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Stakeholders' Perception of an Incentive-Based Approach to Forest Management: The Case of North Swaka Trust Limited in Mkushi District, Zambia.

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Abstract: *The study investigated stakeholder's perceptions of an incentive-based approach to forest management administered by North Swaka Trust in Mkushi district. The purpose of the study was to obtain lessons on such similar initiatives that can be designed towards improved forest management. A mixed approach involving both qualitative and quantitative methods of data collection was used. The study sample comprised 427 respondents along the forest buffer zone while purposive sampling was used to select five (5) key informants. Semi-structured interviews, interview guides, and field observations were used to collect primary data. Qualitative data was analysed using thematic analysis, whilst quantitative data was analyzed using Binary logistic regression, and descriptive statistics. The findings reveal that the incentives provided by North Swaka Trust, such as practical lessons on agricultural activities and input provisions, contribute to livelihood options for communities along the forest buffer zone. Key benefits perceived by stakeholders include conservation agriculture, beekeeping, input provision, growing of cover crops and market provision. The study's analysis of community responses on a Likert scale shows a mean score of 4.25 out of 5, indicating a positive perception (67.5%) of the effectiveness of the incentives towards sustainable forest management. Socio-economic factors like age, household size, and land ownership were found to influence community participation in conservation activities. However, there was scepticism from traditional leaders and some community members on the ability of the community to continue conservation efforts in the event that the trust was to discontinue their operations. The study concludes that North Swaka Trust's incentive-based approach has improved livelihoods, promoted sustainable practices, and mitigated deforestation on one hand, but could lead to dependency syndrome on the other hand. A more balanced approach that considers the socioeconomic context and empowers communities for resilience and self-sufficiency is thus recommended. Other aspects such as the impact of the NST incentive based at household, on forest cover and hydrology can be investigated.*

Keywords: *Stakeholder's perception, incentive-based approach, sustainability, forest management*

1. INTRODUCTION

The country's total land area is 75.3 million hectares (ha), of which 39 to 50 million ha are forested areas (GRZ, 2016). Zambia faces entrenched and chronic natural resource management challenges, which continue to erode its natural wealth and economic potential. Its extensive Miombo woodlands and forests are being lost at roughly 250,000 hectares annually, representing one of Africa's highest rates of annual deforestation (Davis, et al., 2020). Forests are an important constituent of nature and provide benefits critical for rural communities, urban setups, the national economy, and the global community. The key drivers of deforestation include agricultural expansion, mining and infrastructure development, wood fuel extraction (firewood and charcoal), and widespread forest fires (Vinya et al, 2012). Deforestation contributes to disruption in rainfall activities thereby reducing water availability for both domestic and industrial (Aainaa, et al., 2019). There are socio and economic reason for this dependence on the forest resources. Some of factors are age, household size, education level, marital status, length of stay in the communities and wealth one has (Birben, 2022).

The management of the forests remain a big challenge in many areas of the country. The Government of the Republic of Zambia has put in place a legal framework to help foster initiatives to manage the

remaining forests. Among the measures include the participation of all stakeholders in the management of forest as enshrined in the 2014 Zambian Forest Policy.

The policy provides for the private sector and other stakeholders to partner with government in managing forest resources. This has opened up for the private sectors to design innovative initiatives aimed at addressing the challenges the forestry department has been facing in the quest to managing the forest resources. One such initiative being explored is an incentive-based approach fostered by the private sector in Mkushi. Incentive based interventions fall under what is known as payment for ecosystem services (PES), which is described as an innovative approach for improving natural resource management (Ferraro & Kiss, 2002). The approach allows for improving environmental amenities without relying on regulatory agencies to implement restrictive policies (Diana, et al., 2013).

On this background, the Zambian government through the Ministry of Lands and Natural Resources (forestry department) signed a memorandum of understanding (MOU) with North Swaka Trust Limited (NST) in 2016 and a lease agreement for an initial period of ten (10) years, subject to extension for fifteen (15) years on 28th October 2020. The lease agreement came into effect and operational on 1st January, 2021 whose aim is to conserve and develop the North Swaka and Mkushi Head Waters National Forest reserves. The "Trust" started working with communities who are in the forest buffer zone way back in 2019 before the lease agreement was signed. The idea to protect the North Swaka and Mkushi Headwaters National Forests was conceived in 2011 and later North Swaka Trust Limited (NST) was formed, this was after a realization that the two forests were under huge pressure from illegal logging, illegal mining, charcoal production, and encroachments. This was as a result of forestry department unsuccessful in managing the North Swaka and Mkushi head waters national forests. The two forests support agricultural and domestic water supply. 10,000 ha of land is irrigated every year (Andrew, 2022).

The approach being initiated by North Swaka trust is similar to Community Markets for Conservation (COMACO), being applied to manage the wildlife and forest resources in some parts of Zambia (Davis, et al., 2020), because forest and wildlife resources are key to the function of the ecosystem. The ecosystem provides humans with protective, regulating, supporting and cultural services (Kelsey, et al., 2008). Ecosystem services refer to the diverse benefits that are derived from the natural environment (Fripp E, 2014). For the perpetuity of ecosystem services, the communities surrounding these forests need to be incentivized in order for them to avoid over exploiting the forest resources (Emerton, 1999).

