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RESEARCH (CSIR)- FORESTRY RESEARCH INSTITUTE
OF GHANA (FORIG) UNDER MINISTRY OF
ENVIRONMENT, SCIENCE AND TECHNOLOGY**



IN COLLABORATION WITH

**INTERNATIONAL TROPICAL TIMBER ORGANISATION
(ITTO)**

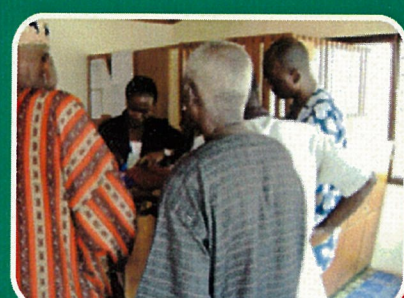
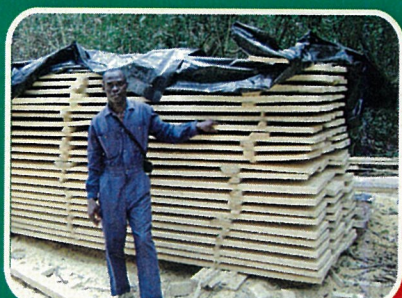
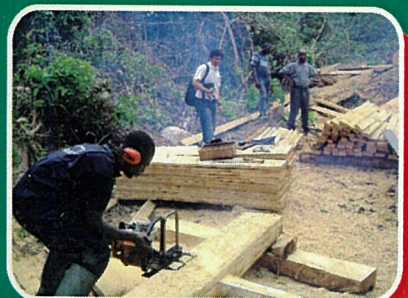
ITTO PD 431/06 REV. 1 (I)

**Processing and utilisation of trees on farmlands and logging
residues through collaboration with local communities**

ITTO PROJECT COMPLETION REPORT



2011





TITLE: PROCESSING AND UTILIZATION OF TREES ON FARMLANDS AND LOGGING RESIDUES THROUGH COLLABORATION WITH LOCAL COMMUNITIES

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EXECUTIVE SUMMARY

This proposal originated from an ITTO Pre-Project (PPD39/02 (I) during which some members of the local communities (both beneficiary and non-beneficiary communities) expressed the desire for trees on their farmlands to be harvested and processed into lumber. Their main reason was that timber companies who operate on their farmlands do not pay any compensation for the crops they destroy during their activities. They also do not have access to lumber for their domestic activities. Because of these some of the farmers were either burning timber trees on their farms or felling them to rot. Since local communities were not benefiting from trees on farmlands as well as logging residues left behind due to inefficient harvesting procedures, the main problem addressed was to make lumber easily available to them and also enhance their livelihood. Therefore the specific objective was to promote processing of logging residues and trees on farmlands and thereby provide increased timber products as well as generate employment and income to local communities and some individual farmers. The strategy used to implement the project were (i) Participatory planning and monitoring, (ii) Capacity building (iii) Gaps in current policies and legislations related to the processing of logging residues and trees on farmlands identified and recommendations for review made to Forest and Wildlife Policy Review Committee. The specific objective and all outputs as planned were successfully achieved. Comparing existing situation to the pre-project situation shows that there had been (a) promotion on the processing of different timber species, (b) increased in lumber yield for the various species to an average of 46-50% with the logosol facilities and with minimal operational risk than freehand chainsaw milling with an average of 40%. The project also facilitated the communities to generate lumber that yielded financial value ranging between GHC 963 (\$ 642) and GHC 7,443 (\$4,072). Some of the lumber pieces were also used for different domestic activities. The project also trained and employed 22 operators and also trained 24 marketing officers who marketed the lumber generated. Beneficiary communities themselves have realized the need to plant trees on their farmlands since they will benefit from the trees when they mature. This idea had caught on with the communities to the extent that any illegal logging operation taking place is resisted or drawn to the attention of the forestry commission for immediate action. The rate of indiscriminate burning of standing trees and felling to rot because of fear of having their farm crops destroyed has been reduced as compared to the pre-project era. Other benefits

that the communities obtained were increase in income which enabled some of them to change thatched roofs to corrugate iron. The Post-project sustainability is assured because the project has submitted to the Forest and Wildlife Policy Review Committee a proposal on harvesting and processing of trees on farmlands as well as logging residues for inclusion in the New Forest and Wildlife Policy which may be promulgated next year. This will enable farmers to sustainably benefit from trees on their farmland. To ensure sustainable supply of trees for processing farmers have been trained in seedling production and enrichment of planting techniques on their farmlands. Again, relationship between local communities, forestry commission and the timber industry has improved. This will allow Forestry Commission to supervise operations on harvesting, processing and marketing when the new policy is promulgated. Timber concessionaires may also allow local communities to use logging residues that are left on their sites. This will improve the livelihood of the local communities due to increase in earnings from the sale of the lumber. For this, a manual on the processing, utilisation and marketing of logging residues and trees on farmlands have been published. The project beneficiaries which were mostly forest fringe communities eagerly and fully participated in project implementation and have benefited and will continue to benefit from the sale of process lumber which improves their income status and availability of lumber for their domestic use.

a) Operational lessons learned were that an inception workshop should be held before the start of every project. This workshop will enable all stakeholder groups to know their roles and responsibilities and personnel on the project will get to know of their activities and the period the activities will be implemented. A meeting should be held before every new activity is undertaken. This will enable team members to discuss the field details for effective execution of activities. Full report on any completed activity should be sent to the project leader and completed activity discussed and evaluated by Project Implementation Team. *b) Conclusions and Recommendations are:* **Identification** - In any Community Based Forestry Project, the local stakeholders should identify the problems themselves or should be involved in the problem identification. **Design** - structures which would supervise the project should be set up with the involvement of the communities themselves. Such structures should supervise the project and report to the project team including problems to be encountered. Regular monitoring of the Project Implementation Team is expected. These local structures should be responsible for

transparent distribution of any benefits that will accrue from the project. Such committees should be motivated from the benefits and that such benefits should be agreed by the whole community.

Implementation - There should be a policy in place which allows forest fringe communities to harvest and process trees on their farmlands or logging residues discarded by logging concessionaires. The Lumber so produced can be sold by the communities or used for domestic purposes. The sharing of benefits should be done in a transparent manner agreed to by all community members whether settler or native. Community members should be made to understand the need plant three or four timber tree seedlings for every timber tree harvested and

processed. **Organization** - The steering committee of such project should involve representatives of all stakeholders including local communities. **Management** - All these activities however

should be supervised by the Project team and their collaborators. **Scaling up** - There is high potential for scaling up since all forest fringe communities face the same problems as that which were faced by project communities.

PART I:

PROJECT IDENTIFICATION

1.1 Context

Social, economic and environmental context and project location, as well as relevant national and regional policies and programs

Social aspects

A recent study by Adam et al (2006) reveals that, of 357 households in forest communities in Ghana, 31% obtain wood for their construction from chainsaw operations; 28% got it from farmlands and 0.6% obtained wood from wood residues in logged areas. This compares with 48% who indicated they obtain their wood from the conventional sawmills. In terms of difficulties these households face in getting the wood, 10% mentioned transportation of wood arising from the fact, most of these mills are located far away from these local communities coupled with the high poverty level of these communities that make it, quite difficult for them to be able to afford these transport charges. In addition to this, 9% indicated fear of arrest and fines, which probably point out that they obtain their wood from chain saw operators whose activity has been banned. Therefore it is quite obvious that local communities face enormous difficulties in getting wood for their uses.

Economic aspects

In the same study of Adam et al (2006), more respondents earned income in chainsaw operations than in large scale logging activities in these local communities, though few households in these local communities succeed to earn income from these activities. For instance, out of 360 households in the local communities interviewed only 22 earned income from chainsaw operations compared with 9 that earn income from large scale logging. Comparatively earnings from chainsaw operations was higher than that from large scale logging activities for these local communities, though the frequency of earnings are different in these two activities. Further, annual income from chainsaw operations as a share of respondent's annual income from primary occupation was fairly significant, particularly for households that participate in the chainsaw.

