CoForEST Sustainable Financing Model

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Outline

- Background
- Objective of the study
- Methodology
- Results and Key findings
- How can the results be applied.
- Recommendations

Background

- Financing of CBFM in Tanzania is donor dependent, erratic and unsustainable. Contributes to Conservation fads.
- Forest-based enterprises in sustainably managed forests have the potential to generate revenue, employment and incomes for rural communities.
- In TFCG and MCP, evidence on revenue generation is clear to CBFM villages where the sustainable harvesting model is practiced.
- Entrepreneurs are allowed to sustainably harvest forest and pay royalties to village government
- The use of royalties from forest products is both on village development projects and financing forest management activities.

Background – cont. -

- Data based evidence to promote sustainable financing is important

- Economic and financial analysis of viability of forest-based business to promote CBFM sustainable financing is called for

- This study carried out to provide important information for setting up or guiding sustainable financing modalities in most CBFM villages in Tanzania.

Main objective

The aim of this study is to determine the financial sustainability of the CoForEST CBFM model and identify lessons learned for CBFM development in Tanzania.

Specific objectives

- To describe the economics of charcoal and timber production for individual producers
- To document community-level revenues and revenue flows from CBFM case study villages.
- To document expenditure patterns in CBFM case studies.
- To identify opportunities and challenges with the current model with a focus on the financial sustainability of the model and potential for scaling-up.
- To present lessons learned and recommendations.

Methodological Approach

- The analytical approach for this study is one that integrates economic and financial analysis elements.
- Economic and financial analyses is used to estimate profit and analyse costs and revenue structures given different production technologies for the forest-based enterprises.
- All costs and revenue accruing from each forest-based enterprise are identified, quantified and valued to enable economic appraisal exercise
- Equation (1) is used to estimate the net value or profit for an individual involved in a forest-based enterprise (charcoal or timber)

$$\boldsymbol{Profit = Revenue - Cost} \quad \textbf{..... (1)}$$

$$\boldsymbol{Revenue = Price \times Quantity} \quad \textbf{..... (1.a)}$$

$$\boldsymbol{Cost = Fixed\ Cost + Variable\ Cost} \quad \textbf{..... (1.b)}$$

$$\boldsymbol{Variable\ Cost = Quantity \times unit\ cost} \quad \textbf{..... (1.c)}$$

Data collection

- This study employed participatory research method that involve and interact stakeholders (producers, traders, village government members and village members – youth, elders, male and female).
- Data were collected using ODK forms loaded onto tablets used for interviewing active charcoal producers and timber producers in October – November 2022
- The questionnaire was developed using the online KoBo Toolbox survey tool.
- Data were collected from interviews with key informants from three selected villages of Ihombwe, Kigunga and Ulaya Mbuyuni in Kilosa District, Morogoro region.
- These villages were selected from the list of Transforming Tanzania's Charcoal Sector - TTCS project villages.

Data collection –cont-

- The study involved interviewer-administered questionnaires with producers of charcoal and timber;
- Key informant interviews and Focus group discussion
- Interviews with producers conducted at each village to capture information on costs, revenue and other views on charcoal and timber business.
- Market survey and analysis at Dar es Salaam to establish potential link model between buyers of charcoal and producers.

RESULTS AND DISCUSSION

1. Forest Resource and Harvesting Rate

- In all surveyed villages, sustainable charcoal and timber production model is implemented through which, registered producers are allotted harvesting coupes.

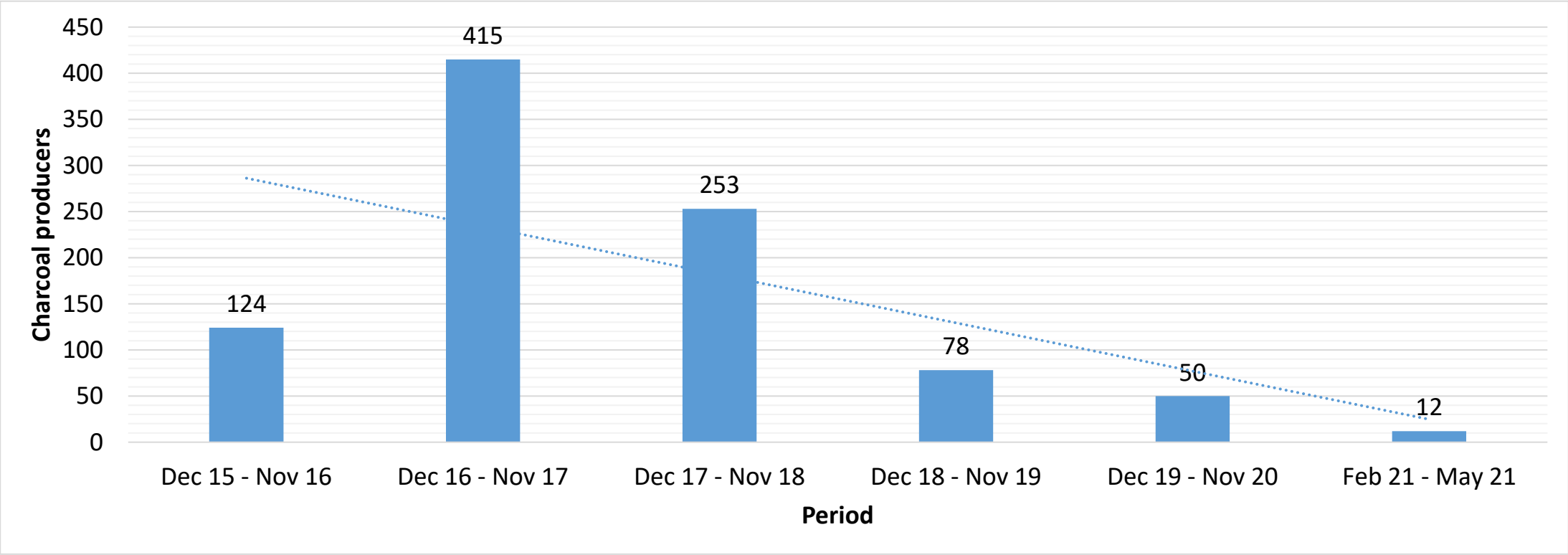
- In each coupe, there is a maximum number of trees to cut per year to ensure sustainability of the forest resources.