Among the incentives to reduce deforestation that the "Trust" has been providing to communities includes Conservation Agriculture (CA) using small pieces of land called "Pfumfudza", practical lessons in compost making, cover crop growing and providing market for the cover crops seed to commercial farmers. Other provisions are beehives to communities and buying the honey produced, provision of multipurpose tree seeds which individual farmers sow and tender, afterwards NST buys the tree seedlings from these individual farmers and redistributing the tree seedlings within the communities to other members for free. The trust has also been training communities in efficient mud stoves making and use. Interventions to address deforestation and promote re-vegetation must address the livelihood issues that drive deforestation activities (Chisola, et al., 2020). The previous forest management approaches (fortress conservation) failed as they were deemed to be exclusionary in addition to the failure of such approaches to address livelihood concerns(Luoma, 2022, Luaba, 2021, Mfune, 2017, Mfune, 2012, Bwalya, 2007). Hence, the National Forestry Policy of 2014 and Forest Act of 2015 have opened up opportunities for participatory and incentive-based approaches to thrive. The North Swaka Trust is one of the peculiar models in this approach as it is driven by commercial farmers downstream supporting small-scale farmers upstream to conserve the upstream forest and protect the Lunsemfwa River. The current management model could be extended to other River catchments. However, little is known about the stakeholder's perception of the incentive-based approach of managing forests and water resources. Hence, the study aimed at examining the stakeholder's perceptions of the NST incentive-based approach and derive lessons for improved forest and landscape management. The study assessed the benefits of the North Swaka Trust model on community livelihoods, the study also evaluated the perception of the local community on the

incentives provided by North Swaka Trust and examined the socio-economic factors associated with community members' participation in the conservation activities being undertaken by NST.

Therefore, this research aimed at assessing the stakeholder's perceptions of the incentive-based approach to forest management being administered by North Swaka Trust in Mkushi district as an experimental case study.

1.1 Conceptual framework

Forests provide rural household income and protect river catchments and enhance water availability which support small- and large-scale irrigation.

Rural communities tend to exploit the forests through extraction of fire wood, charcoal, building materials, wild vegetables, mushroom, medicines, fruits and honey for sale. Households benefit directly or indirectly from forests for improving household income and food security. However, the exploitation of the forests comes with it effects.

It is therefore important for government policies and laws to encourage private-sector participation in sustainable forest management. The involvement of the private sector in managing the forests can enhance forest management using different pioneering models.

Participation of local communities in the private sectors intervention activities such as conservation farming could be influenced by the socio-economic factors such as age, sex, level of education, occupation and household size. Local communities' positive perception on NST forest conservation model plus appreciated benefits accrued and the socio-economic factors could lead to sustainable forest management.

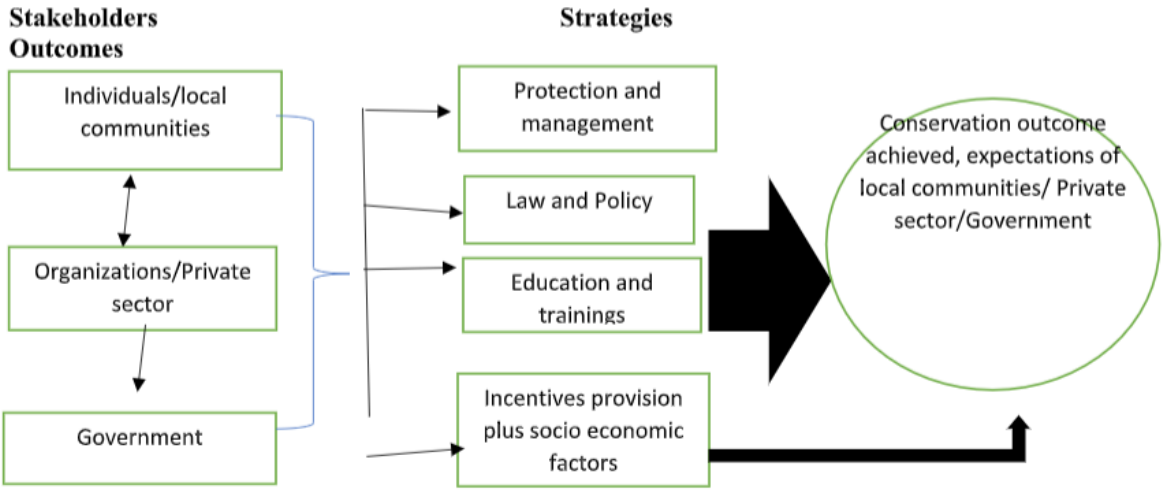

Figure1.1. *Conceptual framework based on generalized conservation model from (Salafky, et al., 2002)*

2. MATERIAL AND METHODS

2.1. Study Area

Mkushi district is located in Central Province of Zambia at Latitude: 13°37′12″ S Longitude: 29°23′38″ E and 1,257 m Elevation above sea level. The district shares borders with Serenje district, North-east of Masaiti and democratic Republic of Congo to the North, Luano District to the south and Kapiri-Mposhi to the southeast. Most of the area falls within Agro-ecological Zone II and receives an average annual rainfall of 950 mm.

There are three distinct seasons in Mkushi District and these are the warm rainy season (November to April), the cool dry season (May to August) and the hot dry season (September to October). The temperatures range from 17 to 32 degrees Celsius in the hot dry season and 15 to 27 degrees Celsius in the warm and cool seasons. The lowest temperatures usually occur in June and July and the highest in September and October (DSA, 2020). The rain varies from 400 mm in the south and valley areas to 1,400 mm in the north and on the plateau (DSA, 2020).

Mkushi has a total population of 208,635, of which 104,345 are females and 104,290 are males (CSO, 2022). The average household size is five (**5**), the growth rate of population was 4.6 percent (CSO, 2022). The people of Mkushi are mainly farmers and comprise commercial, medium and small scale farmers. Some members of Mkushi are civil servants, parastatal workers while others are in Agro inputs business activities.

