Field Report Shea Pilot Project – North Kintampo District

Advancing REDD+ in Ghana: Preparation of REDD+ Pilot Schemes in off-Reserve Forests and Agroforests (REDDES)

Luca Heeb, 3rd October 2013

1. Introduction

Embedded in HAFL's mandate for the REDDES Project, I carried out the data collection for my Master Thesis *(Working Title: Shea Nut Production Enhancement in the Brong Ahafo Region – a viable off-Reserve REDD+ Strategy?)*; data which are meant to be used both as basis for the Thesis and as foundation for the design of an off-reserve REDD+ pilot scheme in the Brong Ahafor Region, more precisely in the North Kintampo District. The underlying hypothesis of the field assignment was that "shea nut production enhancement, if supported by a tailor made REDD+ compensation scheme, is possible, and has the potential to sustainably increase peoples income and reduce net GHG emissions from A&F practices". The frame of the research and the geographical location was partially given by the fact that the Forestry Commission, in the frame of Ghana's REDD+ readiness preparation process, previously selected 7 pilot projects for the preparation of a first REDD+ compensation mechanism. Victoris Ltd. submitted a project proposal which was carefully analyzed and later accepted as a valuable pilot. The Nkoranzaman REDD+ Project, which goal is the protection of remaining forests and open woodlands and the development of alternative, climate friendly, agroforestry systems foresees the promotion of sustainable shea nut collection. Although the impact on forest degradation of sustainable NTFP collection is not negligible, it was agreed that the study should put the focus on restoration of lost C-stocks and the creation of new C-sinks in open woodlands of the Brong Ahafo Region. The constellation of having an off-reserve REDD+ strategy, a high market potential of locally processed shea butter, and a functional shea butter processing unit was considered to be an ideal starting point for carry out this "feasibility study".
Although the detailed targets, as formulated in the ToRs slightly changed once the situation on place was explored, they can still be summarized in the following categories:

(i) Household level: Identify and describe the main farming system in the study region and to which extend these contribute to livelihood security; conduct an rapid livelihood assessment in order to describe rural households coping strategies, access to assets (land, capital, labour), etc.
(ii) Landscape Level: Identify the main Land use systems and describe them with a main focus on carbon stocks and stock changes
(iii) On implementation level: Development of recommendations for benefit-sharing options (done by/in collaboration with Maria Klossner's assignment).

The findings are meant to serve as a basis to see whether possible and what consequences a REDD+ scheme can have on household level and what changes in the farming system and on landscape management this implies. Since the increase of C-stocks with shea trees foresees a transition in the farming system, the study was carried out from three many perspectives, name-

ly: technical feasibility, economical profitability, and social responsibility. The study therefore tries to see off-reserve REDD+ with an integrated and holistic approach.

2. Methodology

Nine households with different landholding sizes were selected in four villages in the North Kintampo District. For each household socio-economic data on household size, structure, income sources from annual and perennial crops, and off-farm income were collected. In addition, GM calculation were carried out for the main annual crops (yam, maize, cassava, groundnuts), for the perennial crop shea, and for livestock (cattle and goats). On landscape level, beside GPS measurements of field farm sizes, AGB-assessments were carried out from the different types of agroforestry systems in the different years after conversion from secondary forest to cropland. AGB-assessments were also carried out on secondary forest in different time slots (4 time slots were defined based on the age of the secondary forest: <5y; 5-10y; 10-15y: 15+). The benefit sharing team, beside GM-calculation carried out FGD with shea nut collector groups and hold different expert meetings with relevant stakeholders which could play a role in a future benefit-sharing mechanism of such an off-reserve REDD+ scheme.

