT

5.1 Policy Options Necessary to Support Certified Charcoal Production

Most Charcoal markets in developing countries offer very low value and therefore low prices for charcoal. This was because wood for charcoal has been regarded as a free good that require just the producer effort to extract. To a great extent this situation is brought about by the fact that forests from which the woodfuel is extracted are not managed. Policy interventions to support sustainable forest management of the charcoal producing woodlands should therefore be developed. This may be building on woodfuel certification that among other things ensures that charcoal in the market is produced from sustainably managed forests.

However, the term “forest certification” could not be viewed solely from the point of view of certification of specific forest products such as charcoal or other non-timber forest products, but must embrace the overall aspects of forest management systems. This means until a forest is managed according to the principles of sustainable forest management, there could be no prospect for certification of only specific forest product from any forest. Therefore the charcoal certification system must include all types of woodfuel production sources, including government-managed national forests, forest plantations, CF, as well as private forests.

5.2 Sustainable Charcoal Production Concept

From the case studied reviewed, sustainable charcoal production and marketing is seen as a system whereby the level of the harvesting of certain tree species for charcoal and other wood uses and the harvesting techniques used does not exceed nor harm the Mean Annual Increment (M.A.I.) of a particular forested area. (Bert Koppers 2001). If the harvesting exceeds and/or damages the M.A.I. then the forest will be on the verge of depletion and subsequent degradation³.

According to Evans Kituyi (2005) a systems approach to sustainable production and management of charcoal should aim at minimizing material and energy losses at all stages of production. In this case, wood obtained from sustainably produced biomass resource is harvested using efficient ways ensuring minimum waste is generated. The wood is then converted into charcoal using improved and efficient kilns after which proper handling is ensured during packaging, storage and transportation to minimize waste. Finally, the generated charcoal is consumed using improved cookstoves.

Sustainable charcoal production and management implies a number of things. Firstly that costs or investments have to be made (research, planning, patrol, control, fire prevention, enrichment planting, inventory, people, cars, etc.) to make sustainable production possible. Secondly, the benefits from management should be higher than the investment cost because if this is not the case management makes no sense. Thirdly, management is aimed at optimising the outputs from these forests that is to ensure that to squeeze the last bit out of forests without really damaging it.

³ The difference between degradation and depletion is that with degradation only certain tree species disappear, with depletion the whole forest will disappear.

The charcoal certification process should be premised on forest certification first. Forest Certification ensures that forests are well managed and that the interests of local people are protected. It helps to ensure that forests are managed properly so that they can continue to provide benefits and services for current and future generations. Certification provides assurance that people who live in or close to the forest must benefit from its management and use. Under proper forest certification schemes, independent auditors issue a certificate to the forest manager after the quality of forest management has been assessed using nationally agreed standards that meet internationally agreed principles. Once a certificate is given, the auditor makes annual follow-up visits to ensure that the forest continues to be managed to the agreed standard. Forest certification therefore is a process that leads to the issue of a certificate by an independent party, which verifies that an area of forest is managed to a defined standard.

5.3 Requirements for forest certification

The credibility of certification as key to sustainable forest management hinges on the following requirements:

- The standards and criteria for measurement has to be defined and accepted by stakeholders - local people, forest owners, industry, government, consumers;
- The standards should be compatible with globally acceptable principles that balance economic, ecological and social objectives.
- There should be an independent and credible verification with reporting of results to stakeholders, Certification and the market place.
- Certified products can carry a label, which verifies that the timber or wood product originates from well-managed forests.
- Companies in the supply chain hold chain of custody certificates so that the label can follow the wood from the forest to the consumer.

5.4 Steps in certification process

Preparing for certification

This involves development of certification standards for sustainable forest management based on Principles and Criteria for the national context by supplementing them with relevant indicators. These national standards provide detailed and specific management requirements. In the absence of nationally adapted certification standards such guidance will be provided by the certifiers using generic or local interim standards. The certification standards, though not designed as a forest management manual, provide clear objectives. Certification itself adds the incentive to achieve those objectives.

Also at this stage preliminary visit (scoping visit) is carried out by the certifier. Scoping visits identify major strengths and weaknesses based on a briefing with the managers and/or a rough estimation of the applicant performance. This helps the enterprise preparing for certification to deal with any major gaps before the full assessment.