Environmental aspects

The processing of logging residues and trees on farmlands into lumber products was done on site, therefore the negative environmental impact of this project was very minimal. One advantage is that the by-products of the processing activity (sawdust) was replenished the soil nutrients in the areas of operation. Hence one of the good/positive externalities generated from this project.

1.2 Origin and Problem

Origin

This proposal originated from an ITTO Pre-project (PPD39/02 (I)) which was aimed at determining the social acceptability, economic viability and environmental impact of collecting and processing logging residues by local communities with collaboration of the local timber industry. During the implementation of this project, some members of the local communities (both beneficiary and non-beneficiary communities) expressed the desire for trees on their farmlands to be extracted and processed into lumber. Their main reason was that timber companies who operate on their farmlands do not pay any compensation to them for the crops they destroy during their activities. Because of this some of the farmers were either burning timber trees on their farms or felling them to rot since there is no definite policy on the extraction of trees on farmlands by communities. Meanwhile these communities travel to the cities to acquire timber for their constructional purposes and the manufacture of school / room furniture. So having been successful in the pre-project, the local communities requested for a full project which would consider the processing, utilisation and marketing of not only logging residues but trees on their farmlands from which they can derive some revenue .

Problem

The main problem was that the local communities were not benefiting from trees on farmlands as well as logging residues left behind due to inefficient timber harvesting procedures.

The effects were that there were low impact on the economic livelihood of the local communities (non-involvement of the local communities in logging activities and non compensation for trees on farmlands) and inefficient utilisation of logging residues and trees on farmlands (inefficient harvesting procedures and Lack of appropriate processing machines). The impact being that

there was inadequate benefits derived from forest resources by local communities impeding their contribution to sustainable forest management.

The wood based industries of Ghana have made significant contributions towards the socio-economic development of the country. This is evidenced by the fact that timber and its associated products constitute an important foreign exchange earner for the country. In Ghana concessionaires and industry men who live in the cities and other urban areas do timber harvesting and processing. As a result of this most of the products are exported or are sold in the urban areas. Therefore local communities who live near the resource do not have access to timber products neither do they benefit any major income from harvesting of timber as concessionaires or from the royalties which are paid by the concessionaires since these go to the paramount and other chiefs. This is with the result that although the local communities who live near the forests are the best people to protect the forests from damaging activities (including illegal logging) they care little about what happens in the forests. One way of stimulating the interest of local communities in the forest and thereby protect the forest from all activities is to enable local communities to have some income from the forest while at the same time having timber products for their needs. By constitutional provisions, revenue from logging operation is shared among Forest Services Division, District Assemblies and Stool Land owners principally the paramount and other local chiefs. Very little, if any, benefits the ordinary members of the local community.

Thus due to the need to have lumber and income to support their livelihood illegal logging has increased as local people desperately attempt to compete against concessionaires to gain access to forest resources. In Ghana, chain saw logging and milling is an important enterprise among the deprived rural communities but the operation as a whole has been blacklisted in Ghana because their working methods have been characterized with wasteful practices that are environmentally unfriendly. Again the milling accidents are very common and fatal and are not conducted under any standard working procedures. Despite a decade of the ban on chainsaw lumber production in Ghana, production still persists and is on the ascendancy. This has been detrimental to the national economy due to non-payment of stumpage and other statutory fees by chainsaw operators. Since 2003, about 12.8 million US dollars of forest revenue are lost annually through illegal chainsaw activities (World Bank, 2005).

With the involvement of local communities in legalized production of logging residues using refined portable and efficient machines, local employment will be generated and the sale of the sawn products will generate revenue to improve the local economies. These benefits will directly go to the local communities and which will affect their social and economic lives.

In an ITTO Pre-project (PPD39/02 (I)) using portable mills it was realised that the socially acceptable, economically viable and environmentally friendly to collect and process logging residues by local communities. During the implementation of this pre-project, some members of the local communities (both beneficiary and non-beneficiary communities) expressed the desire for trees on their farmlands to be extracted and processed into lumber. Their main reason was that timber companies who operate on their farmlands do not pay any compensation to them for the crops they destroy during their activities. Because of this some of the farmers were either burning timber trees on their farms or felling them to rot since there is no definite policy on the extraction of trees on farmlands by communities. Meanwhile these communities travel to the cities to acquire timber for their constructional purposes and the manufacture of school / room furniture. So having been successful in the pre-project, the local communities requested for a full project which will consider the processing, utilisation and marketing of not only logging residues but trees on their farmlands from which they can derive some revenue .

2. PROJECT OBJECTIVE AND IMPLEMENTATION STRATEGY

Specific objective:

To promote processing of logging residues and trees on farmlands and thereby provide increased timber products as well as generate employment and income to local communities and some individual farmers.

Implementation Strategy

Project strategy

In the presence of rural poverty, local people become easy prey for logging companies, who offer them scanty wages in return for their cooperation in cutting and hauling logs. Normally forest dwellers are only too aware of the long-term consequences of such cutting. But in the absence of any other way to support their families, they concede and eventually, become the first

victims of the harvest. Trees on farmlands that are of commercial value are most often burnt or cut down to deny saw millers of their extraction in order to protect their farm crops. This is because token money or nothing is given to the local community farmers as compensation. With representatives of all major stakeholders having realized that utilization of trees on farmlands and logging residues will provide both ecological integrity and improved human well being, this project was intended to use these existing stakeholders. Therefore the project strategy was as follows:

- **Participatory planning and monitoring**

There was a startup workshop where all relevant stakeholders with special emphasis on local communities including women were briefed about the project. The stakeholders made constructive contributions towards the project planning and implementation. Roles and responsibilities of stakeholders were determined and monitoring mechanisms were also established. Periodic meetings were organized to evaluate the progress of work.

Gender and special community group representation were identified. In addition, Institutional roles and responsibilities as well as resource mobilization were identified and detailed out in a Memorandum of Understanding (MOU). All studies and surveys carried out were of reasonable magnitudes that have provided data on the processing and utilization of logging residues and trees on farmlands.

- **Capacity building**

The capacity of community stakeholders were built through workshops and onsite (in-situ) training on the operation and maintenance of the logsol milling machine that were used. Felling methods to avoid damage to logs and farm crops, appropriate method of extracting logging residues, log milling methods for higher lumber yield were taught with demonstration. Again, training in marketing strategies for the sale of lumber to lumber dealers and handling of community finances were organized. Various beneficiary communities called for general meetings and nominated their representatives to serve on the project committees and the chainsaw operators who were interviewed for final short listing by the Project team.

- **Governance**

One of the aims was to address the need to optimise resource utilization by streamlining policies and procedures that govern communities' access to timber both from standing trees on farmlands and logging residues. There were several legislative and institutional constraints for communities to have access to trees on their farms and logging residues from logging companies and to process them for some economic benefits. These do not promote collaboration which is very much needed to ensure protection of forest resources from illegal exploitation. The study explored these constraints through desk review of relevant policies and laws and active stakeholders' participation including communities. Recommendations in the form of gaps in policy and regulatory frameworks on governance related to processing of trees on farmlands and logging residues for the benefit of farmer have been made.

3. PROJECT PERFORMANCE (Project elements planned and implemented)

A) Specific objective

The specific objective was to promote processing of logging residues and trees on farmlands and thereby provide increased timber products as well as generate employment and income to local communities and some individual farmers.