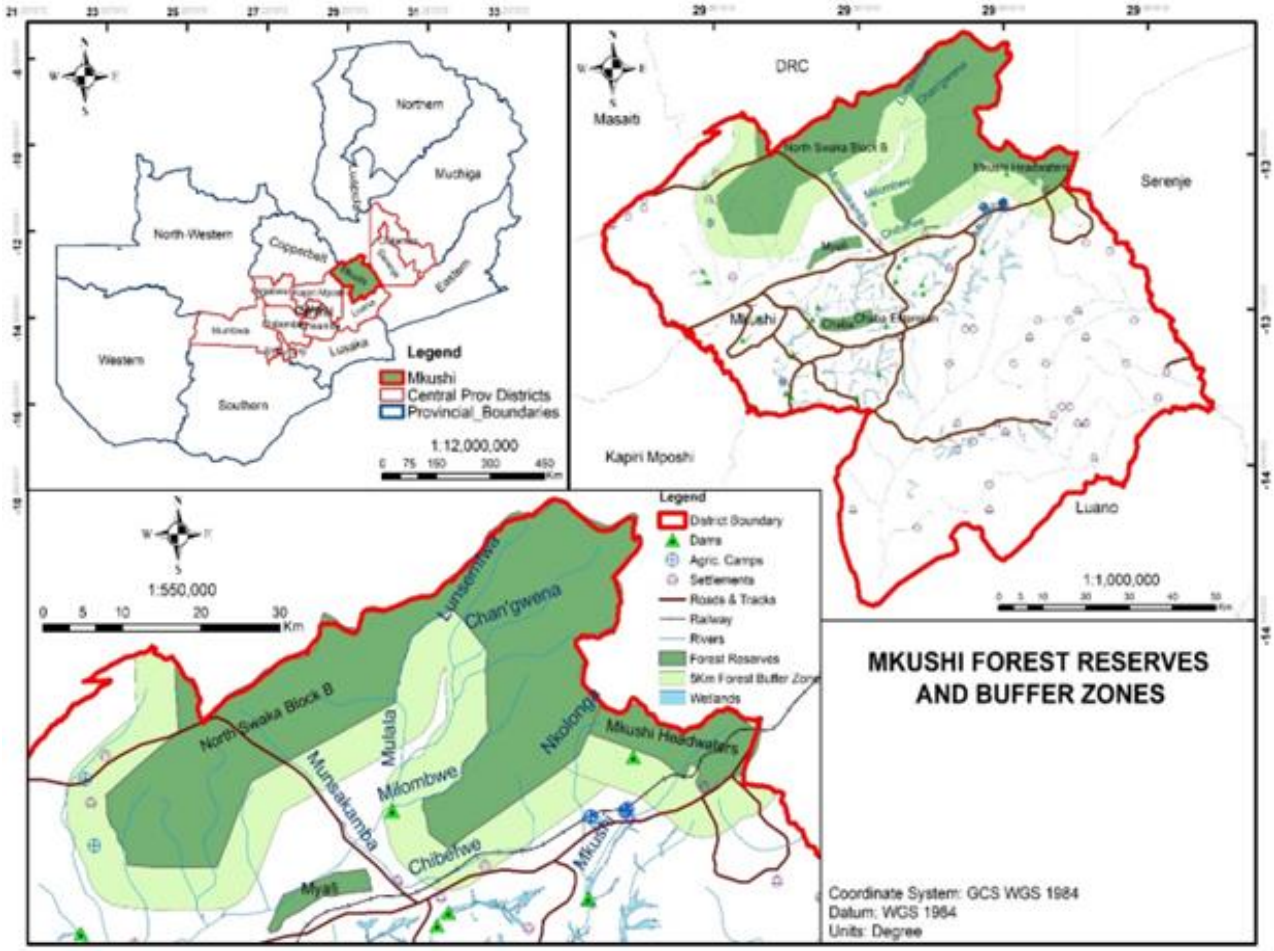

Figure2.2. *Location map of north Swaka and Mkushi Headwaters National Forests*

Administratively, Mkushi District has (fourteen) 14 political wards and one (1) parliamentary constituency. The district has three chiefs namely Chief Chitina, Shaibila, and Mulungwe, with the main traditional language being Lala.

The district has inherently fertile heavy to medium textured soils including alluvial valley soils that support productive farming (DSA, 2020). The District is dominated by the Miombo Woodland which is represented by species of Brachystegia, Julbernadia and Isoberlinia, and the Protected Forest Areas of the province consists of this woodland (DSA, 2020). The two major rivers that support small, medium and large scale irrigation are the Lunsemfwa and Mkushi river comprising 16 streams and 7 streams as tributaries to the Lusemfwa and Mkushi River respectively. Lusemfwa River has its source in North Swaka National forest while Mkushi River has its source in Mkushi Head Waters National forest.

The local water utility company (Lukanga water and sewerage) supplies water to Mkushi town residents from Chibefwe stream whose source is from North Swaka national forest. When water catchment areas are deforested or degraded, water flow and supply for various uses gets affected.

The district has a belt dominated by old granites forming the Mkushi batholiths, which run from South-west to the North-east (DSA, 2020). The North Swaka National forests was a hive of mining of quartz and manganese while Mkushi head waters was heavily mined of manganese, these mining activities compounded with heavy charcoal production degraded the forests and disrupted water flows in the Mkushi District. Hence, North Swaka Trust limited which is composed of commercial farmers

of Mkushi came up with a proposal to government and partnered with forest department to conserve and develop the North Swaka and Mkushi head waters national forest areas to counter the negative effects.

2.2. Data Collection and Analysis

Two data collection methods were used and included semi-structured interviews and group discussion. Semi-structured interviews were used because they allow for more interaction between the researcher and the participant. While group focus discussions were used to encourage free participation amongst participants, hence more information was gathered during the research.

Primary data was collected using a semi-structured questionnaire and group discussions. Secondary data on the perception and assessment methodology was collected from peer reviewed articles, books and other publications. The questionnaire was administered to 427 who are members and non-members of the North Swaka Trust conservation group. Using snowball sampling, 222 NST members were selected from 10 villages along the forest buffer zone. While the 205 non NST members volunteered to be interviewed were administered with the same questionnaire. The study questionnaire was collecting information in an effort to answer the following objectives; to examine the benefits of the North Swaka Trust model on community livelihoods, to discover the perception of the local community on the incentives provided by North Swaka Trust and to evaluate the socio-economic factors associated with community members' participation in the conservation activities being undertaken by NST.

The five-point Likert rating scale was used to describe stakeholder's perceptions on incentives being managed by NST. Socio-economic factors motivating community members to participate in the conservation activities were analysed through binary logistics regression.