Field assessment

Although certifiers have to remain independent of other interests, and therefore are not allowed to provide consultancy services to an operation they certify, in practice the field assessment serves as an informal training opportunity concerning how to reach certification standards. When the assessors interview forest managers and operators about the performance of the operation under investigation the discussions provide a lot of useful hints and recommendations to those involved.

Meeting the conditions

The third phase starts when certification has been achieved, but conditionally on certain improvements. The summary of field results provided in the certification report identifies strengths and weaknesses of an operation. It indicates to forest managers what needs to be consolidated and what needs to be improved. It normally contains a list of corrective actions, or conditions, that have to be met within a given time-frame. If there are major issues these have to be met (and will be checked) before a certificate can be granted. Minor issues can be dealt with subsequently. Together with specific recommendations it provides a clear guide to what kind of training or other measure might be needed to address any areas of noncompliance with the standards. The regular (at least annual) monitoring visits by the certifier ensure that the corrective actions are followed up.

6.0 APPLICATION OF CRITERIA AND INDICATORS FOR CERTIFICATION OF CHARCOAL PRODUCTION SYSTEMS IN THE AFRAM PLAINS

6.1 *Principles and Criteria for Consideration*

The philosophy behind forest certification is that product is produced from sustainable forest management fulfilling economic, ecological and social concerns. So, it is a tool for verifying that forest management complies with a series of internationally accepted standards. The objective of forest certification is therefore to provide assurance to consumers that their purchases of forest products are not contributing to the destruction of the natural resources locally and the world's forest globally. This is ensured by keeping a label in the product by which consumer identifies it as produced from sustainably managed forests (IHEP, 2004). Before deciding what parameters to consider for the certification of sustainable production of direct woodfuels from natural sources, from national forests of different kinds (including government-managed forests, community forests, leasehold forests and buffer zone community forests) and forest plantations, a thorough review has made of the past initiatives of forest certification.

Selection of principles, criteria and indicators for sustainable woodfuel production.

At first, information about past forest certification initiatives under the aegis of different forestry development agencies, including bilateral and international forestry development partners, is collected and analyzed in order to form a broad idea about the current status of principles, criteria and indicators development at national, regional and international levels. After a thorough review of the collected information, an idea about the starting point of this case study was formed which is therefore limited to available secondary information to-date. Identification of criteria and indicators for Woodfuels Certification is based on principles, criteria and indicators. These parameters are expected to enhance the charcoal production efficiency as well as to contribute to the social, economic and environmental betterments, both locally and globally. But for the certification of woodfuels produced from private sources, primarily from private forests and from trees on private and non- forest lands, a separate monitoring mechanism based on the product tracking and transformation process under the chain of custody certification method has been suggested for consideration. The proposed principles and criteria indicators that can be applied in the Afram Plains are:

PRINCIPLE 1: POLICY, PLANNING AND INSTITUTIONAL FRAMEWORK IS IN LINE WITH NATIONAL AND INTERNATIONAL LAWS AND CONDUCIVE TO SUSTAINABLE PRODUCTION OF WOOD, WOODFUELS AND NTFP FOR TRADE.

C.1.1 Policy formulation is carried out in a participatory manner.

Indicators:

- Existence of mechanisms for enhancing participation in policy formulation.
- Existence of a multi-sector forum at vertical level (national, district, and local level).
- Representation and participation of stakeholders in forum meetings (records and minutes of meetings).
- Regularity of meetings, discussions and other interaction in forums (records).

C.1.2 Existence of non-contradictory rules and regulations that are in line with national and international laws and promote the production of woodfuels for trade.

Indicators:

- Forestry policy, rules and regulations acknowledge the international conventions such as CITES, CBS, UNFCCC, etc.

- Government directives and departmental circulars do not contradict with the provisions of forest acts and rules and endorse production of woodfuels for trade.

C.1.3 Non-forestry policies (i.e. energy, environment, agriculture sector policies) do not distort commercial production of woodfuels for trade.

Indicators:

- Absence of distorting policies in relevant sectors that discourage the production of woodfuels for trade, including export.
- Existence of subsidies on imported commercial fuels (fossil fuels).
- Alternative energy promotion policy does not undermine the importance of woodfuels for both traditional and modern energy applications with payment of set royalty fees, taxes and other charges required under the prevailing law.

C.1.4 Legal provisions do not restrict tree growing/raising, planting in private, community and institutional lands under multiple objectives, including harvesting of mature trees (at rotation age) for the production of woodfuels for trade (Includes all types of natural forests under public domain, including forests and forest plantations managed by the government, local communities, forest leases and others).

