

Non-carbon benefits as incentives for participation in REDD+ and the role of Village Participatory Land Use Plans in supporting this: Insights from Kilosa District, Tanzania

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ABSTRACT

This study assessed community perceptions on Non-Carbon Benefits (NCBs) as incentives for participation in Reduced Emission from Deforestation and forest Degradation (REDD+) and the role of Village Participatory Land-Use Plans (VPLUPs) in supporting this in Kilosa district of Tanzania. A mixed-method research design was used in the data collection. Results indicated that the majority (95%) of the respondents thought that VPLUPs had facilitated REDD+ implementation. The results also demonstrated that the REDD+ initiative remains an important source of NCBs. While the respondents believed NCBs were available and important to them, its future availability was somewhat of a concern. The respondents further indicated that the best way to improve VPLUPs (and consequently enhance the REDD+ related activities) and maintain the flow of NCBs, was to improve the knowledge of VPLUPs. NCBs should be considered in the planning, design and implementation of REDD+, especially considering that carbon markets remain questionable and unreliable.

Keywords

community, conservation, management, non-carbon benefits, perceptions

1. Introduction

Reduced Emissions from Deforestation and forest Degradation plus conservation, sustainable management of forests and enhancement of carbon stocks (REDD+) is an initiative under the United Nations Framework Convention on Climate Change (UNFCCC). It is based on the concept of payment for environmental services (PES) (carbon in this case, particularly for carbon sequestration but in some cases also for maintenance of existing carbon stocks). When first proposed, REDD+ was limited to reducing emissions from deforestation, but it has gone through a number of changes (Figure 1) and in the most recent version it includes the need for inclusion of non-carbon benefits (NCBs) (Angelsen et al., 2009; Minang et al., 2009; UNFCCC, 2010; Parrotta et al., 2012; Rival, 2013; Skutsch et al., 2013; Minang et al., 2015; Wong, 2016, Angelsen et al 2018). The inclusion of NCBs in the REDD+ strategy is what Turnhout et al., (2017) called "a triple win REDD+".

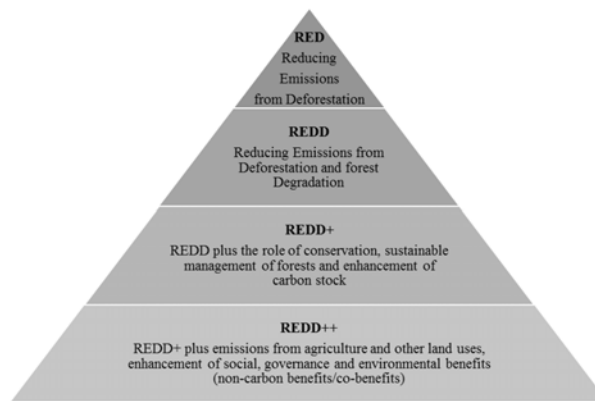


Figure 1: Flow diagram showing how the REDD+ concept has evolved

Source: Author's construction based on Minang *et al.*, 2009; UNFCCC, 2010; Rival, 2013; and Wong, 2016

In the context of this study, NCBs denote the multiple, additional and co-benefits associated with the REDD+ initiative and related activities, both realised and appreciated by the community concerned. These benefits under the REDD+ initiative go beyond forest carbon storage and sequestration (Angelsen et al., 2009; Hvalkof, 2013). Angelsen et al (2018), revealed that in REDD+ co-benefits include social and environmental (provision of ecosystem /environmental services) co-benefits, which result in better well-being outcomes. Realising the importance of NCBs in ensuring community acceptance led to their inclusion in the REDD+ strategy (SBSTA- UNFCCC, 2013; Marlay, 2013; Wong, 2016).

In addition, NCBs generally go beyond the minimum requirements of safeguards, commonly known as “Cancun safeguards” (Hvalkof, 2013). This implies that some of the NCBs are considered to be among the REDD+ safeguards (Hvalkof, 2013; SBSTA - UNFCCC, 2013). These safeguards encompass issues agreed to be promoted and supported to counteract risks and secure benefits associated with the REDD+ activities. They ensure that REDD+ does no harm to livelihoods and biodiversity, making it more proactive and aiming at ensuring a positive impact (Hvalkof, 2013). Thus, when REDD+ projects are designed should encompass social and environmental safeguards which include respect for the rights of indigenous peoples and local communities, effective participation in REDD+ design and implementation, promotion of biodiversity and social co-benefits and avoidance of displaced emissions (leakage) demonstrate international policy consensus around the need to protect and strengthen local rights and livelihoods as part of climate action (UNFCCC 2011; Agelsen, 2018).

There is some evidence that REDD+ can deliver both carbon storage enhancement and livelihoods benefits simultaneously (Chhatre & Agrawal, 2009; Angelsen, 2017). Notably, the success of REDD+ is mainly influenced by its capacity to support peoples’ livelihoods while achieving the global goal of biodiversity conservation and carbon stock enhancement (McDermott et al., 2012; Atela et al., 2015). Thus, NCBs have become fundamental to the REDD+ initiative (Katerere et al., 2015). Moreover, limited markets for carbon (Vatn et al., 2013; Lokina, 2014; Chirwa, 2015; Turnhout et al., 2017) has further necessitated the need to emphasise NCBs and to encourage local people to continue to participate in the REDD+ initiative and related activities, in order to mitigate the impact of climate change.

Literature has highlighted several NCBs arising from the REDD+ initiative and related activities to include poverty reduction/alleviation, biodiversity conservation and the improvement of forest governance (including tenure security and environmental goods and services) (Angelsen et al., 2009; Chhatre et al., 2012; Hvalkof, 2013; Sunderlin, 2014; Hailemariam et al., 2015; Angelsen, 2017). Other NCBs are technology transfers, improved rural livelihood strategies and community empowerment (Lawlor et al., 2013). Further, according to Hvalkof, (2013) NCBs could be grouped into three categories as social, environmental and governance. Social NCBs include maintaining sustainable livelihoods, cultures and communities, cultural services and traditional knowledge resources, adding social value to forests, food security and dynamic subsistence economy, and income generation and

employment. Governance NCBs is comprised of strengthening of traditional decision-making processes (self-governance), forest governance and management, monitoring biodiversity and surveillance of protected areas, and land tenure and territorial management. Environmental NCBs embrace conservation and production of biodiversity, protection and maintenance of ecosystem services, protection and proliferation of medicinal plants and curative practices, and water regulation and watershed maintenance. However, it can be hypothesised that continuous delivery/flow of these NCBs under REDD+ initiative would depend on the improved REDD+ programme and associated elements. In the context of Tanzania, delivery of NCBs may depend on Village Participatory Land Use Plans (VPLUPs) and the community's perceived importance of NCBs benefits. This is because, VPLUPs are recognised to be the building blocks for the REDD+ implementation. The plans are perceived to play major roles in ensuring security of forest tenure, reducing land use conflicts, limiting drivers of deforestation and forest degradation (Kajembe et al., 2015) and providing control over rights to land and resources (Bourgoin, 2012). Overall, this implies that there is a link between VPLUPs, forests and NCBs in the context of the REDD+ initiative.