2.3. Sampling Procedure

Due to the overwhelming responsethe sample size was calculated manually (Anika, 2021), the study selected a total 427 respondents from population of 354 participants under NST but, 222 instead of the calculated 185 NST members were interviewed with an additional of 205 non NST members. Of the participants, 171 were males while 256 were females. The sample size was determined at 95% confidence level, margin error of 5%, confidence interval (Z-score) of 1.96, considering a 50% distribution to make sure that the selected group were adequate. Only six key informants were purposely selected for interviews on perceptions on incentive-based forest management.

2.4. Data Analysis

Qualitative data was analysed using thematic analysis while quantitative data was analysed using descriptive statistics such as the mean, percentage, standard deviations and frequencies through the use of Minitab statistical software. The five-point Likert rating scale Joshi, (2015), was used to describe stakeholder's perceptions on incentives being administered by NST. Binary logistics regression was used to analyse the socio-economic factors motivating community members to participate in the conservation activities being undertaken by NST

3. RESULTS AND DISCUSSION

3.1. Perceived Benefits of the North Swaka Trust Model on Community Livelihoods

The NST activities involved training in CA using a small size area called 'Pfumfudza' measuring 39m x16m (FAO, 2022) with total planting spots of 1456 and each spot containing two plants, composite making, cover crops and beekeeping.

The most appreciated benefits by respondents were CA (Pfumfudza), beekeeping, and farming inputs (Figure 5.3). Cover crops were also liked by respondents mainly because they gain additional income as North Swaka provides a ready market.

The findings relate positively because CA using the Pfumfudza model (small fields) allows the farmers to maximize crop productivity even for households who cannot afford to hire oxen or tractors for tilling the land. One small maize field 39m x16m FAO, (2022), if well managed with composite manure, a handful of chemical fertilizer in the initial years, lime, and seed can feed a family of 7 for

twelve months (one year). Some households reported that they are now managing to buy cattle from the sale of produce under NST. One of the three respondents when asked what they had done with the money realised from the sale of various products to NST said, *"I have bought 2 heads of cattle after selling my produce to NST after the 2022/2023 farming season and am planning to buy more this coming season"* . However, it was noted that, despite soil conservation being one of the main focus of CA practices, it was one of the least perceived benefits by the local communities. Beekeeping is giving benefits immediately through the sale of honey of which the market is readily provided by NST. Although the cost of farming inputs was being deducted at the point of selling back to NST, respondents appreciated this for two reasons. Firstly, they did not have to worry about farming inputs as they would be provided to them, hence reduced stress on their incomes (Andrew, 2022). Secondly, the NST was providing inputs for crops which they were sure the market would be available the following year. Given that smallholder farmers in developing countries often lack market information compared to their commercial counterparts Khapayi & Celliers, (2016), the NST members were appreciative that commercial farmers downstream were able to provide this information by supporting NST activities.

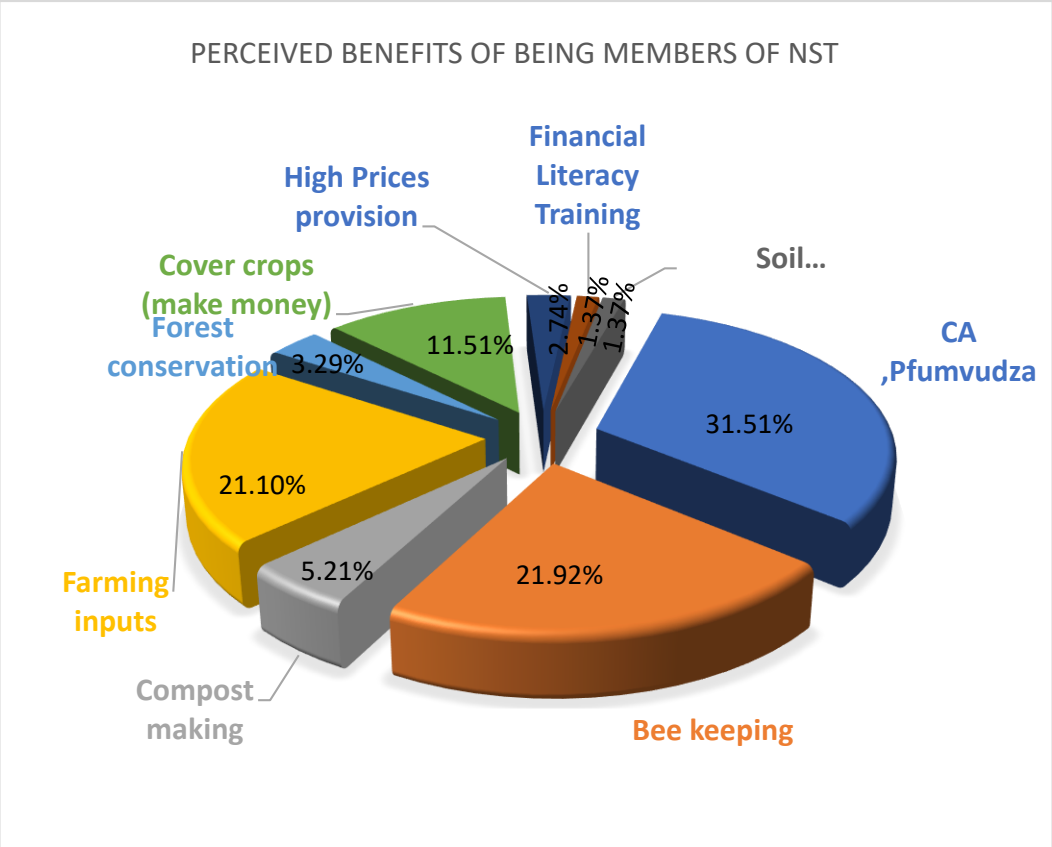

Figure2.2. *Percentage share of NST activities (Source: field data 2023)*

Only a few respondents felt the commodity prices were high enough. Some respondents argued that although they were benefiting, they were unsure of how much mark-up NST or those they sell to were making. The NST on the other hand argued that they are a non-profit making organisation, hence the members can be sure that the prices are right. Despite this uncertainty, members of NST during focus group discussions appreciated the role of NST in improving their livelihoods. The majority of the members stressed that there will be more benefits and improvements in livelihoods now and in the future as long as they commit themselves to implementing what they are being taught. Further, they pointed out that as long as NST continue to provide a market for honey and cover crops, or better still if they are directly linked to the market, they will continue protecting the forests while continuing with what they have been learning as these will ensure that they continue to have access to alternative livelihood sources.