Indicators:

- Acknowledgement of tree ownership right of private land owners, plantation developers, forest lease, FUGs, etc for the trees and forest products grown/raised or planted by them on lands that are legally owned or entrusted for management to them.
- Filing of a number of complaints or court cases against the government organizations claiming ownership of trees, private forests and/or forest products declared restricted for harvesting and/or trade from lands and forests owned/managed by individuals, communities or institutions.
- Land use policy supports commercial growing/planting of trees and forests, including captive and dedicated woodfuel plantations on lands outside of the forestry sector.
- Recognition of indigenous practices of local people that do not hinder sustainable forest management for socio-economic reasons.

C.1.5 Effective structure is in place for the promotion of private forestry and integration of trees into the farming and landscape systems.

Indicators:

- Effective central and local level institutions for supporting commercial production of woodfuels from all natural sources, including private forests and TOF.
- Provision of support and services to individuals, institutions and agencies involved in commercial production of woodfuels in private non-forest lands for trade.
- Absence of overlap/duplication of responsibilities between different institutions.
- Existence of inter-sectoral coordination mechanisms for relevant institutions in forestry, agriculture and energy sectors.

C.1.6 Boundaries of the public wood energy resources are known, clear and respected.

Indicators:

- Local users and other stakeholders recognize and respect the boundaries of public wood energy resources (existence of boundary markers and conditions).
- No evidence of forest encroachment (visual observation and records).

PRINCIPLE 2: CONSERVATION OF BIODIVERSITY AND MAINTENANCE OF ECOSYSTEM INTEGRITY IN THE PROCESS OF FOREST RESOURCE MANAGEMENT UNDER THE PUBLIC DOMAIN.

C.2.1 Conservation of biodiversity, including natural growth and artificial regeneration in managed national production forests, community forests, leasehold forests, buffer-zone community forests, etc.

Indicators:

- Landscape pattern is maintained (information on vegetation type etc).
- Diversity of habitat is maintained (vertical structure of the forest and size class distribution of tree species, etc).
- Species richness/diversity of selected groups is maintained (listing of trees, herbs, birds, mammals and identification of rare and endangered species).
- Population size and structures of selected plant species do not show significant change (due to lack of proper management or overexploitation for wood fuel).
- Population size and density of selected plant species are estimated (during forest management plan preparation) and maintained (through appropriate management prescriptions).

C.2.2 Ecosystem function is maintained.

Indicators:

- Ecologically sensitive areas (buffer-zone along water courses) and other ecologically important areas are identified and protected with appropriate measures.
- Erosion and landslides are minimized (sensitive areas identified, appropriate control measure applied).

PRINCIPLE 3: FOREST (WOOD ENERGY) RESOURCE MANAGEMENT INCREASES BENEFITS THROUGH BETTER FOREST MANAGEMENT.

C.3.1 Effective local management is in place for maintaining and assessing the forest (wood energy) resources.

Indicators:

- Ownership and use rights to resources are clear and respected.
- Rules and norms of resources use are successfully enforced and monitored (existence of rules and norms, patrolling, incidences of violation of rules, number of forest offence cases registered, etc).
- Effective and accepted conflict management mechanisms are in place (number of cases resolved).
- Access to forest (wood energy) resources is perceived locally to be fair (deprived and poor users get fair concession, access to woodfuel and NTFP, evidence of discussion in meetings on access to resources, attendance of gender, class, caste, and ethnicity in meetings).
- Local people feel secure about their access to forest resources, including woodfuels.

C.3.2 Stakeholders get equitable share from the benefits of forest (wood energy) resource management.

Indicators:

- Mechanisms for equitable benefit sharing are developed and implemented (local people express satisfaction on the benefits received).
- Employment opportunities exist for poor and deprived users (number of such people involved in carpentry works, livestock rearing, fuelwood collection for trade, charcoal making and other income raising activities).

C.3.3 All production forests under different systems of management are considered as means of livelihood by the poor and deprived group of people (including ethnicity, individuals and women) as long as their actions do not go against the spirit of SFM.

Indicators:

- The above people invest significant amount of time and efforts in wood energy resource management.
- Destruction of natural resources by the local people is rare.
- Maximum utilization of the productive national forests (all types) by local forestry stakeholders.

