

Report on Financial Viability and Benefit Sharing Options of the Bedum and Nkoranzaman REDD+ Pilot Projects

“Advancing REDD+ in Ghana: Preparation of REDD+ Pilot schemes in Off-Reserve Forests and Agroforests (REDDES)”

In the framework of a 6 weeks internship two independent studies were conducted on two REDD+ pilots with a focus on their financial viability for farmers and possible effects on benefits sharing systems. The report is written in two independent parts regarding the two projects. The reports are written as internal papers to support the project planning process done by HAFL.

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Bedum REDD+ Project (Enhancing REDD+ trough providing farmer alternatives for production)

1 Introduction

The present study takes a closer look to one of the seven pilots which Ghana has selected in the frame of its REDD+ readiness preparation process. The pilot is based in Bedum, under the Breaman-Asikuma-Odben-Brakwa District. The pilot project focus lies in the domain of essential oils production backed by an out-grower scheme. The enhancement of the growth of Ylang-Ylang and different woody and non-woody crops are proposed as an alternative to the common agricultural plantation such as cocoa, rubber, oil palm, and citrus. The study’s aim is to contribute with technical know-how to the SECO co-founded REDDES Project (Reducing Deforestation and Forest Degradation and Enhancing Environmental Services in Tropical Forests), partially implemented by HAFL in collaboration with FORIG (Forestry Research Institute).

The main activity of rural households in the target district is farming (71% of total population). Out of the total land area of 884.84 km², 575.15 km² is agricultural land. The farmers cultivate both staple food crops such as maize, cassava, plantain, and cocoyam and cash crops such as oil palm, cocoa, citrus, and rubber. The land for farming activities can be acquired and owned by family heads or individuals. Often the

land is leased to tenants for a finite period of time defined by the land owner. The main land tenure systems are share cropping (Abusa/Abunu) or leasehold. The leasehold type, which foresees the renting of the land for a specific time for a agreed rent is becoming predominant. Most tenants would prefer the outright purchase of the land from the landlord but this is often not possible. The products are marketed via middlemen to both local and regional markets. For export markets, Accra absorbs most of the market share. Some of the products such as maize and plantain are directly sold. Grain products are stored in cribs or bans or processed into gari, palm oil, palm kernel oil and other using labour intensive technologies (MOFA 2013).

Green Dearms Ltd., a company set up by Mr. Wellington Baiden and Co, was established seven years ago under consideration of future carbon payments. The REDD+ pilot project consists of nine main components of which three are considered in the present study. These are the production of Ylang Ylang (*Cananga odorata*), Cedrela (*cedrela odorata*), Glyrisidia and black pepper.

The company's philosophy of conserving forest resources and improving the socio-economic level of forest dependent communities should be implemented with a forest management plan that calls for the introduction of agro-based income-generating activities to substantially decrease poverty among the forest communities and serve as incentive for the communities' participation in the company's reforestation and conservation programs.

The expected outputs of the project are:

- Establishment of out-grower schemes to cultivate essential oil crops
- Installation of distillation and processing equipment
- Development of a community-based reforestation plan
- Establishment of community reforestation committees
- Capacity building and training for the farmers in the local communities
- Marketing arrangements with European and North American buyers

The present study has its focus in the first component on an economic analysis of the current farming systems (refers to the “business as usual” scenario) in comparison to the proposed alternatives (“with project” scenario), to see if the alternatives proposed by the REDD+ pilot project are a viable option for local out-growers. The second component focuses on roles, rights, and responsibilities of the main actors and stakeholders at different levels (i.e. farmers, communities, regional authorities, private companies). This part should help to understand which parties will play a role in a future benefit sharing mechanism.

2 Material and Methods

2.1 Financial Viability of Business as Usual and of the Proposed Alternatives

The business as usual (BAU) refers to the currently cultivated cash crops, namely citrus, cocoa, oil palm, and rubber. The financial viability of those was analyzed through topic guided interviews with 6 farmers in 3 villages (Bedum, Jamra, Asikuma) and additionally discussed with the district staff of the Ministry of Food and Agriculture office . Additionally, the CSSVD-CU office (Cocoa Swollen Shoot Virus Disease – Control Unit) in Asikuma and the rubber association at Assin Fosu was contacted to complete and triangulate the information from the farmers. Out of the collected data, cost and benefit for each plantation were determined in discussion with experts. For the alternatives (“with project”) an economical cost-benefit analysis for three different plantations was calculated in discussion with Mr. Wellington and his farm manager. The externalities (positive and negative) were not considered in the cost-benefit analysis due to time limitation, but will be considered qualitatively in order to support a future, more comprehensive cost benefit study on the pilot project. In addition to all monetary costs, own labour is also considered in the analysis. The climate mitigation impact of the REDD+ pilot project will be considered in another study of the REDDES Project.

2.2 Calculation for Comparison

Due to limited data availability and for simplification of the calculations the following assumptions were taken:

- (1) Cost of establishment of the plantation: For all plantations the same establishment cost were taken, except the costs for planting material.
- (2) For the BAU scenario the same cost and benefit for annual crops (food crops) were taken. However not all plantations are suitable the same amount of food crops. To remember is that over the whole life span of a plantation, food crops play a minor role from a profitability perspective (not from a food security perspective).
- (3) Only the most profitable BAU is compared with the proposed alternatives.
- (4) For the proposed alternatives, the cost and benefits of the food and non-food crops grown in intercrop with the main crop were standardized.

2.3 Stakeholder Identification and Interest Grid

For the identification of the stakeholders, the main stakeholders were selected with the support of the Forestry Commission of the district and preliminary discussions with FORIG experts. Later on the responsible from the identified offices were consulted for their ideas and visions for the district.

3 Results

3.1 Financial Viability of Business as Usual

The decision making for the farmers on which type of plantation to establish (cocoa, citrus, rubber, oil-palm) strongly depends on the wishes of the land owner and the current trend. It was not possible to identify for each plantation type an owner and a share croppers as some of the systems are more eligible for share croppers and other more for land owners. In the following sub-chapters the financial viability of the different types of common plantation like citrus, cocoa, oil palm and rubber (BAU) will be compared to the alternatives proposed by the Wellington Baiden's project. In addition, the farmers perception towards these alternatives will be explained and discussed.

3.1.1 Clearing Cost for a Plantation on Secondary Forest

For the clearing and the land preparation costs of the plantation the same cost have been taken for all the plantations. Even if the costs for the farmers where differing quite a lot as labour cost varies a lot from year to year because of inflation, but as well because of different labour rates between the villages. The clearing and felling depends significantly on the density of the secondary forest. In general, an assumption of 10 GHS (4.5 USD) per labour per day was taken.

Table 1: Costs for clearing and preparing the plots of one acre of secondary forest for the establishment of a plantation (Bedum Breman-Asikuma- Odoben- Brakwa District; personal communication with 6 farmers and MOFA , Asikuma August 2013)

Labour costs	Citrus		Cocoa/oil palm		Oil palm	Rubber		Alternatives	"Best guesses" MOFA
	1 Asik	2 Bedum	3 Bedum	4 Jamra	4 Jamra	5 Asik	6 Be		
								Wellington	
Clearing	35	50	100	90	90	ukw. ¹	ukw.	150	60
Felling	left all the trees	12	10	10	10	ukw.	ukw.	55	10
Burning	No	10	10	10	10	ukw.	ukw.	No	10
Pegging and lining	20	25	10	25	25	20	ukw.	25	25
Soil preparation	50	48	60	60	60	35	ukw	40	40
Planting	40	20	10	25	25	ukw.	ukw.	80	80
Total Cedis	147.5	169	180	200	200	ukw.	ukw.	350	165

¹ ukw (unknown) both rubber plantations where established after a oil palm plantation, the farmer did not know the costs

For the rubber plantations the main information had to be collected in discussion with the rubber association (See Chapter 3.1.1). In the preparation steps for the establishment of the plantation only one of the farmer significantly differed from the others as he did not practiced felling of trees and he did mulching instead of burning the residues. Wellington and the 1st citrus farmer differ from the others as they did not practice burning but left the organic matter on the field. This decreased the costs for weeding as the pressure of weeds is lower.

As shown in Table 1, the total establishment costs of 1 acre of the “best guesses” reaches 165 GHS (74.25 USD). The biggest contribution to these total costs is from clearing and felling (60 GHS respectively 10 GHS) and from planting (80 GHS). Burning (10 GHS), pegging and lining (25 GHS) play a minor role.