The project achieved this by promoting the processing of different species, increasing lumber yield for these various species by 46-50% with an improved chainsaw milling facilities (logosol machines) than freehand chainsaw milling of 40% and with minimal operational risk. The project also facilitated the Nsabrekwa community to process 2,348 pieces of lumber of various species (excluding logging residues) some of which were sold and yielded financial value GHC 7,443 equivalent to \$ 4,954, Dominase 2,179 pieces of lumber for GHC4,554 (\$ 3,028), Ankasie generated 2,036 pieces of lumber for GHC3,054 (\$2,040), Abesewa Gyaaman had 1,988, which yielded a value of GHC 6,758 (\$4,638). Japa and Twifo-Kyebi, where some conflict arose during the project implementation period, generated 1,048 and 535 pieces of lumber respectively of which some were sold and yielded financial value of GHC 3,668 (\$2,445) and GHC 963 (\$642) in that order. Some of the lumber pieces were also used for different domestic activities. The project also trained and employed 22 operators and also trained 24 marketing offices who marketed the lumber.

b) Outputs

Output 1: Processing of logging residues and trees on farmlands into products determined

Output 2: Capacity of local communities in processing, utilization, and marketing of lumber and lumber products built

Output 3: Livelihood impacts of the processing, utilization and marketing of lumber and lumber products determined

Output 4: Manual on extraction, processing and utilization of trees on farmlands and logging residues published

Output 5: Governance and policy implications for the extraction, processing and utilization of logging residues and trees on farmlands established

c) Activities

Output 1: Processing of logging residues and trees on farmlands into products determined

Sub-Activities

1.4.1 Felling of trees and identification of logging residues to be processed

1.4.2 Determination of volumes of logging residues and felled trees

1.4.3 Milling of logging residues and determination of volumes of lumber

1.4.4 Milling of trees on farmlands and determination of volumes of lumber

1.4.5 Determination of volumes of lumber from logging residues

1.4.6 Determination of volumes of lumber from trees on Farmlands

1.4.7 Analysis and report writing

1.5.1 Determination of physical properties of trees on farmlands and logging residues

1.5.2 Determination of drying characteristics of samples of lumber to be produced from trees on farmlands and logging residues

1.5.4 Strength property determination at green moisture content of the raw materials.

1.5.5 Prepare report

1.6.1 Identification of products on community basis

1.6.2 Selection and stacking of lumber for products manufacture

1.6.3 Prepare report

Output 2.0: capacity of local communities in processing, utilizations, and marketing of lumber and lumber products built

Sub-Activities

- 2.2.1 Data collection on the field
- 2.2.2 Summarise the data for the year 2009
- 2.2.3 Preparation of report
- 2.5.1 Assess lumber sales by the marketing committee
- 2.5.2 Assess marketing committee's bank transaction capabilities
- 2.5.3 Assess the capabilities of machine operators and supervisors
- 2.5.4 Identification of short falls and introduction of measures to address them
- 2.5.5 Prepare report

Output 3: Livelihood impacts of the processing, utilization and marketing of lumber

Sub-Activities

- 3.2.1 Develop indicators of livelihood activities for beneficiary communities
- 3.2.2 Develop questionnaire to assess livelihood impact
- 3.2.3 Administration of questionnaire
- 3.2.4 Assessment of environmental impact on farmlands of beneficiary farmers
- 3.2.5 Preparation of report
- 3.3.1 Identification of stakeholders
- 3.3.2 Organization of stakeholder workshop to discuss impact assessment
- 3.3.4 Prepare of workshop report
- 3.4.1 Write-up of impact assessment report
- 3.4.2 Technical-review of impact assessment report
- 3.4.3 Editing, type-setting and production of impact assessment report
- 3.4.4 Distribution of impact assessment report

Output 4: Manual on extraction, processing and utilization of trees on farmlands and logging residues published

Sub-Activities

- 4.1.1 Review of literature on manual production
- 4.1.2 Designing of outline for manual production
- 4.1.3 Collection of data on extraction, processing and utilization of logging residues and trees on farmland
- 4.1.4 Preparation of report
- 4.2.1 Collection of data on extraction, processing and utilization of logging residues and trees on farmland Designing of outline for manual production
- 4.2.2 Processing of data and manual write-up (Draft)
- 4.2.3 Editing of draft manual
- 4.3.1 Identification of stakeholders
- 4.3.2 Organization of stakeholders workshop to discuss the draft manual
- 4.3.3 Workshop report on draft manual
- 4.4.1 Write-up of final manual
- 4.4.2 Technical-review of final manual
- 4.4.3 Editing, type-setting and production of final manual
- 4.4.4 Preparation of report
- 4.5.1 Identification of relevant institutions and individuals for the use of the manual
- 4.5.2 Manual distribution to identified institutions and individuals
- 4.5.3 Preparation of report

Output 5: Governance and policy implications for the extraction, processing and utilization of logging residues and trees on farmlands established.

Sub-Activities

- 5.1.1 Desk study on gaps in policy and regulatory frameworks that enable or impede processing of trees on farmlands and logging residues
- 5.1.2 Discussion with stakeholders on identified gaps in policy and regulatory framework
- 5.1.3 Report preparation

- 5.2.1 Hold stakeholders meetings to identify policy options for processing of trees on farmlands and logging residues
- 5.2.2 Evaluation and ranking of identified policy options
- 5.2.3 Report preparation
- 5.3.1 Identification of stakeholders
- 5.3.2 Organization of stakeholders workshop
- 5.3.3 Preparation of workshop report
- 5.4.1 Peer-review of final report
- 5.4.2 Editing and production of final report
- 5.4.3 Report preparation
- 5.5.1 Identification of stakeholders
- 5.5.2 Workshop to disseminate report
- 5.5.3 Report preparation

d) Schedule

Starting Date: March 2007

Duration: 3 years

e) Total amount of expenditures, Analysis of Inputs (Refer to Annexes 1 & 2)

4. PROJECT OUTCOME, TARGET BENEFICIARIES INVOLVEMENT

Section 4

The extent to which specific objective was achieved

- i) The specific objective was fully achieved. The project achieved this by promoting the processing of different species, increasing lumber yield for the various species to 46-50% with the improved chainsaw facilities (logosol) than freehand chainsaw milling of 40% and with minimal operational risk. The project also facilitated the Nsabrekwa community to process 2,348 pieces of lumber of various species (excluding logging residues) some of which were sold and yielded financial value GHC 7,443 equivalent to \$ 4,954, Dominase 2,179 pieces of lumber for GHC4,554 (\$ 3,028), Ankasie generated 2,036 pieces of lumber for GHC3,054 (\$2,040), Abesewa Gyaaman had 1,988, which yielded a value of GHC 6,758 (\$4,638). Japa and Twifo-Kyebi, where some conflict arose during the project

implementation period, generated 1,048 and 535 pieces of lumber respectively of which some were sold and yielded financial value of GHC 3,668 (\$2,445) and GHC 963 (\$642) in that order. The project also trained and employed 22 operators and also trained 24 market offices who marketed the lumber pieces that were generated.

- ii) The situation existing at project completion as compared to pre-project situation with respect to the tangible Outputs

The following tangible outputs were achieved as compared to pre-project situation:

1. Processing of logging residues and trees on farmlands into products determined

- a) Fourteen (14) timber species on farmlands of the selected localities were identified, felled and processed into lumber. These were Cedar (*Entandrophragma candollei*), Awiemfosamina (*Albizia ferruginea*), Sapele (*Entandrophragma cylindricum*), Odum (*Milicia excelsa*), Brown Mahogany (*Entandrophragma utile*), Dahoma (*Piptadenia africana*), Edinam (*Entandrophragma angolense*), Avodire (*Terreanthus africanus*), Danta (*Nesogordonia papaverifera*), Emire (*Terminalia ivorensis*), Wawa (*Triplochiton scleroxylon*), Essia (*Petersianthus macrocarpus*), Ofram (*Terminalia superba*), Bompagya (*Mammea Africana*). Figure 1 shows two of the trees being felled.