Despite the aforementioned perceived benefits, NST members also pointed out an issue that was a hindrance to many community members regarding joining the forest conservation groups. One person

stood up and said, "*Why is it that each time we are attending a training, we are asked to pray a prayer of the Catholics, are we all Catholics?*" Based on this practice of praying, some members of the community have ended up stopping being members. When one of the key informants from North Swaka Trust was interviewed, he acknowledged that Foundation Zambia based at Chengelo in Mkushi which NST has partnered with to carry out trainings in communities on their behalf, is a faith-based organization that believes that before anyone could start any work, he or she should thank GOD, by so doing, people become faithful in fulfilling their tasks at home and in communities, especially the wise use of the forest resources. Another hindrance to joining the trust that was reported by non-members was the requirement to make compost in order to continue with the membership of NST. Some respondents complained that compost-making was a labour intensive activity which they could not manage to undertake.

CA allows farmers to maximise crop productivity in the event of dry spells even for households who cannot afford to hire oxen or tractors for tilling the land (Pramanik, et al., 2014). As noted in the study earlier, the model of CA called Pfumfudza being employed by North Swaka Trust utilizes small pieces of land if it is well managed, a Pfumfudza of maize field measuring 39m x 16m (FAO, 2022), yields 19.2 x 50kgs of maize, which could feed a family of at least seven people for twelve months. According to Pramanik, et al., (2014) and Umar (2021), CA improves soil organic matter, and water retention due to mulch, it requires less labor and enhances nutrient cycling thereby increasing nutrient levels in the soil, leading to increased crop yield. However, contrasting findings were found by Zulu, (2017) in their review of the participation of farmers in conservation farming practices under the COMACO model. In the COMACO model, farmers indicated that conservation farming is highly labour demanding especially during land preparation leading to some members dis-adopting the practice, the other challenge cited was weed management since COMACO does not encourage the use of herbicides during weeding because chemicals pollute the soils.

Another initiative perceived to be beneficial to the members of the community was beekeeping through the sale of honey which NST is buying providing a ready market for the members of the community within the groups. According to Ricketts and Shackleton, (2020) beekeeping has the potential to provide a triple benefit of increased income through the sale of bee products, polinations of agricultural crops and forest conservation.

Some respondents attested to the fact that from the income they were realising from the project interventions, they are managing to buy cattle from the sale of produce under NST. The provision of seeds for various crops including maize, groundnuts, soybeans, and other farming inputs by NST to community members was another initiative perceived to be beneficial, the farmers attributed their appreciation to two reasons. Firstly, they did not have to worry about farming inputs as they would be provided to them, hence reduced pressure on their incomes (Andrew, 2022). Secondly, the NST was providing inputs for crops which they were sure the market would be available the following year (Andrew, 2022). Given that smallholder farmers in developing countries often lack market information compared to their commercial counterpartsKhapayi&Celliers, (2016), the NST members were appreciative that commercial farmers downstream were able to provide this information by supporting NST activities.

3.2 Local Community Perceptions on Incentives

The study evaluated the perception of community members on various incentives provided by the trust to conserve the forest reserve. The evaluation focussed on perceptions on the performance of the Trust in the various activities and on how communities perceived the sustainability of these activities.

3.2.1 Perceptions of the performance of activities undertaken NST

Generally, the results revealed that members of the community perceived the NST activities to be good with the mean score of 4.25. The results also revealed that, on average, 67.5% strongly agreed that the trust was succeeding in promoting CA Pfumfudza, Honey production, and the rest of the statements as provided in (Table 1) below.

Table1. *Table of perception index of NST and Non NST members in Mkushi District*

NST Administered Activities	Mean Score
The trust is succeeding in promoting conservation agriculture in the area.	4.46
The trust is succeeding in promoting honey production in the area	4.45

The promotion of efficient stoves by the trust is helping to reduce deforestation	4.44
The trust is buying the produce at higher prices compared to other buyers in the area	4.01
The trust is supporting value addition for the produce	3.65
The presence of the trust in area will help to slow down deforestation	4.4
I am able to continue with bee keeping and conservation agriculture even if the trust was to stop its activities today	4.35
Those under the trust are having more income sources than those not under the trust	4.22
Maize yield is higher under conservation agriculture compared to the same size of land under conventional agriculture	4.25

Note: 1=Strongly disagree, 2=Disagree, 3=Not sure, 4=Agree, 5=Strongly agree

Source: Field data 2023

The local communities living along the forest buffer zone have never had a project which has been implemented that looked at how best to manage the forest reserves using incentives. Most of the local communities have limited sources of livelihood, therefore, the introduction of these alternative activities have been seen to solve some of their household challenges. The other reason for this high perception as attested by some members of the focus group who said "*we have tried CA and growing some cover crops in the past but we could not manage well because of lack of knowledge".* Therefore, the higher perceptions could beattributed to the fact that, some of them have tried the same activities in the past but due to limited knowledge and or skills, they have been unable to succeed, so they have seen an opportunity in NST that the organization will fill up where they have been failing. During the focus group discussion, some members said "we *have tried CA as taught by agricultural officer, we have tried to keep bees but we have not been successful like we are now, thanks to foundation Zambia and North Swaka Trust for these unique ways of handling CA, beekeeping and growing of cover crops*. The third reason for this higher perception was, NST is promoting user friendly activities which any able-bodied person can do. Some focus group members also said, *"the activities being implemented by NST have the potential to increase our household income and food security in the long run",* hence, the reason for this high perception.