3. Preliminary Results

3.1 Description of Households and Farming System

The selected households, with total landholding sizes (annual crop, fallow, and unproductive land) ranging from 9.9 ha up to 37.6 ha, have an average of 27.9% of their land under annual cropping, 60.1% is let on fallow, and 12.0% was defined as other land use[1] (Figure 1). Annual cropland mainly refers to yam, cassava, groundnuts and maize. The farming system is relatively homogeneous, and characterized by a rotational farming system approach. The fallow land, which is converted to annual cropland after a period of 10-20 years, is used for cultivation of yam in the first cropping season. Cassava is grown as a relay intercrop and harvested in the second year after conversion. Each farmer has therefore a yam/cassava intercrop field and a cassava sole crop field. In the third and often last year of cropping, either maize or groundnuts, or maize groundnut intercrop, are grown. After that period the fields are left on fallow again. This farming systems

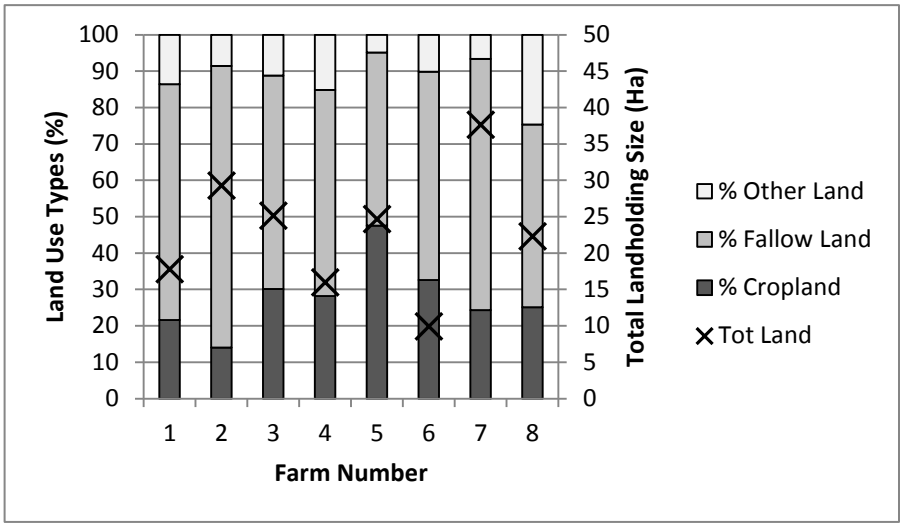

Figure 1 Distribution of Land Use Type (annual cropland, fallow land, other land) in % and total landholding size in ha of selected households in the North Kintampo District. Kumasi, Ghana, 30.07.2013

[1] Other land uses refers mainly to either permanent grassland or unproductive land. If applicable, plantations were also considered in this group.

leads to a rather extensive and land consuming farming system; however, due to the absence of improved nutrient management practices such as the use of fertilizers, improved fallows with N-fixing plants, use of in-situ biomass for soil improvement, etc. a rotational farming system is the only solution against nutrient depletion in those tropical soils. Tendencies show that large farms have a longer rotational pattern, i.e. annual cropland is proportionally smaller to the total landholding size. Land availability seems therefore not to be the limiting factor, but more land productivity. Figure 2 tries to explain the income composition of the household derived from agriculture, forestry, and other land use (AFOLU). Beside the off-farm income, which contributes between 1.2% and 40.3% to the total household income, the main income source of these households are the annual crops with GM/ha ranging from 100 USD/ha/year up to 600 USD/ha/year. Interesting to see is that farms with big landholding sizes tend to have higher GM[2]/land unit what can have several reasons such as less pressure on land or use of improved management technologies. More astonishing is the gross profit of the part forestry and other land use (FOLU[3]), which is contributing to household gross income[4] between 1% and 10%, and has a GM/ha far lower than for annual crops. These data show that even though the fallow land (resp. secondary forest) occupies most of land of the landholdings, the income out of it is still relatively low, but the implication, affected by the rotational farming system, remarkable in terms of a tree poor landscape. Disaggregating further the FOLU gross profit, it can be observed, that the selling of either dried shea nuts or homescale processed shea nut products contribute between 100 USD and 400 USD to the total gross profit FOLU[5], and is therefore the most important contributor with an average of 200.1 USD/year followed by fuelwood (169 USD/year) and charcoal (166.5 USD/year). Shea plays therefore a major role in the household income and given the fact the it has the potential to increase the value of the fallow land, which is occupying roughly 2/3 of the whole landholding size, the potential to sustainably increase people's livelihoods when boosting shea nut production is considerable.