- However, the actual harvesting rate has remained below the sustainable harvesting rate in all study villages.

- Actual harvested areas (ha) are less than 10% of the allotted area for sustainable harvesting between December 2019 and May 2020.

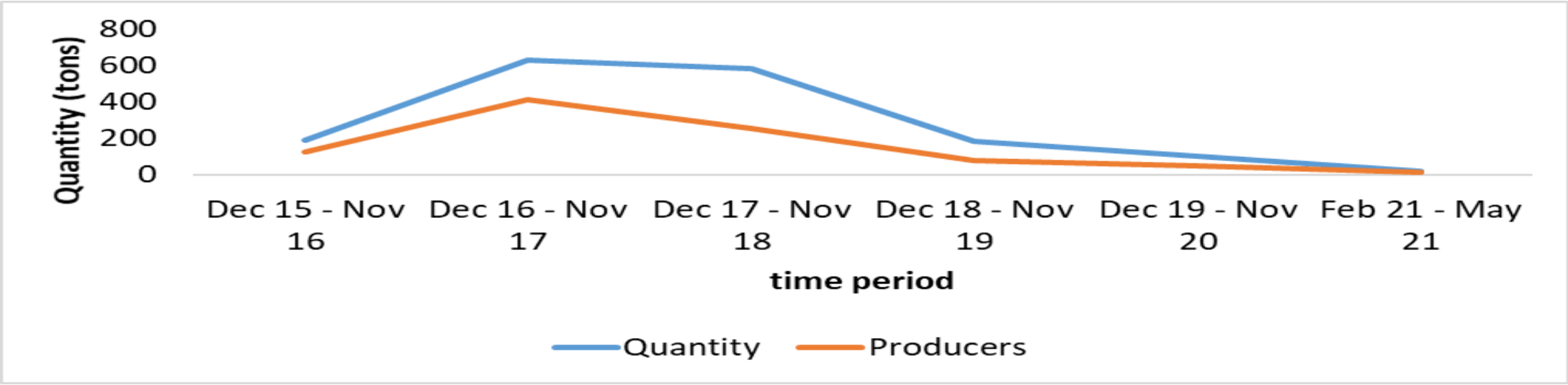
2. Charcoal producers

- Large number of participants and large amount of charcoal produced were in 2015 to 2018
- From 2019, charcoal producers declined due to low charcoal demand, few buyers and hence low income to producers.



3. Trend of charcoal business

- In surveyed villages, charcoal production level decreased by 89.5%, which strongly correlates the number of charcoal producers in the study villages.
- When the number of producers decrease from participating in production, the amount of charcoal produced also reduces.



Income from Charcoal Production

- Charcoal producers received an average income of TZS 34 million per year in the study villages.
- The minimum and maximum income was TZS 1.8 million in 2015 and TZS 87.5 million in 2017 per year.
- The income obtained by charcoal producers in the study villages decreased significantly from 2018 to 2021.
- Income per capita is TZS 247,000 per year
- The decrease in income is associated with the decrease in the number of producers and quantity of charcoal produced (Table 6)

Year	Producers	Income (TZS)	per capita (TZ
2015	12	1,750,000	145,833
2016	142	33,481,500	235,785
2017	421	87,575,000	208,017
2018	224	75,026,000	334,938
2019	75	25,676,000	342,347
2020	46	11,546,500	251,011
2021	12	2,550,000	212,500
Average	133	33,943,571	247,204

Charcoal production practices

- In the study villages, most of activities are done by producers themselves without the use of hired labour.
- This culminates to longer time to complete charcoal production circle and move to next production.
- Charcoal production involves cutting logs, arranging and covering the kiln, burning and pouring out charcoal from the kiln.

Activity type	Days	Percent
Cutting trees or logs (days)	15.8	43
Arranging in kiln (days)	6.5	18
Covering the kiln (days)	3.6	9.9
Burning (days)	10.7	29
Production days	36.6	100

Duration for charcoal production

- On average, to complete the process, producers spend about 36 days (Table 7).

- Cutting tree logs takes longer time period compared to other activities.
- This is done to conform to charcoal making guideline where logs are left for two weeks to dry.