PRINCIPLE 4: CONCERNED STAKEHOLDERS HAVE ACKNOWLEDGED RIGHTS AND MEANS TO MANAGE FORESTS COOPERATIVELY AND EQUITABLY

C.4.1 Forest Users Groups are institutionally developed.

Indicators:

- Users and committee members are fully aware of their rights and responsibilities and perform accordingly (aware of functions, perform assigned role, participate in discussions, acknowledge the issues of gender, deprived and poor).
- Effective leadership is developed within community (evidence of mechanism for leadership transfer).
- Documentation system is well maintained.
- Funds are managed in a transparent way and are properly utilized (existence of financial record, accessibility of financial records, activities in which the fund was spent, misuse of fund, etc).
- Information flow to members is maintained (evidence of information exchange between FUG members, awareness of FUG members, etc).
- Mechanisms for shared learning exist (events and mechanisms for sharing of knowledge and lessons learnt from training, observation tours between FUG members).

C.4.2 Effective two-way communication related to forest resource management exists among stakeholders.

Indicators:

- Local stakeholders meet and interact with satisfactory frequency, representation of local diversity and quality of interaction (regularity of and participation of different class, castes, gender and ethnicity in meetings, no evidence domination by certain individuals or groups).
- Stakeholders' contributions are respected and valued.

C.4.3 Local stakeholders have detailed, reciprocal knowledge pertaining to forest resources use as well as forest management plans prior to implementation.

Indicators:

- Plans/maps showing integration of uses by different stakeholders exist.
- Updated plans, baseline information on socioeconomic conditions of the people, forest conditions and maps are widely available to stakeholders.
- FUG and Forest User Committee (FUC) recognize the legitimate interests and rights of other stakeholders.
- Management of woodfuel and NTFP reflect the interests and rights of local stakeholders.
- Stakeholders are aware of related community forestry acts, regulations, and guidelines.

C.4.4 Agreement exists on rights and responsibilities of relevant stakeholders

Indicators:

- FUGs make agreements with relevant stakeholders in forests and forest resources related activities, including woodfuel distribution systems.
- Effective conflict resolution mechanism in place (conflict remains at acceptable level to stakeholders).

PRINCIPLE 5: THE RELATIONSHIP BETWEEN FORES MANAGEMENT, ENVIRONMENT, AND LOCAL CULTURE IS ACKNOWLEDGED BY RELATED STAKEHOLDERS.

C.5.1 Human activities and the environmental conditions are in balance.

Indicators:

- Environmental conditions affected by human activities are stable or improving.
- There is a balance between forest resources and population growth/migration.

C.5.2 Relationship between human culture and forest management is recognized.

Indicators:

- Local stakeholders can describe the relationship between human culture and forest management
- Forest Working Plan/Operational Plan reflects local human culture
- Absence of activities that disintegrate human culture.

C.5.3 Institutionalization of formal and informal education on forest (wood energy) resource management.

Indicators:

- Increased awareness on forests and forest resource management.
- Establishment of mechanisms to enhance people's awareness on wood energy resource management (training and education programmes/materials).

PRINCIPLE 6: YIELD AND QUALITY OF DESIRED FORESTRY GOODS AND SERVICES ARE SUSTAINABLE.

C.6.1 Forest management unit is implemented on the basis of legal title on the land, scientific Forest Working/Operational Plan and recognized customary rights.

Indicators:

- Forest management takes place based on scientific basis and in consultation with the public in the case of government-managed national forests and in written agreements between the government or private leases in the case of community forestry.
- Information on the identity, location and population of all indigenous and traditional people living in the vicinity of the government-managed forests and community forests and their customary rights exist.
- DFOs, FUGs and other concerned institutions have evidence and map about indigenous and traditional people, their territories and rights.

C.6.2 Management plans is detailed and clearly documented.

Indicators:

- Management objectives (both long- and short-term) are clearly stated reflecting the condition of forest, expressed public interest of the forestry goods and services and the local forest users needs.
- Forest Working Plan/Operation Plan is comprehensive (identifies boundaries, provide inventory of resources, protection, includes management and utilization plans, biodiversity hot spots and cultural and conservation areas, mechanism for handling emergency situations, etc).
- Appropriate involvement of stakeholders in management (including Forest Working/Operational Plan preparations) and takes into account all components and functions of the forest (i.e. timber, woodfuel, NTFP etc).
- Yield regulation by area and/or volume is prescribed in Forest Working/Operational Plan (allowable cuts, minimum exploitable diameter, number of trees or total volume to be harvested per year etc).
- Silvicultural systems are prescribed and are appropriate to forest types and produce growth (management practices, species level inventory, assessment of growth, planting plan and planting stocks).
- Prescribed harvesting systems and equipment match the condition of forest in order to reduce impact.
- Forest Working/Operational Plan is periodically revised and approved by appropriate authority.