[2] Gross Profit Agriculture refers to cumulate GM of the annual crops, determined by the revenue on sales of the crops

[3] Gross Profit FOLU refers to cumulated GM of activities on the fallow and agroforestry land, namely shea nuts, charcoal, firewood, NTFPs, bush meat, etc.

[4] Please consider than when talking about household as such, the whole household is considered. If the income should be gender disaggregated (considering intra-household distribution of the money), the contribution of the respective shea income to the women's income would be far higher)

[5] Taking the Average FOLU income, shea contributes with 22.7%, followed by fuelwood with 24.7%. If looking the contribution to AFOLU income, shea contributes with 1.3%, followed by fuelwood with 1.2%.

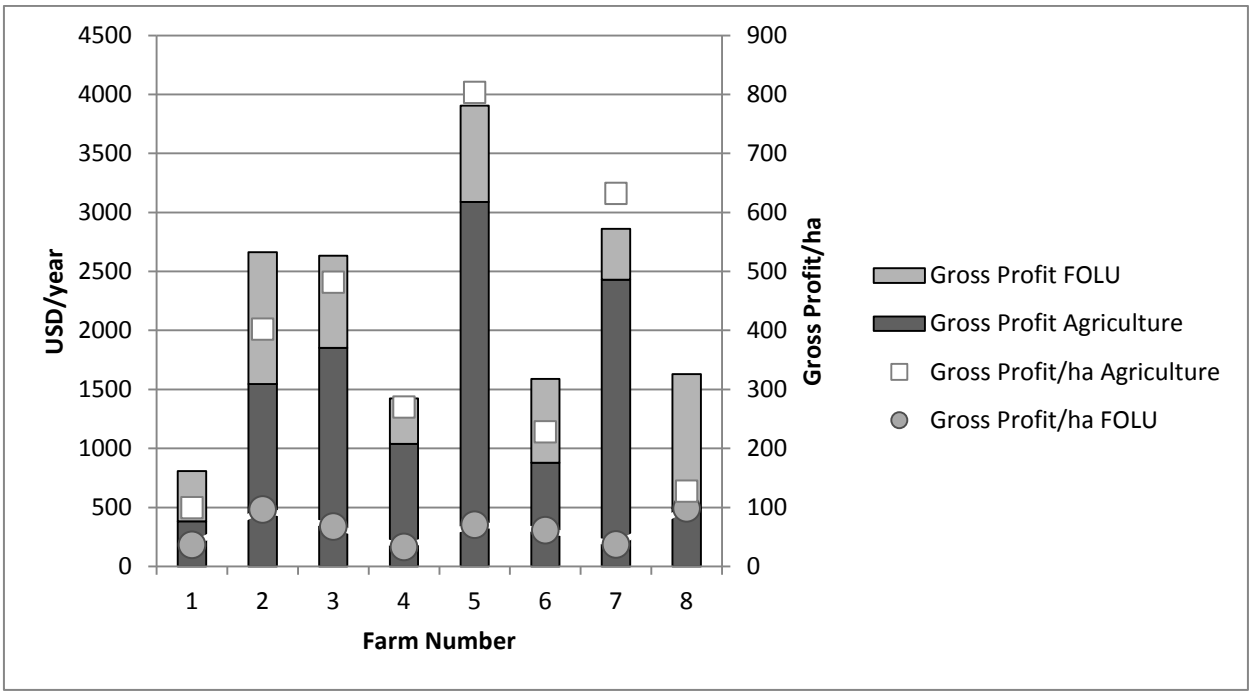

Figure 2 Gross profit from agriculture (annual crops) and from forestry and other land use (FOLU, e.g. shea nut collection, charcoal, bush meat, NTFP, etc) in USD/year and gross profit for the same categories per unit of land (ha) for selected households in the North Kintampo District, Kumasi, Ghana, 02.08.2013