A study by Mfune, et al., (2016) in Chikwa and Chimbombo chiefdoms of Chama districts in Eastern province are in agreement to the findings of this study, where 98% of the farmers attested that COMACO Model provides an easy access to the market, better prices for their products, improved farming technology, quick payment for the produce, and value addition. Also the findings of Ahmad and Louisa, (2021) who in their assessment of an incentive model implemented in Costa Rica revealed that the scheme had contributed to the conservation of nearly one million hectares of forest by payments for reforestation, protection, sustainable management, and regeneration. Similarly, the study carried on the PES model in Rwanda a positive community perception with members of the community highlighting the fact that the incentives were good and every household received a fair amount and were able to obtain some benefits like medical insurance which they could not afford before (NICOLE, et al., 2012), other stakeholders hailed the scheme as a great one as supplemented law enforcement priorities (Nichole et al 2012).

3.2.2 Perceptions on the Sustainability of the NST model

The study examined the potential impact of discontinuing the activities of the NST. The study specifically inquired whether members of the NST would continue their engagement in conservation efforts if the organization were to cease its operations immediately.

The surprising aspect of the findings lies in the predominantly negative responses received from NST members. One member articulated concerns that discontinuing the organization's activities would lead to adverse consequences, notably a risk of hunger. The member highlighted a perceived link between the NST's activities and the community's livelihood, emphasizing that their source of income from the forest had been curtailed. The NST member said "*NST should not stop the activities or leave the communities because we would die from hunger because our livelihood which was derived from the forest has been cut short*", when asked what kind of products they harvested or obtained from the forest for their livelihoods before NST came in, they responded that, they were cutting/making and collecting charcoal and firewood which they were selling for them to survive. Thus, NST in this vein may be perceived to perpetuate a dependence complex among members of the community.

The above findings underscore a significant reliance on the NST for sustenance within the community. The study implies that prior to the NST's intervention, community members depended on extracting and selling charcoal and firewood from the forest for their survival. The cessation of these activities due to the organization's intervention seems to have created a dependency on the NST for livelihood support.

The findings suggested that the NST's role may inadvertently foster a dependence complex among community members. Thus, the findings highlight the importance of ensuring that community development initiatives are done simultaneously with the empowerment of individuals and communities to achieve sustainability and self-sufficiency over the long term. This underscores the need for a balanced approach that encourages resilience and autonomy, fostering a more sustainable and self-reliant community in the absence of external support.

When one of the traditional leaders was asked how he perceived the incentives being provided to the local communities by NST to manage the forest reserves, the Chief doubted the effectiveness of the model and how sufficient the incentive were to deter community members from overexploitation of the forest resources in the quest to find livelihoods from forests. When some key informants from government departments (Agriculture, community development and Social welfare) were asked similar question as the chief, each one of them could not affirmatively pin point at an activity which NST was implementing in the community. When the study probed further as to why they there struggling to point at any activity despite having extension officers, especially Ministry of agriculture and community development, within the communities where NST is providing the incentives and some of them being part of the CA trainings, they all attributed to lack of documentations of the activities. However, one key informant from forestry department attested the fact that NST was supplementing government efforts in areas of forest protection besides improving local community livelihoods through the incentives being provided.

In areas where incentives based has been used to conserve biodiversity have met wih some critisisms, like the findings of Mollie, et al., (2020), some farmers in the PES model of Costa Rica perceived the incentives as just a mere recognition of their effort of taking care of the land they are sitting on or as simply a rural development assistance. Similarly, Nichole et al 2012) found that some members of the community perceived that the PES scheme in Rwanda was not paying enough considering the opportunity costs and that, some households would benefit more than others especially those with bigger land areas. The Rwandan Development Board, Tourism and Conservation (RDB) perceived the scheme of cash payment to have a negative impact on the community as some community members might use the money poorly, adding also that incentives are wrong because they are rewarding people for not breaking the law, a scenario perceived to be recipe for a possibility of promoting perverse incentives (NICOLE, et al., 2012).

3.3. Socio-Economic Factors Associated with Participation in Conservation Activities

The study considered the socio-economic factors that are associated with participation in the conservation activities among the respondents. The study considered two groups, members, and non-members of NST. The factors considered are age of the respondents which was from 18 to 100 years for both male and female, the household size ranged from 1 to 20 members per household with an average of 6 people per household. The respondents had land size that ranged between 1ha and 50ha, the length of stay in the community of the respondents ranged from 1 year to 70 years. With regards to livestock ownership the following were considered, cattle, sheep, goats and poultry. In terms of gender and marital status, 256 were female and 171 males. Among the females, 22 were divorced, 180 married, 3 separated, 19 were single and 32 were widowed, while among the male interviewed respondents, 5 were divorced, 156 were married, 13 were separated and 1 was found to be widowed.

The findings of the study revealed that, the socio-economic factors associated with local communities to participate in conservation activities include age of the respondents, household size, and to some extent land ownership (size of land owned) (Table 3). Ownership of livestock (cattle, sheep, goats, and poultry) and marital status had no significant effect (Table 3). However, age of the respondents and household size were found to be statistically significant, hence rejecting Ho and accepting alternative hypothesis based on the binary regression test performed (table 3), Age and household size have an effect on the motivation for participation in conservation activities.

Table2. *Interviewed Members and Non-members of North Swaka Trust's response information*

Variable	**Value**	**Count**	
North Swaka Trust membership	Yes	214	(Event)
	No	203	
	Total	417	

Source: Field data2023

Table3. *Determined Socio-economic factors (*Coefficients)

Term	**Coef**	**SE Coef**	**Z-Value**	**P-Value**	**VIF**
Constant	-1.465	0.540	-2.71	0.007	
Age of respondent	0.01751	0.00851	2.06	**0.040**	1.56
Household size	0.1310	0.0402	3.26	**0.001**	1.16
Length of stay	0.00830	0.00752	1.10	0.270	1.24
Size of land owned ()	0.01344	0.00730	1.84	**0.066**	1.10
Cattle	-0.0184	0.0354	-0.52	0.602	1.44
Sheep	0.0533	0.0883	0.60	0.546	1.24
Goats	0.0444	0.0330	1.35	0.178	1.15
Poultry (Chicken, ducks etc)	0.00351	0.00699	0.50	0.616	1.12
Gender of respondent					
Male	-0.351	0.231	-1.52	0.129	1.19
Marital status					
Married	-0.314	0.434	-0.72	0.470	3.06
Separated	-0.40	1.48	-0.27	0.790	1.09
Single	0.404	0.564	0.72	0.474	2.14
Widowed	-0.593	0.575	-1.03	0.302	2.21

Source: Field data2023

The findings of the study reveal that, the socio-economic factors associated with local communities' participation in conservation activities include age of the respondents, household size, and to some extent land ownership (size of land owned) (Table 3).