- Dried logs are expected to produce good quality charcoal with low ashes. Also dried logs simplify transport as they become lighter.

Quantity produced

- On average, charcoal producers produce between 23 and 40 bags of charcoal per kiln.
- For the year 2021, the majority of charcoal producers reported to have created 1 kiln between March and October (Table 8).
- Production of charcoal is reported to be constrained by inadequate market as potential buyers (traders) of charcoal visiting the villages for the business has decreased significantly since 2019;
    - Hence dwindling of the charcoal business in the villages.

Month	Average no. of kilns	Average bags	Min	Max
March	1.1	22.9	10	45
April	1.2	24.8	17	40
May	1.5	28	26	30
June	2	40	35	45
July	1	32.5	30	35
August	1	40	40	40
September	1	33.5	19	50
October	1	36	30	48
Average				

Cost of production

- Costs incurred by individual charcoal producer in the study villages have been established
- Charcoal producers incur mainly two types of costs. Cost of tree felling for logs and preparing of kiln and carbonization.
- The study established WTA payment if hired, this was to establish the price of labour for a particular activity.
- Producers also invited fellow producers to work together in cutting and arranging logs - food is provided for that day

A	B	C	D
Month	Average number of kilns	Average cost (TZS)	Total cost (TZS) =B X C
March	1.1	73,150	80,465
April	1.2	79,800	95,760
May	1.5	99,750	149,625
June	2	133,000	266,000
July	1	66,500	66,500
August	1	66,500	66,500
Septemb	1	66,500	66,500
October	1	66,500	66,500
Aerage			107,231

The average production is TZS 107,000 per kiln

Revenue by individual producers

- Average revenue from charcoal making by individuals in the study villages was estimated by considering amount of charcoal produced and the market price (selling price) at the village.
- Individual producers sell charcoal to buyers who visit village at an average price TZS 5,000 and 7,000 per bag(50 kg).
- The estimated average revenue accruing to individual charcoal producer is in the range of TZS 145,000 – 350,000 (Table 11).
- From the survey, charcoal production revenue is realized in 8 months in a year from March to October.

Month	elling price (TZS/50-kg ba			venue (TZS/kiln/pers	
	Mean	Minimum	Maximur	Mean	Maximum
March	6,357	5,000	7,000	145,071	315,000
April	6,100	5,500	7,000	155,400	260,000
May	7,000	7,000	7,000	196,000	210,000
June	5,625	5,000	6,500	228,125	292,500
July	6,000	6,000	6,000	195,000	210,000
August	6,500	6,500	6,500	260,000	260,000
Septemb	7,000	7,000	7,000	234,500	350,000
October	5,833	5,000	7,000	205,000	240,000

Profit from charcoal business

- The average production cost is TZS 107,000 per kiln and average revenue is TZS 312,200.
- The profit or net benefit accruing to charcoal producer is estimated to be TZS 205, 200 per kiln.
- Producers spend 36 days to prepare charcoal in one kiln, this limits the charcoal producers from gaining more profit from charcoal business.

S/N	Items	Amount
1	Charcoal produced per kiln (bags)	44.6
2	Price of charcoal (TZS/bag)	7,000
3	Revenue (TZS)	312,200
4	Average total cost (TZS)	107,000
5	Average Net revenue	205,200
6	Minimum Net Revenue (at cost of TZS 90,000)	222,200
7	Maximum Net Revenue (at cost of TZS 44,000)	268,200

Viability of charcoal business

- Participation in charcoal production is dependent on the availability of charcoal buyers at the village.
- Registered charcoal producers sell charcoal at the village.
- Using the discount rate of 10%, over period of 9 years, the estimated NPV for charcoal enterprises is TZS 641,679.
- Sensitivity analysis reveal, viable business

Scenario	NPV (TZS)	%Change NPV
Baseline	641,679	
Price decline by 5%	573,356	-10.65
Price decline by 10%	505,033	-11.92
Production cost increased by 5%	605,440	-5.65
Production cost increased by 10%	569,201	-11.30

- **Charcoal business is viable in the study villages**

Transaction costs in charcoal business

- Charcoal producers sell directly to buyers/traders of charcoal soon after production - average selling price is TZS 7,000/bag.
- A buyer of charcoal is responsible to pay for market transaction costs (transportation costs, royalty, permit related costs etc).
- Market based transaction costs incurred by buyer is TZS 34,500 per bag.

Item	Amount (TZS/bag)	Trip cost (TZS/100 bags)
Purchase of charcoal from	7,000	700,000
Fee at village	12,500	1,250,000
Levy (District)	2,000	200,000
Bag and rope	1,500	150,000
Packing	1,000	100,000
Transport from EDU	2,000	200,000
Transport to Major market	7,500	750,000
Contingent	1,000	100,000
Total	34,500	3,450,000

❖ Trader realizes TZS 1 - 1.5 million as profit per trip of 100 bags.

