



Tanzania Forest
Conservation Group
Shirika la Kuhifadhi
Misititu ya Asili Tanzania



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

TFCG Technical Paper 51

Financial sustainability for forest-based enterprises in community-based forest management areas in Tanzania

Dr. Aloyce Shaban Hepelwa and Dr. Joseph Perfect Mrema

Dar es Salaam
2022

This report was prepared by:
Dr. Aloyce Shaban Hepelwa (PhD)

Department of Agricultural and Natural Resource Economics and Business, University of Dar es Salaam, P.O. Box 35097, ahapelwa@yahoo.com or ahapelwa@udsm.ac.tz

Dr. Joseph Perfect Mrema

Institute of Resource Assessment, University of Dar es Salaam, P.O. Box 35097
josephperfect@ymail.com

On behalf of the project:

Conserving Forests through sustainable, forest-based Enterprise Support in Tanzania' – CoForEST.

The goal of the project is to achieve a sustainable, pro-community natural forest management that transforms the economics and governance of the forest products value chains and contributes to climate change mitigation and adaptation.

The project is designed to achieve its overall goal through three inter-related Outcomes:

Outcome 1: The capacity of national, regional and local authorities and community members is strengthened to implement and scale-up CBFM in ways that diversify livelihoods and reduce deforestation.

Outcome 2: A supportive policy framework and financing mechanism for community based forest management and sustainable natural forest based enterprises is in place

Outcome 3: Research and learning institutions in Tanzania are generating new knowledge about enterprise oriented CBFM and are integrating this in student learning.

The project is financed by the Swiss Agency for Development and Cooperation and is implemented by the Tanzania Forest Conservation Group in partnership with the Tanzania Community Forest Conservation Network (MJUMITA)

Recommended citation: Hepelwa, A.S. and J.P. Mrema 2022. Financial sustainability for forest-based enterprises in community based forest management areas in Tanzania. TFCG Technical Paper 51. p. 71



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

EXECUTIVE SUMMARY

Forest-based enterprises such as charcoal production and timber harvesting in sustainably managed forests have the potential to generate community revenue, employment and incomes for rural communities. Economic and financial analysis is important for assessment of viability of business to promote CBFM sustainable financing. In Tanzania, evidence on revenue generation is clear to many 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 is both on development projects as well as financing forest management activities. Data based evidence to promote sustainable financing is justified by economic and financial analyses carried out to provide important information for setting up or guiding sustainable financing modalities in most CBFM villages in Tanzania.

AIM AND OBJECTIVES OF THE CONSULTANCY

The aim of this assignment is to determine the financial sustainability of the CoForEST CBFM model and identify lessons learned for CBFM development in Tanzania. The study will address the following objectives:

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

KEY MESSAGES

The CoForEST CBFM model villages have had financial sustainability driven from the existing forest-based enterprises. However, over time the income and revenue generated by these enterprises are not perfectly stable due to market-based factors. It has been found that, the CoForEST CBFM model villages are experiencing low demand of charcoal produced in these villages and consequently, some producers have opted to taken on other economic activities. As such, the community revenue used to finance development project and forest management activities is not adequate available.

1. Sustainable Forest based enterprises are financially and economically viable

Forest based enterprises undertaken under the sustainable harvesting model generate high income to producers and revenue to community when producers participate in market value chain node. In Tanzania, charcoal businesses are profitable as long as producers and traders aim to trade in Dar es Salaam Market where consumption is high and the current market price is reasonably attractive enough to offset the market-based transaction costs. Low participation of producers to trade forest products beyond village boundaries have limited the scope of benefits to producers and hence community level in the project villages. As means to enhance financial sustainability, the CoForEST CBFM model should consider addressing this gap.

2. Forest-based enterprises and community revenue

Forest based enterprises have been the main source of revenue used to finance development projects and forest management activities in the study villages. The average revenue from royalty charges has been declining from year 2019. Revenue generated is less than the amount money requirement to support implementation of the ongoing and new development projects as well as financing forest management activities. This situation is jeopardizing villages from realizing development and forest management goals. The basis for community revenue generation in the CoForEST CBFM model villages is royalty charged on the quantity of charcoal/timber produced. Deliberate effort is needed to reverse the situation towards increasing charcoal and timber production and hence increased community revenue. This will enhance financial sustainability in the CoForEST CBFM model villages.

3. Unplanned production

Effective business model that links producers and market is missing. Production of charcoal and timber rely 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. Innovative business model to link local producers with the large charcoal and timber markets is needed. The model will enhance planned production and income by producers and village government execution of development projects and management of forest resources.

RECOMMENDATIONS

1. Institute mechanism to promote production and market access

There is a need to have production enhancement, increased market access and market - based transaction cost dilution to enhance the sustainable forest-based enterprise in project villages. To achieved increased production of charcoal, individual producers should be incentivized in terms of reducing production and market - based transaction costs. Following incentives are recommended to be explored and adopted:

- (i) provision of soft loan to producers and introduction of competition – based reward as an incentive to producers. Village government should adopt a rewarding system to producers after achieving certain level of production. Village government may agree on the amount of reward and the source of reward is deduction of certain amount from the fees collected per month.
- (ii) New model is needed to raise income per capita of charcoal producers and hence will be an incentive for more participation in charcoal business. Producers should be empowered through entrepreneurship training – production and trade to improve individual income gain from charcoal business.
- (iii) There is need to have a mechanism to empower producers to sell charcoal in large markets. 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 should be in the form of awareness and confidence creation to transport and sale charcoal in urban areas.
- (iv) These groups should be facilitated by linking them with main charcoal buyers in urban areas. The study has identified 48 potential charcoal buyers in Dar es salaam who are willing to trade with producers from the project villages given the good quality of charcoal produced in these villages. Buyers' information and procedures to link up are as provided.
- (v) Group of producers to be capacitated with seed capital (TZS 4 million) per group to enable production and transport of minimum of 100 bags of charcoal to Dar es Salaam market. This translates to a profit of 17,500 per bag which higher than TZS 7,000 received at the village market.

2. Initiate investment promotion of the CoForEST CBFM model villages potentials

There is a need to profile the existing investment potential in forest-based enterprises in study villages and promote them to be tapped by potential investors. Charcoal business

analysis performed has revealed a sound business avenue for potential investors in forest-based enterprises within CoForEST CBFM model villages. Investment potentials characterized by relatively small initial capital required (TZS 4 million) is found to attract prospective investors especially youth men and women graduating from colleges. 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. These potentials are yet to be known to many people. Investment promotion initiatives by the CoForEST CBFM model villages will form the base of investors in both production and trade nodes of the charcoal value. In this way, production will be enhanced and consequently realization of adequate revenue for community development projects and sustainable forest management.

TABLE OF CONTENTS

Executive summary	3
1. INTRODUCTION.....	10
2. INTRODUCTION TO THE CoForEST PROJECT	12
2.1 Background to the Consultancy	13
2.2 Aim and objectives of the consultancy	15
3. RESEARCH METHODS	16
3.1 Analytical framework.....	16
3.2 Data collection.....	16
3.3 Population and sampling.....	17
3.4 Data processing and analysis	18
3.4.1 Data cleaning.....	18
3.4.2 Data analysis	18
3.5 Developing Financial and economic model.....	19
4. RESULTS	20
4.1 Situation analysis of forest – based enterprises in study villages.....	20
4.1.1 Timber Production	20
4.1.2 Economics of Timber Production to Individual Producers.....	21
4.1.3 Charcoal production and producer status	22
4.1.4 Trend of Charcoal Production.....	23
4.1.5 Production Efficiency	23
4.1.6 Forest Resource and Harvesting Rate	24
4.1.7 Income from Charcoal Production	25
4.2 Description of Economics of charcoal production for individual producers.....	26
4.2.1 Charcoal production practices	27
4.2.2 Cost of Charcoal Production.....	28
4.2.3 Revenue from Charcoal Business by Individual Producers	30
4.2.4 Profit from Charcoal Production.....	31
4.2.5 Individual charcoal producer and Profit from charcoal production	31
4.2.6 Sensitivity analysis	32
4.3 Charcoal business value chain	33
4.3.1 Charcoal Business Transaction Costs.....	33
4.3.2 Profit from Charcoal trade in Dar es Salaam Market	33
4.3.3 Royalty changes and charcoal business viability.....	34
4.3.4 Effect of royalty change on charcoal business profitability.....	35
4.4 Community-level revenue and revenue flows from CBFM case studies	36
4.5 Expenditure patterns in CBFM case studies	37

4.6	Expenditure pattern on Patrol activities	38
4.6.1	Expenditure by Village Natural resource committee and Village Council	39
4.6.2	Expenditure pattern on development projects	40
4.6.3	Planned development projects and level of funding retirement	41
4.7	Challenges	42
4.7.1	Conflicts over boundaries	42
4.7.2	Timber Production obstacles	42
5.	DISCUSSION.....	42
5.1	LESSONS LEARNED	42
5.1.1	Charcoal production and demand.....	42
5.1.2	Royalty changes and charcoal business.....	43
5.1.3	Role of Charcoal Business on Producer Income	43
5.1.4	Window for More Profit to Charcoal Producers.....	44
5.1.5	State of Charcoal Business to Sustain Community Revenue	44
5.1.6	Development Projects and Forest Management.....	45
5.1.7	Forest-based Enterprises Value Chain Potential	45
5.1.8	Limited Participation of Individual Producers in Forest value chain	46
5.1.9	Community Development projects are faced with reduced funding	46
5.1.10	Sustainable Forest based enterprises are financially and economically viable	46
5.1.11	Instituted sustainable charcoal production	47
5.2	RECOMMENDATIONS.....	47
5.2.1	Stimulate charcoal/timber demand and supply	47
5.2.2	Enhance Production and Thinning Market-based Transaction Costs	48
5.2.3	Facilitate Creation and Piloting of Production – sales link (PSL)model	49
5.2.4	Promote Investment potentials of the CoForEST CBFM model villages.....	49
	References.....	52
	Annex 1: Charcoal producer questionnaire	53
	Annex 2: Timber producer questionnaire.....	58
	Annex 3: CHECKLIST	62
	Annex 4: Expenditure on forest management activities for 2016 to 2021 by Village	68
	Annex 5: Estimated Costs for TFCG and MJUMITA Sustainable Charcoal Establishment Project per village.....	69
	Annex 6: type of expenditure on development projects by study villages.....	70

LIST OF TABLES

Table 1:	Number of respondents by category per location	18
Table 2:	Study villages and their Population size	20
Table 3:	Trend of Charcoal producers from December 2015 – May 2021	23

Table 4: Quantity of Charcoal produced and production per person	24
Table 5: Trend of sustainable forest harvesting in the study villages	25
Table 6: Trend of income from charcoal production	25
Table 7: Average number of Days used for charcoal making by activity type.....	27
Table 8: Charcoal production by individuals (50-Kg bags) in 2021.....	28
Table 9: Average cost of production incurred by individual charcoal producers	29
Table 10: Average cost of charcoal production per kiln.....	30
Table 11: Average price and revenue from charcoal production	30
Table 12: Average revenue by individual charcoal producers	31
Table 13: Discounted cashflow for charcoal business.....	32
Table 14: Net Present Value for different scenarios.....	32
Table 15: Charcoal trade and market-based transaction costs	33
Table 16: Profit to Producer and trader and village and Dar es Salaam markets	34
Table 17: Net Present value when royalty is TZS 6,750.....	35
Table 18: Net Present value when royalty is TZS 12,500.....	35
Table 19: Community revenue from royalty charge (TZS).....	37
Table 20: Expenditure on forest management activities for 2016 to 2021	38
Table 21: expenditure to facilitate meetings for forest management issues	39
Table 22: Expenditure on development projects by study villages	41
Table 23: Current and planned expenditure on community development projects	41
Table 24: Name of potential charcoal buyers visited in Dar es Salaam.....	50

LIST OF FIGURES

Figure 1: Active charcoal producers in the study villages from December 2015 – May 2021	22
Figure 2: Trend of charcoal produced and producers between December 2015 and May 2021	23
Figure 3: Charcoal production per person between December, 2015 and May, 2021.....	24
Figure 4: Trend of per capita income received by charcoal producers in the study villages	26
Figure 5: Percent of days by Charcoal making activity.....	27
Figure 6: Trend of revenue from royalty for 2015 – 2021	37
Figure 7: Trend of expenditure (TZS) on forest management activities.....	38
Figure 8: Trend of expenditure by Village Natural resource committee	39
Figure 9: Expenditure pattern on community development projects	40

1. INTRODUCTION

Community-based forestry (CBF) emerged in the 1970s and 1980s as an alternative to industrial forestry that characterized forest management in much of the global south during the colonial and early post-colonial periods (Gilmour et al., 1989). Within Tanzania's forest sector, Community Based Forest Management (CBFM) became the most important program and implementation guided by policy, Acts and guideline since 1998. The National Forest Policy approved in 1998, followed by the enactment of Forest Act 2002 and Community Based Forest Management guidelines. In many countries, CBF began with a focus on providing subsistence goods to communities and has since transitioned to a greater focus on commercial forest products (Gilmour, 2016). Community-based Forest management has become increasingly widespread in Africa since the 1990s as an approach to conserving local forests while contributing social and economic benefits to local communities. Community forests (CFs) can sell forest goods and services to generate revenue for community benefit. Increased understanding of whether and how CFs can be economically viable is important for assessing their potential to alleviate rural poverty and deliver benefits to local communities. For CBFM to be sustainable over the long term, it must meet environmental, social, and economic objectives (Burivalova et al., 2017).