- Programs and estimated costs of forest management activities are included in Working/Operational Plan on a priority basis.
- Programs and estimated costs of community development are included in Forest Working/Operational Plan on a priority basis.

C.6.3 Implementation of Forest Working/Operational Plan is effective.

Indicators:

- Management as defined in the objectives.
- Implementation of Operational Plan as per the prescriptions, including record keeping.
- Low residual stand damage (skilled labours, sound logging plans, etc).
- Rehabilitation of degraded and impacted forest.
- Absence of significant off-site impacts.
- System of forest products harvesting and transformation are efficient.

C.6.4 Effective monitoring system is implemented.

Indicators:

- Mechanisms for monitoring and evaluation are clearly described in the Forest Working/Operational Plan, including chain of custody monitoring of products.
- Documentation and record of all forest management and forest activities are kept in forms that enable monitoring, also for product tracking during transportation and transformation.
- Forest trial plots are established and monitored regularly.

C.6.5 Costs and benefits from all types of national forests are properly accounted for, distributed and shared among relevant stakeholders.

Indicators:

- Mechanisms for sale and/or equitable distribution of forest products (including woodfuels) to relevant stakeholders are clearly described in the Forest Working/Operational Plan.
- Re-investment of the benefits from forestry management for forestry development.

C.6.6 Promotion of user and environment-friendly wood energy technologies, government initiatives of R&D on woody and non-woody biomass-based modern energy applications.

Indicators:

- List of environment-friendly modern wood energy technologies relevant to the country
- Priority R&D areas in modern wood energy applications (i.e. technologies and end uses).
- Priority R&D areas in non-wood biomass based modern energy applications (i.e. technologies and end uses).

Additional principle, criteria and indicators for sustainable charcoal production

PRINCIPLE 7: TECHNOLOGIES USED FOR CHARCOAL MAKING ARE EFFICIENT (PRODUCE HIGHER OUTPUT), NONHAZARDOUS TO CHARCOAL MAKERS AND LEAST POLLUTING TO THE ENVIRONMENT.

C.7.1 Fuelwood supply sources are sustainable and the supply is legal.

Indicators:

- Supply sources (national forests) are under sustainable management.
- Fuelwood procurement system for charcoal making is legal, pays full royalty fees, and taxes etc., on fuelwood harvested/collected (from national forests).
- Record of every batch of fuelwood purchase, charcoal production and trade maintained, including number of people employed by gender and ethnic group.

C.7.2 Inventory of charcoal making technologies currently in use, assessment of their average efficiency and selection of efficient models.

Indicators:

- List of prevailing charcoal making technologies.
- Average efficiency of common technologies assessed (record/report, fuelwood input to charcoal output ratio).
- List of tested efficient models for promotion.

C.7.3 Assessment of health and the environmental impacts of common charcoal making technologies.

Indicators:

- Health-related complaint and cost of medication to the charcoal makers, transporters and traders.
- Analysis of chemical constituents of the smoke emitted out of the chimney/exhaust pipe of charcoal kilns/pits, including green house gases (GHG) such as carbon dioxide and methane and health damaging emissions (HDE) such as particulates and sulphur dioxide).

C.7.4 Field-testing, demonstration and extension of efficient charcoal making technology to directly relevant occupational group(s).

Indicators:

- Different types of models tested and demonstrated in the field.
- Selection of accepted models and efficiency.
- Extension program for dissemination and training.
- Continuation of R&D for further improvement.

6.2 Challenges In Applying Criteria And Indicators

The above sets of principles, criteria and indicators will be suitable for the certification of sustainable fuelwood production from different types of productive national forests and forest plantations. But these will not be applicable to private forests and trees on private and other lands including public and institutional landbased TOF. While identifying suitable parameters for the certification of sustainable woodfuel production systems and the trade in certified woodfuels, the past initiatives of criteria and indicators development at both national and international levels were taken into consideration.