If looking at the GM calculation in detail, first results show than the variability within annual crops and within shea is relatively high. For shea, the main factor affecting the high variability is the farmgate price, which for a standard bag of 85kg is highly variable, depending on the timing when it is sold, roughly between 20 and 60 USD for dried nuts. The reasons for the variability of the GMs for annual crops are more complicate and depend upon many factors (e.g. use of machinery, use inputs, seed quality, distance field to market, etc). The most profitable seems yam, with an average GM/ha of around 104 USD/ha, followed by cassava (80 USD), maize (60 USD) and groundnuts (45 USD). According to the data collected, the GM of shea (expressed in GM/tree) is for processed shea nuts (usually in pomade and/or soap) with 4 USD little higher than for non-processed nuts (3 USD), but variability is extremely high from year to year, since yield fluctuation is considerably. Nevertheless, considering that real opportunity costs for women labor are marginal due to lack of alternatives[6] and shea trees in agroforestry systems do not compete with the main crop[7], theoretically the GM shea can be added to the GM crop, if an intensive shea-annual crop agroforestry system is put in place. Taking average numbers, the GM/agroforestry could be increased, in the case of yam-shea from 104 USD to 134 USD/ha[8].

[6] Alternative income sources for women can be the collection of firewood, vegetables, and partially charcoal

[7] As a rule of thumb between 15-20 shea trees/ha on annual cropland and 50-60 shea trees/ha on grassland could be possible according to literature.

[8] With the following assumptions: average yam GM of 104 USD/ha, labour costs yam 4 USD/day, labour costs shea marginal, planting density 10 shea trees/ha, shea sold with a farmgate price of 55 USD/bag (non processed, i.e. boiled and sun-dried)

3.2 Carbon Assessment:

The carbon assessment shows that there is a strong link between farming system and C-stocks and changes in C-stocks. Table 1 shows that C stock on the analyzed farm ranges between 7.7 t/ha and 26.4 t/ha. The highest C stock was found on the land plot which is foreseen to be converted into annual cropland in the following cropping year and the lowest C-stock where the farmers is cropping in the third, and most probably last, cropping year, before the fallow period.

Table 1 Carbon assessment of one household indicating AGB (t/ha and t/farm), C-stock (t/ha and t/farm), and the contribution of Vitellaria Paradoxa (Shea Tree) to these stocks of different annual fields (in year 1, 2, and 3 after conversion from secondary forest to cropland), and for fallow land in the 10th year of fallow. The numbers with asterisks indicate that data are not yet verified by the author. North Kintampo District, Ghana, 02.08.2013.

Land Type/year of cropping	AGB t/ha	AGB t/farm	C-Stock t/Ha	C-Stock t/farm	% Shea Tree
Field 1 (y3)	16.4	13.5	7.7	6.3	52.3
Field 2 (y1)	16.4	52.9	15.8		
Field 3 (y2)			10.5*	24.9	52.4
Field 4 (y3)			7.7*		
Conversion Land (y10)	56.2	681.2	26.4	320.1	31.9
Total		746.6		350.8	33.8

This change in C-stocks is obvious if considering that in the first cropping year (Yam) the removal of trees (either for charcoaling, firewood, timber) starts, but since young trees are ideal for yam growing and machinery in yam cultivation cannot be applied, the disturbance to the annual crop is little. In the second (cassava), and especially in the third (maize/groundnuts) cropping year, more and more trees are removed, what obviously decreases C-stocks drastically (in this case from 26.4 t/ha, to 15.8 t/ha, to 10.5 t/ha, to 7.7 t/ha). The data also show that at least in this case, shea tree already plays an important role since contributing between 31.9% and 52.3% to the total C-stock on farmland. Based on observation, it can be said, that the contribution of shea is in many farms, which will be analyzed later, far lower than in the case shown in Table 1, ranging from almost 0% to an estimated average of 10-15%.