3.1.2 Food Crops

In the BAU it can generally be assumed that farmers plant in the first years after clearing the plot the food crops maize, cassava, and plantain in an intercropped system. While maize is stopped after two years the cassava is planted for two to three years, plantain for four years. The cost related to the food crops are marginal compared to the total plantation costs and can be reduced to the cost for the planting material, as the labour for food crops is always done at the same time with the monitoring work of the plantation. For the planting material, the cost can be estimated to 50 GHS/acre in the first year and 10 GHS in the second and following years (Annex 1). The income through food crops varies a lot from farmer to farmer and from village to village as the farmers do have different needs and coping strategies. The income from these annual crops is very marginal if compared to total household income, but sometimes relevant for the farmers as they did big investments for the plantations and need the food for own consumption and selling in the first years. In the first year maximum of 390 GHS can be earned from one acre if all products would be sold. In the next three years just with cassava and plantain 160 GHS could be earned (Annex 2).

3.1.3 Case Study on Orange Plantation

Two farmers have been interviewed to figure out the costs and benefits of a citrus plantation; one in Asikuma (Box 1, the) another in Bedum (Box 2).

Box 1: Brief description of the citrus plantation farmer in Asikuma

Mr. Amankra comes from another town in same region, his parents moved to Asikuma because of marriage. As a tenant he works on the land of three different landowners where he has a sharecropping agreement with them. He can keep the food crops and gives the half of the cash crop (oranges) harvest to the land owner. He said that this can be in some cases risky for the establishment of the plantation as the land owner is allowed to take the land away as soon as the plantation is not giving enough harvest anymore. For people coming from outside it is impossible to buy land, as the prices are far too high. Only rich investors have the possibility to buy land as land is scarce and individuals do not sell land. To sell the land would never be profitable for the land owners

Box 2: Brief description of the citrus plantation farmer in Bedum

Mr. Osman is a land owner and he established in the year 2006 a citrus plantation which is 7 years old now. Additionally to the citrus farm he has also cocoa. The total farm size is 7 acres out of which 4 acres are citrus. He established the citrus plantation as he was expecting a good market for the oranges, selling them to the nearby fruit juice factory. But the yields of the citrus are not so good anymore because of a major infestation of fruit fly which according to him, is as a result of the climate change in the region. In future he would like to replace the citrus plantation with cocoa, as he is expecting a more reliable and stable market.

The cost of the seedlings vary a lot depending on the type (budded or simple) of seedlings purchased (3 GHS for budded, 0.7 GHS for simple). For the calculation of the establishment the costs for budded seedling will be used since it is the more common practice. 80 seedlings per acre are taken as a "best guess", with a tree density of roughly 7 trees/m². To approximate the real costs for the seedlings we would have to know the survival rate in order to estimate the amount of seedling which a farmer has to purchase. Not considering the dye-off rate, the seedlings cost are 240 GHS/acre.

The annual management cost of the plantation varies from farmers to farmer, in our case the main differences of the annual management costs are the weeding costs; these depends in the first years a lot on the preparation of the plots. For further comparison the "best guesses" will be taken as a reference for the annual management cost of an orange plantation. The yearly management cost are from year 1 to year 4 roughly 580 GHS/acre and increase up to 760 GHS/acre in the following years. The additional costs come from the harvest and the increased needs of plant protection when the tree starts bearing fruits (Annex 3).

According to the district profile with data based on the year 2010, the average yield of citrus was 15.1 metric tons per hectare. This would make up to 6.1 ton per acre. John O. Amankra would receive from the fruit juice company around 120 GHS per ton. This would make an average yearly income of 732 GHS. In the discussion with Osman we saw that this is already a high estimation. He receives on the local market around 5 GHS per 100 fruits. The income in the 3rd years of production was fluctuating around 350 GHS as the plantation was not yet on the peak of the productivity. As no better estimates of the development of the yield through the year are available, the income of 730 GHS as a basis for our calculations was taken.

Considering the above costs and benefits, a plantation is financial not viable at all as in the first years the loss will be the total cost of 580 GHS and even in year 5 when fruits are harvested the costs are not covered.

This was reflected as well in the results of the focus group meeting. The farmers did not mention any positive aspects about orange plantations anymore. The orange plantations were in trend in some years back, when farmers and land owners expected a lot of benefits through selling oranges to the fruit juice company, which promised good farm gate prices and a growing market. But nowadays there is only frustration left, as the fruit Juice Company is not reliable in buying and the market prices are very low. Additionally the problems due to fruit flies rises and the climate is, according to the farmers, changing and not anymore in favor of citrus plantations.

Table 2: Positive and negative aspects of citrus plantations (Bedum Breman-Asikuma- Odoben- Brakwa District; personal communication with 6 farmers and MOFA , Asikuma August 2013)

Positive Aspects	Negative Aspects
<ul style="list-style-type: none">- Social crop , to distribute to neighbors- Low chemical inputs as compared to others such as cocoa and are therefore better for the biodiversity maintenance and ecologically more sustainable.	<ul style="list-style-type: none">- There is a very low benefit- Dependency from fruit juice company- The fruits are very perishable- Big pressure of pest and diseases (especially fruit flies)- The climate is not anymore so much in favor of citrus plantations

3.1.4 Case Study on Cocoa Plantation

For the cocoa plantation two farmers were interviewed, one women (Margaret; Bedum) and one man (Ahmed Ali; Jamra village).

Box 3: Brief description of the cocoa plantation farmer in Bedum

Margaret lives in a female headed household and cultivates in total 6 acres where she has as well coconut, cassava, and oil palm. The latest established farm is only three years old and she planted a cocoa hybrid variety. She is a tenant and has the farm in a sharecropping contract Abunu (50:50).

Box 4: Brief description of the cocoa plantation in Jamra

Ahmed is a land owner and a settler in Jamra, he cultivates about 42 acres of land of which 20 acres are for oil palm and the other 22 acres for cocoa, oil palm and plantain. he however cultivates 15 acres of cocoa out of the 22 acres. He also converted an existing secondary forest left by his father for the current plantations. The age of the cocoa plantation is 3 years the oil palm plantation which will be mentioned later on is 8 years old.

The information about the establishment cost and the amount of seedlings used was still present and could be compared with the cost of today. For the price of the seedlings, today 0.2 GHS is paid and for once acre, according to CSSVD, 435 seedlings are recommended. The cost of seedlings for one acre can be assumed to 90 GHS (Annex4). The yearly management costs for an acre of cocoa vary a lot between the farmers. Beside the labour costs for weeding and monitoring the plant protection is a remarkable cost. From the farmers these costs were not very reliable (Annex). The cost in the first two years are mainly related to monitoring and weeding since not all farmers apply fertilizer and the pruning costs are not very high, but if demanding varieties (hybrids) are planted and a fist harvest is expected in the 3rd year the farmer bares as well costs for plant protection and fertilizer. In the first two years the cost of maintaining the plantation are around 770 GHS/acre and after the 3rd year around 920 GHS/acre (Annex 4). But not only the costs/unit of land are high but also the return on sales which a farmer can achieve with cocoa is extremely high. It starts from year 3-5 with a low yield with around 400 GHS/acre and increases to around 2000 GHS/acre after year 10 (Annex4). Deducting the annual costs there would be still a net benefit

of 1080 GHS/acre/year¹. The same was reflected in the focus group discussion with the farmers. Cocoa seems to be financially highly profitable for both farmers and land owners, even for share croppers it pays them additionally to the labor some profit, even if they have to give the half of the harvest to the landowner.

Positive aspects

- Very profitable
- Ready market; the farmers can always sell
- State support and the risk is low
- Additional benefits for the household (soap from the husk)

Negative aspects

- Workload is very seasonable,
- The big pressure of pest & disease can easily
- Irregular income
- Not very ecological

3.1.5 Case Study on Oil Palm Plantation

The same farmer as for the cocoa case in Jamra was interviewed as he had as well two oil palm plantations(Annex 5). For the seedlings of oil palm he paid 5 GHS each and on one acre he planted 70 seedlings with the recommended spacing of 9 by 9 meters. The costs of one acre are therefore 350 GHS. The annual management costs for the oil palms are not as high as for cocoa as the plants are very resistance to pest and diseases and lower monitoring cost arise. The main cost is the labor for weeding, but the work for weeding decreases as soon as the canopy closes. After the 5th year there are additional costs for the harvest and the farmer has to start using fertilizer. The total annual management costs are estimated to be 350 GHS per year until year 5 and after year 5 706 GHS including the harvest costs. The cost for harvesting are relatively high as it is done by hired labor and paid with a higher daily fee, as it is a dangerous work (Annex 5). An annual income starts only in the 5th year where the yield is still very low and can be estimated to 240 GHS/acre. After year 5 it is steadily increasing until year 15 to 1800 GHS/acre and from there decreasing again. The plantation operates only cost-covering after year 8 and 9 until year 20. The net-benefit in year 9 would be 314 GHS/acre and increase until year 15 to 1154 GHS/acre and from there it decrease again .