Forest-based enterprises such as charcoal production and timber harvesting in sustainably managed forests have the potential to generate employment and incomes for rural communities; and to incentivize communities to choose to allocate land for natural forests, rather than agriculture. However, communities are faced with some key challenge in identifying commercialization strategies to realize the full economic benefits from CBF management (Gilmour, 2016). Communities are establishing forest-based enterprises with the goal of maximizing profit. Many of the enterprises in CBFM forests are assumed to be individual and group-based forest enterprises and provides a very different economic paradigm from the traditional model of the firm as a private enterprise (Antinori 2005). From the traditional microeconomic theory of the firm, enterprises are established to maximize profit by the business owners (entrepreneurs). The management and analysis of financial data can be difficult for any small enterprise but can be especially tough for community-based forest enterprises in developing countries (Humphries and Holmes 2015).

Economic and financial analysis is important for assessment of viability of business and provide opportunity for the techniques to be applied in the forest – based enterprises. While

these enterprises often quickly learn the technical aspects of forest management, many struggle in the process of becoming viable businesses. Including transaction costs in an economic study may help to examine the nature of costs and benefit, and their impact on different stakeholder groups. However, measurement of transaction costs is not so direct (Benham & Benham (2000)). Analysis of forest-based businesses in the CBFM villages opens up another challenge with regard to lack of data recording transaction costs and revenues. Tools to monitor and manage their financial data, i.e., costs associated with production and income from sales are not adequately available in villages and most villagers mandated to perform the monitoring of the CBFM activities are not well equipped to do that. Unavailability of key facilities such as data storage devices has remained to be the main challenge in assessing the financial viability of the CBFM enterprises in developing countries and Tanzania in particular. Consequently, to calculate total costs per activity, depreciation value of machinery, net income, or rate of return becomes an uneasy task in most cases.

Noticeable Government efforts through implementation of various conservation programmes with adequate funding from international donors have been emphasizing on the sound data capture tools important to guide the evaluation of programmes' effectiveness with regard to sustainability of forest resources. Good data and information capture is critical to ensure the valid financial viability of these enterprises and the distribution of financial benefits to the communities involved. In many developing countries, communities own or control approximately 31% of forests (Rights and Resources Initiative, 2012) and many communities use these forest landscapes to obtain timber and non-timber forest products which form an important contribution to welfare development. From the realized developmental benefits emanating from forest-based enterprises, communities are increasingly participating in timber and charcoal enterprises. Effort to support development of community-based forest enterprises (CFEs) for the commercial sale of forest products and/or services is a necessary endeavour. These enterprises be at the individual or family or community levels would have sound contribution in generating revenues. Global estimates indicate that, in many countries up to 80 % or 90 % of forest-based enterprises are small and medium (Mayers 2006) and play an important role in rural livelihoods diversification. Community based forest management (CBFM) in Tanzania is aimed at enhancing forest governance, conserving forests, improving local livelihoods and contributing towards climate change mitigation. However, communities are rarely in a position to voice their arguments for forest management activities that maximize their net

benefits from the forest and fulfil livelihood needs. Effort is needed to inform the best way of utilizing forest resources and appreciate the need for the sustainable management.

In Tanzania, evidence on revenue generation is clear to many CBFM villages where the sustainable harvesting model is practiced. Villagers have managed to implement many development projects through own funds coming from forest-based enterprises. Entrepreneurs are allowed to sustainably harvest forest products and pay royalties to village government. The use of royalties is both on development projects as well as financing forest management activities. With this model, benefit sharing is vivid whereby both communities benefit as well as forest resources are managed in sustainable manner. For sustained mutual benefits, forest-based enterprises ought to be the source of sustainable CBFM financing. However, expansion and implementation of CBFM in Tanzania is hampered by erratic, unreliable and unsustainable financing mechanisms that are highly donor dependent. Data based evidence to promote sustainable financing is justified by economic and financial analyses carried out to provide important information for setting up or guiding sustainable financing modalities in most CBFM villages in Tanzania.

2. INTRODUCTION TO THE CoForEST PROJECT

With financial support from the Swiss Agency for Development and Cooperation, the Tanzania Forest Conservation Group (TFCG) in partnership with the Tanzanian Community Forest Conservation Network (MJUMITA which is the Swahili abbreviation for Mtandao wa Jamii wa Usimamizi wa Misitu Tanzania) are implementing the project 'Conserving Forests through sustainable, forest-based Enterprise Support in Tanzania' – CoForEST. The project goal is a sustainable, pro-poor, community natural forest management that transforms the economics and governance of the forest products value chains and contributes to climate change mitigation and adaptation. The project has three major outcomes:

Outcome 1. Central Government, Local Government Authorities, Non-Governmental Organisations (NGOs) and the private sector are supporting communities to reduce deforestation and diversify livelihoods by establishing, implementing and benefitting from Community-Based Forest Management (CBFM), including sustainable natural forest-based enterprises.

Outcome 2. A supportive policy framework for CBFM and sustainable natural forest-based enterprises is in place.

Outcome 3. Research and learning institutions in Tanzania are generating new knowledge about enterprise-oriented CBFM and are integrating this in student learning. The three-year project includes a research component that seeks to generate new knowledge about enterprise-oriented CBFM through a programme of research on CBFM and forest-based enterprises, under Outcome 3. It is envisaged that the results of the research will feed into the awareness raising and policy dialogue activities under Outcome 2, and into the capacity building work under Outcome 1.

These Terms of Reference contribute to all outcomes of the project generally, and specifically to:

Output 3.1. A programme of research on CBFM and forest-based enterprises. The project works with 30 villages in Morogoro Region and 4 villages in Kilolo, Ruangwa, Nachingwea and Liwale Districts. The project's awareness-raising and capacity-building components have a national scope.

2.1 Background to the Consultancy

According to a recent survey, there are over 1,600 Village Land Forest Reserves -VLFRs in Tanzania, covering > 2.6 million hectares (FORVAC, 2021). With over 20 million hectares of forest and woodland on village land, there remains considerable scope to scale-up CBFM. Scaling-up CBFM requires investment. Resources are needed to establish new governance mechanism and build communities' capacity to implement CBFM. Once a village land forest reserve is established, resources are needed to implement CBFM including covering the costs of technical support and forest monitoring activities. Accessing funds for establishing CBFM has been a challenge for communities and local government authorities in Tanzania, and there has been a reliance on donor-funding to cover CBFM start-up costs. With the recent emergence of sustainable forest-based enterprises including timber and charcoal in CBFM areas, there has been growing interest in developing CBFM financing models that connect with these enterprises. This trend is not restricted to Tanzania and the mechanics of community forestry are emerging as an important research frontier. During Year 1 of the CoForEST project, stakeholders identified five key areas of research in relation to sustainable financing for CBFM:

- i. Review existing domestic and international CBFM funding opportunities
- ii. Examine the possibility of linking existing CBFM interventions with payment for environmental services
- iii. Assess capacity at different levels for fundraising for CBFM

- iv. Assess innovative models for financing CBFM
- v. Evaluate costs for establishing and sustaining CBFM

In 2020, a first study was commissioned to address the first four of these objectives. The objectives of the study were:

- Review existing domestic and international CBFM funding opportunities for scaling up and sustaining CBFM
- Analyse different mechanisms for local government authorities in allocating resources to provide long-term support, including through the use of revenues from CBFM areas
- Analyse different mechanisms for central government in allocating resources to provide long-term support for communities in managing CBFM, including through TFS and / or FBD
- Analyse the barriers to local and central-government financing for providing long-term support to manage VLFRs
- Make recommendations around the changes that can be made that would result in LGAs spending resources on supporting CBFM and scaling-up CBFM
- Propose innovative models for financing CBFM

Key conclusions and recommendations from the 2020 CoForEST research on sustainable financing for Community-Based Forest Management were:

- financing is an important aspect in ensuring the sustainability of CBFM. There is a need to expand and diversify financing mechanisms and sources of finances in order to sustainably manage the established CBFM and scale-up CBFM in other areas.
- there are existing potential financing mechanisms from different stakeholders.
- the current financing of CBFM is mainly donor-dependent, inadequate, unreliable and unsustainable. Tanzania Government should take her responsibility to finance the forests including those under CBFM.
- both Local Government Authorities and Central Government should have positive attitude towards financing of CBFM by allocating adequate budget for the same. Development partners on the other hand, should only supplement to the Government efforts, contrary to the current situation where development partners are the leading supporters of the management of CBFM.
- there is a need to review some of the forest-related guidelines and regulations so as to give forest sector (including CBFM) the importance it deserves (BACAS, 2021).

The study recommendations for further research include:

Establishing facts and figures on activities that are involved in implementing CBFM, costs involved in establishing CBFM, costs involved in managing CBFM, products and quantities harvested from CBFM forests, revenues accrued from such harvests and uses of revenues accrued. This will form the basis for bargaining and justification on funds being sought from various sources to sustain CBFM. Facts/figures on CBFM will help convince the central government/district councils/village governments to prioritize CBFM during budgeting just like it is with other sectors such as education, health and water.

¹ Hajjar, R., Oldekop, J.A., 2018. Research frontiers in community forest management. *Current Opinion in Environmental Sustainability* 32, 119–125. <https://doi.org/10.1016/j.cosust.2018.06.003>

The recommendation to further investigate CBFM costs and revenues is aligned with the initial stakeholder recommendation to evaluate costs for establishing and sustaining CBFM. This provides the basis for this consultancy.

2.2 Aim and objectives of the consultancy

The aim of this assignment is to determine the financial sustainability of the CoForEST CBFM model and identify lessons learned for CBFM development in Tanzania. The study will address the following objectives:

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

3. RESEARCH METHODS

3.1 Analytical framework

The analytical approach for this study is one that integrates economic and financial analysis elements. This helps to increase understanding of whether and how community forests can be viable and therefore determine the financial sustainability of the CoForEST CBFM model in the study area. The viability analysis is important for assessing the potential of CBFMs to alleviate rural poverty and deliver benefits to local communities. Economic and financial analyses is used to estimate profit and analyse costs and revenue structures given different production technologies for the forest-based enterprises. Economic analysis on viability involves an assessment of the net benefits of the forest-based enterprises in the study villages. All costs and revenue accruing from each forest-based enterprise are identified, quantified and valued to enable economic appraisal exercise. Net value is used to evaluate the relative profitability of forest-based enterprises in the study area per type of forest-based enterprise and per technology used. Equation (1) is used to estimate the net value or profit for an individual involved in a forest-based enterprise (charcoal or timber)

$$Profit = Revenue - Cost \dots\dots\dots (1)$$

Where $Revenue = Price \times Quantity \dots\dots\dots (1.a)$

$$Cost = Fixed Cost + Variable Cost \dots\dots\dots (1.b)$$

$$Variable Cost = Quantity \times unit cost \dots\dots\dots (1.c)$$

Furthermore, the established net benefit is subjected to economic and financial analyses to ascertain the viability of each of the forest-based enterprise. The economic and financial model is developed to facilitate the viability assessment of the forest -based enterprises.

3.2 Data collection

This study employed participatory research methods to ensure significant involvement and interaction with stakeholders (charcoal producers, timber producers, traders of charcoal and timber, buyers of timber and charcoal produced, village government members and representative 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. The questionnaire (Annex 1) was developed using the online KoBo Toolbox survey tool. It was pre-tested with 3 charcoal producers in Kigunga village and the

results from the pre-testing were included in the final survey as there were no significant problems experienced during the pre-testing stage. 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. Surveys were conducted from October to November 2021 and aimed to collect information on timber and charcoal making and revenue and expenditure. The study involved interviewer-administered questionnaires with producers of charcoal; key informant semi-structured interviews with village government officials and traders (Annex 2); market survey to collect price data, quantity of charcoal produced and sold; and review of key policies and other relevant documents. Interviews with charcoal and timber producers were conducted at each village to capture information on costs, revenue and other views on charcoal and timber business in the study village.

The study employed random sampling of individual village members involved in forest-based enterprises for in-depth interviews. The focus was to ascertain the relevant information on revenues and costs emanating from forest-based enterprises (charcoal and timber production). In order to have representative respondents, the villages were clustered according to existence of timber and charcoal enterprises. The number of active registered charcoal and timber producers in a village was used as a criterion for selecting a village. The study reviewed TFGC annual reports and established villages with registered active producers of charcoal and timber. Since the ToR required to study only 3 villages, the team selected villages that are distant in order to capture diversity information on charcoal and timber production.

3.3 Population and sampling

The charcoal/timber value chain involves four key steps: production, transportation/traders, retail/wholesale and consumption (Sander, Gros, & Peter, 2013). Reflecting on this, the study included questionnaire interviews with actors along the value chain including producers, transporters/traders, retailers and wholesalers. Producers were selected strategically from three charcoal-producing villages in Kilosa. The study interviewed one buyer who visited to buy charcoal in the Ulaya Mbuyuni village in November 2021. Due to low turnover of buyers of charcoal in the project area, it was not easy to interview other potential buyers as they are not buying in these villages.

Table 1: Number of respondents by category per location

Place	Key Informants	Producers	FGD1	FGD2	Buyers
Kigunga	3	8	16	10	-
Ihombwe	4	5	16	6	-
Ulaya Mbuyuni	3	6	14	7	1
Dar es Salaam	-	-	-	-	48
Total	10	19	46	23	49

Source: Filed survey 2021

The study also performed market analysis at Dar es Salaam to establish potential link model between buyers of charcoal and producers. The market research in Dar es Salaam was conducted in three districts – Ubungo, Ilala and Temeke. These are areas found to have large number of charcoal stores and majority of buyers of charcoal are involved in trade of charcoal from natural forest. At first, the study established locations of buyers and then visited each of the buyer. To have good number of buyers, researchers used snowball method to get other potential buyers for interview. The information gathered were (i) type of charcoal (ii) volume of charcoal in the store (iii) whether they need more charcoal (iv) selling and buying price per bag and other units used (v) general view on charcoal trade – regulations, availability, customers etc

3.4 Data processing and analysis

3.4.1 Data cleaning

Data cleaning was done during the data collection period primarily using dashboard¹ report. The data manager pulled out data regularly from the server and examined the data. Any discrepancies were communicated with survey coordinator, supervisors and team leaders on progress and relevant changes made prior to the data analysis.