Profit by producers and traders

- Profitability of charcoal business is different by producers and traders due to final trading location
- At the village level, producers receive low profit
- At the urban centers, traders received high profit

	Market location	Market based transaction costs	Price	Revenue	Profit
Trader	Dar es Salaam	3,500,000	45,000	4,500,000	1,000,000
Producer	Within village	-	7,000	700,000	700,000
	Dar es Salaam	2,750,000	45,000	4,500,000	1,750,000

✓ Trading charcoal at the urban centers is more profitable to Producers than at the village level

Effect of change in royalty

•Analysis of NPV to establish reasonable gain by charcoal trader at Dar es Salaam market taking into account prices by producers, royalty and price at the Dar es Salaam Market.

•Goal seek analysis is performed in the constructed financial model. The result is that,

i. NPV decreased by 31.5% when price of charcoal remained the same (TZS 5,000 at the village and TZS 45,000 at Dar es Salaam Market).
ii. NPV decreased by 42.5% when price of charcoal at village is TZS 7,000 and price of charcoal in Dar es Salaam market is TZS 45,000.
iii. For the charcoal businessperson to achieve the same NPV before 2019, but with new royalty in place, the model result is that the minimum price at Dar es Salaam market should be TZS 52,750.

•This implies that, with new royalty charge, charcoal business is still profitable as long as producers and traders aim to trade in Dar es Salaam where consumption is high and the current market price is reasonably attractive and enough to offset the market-based transaction costs.

Economics of Timber production

- The study endeavoured to collect relevant information for describing economics of timber production to individual timber producers.
- Such information –including but not limited to amount/ quantity of logs harvested, volume/quantity of timber produced, labour cost for cutting of tree/logs, transporting logs, cost of equipment used (purchase or outsourcing), cost of logging licenses and royalties and price per cubic meter -was to be re-called from the local timber producers over the past twelve months (standard re-call time in economic surveys).
- However, the fieldwork revealed the local timber producers have not managed to operate in any of the TTCS villages in not just the past twelve months but the entire lifetime of TTCS.