4. Consideration for further Proceeding

4.1 Starting Point

Summarizing the chapters above, following statements can help as a starting point for an off-reserve REDD+ strategy with enhancement of C-stocks with shea tree as central element:

(i) Rotational farming system is characterized by low productivity per unit of land and therefore land consuming and high CO_2-emitting due to land use change activities.

(ii) Partially unproductive land (fallow of annual crops) is contributing little to livelihoods security, since extracted value (in terms of NTFP, charcoal, fuel wood, etc) is low per unit of land

(iii) The contribution of shea to AFOLU income is relatively low, much higher is the contribution to FOLU income and extremely if considering women labour only.

(iv) Both GM/ha and C-stocks can be increased with a semi-intensive shea agroforestry system without compromising annual crop yield.

(v) Alternatives to an improved agroforestry system, e.g. with community shea plantation (same approach as for woodlots) is a valuable option and from a land, tree, and carbon tenure perspective easier[9] to implement

4.2 Fundamental Points to Consider in the Proposal

(i) Land and tree tenure issue have to be considered as a cornerstone which has a can be tackled in an early implementation stage. Carbon rights are more complex to address since ownership is not yet clearly defined by Ghanaian law. In order to incentivize participation, a pilot based tree tenure agreement on shea tree could be a first step to undertake.

Remember: Article 257 (1) and (2) of the 1992 Constitution vests all public lands in the President on behalf of, and in trust of the nation. Between State managed forests and off-reserve forests there are fundamental differences. Even if the allodial title to the forest land is hold by the respective stool, the rights to the forest resources are vested in the State. In off-reserve, rights, interests and entitlements of both land and trees (except for commercial right on trees) are founded on the customary system of land tenure administration, i.e. beside from commercial right on trees, which are held by the central State, all other right and interest are held by the landowner (stool, families or communities. Like other African countries, Ghana vests the right to natural resources in the State irrespectively whether it's on private or public land. I.e. naturally occurring trees belong to the State and it remains a statutory offence to harvest in both reserve and off-reserve without the consent of the State. Planted trees, on the other hand, belong to private what should encourage A&R. In the case of carbon, if carbon would be decoupled from the tree and considered as a natural resource as such, the State would vest the right on it. If carbon would be considered the ecosystem service provided by the trees, the right of the benefits would be to the owner of the tree.

(ii) Shea tree is a slow growing tree (gestation period 12-15 years) what hinders most farmers to actively intervene in enhancement of shea population. The inclusion of domesticated varieties (either from Cocoa Research Institute or form University for Development Studies) are a central success factor, since reduced gestation period, yield stability, disease tolerance, incentivizes farmers participation.

The project could assist target communities with following technical support in the frame of domestication activities: a. Transplanting of young seedling; b. direct seed-

[9] For shea collectors opinion in regard to this two possibilities (agroforestry vs. shea plantation) look results of FGD in benefit sharing report

ing; c. grafting and practices of assisted natural regeneration; d. sanitary and rejuvenation cutting (according to Shisun Project 2012, Helvetas Swiss Intercooperation, Mali)

(iii) Know-how of rural communities on both nursing and managing new shea generations is non-existent. Strong technical support is essential over a medium-term[10]. In a next stage, a training-of-trainer approach could be a possible solution for upscaling.

(iv) Institutionalization of shea collector group and integration of it in village committees can help to protect shea resources and start dialog between women's and men's, local authorities, land owners, FSD, etc.

(v) Further strengthen market linkages between shea nut buyer(s) and shea nut collector in order to reduce transaction costs and create price transparency.