Figure 1: Felling of trees on farmlands for lumber by field operators

b) Physical properties and drying characteristics of processed lumber some timber species extracted from farmlands determined

Same wood samples from same species were collected from project sites (Figure 2) to determine their physical properties, which included moisture content, density, radial shrinkage and tangential shrinkage. Kiln schedules were developed for the species and as shown in Figure 2 (right) lumber pieces were also stacked for air drying studies. Therefore lumber drying sheds as shown in Figure 3 were constructed at the project sites. On the average, all the processed boards were air-dried from green to 21% MC within sixty-two days during the wet period and fifty-one days during the dry period with an overall average of fifty-six days for lumber dried in the five communities.



Figure 2: Wood samples for physical and air drying tests



Figure 3: Dr. Tetra (ITTO Rep) at a community drying shed



Figure 4: Scientist at work on the physical properties kiln schedules of some wood species

a) Some mechanical strength properties of trees on farmlands determined

Determination of Mechanical Strength Properties: Four mechanical strength properties of seven timber species (Dahoma, Black Ofram, White Ofram, Wawa, Essia, Avodire and Edinam) at green moisture content were determined using Universal Instron Machine (Figure 6) and some results shown in Table 3. These strength properties included shear parallel to grain, Modulus of rupture (MOR), Modulus of elasticity (MOE) and compression parallel to grain. The results at green moisture content indicate that the strength properties of the tested wood species are comparable to those in literatures and in some cases better. Again, comparing the species with Odum (Iroko), Dahoma and Essia (whose densities are 690 kg/m^3 and 800 kg/m^3 respectively) are better in all the properties than Odum, while the others do not vary so much from Odum. These show that trees on farmlands are as good as those from the forest.



Figure 5: Mechanical bending test of timber species with universal Instron machine

Table 1: Mechanical strength properties at green moisture content of some wood species from farmlands

Strength properties	Wood species									
	Dahoma		Black Ofram	White Ofram	Wawa		Essia	Avodire	Edinam	Odum
	Test	Literature	Test	Test	Literature		Test	Test	Literature	
Shear (N/mm ²)	15.3	7	9.49	8.8	3.3	3		8.7	9.1	7.4
Compression (N/mm ²)	39.3	36.7	24.4	24.2	19.5	18.5		23.8	22.6	35.4
MOE (N/mm ²)	9191	9900	6018.4	5832.8	4735.8	4600	Test	5760	6008	8300
MOR (N/mm ²)	79.6	76	45.7	45.3	38.4	37	9.8	55.3	51.4	74
Density from literature kg/m ³		690	550	550	380		800	550	40.5	640

Source: Project results and Farmer *et al* (1972)

b) The quality of lumber generated from trees on farmlands have been assessed and graded

The lumber generated from the 13 timber species and the logging residues obtained at the six communities were evaluated and graded (Figure 6) using SATA/ATIBT grading rules. The lumber pieces graded were in the range of grade 1 to grade 4. Some of the lumber from logging residues had defects like dead knots, wane, and borer holes. Most of the lumber from Nsabrekwa, and Dominase were graded 1 and 2. This means that the trees on farmlands at these communities were less defective.

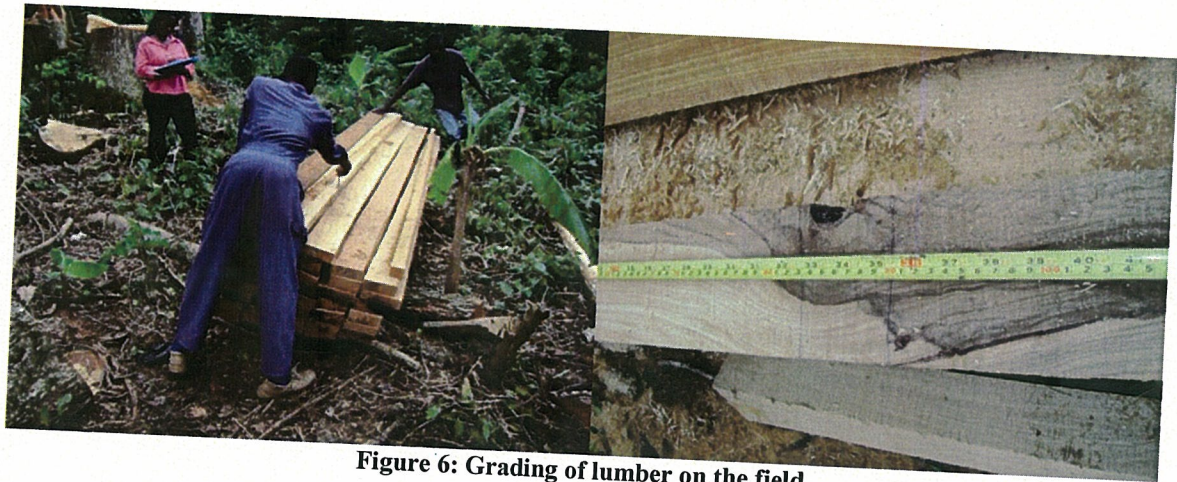


Figure 6: Grading of lumber on the field

Processing of Logs into Lumber

The project has introduced improved chainsaw facilities to some localities in Ghana. These were used to process timber trees from farmlands. Before logs were milled their dimensions (butt & top diameters and length) were taken as indicated in Figure 7 (top). The logs were then milled into lumber using the logosol machines (Figure 7-bottom). The dimensions of each lumber generated were also taken, as shown in Figure 8, to determine the volume.

Lumber yield for the various species are determined to be higher ranging between, 6-10% more with the improved chainsaw facilities (logosol) than freehand chainsaw milling at yield of 40% and with minimal operational risk.



Figure 7: Milling of logs with logskidder machines at project sites



Figure 8: Lumber dimensions being taken

2. Capacity of local communities in processing, utilization, and marketing of lumber and lumber products built

At the end of the project, 22 illegal chainsaw operators were trained in the operations of the improved chainsaw facilities (Logosol) for lumber processing. Figure 9 shows some photographs of the trainees engaged in the assembling of the logosol components while Figure 10 illustrates the handling of the machine in milling by the operators and a group picture with the Paramount chief of Wassa Amenfi traditional area (arrowed) during his visit to the training site at Wassa Akropong.

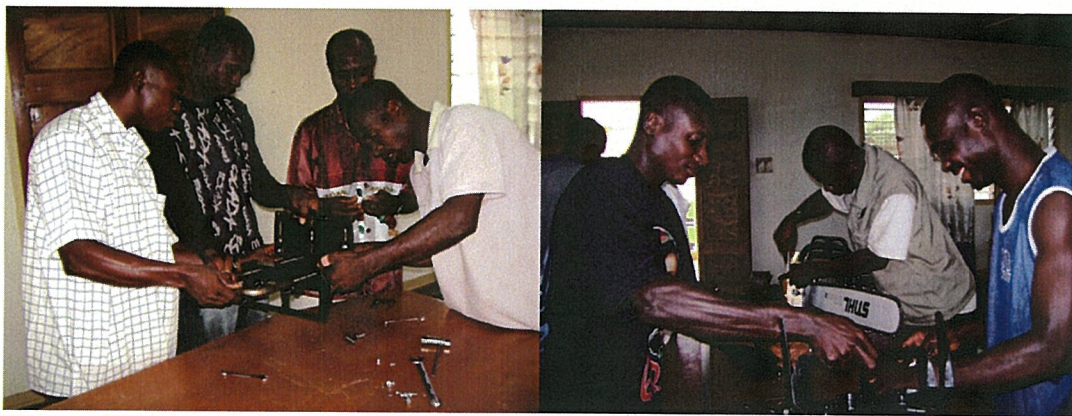


Figure 9: Trainees (selected chainsaw operators) assembling logosol components



Figure 10: A cross section of machine operators who were under training and a group photograph of the machine operators & a Paramount chief of Wassa Amenfi

The project also trained 24 members of the local communities in the techniques for the sale of lumber generated and the handling of finances of the communities and hence constituted a committee known as Marketing Committee. They were also in-charge of the monitoring of the lumber against theft. Figure 11 shows two of such training workshops that were organized at two communities.