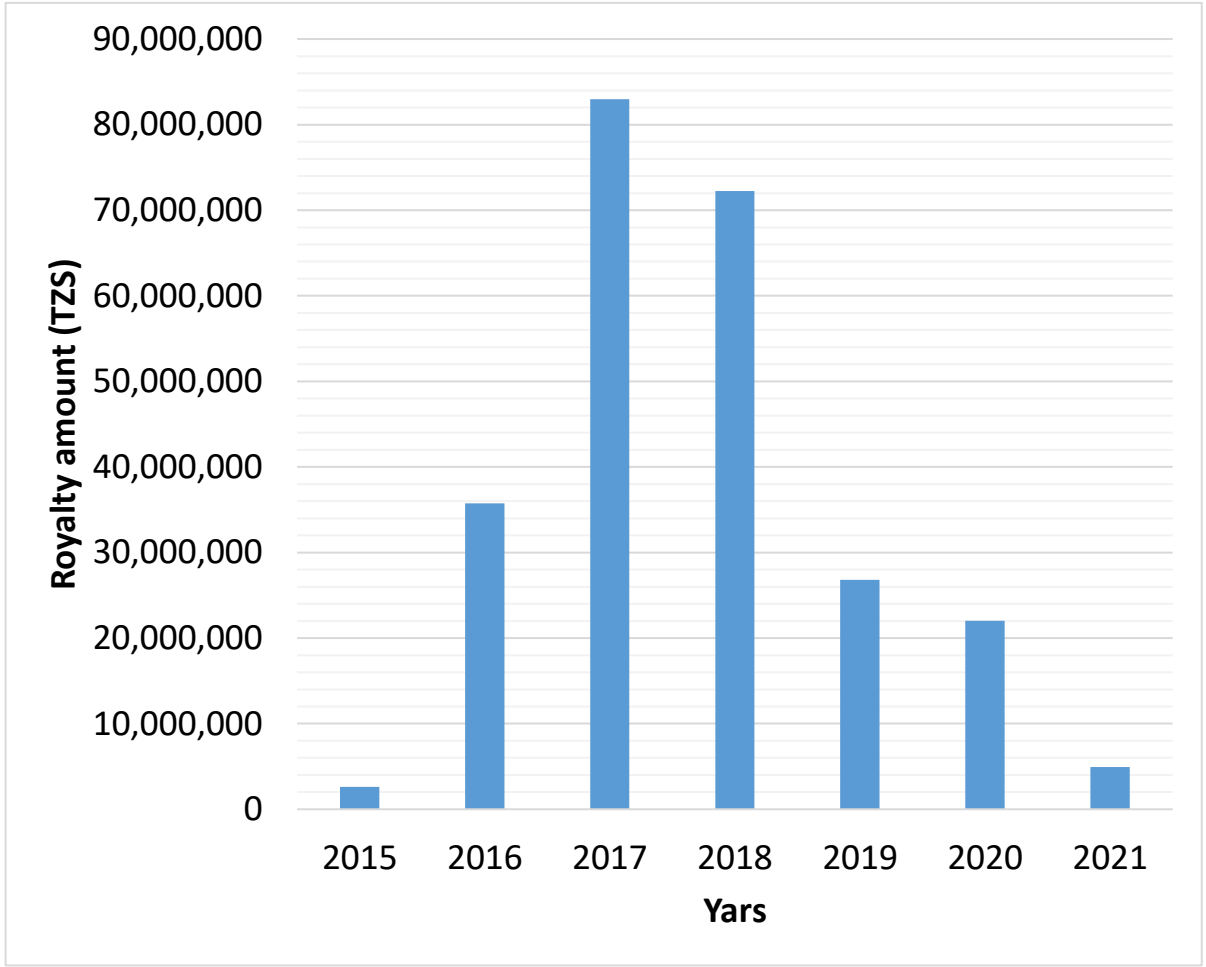
Economics of Timber production

Challenges

- The tendency for timber traders to prefer their own timber producers as they can work for them without demanding significant advance payments.
- Quality work is expected from such experienced timber producers that are often used by timber traders in different natural forests yearound.
- The timber traders prefer chainsaws that ensure faster timber production processes while majority of timber producers in TTCS villages are not trained on how to fell and produce sawn timber using chainsaws.
- Another hindrace block in timber production and trade is traders preference in harvesting class 1A timber especially *Dalbegia melanoxylon* and *Afzelia quanzensis* and class 1B especially *Pterocarpus angolensis* due to high demand in the market. There is limited market for plentiful but lesser known tree species in class III and IV.
- The price for one cubic meters (Tshs 350, 000 for class 1A; Tshs 290,000 for class 1B; Tshs 100,000 for class IV) is much higher than price for softwoods that dominate the local market (class 1 charged Tshs 60,000 per cubic meter). As such, the project villages have failed to attract many timber traders at the government price. Notwithstanding, Ihombwe village –without employing the local timber producers- managed to sell timber wothy Tshs 56, 000,000/- to the standard gauge railway construction project.

Community-level revenue and revenue flows from CBFM case studies

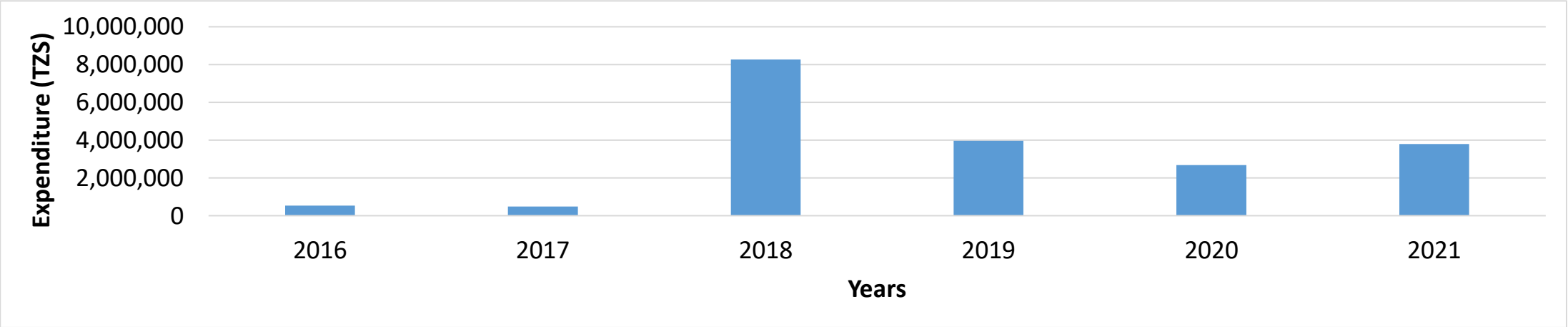
- Analysis of the revenue from royalty charged from charcoal trade show that, villages received large amount from royalties in year 2017 and 2018.
- However, the average revenue from royalties has been declining from year 2019.
- The trend is associated with the reduced number of buyers of the forest products in the study villages.
- Field survey revealed that, implementation of 2019 forest regulation (GN 417) where registered buyers of charcoal started paying royalty of TZS 12,500 per 50kg- bag instead of TZS 6,750.
- Consequently, buyers of charcoal have refrained from project villages and they are more on non-CBFM villages.
- Innovation geared toward increasing participation of villagers in charcoal production is called for



Expenditure pattern on Patrol activities

- The expenditure on CBFM patrol reported to be higher in year 2018 for which TZS 8 million were spent in three villages (Figure 7).
- The declining trend of expenditure pattern in relation to forest management activities is in the same form of declining state of the revenue collected from forest-based enterprises.
- This implies that effective forest management activities are conducted and facilitated by revenue from forest-based enterprises.