4.3 Possible Project Stakeholders

The shea tree can grow between roughly 400 and 1200mm rainfall, and it's found as natural regenerating tree in most parts of the transitional, and in all part of the savannah zone of Ghana. The predominance of shea in the landscape mosaic of Ghana increases the more north we go; the North Kintampo District is located on the southern edge of the area where shea still has a socio-economic importance for rural livelihoods. The advantages of the region are especially the fact that water availability for nursing is more secure than in the north and livestock pressure is far lower than in north, where livestock keeping is the predominant activity or the rural population. In terms of growing condition, pro-poor orientation or other framework condition, the North Kintampo District does not have disadvantages than regions from the North. One constraint could be that both institutions (e.g. Savannah Accelerated Development Authority, University for Development Studies, Cocoa Research Institute, etc.) and resource persons dealing with enhancement of shea nut production are more concentrated in the northern and upper region.
For an off-reserve REDD+ project dealing with C restoration with shea and including non-carbon benefits such as livelihood improvement, biodiversity conservation, etc following stakeholders were identified and interviewed:

Table 2 List of possible stakeholders of a shea pilot project in the North Kintampo District with its contact persons and their capacities and incentives based on subjective evaluation of the author (random order).

Stakeholder	Role, Capacities, Incentives	Contact Person
Victoris Ltd.	Main implementer of the project with RIDE as either partner or sub-contractor of the planned activities. Capacities are unknown. Plays a crucial role in marketing activities of shea butter processed by The Pure Company	Project Initiator: John Addaquay; 024 436 04 57; johnaddaquay@gmail.com
Shea Collector	Beneficiaries and targets of the project activities.	Contact Person: Rose

[10] GIZ has provided nursed shea trees to some communities but due to lack of follow up support, the survival rate was extremely low.

	Incentives high, capacities low. High lack in technical knowhow in regard to CSA activities. Incentive exists also without direct financial support via C-payments.	Amoyav; 024 481 66 44; amoya-wrose@yahoo.com
The Pure Company	Key link between shea nut collector/producer and market. Capacities are especially in shea nut processing, not in marketing or effective supply chain management. Incentive to increase production since degree of capacity utilization is as at 50%, and company runs on a demand based mode.	Shareholder: John Addaquay; 024 436 04 57; johnaddaquay@gmail.com
RIDE (Rural Intervention for Development and Employment)	High incentive for act in a new project and stakeholder with the highest capacities in the shea domain on household level. Strong link to shea collector and well established in the region (trustful relationship to farmer). Limited in human resources (1 director, 2 field workers). Capacities lie especially in the domain of organization of communities, shea nut storage and household processing; establishment of price agreements between communities and buyers (mediator).	Director: Rose Amoyav; 024 481 66 44; amoya-wrose@yahoo.com
FORIG and KNUST	High capacities of both local framework conditions (e.g. in respect to land, tree tenure, etc) for a successful implantation of a pilot, and expertise in various fields related to successful management of forests and agroforests.	Director: Victor Agyeman; 024 484 41 71 agyeman-victor@yahoo.com
Cocoa Research Institute (CRIG)	Expertise in the domain of domesticated shea varieties (have distributed thousands to farmers in Tamale) and pest and disease control. Would like to include Cashew in the activity, since they have good planting material. Have several shea fields in the research station in Bole	Senior Research Scientist: Dr. E. Agayemang Dwomoh; 024 457 45 34; aedwomoh@gmail.com
University for Development Studies (UDS)	High incentives and capacities to act in the function of technical expertise for establishment of community nurseries, improved agroforestry systems with shea, or community plantations. High capacities in shea domestication since partner of the biggest shea domestication project (http://inco-innovkar.cirad.fr/), over 60 publications available.	Dean Faculty for Agriculture, Ghana Inst. Of Horticulturalist: Dr. George Nyarko; 024 460 18 92; gnyarko@uds.edu.gh
Forest Service Division Kintampo	Key partner when dealing with tree tenure in A&R activities. Incentive to promote tree dense landscape and capacities in establishment of plantations. Beside teak, mango, and cashew,	Director FSD Kintampo: Mr. Opuku: 024 404 36 57