Positive aspects

- Many different products for home use/consumption
- NTFP (mushrooms)
- Reliable market

Negative aspects

- Slow market (liquidity)
- High workload
- Short duration of the plantation (after 20 years the harvest get less)
- Not possible to intercrop (early canopy)
-

¹ Without taking into consideration the investment costs or opportunity costs

3.1.6 Case Study on Rubber Plantation

Looking at rubber two farmers were interviewed; one was the village chief of Bedum and the other farmer was a rubber farmer from Asikuma.

Box 3: Brief description of the rubber plantation farmer in Bedum

The 1st rubber plantation was owned by the village chief of Bedum. Besides rubber he has as well cocoa plantations. The rubber plantation was established between 2006 and 2009 because of several reasons. On the same plot before was an oil palm plantation, which was too old and he had to look for an alternative as the oil palm business was not very profitable anymore. The reason why he did not want to grow more cocoa were several. Firstly the soil was not good enough for cocoa, secondly as he is getting old he wanted a less labour intensive cash-crop and thirdly he wanted something different than cocoa as a risk adverse strategy.

Box 4: Brief description of the rubber plantation farmer in Asikuma

The 2nd rubber plantation farmer we talked to was Mr. Benjamin from Asikuma. He, as well like the chief from Bedum, is a better-off farmer. Rubber is therefore only a side business for him. He has a poultry farm and cocoa production as core businesses activity. The decision on the establishment of the rubber was done by his father, which was a former paramount chief in the area, but passed away a year ago.

The rubber farmers produce in an out-growers scheme for the rubber association(Annex 6). Because they were not aware of all the cost and benefits of the plantations, the calculations are mainly based on the discussions with Mr Edubrahim from the rubber association in Asim Fosu. For the seedlings 1.13 GHS per seedling is used for calculation, with a planting density of around 6 meters between the rows and 3 meters within the rows what gives 222 plants/acre with total seedling cost of 250 GHS/acre .The cost for the annual management is as well quite different from the other plantations, since the main cost occur only after 6 year when the labour of a tapper has to be paid. Until year six the total annual costs can be estimated with 400 GHS/acre. After year six the tapping costs and inputs cost result up to 2660 GHS/acre. But rubber is not only a costly but as well a high income plantation. After year 6 revenue on sales is in average around 3300 GHS/acre/year, what corresponds to a net-profit of 640 GHS/acre/year.

Positive aspects

- Might be more profitable than cocoa
- The workload is more regular

Negative aspects

- Easy to get land for rubber
- Expect a lot of workload
- Reluctance of farmers as they don't know well about the work
- No intercropping with cassava possible
- Fears about the market stability

3.1.7 Discussion of Business as Usual

The results show that financially the cocoa production is the most viable, followed by rubber and oil palm plantations. The option of orange plantations is not a financial viable option. In the discussion with the farmers we could see that the ones with the

orange plantations would be the main target group looking for alternatives, followed by the oil palm producers and the rubber producers. The rubber and the oil palm producers have different reasoning for their plantations choice. While with rubber there is a longer steady income possibility and the income and work is more regular, the oil palm production has its own benefits as the different product for own consumption and the mushrooms as NTFPs. Oil palm production in this region is more suitable for small scale farmers and it produces more employment downstream the value chain. Rubber production is more an option for bigger, wealthier farmers and landowners having enough liquidity for hiring people for tapping and having rubber as a side business next to cocoa.

3.2 Analysis of the Proposed Alternatives

The focus of this chapter is looking at the financial viability of the alternatives for out-growers and the farmers' perceptions on getting into alternatives like the one proposed by Wellington's business model. For the financial viability, the alternatives are compared with cocoa, as it is the most profitable business as usual.

3.2.1 Cedrela Plantation

A first alternative to discuss is *Cedrela Odorata*, an important timber tree, producing a lightweight odorous wood with very good resistance to termites and other wood-boring insects. It is very simple to manage and grows well on seasonally dry tropical and subtropical forests. In the proposed concept of the Wellington pilot project, Cedrela is proposed as a main crop sold for timber with the option of several intercrops in the first years.

For the ease of calculation the establishment cost were taken the same as for the business as usual scenarios described in the prior chapter. The costs for the seedlings for one acre are set to 222 GHS (0.5 GHS per seedling).

The annual management cost can be reduced to monitoring and weeding and with a total cost of 310 GHS/acre (Annex 7). Inputs are just used in the first year, with an insecticide where the costs are marginal. In the 2nd and 3rd year additional cost of 60 GHS/acre for pruning have to be considered. The main costs arise in the years of harvest. The cost per tree harvested is 5 GHS including the tractor costs and the food for the chainsaw operator; the cost was estimated as high as 2480 GHS/acre (labour for felling, equipment, motor oil for chainsaw and the rent of a tractor to bring the wood to the road).

The technique proposed by Wellington of managing Cedrela by coppicing after 10 years is not possible². When Cedrela is cut down it would have to be replanted by striplings. The earnings from Cedrela harvest after 10 years would be too low as it cannot be used as sawn wood. Sawn wood prices of US\$ 207/m³ could only be expected from a 25 years old plantation. The price Wellington can expect for trees of a 10 years old plantation would be US\$ 70/m³ from which he would pay US\$ 35/m³ to the out growers (Gross Income for out growers of 3595³ GHS/acre). This price would not be profitable. As the total cost of harvesting and annual management would already cost 6120 GHS. To cover the costs the out growers would regarding a broad estimation at least have to earn US\$ 70/m³.

An advantage of growing Cedrela is the short term benefits from the agroforestry intercrops. According to Wellington and as well the interviewed farmers Cedrela is suitable with nearly all types of intercrops. Wellington proposes plantain, chili, cowpea

² Management of cedrela by coppicing is not possible

http://database.prota.org/PROTAhtml/Cedrela%20odorata_En.htm

³ 4.8 m³/year growth times 10 are 48m³ times US\$35 = US\$ 1680 equal 3595 GHS

maize and ginger. Where chili and cowpea might be very profitable as they are niche products in the region if there is an access to the market and ginger could be produced for a long period in the shadow of the trees.

Table 3: Prices paid on the Asikuma market for the different proposed intercrops

	Cowpea	Chili pepper	Ginger
Price per kg	3	5.2	1.6
GHS			

But the main crop should not be (cross) subsidized by the intercrop

Table 4: The farmers view of positive and negative aspects of Cedrela plantations

Positive aspects of the plantation	Negative aspects
<ul style="list-style-type: none"> - They can intercrop with other species, crops 	<ul style="list-style-type: none"> - Afraid of alternatives (Buyers?) - Is not pro poor - Selling of timber is not feasible in small scale

3.2.2 Ylang Ylang plantation

Cananga odorata commonly called Ylang Ylang, is a medium sized tree, which grows between 10-40 meters high and bears extremely fragrant flowers. The distilled oil is of a highly valued essence used in perfumery, and in aromatherapy. The pruned trees flower year around, generating a regular income for growers.

For the investments in the beginning the seedling of Ylang Ylang costs 1.5 GHS, this makes up to 666 GHS for one acre plantation. Maintaining the plantation is not expensive, as there are nearly no inputs needed. The labour consists in monitoring, weeding and cutting and harvest. The main costs of the production are due to the labour costs from harvesting, which are paid per tree 5 GHS per tree 6 times a year. The sum of annual management cost is 360 GHS, but the harvesting cost is estimated very high with cost of 113'320 GHS per year, resulting in total annual costs of 113'680 GHS (Annex8).

For the income, it was communicated to us that the young tree of about 5 years old yields about 5 kg flowers; when it reaches the age of 10 years, it can give as much as 10-15 kg⁴. Topped trees rarely produce more than 20 kg⁵ per year. Carefully calculated a plantation of one acre would yield about 4440kg (calculated with an average of 10kg per tree). The income for out growers will be dependent on the price Wellington Baiden is paying per kg of flowers. The communicated 80GHS per kg is sure a misunderstanding between raw flowers and essential oil. To cover the yearly labour cost, the out growers would have to receive a minimum of 26 GHS per kg to have a positive balance the years when trees start to yield 10 kg. The prices paid to out growers are very unsure. Critical sources from East Jawa say that. The market for cananga oil is small so the price paid to the flower harvesters is low - approximately \$0.45 U.S.⁶ per kg.

Even though the situation of the prices is unclear the production of Ylang Ylang might be still very interesting, as it gives labour to the farmers and they will not be reliable

⁴ http://www.albertvieille.com/en/upload/210313_103636_PEEL_yXjFM2Xa.pdf

⁵ <http://agroforestry.net/tti/Cananga-ylang-ylang.pdf>

⁶ <https://www.achs.edu/blog/2011/07/25/do-you-use-cananga-oil-alternative-ylang-ylang-achstv-gathering-canaga-flowers-dis-0>

on cocoa only. And the possibilities for intercropping are huge and economically interesting. This is as well reflected in the farmers view towards this alternative.