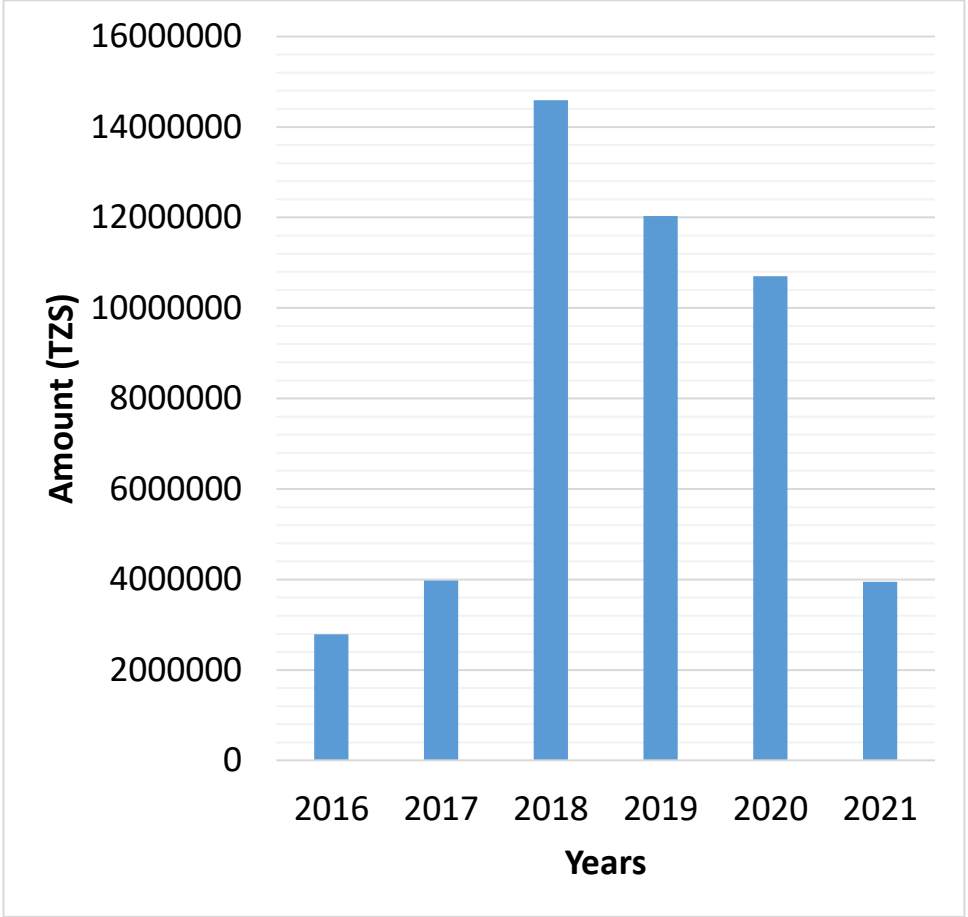
❖Declining charcoal production also leaves no fund to finance forest management activities, thus jeopardizing the sustainability of forest resources in the study villages.



Expenditure by Village Natural resource committee and Village Council

- Assessment of expenditure pattern in relation to natural resource committee and Village Council shows that, the amount spent by these committees has declined.
- The decrease in expenditure is associated with the decreased revenue collected from forest-based enterprises.
- Village natural resource committee holds meeting to discuss issues related to management of forest resources.
- However, the main source of fund to facilitate these meeting has been revenue generated from forest -based enterprises.

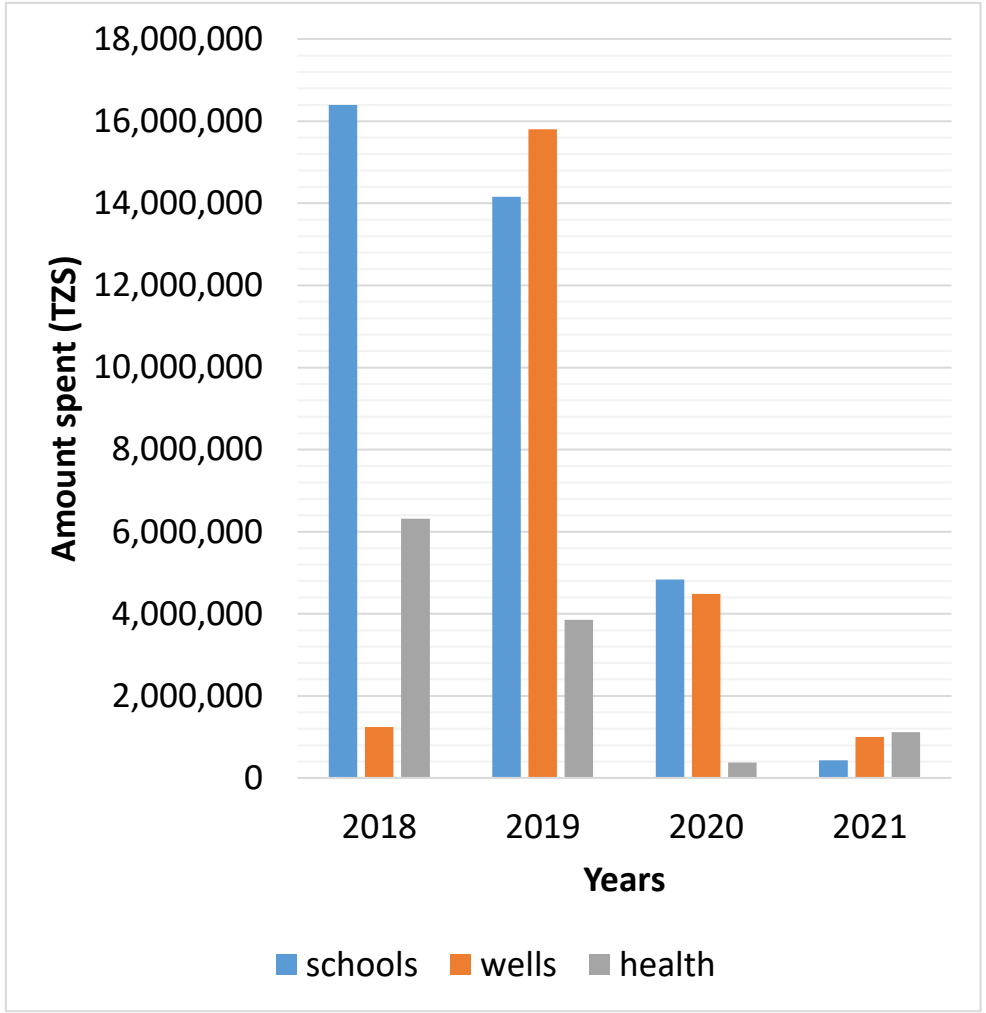
✓Dwindling of revenue generation translate to underfunding of forest management activities.