3.4.2 Data analysis

Quantitative data were analysed using a computer software (STATA). Frequency tables and cross-tabulation were employed in order to measure and assess the coverage and attitudes towards the outcomes of interest across the villages in relation to financial

¹ Dashboard reporting is a visual representation of key variables and be able to identify any problem emerging during data collection. Dashboard visuals provide charts and graphs to give an at-a-glance vision of performance.

sustainability from forest-based enterprises. The study prepared descriptive statistics from the results of the producers' questionnaires to provide an overview of quantity produced, cost of production and revenue and compared these with results reported in project progress reports.

3.5 Developing Financial and economic model

The Economic and Financial model was constructed in excel and used in establishing financial viability of the forest-based enterprise in the study villages. The net benefit was analysed to take into account future benefits given envisaged changes in costs incurred by producers and changing market conditions and policies. Key economic variables that are subject to change with time are considered. The extent of change is determined by considering a range of possible changes. In this case, price change and also production costs were considered during scenario analysis. The study performed Discounted Cashflow (DCF) analysis² and establish financial performance indicators – Net present value (NPV) of the cashflows generated by the enterprises. NPV is summed discounted Net benefits less summed discounted costs. The NPV equation (2) is used in constructing the EXCEL based Economic and Financial model:

$$NPV_{CE} = \frac{CE_NET_REV_0}{(1+R)^0} + \frac{CE_NET_REV_1}{(1+R)^1} + \dots + \frac{CE_NET_REV_T}{(1+R)^T} \dots\dots\dots (2)$$

Where NPV_{CE} represents NPV for forest enterprise; $CE_NET_REV_0, CE_NET_REV_1, \dots, CE_NET_REV_T$ represents the net revenue (profit) from the forest enterprise in time period of analysis (period 0 to period 10) and R is the appropriate discount rate. An appropriate discount rate and time horizon for DCF analysis model was obtain from the money market records provided by Bank of Tanzania.

²Spreadsheet with revenue, cost, net benefit, discount rate is linked to estimate the present value of a product for a specified period of time (say 5 years). The summation of the present value for the period of analysis gives the net present value – key indicator variable for viability analysis

4. RESULTS

4.1 Situation analysis of forest – based enterprises in study villages

Three study villages visited – Ihombwe, Kigunga and Ulaya Mbuyuni has total population of 7,600 people and 1,450 household. The average number of household members is 5.2 (Table 1). In these villages, charcoal production is dominant, and producers have received training on sustainable harvesting model. Other economic activities by village members are crop farming to large extent and small-scale livestock keeping.

Table 2: Study villages and their Population size

Village	Number of Household	Male population	Female population	Total population	% Study site population
Ihombwe	530	1,462	1,638	3,100	40.8
Kigunga	347	602	633	1,235	16.3
Ulaya Mbuyuni	581	1,617	1,640	3,257	42.9
Total	1,458	3,681	3,911	7,592	100

Source: Village Government Offices and Field Survey 2021

4.1.1 Timber Production

Timber harvesting is a potential forest-based business in these villages; however, the operation of the business is still at a low level by villagers. From the field survey, there is yet to be direct involvement of villagers in timber production. Timber traders prefer their own timber producers who are experienced and produce quality timber than employing labour from the village. The timber traders prefer to use chainsaws that ensure faster timber production processes while the majority of timber producers in TTCS villages are not trained on how to fell and produce sawn timber using chainsaws. Also, the price of timber from natural forests is higher than the price of timber from plantation forests. The other hindrance block in timber production in the TTCS villages is traders' preference in harvesting class 1A timber especially *Dalbergia melanoxylon* and *Azelia quanzensis* and class 1B especially *Pterocarpus angolensis* due to high demand in the market. There is limited market for abundant class III and IV (lesser-known tree species) in the TTCS villages. On the other hand, the current price for one cubic meter (TZS 350, 000 for class 1A; TZS 290,000 for class 1B; TZS 100,000 for class IV) is much higher than price for timber from plantation forest that dominate the local market (class 1 charged around TZS 70,000 per cubic meter). As such, the TTCS villages have failed to attract significant timber traders at the charged government royalties.

4.1.2 Economics of Timber Production to Individual Producers

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. The study noted just lhombwe village among the three studied villages managed to produce and sell timber worthy Tshs 56, 000,000/- to the standard gauge railway construction project in 2019/2020 without employing the local timber producers. The researchers could not invest extra efforts, time and transaction costs to trace such timber producers around the country because the timber production period in lhombwe village is well outside the standard recall time in economic surveys (12-month recall period).

To further contextualize the timber production dynamics in TTCS villages, various key informants noted there is tendency for timber traders visiting TTCS villages to prefer their own timber producers (from non-TTCS project villages) as they can work for them without demanding significant advance payments. The key informants also revealed it is unlikely for such seasoned timber producers to offer performance excuses or delay timber production. Quality work is expected from such experienced timber producers that have been used by timber traders in different natural forests over years.

Moreover, the timber traders prefer chainsaws that ensure cost-effective and faster timber production processes while majority of local timber producers in TTCS villages are not trained on how to fell and produce sawn timber using chainsaws. Much as the use of chainsaws in production of sawn timber is discouraged through regulatory penalties, the respondents at district and village levels noted this particular aspect of timber production is ignored by both foresters at various inspection gates and timber traders. It was also pointed out the timber traders do not entrust timber producers in the TTCS villages (majority of them are strangers to them) with their valuable working tools especially chainsaws.

Regarding the charged timber royalties, a local timber producer in Ihombwe village commented: “the government should revisit these timber royalties to enable timber producers to commence activities because it is unlikely to receive any trader at the village at such higher government royalties. If we produce timber no timber trader would afford and the piles of timber will remain at the village office”. When asked whether the timber group and TFCG sat down with the government and discussed on how the timber activity could emerge, another key informant stated: “Actually, there should be a reliable market for someone to work for about a month in the forest to produce timber. Even if, we (timber producers) produce timber where can we sell? We cannot produce timber to pile up and abandon at the village office. There are many researchers, TFCG and district officials who discuss this issue in village meetings but I still think the government has not looked at it and that is the biggest obstacle. These obstacles on legal timber production foster and legitimize illegal timber production activities.” Besides, the villagers noted that affordable timber in Kilosa district comes from plantation forestry in Iringa region (according to GN 627 of 2020 the royalties set for such softwood species such as *Pinus spp* and *Cupressus spp* are much lower).

4.1.3 Charcoal production and producer status

During the initial years of the project, villages registered large numbers of charcoal producers, who were trained on sustainable charcoal production. Study results shows that, the number of active charcoal producers has declined significantly in the selected study villages. For the period between 2015 and 2021, charcoal producers decreased by 90% (Figure 1 and Table 3). The decreasing number of active charcoal producers is associated with low charcoal demand in these villages. Reported low demand of charcoal emanates from decreased investors or traders registered to buy charcoal from producers in project villages.

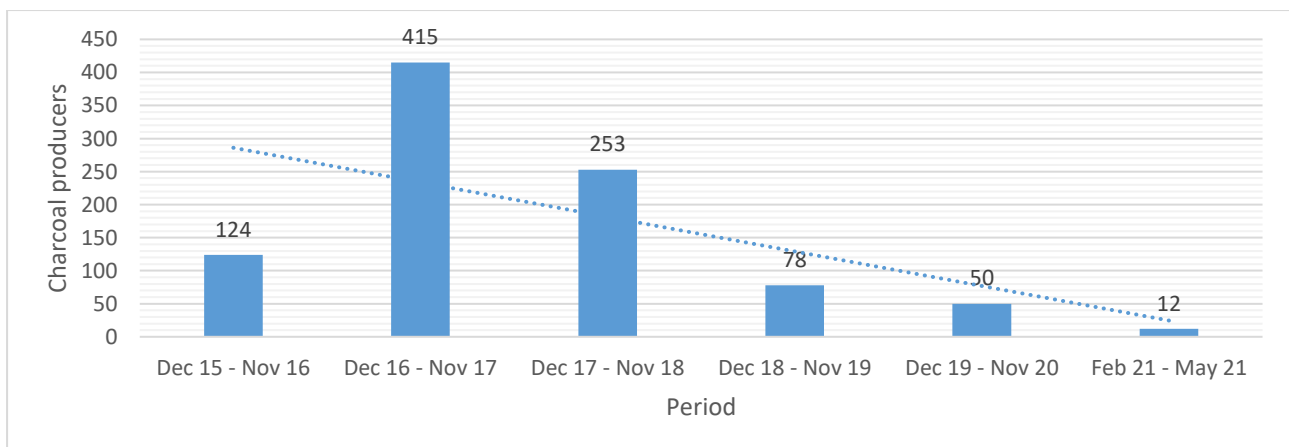


Figure 1: Active charcoal producers in the study villages from December 2015 – May 2021

Table 3: Trend of Charcoal producers from December 2015 – May 2021

Period	Ihombwe	Kigunga	Ulaya Mbuyuni	Total
Dec 2015 - Nov 2016	37	70	17	124
Dec 2016 – Nov 2017	126	195	94	415
Dec 2017 - Nov 2018	85	59	109	253
Dec 2018 - Nov 2019	38	8	32	78
Dec 2019 - Nov 2020	16	23	11	50
Feb 2021 - May 2021	4	6	2	12
% Change	-89.2	-91.4	-88.2	-90.3

Source: TFCG and Field survey 2021

4.1.4 Trend of Charcoal Production

The average production of charcoal in the selected study villages shows a declining trend between December 2015 and May 2021. In surveyed villages, charcoal production level decreased by 89.5% (Figure 2 and Table 3) which strongly correlates the number of charcoal producers in the study villages. This suggests that when the number of charcoal producers decrease from participating in charcoal production, the amount of charcoal produced also reduces.

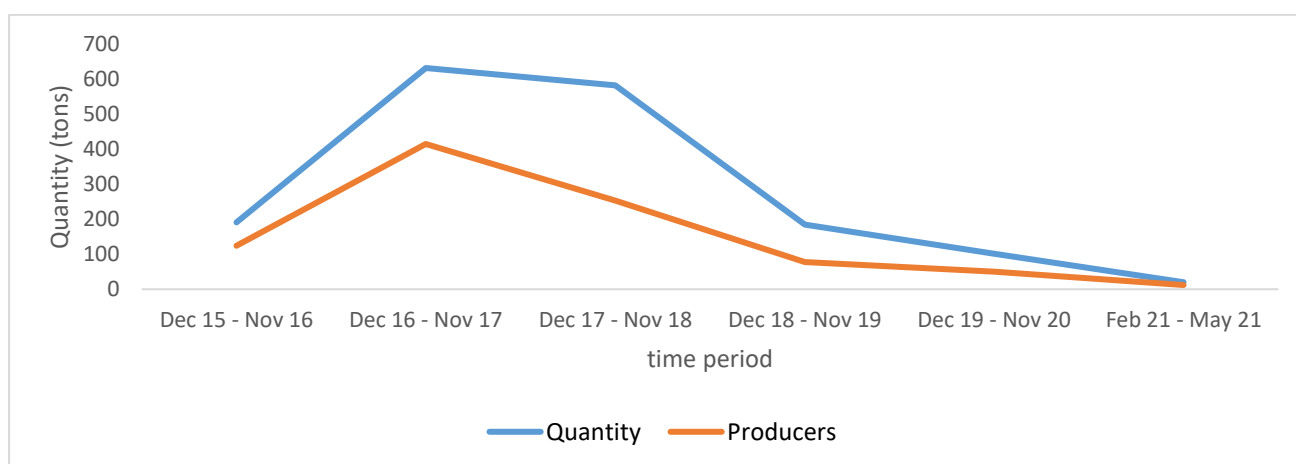


Figure 2: Trend of charcoal produced and producers between December 2015 and May 2021

4.1.5 Production Efficiency

The quantity of charcoal produced and the number of people participated in production are related to indicate production efficiency. The results show that, while the number of producers has decreased significantly, the per capita production increased from 1.54 ton/person to 2.37 ton/person between December 2015 and November 2016, and December 2018 and November 2019 respectively. However, the trend decreased to 1.67 ton/person between February and May 2021. These findings suggests that, over time, charcoal producers gained more skills and experience which cumulatively resulted into efficiency in charcoal production (Figure 3 and Table 4).

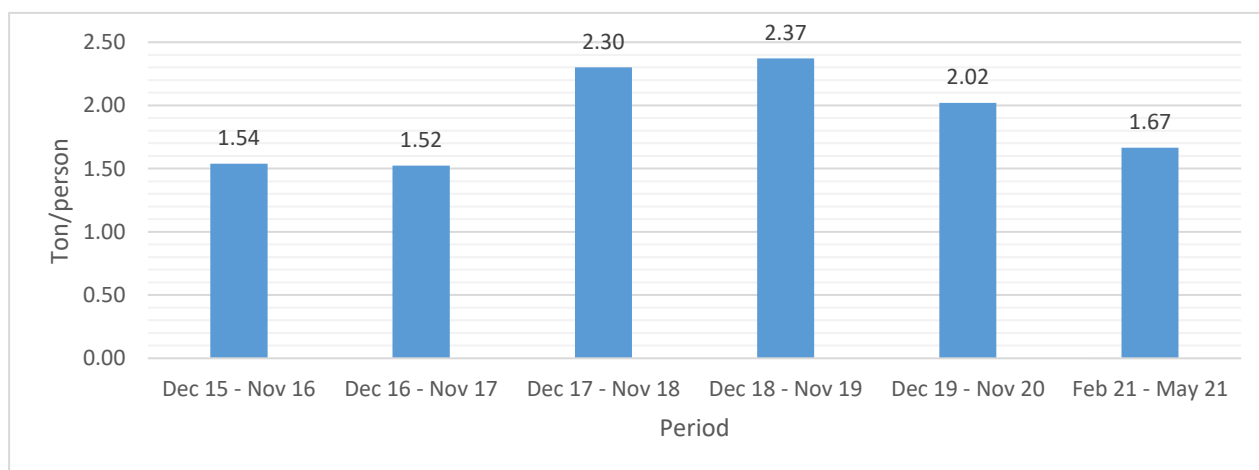


Figure 3: Charcoal production per person between December 2015 and May 2021

Table 4: Quantity of Charcoal produced and production per person

Period	Total Quantity(tons)	Total Producers	Production per person (tons)
Dec 2015 - Nov 2016	191	124	1.54
Dec 2016 – Nov 2017	632	415	1.52
Dec 2017 - Nov 2018	582	253	2.30
Dec 2018 - Nov 2019	185	78	2.37
Dec 2019 - Nov 2020	101	50	2.02
Feb 2021 - May 2021	20	12	1.67
% Change	-89.5	-90.3	8.20

Source: TFCG and the study calculations

4.1.6 Forest Resource and Harvesting Rate

In all surveyed villages, sustainable charcoal and timber production model is implemented through which, registered charcoal 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 quite 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 (Table 5). This implies that, in the CBFM villages, forest resources are not over utilized. However, it is important to note that, the current condition is greatly influenced by low

harvesting rate due to decreasing number of charcoal producers in the study villages as indicated above.