Table 5: The farmers view on positive and negative aspects of Ylang Ylang production

Positive aspects of the plantation	Negative aspects
<ul style="list-style-type: none">- Very interested/ know the plant- Growing possibilities intercrop with cocoa, in the backyard and other farms- Regular income, regular work	<ul style="list-style-type: none">- Wellingtons acceptance of small scale production?- Organisation of small scale producers

Having a few Ylang Ylang trees with a community collection scheme would help the poorest of the poor and not use additional land. All people could profit from a market with Ylang Ylang even those who have no access to farm land.

The target group for promoting the proposed alternatives would be more midsized landowners having already a secured income from cocoa, and having additional resources to invest in alternatives to have a shard risk.

3.2.3 Gliricidia and black pepper

In the proposed alternative of Gliricidia and Pepper, Pepper is seen as the main cash crop growing on Gliricidia. The process consists of using live Gliricidia stakes in black pepper plantations. The use of living Gliricidia stakes for the Black Pepper plants is supposed to reduce production costs and environmental impact and should also increases the longevity and improves the yield (compared to other live stakes) of the pepper plants. Even through by Wellington, in a production point of view it is the side product of the black pepper plantation. Gliricidia sepium as a leguminouse tree can be used for many purposes as firewood, living fences, shade, forage, green manure and soil stabilisation, and construction. The management of the tree is very simple and the tree grows in general very well. An advantage of is its ability to root from cuttings or stakes with high attendant survival. The ease of coppicing makes it a good source of fuel wood. The leaves can be used as a green manure, to improve the soil quality. Glyricidia is already commonly used to shade cocoa, where derives its common names (e.g. madre de cacao) from its use in its native range to shade cocoa and coffee plantations⁷.An additional benefit found reduction in the incidence of termites.

Black pepper ⁸is grown in India under a variety of agricultural schemes ranging from home gardens, mixed crops in coffee plantations and monocrops on slopes and in valleys. In the case proposed by Wellington Gliricidia is placed at intervals in the ground. Cuttings, once rooted, are planted close to the supports. As the stems grow, they climb the supports. After almost 3 years the plants are over 2m tall and are bushy. They start flowering at the onset of rains. The labour for harvest is very high as the fruits are picked by hand, and are harvested 6 to 8 times at 2 week intervals. The expected range of yields full grown plant (7-8 years), well developed mature vine can yield about 1.8-2.3 of dried berries each harvest season.

For the production expenses discussed with Wellington Baiden (Annex 9) except the seedlings the same costs as for other plantations are expected. The plantation material for pepper is about 1.5 GHS estimated and for gliricidia about 0.5. This make up

⁷ <http://www.fao.org/ag/agp/AGPC/doc/Publicat/Gutt-shel/x5556e07.htm>

⁸ http://www.kew.org/plant-cultures/plants/black_pepper_production_trade.html

total cost for seedlings of about 888 GHS. In literature we could find that for black pepper planting material and stakes can be possibly harvest inexpensively or for free of charge from a forested area nearby⁹. For the yearly cost we can expect following costs. The labour for the first 24 months consist in compost mulching control of nematodes and the arrangement of vines (no peppercorn production) 296GHS excluding the general cost for monitoring and weeding . In the years after the costs are the crop management as usual and mulching control of nematodes and pruning of old leaves, summing up to 195 GHS

In the 3-15 there are the additional main costs of harvest coming up to 400GHS by harvesting 8 times.

After Wellington Baiden's expectation the yield per plant is about 1.5 kg twice a year per plant, according to his calculation 16650 could be earned through the black pepper selling of one acre.

The labor for is high and corresponds to the perceptions of farmers, where they think that the labour and technical knowledge needed would not be in a relation to the income they could generate with black pepper production.

Table 6: The farmer view of positive and negative aspect of black pepper gliricidia plantations

Positive aspects of the plantation	Negative aspects
<ul style="list-style-type: none"> - Regular income - Firewood 	<ul style="list-style-type: none"> - Lot of work - Lot of technical knowledge needed - Farmers perceive it as a low value product (Normally collected in the wild)

3.2.3 Discussion on the perceptions towards alternatives

Out of the focus group discussion we can see that farmers at the moment are only particularly interested in finding alternatives for cocoa. Even if this is dangerous to generalize as we interviewed only a few farmers, it can be pointed out that for small and midsize farmers growing alternatives seems to be very risky. They are afraid to trust newly established markets and they are too vulnerable to invest in unsure businesses. According to the rubber association who has nowadays already many out-growers this is/was a problem for the introduction of rubber as well. The rubber association is trying very hard to find more out growers, but farmers still prefer to grow cocoa, as cocoa is promoted by the state and they have a reliable market. Cerdrela doesn't seem like an option for small farmers. For big farmers it might be a possibility as a side business. The Gliricidia pepper system might be an interesting option for farmers even if the expected income seems to be too high. Farmers at the moment are not interested but with training and extension it could be a viable alternative for some of them. The favorite nevertheless for the farmers would be the production of *Ylang Ylang*, as they are familiar with the tree and they think that they could grow them either in other plantations or in the backyards and organize the collection and selling in the community group. This idea would be very pro poor oriented, but very difficult to implement as the flowers are very perishable and a big organization for collection and bringing to the distillation would be needed. A critical point would as well be the quantity, but starting with a small backyard production farmers could get motivated to grow in larger areas.

⁹ http://www.agroforestry.net/scps/Black_pepper_specialty_crop.pdf

3.3 Stakeholder involvement and benefit sharing

The situation of stakeholders for the development of the REDD+ project can be analyzed according to a triangle of actor of implementing public policies once the politico-administrative authorities the focus group (cause of the problem; farmers doing deforestation) and the final beneficiaries (others suffering from deforestation). In this case the focus group and the final beneficiaries are partly the same people. As deforestation is a problem for all stakeholders. The same stakeholders doing deforestation are suffering from the negative aspects biodiversity loss and land degradation in a longer term and as well the climate impact of deforestation. From the politico administrative point of view we encounter a dual system in Ghana, with a traditional and governmental structure. The traditional includes the local chiefs and the paramount chief taking the decisions among stool land.

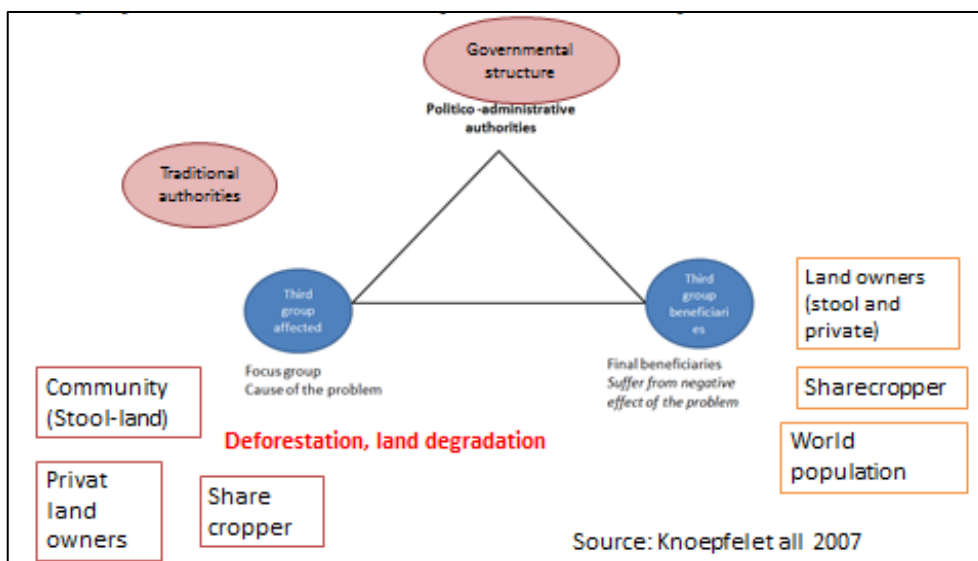


Figure 1: stakeholder framework in the central region project

3.1.1 Stakeholder involvement in the case of the Bedum Project

Looking at the case of the stakeholder involvement in the Bedum the situation is limited, through the very business oriented approach of the project. From the point of view of the politico administrative authorities the governmental side is properly involved and as well interested in the project. The district administrative and forestry offices are very in favour of the project, as the project is pushing economic activities, bringing tax income and fostering a sustainable management of forests. From their point of view increased benefits from plantations, would hinder. Solely the district MOFA office is a bit concerned about the situation of food sovereignty of the district if new non-food alternatives are promoted. They fear that in the first years it might not be a problem as intercropping is possible, but later on the will be less space for food crops if no new land is cleared (Table 7). From the traditional side there is a lot of scepticism especially from the village head of Bedum as he is not involved anymore. He fears that the plantations will not be profitable for farmers. The farmers will be to dependent on only one buyer, which has too much bargaining power. He himself would not recommend the alternatives proposed by Wellington to the farmers in his community. He would rather recommend them to go into rubber production, even if it is not so profitable but it would share the risk of not only having cocoa farm. Another problem he sees as well that the project is targeting rather landowner and no migrant farmers which are the most vulnerable of the system (Table 7).