However, despite this link, community perceptions on how to improve VPLUPs for forest management and conservation and perceived NCBs in the context of the REDD+ initiative have not been critically investigated and documented especially in Tanzania. As VPLUPs are building blocks of the REDD+ thus, it's necessary to know its extent that can help to achieve REDD+ objectives especially in provision of NCBs (URT, 2013b). Understanding the synergies between VPLUPs and REDD+ with its associated NCBs could lead to better planning, designing and implementation of this initiative. Drawing on the ideas of Angelsen et al (2018), this understanding is of global importance as REDD+ proponents are attempting to improve REDD+ practices especially on the delivery of benefits (NCBs) to the communities involved and how appreciated by the community, better tools (for example the use of VPLUP) to facilitate the management and conservation of forests and what's community improvement is needed. Further, Agelsen (2017) noted that as REDD+ approaches its 10th anniversary, there are questions concerning its impacts. In previous studies in the area (Uisso *et al.*, 2018; Uisso *et al.*, 2019) have examined these topics on the role of Village Land Forest Reserves (VLFRs) in the implementation of land use plans, and forest management and conservation before and after the introduction of land use plans, but this study focused on VPLUPs and NCBs. Thus,

this study assessed community perceptions on NCBs as incentives for participation in REDD+ and the role of VPLUPs and associated VLFRs in supporting this. VLFRs are the type of forest reserves within the village land of which its management is vested in the community themselves (URT, 2014). The following research questions were addressed in this study: i) have the VPLUPs facilitated the implementation of REDD+?; ii) what are the community perceived NCBs under the REDD+ related activities?; iii) what are the community's perception of the importance and status of NCBs under REDD+?; iv) what are the socio-economic factors driving their perceived importance of NCBs?; v) do VPLUPs adequately improve the management and conservation of VLFRs and NCBs under REDD+?; vi) what are the community's perception of improving VPLUPs for enhancing the management and conservation of VLFRs and NCBs under REDD+?

The assessment was carried out in a recently established REDD+ pilot project of the global initiative in the Kilosa district of Morogoro region in Tanzania. The following section provides a detail description of the project.

2. About the Kilosa District REDD+ project

The Kilosa District REDD+ project was implemented by a consortium of non-governmental organizations, a Tanzania Forest Conservation Group (TFCG), in collaboration with Tanzania Community Forest Conservation Network (MJUMITA). It started in 2009 and ended in 2014 (Kajembe et al., 2015; Blomley et al., 2017). **The total pilot area covered about 10,000 ha of forest, managed by 105 CFUGs.** As the project has ended the future implementation of the initiated activities have been handed over to the village governments and the Kilosa District council has the task to oversee the implementation and provide technical support. At the same time, MJUMITA looks for opportunities for potential carbon market which relies on voluntary market (Uisso *et al.*, 2019).

This REDD+ initiative aimed at ensuring that forests serve as a platform for carbon storage, sequestration and local community's livelihoods, as well as enhancing local level governance and institutional frameworks. Thus, the community would benefit from both Non-Carbon Benefits (NCBs) and selling carbon credits (carbon funds). This can be achieved by managing and conserving forests, especially Village Land Forest Reserves (VLFRs), by changing free access (open access) to forests to a more regulated access (TFCG, 2012; Vatn et al., 2013;

Dyngeland et al. 2014; Kajembe et al., 2015). The approach used to implement the REDD+ project in Kilosa District was based on the philosophy of participation underpinned by the principles of obtaining “Free Prior and Informed Consent” (FPIC). The FPIC principles emphasized transparency (communal orientation, communal consent and communal participation) (Dyngeland et al., 2014) and provided opportunity for many villagers to participate in the decision-making process regarding the implementation of the project (Uisso et al., 2018). Thus, their perceptions regarding the project could further improve the initiative.

Prior to REDD+ implementation in the context of Tanzania, Village Participatory Land Use Plans (VPLUPs) and associated VLFRs (as government initiatives and can also supported by non-governmental organization) are building blocks for promotion and implementation of REDD+ (URT, 2013b). Thus, the first activity in the implementation of the Kilosa REDD+ was the preparation of VPLUPs. During the planning process VLFRs was among the land uses proposed to be part of VPLUPs that the REDD+ initiative can be implemented. Unlike the case of the Kilosa REDD+ initiative in Tanzania, in some places VPLUPs and VLFRs may have existed before REDD+ implementation. So, the REDD+ initiatives in this case should build on the existing VPLUPs and VLFRs. At the time of data collection, the REDD+ initiative in Kilosa had established and approved VPLUPs and VLFRs and associated land use and forest by-laws for the participating villages. In addition, some selected people from village natural resource committees were given training and were involved in taking measurements in the VLFRs for calculations for estimation of carbon stock and increment. Although the data for carbon stock in each village were not available, trial carbon payment had already been made to the participating villages. For example, in the study villages: Chabima = 14 510.48 USD, Dodoma-Isanga = 8 307.45 USD, Kisongwe = 10 493 USD and Mfuruni = 4 010 USD) (Dyngeland & Waized, 2013; Kajembe et al., 2015). Furthermore alternative income and conservation activities were introduced and implemented, which included conservation agriculture, chicken rearing, beekeeping, sustainable charcoal production (only two villages), improved stoves and village community banks (VICOBA). All these activities especially the cost for training was financed/subsidised by the REDD+ project and aimed to reduce pressure from the VLFRs (Vatn et al., 2013; Dyngeland et al. 2014; Kajembe et al., 2015).

3. Materials and Methods

3.1 Description of the study site

The study was conducted in the Kilosa district of Tanzania by involving Chabima, Dodoma Isanga, Kisongwe and Mfuruni villages taking part in the REDD+ initiative. The Kilosa district is one of the six districts in the Morogoro region located about 300 km inland from Dar es salaam. The district lies between 6°00' and 8°00' S latitude and 36°30' and 38°00' E longitude (Figure 1) at an altitude ranging from 550 m to 2 200 m above sea level (a.s.l.) (KDC, 2012). The district receives a mean annual rainfall that ranges from 500 mm to 1 600 mm and its average annual temperature ranges from 25°C to 30°C. The rainfall distribution is binomial, characterised by two rain peaks per year with dry spells separating the short rain period between October and December from the longer rain period between February and May (KDC, 2012; Mutabazi, Kajembe, Silayo, & Mombo, 2014). The district vegetation is dominated by *Albizia spp*, *Brachystegia boehmii*, *B. spiciformis*, *B. microphylla*, *Commiphora spp* and *Combretum spp*, which classify the forest of the area as Miombo woodlands (Shishira, Yanda, Sosovele, & Lyimo, 1997). Most of these forests are government forest reserves (covering about 106 983 ha and managed by the government), Village Land Forest Reserves (VLFRs) (covering about cover about 124 335 ha and managed by the community) and forests on general land (all forests in the village land but outside VLFRs which are free access) (KDC, 2012). Prior to REDD+ in the area all forests except the government forests were free access. The introductions of REDD+ project made the VLFRs in the area.