A straight forward set of C&I could not be conceived exclusively for the certification of sustainable woodfuel production for trade in the Afram Plains, as woodfuels in most cases were not the main (or final) product but produced as residues or by-products of forest resource management, during tree harvesting, thinning, pruning etc.

Similarly, no specific set of principles, criteria and indicators could be suggested/ prescribed for the certification of woodfuels produced from private forests and TOF on different types of lands owned and managed by non-forestry sectors. For these additional sources of woodfuel production, as well as for certification of the production systems of indirect woodfuels and recovered woodfuels, the only logical method that seems suitable for adoption for certification would be the chain of custody monitoring during transportation and transformation. For certification of the fuelwood supplied for charcoal making from government managed forests and CF, the above set of principles, criteria and indicators could be applied.

But for certification of the sustainable charcoal production systems and trade in certified charcoal a combined system of monitoring will be needed to monitor the charcoal making practices (transformation process: technology, conversion ratio, etc), as well as any misdoings during transportation and trade.

Based on their study findings, one additional principal, four criteria and 12 indicators have been suggested for consideration under this study for certification of the sustainable

charcoal production and trade of certified charcoal, primarily to minimize the health and environment related adverse impacts of charcoal making.

Chain of custody monitoring criteria for fuelwood

In the case of direct woodfuels produced from private sources such as private forests and TOF, it would not be possible to apply standard set of principles, criteria and indicators of SFM suggested for national forests. Due reasons are already explained in preceding paragraphs. However, these alternative fuelwood supply sources are crucial in meeting the market demands of traded woodfuels. Besides, it will be necessary to ensure an unhindered flow of this complementary supply in the market that will help relieve the pressure off the national forests for illegal fuelwood harvesting leading to deforestation.

Nevertheless, some kinds of monitoring system could be devised and implemented for avoiding illegal collection and/or mixing of illegally harvested/stolen woodfuels from the national forests when the fuelwood from private sources become necessary to transport to distant places for trade in commercial markets.

Monitoring parameters

- Notification/application to the concerned local authority (i.e. DFO, DDC, VDC, etc) informing/seeking permission for harvesting, including details such as species, number and size of trees to be harvested for trade.
- Verification of the number of trees applied for felling, estimation of volume of wood and direct woodfuels that are likely to be produced by tree species.
- Public notification of the estimated amount of wood and fuelwood that would be harvested by particular individuals or institutions for own use or for the purpose of trade (posting information and/or maintaining records in concerned offices such as DFO, DDC and other local level public institutions/agencies including VDC, FUG, NGOs and schools).
- Recording of actual amount of construction wood and woodfuels harvested by species and source.
- Informing the offices of relevant local agencies and other stakeholders about the amount of wood and woodfuels approved and authorized for transportation and trade.
- Maintenance of records of tax or royalty amount, if subjected to any, in relevant offices.
- Issuance of formal permit and informing relevant checkpoints about total amount harvested by product type and by species in each consignment during transportation and the depot where the products are to be transported for sale.
- Every depot that sells privately produced woodfuels must maintain information on record showing the sources of origin, total volume by species procured from particular producers, whole-sellers, transporters, etc.

The checkpoints en-route must also compile information showing the sources of origin (including place and name of producer) total volume by species for particular producers, transporters and the destination of each consignment Indirect/recovered woodfuels from industries and society. Currently, no system exists for monitoring the indirect woodfuels production from forest industries. Similar is the situation regarding the recovered woodfuels produced by the society. In the case of indirect woodfuels produced as a by-product in wood industry, as long as the materials are consumed for in-house energy supply by the producing industry itself, then institutionalization of a simple record-keeping system that indicates the quantity of such woodfuels produced and consumed by commodity type would be desirable for monitoring of production and consumption. Besides, submission of a summary report of

indirect woodfuels production and consumption by commodity type and quantity by specific industry to relevant local level offices under the ministry of industry and MFSC, as well as the concerned DDC seems adequate.

If the commodity is also to be transported from the production source to other place for trade, either for straight-forward use as fuel or for transforming into other energy forms, then, institutionalization of a record-keeping system at the production source, as well as in forestry check-points along the transportation route and at the delivery points or consumption centre, would be desirable. Such record-keeping system could assist in monitoring of the production of indirect woodfuels, if trade in certified product becomes the objective to ensure SFM in the future. But, it would be difficult even if desired to certify the scattered production of recovered woodfuels, which in most cases, is consumed within the vicinity of production sources, mostly in rural households and by the poor in urban areas. Whenever it requires transportation to some market centres, it would be advisable to maintain at least some kinds of record in local level offices of the concerned line ministries that show the quantity, source of origin and the identity of traders and transporters.