Table 7: Analysing of stakeholder

Actor	Interests/Benefits	
		political-admin / focus group / final beneficiaries/ indirect actors
Ghana Government	<ul style="list-style-type: none"> - <i>Efficiency (increased stock of carbon with alternatives is unclear)</i> - <i>Profiting from the legalising the sector taxes</i> 	political-admin
MOFA	<ul style="list-style-type: none"> - <i>Interests in food crops as intercroops</i> - <i>Interest in keeping soil fertile</i> - <i>Interest in additional work and consultancy (Mastertrainers)</i> - <i>Taxes (as government entity)</i> 	political-admin /focus group
Forestry Commission	<ul style="list-style-type: none"> - <i>Interest in increased plantation areas</i> - <i>Interest in registration</i> - <i>Interest in wood production</i> - <i>Interest in additional work and consultancy (Mastertrainers)</i> - <i>Taxes (as government entity)</i> 	Political admin
Social Welfare office	<ul style="list-style-type: none"> - <i>Interest in benefits for out growers</i> - <i>Interest in increased employment</i> 	Political admin
District As-semblee	<ul style="list-style-type: none"> - <i>Fostering rural development</i> - <i>Conservation of natural resources</i> 	Political admin
Stool	<ul style="list-style-type: none"> - <i>Receives an increased income from the shareholders through better profitability of sharecropping</i> 	Focus group; final beneficiaries
Traditional authorities	<ul style="list-style-type: none"> - <i>Increase of income through additional income from stool land</i> - <i>Increased income and fostering rural development</i> 	Political admin
Farmers migrant	<ul style="list-style-type: none"> - <i>In some of the alternatives they have increased possibilities for intercropping</i> - <i>In others the system of sharecropping is difficult to apply</i> - <i>The alternatives are work intensive and it might not be profitable for farmers which are not tenants</i> 	Focus group
Farmes tenant	<ul style="list-style-type: none"> - <i>Increased risk sharing, opportunity for income</i> 	
Private Land owners	<ul style="list-style-type: none"> - <i>Increased income , new markets, risk sharing</i> 	Focus group
Community	<ul style="list-style-type: none"> - <i>Revenue from stool land</i> - <i>Increased jobs</i> 	third groups beneficiaries

4 Discussion

The alternatives proposed are interesting for the region, as having more tax income and more workplaces might be created and the farming systems would be diversified. Even if the expected income seems over estimated the idea of going into niche products makes sense. Our calculations with a daily wage of 10GHS, was quite high and would be a good income for workers in the region, 10 GHS is the wage paid to exter-

nal labours normally for the cocoa harvest. In this sense it is positive, even if farmers and traditional authorities are still very sceptical towards these alternatives. But as soon as the business is running and the first ones start to earn money. Farmers can be expected to jump on board receiving a good training. The biggest concern remains the target size of the farms Wellington Baiden wants to work with, is rather too high. That farmers cannot start with small plot makes them less interested in trying alternatives. The planning and the strategy at the moment is still too much learning by doing approach where it would be too risky for farmers to join, as they have a lot to loose and are dependent on the cocoa income.

5 Conclusions

Even if at the moment the ideas and visions of the project are too optimistic and there is not enough technical knowledge about the new alternatives. The project should be supported in different aspects and not only with financial help for a distillery. There is a need of making a fully fleshed business plan for each crop, supported by technical and business staff to calculate the exact prices Wellington Baiden can pay to farmers. Further the buyers have to be identified carefully before starting the production. The project would have to link to the local extension and educational institutions to advise farmers properly in the technical and financial aspects. That the project give technical support in plant growing, business management and marketing to farmers. Further the plan of Mr. Wellington to work with a German investor has to be clarified. Farmers can only go into the business, when the risks are minimized and if a guarantee of purchase to a certain price range can be given to them.

Piloting of REDD+ in the wooded savannah area of Brong Ahafo region by Vicdoris limited in the framework of “Advancing REDD+ in Ghana: Preparation of REDD+ Pilot schemes in Off-Reserve Forests and Agro-forests (REDD+)”

1 Introduction

The present study has a closer look at one of the seven pilot activities Ghana has selected in the REDD+ readiness preparation process. The selected pilot for the study is the Nkoranzaman REDD+ project, focusing on piloting REDD+ in the wooded savannah of the Brong Ahafo region in the Kintampo North district. The pilot project idea seeks to work with the Nkoranza Stool to protect the remaining forests in the area by developing alternative agro-forestry solutions.

One of the key elements is to protect the remaining Shea trees by improving the market situation for Shea nuts. Thus it is expected that, improving the economic utility of the Shea tree will lead to an enhancement of communal preservation of the ecological environment in the Shea endemic areas. The present study focuses on two main aspects: (1) How is the financial compatibility of Shea nut collection compared to business as usual and how could it be enhanced.(2) How could a benefit sharing mechanism look like, regarding enhancement Shea production.

2 Background

2.1 Description of the area

The major economic activity and the main source of household income in the area, is related to agriculture. 71.1% of the population is engaged in agriculture and its related activities. The major food crops produced in the area are yam, maize, cowpea, cassava, rice, plantain, egusi¹⁰, groundnut and beans. Other crops are produced in small quantities as cash crops are cashew, mango, tomatoes, onions, water melon, garden eggs, soya beans and sorghum. The livestock industry is as well important for the region but more in the management of Fulani from the north. Locals give their livestock away for herding. The major livestock enterprises are cattle, sheep and goats and local poultry. One of the potentials of the region is the water resources, through its rivers flowing through the west part of the region and joins the Black Volta at Buipe. Most of these rivers are intermittent and the large ones like Urukwin and Pumpum fluctuate in volume what makes the use of them challenging and unreliable for irrigation purpose. The vast water resources in the western part of the Municipal could be harnessed for irrigation. The district has a population growth rate of 2.5% (census 2000) caused as well from migration from the north the estimated population density of 21.75 persons per square kilometre which is considered as still low but sooner or later, the bush fallow system practiced would not be possible, as land per head would reduce. And as well the pressure on the remaining trees will increase. The major drivers of environmental degradation in these are the shifting cultivation and the population pressure, inefficient farming technology, destructive hunting methods and wasteful charcoal production (MOFA¹¹).This is where a project like the Nkoranzaman comes in. The interaction of the project with the district structure proposes as major activity to encompass all stakeholders of adopting Community Resource Management Area (CREMA). The project seeks to work with the Nkoranza Stool to protect the remaining forest in the area by developing alternative agro-forestry systems that the

¹⁰Pumpkin seeds

¹¹ http://mofa.gov.gh/site/?page_id=1369

pressure on the forest will be less and even carbon stock conservation can be enhanced.

2.2 Ownership of trees and CREMA establishment

The land in the Nkoranza North district is all belonging to the stool and is managed by the farmers. The farmers own the crops they plant and do nearly not have to pay any land rents. (personal communication, Forestry Commission 2013). The land at the moment has a low value and as until now there is mainly just food crops produced, the share cropping system is not introduced. In Nkoranza South the landowners started to introduce the sharecropping in areas with cashew and mango plantations like in more southern regions as the central region. In the Nkoranza area the Shea tree is only natural occurring and until now nobody is planting any trees. The farmers claim as a big treat the charcoal makers of burning the trees. When Shea is naturally occurring the farmers have only limited possibilities to protect the trees, especially when they are in fallow land, as there is no private ownership on trees on fallow stool land. The natural occurring resources do belong to the government, what gives little incentives for the farmers to leave trees on their fields as this is insecure and they cannot make profit of it. They leave only trees on their field, where they see a short term benefit. This is only the case when the trees already bear nuts and when the household is into Shea nut collection (Farmer interviews 2013). In general farmers have to go always more into the north when they want to go for Shea collection as further north are more trees remaining, this creates conflicts with Shea collectors from other villages. To solve this problem the pilot proposes the establishment of a participatory management scheme as the CREMA. This would allow communities to manage and sustainably utilize forest resources within a defined area. It empowers local communities to actively participate in the conservation of forests¹² (Sandbrook 2010)

The CREMA as existing management in Ghana, was first developed by Ghana's Wildlife Division part of the forestry commission to protect wildlife

¹³. The same approach might be a valuable solution to protect Shea and other tree in combination with REDD+. It decentralizes the rights to manage and benefit economically from their natural resources. There are success stories all among the country as it implies the traditional and governmental structures. According to Asare et al.(2012)

¹⁴CREMA represents a profound policy shift by permitting communities, land owners and land users an opportunity to govern and manage forest and wildlife resources within the boundaries of the CREMA, and to benefit financially or in kind.