The district covers an area of 14 245 km² with a total population of 438 175 (URT, 2013a). Various ethnic groups inhabit the district, but the dominant tribes are Wakaguru, Wasagara and Wavidunda. The Maasai, Barbaig and Sukuma, who are mainly pastoralists, are also distributed in the district (Kajembe et al., 2013; URT, 2013). The main economic activity is farming, which is practised by 80% of the people (Derman et al., 2007; Kajembe et al., 2013). The main farming system is characterised by subsistence and smallholder farmers (Kajembe et al., 2013).

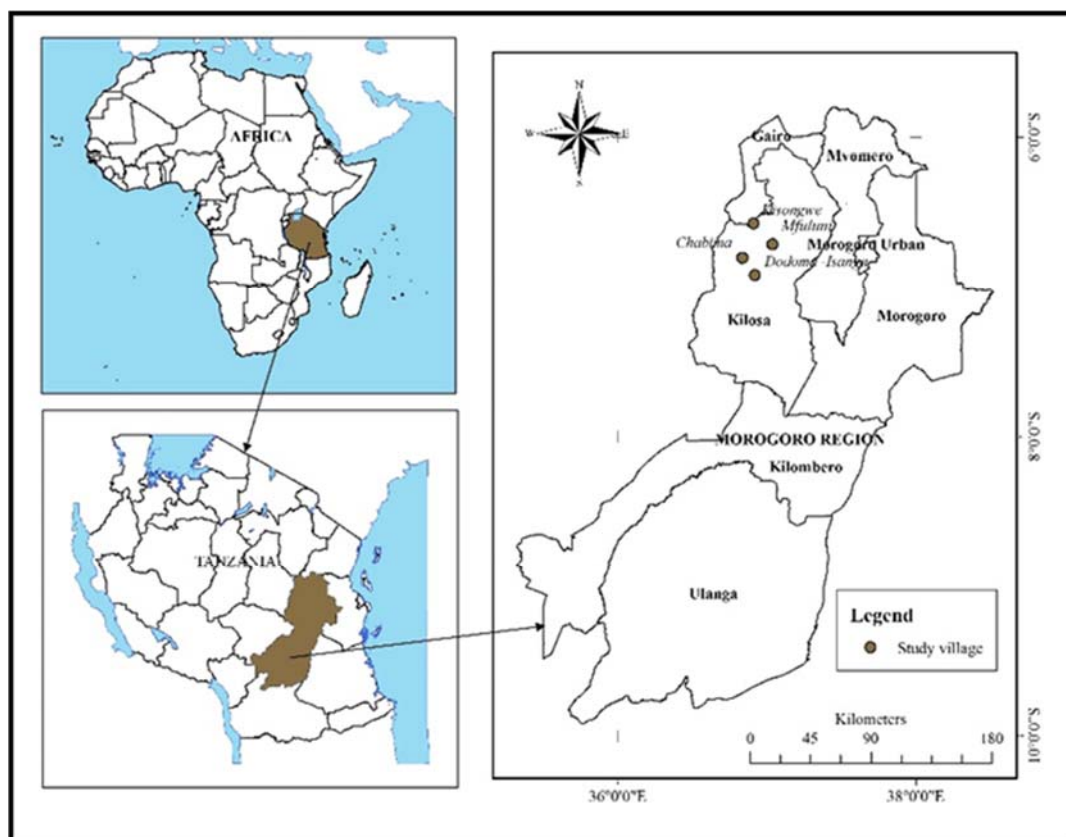


Figure. 1: Location of the study area

3.2 Research design and sampling procedure

The research employed a mixed-method approach that comprised both quantitative and qualitative research techniques (Donley, 2012; Creswell, 2014). This design allowed the collection, analysis, integration and interpretation of data based on both qualitative and quantitative approaches (Creswell & Plano, 2011). Of the six mixed-method models (convergent parallel, explanatory sequential, exploratory sequential, embedded, transformative and multiphase models), the study adopted a convergent parallel model. The model consists of one distinct phase which allowed parallel collection of both quantitative and qualitative data and enabled comparison and interpretation of the results by identifying areas of similarities, convergence and complementarities (Creswell & Plano, 2011; Creswell, 2014).

The sampling procedure comprised both purposive and random sampling. The studied villages were selected purposively, focusing on villages involved in the REDD+ initiative, with two villages from the highland (Kisongwe & Mfuluni) and two from the lowland areas (Chabima

and Dodoma Isanga). Purposive sampling was also used to select participants for participatory community mapping (PCM), focus group discussions (FGDs), key informant interviews (KIIs) and direct observations (Patton, 2002; Donley, 2012). Simple random sampling was used to select 328 households from a sampling frame of 1826 (total number of households in the four sampled villages) households for the household survey (Sapsford & Jupp, 2006; Donley, 2012). However, after excluding partially filled questionnaire and the questionnaires with the respondents who were not aware of VPLUPs, the final sample size considered was 301 households.

3.3 Data collection

Data collection involved a combination of quantitative and qualitative data (Creswell, 2014) and were collected between July 2016 and January 2017 by the first author of this manuscript and four field assistants. Quantitative data were collected via structured questionnaires (comprising both closed and open-ended questions) administered face-to-face with the head of households. Of the respondents 57% were males and 43% were females, and 93% fell within the economically active (workforce) group aged between 18 and 64 years. Qualitative data were collected through PCM, FGDs, KIIs and field/direct observation methods. Data collected under the quantitative and qualitative methods are as indicated in Table 1.

3.4 Data analysis

Quantitative data from the questionnaire were analysed using Statistical Package for Social Sciences (SPSS) (version 24) and Microsoft Excel 2016 to generate both descriptive (percentages and frequencies) and inferential statistics (relationship between variables and inferring the property of the sample population) (Landau & Everitt, 2004). Table 1 further shows the main issues analysed, and their related analytical tools used (Pallant, 2013; Bleyer et al., 2016). Qualitative data, mainly obtained from PCM, FGDs, KIIs and direct observations, were analysed using the qualitative content analysis technique (Patton, 2002; Donley, 2012; Bless et al., 2016).