Table 5: Trend of sustainable forest harvesting in the study villages

Period	Ihombwe			Kigunga			Ulaya Mbuyuni		
	Sustainable harvesting rate (ha/yr.)	Actual harvest (Ha/yr.)	% Harvested	Sustainable harvesting rate (ha/yr.)	Actual harvest (ha/yr.)	% Harvested	Sustainable harvesting rate (ha/yr.)	actual harvest (ha/yr.)	% Harvested
Dec 2016 - Nov 2017	35.0	17.5	50.0	12	13.3	110.4	10	7.0	70.0
Dec 2017 - May 2018	35.0	6.0	17.1	12	6.0	50.0	10	11.0	110.0
Dec 2018 - May 2019	78.0	7.3	9.3	12	1.0	8.3	26	1.5	5.8
Dec 2019 - May 2020	78.0	5.6	7.2	12	4.2	35.0	26	0.5	1.9

Source: TFCG and the study calculation

4.1.7 Income from Charcoal Production

Assessment of income to charcoal producers shows that, 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. The decrease in income is associated with the decrease in the number of producers and quantity of charcoal produced (Table 6)

Table 6: Trend of income from charcoal production

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

Year	Income (TZS)	Producers (number)	Income per capita (TZS)
Average	33,943,571	133	247,204

Source: TFCG and own calculation

While the total income received per year is significantly large, the per capita income is relatively small. Estimates show that, the average income per capita in the study villages is about TZS 250,000 per year. The lowest is TZS 146,000 and highest is TZS 340,000 per year. Since year 2019, the income per capita has been declining (Figure 4). This implies that, the charcoal business is not benefiting individual charcoal producers. The average income per capita per year is small to sustain charcoal producing household's demands in these villages.

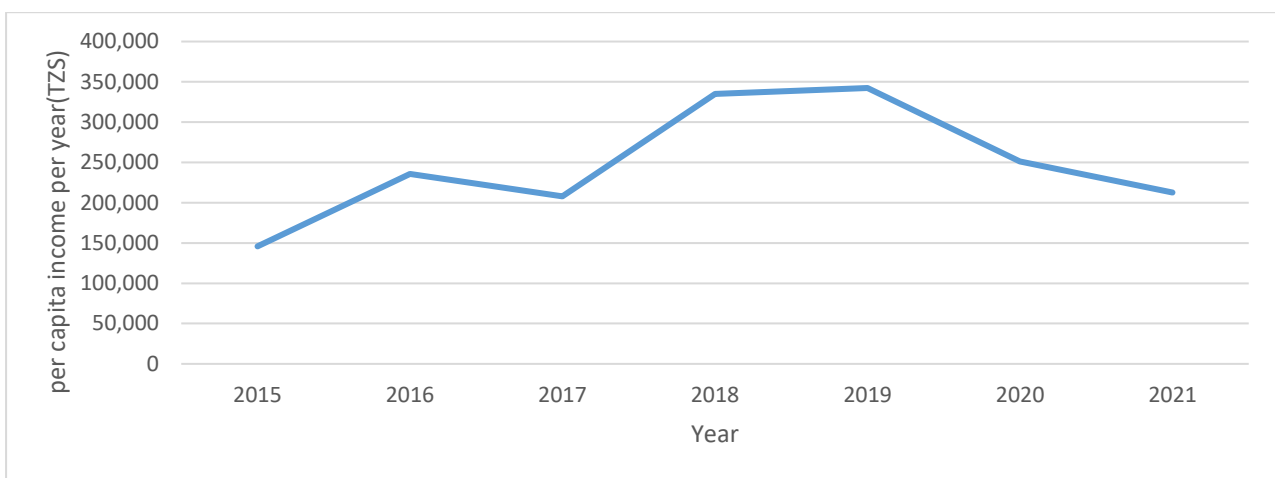


Figure 4: Trend of per capita income received by charcoal producers in the study villages

4.2 Description of Economics of charcoal production for individual producers

Economic and financial analysis is used to estimate profits, and to analyse the cost and revenue structure related to charcoal enterprises. Data were collected through interviews with key informants - charcoal producers. Interview protocol was designed to identify the activities and associated costs of charcoal making facilitation process, charcoal kilns operations, charcoal sales and prices received in the market. For the three case study villages, charcoal production is a primary activity to registered charcoal producers of which male producers dominates.

4.2.1 Charcoal production practices

Relevant information for estimating revenue from charcoal production were collected from sampled charcoal producers. 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. 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.

Table 7: Average number of Days used for charcoal making by activity type

Activity type	Days	Percent
Cutting trees or logs (days)	15.84	43
Arranging in kiln (days)	6.47	18
Covering the kiln (days)	3.63	9.9
Burning (days)	10.68	29
Production days	36.63	100

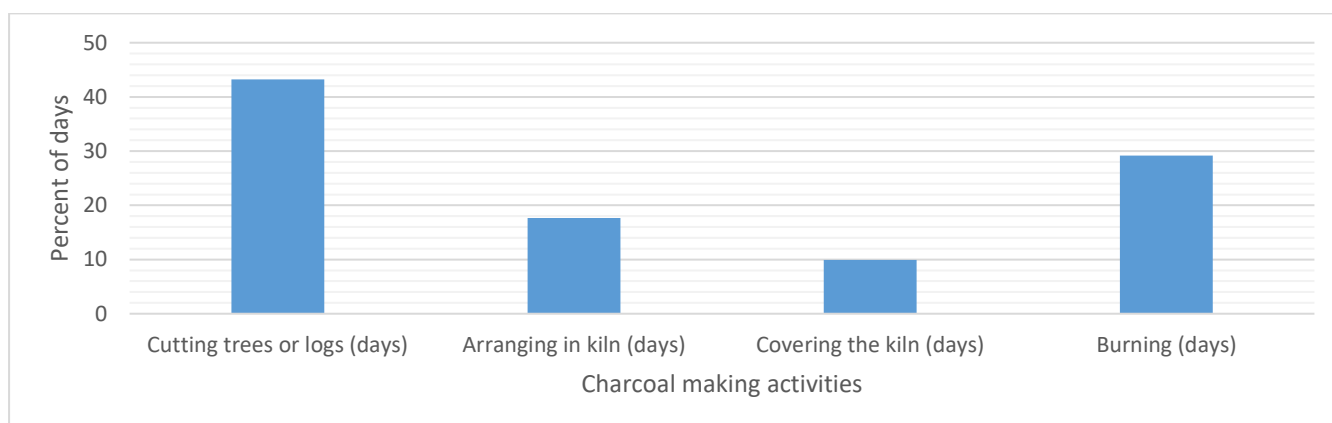


Figure 5: Percent of days by Charcoal making activity

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. Key informant interviews and focus group discussions revealed that, active charcoal producers manage to produce charcoal just once per year. Between March 2021

and October 2021, more than 90% of charcoal producers participated only once. It was also reported that individual producers registered in the villages do not have enough capital to transport produced charcoal to well established charcoal markets in urban centres.

Table 8: Charcoal production by individuals (50-Kg bags) in 2021

Month	Average number of kilns	Average bags	Minimum	Maximum
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		44.6		

Source: Field Survey, October 2021

When buyers are available, a charcoal producer can produce 6 to 7 kilns of charcoal per year, suggesting that the higher the frequency of charcoal production, the higher the income to individual producers as well as to the community revenue. The current situation of low charcoal demand (fewer buyers) in the CBFM villages results into low income to both producers and to the community. In the past, village governments in the CBFM villages were responsible in setting fees to charcoal buyers and in most cases, fee charged was TZS 6,500 per 50kg bag of charcoal. When the fee was TZS 6,500, buyers looking for charcoal in the CBFM villages were many. However, following the recent GN 417 where fee set by central government amounting to TZS 12,500 per bag of charcoal, has made most CBFM village less attractive to buyers of charcoal. This might be due to availability of cheap charcoal from other sources likely from unsustainable harvested forests competing with charcoal produced from CBFM. Often, traders are expected to buy cheap charcoal likely to come from forests which are not managed sustainably.

4.2.2 Cost of Charcoal Production

Costs incurred by individual charcoal producer in the study villages have been established. In this case, the study estimates time taken to perform activities in each stage of charcoal production and the associated costs. In the study villages, charcoal producers incur mainly two types of costs. Cost of tree felling for logs and preparing of kiln and carbonization. During the survey, producers were asked how much they are willing to accept as payment from the work they perform. This was to establish the price of labour for a particular activity.

Also, during the interview, it was reported that, producers also invited fellow producers to work together in cutting and arranging logs. In such arrangement, the owner of the kiln required to prepare food for them. Such information was used to estimate cost of food and hence cost of producing charcoal. Sample questions (annex 1) include (i) what is the average cost of cutting logs for one kiln? (ii) If you asked to cut logs for one kiln, how much will you accept as payment for the task? (iii) what is the average cost of transporting logs for charcoal making point? (iv) Are you hired for preparing kiln and burning processes? (v) What is the estimated cost for preparing kiln and burning (vi) Do you hire equipment or labour? 1=yes, 2=No (viii) what is the cost incurred in relation to the following? (a) License/permit for charcoal making per year (b) Fee payment per bag (c) Transportation per bag (TZS) etc. All these questions provided vital information used to estimate the average cost of production. Currently, buyers of charcoal in these villages are responsible to transport charcoal from the forest to village centres and then to market centres and paying fees to villages and district council as per requirement. Individual charcoal producers are not required to pay fee to the village when charcoal is sold within the village³.

Table 9: Average cost of production incurred by individual charcoal producers

Variable	Mean	Std. Dev.	Minimum	Maximum
Bags (50kg) per kiln	44.58	33.25	10	125
Tree/log cutting for 1 kiln (TZS)	29,526.32	9,014.61	10,000	50,000
Preparing kiln, covering and burning (TZS)	36,947.37	12,903.37	15,000	60,000

Source: Field survey 2021 and own calculation

Considering charcoal production costs for each month, study estimate, the average cost of production per kiln for the 8 months for which majority producers report to produce charcoal. The average production is TZS 107,000 per kiln. This is average production for reported number of kiln and average cost of operations (tree cutting, preparing kiln, covering and burning) during March to October. Producers with large kiln is expected to incur relatively high production cost per kiln.

³ Fees/royalties is paid for charcoal being transported outside the village and it is a responsibility of the one who is transporting outside village who has to pay fee. Now producers are selling charcoal to the buyers who visit the village. Thus, actual sell by producers takes place within the village, thus no fee payment by the producer. However, a buyer who has to transport outside the village is one who pays the fee to the village

Table 10: Average cost of charcoal production per kiln

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	2.0	133,000	266,000
July	1.0	66,500	66,500
August	1.0	66,500	66,500
September	1.0	66,500	66,500
October	1.0	66,500	66,500

Source: Field survey 2021 and own calculation

4.2.3 Revenue from Charcoal Business 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. As noted above, individual producers sell charcoal to buyers who visit village jurisdictions at an average price of between TZS 5,000 and 7,000 per 50 kg bag of charcoal. 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.

Table 11: Average price and revenue from charcoal production

Month	Selling price (TZS/50-kg bag)			Revenue (TZS/kiln/person)	
	Mean	Minimum	Maximum	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

Month	Selling price (TZS/50-kg bag)			Revenue (TZS/kiln/person)	
	Mean	Minimum	Maximum	Mean	Maximum
August	6,500	6,500	6,500	260,000	260,000
September	7,000	7,000	7,000	234,500	350,000
October	5,833	5,000	7,000	205,000	240,000

Source: Field survey 2021 and own calculation

4.2.4 Profit from Charcoal Production

Net revenue estimation is carried (equation 1) and the revenue and cost information in Table 10 and 11 above are used to estimate the profit gained by the individual charcoal producer in the study area. The average profit per producer per kiln is TZS 245,700 (Table 12). The higher the frequency the individual producer is engaged in charcoal production the more the profit per year. In the study villages, producers spend 36 days to prepare charcoal in one kiln, this limits the charcoal producers from gaining more profit from charcoal business.

Table 12: Average revenue by individual charcoal producers

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

Source: Field survey 2021 and own calculation

4.2.5 Individual charcoal producer and Profit from charcoal production

The net income or profit from charcoal business accruing to individual producer per kiln may be considered as significant provided that, the producer can produce more charcoal during the year. Field survey indicates that, the individual producer's participation in charcoal production is much dependent on the availability of charcoal buyers at the village. Field survey found that all registered charcoal producers sell charcoal at the village. Transportation of produced charcoal to other large markets outside village jurisdiction is

yet to be realized by registered charcoal producers. 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. Using information in Table 12 and the discount rate of 10%, the estimated NPV for charcoal enterprises is TZS 641,679. The Discounted cash flow analysis on the profitability of the charcoal business is constructed (Table 13).