According to Asare 2013 "The CREMA development process and the mechanism itself help one to solve some of the main benefit-sharing challenges associated with implementing REDD+. Until now no CREMA has realized emission reductions revenue yet, but a number of CREMAS are now exploring this possibility. According to Asare 2013 lessons from the CREMA experience are highly relevant for REDD+ projects aimed at furnishing benefits to smallholders and communities. The CREMA process is also compatible with the process of developing a REDD+ project, and the mechanism itself has the potential to provide a neat solution to a number of the challenges to implementing REDD+, especially in the Nkoranza area where complex land and tree tenure regimes prevail.

¹² <http://pubs.iied.org/pdfs/G02770.pdf>

¹³ http://books.google.ch/books?id=2I7a3WU_NPEC&pg=PT61&lpg=PT61&dq=crema+ghana&source=bl&ots=4OJKol1ySf&sig=efncsiaOWQDeS_6LPolrETJLfVE&hl=de&sa=X&ei=_I72UcyQGvLo7Aa1noD4CQ&sqi=2&ved=0CFMQ6AEwBA#v=onepage&q=crema%20ghana&f=false

¹⁴ <http://rstb.royalsocietypublishing.org/content/368/1625/20120311.full>

Especially for the benefit sharing lessons learnt from the CREMA have to be taken into account. The communities and authorities have their own benefit-sharing arrangements responsive to stakeholders' values, perceptions of equity and needs. They are internally defined but have to be in line with the national benefit-sharing legislation or tax laws (Asare 2013).

2.3 Benefits and Benefit sharing

Angelson (2012)¹⁵ divides the benefit arising from REDD+ implementation in direct and indirect benefits. *Direct benefits* include employment, livelihood improvements and direct ecosystem benefits, which include NTFPs, fuelwood, fodder etc. *Indirect benefits* comprise improved governance such as the strengthening of tenure rights and law enforcement, enhanced participation in decision making as well as benefits from infrastructure provision. Indirect ecosystem benefits include the protection of soil and water quality, biodiversity protection and climate stabilization. For the cost we have to take three main categories into account the opportunity costs for a different land use, transaction and implementation costs (Angelson 2012)¹⁶ in this study we will have a main focus on opportunity costs.

Lindhjem et al. (2010) in Angelson (2012) characterize benefit sharing as having two essential dimensions: vertical benefit sharing, which involves benefit sharing between national and local level stakeholders and horizontal benefit sharing between and within communities, households and other local stakeholders. An emerging question related to vertical benefit sharing concerns the appropriate balance between benefits used as direct incentives for reducing deforestation and degradation and benefits used to enhance the governance and policy context needed for successful REDD+ implementation (as argued by Gregersen et al. 2010; Karsenty and Ongolo 2012).

3 Material and methods

The study has been conducted in a two weeks field trip in the region. Looking at three main aspects: (1) The economic viability of having more Shea in the farmlands (2) Stakeholder involvement (3) Possible implementation and benefit sharing

- (1) To figure out non carbon benefits the study focuses on a financial analysis of the current farming systems in comparison to the proposed alternative of having more Shea nuts trees in the fields. In the first week we were focusing on the existing farming systems by looking with the farmers at the net income of their main important crops. Income from other sources or livestock and had been untended as they were not predominant in the surveyed communities and as we wanted to have a special look at the land use systems. The net income of yam, cassava, maize was estimated with the farmer and groundnuts and Shea income with the farmer's wife. For the net income 8 households in the villages were selected (Dawadawa 2, Dawadawa 1, Kawampe, Kukpal Abini).¹⁷ These data will be used later on to forecast farming system income with and without Shea tree plantation as a model¹⁸. For the business as usual the production of the major food crops in the district are tubers as yam and cassava further maize has as well a certain importance for the crop rotation. Additionally groundnuts are important for the study, as it belongs to the important cash crops and is managed

¹⁵ http://www.cifor.org/publications/pdf_files/Books/BAngelsen120108.pdf

¹⁶ http://www.cifor.org/publications/pdf_files/Books/BAngelsen120108.pdf

¹⁷ After this more farmers were interviewed by Angella Adje Darko in Kurawura Kura

¹⁸ The results of this data collection do only limited appear in this study, as they will be further developed in the Master Thesis of Luca Heeb

by the women (MOFA 2013. personal communication). Shea is an important income for the women from Dawadawa 2 towards the north.

- (2) The main actors and stakeholders in the communities at different levels (i.e. farmers, communities, regional authorities, private companies) in some selected communities have to be identified and their role, rights and responsibilities have to be identified. A possible benefit sharing concept has to be drafted.
- (3) The possibility of establishment of a benefit sharing towards CREMA and community based nurseries was analyzed with a Shea collector women group in Kurawuraa Kura. To identify their interests, needs and potentials of increased Shea production a focus group discussion was conducted. For the stakeholder identification, interviews were held with the Forestry commission, the Ministry of Food and Agriculture of the district; the planning and the social welfare office. The responsible from the offices were consulted for their ideas and visions for the district in terms of implementation and benefit sharing systems of the REDD+ pilot project targeting the increase of Shea production.

3 Results

3.1 Viability of increased Shea nut plantation¹⁹

Looking in at the first results comparing the business as usual net income (Figure 1), we can see that in the Nkoranza North region yam is the most profitable crop followed by cassava. Groundnuts and maize have a lower income; nevertheless they are still important for the rotational system. Looking at the gender aspect, groundnuts are very important for women as the income out of the groundnuts, and Shea income belong to them. The net income of yam reaches up to 250 GHS per hectare, while maize and groundnuts net incomes is only about 150GHS²⁰. To have some comparable figures the net income from processed and unprocessed Shea was calculated. For the unprocessed Shea the critical figure is the right moment for selling. When they sell under pressure²¹ (not well dried nuts) the price is only 60 GHS but if they sell at the right time to the company (well dried good quality nuts), they can earn up to 120GHS for the same bag (Annex 10). In a calculation with the preliminary results of Heeb (2013) for one bag of Shea nuts 5-6 trees have to be harvested. Out of this a net income per tree can be calculated resulting in a maximum net income of up to 14 GHS. The net income per tree depends a lot on the distance where farmers go harvest the trees.²²This in addition to the net income of food crops in agro forestry systems, or as a sole net income per hectare in plantations. In the further work of the master thesis student net incomes of Shea in agro forestry systems and plantations can be calculated. The home processing of Shea is very interesting for farmers, as the opportunity cost for women labour is close to zero because the processing is done in a time when there is not a lot of other work on the farm. But the market for home processed Shea is limited because the quality is low and many women produce for themselves.

¹⁹ Will be completed with more data, detailed calculation and results will be presented in the Master Thesis of Luca Heeb

²⁰ This figures have still to be confirmed and completed

²¹ Farmers often sell under pressure because of liquidity problems

²² The highest cost is the time consumption for the walking distance

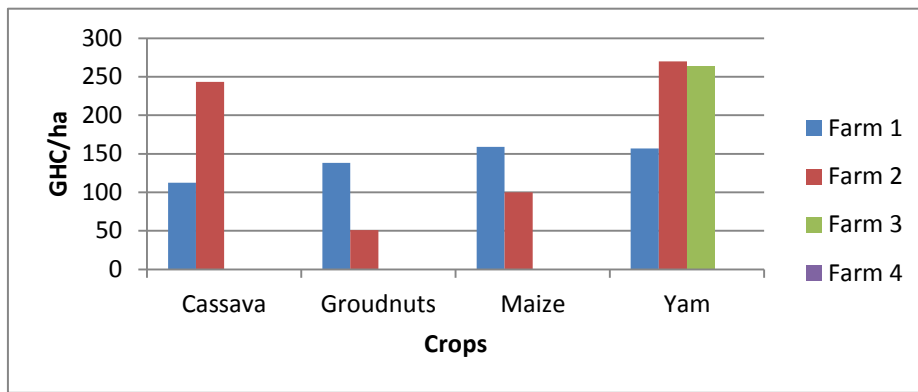


Figure 2: Net income (BAU), preliminary results²³

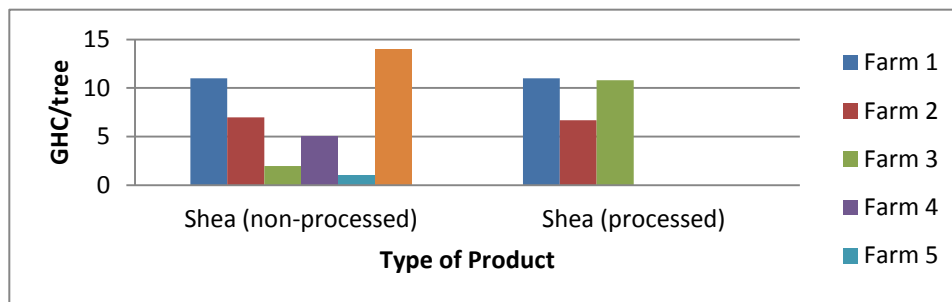


Figure 3: Net income shea non-processed and processed

3.2 Stakeholder involvement

Looking at the stakeholders in the Nkoranzaman north district, we can see a similar picture as in the other regions of Ghana. From politico administrative side we have a dual system with the traditional and governmental authorities. In the Nkoranza North district the importance of the traditional authorities is still very high as all land belongs to the stool. Traditional authorities are taking the decision on the land; therefore they have to be informed about all the projects going on in the area. According to the representative of the paramount chief they are willing to negotiate about land selling or introducing the sharecropping as soon as people want to go into perennial crops as plantations, where land tenure has to be secured for longer terms. The focus group in the area are the communities, including the Fulani and the charcoal makers, which are responsible for the deforestation of Shea trees. If new land rights would be introduced private land owners or sharecroppers would be made accountable. For the third group beneficiaries, this are all the people living in the area and which are depending on the natural resource, but as well further people interested in the climate change problematic.