Table 1: Main issues analysed, and their related analytical tools used

Issue	Main issues analysed	Method of data collection	Measurement level and type	Analytical tool/technique
1.	Community perceptions of whether VPLUPs facilitated REDD+ implementation	<ul style="list-style-type: none"> Household interviews 	<ul style="list-style-type: none"> Nominal (yes and no) Dichotomous outcome of a single variable (yes=1 and no=0 responses) 	<ul style="list-style-type: none"> Descriptive statistics (frequencies and percentages) Binomial test
2.	Community perceived NCBs under the REDD+ related activities and community-perceived importance and status (current and future availability) of NCBs of the REDD+ initiative	<ul style="list-style-type: none"> Household interviews PCM, FGDs KII Field/direct observation 	<ul style="list-style-type: none"> Nominal (list of NCBs) Ordinal – three-point Likert scale (very important, moderately important, not important; and very available, moderately available, not available) 	<ul style="list-style-type: none"> Descriptive statistics Ordered logistic regression (socio-economic variables versus ordered outcome) Wilcoxon rank test (current and future availability)
3.	Community perceptions on whether VPLUPs can adequately improve management and conservation of VLFRs and NCBs under the REDD+ initiative	<ul style="list-style-type: none"> Household interviews PCM, FGDs, KIIs Field/direct observation 	<ul style="list-style-type: none"> Nominal (yes and no) Dichotomous outcome variable (yes=1 and no=0 responses). 	<ul style="list-style-type: none"> Descriptive statistics Binary logistic regression (socio-economic variables versus dichotomous outcome)
4.	Community perceptions on improving VPLUPs for enhancing the management and conservation of VLFRs and NCBs of the REDD+ initiative	<ul style="list-style-type: none"> Household interviews FGDs KIIs 	Nominal (yes and no)	Descriptive statistics

Prior to running of the logistic regression and ordered logistic regression, a multicollinearity (also collinearity) test for predictor variables (independent variables) was checked using

tolerance tests. In this case tolerance was greater than 0.1, which indicates weak colorations between predictor variables (Pallant, 2013).

4 Results and Discussion

4.1 Community perceptions on whether Village Participatory Land Use Plans (VPLUPs) facilitated the REDD+ initiative implementation

The results revealed that a significant majority (95.4%) of the respondents believed Village Participatory Land Use Plans (VPLUPs) had facilitated the implementation of the REDD+ initiative. In various discussions (through participatory community mapping (PCM), focus group discussions (FGDs), key informant interviews (KIIs) it was claimed that, without VPLUPs, it would not have been possible to allocate land for VLFRs, which is the main component of REDD+. This is because VPLUPs provide an opportunity to use land (including VLFRs) effectively with clearly defined land uses and provide security of tenure to the land users. This implies that the villagers recognise the importance of VPLUPs for REDD+ implementation, which is also a good indicator of villagers' support of the initiative. In addition, the positive perceptions might have been reinforced by the implementers who created more awareness among the villagers about the importance of VPLUPs for supporting REDD+ implementation. This was reflected during various discussions with statements such as: *“Yes, we were told that in order to implement REDD+ there was a need to plan for the use of our land, and without the plan, REDD+ initiative would have not been implemented.”*

Overall, these results imply that the community now understands that VPLUPs can facilitate REDD+ implementation. The results are further evidence that Land Use Planning (LUP) is a prerequisite for REDD+ implementation. Peoples' positive perceptions of LUP for REDD+ implementation is a good motivator for supporting REDD+ implementation. Thus, implementers should develop a policy to increase these positive perceptions about LUP for REDD+. Another study in Lao PDR revealed that LUP was perceived as a key instrument in facilitating REDD+ implementation and providing guidance on land tenure security at local level. Conversely, REDD+ could also provide long-term incentives for compliance with LUP (Bourgoin, 2012). In addition, the results of this study support the earlier argument that LUP is perceived as a necessary approach during the implementation of the REDD+ initiative to effectively deal with leakage and permanence issues (Sundstrom & Mustalahti, 2010). Finally,

Pettenella & Brotto (2012) viewed LUP as a crucial determinant in the successful implementation of the REDD+ initiatives.

4.2 Community perceptions on Non-Carbon Benefits (NCBs) under the REDD+ initiative and related activities

The findings revealed that the community perceived that several NCBs have emerged under the REDD+ initiative and related activities (Table 2).

Table 2: Perceived NCBs under the REDD+ initiative and related activities (N=301)

Benefits	Frequency	Percent (%)*
Introduction of village community bank (VICOBA)	269	88.5
Environmental education (capacity building)	264	86.8
Improved stoves (energy efficient stoves)	255	83.9
Forest conservation	210	69.1
Facilitate forest management (governance)	181	59.5
Support livelihood strategies	157	51.6
Poverty reduction	117	38.5
Construction of village government offices	94	30.9
Conservation agriculture	40	13.2
No answer	4	1.3

Note: * = percentage based on multiple responses

These NCBs were also confirmed during various discussions but included VPLUPs, VLFRs, training on good governance, creation of alternative income generation groups and enterprise activities (such as beekeeping and chicken rearing) as other benefits that emerged from REDD+ implementation. This implies that the REDD+ initiative in the study area can deliver/generate benefits for the community in all three major categories of NCBs, namely social, governance and environmental benefits (UN-REDD programme, 2012). Figure 2 summarises categories of NCBs identified in the study area. However, from Table 2 it is clear that there is a big difference between those benefits that were supposed to flow from the REDD+ activities themselves (42%), such as forest conservation, forest governance, support livelihood strategies and poverty alleviation, and REDD+ direct support to livelihood activities such as introduction to VICOBA, environmental education, improved stoves and construction of village offices (58%).