Table 13: Discounted cashflow for charcoal business

Period	Cost (TZS)	Revenue (TZS)	NET REVENUE (TZS)	Discount Factor	Present value
0	107,231	202,168	94,937	1.000000	94,936.66
1	107,231	202,168	94,937	0.909091	86,306.06
2	107,231	202,168	94,937	0.826446	78,460.05
3	107,231	202,168	94,937	0.751315	71,327.32
4	107,231	202,168	94,937	0.683013	64,843.02
5	107,231	202,168	94,937	0.620921	58,948.20
6	107,231	202,168	94,937	0.564474	53,589.27
7	107,231	202,168	94,937	0.513158	48,717.52
8	107,231	202,168	94,937	0.466507	44,288.65
9	107,231	202,168	94,937	0.424098	40,262.41
				NPV	641,679.16

4.2.6 Sensitivity analysis

Sensitivity analysis was performed to establish new NPV by considering scenarios on price decrease and increase in production costs. Sensitivity analysis was carried out by considering a price decrease by 5% - 10% on NPV and production costs to increase by 5% - 10%. By assuming a price decrease by 5% and 10% there will be an impact on the amount of revenue generated. As the price decrease by 5%, the NPV decreases by more than 10.7%. Also, the price decrease by 10%, the NPV decreases by about 12%. Also, assuming an increase in production costs by 5% and 10%, the NPV decreased by 5.6% and 11.3% respectively. The percentage change in NPV is larger than the percentage change in the price variable, this implies that the price of charcoal is a key variable for the Charcoal business (Table 14). In general, the charcoal business is still viable given the decrease and increase in the price and variable costs respectively.

Table 14: Net Present Value for different scenarios

Scenario	NPV (TZS)	%Change NPV
Baseline	641,679.16	
Price decline by 5%	573,356.00	-10.65

Price decline by 10%	505,033.00	-11.92
Production cost increased by 5%	605,440.00	-5.65
Production cost increased by 10%	569,201.00	-11.30

Source: Own calculations

4.3 Charcoal business value chain

Assessing the economics of charcoal business in different value chain node is important to ascertain benefits accruing to value chain stakeholders. When production and sells end at the village level, the benefit to stakeholders is different to when the focus of analysis is extended to other nodes of the value chain.

4.3.1 Charcoal Business Transaction Costs

Charcoal business practices in the surveyed villages are that producers sell directly to buyers/traders of charcoal soon after production and the average selling price is TZS 7,000 per 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. Traders transporting at least 100 bags of charcoal per trip to main trading centres would translate to TZS 3.5 million as minimum cost needed for a person or group of producers to transport and trade charcoal in Dar es Salaam market.

Table 15: Charcoal trade and market-based transaction costs

Item	Amount (TZS/bag)	Trip cost (TZS/100 bags)
Purchase of charcoal from producers	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 (Dar)	7,500	750,000
Contingent	1,000	100,000
Total	34,500	3,450,000

Source: Field survey 2021 and own calculation

4.3.2 Profit from Charcoal trade in Dar es Salaam Market

Estimates of the profit of the charcoal business is from the charcoal trade surveys of 48 charcoal traders in Dar es Salaam where the average price of charcoal is between TZS 45,000 to 50,000 per bag. Total revenue per trip of 100 bags is estimated to be between TZS 4,500,000 and TZS 5,000,000. By subtracting market-based transaction costs estimated above (section 4.3.1), trader would realize between TZS 1,000,000 and TZS 1,500,000 as profit per trip of 100 bags.

Similarly, same analysis was carried by considering a producer selling her/his charcoal in Dar es Salaam market. When a producer transports charcoal and sell to Dar es Salaam market, the average market-based transaction costs per trip is TZS 2,750,000 (excludes buying cost of TZS 700,000 per trip) and the average net gain is TZS 1,750,000 per trip (100 bags). This shows that, producers being able to transport her/his charcoal to Dar es Salaam market would realize profit of TZS 17,500 per bag or 1,750,000 per trip. During field survey, producers reported to sell charcoal at TZS 7,000 per bag within the village, this is equivalent to revenue of TZS 700,000 per trip. The difference in profit between selling within the village and selling in Dar es Salaam is TZS 1,050,000. This suggests that producers able to reach Dar es Salaam market would get more income than just selling within the village.

Table 16: Profit to Producer and trader and village and Dar es Salaam markets

	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

Source: Field survey 2021 and own calculation

4.3.3 Royalty changes and charcoal business viability

In 2019, government instituted the 2019 Forest Regulation for which licensed charcoal traders are required to pay royalty of TZS 250 per kg or 12,500 per 50kg Bag. The analysis is done to ascertain the effect of the new royalty to charcoal business in project area. Sensitivity of NPV is analysed by considering NPV of charcoal trade in Dar es Salaam market where all charcoal produced from Kilosa is traded. Before 2019, traders used to buy charcoal from producers at the average price of TZS 5,000 per bag and royalty payment of TZS 6,750. Considering the Dar es Salaam market, the charcoal business where price of

a 50 kg bag of charcoal is TZS 45,000 is estimated to have a NPV of TZS 11.6 million (Table 17)

Table 17: Net Present value when royalty is TZS 6,750

Period	Royalty	Other cost	Total cost	Revenue	Net	DF	PV
0	675,000	1500000	2675000	4500000	1825000	1.00	1,825,000.00
1	675000	1500000	2675000	4500000	1825000	0.909	1,659,090.91
2	675000	1500000	2675000	4500000	1825000	0.826	1,508,264.46
3	675000	1500000	2675000	4500000	1825000	0.751	1,371,149.51
4	675000	1500000	2675000	4500000	1825000	0.683	1,246,499.56
5	675000	1500000	2675000	4500000	1825000	0.621	1,133,181.41
6	675000	1500000	2675000	4500000	1825000	0.564	1,030,164.92
7	675000	1500000	2675000	4500000	1825000	0.513	936,513.57
8	675000	1500000	2675000	4500000	1825000	0.467	851,375.97
						NPV	11,561,240.31

Source: Field survey 2021 and own calculation

Recent survey revealed that, producers are selling charcoal at an average price of TZS 7,000 per bag. The royalty payment is TZS 12,500. Using market data collected (Table 15), the new NPV for charcoal business in Dar es Salaam market is TZS 6.7 million (Table 18)

Table 18: Net Present value when royalty is TZS 12,500

Period	Royalty	Other cost	Total cost	Revenue	Net	DF	PV
0	1250000	1500000	3450000	4500000	1050000	1	1,050,000.00
1	1250000	1500000	3450000	4500000	1050000	0.909	954,545.45
2	1250000	1500000	3450000	4500000	1050000	0.826	867,768.60
3	1250000	1500000	3450000	4500000	1050000	0.751	788,880.54
4	1250000	1500000	3450000	4500000	1050000	0.683	717,164.13
5	1250000	1500000	3450000	4500000	1050000	0.621	651,967.39
6	1250000	1500000	3450000	4500000	1050000	0.564	592,697.63
7	1250000	1500000	3450000	4500000	1050000	0.513	538,816.02
8	1250000	1500000	3450000	4500000	1050000	0.467	489,832.75
						NPV	6,651,672.51

Source: Field survey 2021 and own calculation

4.3.4 Effect of royalty change on charcoal business profitability

Comparing business performance indicator – NPV before and after 2019, we found that, the NPV decreased by 43% when buyers are paying royalty of TZS 12,500, buying charcoal from producers at TZS 7,000 and transporting charcoal to Dar es Salaam market where they sell at an average price of TZS 45,000 per bag. The effect of royalty increase is on

the reduced NPV value which indicate that, charcoal business is more beneficial to traders when royalty charge is low.

The reduced NPV is an indicator for the reduced charcoal business performance and hence may attribute to withdraw of buyers from participating in this business. The effect of change of royalty is found on charcoal production reduction in villages due to low demand from registered buyers. However, the average gain by individual producers of charcoal did not change directly since all charcoal producers in the study village sell their charcoal to buyers who visit their villages. Producers are not obliged to pay royalty when selling charcoal within their villages. However, the buyer who buy and transport charcoal to Dar es Salaam markets is obliged to pay the royalty. In this case, the royalty affects indirectly individual charcoal producers through the reduced demand of charcoal by registered buyers due to increase in market-based transaction costs as a result of increase in royalty charges.

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.

4.4 Community-level revenue and revenue flows from CBFM case studies

The study estimated the revenue generated from charcoal production and utilized at the community level. 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. CBFM villages started experiencing low revenue for the same period when both number of producers and quantity of charcoal produced started to decline. Decreased participation of villagers in charcoal production is the main factor constraining villages from getting maximum revenue from charcoal business. Innovation geared toward increasing participation of villagers in charcoal production is called for.

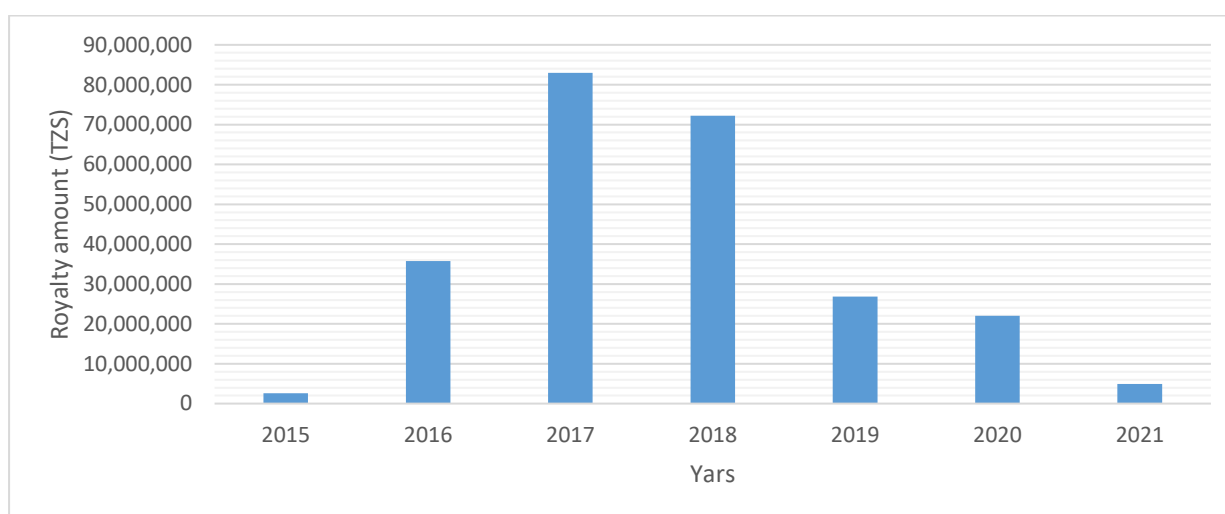


Figure 6: Trend of revenue from royalty for 2015 – 2021

Table 19: Community revenue from royalty charge (TZS)

Period	Ihombwe	Kigunga	Ulaya Mbuyuni	Total
2015	1,800,000	828,000	-	2,628,000
2016	7,754,200	21,570,000	6,409,440	35,733,640
2017	15,546,500	40,690,500	26,745,750	82,982,750
2018	23,841,000	16,139,250	32,251,500	72,231,750
2019	19,863,250	1,383,750	5,562,000	26,809,000
2020	7,932,500	9,500,000	4,607,500	22,040,000
2021	2,250,000	2,250,000	437,500	4,937,500
Total	78,987,450	92,361,500	76,013,690	247,362,640

Source: Field Survey 2021 and TFCG

4.5 Expenditure patterns in CBFM case studies

The study explored expenditure accruing in different activities associated with CBFM in each of the study village. The study focused on expenditures related with forest management activities and expenditure on community development projects financed

using revenue from charcoal and timber production. The study examined cost of creating or establishing the CBFM, cost on delimitation and mapping, cost on forest inventory, baseline studies (drafting management plan, drafting and filling of logging permit applications), training of community members, time spent on meeting, assemblies for planning and management of CBFM fees by CBFM communities to Kilosa District Council, costs of visits by local government staff, payment to MJUMITA for technical support, environmental awareness and conflict resolution. Also, the study considered expenditure on protection (monitoring and patrol), forest boundary clearing, tree planting and fire line clearing (Table 20).

4.6 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. The dependence of forest management activities on revenue from forest-based enterprises is a matter of concern over the sustainability of forest resources. Declining charcoal production also leaves no fund to finance forest management activities, thus jeopardizing the sustainability of forest resources in the study villages.

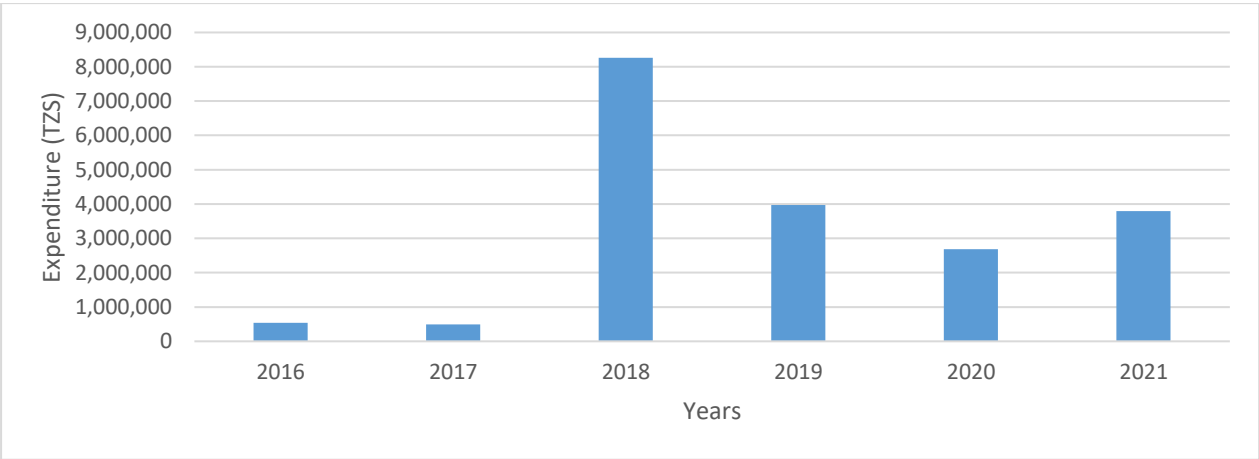


Figure 7: Trend of expenditure (TZS) on forest management activities

Table 20: Expenditure on forest management activities for 2016 to 2021

Year	Team patrol	Special patrol	Purchase of Motorcycle	Fuel Costs	Maintenance costs	Total
2016	535,000	-	-	5,000	-	540,000
2017	490,000	-	-	5,000	-	495,000
2018	4,405,000	980,000	2,230,000	421,000	225,100	8,261,100

Year	Team patrol	Special patrol	Purchase of Motorcycle	Fuel Costs	Maintenance costs	Total
2019	3,260,000	-	-	296,000	413,000	3,969,000
2020	1,845,000	-	-	537,000	304,500	2,686,500
2021	840,000	1,900,000	-	495,000	560,000	3,795,000

Source: Field survey, 2021

4.6.1 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. On average, 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.