Negotiations on shea tree enhancement have to be between village chiefs and paramount chiefs in the region. The Paramount chiefs are very in favour of all projects which sustainably enhance the sustainability of farming in the region and would be open to release land for pilot projects, if the communities are willing to participate.

²³ Preliminary results: The complete results will be presented in the Master Thesis of Luca Heeb

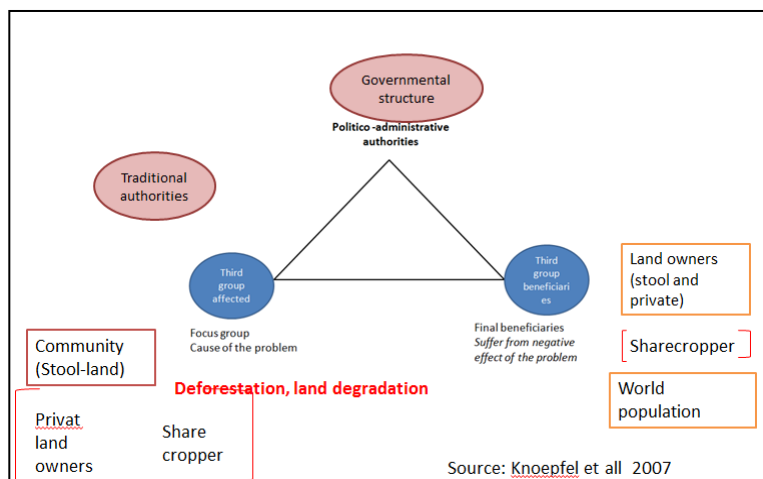


Figure 4: Stakeholder in the Nkoranza north district

3.3 Community nursery approach as benefit sharing possibility

As the farmers would be in favour of having more trees, but are not able to get seedlings, a possible benefit sharing approach would be investments in a community based nursery²⁴ which is a system already working in Ghana. But not yet linked to REDD+ schemas. The nurseries were intended to be community owned and managed; training and investments should be financed by linking it to the voluntary carbon market. According to Abu-Bonsrah (1996)²⁵ experiences with community based nursery a community should have enthusiasm and interest in tree planting, sufficient water availability and the project has to be built on either existing or potential organizational base open to education and training.

3.1.1 Farmer groups interest and perceptions of community based nursery

The idea of a community based nursery was discussed with a women shea nut collector group in the Kurawura Kura village. The group was selected with RIDE NGO from Kintampo

The women group already existed before the interactions with RIDE. It was before one group manly organized for the funding scheme, to help each other out by liquidity problems. Through the interaction with RIDE the group was split up in four small subgroups of 10 members. Besides the collection and commercialization of shea nuts the group does as well other activities. As preparing soap out of palm oil kernel, there the income goes in a group fund. The benefit of the collected nuts is for the individual benefit. Some of the women collect from the wild others go to buy in the neighboring villages. Actually it would be profitable for all to collect the nuts in the wild but the reasons for those who do not collect are for all the same. The trees are too far away (around 3h walking distance), either they cannot leave the household because of taking care of the children or they are sick and too weak to walk such distances.

This is why the women would be interested in being able to plant new trees closer to the compound either in form of an agroforestry system in the cropping field or as plantations. This is why a possibility of a community nursery was discussed with the women group (Table 8).

²⁴ <http://permacultureghana.wordpress.com/the-solutions/agroforestry-2/>

²⁵ <http://www.mtu.edu/peacecorps/programs/forestry/people/1997/heist.pdf>

Table 8: SWOT Analysis of the focus group interview for community based nursery

<p>Strengths</p> <ul style="list-style-type: none"> • Cheaper seedlings for all would be available through the community nursery • There is enough water as there is a river to establish a nursery • The village head would be very in favor of a nursery and would provide land • Charcoal makers are not anymore a problem in the community 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Trees planted on farmland belong to the government and the benefit sharing there is unclear • There will not be all the women involved in such a community nursery or plantation project • The group is somehow scared that they will not have a fast enough benefit from the trees • The groups accepts only women which are available to attend the meetings the those who are out in the bush for farming might be excluded • There is a cost for entering the group as 1 cedi per months
<p>Opportunities</p> <ul style="list-style-type: none"> • From a nursery the women group could profit in two ways, having easy access to seedlings and having a possibility to generate income for the community • The women would like to put other trees like cashew mango in the shea plantation • The group is well established with strong leaders 	<p>Threats</p> <ul style="list-style-type: none"> • The newly planted trees might be destroyed by the cattle of the Fulanias • Thieves might steal the trees for wood and charcoal. • The village head is only an tenant • The group fears that in future their children will not be interested in collecting nuts • The group is only interested in fruit and nuts trees • Other trees as fast growing species seem out of their interest

3.4 Stakeholder interest and benefits

For the stakeholder interest and benefits the Forestry Commission, the planning office and the social welfare office were consulted.

The planning Unit is basically in charge of the layout and planning of settlements in the district and therefore is well-versed on issues of land tenure situations in the district. The officer, Mr. George Owes informed us that all the lands in the district belonged to the paramount chief with the chiefs in the various communities being caretakers of the lands. He confirmed again that natural tree tenure issues have to be discussed with the forestry commission. The social welfare deals with ensuring the welfare of people. The social welfare suggested that the REDD+ projects in the region of Nkoranza North adopts the approach of the social welfare's LEAP's (Livelihood Empowerment Against Poverty) an which targets the vulnerable (disable, aged, women) in communities. He stated that, introduction of the share cropping system in these communities will serve as an incentive for farmers to go into tree planting. Plantations can be registered by the owner in National plantation register and this gives a 100 % guaranty for the ownership. But if trees are planted individually on farmland they cannot be registered and would therefore belong to the government. But according to the

Ministry of Land and Natural Resources (MLNR) ²⁶ draft Terms of Reference (2013) this regulation might be soon changed.

4 Discussion

Shea is a viable income especially for women in the region, as it is not related to land access it is targeting as well the poor. The labour and market capacity of the region would allow getting more into Shea production. Interesting for the women would be mixed Shea cashew and mango cropping. They assume that teak and other trees would be more dominated by the man and difficult to market in small scale as side business. In general they would be very interested in planting more trees if they would have access to seedlings. But when they plant the trees on the farmland it has several obstacles: (1) as they cannot declare it as private ownership (during the fallow all people would be allowed to collect). (2) they would have to agree with their husband, who always dream of more machinery which would make a agro forestry system more difficult. (3) They are not able to protect them in a agro forestry system from Charcoal makers and Fulani herders. This is why the women group would like to go rather in the direction of having plantations with only intercropping of food crops in the first years. So they could insure that the trees are planted and in private ownership. But going in to plantations brings as well several disadvantages. (1) the land ownership has to be cleared, either they have to go into sharecropping or they have to buy the land. (2) When it is in a plantation the man will start to claim ownership (3) There would be a problem with people not having access to land for shea plantation (ownership creates exclusion)

The community nursery would be a great solution for them to get more the possibility of access to seedlings but it would not solve the problem of protection and ownership.

5 Conclusions

Piloting REDD+ in a small area, by establishing a CREMA area, and supporting it with production and market facilities would enhance the growth of shea and other trees in the area. Even if it would be a very small start it would have a positive effect of the community with possibilities of a bigger outreach when the markets for shea are established and the Pure Company is working at full capacity. The starting point for the project at the level of policy dialogue with the governmental and traditional leaders of the Nkoranza North region where land and tree ownership of a small area would have to be clarified would be at the level of land and trees ownership.