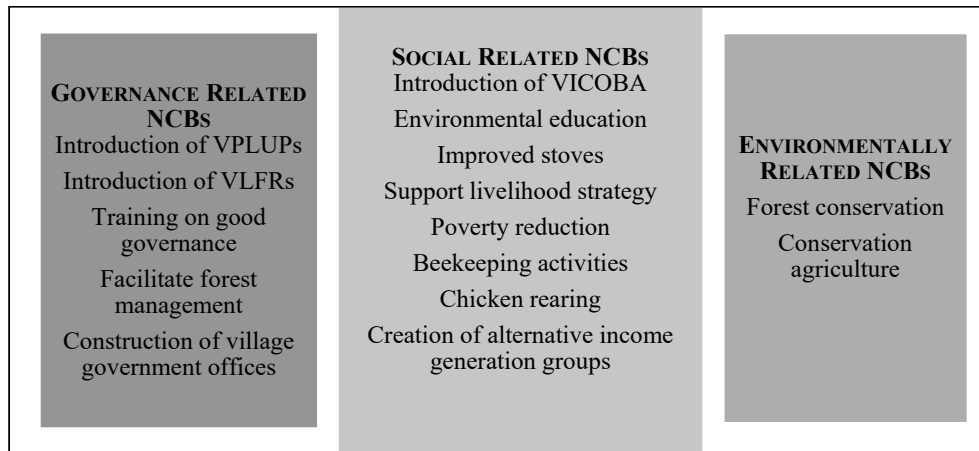


Figure 2: Categories of NCBS under the REDD+ initiative in the study area

In addition, the observed NCBS suggest that the REDD+ safeguards were successfully addressed, a significant step towards attaining positive REDD+ outcomes. This further reflects that REDD+ was introduced for providing multiple benefits to the community, supporting the previous view that REDD+ is likely to provide opportunities for benefits other than the enhancement of carbon stock (Lu et al., 2012).

The three main benefits, regardless of their category, were the introduction of VICOBA, environmental education and improved stoves (Table 2). It implies that the most appreciated NCBS were those that were supported by the project, not these and those that were expected to result from the activities. As noted earlier, VICOBA was among the alternative income generating activities introduced as part of REDD+ activities in the villages and the fund to start up was from the villagers themselves especially those who agreed to join this financial institution. According to the villagers, the introduction of VICOBA had opened new avenues for access to loans/credit, which could be used to start up small businesses and increase their income. The villagers further narrated that they could now access loans to satisfy basic needs for their families and repay the loans when they sell agricultural products during the harvesting period. This implies that the loan scheme is beneficial to the community's livelihood, as supported by Dyngeland et al. (2014) who noted that the loan and credit schemes (emphasised by the Tanzania Forest Conservation Group (TFCG) in the study area for alternative livelihood strategy) are important to the community. Lastly, according to Tomaselli, Timko, & Kozak, (2013), access to credit/loan enables a rural community to acquire the necessary financial capital and equipment to start and/or expand their enterprises. Thus, increased support of

VICOBA is significant given that access to financial services is generally difficult in rural communities (Ellis, Lemma, & Rud, 2010). In this case, the introduced VICOBA in the area and its enhancement thereof could make financial services and alternative income more accessible to the community involved in REDD+, thereby possibly reducing pressure on VLFRs.

In addition, regarding improved stoves, it was narrated that: *“We are happy that the project has brought to us improved stoves because firewood is the most utilised energy source in our households. Hence, improved stoves would reduce tree consumption from the forest, but the only challenge is that this technology was provided to few people, we need them to support more people.”*

This suggests that the community is aware that improved stoves would reduce pressure on forests. It also suggests that improved stoves denote reducing emissions caused directly by households in their daily lives. Tanzania’s various policies have emphasised the link between improved stoves and forest conservation. This is because about 90% of the households in rural and urban areas use fuelwood as their primary source of cooking energy, mainly in the form of firewood in rural areas and charcoal in urban areas (URT, 2014; URT, 2015). Thus, the Tanzanian government is promoting energy conservation and efficiency practices as a means to reduce pressure on forests. The government’s efforts to support improved stoves in the country play an important role in reinforcing the REDD+ initiative in the area. However, it was noted that support was required to acquire the improved stoves. The government should therefore support awareness creation and aid in the installation of the improved cooking facilities. Nevertheless, having started the initiative in the area, the willingness of the people to embrace the new cooking facilities, coupled with supportive policies that promote improved stoves, means that there is an opportunity to enhance the initiative (improved stove) in the REDD+ initiative areas.

Concerning environmental education as a human social capital, the villagers reported that REDD+ had broadened their understanding on the environmental issues, especially pertaining to the importance of conserving the environment. This is also evident in the previous results as the community perceived VPLUPs and VLFRs as conservation strategies which have improved their awareness of forest management and conservation. This suggests that REDD+ has played

a vital role in increasing the community's awareness of environmental issues as evidenced by their ability to engage in various discussions regarding environmental issues during data collection and that 80% had benefited with environmental education as shown in Table 2 above. It is important to enhance their interest and to facilitate a greater appreciation of conservation issues in order to achieve long-term conservation benefits. These results support Mehta and Heinen (2001) who noted that empowerment and education are the most important social benefits derived from community-based initiatives. Furthermore, some studies have elucidated the importance of environmental education as one of the strategies for ensuring sustainable forest management (Ifegbesan, 2009; Tanui, 2015). Thus, environmental education could be an important opportunity and input to present and future conservation efforts under REDD+ implementation in the area.

Overall, these results support that the community now understands that NCBs under the REDD+ initiative can partly allow them to improve their livelihoods. This also may reflect community dependency on these potential NCBs and partly dispels the concerns that the benefits of REDD+ would not be transferred to the community (Phelps et al., 2010). However, based on these results there seems to be some contradiction in community perceptions on NCBs. On one side, community members perceived several NCBs under the REDD+, for example, access to loans to start up a business and increase their income, alternative income generation and forest-based enterprises, however, less than 40% of respondents perceived poverty reduction as a NCBs benefit. This suggests that although the community have received NCBs to a large extent have not helped them to get out of poverty.

In addition, the observed community's knowledge of the potential NCBs available in the area can motivate their participation in VPLUPs and REDD+ implementation, which can create greater social cohesion among the villagers and promote good land and forest governance. For example, Katerere et al., (2015) claimed that NCBs are linked to greater carbon benefits because it is through the promotion of NCBs that the REDD+ strategies address the drivers of deforestation and forest degradation. This implies that by enhancing NCBs, the REDD+ initiative would be positively influenced. However, literature suggests that the REDD+ capacity to provide certain NCBs often depends on the location and type of the REDD+ initiative, forest type, who is defining them and for what, and how participatory the process is (UN-REDD programme, 2012; Forest of the world, CARE, IBIS, & IWGIA, 2013; Katerere et

al., 2015). For example, the REDD+ activities implemented in intact natural forests may yield greater biodiversity benefits, whereas the REDD+ activities implemented in degraded forests may yield greater benefits in terms of water regulation (UN-REDD programme, 2012; Forest of the world, CARE, IBIS, and IWGIA, 2013). A study in West Africa reported the main NCBs related to the REDD+ initiative as income generating activities, infrastructure development and employment opportunities (Abbey, 2015). This partial variation in NCBs supports the above observation on the capacity of the REDD+ initiative to deliver NCBs. Thus, the REDD+ initiatives should recognise this variation in NCBs and acknowledge that the locations and nature of forests where REDD+ are implemented are not homogeneous but rather heterogeneous.