Expenditure pattern on development projects

- Village governments are implementing community development projects such as construction of classes wells, roads and medical facilities.
- Also, villagers' accesses health insurance cover (CHF) through funds from forest-based enterprises.
- CHF covers mainly people with special needs (old aged and people with disabilities).
- Survey results show that, in the three villages surveyed, expenditure on school related projects has decreased from TZS 16 million in 2018 to only TZS 430,000 in 2021.
- Also, expenditure on health-related activities has decreased from TZS 6.3 million in 2018 to TZS 1.1 million in 2021.

❖The declining trend is mirrored with the declining revenue collection in these villages (Table 22 and Annex 3)



Planned development projects and level of funding requirement

- During field visit, it was pointed out that, about 112 million is needed to finance development projects in the first half of the financial year 2021/22 (Table 20).
- The reduced revenue from forest-based enterprises pose challenge on successful implementation of these projects.
- This situation limits the scope of development initiatives in these villages.

Planned expenditures	Ihombwe	Kigunga	Ulaya Mbuyuni	Total
Health (house)	10,000,000			10,000,000
CHF	900,000			900,000
Office	2,371,000	45,000.00	200,000	2,616,000
House (VEO)	350,000			350,000
MJUMITA	800,000			800,000
%District	1,000,000			1,000,000
Secondary school	20,000,000			20,000,000
store forest product	400,000			400,000
primary school	15,000,000	10,000,000	4,000,000	29,000,000
wells		1,000,000		1,000,000
Fishpond			30,000,000	30,000,000
Patrol	3,500,000.00		3,000,000	6,500,000
Meetings	5,000,000		5,000,000	10,000,000
Total				112,566,000

Opportunities and Challenges TTCS Financial Model

❖**Opportunity**

- Sustainable Charcoal production
- Transparent and efficient Community Monitoring mechanisms

❖**Challenges**

- Government Notice No. 255 of 2017 and Government Notice No. 627 of 2020
- Differential community monitoring mechanisms in TTCS project villages as compared to majority of non-TTCS villages
- Resistance by TFS and District Authorities
- Governance, Corruption and Power issues.
- Unsustainable Sugarcane production
- Expansion of TTCS project to villages closer to main charcoal markets
- Conflicts over boundaries

Lesson learned

Charcoal production and demand mismatch

- Charcoal production was in good condition up to the year 2018, where the number of villagers participating in the production was large resulting to realization of large quantity of charcoal and high income to producers.
- However, since 2019, charcoal business has been declining due to low charcoal demand in the study villages resulting to fewer registered charcoal producers participating in the charcoal production activities, low quantity of charcoal produced and hence low income to producers.

❖ Low production is associated with fewer buyers of charcoal reported to visit and buy small quantity of charcoal (low demand of charcoal).

Royalty changes and charcoal business

- Buyers of charcoal have reduced frequency to buy charcoal from project villages after implementation of 2019 forest regulation (GN 417) which in reality has increased market transaction cost to buyers.
- The effect of change of royalty is found on reduction of charcoal production in villages due to reduced demand.
- The average gain by individual producers of charcoal did not change since all charcoal producers in the study village sell their charcoal to buyers who visit their villages.
- The royalty changes affects indirectly individual charcoal producers from the reduced demand of charcoal by registered buyers.

❖Charcoal business still remain profitable to traders and producers when final trade is at Dar es Salaam market where prices are relatively higher

Role of Charcoal Business on Producer Income

- Contribution of charcoal income to producers is relatively low compared to what is expected by individual charcoal producers who produce and sell charcoal within the village.
- The per capita income has remained around TZS 230,000 per person per year.
- This amount is relatively small for producers to sustain expenditures to fulfil essential household needs.
- This is likely to be disincentive to individual producers to participate in charcoal production.

❖New model is needed to raise income per capita of charcoal producers and hence will be an incentive for more participation in charcoal business.

Window for More Profit to Charcoal Producers

- The market analysis shows that, producers being able to transport their charcoal to Dar es Salaam market would realize profit of TZS 1,750,000 per trip which is higher than a profit of TZS 700,000 per trip producers likely to get if sell charcoal within the village.
- The difference in profit between village market and Dar es Salaam market is TZS 1,050,000 which means that a charcoal producer able to reach Dar es Salaam market will accrue more income than the one selling within the village.
- Nevertheless, producers are faced with challenges like lack of marketing skill and capital to transport charcoal to rich and bigger market like in Dar es Salaam.
- This suggests that individual producer's ability to trade at Dar es Salaam market would be an opportunity to gain more income and motivation to participate in charcoal production.