	they would like to expand also in shea.	
MoFA Kintampo	Not dealing with shea in particular yet but has an incentive to sustainably increase production of staple and cash crops in the region and sees shea as a valuable option.	General Director: to find
Taimako Plants Research Center/Nursery	Capacities in nursing and establishment of nurseries. Know about the difficulties of nursing shea seedlings and have already distributed shea seedlings via GIZ to local communities.	General Director: 024 614 85 74
Helvetas Swiss Intercooperation	HSI Mali has implemented a comprehensive shea project (Shisun Project), including domestication, production, marketing, community organization and can be a valuable exchange partner.	Country Director: pierre-yves.suter@helvetas.org Shea specialist Mali: Rosalie Dacko; Rosaline.Dacko@helvetas.org

5. Possible Results

The presented outputs and outcomes are not meant to be comprehensive; they should rather be a basis for the next planning step of the pilot project. The *overall goal of climate mitigation, adaptation, and better livelihoods* will be achieved through these interventions. A result chain will not be done in this paper but must be integrated in the next planning process.

Table 3 First draft of possible outcomes and outputs of a off-reserve REDD+ shea project in the North Kintampo District.

Outcome	Output
Outcome 1: Climate Smart farming practices are in place, i.e. carbon stocks increased, emission reduced, current shea population preserved	Output 1.1 Men's and women's start a dialog on how to manage improved agoforestry systems with shea tree as main perennial crop
	Output 2.2 Farmers are aware that he value of crop and fallow land can be increased, if the climate smart farming practices promoted are implemented
	Output 3.3 Demo plot are in established and upscaled on district level
	Output 3.4 …
Outcome 2: Shea population has increased, i.e. carbon stock increased and contribution to livelihood substantially improved, especially for women shea collector	Output 2.1 Female farmer have received the necessary technical knowhow along with tools, equipment, and all necessary support to establish either mini-plantation, improved agro forestry systems, or similar.
	Output 2.2 Female farmer have secured access to land and land right as well as rights over the trees
	Output 2.3 Capacities of female framers (farmer groups) to engage with local self government has been strengthened
	Output 2.4 …
Outcome 3: Alternative livelih-	Output 3.1 Charcoal producer are assisted in participatory

ood activities are promoted in order to preserve the woodland	or community based management activities, establishment of woodlots or charcoal plantations, and sustainable charcoal production activities (e.g. improved kilns) and e.g. trade (market regulation activities)
	Output 3.2 Value of fallow land is further increase with beekeeping activities to have a short term income effect and hinder farmer to clear fallow with bush fires.
	Output 3.3 …
Outcome 4: Market access and term of trade are more advantageous for female shea nut collector	Output 4.1 Improved linkages between shea nut buyers and female collector are in place and transaction cots reduced
	Output 4.2 Collector groups have improved their management and governance practices
	Output 4.3 Capacities of shea nut collector groups to advocate for promotion of a public-private dialogue in support of better market access and terms of trade are improved
	Output 4.4 Capacities of local self Government to contribute efficiently to the promotion of a public-private dialogue in support of a better market access and terms of trade are improved (e.g. formation of “cooperatives”)
	Output 4.5 …

As shown in Table 3, the pilot project should not focus only on promotion of shea tree but try to consider the farming system as a whole. Important is to not neglect the importance of other trees on the landscape with it values. The Taimako Plants Research Center (Table 2) is an ideal partner and knowledgeable about many local trees and their potential (e.g. Moringa, Acacia Senegal, etc) integration in a shea enhancement project. Important is also to consider that pressure on woodlands not only comes from farmers which are already collecting shea nuts but many others such as fulani herders, charcoaling tribes, bush meat hunters, are part of the complex land use system and dependent on its resources.