4.3 Community perceptions on the importance of NCBs of the REDD+ initiative

Overall, community perceptions on the importance of NCBs of the REDD+ initiative, regardless of their category, showed that the majority (67.7%) of the respondents perceived NCBs to be very important to them, while 28% and 4.3% indicated moderately important and not important respectively. The importance of NCBs was also highlighted by various discussants (participants in various discussions during PCM, FGDs, KIIs and direct observations), indicating that NCBs were important to them, especially as they are linked to livelihood strategies and forest management and conservation. In other instances, however, they expressed some negative feelings about carbon payments. For example, it was expressed that: *“Yes non-carbon benefits are important because the project promised us that we would get multiple benefits like forest-based enterprises, conserving our environment as well as selling carbon, but since we received the first payment for carbon, we have not received another fund, we have only benefited with the other things”*.

This shows that unless another tranche of carbon fund is provided, people may become disillusion with REDD+. In addition, it may also mean that that NCBs are important to people because, at the time of the study, the community had not been awarded (given/paid) another tranche of money for carbon but only a few villagers expressed negative evaluations. Thus, flow of carbon funds and the overall perceived importance of NCBs may increase a community motivation to continue with the implementation of REDD+. However, the issue of carbon funds needs to be carefully considered and the community should be well-informed regarding future payment of carbon funds. The observed positive attitude towards NCBs in this study should

receive greater attention from the implementers and be exploited for further development of NCBs and the REDD+ initiative. This level of perceived importance of NCBs has also been reported in Asia (Joshi et al., 2013). Notably, Bayrak & Marafa (2016) argued that the co-benefits of REDD+ are more important because they play bigger roles than future carbon payment. In the same vein, another study in Asia reported that people see the REDD+ programmes as benefiting communities with more than carbon benefits because of the consideration of livelihood benefits (as NCBs) (Myers et al., 2016). Conversely, in some cases in Asia, REDD+ has contributed to commercialisation of community forests, at the cost of the livelihoods of the poorest people. It has ignored the wider range of non-monetary values/benefits that forests provide. (Khatri et al., 2018).

In addition, the ordered logistic regression revealed that none of the socio-economic factors had a significant ($p > 0.05$) influence on the perceived importance (very important, moderately important and not important) attached to NCBs under REDD+ (Table 3).

Table 3: Socio-economic variables influencing community perceptions on the importance given to NCBs under the REDD+ initiative

Independent variable	Estimate	SE	Wald	df	Sig.
Gender – male (x_1)	-0.209	0.264	0.626	1	0.429 ^{ns}
Age (x_2)	-0.001	0.011	0.009	1	0.926 ^{ns}
Household size (x_3)	0.002	0.077	0.001	1	0.978 ^{ns}
Number of dependants (x_4)	0.065	0.076	0.730	1	0.393 ^{ns}
Marital status – married (x_5)	-0.156	0.323	0.233	1	0.629 ^{ns}
Education level – literate (x_6)	-0.29	0.350	0.689	1	0.406 ^{ns}
Farmland ownership – yes (x_7)	-0.683	0.836	0.666	1	0.414 ^{ns}
Residence period (x_8)	0.008	0.010	0.679	1	0.410 ^{ns}

Note: ns = Not significant at 0.05

These results revealed some common or collective perceptions in the community regarding the importance of NCBs despite their socio-economic differences, meaning that NCBs have the same appreciation across socio-economic classes in the community. This implies that socio-economic factors do not always significantly influence peoples' perceptions of the importance of issues. Thus, it is worth noting that community perceptions might have been influenced by other contextual and institutional factors such as existing social institutions, social networks, power relations, and proximity to roads and forests. In addition, though no significant

relationship between socio-economic and perceived level of importance given to NCBs was observed, it is important to make sure that the benefits are evenly distributed/considered among the community. This is to at least make sure that the benefits of REDD+ initiative are evenly distributed, as it was learnt earlier that benefits like stoves were not evenly distributed.

4.4 Community-perceived current and future (after five years) availability of NCBs under the REDD+ initiative

Regarding the current availability of NCBs, the majority (>95%) of respondents perceived that NCBs under the REDD+ initiative-related activities were moderate to very available (Table 4).

Table 4: Perceived current and future (after 5 years) availability of NCBs under the REDD+ initiative (N=301)

Availability	Current availability		Future availability		Wilcoxon test
	Frequency	Percent	Frequency	Percent	P-Value
Very available	180	59.8	158	52.5	0.01*
Moderately available	108	35.9	109	36.2	
Not available	13	4.3	34	11.3	

Note: * Significant at 0.05

Similar results were also evident during various discussions (through PCM, FGDs and KIIs). In this regard (for example), it was said: *“Non-carbon benefits of the REDD+ initiative exist and are many, you can benefit from all available benefits unless if you don’t want to be part of it, personally I have benefited from improved stoves, environmental education through attending meetings, seminars and training.”*

Another explanation was that: *“As for now, we are satisfied with the status of availability of non-carbon benefits.”*

These results highlight REDD+ success in providing NCBs. While the project proponents should thus be able to ensure that the availability and viability of NCBs are maintained, achieving this seems to be a challenge, possibly because strict monitoring (Vijge et al., 2016) and effective implementation of the REDD+ related activities are required. On the other hand, the majority (>88%) of the respondents perceived that future NCBs under the REDD+ initiative and related activities would be moderate to very available (Table 4).

The Wilcoxon test, however, indicated a significant ($p < 0.05$) difference between current and future perceived availability of NBCs (Table 4). This implies that the villagers are of the opinion that NBCs would be less available in the future. This pattern is also evident in the increase in the percentage of respondents who said that, in future, NBCs would not be available (11.3%) (Table 4). These findings agree with various discussions with the villagers where they indicated that they expected long-term benefits from REDD+, but were also uncertain about the future availability of some of NBCs. The limited future availability of NBCs suggests lowering/weak enforcement of the VPLUPs and REDD+ initiative at large.

In general, perceptions about the availability of NBCs may be based on the current performance of REDD+, especially in its deliverance of the NBCs. However, a plausible explanation for villagers' uncertainty could be the fact that the local NGO, TFCG, had already handed over the project to the village governments and the district authority. The villagers, therefore, do not hope to enjoy NBCs in future in the same way as they had under the current administration. This may be due to their overall experience of the previous initiatives that were overseen by the village governments and district council (Vatn et al., 2017). Thus, the community needs to be made aware of this in order to build their confidence and to motivate them to continue implementing the REDD+ initiative.