Figure 11: Capacity building workshops for local marketing committee members

3. Livelihood impacts of the processing, utilization and marketing of lumber and Lumber products determined

At the end of the three years of the project, modest gains appear to have been achieved in terms of these set objectives. The undiscounted benefit cost ratio of 1.20 indicates that the cost of the lumber production for the period is lower than the revenue obtained. This is a good signal, despite the fact that this ratio is quite low. It indicates that revenue obtained was slightly higher than the cost of producing the lumber. Figure 12 shows a Socio-Economist Scientist assisting some local marketing committee members in opening bank accounts for their communities in order to banks all monies from the sale of lumber. It is also worth noting that other indirect benefit that community members might have derived from having access to the lumber within the community included direct employment. In addition there were increase in social capital (good working relation created) between communities and forest and forest managers in the project area; availability of lumber from their localities without travelling long distances, minimal damage to cash crops food crops and other plant vegetation

through the use of logosol machines as compared with the conventional method of logging. Lumber awaiting stacking under a drying shed (Figure 13) was inspected by a project team member (arrowed) and two marketing officers with a beneficiary.



Figure 12: Project marketing committee members opening bank accounts at a rural bank



Figure 13: A Scientist (arrowed) with marketing officers inspected lumber ready for sale

4 Sectoral policies and programs

The Executing Agency (FORIG) collaborated with the Forest Services Division (FSD) of the Forestry Commission which had mandate for managing all forest resources including the harvesting of trees both on and off reserves. FSD thus used to arrest community members who harvested or was suspected of harvesting trees. This collaboration affected the success of the project because communities realized that once the FSD was involved there was no fear of being arrested and that they could sell the processed lumber without fear. The project results in conjunction with those of EU chainsaw project (being implemented by Tropenbos International, Ghana) have submitted recommendations to Forest Policy review Team on allowing farmers to process trees on their farmlands and wood residues left by concessionaires to provide lumber for domestic use and to sell some to reduce poverty.

Physical Environment: The processing of timber into lumber and other products were done in situ and such the negative environmental impacts of this project was very minimal. Rather by-products of the processing replenished soil nutrients in the areas of operations and this has improved regeneration. c). Crops yields were observed to have grown better in areas where trees were processed because decomposition of the sawdust into manure was faster (smaller grain particles) than that with freehand milling (in a shaving form).d). Regeneration of different timber tree species which had been suppressed by logging residues had on processing of residues and also wood residues generation had the chance to regenerate well.. The Project has injected the spirit of tree planting and thus farmers have planted 3-4 seedlings in place of every tree harvested .This is because of the financial and other economic benefits enjoyed by the farmers and that indiscriminate felling and burning of trees on farmlands by farmers as well as condoning and conniving with illegal chainsaw operators have been reduced.

Assessment of environmental impact: The environmental impact on farmlands of beneficiaries of the communities was made by determining cash crops and vegetation that were available. Measurements were made at areas that were disturbed after processing logs into lumber with logosol machines and compared with areas that had undergone heavy duty machinery logging (Figure 14 and 15).



Figure 14: Disturbed areas due to heavy duty machinery logging



Figure 15: Areas disturbed after Logosol Operations

The participation of the target beneficiaries had in the implementation of the project and how the results have been used or will be used in the future

The involvement of the beneficiary communities was very high. Communities formed local committees which supervised activities in communities and formed part of monitoring team. They also led a inventory teams to farmlands during the inventory exercise, were part of the field operational planning when machine operators got to the community,, Also each farmers whose trees on his farmlands were to be processed accompanied he machine operators until the processing was completed, The local committee took records of the quantity of lumber pieces

generated and were present whenever timber dealers came to their communities to buy the lumber. They also ensured that financial benefits were transparently distributed to the beneficiary farmers. The communities had representation on the Project Steering Committee (PSC) and were duly invited to all such meetings. They were present at all official community meetings. They facilitated the activities of machine operators. At the PSC meetings they were able to articulate the views of their communities and also discussed outcome from such meetings to their members. Figure 16 depicts one of such participations where Nsabrekwa community was involved in the construction of a lumber drying shed.



Figure 16: Local community participation for the construction of lumber drying shed

The project had significant impact on target beneficiaries because of (i) improvement in their income which the sale of processed lumber generated, the availability of lumber for their domestic use and the employment the processing created. (i) the appreciation of the value of trees on their farmlands which most of them had been destroying as part of their farming activities (iii) the improvement in growth of their food crops as a result of in situ processing which generated sawdust which improved soil properties (iv) adoption of the practice of tree planting to increase the availability of trees on farm and other waste lands (vii) acquisition of marketing techniques for the sale lumber. Figures 17-20 show some of the benefits that were derived.



Figure 17: Plastic chairs bought by local community from income from project



Figure 18: Increase in growth of food crop at site used for processing



Figure 19: Trained logosol operators recruited from local communities

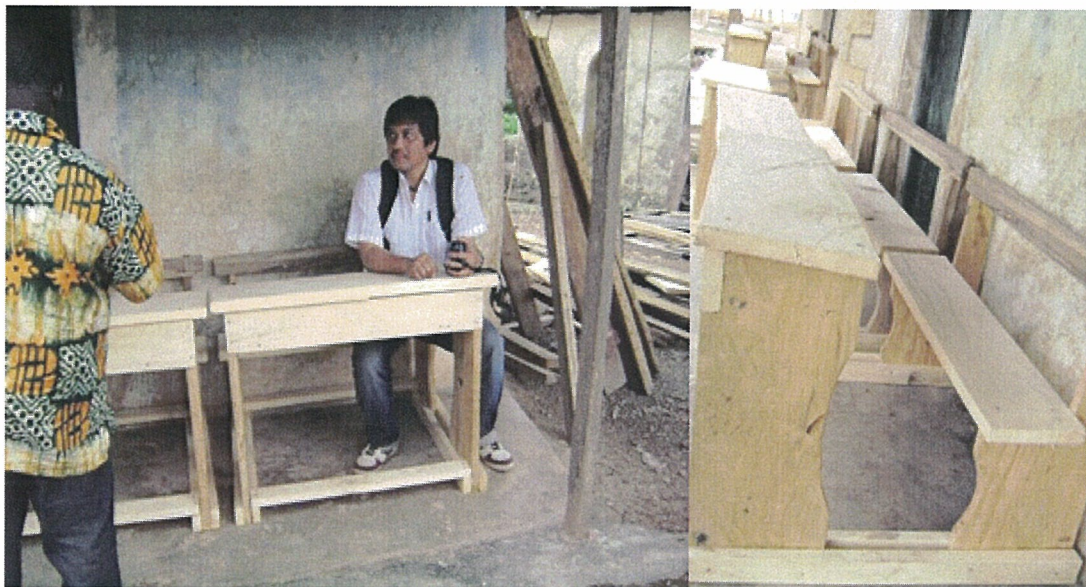


Figure 20: Dr. Tetra inspecting school furniture constructed from lumber obtained from project

Project sustainability after project completion as result of conditions prevailing at completion

The project has submitted to the Forest and Wildlife Policy Review Committee a proposal on Harvesting and processing on trees on farmlands and logging residues by farmers to be included in New Policy to come next year. This will enable farmers to have benefits from trees on their farmland when approved for inclusion in new forest and wildlife policy which is to replace the present policy. Workshops were organized at various levels of stakeholders to identify the policy gaps within the current one. Figure 21 illustrates one of such workshops that was organized for the local communities.