The age of the respondent showed a statistically significant positive association ($p<0.05$). This indicates that older respondents are more likely to participating in NST conservation activities. The results suggest a potential influence of age on the likelihood of participation in conservation activities.

Household size had a significant positive association with the participation in NST activities ($p<0.05$). This indicates that larger households are more likely to participate in conservation activities.

Land ownership, in particular, the size of land owned demonstrated marginal significance ($p=0.066$). Although not statistically significant at the 0.05 level, the results suggests a potential influence of landownership with respect to participating in conservation activities such as those under NST. Those who own land are more likely to participate.

Further analysis of the results reviewed that, for Continuous variables (appendix 2).The likelihood for participation in conservation activities in terms of age, is an increase by 1.0177 odds ratio, while household size, is an increase by 1.1400 odds ratio, and for length of stay, is an increase by 1.0083 odds ratio. In terms of size of land owned, the increase by 1.0135 odds ratio increases the chances of participation in conservation activities, for Sheep, is an increase by 1.0547 odds ratio, forGoats, is an increase by 1.0454 odds ratio and finally for Poultry (Chicken, ducks etc), is an increase by 1.0035 odds ratio. On the other hand on cattle, a reduction by 0.9817 odds ratio reduces the likelihood of participation in conservation activities.

The findings of the study in terms of gender, categorical variables (appendix 3) single males are more likely to be motivated to participate in NST conservation activities than divorced, married and separated female persons with odds 1.4978, 2.04 and 2.2235 respectively. Comparatively, other

variable are less likely to be motivated to participate in conservation activities comparing odds ratio from level A relative to level B.

The result of the study align with Kazungu, et al., (2021), who hypothesised that age provides information about members experience and integration level in group and community activities. Older members are more likely to partcipate in conservation programmes as they perceive such proagrammes as important to enhance household livelihood options (Kazungu, et al., 2021). The findings in the study by Musyoki, et al., (2013) agree with the findings of this study as they also found that older people were more interested in joining the CFA program than the younger people whom they found to have various other priorities compared to older people. However, in the study carried out by Faham, et al., (2008) contrasting results were found in which age of members of the community found to be negative and significant in the participation of reforestation and development of forest areas, indicating more younger members of the community were more likely to participate in the forest conservation programmes.

On the size of the household, the findings of the study were found to be statistically significant ($p < 0.05$). The results showed that a larger household size is positively associated with participation in conservation activities being undertaken by NST. The results are not surprising because the larger households may have a greater need to increase productivity and diversify the income streams for sustenance. The question of some conservation activities being labour intensive may not be so much of a hurdle for bigger families. The result of this study align with the findings by Musyoki, et al., (2013) that households with a large family size have higher dependence of forest resources and thus their desire to participate in the community forest conservation efforts. Similary, Faham, et al., (2008) found a positive and significant correlation between household size and participation in reforestation and development of forest areas in Iran.

With respect to land ownerships, the size of land owned was marginally significant ($p=0.066$) highlighting the nuanced nature of socio-economic factors that influence participation. The results hint at a potential positive relationship between larger land sizes and participation in conservation activities. However, further investigation and analysis could be needed to establish the robustness and reliability of this association**.**

4. CONCLUSION AND RECOMMENDATION

The results of this study highlight perceptions on the dynamics surrounding the conservation efforts carried out in Mkushi District by the North Swaka Trust (NST) especially in the forest buffer zones of the North Swaka and Mkushi Headwaters national forests. The study examined the perceived benefits on community livelihoods, investigated how the local community felt about the incentives offered by NST and evaluated the socioeconomic factors explaining the likelihood to participate in conservation efforts.

It can be concluded that the NST's efforts were generally well-received by the local communities. The community recognized the benefits of programs like beekeeping, conservation agriculture (CA)and the supply of farming inputs. There were several ways in which the NST model was thought to improve community livelihoods. One key component that emerged is conservation agriculture applying the Pfumfudza model which enables households to maximize crop productivity even in the face of resource constraints. In addition to offering quick financial gains through the sale of honey, beekeeping promoted pollination and the preservation of forests. By giving community members access to seeds and farming supplies, NST helped to alleviate financial strain and market uncertainties.

Important information was gleaned from the socioeconomic factors influencing involvement in NSTs conservation initiatives. Older people and households with more members exhibited a higher likelihood to participate in conservation efforts. Age and household size were found to be significant determinants. Although not statistically significant, land ownership suggested a positive correlation between larger land areas and involvement. These results highlight the importance of ensuring that conservation efforts fit the local community's economic and demographic circumstances.

Notwithstanding the largely favourable response, the study has also brought out negative feelings such as worries about possible reliance on NST and how membership might be impacted by religious

reasons. These difficulties highlight the need to ensure that community-based conservation programs are context-specific and consider the cultural and religious diversities of communities.

In conclusion, the North Swaka Trust's incentive-based approach has improved livelihoods, promoted sustainable practices and slowed down deforestation in the area. In order to guarantee the long-term viability and community-driven character of such projects, the study emphasizes the need for a more balanced approach that takes into account the varied socioeconomic environment and gives communities the tools they need to be resilient and self-sufficient.