Chain of custody monitoring criteria for charcoal

Four different phases have been identified from charcoal making to charcoal trading phases. Which means, the chain of custody monitoring system for the certification of sustainable charcoal production and trade of certified charcoal if at all intended for introduction in the future, would be desirable to include all phases of charcoaling.

This means it would include standing tree procurement to fuelwood preparation (including harvesting/collection/preparation) phase; transportation of fuelwood from production sources to loading of charcoal kilns/pits for transformation (including unloading and packing) phase; transportation of charcoal to consumption points or markets (including loading, unloading) phase; and, trading (selling) phase.

Fuelwood procurement phase

The important concern at this phase will be to ascertain the fuelwood supply sources for charcoal making, primarily to ensure that it came from managed sources and through legal means. The principles, criteria and indicators suggested for certification of forest and direct woodfuels production from different types of national forests and forest plantations will also be suitable for certification of sustainable fuelwood supply for charcoal making for trade. But these variables will not be relevant for the indirect and recovered woodfuels used for charcoal making and separate criteria under the chain of custody certification method would be needed to apply.

Transformation phase

Monitoring of the origin and methods of procurement of fuelwood used for charcoal making would be crucial at this phase, as charcoal makers could easily add illegally acquired fuelwood to their legally acquired fuelwood from adjoining forests. Such possibilities would be more if the charcoal making sites remain close to or within the boundary of national forests and forests plantations. So, the concerned agencies (DFOs and FUGs) could think of institutionalization of a simple monitoring system that would help identify the sources of fuelwood supply for charcoal making, primarily to discourage mixing of illegally procured fuelwood. Besides, determination of average ratios of fuelwood input to charcoal output by kiln type would be desirable for the chain of custody certification system for traded charcoal. In addition, the following parameters for monitoring could be considered:

- Discourage the use of illegally produced fuelwood for charcoal making.
- Discourage the use of illegally produced charcoal.
- Promote the use of efficient charcoal making devices instead of traditional dugpits.
- Promote the utilization of all sizes of available fuelwood for charcoaling.

Transportation phase

So far, no agency has registered for transporting charcoal in the country. As the production and trade is in the informal sector, mostly as an illegal activity, its transportation and trade is therefore not done openly. However, if FUGs are allowed to use the surplus fuelwood available from CF for charcoal making for trade, then they may consider the following parameters for monitoring in order to promote SFM.

- Issue certificate of legal charcoal production from managed CF, indicating fuelwood supply sources, amount of charcoal produced for trade etc.
- Maintain record and make it transparent to interested stakeholders.
- Issue permit for transportation and trade, indicating origin, amount etc.

Trading (selling) phase

Currently, no formal agency or company exists for trade in charcoal. The present volume of trade and the size of charcoal market remain unknown. It would be therefore difficult, if at all possible to monitor its trade in a closed market, often sold in small amount (about 1–2 kg) in dark poly bags to hide the content inside. If FUGs would like to get involved in charcoal production and trade in the future, then they could think of the following:

- Register local traders and their annual volume and value of charcoal trade.
- Issue certificate indicating registered charcoal traders for particular FUG.
- Institutionalize record-keeping systems at both ends, in production sites as well as in trading places.
- Discourage registered charcoal traders to buy and sell illegally produced charcoal.

7.0 CONCLUSIONS AND RECOMMENDATIONS

This study suggests that the term “certification” should not be viewed solely as certification of the tree products such as, woodfuels or NTFP, but certification of overall management of the forest. And it means, until and unless forests are managed according to the principles of SFM that qualify for certification of forest management system, certification of only the products of forests such as woodfuel will not be possible.

Certification of the sustainable woodfuel production systems and the trade of certified woodfuel, primarily the direct woodfuels produced as by-products of forest harvesting, thinning or pruning, from government-managed national forests and forest plantations, as well as from FUG-managed community forests, seems possible to consider at the FMU level. But it will require a simultaneous certification of both production sources and the production process, which means the certification of forests (or wood energy resources) for initiation of sustainable management and the certification of important forest products, including direct woodfuels for its sustainable production for trade in local markets or for export.

The next level of reporting is to design a sustainable woodfuel production to guide the adoption of the certification process in the Afram Plains.