Figure 21: Local communities at a workshop on identification of gaps in policies

In the interim 1/8 of every of the part of proceeds accruing from the sale of processed products by communities was set aside to maintain the logosols until new ones are acquired through private –community or government- community partnership. To ensure sustainable supply of trees for processing farmers have been trained in seedling production and enrichment of planting techniques on their farmlands.

Again, relationship between local communities, forestry commission and the timber industry has been improved, which will allow Forestry Commission to supervise operations on harvesting processing and marketing and timber concessionaires to allow local communities to use logging residues that are left on their sites. A manual on the processing, utilisation and marketing of logging residues and trees on farmlands have been published to enable other stakeholders replicate the technology.

Again, it is expected that there will be an increase in lumber at the various project areas when the developed policy becomes a law to enable farmers process trees on their farms and logging residues. This will improve the livelihood of the local communities due to an increase in earnings from the sale of the lumber.

5. Assessment and analysis

i) Analysis and comments on project rationale and project identification process emphasizing the (in) adequacy of stake holder identification and participation.

The project rationale was very relevant and appropriate and there was adequate stakeholder identification which was done through focus group. Stakeholders also participated in the project formulation process because they were the initiator of project identification and development.

ii) Analysis and comments on the (in) adequacy of the results of the identification process emphasizing correct identification of the problem to be tackled, the project objectives, the choice of the implementation strategy.

The identification process was adequate and problem to be tackled, the project objectives and the implementation strategy which involved participatory planning and monitoring where there was a startup workshop for all stakeholders as well as determination of roles and responsibilities, capacity building of the stakeholders on operation and maintenance of the logskid which was used and Reduced Impact Logging (RIL) and governance which identified gaps in current policy legislation as related to processing of logging residue and trees on farmlands and a memorandum for modification were submitted to Policy Review Committee were also adequate.

iii) Highlights and analysis of the most critical differences between planned and actual project implementation as presented in section 3 and suggest any measure and action which could have avoided these variations.

There were no critical differences between planned and actual project implementation.

- iv) Evaluate and comments on the (in) adequacy of time and project input(quality and quantity personnel and equipment, financial resources, knowledge and expertise) for project formulation and implementation.**

Except for rainfall which affected the period of processing of trees on farmlands logging residue which made project to extended for a period of six months. Other project inputs were adequate for project formulation and implementation.

- v) Evaluate the anticipation and reality of external influences, assumption and risk etc. and the effectiveness of the mitigation measures.**

The only external influence which was not anticipated was the shortage of fuel for the logsol machines. This was however mitigated by buying the fuel in bulk and storing them in secured places.

- vi) The project Evaluates while referring to section 4 above, the participation of the anticipated and actual project beneficiaries in project implementation and how they have and will be benefited from.**

The project beneficiaries which were mostly forest fringe communities which eagerly and fully participated in project implementation and have benefited and will continue to benefit from the sale of process lumber which improve their income status and availability of lumber for their domestic use.

- vii) Analysis project (in) sustainability after project completion, referring to section 4 as a result project conceptualization, assumptions made and implementation conditions.**

The sustainability of the project is assured because the memorandum submitted to the Policy Review Committee on processing of tree on farmlands by farmers as well as processing of logging residue left behind by concessionaires is likely to be accepted for

inclusion in the new policy The project has trained also 22 local personnel in the marketing of lumber 24 local personnel in the use and maintenance of the logosol for processing.

In the interim 1/8 of every of the part of proceeds accruing from the sale of processed products by communities was set aside to maintain the logosols until new ones are acquired through private –community or government- community partnership.

To ensure sustainable supply of trees for processing farmers have been trained in seedling production and enrichment of planting techniques on their farmlands.

viii) Analyzes and comments on the understanding and appropriateness of roles responsibilities of the institution involved with project implementation.

The role and responsibilities of all institution involve in the project especially Forestry Services Division were clearly understood and implemented accordingly which led to the successful achievement of the specific objectives of the project.

6. Lessons learned

A) Project Identification, design and implementation as to

- **Aspects of project identification and development including problem analysis and stakeholder identification and participation which most contributed to its success or failure in achieving the Specific objective contributing to the Development objective.**

The project was identified during the implementation ITTO pre-project (PPD39/02I) which was aimed determining the social acceptability economic viability and impact of collecting and processing logging residue with the collaboration of the local timber industry. Since the project was identified by the local communities they were involved in the development and problem analysis through focus group discussions. Stake holders were also identified through focus group discussions. Since project identification development and problem analysis had involved local communities and other relevant stake holders they were necessarily involved in the implementation.

- **Aspects of project design which most contributed to its success or failure in achieving the Specific objective contributing to the Development objective:**

The aspect of project design which most contributed to its success was the fact that every local community had structures which was responsible for the implementation of the project within their community including the sharing of financial resources from the lumber which was sold.

The sharing of proceeds from sold lumber was also done in an open and transparent manner.

- **Additional arrangements that could improve cooperation between the relevant parties interested in the project**

Additional arrangements that could improve cooperation between relevant parties interested in the project is for FORIG to keep on with its research to provide relevant information which FSD will utilize in managing the forest resources and improve livelihood of the forest fringe communities..

- **Factors which will most likely affect project sustainability after completion**

(i) Communities should be allowed to harvest and process trees on their farmlands

- (ii) Communities should be allowed have access to logging residues in forests within their vicinity
- (iii) Communities should be allowed to sell or use domestically these lumber
- (iv) Logosol or wood processing machine with higher efficiency should be used for the processing of trees on farmlands or logging residues.
- (v) These machines should be acquired for the communities on hire purchase basis either by private establishments or by government.

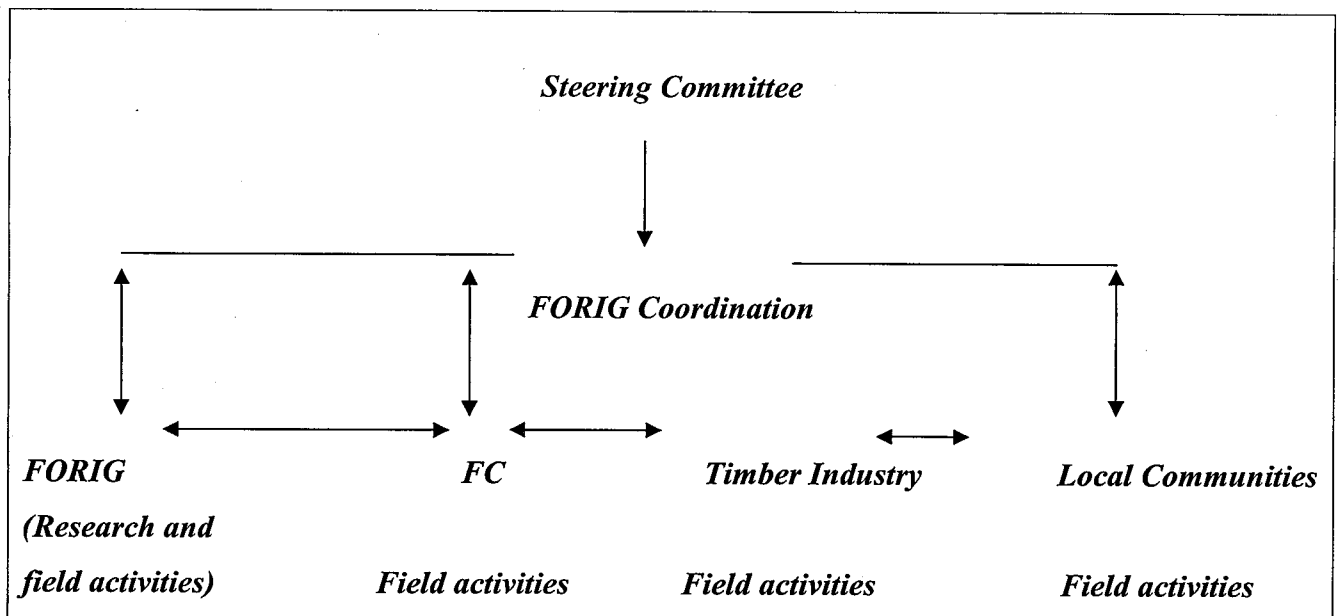
• **Actions to be taken to avoid variations between planned and actual implementation (schedule, cost, etc)**