The discussants were doubtful about the future availability of NBCs such as conservation agriculture and improved stoves, which seem to be poorly adopted. Various discussions and the results by Vatn et al., (2013) showed that the reason for the low adoption rate was the fee required to join these group activities. The villagers also claimed that they could not afford the costs involved in installing the improved stoves. As the discussants showed that improved stoves were poorly adopted creates a contradiction. This is because more than 80% of the sampled respondents perceived improved stoves as NBCs. There seems that those who mentioned improved stoves were not necessarily using the technology rather they just know that people have benefited with improved stoves. Regarding conservation agriculture, the villagers claimed that those who received training on conservation agriculture were reluctant to disseminate this technology to others. At the same time, they were also complaining about the low prices of the agriculture products, which could not compensate for the costs related to conservation practices.

Overall, this means that returns to conservation agriculture is too low and capital costs of stoves are too high although they were subsidised by REDD+ project. This concern needs consideration in the future in order to sustain the REDD+ initiatives. Thus, more efforts to create incentives are needed to improve the adoption rate of conservation agriculture and improved stoves, which seems to be poorly adopted (Vatn et al 2013).

Again, the discussants were doubtful about the future availability of NCBs could be linked to the scenario noted earlier that most appreciated NCBs were those that were paid for by the project, not those that were expected to result from the activities.

Generally, villagers' expectations regarding the availability of NCBs provide signals to the REDD+ initiative proponents to increase the flow of NCBs. Continuity of available NCBs would be one potential indicator of the sustainability of REDD+. Furthermore, it can be hypothesised that the availability of NCBs depends on continued support for the project, with a particular emphasis on NCBs. If the emphasis should shift to carbon benefits, it is likely going to affect NCBs, as there will be a conflict of interest. For example, it is hypothesised that if REDD+ project proponents should impose full restrictions on accessibility to forest resources to capitalise on carbon benefits, it may imply that some of the NCBs may also disappear, thereby negatively affecting the community's livelihood. Unless the price of carbon offsets the lost income from NCBs. Maraseni et al., (2014) and Poudel et al., (2014) contended that when REDD+ imposes full restrictions on access to forest products, it leads to negative impact on peoples' livelihood.

4.5 Community perceptions on VPLUPs' adequacy to improve the management and conservation of NCBs under the REDD+ initiative

The results indicated that a significant majority (92.4%) of the respondents were of the opinion that the present VPLUPs were adequate for enhancing the management and conservation of forests for NCBs under REDD+, while 7.6% thought otherwise. This result suggests that the present VPLUPs are performing well, as evidenced by the previous results that the plans have enhanced forest management and conservation (Uisso et al., 2019). This is further confirmed by the overall perceptions of the REDD+ initiative in the area, as people gave a positive evaluation of the programme, especially regarding forest conservation (Vatn et al., 2017).

Further analysis was carried out to ascertain the socio-economic variables influencing the community's perceptions of the capacity of VPLUPs to improve management and conservation of forest for NCBs under the REDD+ project-related activities. The logistic regression results showed that farmland ownership was significantly ($p < 0.05$) influencing these perceptions (Table 5).

Table 5: Socio-economic variables influencing perceptions of the capacity of VPLUPs to improve the management and conservation of forest for NCBs under the REDD+ initiative (N=301)

Independent variable	B	SE	Wald	df	Sig.	Exp (B)
Constant	1.787	1.701	1.103	1	0.294 ^{ns}	5.969
Gender – male (x_1)	-0.802	0.536	2.241	1	0.134 ^{ns}	0.448
Age (x_2)	0.031	0.022	1.948	1	0.163 ^{ns}	1.031
Household size (x_3)	-0.218	0.136	2.574	1	0.109 ^{ns}	0.804
Number of dependants (x_4)	0.041	0.127	0.104	1	0.747 ^{ns}	1.042
Marital status – married (x_5)	-0.460	0.789	0.339	1	0.560 ^{ns}	0.631
Educational level – literate (x_6)	-1.344	1.103	1.484	1	0.223 ^{ns}	0.261
Farmland ownership - yes (x_7)	2.543	0.982	6.714	1	0.010*	12.722
Residence period (x_8)	0.009	0.020	0.212	1	0.645 ^{ns}	1.009

Note: * Significant at 0.05; ns = Not significant at 0.05

This could be explained by the high demand for land for especially farming, thus those who own land are interested to know about the performance of VPLUPs and related opportunities. Thus, it is important to consider farmland ownership issues in order to successfully implement VPLUPs and the REDD+ initiative. However, this does not mean that the greater interest of landowners in the planning, is that they gain more from REDD+ than the smaller or landless farmers, rather the benefits are supposed to be evenly shared/distributed among the community (DELOITTE, 2012).

4.6 Community perceived actions to improve VPLUPs for the management and conservation of forests for NCBs under the REDD+ initiative

Community perceptions on improving VPLUPs for enhancing the management and conservation of VLFs and NCBs of the REDD+ initiative and related activities were assessed. The results showed that only 7.6% of the respondents thought that VPLUPs for the

management and conservation of forests for NCBs under the REDD+ initiative need to be improved. This implies that a small percentage of people thought improvement could be made. This may be likely due to community satisfaction of the current performance of VPLUPs. The current good performance of VPLUPs is evident in earlier results (Uisso et al., 2019) where it was indicated that the plans have enhanced the management and conservation of VLFRs (in addition to its perceived capacity to support REDD+ implementation and overall current availability of NCBs). Certainly, the need to improve VPLUPs for enhancing NCBs is also evident in the observed perception that the availability of NCBs might decrease. The villagers (7.6%) who perceived that the VPLUPs for management and conservation of forest need improvement, thereby improving NCBs under the REDD+ initiative, proposed various actions to achieve this (Table 6). This implies that the community's suggestions to improve the management and conservation of forests for enhancing VLFRs and NCBs provide evidence that VLFRs and NCBs are important to them.

Table 6: Perceived actions to improve VPLUP for management and conservation of forest for NCBs under the REDD+ initiative related activities

Suggestion/action	Frequency	Percent (%)
Provide more education (knowledge) on VPLUPs	14	60.9
Keep promises about the programmes	3	13.0
Increase workforce for Village Land Use Management Committee (VLUMC) (human capacity)	3	13.0
Adjust violations of forest boundary demarcations	1	4.3
Financial and technical support from the government	1	4.3
Total	23	100

The main (61%) action proposed was to provide more education (knowledge) on VPLUPs (Table 6). As noted by Uisso et al., (under review), few villagers are knowledgeable about the steps involved in VPLUP implementation, further emphasising the need to educate people about VPLUPs. This is important as interventions such as education can enhance human capital, which in turn is likely to increase the possibility that people will engage more in VPLUPs implementations and the REDD+ project at large. Thus, more education and the broadening of the training on VPLUPs could be an effective way of improving VPLUPs for NCBs and REDD+ sustainability. This training should cater to the villagers who are less

knowledgeable about and experienced in VPLUPs issues. Similar results were reported during various discussions, but the emphasis was also on the enforcement of by-laws and accountability and transparency of village leaders. These results are also confirmed by the previous results as challenges for VPLUPs implementation (Uisso et al., 2018).