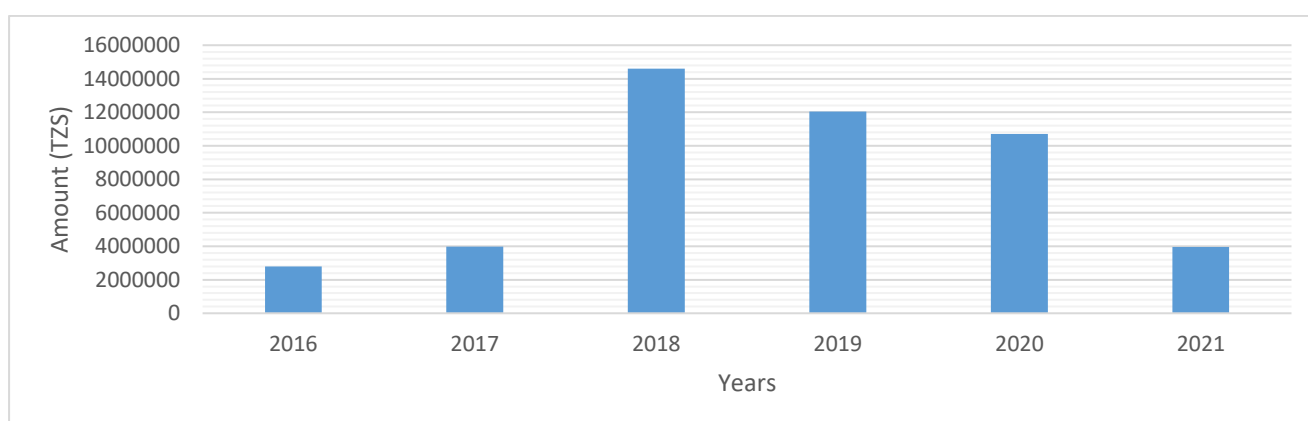


Figure 8: Trend of expenditure by Village Natural resource committee

Table 21: expenditure to facilitate meetings for forest management issues

Year	VNRC	LUC	VCC	District meetings	Total
2016	2,376,000	-	415,000	-	2,791,000
2017	3,608,400	27,000	345,000	-	3,980,400
2018	9,663,356	1,602,000	1,183,000	2,144,000	14,592,356
2019	8,428,000	367,000	2,937,500	300,000	12,032,500
2020	6,102,000	455,000	2,690,100	1,458,000	10,705,100

2021	3,096,000	160,000	695,000	-	3,951,000
------	-----------	---------	---------	---	-----------

Source: Field survey, 2021

4.6.2 Expenditure pattern on development projects

In this part, the study establishes all community development projects that are financed using revenue from charcoal business, timber production and from other sources. Both completed, ongoing and planned community projects were assessed. For the ongoing and planned projects, the study established the financing needed for these projects and made comparison with the revenue generation capacity of the existing charcoal and timber enterprises in comparison with revenue from other sources to ascertain ability of these enterprises to fulfil the financing needed. 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)

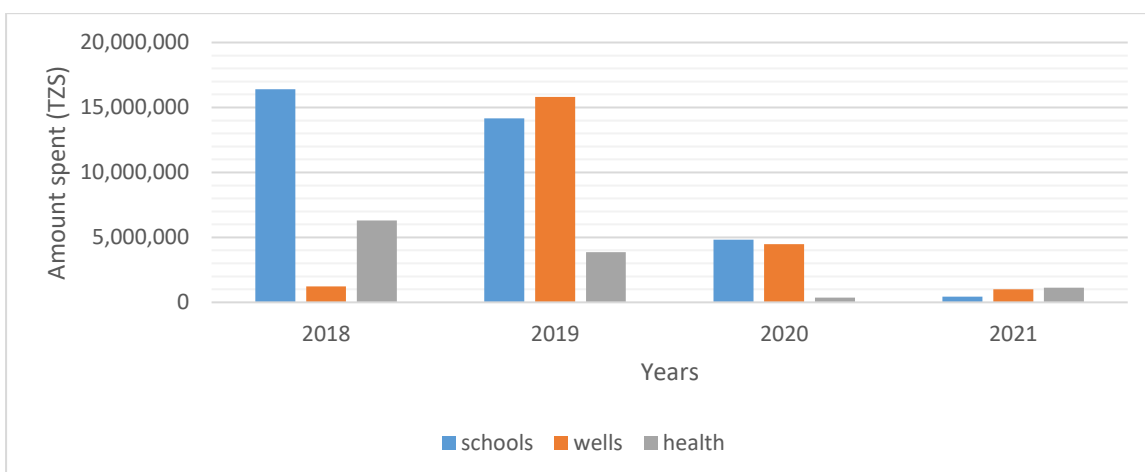


Figure 9: Expenditure pattern on community development projects

Table 22: Expenditure on development projects by study villages

Year	Expenditure on schools	Borehole	Road construction	Health building	Medical facilities	CHF Insurance	Total health
2018	16,400,000	1,239,000	-	405,000	140,000	5,770,000	6,315,000
2019	14,160,000	15,805,000	-	2,955,000	-	900,000	3,855,000
2020	4,833,600	4,489,000	29,100,000	375,000	-	-	375,000
2021	430,000	1,000,000	-	220,000	-	900,000	1,120,000

Source: Field Survey, 2021

4.6.3 Planned development projects and level of funding retirement

While revenue sources are declining in all visited villages, there is high need of fund to facilitate development projects. 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. In addition, village government earmarks development projects on the basis of revenue availability. The current dwindling situation of revenue from forest-based enterprises make difficulty for governments to plan new development projects. This situation limits the scope of development initiatives in these villages.

Table 23: Current and planned expenditure on community development projects

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

Source: Field visit, 2021

4.7 Challenges

4.7.1 Conflicts over boundaries

There are boundary conflicts between Ihombwe, Kisanga and Kitunduweta villages. During monitoring and evaluation, deforestation and forest degradation was observed in disputed forest localities that are currently occupied by Kisanga villagers. Besides, villagers complained about the forest surveyors who mark the boundaries of Village Land Forest Reserve (VLFR) by GPS points. The latter appear to be interested with any forest cover. As such, they include the forested areas that belong to villagers in the CBFM forest. Such acts lead to boundary conflicts with villagers and overestimated deforestation in the project villages

4.7.2 Timber Production obstacles

The local timber producers have not managed to operate in any of the TTCS villages. According to some key informants at Project, District and Village level, the major reasons are that Timber traders prefer own experienced timber producers to work with. This limits opportunity to villagers to participate in timber production. Also, hardwood timber from natural forests is more expensive than softwood. Thus, timber from CBFM village would face low demand due to high price compared to softwood.

5. DISCUSSION

5.1 LESSONS LEARNED

5.1.1 Charcoal production and demand

Analysis of charcoal production for the period between 2015 and 2021, reveals a good state and bad state. 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. As a result, charcoal producers are opting to participate in other economic activities (sugarcane in Ihombwe village, onions and maize in Ulaya Mbuyuni) because of low demand (no buyers) of charcoal in the study villages. Majority of interviewed charcoal producers reported to have produced one kiln for the entire period of March – October 2021. Low production is

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

5.1.2 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 study performed a sensitivity analysis of the NPV to establish on how sensitive was the charcoal enterprise net benefits on varying key economic variables (market transaction costs such as royalty). 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. When producers sell at the village, producers are not obliged to pay royalty. However, the buyer who buy and transport charcoal to large markets is obliged to pay the royalty. In this case, the royalty affects indirectly individual charcoal producers from the reduced demand of charcoal by registered buyers. Reduced charcoal demand at the village level (traders are not visiting frequently) is attributed by both increased price by producers and increased royalty. Charcoal business still remain profitable to traders and producers when final trade is at Dar es Salaam market where prices are relatively higher.

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 the 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.

5.1.3 Role of Charcoal Business on Producer Income

Contribution of charcoal income to producers is quite less compared to what is expected by individual charcoal producers who produce and sell charcoal within the village. Analysis of production and income received for the period between 2015 and 2021 shows that, profit obtained by individual producers is far below the optimal. While the aggregated income data at the village level shows that large amount of income is generated from charcoal business; the estimated income received per person per year is relatively small. 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. Even when the charcoal demand is high, the average income per person per year has remained low. 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.

5.1.4 Window for More Profit to Charcoal Producers

At the village level, charcoal producers sell charcoal at an average of TZS 7,000 per 50kg bag; the price which is lower than an average price of TZS 45,000 sold in Dar es Salaam market. The study's market analysis shows that, producers being able to transport their charcoal to Dar es Salaam market would realize a minimum profit of TZS 17,500 per bag or 1,750,000 per trip which is higher than a minimum 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. These challenges, coupled with the lack of market opportunity and profitable pricing mean that, producers have very little incentive to invest in charcoal, either individually or collectively. 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.

5.1.5 State of Charcoal Business to Sustain Community Revenue

The study estimated the revenue generated from charcoal production and utilized at the community level. The average revenue from royalty charges has been declining from year 2019. The trend is associated with the reduced number of buyers of the forest products in the study village. Field survey revealed that, implementation of the 2019 Forest Regulation (GN 417) for which traders of charcoal are to pay royalty of TZS 12,500 per 50kg- bag at some point has resulted to reduced charcoal traders visiting study villages. This has had side effect through reduced producers and reduced quantity of charcoal produced. The basis for community revenue is the quantity of charcoal produced in a village from which royalty is charged from. In recent situation, small quantity of charcoal produced and

ultimately results to low community revenue. The period for which royalty revenue to villages is declining, is the same time period when both number of producers and quantity of charcoal produced also declines. Thus, deliberate effort is needed to reverse the situation towards increasing charcoal production for increased community revenue.

5.1.6 *Development Projects and Forest Management*

Forest based enterprises have been the main source of revenue used to finance development projects and forest management activities. The use of such funds is agreed through consensus in village assembly meetings. Currently, people are incentivized to conserve the forest because there are tangible benefits from forest conservation". However, the declining trend of community revenue caused by low business performance in the study village 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.

5.1.7 *Forest-based Enterprises Value Chain Potential*

Kilosa District has the right forest resources and enabling conditions for a thriving forest-based enterprises. It has an abundance of trees, however due to low market demand, the forest-based enterprises are struggling in project villages. Current charcoal production and market practices unlock only a fraction of the potential value of the product by producers at the village. This is a significant missed opportunity and villagers struggling with a lack of entrepreneurship drive to reverse it. Producers do see the charcoal business potential, but without the ability to invest and with a weak to sell into, they have little incentive to engage in the value chain. There is need to have a mechanism to empower producers to be able to sell charcoal in large markets for increased benefits to producers and consequently to community in general. Development projects in villages that are largely financed by revenue from forest-based enterprises will progress well only when production stage of charcoal value chain is improved.

5.1.8 Limited Participation of Individual Producers in Forest value chain

Participation of charcoal/timber producers in the charcoal/timber value chain is minimal. Produced charcoal at the village is transported for sale in urban areas where consumption is high. For the charcoal produced in project villages, the main market is Dar es Salaam. Producers in villages do not transport and sell charcoal to Dar es Salaam. Traders visit and buy charcoal from producers and transport for sale in Dar es Salaam. Dependency on traders to transport charcoal to urban areas has resulted in a dwindling of charcoal business. The number of traders has reduced significantly and consequently reducing charcoal production in these villages due to lack of market. The individual producers participate in only one node of the forest value chain – production only. Limited participation of producers in the chain limits the avenue for producers to gain additional benefits at the market node of the value chain. Limited participation has been a disincentive to producers and hence majority have dropped from charcoal/timber production in the project villages.

5.1.9 Community Development projects are faced with reduced funding

Community expenditure on 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 villages is prominent in recent years due to reduced charcoal traders in the project villages. Forest management regulation changes in 2019 (GN 417) have resulted in increased cost of doing business and hence reduced demand and supply of charcoal/timber originating from CBFM villages. Registered charcoal traders 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 to a 50kg requirement.

5.1.10 Sustainable Forest based enterprises are financially and economically viable

Forest based enterprises undertaken under the sustainable harvesting model generate high income to producers and revenue to the community when producers participate in the market value chain node. Low participation of producers to trade forest products beyond village boundaries has limited the scope of benefits to producers and hence the community level in the project villages. Charcoal business still remains a profitable business for both traders and producers when final trade is done at the right market. For the charcoal business, with the 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.

5.1.11 Instituted sustainable charcoal production

Sustainable charcoal production has been instituted in all the three studied villages in which charcoal is sourced legally from sustainably managed Village Land Forest Reserves. The trees are cut at required height of 50 cm height to allow for coppice regeneration. Before, they used to cut the entire stem such that the tree would never resprout. The trees that are below 20 cm are not cut for charcoal production. The latter represents remarkable shift from business as usual informal, illegal and unprofessional charcoal production and trade.