The project planning had involved local communities and experts who knew the terrain and who could calculate input that was required for implementation. Thus the planning was of good quality, hence there was not much variation between plan and actual implementation except the period which has to be extended by a period of six months because of rainfall which was very much unexpected

B) Operational matters

Project organization and management:

The Organization of the project is shown in the Chart below



- FORIG
- Forestry Commission
- Representative of Local Communities
- Representative of Traditional Authorities
- Representative of Timber Industry

The steering committee met once a year to review the project and provide guidance to ensure successful implementation of the project. Figure 22 shows some stakeholders at a steering committee meeting with an ITTO representative.

Management

The Executing Agency of the Project was FORIG, which was also responsible for implementation of field activities. The local communities, Forestry Services Division of the Ghana Forestry Commission and the some four timber concessionaires and three local communities were collaborators.

Flow of funds: There was regular flow of funds for project activities.

Definition of the roles and responsibilities of the institutions in the project implementation:

Key Staff

Key staff of the project were:-

1. Dr. Dominic Blay Jr
2. Mr. Francis Wilson Owusu
3. Mr. Lawrence Damnyag
4. Mr. Joseph Kwame Appiah
5. Mr. Francis K. Dwomoh
6. Mr. Charles Dei-Amoah
7. Local community representatives
8. Timber companies

Their responsibilities were:-

- Dr. Dominic Blay (Ecologist/Management - Forestry Research Institute of Ghana). Project leader
Responsible for execution and coordination of all aspects of the project including collection and collation of project reports for all participating scientists and community project teams.
- Mr. Francis Wilson Owusu (Wood Technologist – Forestry Research Institute of Ghana).- Project leader Responsible for execution and coordination of all aspects of the project including collection and collation of project reports for all participating scientists and community project teams. Also responsible for processing of timber into lumber and lumber grading.
- Mr. Lawrence Damnyag (Economist – Forestry Research Institute of Ghana). Responsible for all socio-economic studies. Also responsible for organizing workshops.
- Mr. Joseph Kwame Appiah (Mensuration expert – Forestry Research Institute of Ghana). Responsible for the quality determination of the logs to be extracted and the lumber to be produces.
- Mr. Francis K. Dwomoh (Mensuration expert – Forestry Research Institute of Ghana). Responsible for mensurational activities with Dr. Blay.
- Mr. Charles Dei-Amoah (RMSC-FC logging expert). Will be responsible for efficient logging of trees on farmlands.
- Local Community Representative: - Representing local communities on monitoring and evaluation of activities and act as liaison officer between local communities and other key project staff, and organizing local communities for all project activities.
- Timber Companies: - Will be assisting the project team and the local communities in the extraction of logging residues in their concessions at the three selected districts.



Figure 22: Dr. Blay with ITTO Representative and the Steering Committee members at a steering committee meeting.

Project documentation

Field recording materials were acquired for the field operators on group basis and some individuals who needed to take records from the field. Intensive training was given to field recorders before they were dispatched. The field recording books were thoroughly checked during visits. All reports on completed activities and field data were kept by the project secretary while softcopies were given to the project leader.

Monitoring and evaluation; Quality planning

An internal monitoring and self-evaluation for the project was carried out. To do this, a monitoring committee of five (5) members made of three members selected by the community in each area and two project team members in each project area was formed. This team was responsible for ensuring the successful execution of project in their respective areas and they submitted progress on activities in their areas bi-annually (before submission of progress report to ITTO) to the project coordinator. The result of the self-evaluation was used in fine-tuning the activities foreseen for the rest of the project cycle. ITTO monitoring visits was carried out every 12 months and that a total of 3 visits throughout the project cycle were made. During such visits the ITTO Rep is accompanied by a team from the implementation agency to tour the project sites as shown in Figure 23. The project steering committee met once a year (Figure 22) to discuss project technical details as well as to approve certain documents, such as the yearly plan of

operations (YPO). Evaluation was carried out by ITTO project managers' who evaluated the project anytime there was steering committee meeting.



Figure 23: ITTO Rep. and a scientist on field visit during a monitoring mission

PART III: CONCLUSIONS AND RECOMMENDATIONS

Section 7

Identification

I. In any Community Based Forestry Project, the local stakeholders should identify, the problems themselves or should be involved in the problem identification

ii Involvement of the local stake holders should be done in a participatory manner

Design

In the design of locally based local project, structures which would supervise the project should be set up by the communities themselves.

Such structures should supervise the project and report to the project team if there are problems, but the project team should monitor them regularly.

These local structures should be responsible for transparent distribution of any benefits that will accrue from the project.

- Local committees responsible for supervision of all issues dealing with sustainable forest management including the sharing of benefits which accruing to community from their resources should be set up in all communities.
- Such committees should be motivated from such benefits that and that should be agreed by the community.

Implementation

- There should be a policy in place which allows forest fringe communities to harvest and, process trees on their farmlands or logging waste discarded by logging concessionaires (in progress).
- The Lumber so produced can be sold by the communities or used for domestic purposes.

- (i) The sharing of benefits should be done in a transparent manner agreed to by all community members whether settler or native.
- (ii) Community members should be made to plant three or four timber tree seedlings for every timber tree harvested and processed.
- (iii) Efforts should be made to harvest trees and process them as well as logging residues in accessible areas.

Organization:

- The steering committee of such project should involve expertise in such areas as well as community representatives

Management:

- All these activities however should be supervised by the Project team and their collaborators

Comment on the potential for replication and/or for scaling up.

- There is high potential for scaling up since all forest fringe communities face the same problems as that which was faced by project communities.

Responsible for the Report

Name: Dr. Dominic Blay

Position: Project Leader

Date: August 2011

Annex 1: Project financial statement

Table 2: Project financial statement

INPUTS APPLIED

Project No. PD 431/06 Rev.1 (1)

Period ending on:31 December 2010

Component	Budget in US\$	Amount	
		expenditure in US\$	Remaining in US\$
B. Expenditures by Executing Agency:			
10. Project Personnel			
11.National Experts			
<i>11.1 Project Director FORIG</i>	\$11,664.00	11,660.02	3.98
<i>11.2 Forest Ecologist</i>	\$11,664.00	11,660.02	3.98
<i>11.3 Wood Technologist</i>	\$11,664.00	11,660.02	3.98
<i>11.4 Economist</i>	\$11,664.00	11,660.02	3.98
<i>11.5 Wood Quarlity Expert</i>	\$11,664.00	11,660.02	3.98
<i>11.6 Mensuration Expert</i>	\$11,664.00	11,660.02	3.98
<i>11.7 Community Laision Expert</i>	\$23,328.00	23,320.04	7.96
<i>11.8 District Forest Managers</i>	\$23,328.00	23,320.04	7.96
Component Total	\$116,640.00	116,600.22	39.78
13 Other Labour	\$15,700.00	15,676.01	23.99
20 Sub- Contracts			0.00
Component Total	0.00	0.00	0.00
30. Duty Travel			0.00
31.Daily Subsistance Allowance			
<i>31.1Ag. Director- Drying Expect</i>	\$3,750.00	3,750.00	0.00
<i>31.2 Forest Ecologist</i>	\$3,750.00	3,750.00	0.00
<i>31.3 Wood Technologist</i>	\$3,750.00	3,750.00	0.00
<i>31.4 Economist</i>	\$3,750.00	3,750.00	0.00
<i>31.5 Wood Quarlity Expert</i>	\$3,750.00	3,750.00	0.00
<i>31.6 Mensuration Expert</i>	\$3,750.00	3,750.00	0.00
<i>31.7 Community Laision Expert</i>	\$7,500.00	7,500.00	0.00
<i>31.8 District Forest Managers (3)</i>	\$7,500.00	7,500.00	0.00
Component Total	\$37,500.00	37,500.00	0.00
32.International and Regional Travel	\$3,500.00	3,500.00	0.00