Concerning the increase of the VLUMC workforce: various discussions revealed that there was insufficient human capacity to reinforce compliance (enforcement of by-laws) to VPLUPs. This concern may hold true as it was indicated earlier that the enforcement of the law was a challenge as well as a supportive factor for VPLUPs implementation (Uisso et al., 2018). It was further noted that, more often, there has been a tendency for some of the committee members to drop out, and it took time to replace them. This further emphasises the need to increase human capacity for VLUMCs.

Various discussions with villagers indicated that they were concerned about obtaining the following: the next payment of carbon fund, individual customary right of occupancy, village land certificates and the Sisal estate (owned by an Arab) in Dodoma Isanga (to be given to the community for agriculture activities). Villagers need to feel that promises made about the REDD+ initiative are kept. It was narrated, for example: *“We were promised that we will be given the sisal estate for farming activities but the programme (REDD+) has failed to do so, we need that land because the programme has reduced the land available for farming activities.”*

This suggests that there has been uncertainty about the fulfilment of some of the agreements and that the community is still waiting for such promises to be kept. It also gives the impression that the villagers have not been informed that the carbon fund received earlier was a trial payment and that no more payments would be made unless carbon buyers emerged.

This experience may threaten conservation efforts in the area as elite capture may take advantage of the situation and impose their interests and associated benefits. Thus, villagers should be informed about the trial payment and the carbon markets and they should be advised to concentrate more on NCBs (regardless of their distribution among community members), which seem to be promising. Based on the claim of Turnhout et al., (2017) that NCBs are key to REDD+ and that forest-carbon focused REDD+ initiatives are unlikely to grapple with the

complex causes of deforestation and forest degradation, it is possible that a focus on NCBs could have been the best option for more positive impacts.

NCBs of REDD+ are more valuable to the community than carbon (UN-REDD Programme, 2016). They can offer distinctive and significant contributions to the management and conservation of forests and their multifunctional role in the global agenda on climate change mitigation and adaptation is valuable (Turnhout et al., 2017). In addition, the results of this study demonstrate the need for the government to facilitate the process of obtaining customary rights of occupancy and village land certificates. Uncertainty about the fulfilment of the agreements has also been reported in other REDD+ initiatives elsewhere in Asia (Rahman and Miah, 2017; Khatri et al., 2018).

Khatri et al (2018), in a REDD+ project in Nepal there have been increased forest surveillance and tightened the rules regarding certain uses of forests. We argue that the technical and financial logic of REDD+ have had implications for CF governance, risks of co-opting local voices and has contributed to an ongoing commercialisation of community forests, at the cost of the livelihoods of the poorest people. The group has promised to provide us fifty thousand Nepalese rupees last year but we have not received it yet".

The findings also support earlier studies in the same project (Poudel et al., 2014), showing that the CFUG leadership have increased forest surveillance and tightened the rules regarding certain uses of forests. This commercialisation of community forests which REDD+ has contributed to, are at the cost of the livelihoods of the poorest people (Leach and Scoones, 2015; Groom and Palmer, 2012)

This widespread participation in processes for creation and implementation of CFs is compatible with the REDD+ safeguards on the respect for the knowledge and rights of indigenous people and local communities as well as the full and effective participation of relevant stakeholders in REDD+ actions.

REDD+ may accelerate shifts in the way people perceive forest value, moving from subsistence uses towards monetary benefits (Khatri 2018)

5 Conclusion and Recommendations

This study assessed community perceptions on NCBs as incentives for participation in REDD+ and the role of VPLUPs and associated VLFRs in supporting this. Understanding the synergies between VPLUPs and REDD+ (with its associated NCBs) could lead to improved planning, design and implementation of this initiative. This understanding is of international importance as REDD+ proponents are trying to figure out ways in which REDD+ initiative could provide many benefits to the local communities. The study has generated information about the perceived importance of VPLUPs for REDD+ implementation and NCBs in relation to the community, which could be useful in addressing the priorities of the REDD+ NCBs.

The study findings highlighted the positive perceptions of the community about the importance and effectiveness of the VPLUPs to facilitate REDD+ implementation. However, farmland ownership was found to be significantly influencing villagers' perceptions of the adequacy of the plans to facilitate REDD+. The community identified several NCBs from the REDD+ initiative, which were collectively understood across socio-economic characteristics to be important to them for social, environmental and governance aspects. This suggests that the REDD+ initiative in the area has the greatest potential to achieve NCBs in all three categories of NCBs under REDD+. The enhancement of NCBs that the local community get from the REDD+ initiative would be a powerful incentive to increase their willingness to support forest management and conservation in the area. This is also supported by NCBs being formalised as part of safeguards for the REDD+ initiative. The NCBs as co-benefits could be potential since carbon payments/benefits as the primary benefit under the REDD+ initiative are uncertain.

Community-perceived VPLUPs for REDD+ implementation and positive perceptions about the current availability and importance of NCBs would potentially encourage the community to support the REDD+ initiative. However, the significant difference between current and future availability may discourage future support. More importantly, villagers' fear about the possible unavailability of NCBs (especially improved stoves and conservation agriculture) in the future implies that efforts are needed to increase the future availability of these NCBs. For example, in the context of improved stoves, villagers' willingness to embrace the technology needs to be supported with project policies that are enforceable and that promote improved stoves. In addition, despite the current availability and importance of NCBs to the community, based on the perceived future availability and observations by Vijge et al., (2016), very little

attention has been given to the monitoring of NCBs in the REDD+ initiatives. The future availability of these NCBs in the area will be more dubious if effective monitoring systems are not implemented.

The community's willingness to improve VPLUPs was clear and they perceived that the best way of improving the initiative for enhancing NCBs was to be equipped with more knowledge about VPLUPs. This is partly evident given that few villagers were knowledgeable about VPLUPs steps, which usually complicates the process of reviewing or improving the plans. Thus, a clear education strategy, embedded in VPLUPs implementation, seems to be essential for the delivery of the initiative. In addition, perceived willingness and actions to improve VPLUPs imply that VLFRs and NCBs under the REDD+ initiatives are important to the community.

Thus, the study recommends the need to emphasise the consideration of NCBs in the planning, design and implementation of REDD+. This inclusiveness of NCBs in REDD+ would partly ensure its acceptance by the host communities, considering that the carbon markets are uncertain/questionable. The needs of the community, especially priority NCBs such as the introduction of VICOBA, environmental education and improved stoves, could, if not addressed effectively, hamper the achievement of the VPLUPs and REDD+ outcomes.

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