RECOMMENDATION

To effectively manage the North Swaka and Mkushi Headwaters national forests placed under lease to NST, the traditional leaders and all stakeholders need to be brought on board fully. This is in order to avoid misinformation and mistrust between government, stakeholders and the private sector (NST).

NST should do more to engage the local communities on what activities they think can improve their livelihoods besides setting up a training center where local communities can be accessing short courses in forest resources management and utilization and sustainable agriculture production.

FURTHER RESEARCH

- There might be need to evaluate the impact of the incentives-based approach by NST at household level.
- Research on hydrology be conducted to determine water outflows and water users from the forest since the two forests placed under NST are water catchment areas.
- Investigate environmental and ecological impacts of incentive-based forest management NST model on biodiversity and ecosystem services.
- Assess carbon sequestration potential of forests under incentive-based forest management to sequer carbon towards contributions to climate change mitigation.
- Investigate the potential of market-based instruments like carbon-credits, payments for ecosystem services.

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APPENDICES

Appendix1. *Table of perception index of NST and Non NST members in Mkushi District*

	Level of perception (N=427)					
NST administered activities	Strongly Disagree %	Disagree %	Not Sure %	Agree %	Strongly Agree %	Mean
The trust is succeeding in promoting conservation agriculture in the area.	6.9	0.8	8.9	6.4	77.0	4.46
The trust is succeeding in promoting honey production in the area	7.1	0.8	9.1	6.1	76.9	4.45
The promotion of efficient stoves by the trust is helping to reduce deforestation	5.3	1.5	11.4	7.6	74.1	4.44
The trust is buying the produce at higher prices compared to other buyers in the area	4.9	2.3	32.0	8.7	52.2	4.01
The trust is supporting value addition for the	14.7	2.5	30.2	8.6	44.0	3.65

produce						
The presence of the trust in area will help to slow down deforestation	8.3	0.7	8.0	9.2	73.8	4.4
I am able to continue with bee keeping and conservation agriculture even if the trust was to stop its activities today	7.2	0.5	14.6	5.9	71.8	4.35
Those under the trust are having more income sources than those not under the trust	8.7	0.7	17.4	5.8	67.4	4.22
Maize yield is higher under conservation agriculture compared to the same size of land under conventional agriculture	9.3	0.0	17.0	3.5	70.3	4.25

Note: 1=Strongly disagree, 2=Disagree, 3=Not sure, 4=Agree, 5=Strongly agree

Source: Field data 2023

Appendix2. *Table of Odds Ratios for Continuous Predictors*

	Odds Ratio	**95% CI**
Age of respondent	1.0177	(1.0008, 1.0348)
Household size	1.1400	(1.0537, 1.2334)
Length of stay	1.0083	(0.9936, 1.0233)
Size of land owned ()	1.0135	(0.9991, 1.0281)
Cattle	0.9817	(0.9159, 1.0523)
Sheep	1.0547	(0.8872, 1.2539)
Goats	1.0454	(0.9799, 1.1152)
Poultry (Chicken, ducks etc)	1.0035	(0.9899, 1.0174)

Appendix3. *Table of Odds Ratios for Categorical Predictors*

Level A	**Level B**	**Odds Ratio**	**95% CI**
Gender of respondent			
Male	Female	0.7038	(0.4474, 1.1071)
Marital status			
Married	Divorced	0.7307	(0.3122, 1.7104)
Separated	Divorced	0.6736	(0.0369, 12.2949)
Single	Divorced	1.4978	(0.4957, 4.5254)
Widowed	Divorced	0.5528	(0.1792, 1.7053)
Separated	Married	0.9219	(0.0557, 15.2518)
Single	Married	2.0498	(0.9421, 4.4597)
Widowed	Married	0.7565	(0.3223, 1.7755)
Single	Separated	2.2235	(0.1218, 40.5850)
Widowed	Separated	0.8206	(0.0454, 14.8377)
Widowed	Single	0.3690	(0.1191, 1.1440)

Odds ratio for level A relative to level B

Appendix4. *Model Summary*

Deviance R-Sq	**Deviance R-Sq(adj)**	**AIC**	**AICc**	**BIC**	**Area Under ROC Curve**
7.52%	5.27%	562.32	563.36	618.78	0.6903

Source: Field data, 2023

Appendix5. *Goodness-of-Fit Tests*

Test	**DF**	**Chi-Square**	**P-Value**
Deviance	403	534.32	0.000

Pearson	403	420.76	0.261
Hosmer-Lemeshow	8	9.38	0.311

Source: Field data, 2023

Appendix6. *Analysis of Variance*

		Wald Test	
Source	**DF**	**Chi-Square**	**P-Value**
Regression	13	37.41	0.000
Age of respondent	1	4.24	0.040
Household size	1	10.64	0.001
Length of stay	1	1.22	0.270
Size of land owned ()	1	3.38	0.066
Cattle	1	0.27	0.602
Sheep	1	0.36	0.546
Goats	1	1.81	0.178
Poultry (Chicken, ducks etc)	1	0.25	0.616
Gender of respondent	1	2.31	0.129
Marital status	4	4.24	0.374

Source: Field data, 2023

Appendix7. *Fits and Diagnostics for Unusual Observations*

Obs	**Observed Probability**	**Fit**	**Resid**	**StdResid**		
12	0.000	0.598	-1.351	-1.50		X
72	0.000	0.291	-0.829	-0.88		X
88	1.000	0.944	0.340	0.36		X
95	1.000	0.873	0.521	0.55		X
105	0.000	0.462	-1.114	-1.18		X
150	1.000	0.382	1.387	1.52		X
199	0.000	0.495	-1.169	-1.65		X
213	1.000	0.505	1.169	1.65		X
227	0.000	0.522	-1.215	-1.44		X
242	0.000	0.703	-1.558	-1.65		X
313	1.000	0.805	0.658	2.09	R	X
342	0.000	0.888	-2.092	-2.13	R	
392	0.000	0.744	-1.650	-1.76		X
404	0.000	0.511	-1.196	-1.27		X
423	0.000	0.802	-1.798	-2.11	R	X

Source: Field data, 2023

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