33. Transport Cost			
<i>33.1 Ag. Director- Dying Expect,</i>	\$4,650.00	4,600.00	50.00
<i>33.2 Forest Ecologist,</i>	\$4,650.00	5,460.30	-810.30
<i>33.3 Wood Technologist,</i>	\$4,650.00	3,680.50	969.50
<i>33.4 Economist</i>	\$4,650.00	5,487.34	-837.34
<i>33.5 Wood Quality Expert</i>	\$4,650.00	4,643.00	7.00
<i>33.6 Mensuration Expert</i>	\$4,650.00	5,371.64	-721.64
<i>33.7 Community Liaison Expert</i>	\$9,300.00	9,153.63	146.37
<i>33.8 District Forest Managers (3)</i>	\$9,300.00	9,153.63	146.37
Component Total	\$46,500.00	47,550.05	-1,050.05
40 Capital Items			0.00
<i>41. Premises</i>			0.00
<i>42. Land</i>			0.00
<i>43. Vehicles</i>	\$40,000.00	24,928.00	15,072.00
<i>44. Capital Equipments</i>	\$39,200.00	24,236.87	14,963.13
Component Total	\$79,200.00	49,164.87	30,035.13
50. Consumable Items			
<i>51. Raw materials</i>	\$23,300.00	47,502.80	-24,202.80
<i>52. Spares</i>			0.00
<i>53. Fuel and Utilities</i>	\$25,300.00	28,024.10	-2,724.10
<i>54. Office Supplies</i>	\$8,000.00	7,996.20	3.80
<i>55. Publication and education</i>	\$11,430.00	6,116.13	5,313.87
Component Total	\$68,030.00	89,639.23	-21,609.23
60. Miscellaneous			
<i>61. Sundry</i>	\$13,700.00	13,662.62	37.38
<i>62. Auditing</i>			0.00
<i>63. Steering Committee</i>	\$4,000.00	4,000.00	0.00
<i>64. Contingencies</i>	\$5,000.00		5,000.00
Component Total:	\$22,700.00	17,662.62	5,037.38
Total Expenditures To-date (B):	389,770.00	377,293.00	
Remaining Balance of Funds (A-B):			12,477.00

Table 3: Input Applied, Government of Ghana

4.3.2 Inputs Applied, Government of Ghana (USD)

COMPONENTS	G.O.G	Up-to-date	Remaining
	Budget (\$)	Budget (\$)	Budget (\$)
A	B	C	D
10. PROJECT PERSONNEL			
11. National Expert	5,500.00	5,500.00	0.00
13. Other labour			0.00
19. Total Component	5,500.00	5,500.00	0.00
30. DUTY TRAVEL			
33. Transport Cost	5,800.00	5,800.00	0.00
39. Total Component	5,800.00	5,800.00	0.00
40. CAPITAL ITEMS			
41.Premises	11,300.00	11,300.00	0.00
42.Land			0.00
49. Total Component	11,300.00	11,300.00	0.00
50. CONSUMABLE ITEMS			
54. Office Supplies	400.00	400.00	0.00
59. Component total	400.00	400.00	0.00
60. Miscellaneous	600.00		
70. IMPLEMENTING AG. Mgt cost	41,337.00	41,337.00	0.00
Total GOG Cost	64,337.00	64,337.00	0.00

Annex 2: Project cash flow statements

Table 4: Project Cash Flow Statement

Project No. PD 431/06 Rev.1 (1)

Period ending on:31 January 2011

Project Title: Processing and utilization of trees on farm lands and logging residues etc.

Component	Reference	Date	Amount	
			in US\$	Local Currency ¢
A. Funds received from ITTO:				
1. First instalment		Apr-07	\$70,000.00	71,400.00
2. Second Instalment		Aug-07	\$70,000.00	71,400.00
3. Third instalment		May-08	\$80,000.00	81,600.00
4. Fourth instalment		May-09	\$80,000.00	81,600.00
5. Fifth instalment		Mar-10	\$50,000.00	70,000.00
6 Sixth Instalment			\$34,770.00	48,000.00
Total Funds Received (A):			384,770.00	424,000.00
B. Expenditures by Executing Agency:				
10. Project Personnel				
11. National Experts				
11.1 Project Director FORIG			11,660.02	12,476.22
11.2 Forest Ecologist			11,660.02	12,476.22
11.3 Wood Technologist			11,660.02	12,476.22
11.4 Economist			11,660.02	12,476.22
11.5 Wood Quarlity Expert			11,660.02	12,476.22
11.6 Mensuration Expert			11,660.02	12,476.22
11.7 Community Laision Expert			23,320.04	24,952.44
11.8 District Forest Managers			23,320.04	24,952.44
Component Total			116,600.22	124,762.20
13 Other Labour				
			15,676.01	17,400.37
20 Sub- Contracts				
Component Total			0.00	

30. Duty Travel			
31. Daily Subsistence Allowance			
31.1 Ag. Director- Drying Expert		3,750.00	4,162.50
31.2 Forest Ecologist		3,750.00	4,162.50
31.3 Wood Technologist		3,750.00	4,162.50
31.4 Economist		3,750.00	4,162.50
31.5 Wood Quality Expert		3,750.00	4,162.50
31.6 Mensuration Expert		3,750.00	4,162.50
31.7 Community Laision Expert		7,500.00	8,325.00
31.8 District Forest Managers (3)		7,500.00	8,325.00
Component Total		37,500.00	41,625.00
32. International and Regional Travel		3,500.00	4,200.00
33. Transport Cost			
33.1 Ag. Director- Drying Expert,		4,600.00	5,106.00
33.2 Forest Ecologist,		5,460.30	6,060.94
33.3 Wood Technologist,		3,680.50	4,085.36
33.4 Economist		5,487.34	6,090.95
33.5 Wood Quality Expert		4,643.00	5,153.73
33.6 Mensuration Expert		5,371.64	5,962.52
33.7 Community Laision Expert		9,153.63	10,160.53
33.8 District Forest Managers (3)		9,153.63	10,160.53
Component Total		47,550.05	52,780.56
40 Capital Items			
41. Premises			
42. Land			
43. Vehicles		24,928.00	26,672.96
44. Capital Equipments		24,236.87	28,731.82
Component Total		49,164.87	55,404.78
50. Consumable Items			
51. Raw materials		47,502.80	52,728.11
52. Spares			0.00
53. Fuel and Utilities		28,024.10	31,106.75
54. Office Supplies		7,996.20	8,875.78
55. Publication and education		6,116.13	6,544.26
Component Total		89,639.23	99,254.90

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-	60. Miscellaneous			
-	61. Sundry		13,662.62	15,165.51
-	62. Auditing			0.00
-	63. Steering Committee		4,000.00	4,400.00
-	64. Contingencies			0.00
-	Component Total:		17,662.62	19,565.51
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-	Total Expenditures To-date (B):		377,293.00	414,993.32
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-	Remaining Balance of Funds (A-B):		7,477.00	9,006.68