5.2 RECOMMENDATIONS

The charcoal/timber business in the study village is faced with shortage of buyers/traders of charcoal/timber who could buy directly from producers and sale to other markets in urban areas where consumption of charcoal/timber is high. There is a need to expand the participation of charcoal/timber producers in market value chain node. Charcoal/timber producers found to end only at the first stage of charcoal/timber value chain (production node). Expanding the participation of producers in the market node of value chain will enable producers to gain addition income and hence improve the welfare of individual producers in the project villages. Participating in the trade of charcoal/timber to urban areas will enable villages to accurately forecast revenue generation for development projects. The following are action-oriented recommendation to revive forest-based enterprises flourily important for sustainable financing in CoForEST CBFM model villages.

5.2.1 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 income to individual producers and low revenue to village government which results to non-completion of envisaged development projects. Thus, deliberate efforts are needed to stimulate production and sale of charcoal/timber in urban areas for increased benefits to forest based value chain participants. In this case, consideration on transaction cost

dilution and market access facilitation is important. 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.

5.2.2 Enhance Production and Thinning Market-based Transaction Costs

To achieved increased production of charcoal, individual producers to be incentivised in terms of reducing production costs and market-based transaction costs. The incentives could be in the form of provision of soft loan to producers with condition to be repaid back the borrowed amount after a round of sale is complete. This will attract more people to engage in charcoal production and also will make individual producer to produce more charcoal per year than the current level of production.

Introduction of competition – based reward as an incentive to producers. Village government to adopt a rewarding system to producers after achieving certain level of production. Village government may agree on the amount of reward and the source of reward is deduction of certain amount from the fees collected per month. Say for group of producers, village may provide an incentive of TZS 2,000 per bag. This is for extra bags produced beyond the minimum set limit of bags produced.

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. It is recommended that, 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.

5.2.3 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). In this model, when both the production and market are linked, there is high possibility to increased income to producers and community revenue. 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. Each group should have a list of potential buyers of charcoal in town where they could directly sale charcoal to them. Individual producers with experience in trading of charcoal in urban areas to be part of the group as group lead person to influence other group members in getting market access and skills in trading charcoal. 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. A mixture of experienced and inexperienced traders is considered to ensure trade efficiency and hence increased income and community revenue from the forest-based enterprises.

This study has identified a viable opportunity to address the challenges of low demand by developing the domestic capacity to transport and sell charcoal in Dar es Salaam market. This opportunity will bear meaningful results to producers when they are empowered to move from village charcoal sale point to Dar es Salaam market. The study has identified 48 potential charcoal buyers in Dar es salaam (Table 23) who are willing to trade with producers from the CoForEST CBFM model villages potential. With this model, Charcoal producers with capital of TZS 3,500,000 will be able transport a minimum of 100 bags of charcoal to Dar market and sell at minimum of TZS 45,000 per bag. This translates to a profit of 17,500 per bag which higher than TZS 7,000 received at the village market.

5.2.4 Promote Investment potentials of the CoForEST CBFM model villages

There is a need to profile the existing investment potential in forest-based enterprises in study villages and promote them to be tapped by potential investors. Charcoal business analysis performed has revealed a sound business avenue for potential investors in forest-based enterprises within CoForEST CBFM model villages. Investment potentials

characterized by relatively small initial capital required (TZS 4 million) is found to attract prospective investors especially youth men and women graduating from colleges. 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. These potentials are yet to be known to many people. Investment promotion initiatives by the CoForEST CBFM model villages will form the base of investors in both production and trade nodes of the charcoal value. In this way, production will be enhanced and consequently realization of adequate revenue for community development projects and sustainable forest management.

Table 24: Name of potential charcoal buyers visited in Dar es Salaam

FULL NAME	Market Place/location	District
Abdillah Naboli	Tabata	Ilala
Agata Tadeo	Barakuda	Ilala
Amalya Abeli	Tabata	Ilala
Amina Dakara	Tabata	Ilala
Amri waziri	Gongo la Mboti	Ilala
Anjela Antony	Tabata	Ilala
Anna Malisa	Segerea	Ilala
Asha mchome	Kimanga	Ilala
Ashura Dege	Tabata Msimbazi	Ilala
Ashura Nassoro	Umoja Road	Ilala
Asnati Ramadhani	Tabata Msimbazi	Ilala
Bashiri Ubuguyu	Mbagala	Temeke
Diana Edward	Kimanga Masoko	Ilala
Erick	Segerea	Ilala
Fadhili Wiye	Mabibo Sokoni	Ubungo
Fatuma Kitungi	Mbagala Chalambe	Temeke
Galus Makwinya	Kinyerezi Mwisho	Ilala
Gelaidina Kahabuka	Mnadani Kinyerezi	Ilala
Hadija Kimola	Mabibo Hostel	Ubungo
Hafidhi Mpoloto	Kimanga Maluma	Ilala
Hamza Tingisha	Temeke	Temeke
Hassan Amani	Manzese	Ubungo
Hassan Kilindo	Toangoma-Kigamboni	Kigamboni
Helen Senga	Kimanga Doni	Ilala
Hemedi Mshamu	Mbagala Chalambe	Temeke
Innocent Ndaona	Mbuyuni	Ilala
Issa Mgomba	Mbagala	Temeke
Jeshi Kidava	Tabata	Ilala
Luca Kihongozi	Tabata Shule	Ilala

FULL NAME	Market Place/location	District
Magreth Kasigeta	Segerea	Ilala
Mama Zai	Mbagala	Temeke
Maria Kizwalo	Songas	Ilala
Mpenda Songs	Segerea	Ilala
Naomi Mnenei	Makuburi	Ubungo
Nicolaus Rutibinga	Segerea	Ilala
NYAU (Jina Maarufu)	Mabibo Sokoni	Ubungo
Pili Chomvi	Tabata	Ilala
Roza Rwambo	Mbagala	Temeke
Salome Juma Ndega	Mandela Chini	Ilala
Sefu Manyika	Segerea	Ilala
Shabani Salumu	Gongo la Mboti	Ilala
Susana Singu	Mbagala	Temeke
William Kiyao	Temeke	Temeke
Yussuf Juma	Tabata	Ilala
Zainab Nguruwe	Kimanga Maluma	Ilala
Zarika Zamgambo	Tabata	Ilala
Zuwena Hassan Said	Segerea	Ilala

REFERENCES

- Antinori C, Bray DB (2004) Community Forest enterprises as entrepreneurial firms: Economic and institutional perspectives from Mexico. *World Dev* 33:1529–1543
- Branch, A., Martiniello, G. (2018). Charcoal power: The political violence of non-fossil fuel in Uganda. *Geoforum* 97, 242–252. doi:<https://doi.org/10.1016/j.geoforum.2018.09.012>
- Cubbage F, Davis R, Frey G, Chandrasekharan Behr D (2013b) Financial and economic evaluation guidelines for community forestry projects in Latin America. Program on Forests (PROFOR). <http://www.profor.info/knowledge/community-forestry-enterprise-competitiveness-and-access-markets-mexico>. Accessed 1 Apr 2014
- Doggart N and Meshack C (2017) The Marginalization of Sustainable Charcoal Production in the Policies of a Modernizing African Nation. *Front. Environ. Sci.* 5:27. doi:10.3389/fenvs.2017.00027
- Humphries S, Holmes T, Kainer K, Koury CGG, Cruz E, Roches RM (2012) Are community-based forest enterprises in the tropics financially viable? Case studies from the Brazilian Amazon. *Ecol Econ* 77:62–73 CrossRef
- Mayers J (2006) Small and medium-sized forestry enterprises. ITTO Tropical Forest Update. ITTO, Yokohama, p 2
- Nike Doggart, Remidius Ruhinduka, Charles K. Meshack, Romanus C. Ishengoma, Theron Morgan-Brown, Jumanne M. Abdallah, Dominick V. Spracklen, Susannah M. Sallu (202). The influence of energy policy on charcoal consumption in urban households in Tanzania
- URT (2021). Integrated Labour force Survey. Key Market indicators for Tanzania.
- World Bank (2009). Environmental crisis or sustainable development opportunity? Transforming the charcoal sector in Tanzania. Policy Note by World Bank Environment and Natural Resources Unit for the Africa Region.

ANNEX 1: CHARCOAL PRODUCER QUESTIONNAIRE

Date of Survey; _____

Questionnaire Number

.....

Name of interviewer: _____

Name of interviewee:

District.....Ward_____

Village

_____Hamlet_____

Latitude Longitude Altitude

A: Background information and demographic characteristics

1. Name of the charcoal producer _____
2. Whether a charcoal producer is a head of the household _____
3. Age of the Charcoal producer _____ Sex(F/M)

4. What level of education do you have?
 - a) Never attended school
 - b) Primary education
 - c) Secondary Level
 - d) Advanced Level
 - e) Others _____
5. Marital status: Married [] single [] divorced [] widow/er []
6. How many people are in your household: Total HH members _____
Adult male _____, Adult female _____, Children – 15yrs and below _____

7. Primary occupation of the charcoal producer: (rank in order of importance)

Activities	Rank
Charcoal production	
Crop farming	
Livestock keeping	
Petty business	
Formal employment	
Others (specify)	

B: Charcoal production practices

8. How long have you been producing charcoal (years)_____?

9. Which months you are involved in charcoal making in year?

Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec

10. When did you start producing charcoal (year) _____?

11. What type of tree species are used for charcoal making?

- a. _____
- b. _____
- c. _____

12. What are your preferred tree species for charcoal?

1 = Tree species1, 2 = Tree specie2, 3 = Tree species3

13. How do you select trees for charcoal?.....

14. How long it takes to produce charcoal (from first stage to the last)

(days)_____

15. For the following stages of charcoal production, specify time spend on (per 1 kiln)

- a. How many trees/logs (total)_____
- b. Cutting trees or logs (days)_____
- c. Transporting kiln place (days) _____
- d. Arranging in kiln (days)_____
- e. Covering the kiln (days)_____
- f. Burning (days)_____
- g. Transporting/sale to market point (days)_____

16. On average, what amount of charcoal do you normally get per kiln?
 (bags)_____
17. How long does it take to go for next production?
 (days)_____
18. On average, how many kilns do you process per year?

19. Are you satisfied with the frequency of making kilns per year? Yes _____
 No_____
20. If No, mention the limiting
 factors_____

C: Cost of production (one kiln)

21. What is the average cost of cutting logs for one kiln (TZS)? _____
22. If you asked to cut logs for one kiln, how much will you accept as payment of that
 task? TZS: _____
23. What is the average cost of transporting logs for charcoal making point?
 (TZS)_____
24. Are you hired for preparing kiln and burning processes? Yes _____
 No_____
25. What is the estimated cost for preparing kiln and burning (TZS);

26. Do you hire equipment or labour? 1=yes, 2=No
27. What is the cost incurred in relation to the following?
 a. License/permit for charcoal making per year (TZS)_____
- b. Fee payment per bag (TZS)_____
- c. Transportation per bag (TZS)
28. Please indicate the market channels you use for charcoal
 a. Exchange within the village
 b. Exchange outside the village
 c. Through agents/middlemen
 d. Through cooperatives

D: Charcoal trade

29. where do you sell your charcoal? Villagers = 1, Small scale transporter = 2, Large scale transporter = 3, other (Specify) = 4.....
30. what is the average distance from the place obtaining the logs to the charcoal kiln? (hrs/km)
31. what is the means of transport are you using? (Rank) Headloads = 1, Carts = 2, vehicle = 3, bicycles = 4.
32. what are charcoal transporting costs to the selling point? for each means per bag
33. Distance from kilns location to the selling point?
34. The equipment used in charcoal extraction (rank): Own purchase = 1, hired = 2, both =3
35. For purchased equipment, when did you purchase? (year), and at what costs?
36. For hired equipment how many times do you hire per year? and at what costs?
37. How do you sell your charcoal products? Mention (e.g., individually, as a group etc.)

38. Price associated: Individuality....., Group.....
39. How much did you earn per month from selling charcoal before deductions of running costs?

Price received per bag	Quantity of charcoal sold (Tick one)		
	Most	About half	Few

40. What are the average sales do you make per month? (Reference 2021)

Species	Ja n	Fe b	Ma r	Ap r	Ma y	Jun e	Jul y	Au g	Se p	Oc t	No v	De c
Quantity(bag)												
Price (TZS/bag)												

41. How many kilns do you prepare in charcoal production? month

42. What is the amount/quantity of charcoal do you get per kiln? (bags)

43. Where do you normally sell your charcoal? kiln site = 1, roadside = 2, village centers = 3

44. Does your household use charcoal that you have produced? Yes No

45. If yes, how much of your charcoal do you use on average (bags/month)?

- a. Less than ½ bag
- b. ½ to 1 Bag
- c. 1 to 2 Bags
- d. More than 2 bags

E: Status of the charcoal business

46. How do you compare the current charcoal production in terms of quantity and availability of trees in past 5 years?

S/N	Description	1= Yes, 2=No
1	Getting more trees now	
2	Getting more immature trees now than in past	
3	Travelling longer distance to get good trees	

47. If the availability of trees declined, how have you responded to these changes?

S/N	Action /strategy adopted	1=Yes, 2=No
1	Increased/changed charcoal making equipment	
2	Cutting trees in different areas/sites	
3	Travelling longer distances	
5	Other strategies (specify)	

ANNEX 2: TIMBER PRODUCER QUESTIONNAIRE

Date of Survey; _____

Questionnaire Number

.....

Name of interviewer: _____

Name of interviewee:

District.....Ward_____

Village

_____Hamlet_____

Latitude Longitude Altitude

A: Background information and demographic characteristics

48. Name of the timber

producer_____

49. Whether a timber producer is a head of the

household_____

50. Age of the timber producer _____ Sex(F/M)

51. What level of education do you have?

f) Never attended school

g) Primary education

h) Secondary Level

i) Advanced Level

j) Others _____

52. Marital status: Married [] single [] divorced [] widow/er []

53. How many people are in your household: Total HH members_____

Adult male _____, Adult female _____, Children – 15yrs and below _____

54. Primary occupation of the timber producer: (Rank in order of importance)

Activities	Rank
Timber production	
Livestock keeping	
Petty business	
Formal employment	
Others (specify)	

Timber production practices:

- How long have you been producing Timber (years) _____?
- Which months you are involved in Timber making in year?

Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec

- When did you start producing Timber (year) _____?
- What amount of timber do you produce per month by size?

Size of timber	1 by 8	1 by 4	2 by 6	2 by 4	2 by 2	2 by 3	1 by 10
Amount							

- What type of tree species are good for Timber making?
 - _____
 - _____
 - _____
- How long it takes to produce Timber (from first stage to the last) (days) _____
- For the following stages of Timber production, specify time spend on: (days)
 - Cutting of trees.....
 - Collection and arrangement of trees.....
 - Preparation of pits.....
 - Timber making
 - Carrying of timber from the making site to the roadside (per size)

- f. Treatment for preservation.....
- g. Arrangement of timber (treated).....
- h. Drying of timber.....

8. On average, what amount of timber do you normally get per one production period?

(size)_____

9. How long does it take to go for next production?

(days)_____

10. Are you satisfied with the frequency of making Timber per year? Yes _____

No_____

11. If No, mention the limiting

factors_____

B: Cost of timber production (one sawmill operation):

12. What is the average cost of tree felling and cutting logs?.....

13. What are the average costs collection and arrangement of trees?.....

14. What is the average cost of carrying a sawmill machine (timber making machine) to the site?

15. What is the average cost of preparing pits?.....

16. What is the cost of carrying of timber from the making site to the roadside (per size)?.....

17. What are the costs of loading and unloading to the truck (to the collection centre)?.....

18. What is cost of arrangement of timber (treated) and treatment of timber for preservation?.....

19. What is the average cost of transporting logs for Timber making?

(TZS)_____

20. What is the cost incurred in relation to the following?

- a. License/permit for Timber making per year (TZS)_____
- b. Fee payment per size of Timber (TZS)_____
- c. Transportation per size of timber (TZS)

21. Please indicate the market channels you use for Timber

- a. Exchange within the village
- b. Exchange outside the village
- c. Through agents/middlemen
- d. Through cooperatives

Timber trade:

22. where do you sell your timber? Villagers = 1, Small scale transporter = 2, Large scale transporter = 3, other (Specify) = 4.....

23. what is the average distance from timber making site to the roadside/collection centre? (hrs/km)

24. what is the means of transport are you using? (Rank) Carts = 1, Vehicle = 2, Truck = 3.

25. what is timber transporting costs to the selling point? for each means per bag

26. The equipment used in timber making (rank): Own purchase = 1, hired = 2, both =3

27. For purchased equipment, when did you purchase? (year), and at what costs?

28. For hired equipment how many times do you hire per year? and at what costs?

29. How do you sell your Timber products? Mention (e.g., individually, as a group etc.)

30. How much did you earn per month from selling Timber before deductions of running costs?

Price received per size	Quantity of Timber sold (Tick one)		
	Most	About half	Few

31. What are the average sales do you make per month? (Reference 2021)

Month	Ja n	Fe b	Ma r	Ap r	Ma y	Jun e	Jul y	Au g	Se p	Oc t	No v	De c
Quantity(size)												
Price (TZS/size)												

32. Does your household use Timber that you have produced? Yes No

33. If yes, which size of your Timber do you use on average (size/month)?

- a. 1 by 8
- b. 2 by 4
- c. 1 by 6
- d. Others

Status of the Timber business

34. How do you compare the current Timber production in terms of quantity and availability of trees in past 5 years?

S/N	Description	1= Yes, 2=No
1	Getting more trees now	
2	Getting more immature trees now than in past	
3	Travelling longer distance to get good trees	

35. If the availability of trees declined, how have you responded to these changes?

S/N	Action /strategy adopted	1=Yes, 2=No
1	Increased/changed Timber making equipment	
2	Cutting trees in different areas/sites	
3	Travelling longer distances	
5	Other strategies (specify)	

ANNEX 3: CHECKLIST

Objective 2: Community Revenues and Revenue Flows

- Amount of revenue obtained by village i (community i) from CBFM/TTCS enterprise model since 2013

Year	Charcoal bags	License per bag	Royalty per bag	Revenue from license	Revenue from royalty	Total revenue from charcoal
2013						
2014						
2015						
2016						
2017						
2018						
2019						
2020						
2021						

Revenue from other sources supporting sustainable charcoal

Year	Revenue from TTCS project	Revenue from Local Government	Other financiers supporting CBFM i.e., Donors
2013			
2014			
2015			
2016			
2017			
2018			
2019			
2020			
2021			

Community Revenue from timber production

The study estimated the revenue generated from timber harvests and utilized at the community level. Sources of revenue include license, permits, royalties etc from harvesting of timber in the study village were considered.

Year	Timber volume	License per volume of timber	Royalty per volume of timber	Revenue from license	Revenue from royalty	Total revenue from timber
2013						
2014						
2015						
2016						
2017						
2018						
2019						
2020						
2021						

Revenue from other sources supporting sustainable timber harvesting

Year	Revenue from TTCS project	Revenue from Local Government	Other financiers supporting CBFM i.e., Donors
2013			
2014			
2015			
2016			
2017			
2018			
2019			
2020			
2021			

- Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of TTCS forest enterprise model on community revenues trajectories 2013-2021

Objective 3: Expenditure patterns in CBFM case studies since 2013

- Number of expenditures by village i (community i) from CBFM/TTCS Enterprise model since 2013

Expenditure patterns of CBFM	2013	2014	2015	2016	2017	2018	2019	2020	2021
Fees to Kilosa DC									
Payments to Visiting Government Staff									
Payments to Mjumita									
Mapping and Delimitation									
Forest inventory									
Training community members									
Meetings (VNRECs and village assemblies)									
Environmental awareness and conflict resolution									
Monitoring and Patrol									
Tree Planting									
Fire line clearing									
Others									

- Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of TTCS forest enterprise model on CBFM expenditure trajectories 2013-2021

Community development projects expenditure

Year	Schools	Health facilities	Medical insurance	others
2013				
2014				
2015				
2016				
2017				
2018				
2019				

2020				
2021				

Objective 4: Opportunities and Challenges on the current model with focus on financial sustainability

Explore:

- Explore the trends in net revenues from 2013 to 2021 (increasing or decreasing?)financial sustainability?
- Impact of changes in charged fees to Charcoal and Timber producers on revenues i.e., impact of government notice number 417 of 2019 on financial sustainability of the current model?
- Net Revenues from Forest Enterprise versus village financing needs and impact on financial sustainability?
- Sub-divisions of VLFRs and impact on financial sustainability?
- Limited technical capacity at village level and impact on financial sustainability?
- Resistance to the model by TFS and District Technical staff and impact on up scaling and financial sustainability
- Administrative bottlenecks by District Authorities and impact on financial sustainability
- Ecological sustainability of the model and impact on sustainability of revenue streams
- Stringency, Quality and Direction/Timeliness of Transparency and impact on financial sustainability.
- Readiness and Sturdiness of accountability and impact on financial sustainability
- Politically informed monitoring and remediation on financial sustainability i.e., dynamics of politics and power, informal and illegal networks of charcoal and timber trade, incentives and disincentives, local institutional arrangements and professional and technical issues
- Dynamics of community participation in decision making and benefit sharing mechanisms and impact on financial sustainability
- Impacts of existing collective arrangements and conflict resolution mechanisms on financial sustainability
- Impact of nested enterprises on one hand and self-governance on the other, on financial sustainability
- Impact of macro energy policies and charcoal and timber market trends on financial sustainability of the model

Objective 5: To present lessons learned and recommendations

Explore:

- Everything considered, are you positive, neutral or negative on TTCS enterprise model?
- Do you consider the TTCS Enterprise model to be a remarkable achievement in your village?
- Think about the TTCS project in the past few years....
 - What has worked well?

- What has not worked well?
- What do you appreciate most about TTCS Enterprise model?
- What are you dissatisfied most with TTCS Enterprise model?
- Is there anything you wish you could change about your experience of TTCS project?
- What are the barriers to achieving TTCS Enterprise model goals?
- What are the impacts of TTCS Enterprise model on?
 - Community livelihoods including marginalized groups
 - Forest resource base and reduction of deforestation rates in the village.
 - Social services in the village i.e., education, water, health facilities and services
 - Integration or conflicts (if any) with other land-uses
 - Formalization of CBFM at village and district level
 - Gender dynamics in the village (especially decision making and benefit sharing)
 - Overcoming past and present CBFM governance challenges
 - Adoption of improved agricultural techniques and income diversification in general in CBFM villages
- What is the level of support of villagers, village leaders, CSOs and District Political and Technical staff on TTCS enterprise model?
- Your views on ecological sustainability of TTCS enterprise model?
- Are the Charcoal and Timber royalty's calculations fair to producers and village in general? Any inconsistencies in calculations and remediation measures?
- Is there Transparency and Accountability on levels of deforestation by producers and TTCS villages in general to higher governance scales?
- How do you overcome challenges of different charcoal and timber yields across the reserve and different reserves?
- How do you deal with the challenge of shrinking window of expansion of TTCS enterprise model in your village?
- Reflecting on our discussion today, what things have we discussed are most important to address in order to achieve a desirable future for TTCS enterprise model in your village and other localities in Tanzania in general?
- Is there anything that is "very important" that you can think of that we have not covered in this discussion? Describe the pertinent enterprise model related issue...

Trade information

Name of Village:

Charcoal production and trade

Year	Amount produced	Amount sold	Selling price	Unit
2013				
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				

Name of Village:

Timber production and trade

Year	Amount produced	Amount sold	Selling price	Unit
2013				
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				

ANNEX 4: EXPENDITURE ON FOREST MANAGEMENT ACTIVITIES FOR 2016 TO 2021 BY VILLAGE

Year	Ihombwe	Ulaya Mbuyuni	Kigunga	Team Patrol
2016		535,000		535,000
2017	0	490,000	0	490,000
2018	355,000	3,330,000	720,000	4,405,000
2019	80,000	2,535,000	645,000	3,260,000
2020	55,000	1,250,000	540,000	1,845,000
2021	0	0	840,000	840,000

Year	Ihombwe	Ulaya Mbuyuni	Kigunga	Special patrol
2016		0		-
2017	0	0	0	-
2018	980,000	0	0	980,000
2019	0	0	0	-
2020	0	0	0	-
2021	1,900,000	0	0	1,900,000

Year	Ihombwe	Ulaya Mbuyuni	Kigunga	P_mcycle
2016		0		-
2017	0	0	0	-
2018	0	2,230,000	0	2,230,000
2019	0	0	0	-
2020	0	0	0	-
2021	0	0	0	-

Year	Ihombwe	Ulaya Mbuyuni	Kigunga	Fuel
2016		5,000		5,000
2017	0	5,000	0	5,000
2018	240,000	181,000	0	421,000

2019	240,000	56,000	0	296,000
2020	500,000	37,000	0	537,000
2021	480,000	15,000	0	495,000

Year	Ihombwe	Ulaya Mbuyuni	Kigunga	mmcycle
2016		0		-
2017	0	0	0	-
2018	50,000	175,100	0	225,100
2019	200,000	213,000	0	413,000
2020	100,000	204,500	0	304,500
2021	512,000	48,000	0	560,000

ANNEX 5: ESTIMATED COSTS FOR TFCG AND MJUMITA SUSTAINABLE CHARCOAL ESTABLISHMENT PROJECT PER VILLAGE.

S/NO	Activities/Modules	Required / Optional	Cost per village US\$	Cost per village (TZS)
1	Establishment of new village land forest reserves including sustainable charcoal harvesting plan.	Required, if no VLFR in place or VLFR needs expanding.	15,568	35,805,791
2	Integration of sustainable charcoal production into existing village land forest reserves	Required if a VLFR is already in place.	15,309	35,211,241
3	Training and technical support on integration of sustainable charcoal production into village forest reserve management	Required	15,682	36,068,600
4	Training and technical support on sustainable charcoal production and marketing including formalization of producers.	Required	9,855	22,666,707
5	Village land use planning	Optional.	8,732	20,083,134
6	Introduction and training at District level	Required	910	2,093,767
7	Village office construction and land registry establishment	Optional.	26,819	61,684,034
8	District harvesting plan production	Optional.	2,209	5,079,703
9	Training on improved agricultural practices and micro-finance	Optional. Reduces risks associated with potential negative social impacts of restricting access to agricultural land.	45,329	104,256,177
TOTAL	Estimated costs - new VLFRs and all modules		140,413	322,949,153

ANNEX 6: TYPE OF EXPENDITURE ON DEVELOPMENT PROJECTS BY STUDY VILLAGES

Village Natural Resource Committee

Year	2015	2016	2017	2018	2019	2020	2021
Ihombwe			0	1,760,000	1,015,000	1,835,000	1,885,000
Ulaya Mbuyuni	0	2,376,000	3,608,400	5,662,356	3,266,000	2,237,000	135,000
Kigunga			0	2,241,000	4,147,000	2,030,000	1,076,000

Land use Planning

Year	2015	2016	2017	2018	2019	2020	2021
Ihombwe			0	112,000	0	0	0
Ulaya Mbuyuni	0	0	27,000	910,000	254,000	115,000	0
Kigunga			0	580,000	113,000	340,000	160,000

Village Council

Year	2015	2016	2017	2018	2019	2020	2021
Ihombwe			0	150,000	345,000	430,000	70,000
Ulaya Mbuyuni	0	415,000	345,000	453,000	1,218,500	631,000	20,000
Kigunga			0	580,000	1,374,000	1,629,100	605,000

District council meetings

Year	2015	2016	2017	2018	2019	2020	2021
Ihombwe			0	420,000	0	355,000	0
Ulaya Mbuyuni	0	0	0	1,559,000	300,000	935,000	0
Kigunga			0	165,000	0	168,000	0