6 Recommendation

Both pilots are very interesting and should be supported somehow, whether the first pilot in Bedum area needs more technical support to establish clear business plans and to properly manage themselves the plantations but teach as well out growers how to do it in a social, economic and ecological sustainable way. To make the project more REDD+ eligible the component of having a forest recreation area would have to be fostered and better embedded in the project and the out grower scheme.

For the second pilot in the Nkoranza area, the entry point would more be the legal affairs of land and tree ownership where a project could interfere and support the pol-

²⁶ [http://www.fcghana.org/assets/file/Publications/mlnr/Terms%20of%20Reference%20-%20Assessment%20of%20the%20design%20of%20tree%20tenure%20and%20benefit%20sharing%20arrangements%20in%20Ghana%20\(2\)\(1\).pdf](http://www.fcghana.org/assets/file/Publications/mlnr/Terms%20of%20Reference%20-%20Assessment%20of%20the%20design%20of%20tree%20tenure%20and%20benefit%20sharing%20arrangements%20in%20Ghana%20(2)(1).pdf)

icy dialogues at district and national level. Later on the technical and business management supports will be necessary as well.

7 Annex

Annex 1: Cost for planting material food crops

Table 9: Costs for seeds and plantation material (Bedum Breaman-Asikuma- Odoben- Brakwa District; personal communication with 6 farmers and MOFA , Asikuma August 2013)

Crop	Comment	1	2	“best guesses” together with MOFA	
Maize	1 alunka per acre (9kg) Certified seed	6 10	6 10	6	Only in the first year planted
Cassava	For free from neighbours	0	0	0	Always free available
Plantain	0.2 cedis per sucker(Farmer)	40	0	0	Cost only in the first year

Annex 2: Income from food crops

Table 10: Income from food crops (Bedum Breaman-Asikuma- Odoben- Brakwa District; personal communication with 6 farmers and MOFA , Asikuma August 2013)

	Comments	Y=1	Y=2	Y=3	Y=4
Maize	Normally 6 bag 60 cedi 8-12 bags MOFA	240	0	0	0
Cassava	8 t Cassava	80	70	60	0
Plantain	6-8t Plantain	70	90	70	40

Annex 3: Orange plantation.

Table 11: Annual management cost for oranges plantation (Bedum Breaman-Asikuma- Odoben- Brakwa District; personal communication with 2 farmers and MOFA , Asikuma August 2013)

	1		2		“best guesses” MOFA	
Annual management costs	Y1 to Y4	Y5 to Y20	Y1 to Y4	Y5 to Y20	Y1 to Y4	Y5 to Y20
Labour						
Monitoring the trees 30 day to 10 cedis	300	300	300	300	300	300
Weeding	80	40	240	240	240	240
Spraying and applying fertilizer		20	20	20	20	20
Pruning		20	20	20	20	20
Harvest on the field		76		80		80
Carrying costs		54				60

Inputs (Material costs)						
Pesticides /Fungicides /Herbicides		34	22.5	22.5		40
Fertilizer	The farmers did not mention any fertilizer inputs					
Total cedis	380	544	602.5	682.5	580	760

Annex 4: Cocoa production

Table 12 : Cost of cocoa seedlings (Bedum Breman-Asikuma- Odoben- Brakwa District; personal communication with 6 farmers and, CSSVD-CU office (Asikuma August 2013)

	Cost of seedlings Cedis	Number of seedlings per acre	Total costs
1	0.2	500	100
2	0.2	360	72
Assumption	0.2	435 ¹	87

Table 13 Annual management cost for cocoa plantation (Bedum Breman-Asikuma- Odoben- Brakwa District; personal communication with 2 farmers and CSSVD-CU office , Asikuma August 2013)

	Margaret		Ahmed		Best guesses after discussion with CSSVD		
	Y1 to Y2	Y3 to Y20	Y1 to Y2	Y3 to Y20	Y1 to Y2	Y3 to Y20	to
Labour							
Monitoring the trees	300	300	300	300	300	300	
Weeding	200	200	270	270	240	240	
Spraying and applying fertilizer	0	ukw.	40	40	40	40	
Pruning	0	ukw.	90	90	90	90	
Harvest							
Cutting				50		50	
Carrying costs				42		42	
Breaking				56		56	
Inputs (Material costs)							
Pesticides /Fungicides /Herbicides	17.5	17.5	54	54	70	70	
Fertilizer		Ukw.		130	30	30	
Total costs	517.5	ukw.	754	1032	770	918	

Table 14 Annual income cocoa (Bedum Breman-Asikuma- Odoben- Brakwa District; personal communication with 2 farmers and CSSVD-CU office , Asikuma August 2013)

Years	3-5	5-7	8-9	10-30	30-35	35-40
Bags	2	4	8	10	8	6
Cedis per bag	200	200	200	200	200	200
Total	400	800	1600	2000	1600	1200

Annex 5: Oil palm production

Table 15: Annual costs oil palm production

	Ahmed		Best guesses after discussion with MOFA		
	Y1 to Y5	Y5 to Y20	Y1 to Y2	Y3 to Y20	
Monitoring the trees	150	150	150	150	
Weeding	180	90	180	90 ²⁷	
Spraying and applying fertilizer	10	10	10	10	
Pruning	10 ²⁸	10	10	10	
Cutting		192		190	
Carrying costs		144		140	
Inputs (Material costs)					
Fertilizer		110		110	
Total annual costs	350	706	350	706	

Table 16 Annual income oil palm plantation

Years	5	9	15	20	30-35
tons	2	8	15	8	6 ²⁹
Cedis per t	120	120	120	120	120
Total	240	960	1800	960	680

Annex 6: Rubber production

Table 17 Annual management cost for rubber plantation (Bedum Breman-Asikuma- Odoben- Brakwa District; personal communication with 2 farmers and CSSVD-CU office , Asikuma August 2013)

	Y1 to Y5	Y6 to Y40
Labour		
Monitoring the trees	150	150
Weeding	160	160
Spraying and applying fertilizer	10	10
Harvest		
Tapping labour costs		2200
Inputs (Material costs)		

²⁷ The weeding is less when the canopy is big

²⁸ Just in year 3 and after year 5 every year

²⁹ Many farmers only harvest until year 20 as afterwards it is too difficult to cut the bunches

Tapping inputs

Pesticides /Fungicides /Herbicides Fertilizer	80	140
Total annual costs	400	2660

Annex 7: Cedrela plantation

Table 18: Annual management cost of a cedrela plantation

	Y1 to Y9	Y 10
Labour		
Monitoring the trees	150	150
Weeding	160	160
Pruning	60	
Harvest		
Chainsaw operations (10 cedis for food)		2230
Tractor		250
Total costs	370	2790

Annex 8: Ylang Ylang plantation

Table 19 Annual management costs of Ylang ylang

Annual management costs	
Labour Monitoring	150
Weeding (4 times 4 people)	160
Labour for applying pesticides and fertilizer	0
No inputs needed (insecticide in the beginning but marginal)	
Labour for mantainance (cutting)	50
Labour for pruning (included in harvest costs)	
Harvest	
Harvest cost for flowers (including pruning) (5 cedis per tree; 6 times a year;; every two months)	13320

Annex 9: Gliricidia and pepper plantation

Table 20: Establishment costs of Gliricidia and Black Pepper plantation

Establsihment cost of gliricidia and pepper plantation		
	Unit	Cedis
Clearing		150
Felling		55
Lining and pegging		25
Seedlings black pepper (including transport)	444 * 1,5	666
Seedlings glyrisidia	444*0.5	222
Planting Glyrisidia	8 ppl 1 day	80
Planting Pepper		220

Total	1418
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Table 21: Annual management cost of Gliricidia

Annual management costs Gliricidia				Y=1-10	
Running Costs	Labour days/year	Cedis/u nit	Total cedis per year	Total cedis per year	
Labour for monitoring	30	10	300	300	
Labour weeding	4 times people	4	10	160	160
Cutting every 6 months				20	

Table 22: Annual management cost of black pepper

Cost black pepper	Year 1	Year 1-10
Fertilizer (Compost in the first year)	50	0
Mulching with gliricidia leaves	120	120
Control of nematodes (burning firewood)	45	45
Arrangement of vines	80	
Pruning of old leaves		30
Total	295	195

Annex 10 Details on the shea nut calculations

Trees per bag	5-6 trees
Price pure company per kg (driednuts)	50 pesos and max 150 pesos
Yield per tree	17kg (fresh nuts per season)
Yield per tree dried nuts	12.75 kg
Kg per bag (fresh fruits)	106.25
Kg per bag (dried nuts)	85 kg
Selling price per bag (dried nuts)	
Under pressure (not yet dried well)	40-60 cedis
To neighbors (green market)	80-100 cedis
To company (at the right time)	100-120 cedis
Labour	
Labour collection	2 days per bag (dried nuts)
Labour for drying	1 day per bag
Additional Labour sold as pomade	8 days per bag
Cost for the mill per bag	1.5 cedi