❖This will reduce dependency on unreliable registered charcoal buyers who are not visiting respective villages to buy charcoal as needed.

Development Projects and Forest Management

- Forest based enterprises have been the main source of revenue used to finance development projects and forest management activities.
- However, the declining trend of community revenue caused by low business performance in the study villages is also negatively affecting development projects and forest resource management in these villages.
- Revenue generation is less compared to expenditure requirement to undertake new projects and also to support the ongoing development expenditure.

❖The current state of declining revenue indicates unhealthy state to community development as well as the sustainability of forest resources.

Community Development projects are faced with reduced funding

- Community expenditure pattern to development projects in project villages has reduced significantly due to low revenue from charcoal and timber businesses in the project villages.
- Dwindling of forest-based businesses in the project village is prominent in the recent years due to reduced charcoal traders in the project villages.
- Forest management regulation changes in 2019 (GN 417) has resulted to increased cost of doing business and hence reduced demand and supply of charcoal/timber originating from CBFM villages.
- Registered traders of charcoal undertake more trading activities in non-CBFM villages than CBFM villages.

❖Business operation by traders in Non CBFM villages is considered to be more profitable to them due to low enforcement of forest management regulations such as size of the bag packed not adhering with a 50kg requirement.

Unplanned production

- Effective business model that links producers and market is missing.
- Production of charcoal and timber relay mostly on buyers who rarely visits villages to buy charcoal and timber.
- In the CoForEST CBFM model villages, production of charcoal and timber is not planned with certainty until a buyer visit the village and place order of charcoal and timber to be produced.

❖Prevalence of unplanned production is a threat to the CoForEST CBFM model villages in achieving financial sustainability.

Recommendation for sustainable financing in CoForEST CBFM model villages

Stimulate charcoal/timber demand and supply

- In CoForEST CBFM model villages, the demand for charcoal/timber produced is low due to reduced number of buyers/investors who do not visits on regular basis to project villages to buy and transport charcoal to consumers in urban areas.
- Reduced buyers have resulted to low moral for villagers to participate in forest-based enterprises and consequently low revenue to village governments which results to non-completion of envisaged development projects.
- The limiting factors for the producers to participate in the wide range of forest-based value chain includes production costs, royalties, permit fee and transport costs.
- Recommendations on production enhancement, increased market access and cost dilution are put forward for consideration to enhance the sustainable forest-based enterprise in project villages

Promote Investment potentials of the CoForEST CBFM model villages

- Charcoal business analysis performed has revealed a sound business avenue for potential investors in forest-based enterprises within CoForEST CBFM model villages.

- The profit generation in a multiple short round of charcoal production and trading cycles, provides good foundation to go with by many youths' female and male.

- In this way, production will be enhanced and consequently realization of adequate revenue for community development projects and sustainable forest management.

Institute low-cost credit to producer groups

- Recommendation is that a group of producers to be facilitated through provision of low-cost credit during the initial take off to participate in the market value chain.
- Credit provided is to facilitate production, transportation and royalty payment costs. Permanent residence and formal registration to be one of the conditions to facilitate traceability of the borrowing group.
- Village government to facilitate permit and fee payment through issuance of guarantee to producer lead person with condition that, buyers of charcoal will have to effect payment to the producer lead person who will be responsible to pay back to the village government within 2 days after trading circle.
- This will work in same way for the transport cost, where traders pay transport cost after sale of the transported goods.

❖This modality if followed will enable producers of charcoal to participate in the entire charcoal value chain and hence realize more benefits from charcoal business.

Facilitate Creation and Piloting of Production – sales link (PSL)model

- There is need to have a mechanism to empower producers to sell charcoal in large markets.
- To achieve the CBFM substantiable financing goal, it is imperative to connect stakeholders in the key charcoal/timber value chain nodes of the production and large markets (Dar es Salaam market).
- Small groups of registered charcoal producers (4 to 5 members) in each village to be formulated and be empowered to access charcoal market in urban areas.
- The empowerment in the form of awareness and confidence creation to transport and sale charcoal in urban areas is important. These groups should be facilitated by linking them with main charcoal buyers in urban areas.
- A group of producers with permanent residence and formal registration as cooperative in the village are considered to be potential producers. This is a group of individuals trained on sustainable charcoal/timber making.

How the results can be applied

- ❖Lobbying and Advocacy of TTCS Model in Tanzania.
- ❑Significant benefits to charcoal producers
- ❑ Local funds for sustainable forest management.
- ❑Funds for development activities in the local governments
- ❖Addressing the packaged challenges facing the TTCS project.
- ❖Policy Brief on the TTCS Financial Model
- ❖Scaling up TTCS financial model in CBFM and non-CBFM villages.

Areas for further research

- ❖ Charcoal and Timber Value Chain Modalities in the TTCS villages
- ❖Opportunities and Challenges for Timber Production and Business in the TTCS villages
- ❖Governance challenges facing the TTCS financial model.
- ❖Entrepreneurship, Marketing and Capital options in the TTCS villages
- ❖ Study of the Policy and Regulatory framework with emphasis on Charcoal and Timber production in CBFM villages
- ❖ A comparative study of Charcoal and Timber production in TTCS and non-TTCS villages with focus on financial sustainability.