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Determinants of participation in state and private PES projects in Uganda

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ABSTRACT

Climate change mitigation can improve rural livelihoods through payment for environmental services (PES) approaches. However, participation in PES projects is voluntary, uncertain and some people's participation is more important than others. In this article, we use quantitative and qualitative methods to examine factors that determine local peoples' participation in state (Rwoho and Kasagala) and private ('Undisclosed' and Hoima) forestry carbon projects in Uganda. We find that such determinants vary within and between projects. For example, older people with more land parcels were more likely to participate in private projects compared to their counterparts in state projects. In plantation forests, participation was motivated by access to forest products (timber and charcoal), while the desire to conserve water sources was important for participants adjacent to natural forests. While expected carbon payments were important in one state project, they were less significant in the others. Non-participation was linked to high entry costs, distrust for forest managers in state projects and non-ownership of natural forests. In all case studies, non-participation was mainly associated to limited project information. To gain broad participation, Reducing Emissions from Deforestation and forest Degradation (REDD+) and other PES mechanisms must critically identify and consider community specific needs, expectations and concerns in their design and implementation. This requires willingness to diagnose community concerns and allow adjustments.

1. Introduction

Payment for environmental services (PES) is promoted as a cost-effective mechanism that can mitigate climate change and improve livelihoods in developing countries [8,46]. The mechanism provides payments to land owners who support activities that provide public environmental services e.g. afforestation and forest protection for carbon sequestration and storage. Unlike previous conservation efforts, PES uses a performance-based approach where land owners receive payments

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on condition that improvements are made in the target environmental service [49]. This condition is what makes PES attractive to most environmental service buyers and funders of such projects [9]. Despite its potential to offer a 'win-win' for conservation and livelihood goals, community participation in PES projects initiated in developing countries remains uncertain [7]. Besides, the level of success of these projects has tended to vary from place to place. For instance, while direct cash payments to forest owners helped to reduce deforestation in mid-western Uganda [21], some PES projects were considered unsuccessful by other authors [3,17,52]. It is now generally accepted that the effectiveness of PES projects largely depends on local community acceptance and participation [1,8,27]. Therefore, understanding why and how local communities participate in PES projects is important for policy makers and conservationists interested in effective and equitable PES projects.

1.1. Participation in PES projects

Community participation in PES dialogues and activities that enhance environmental services is extremely important. It enhances the flow of benefits to the local population, helps to reduce implementation costs [10], lessens potential resistance or conflict, and may increase PES project success likelihood [23]. Despite its importance, participation in PES projects remains uncertain for most rural communities in developing countries [7]. Therefore, debates on who participates and why remain critical in PES literature. According to Pagiola et al. [35], participation in PES depends on eligibility, desire and ability related factors. Eligibility is determined by PES design characteristics such as target area, resource ownership e.g. possession of a land title, and membership in a local association. Some individuals may meet the eligibility criteria but lack the desire to participate. The desire to participate often depends on whether the project is perceived as beneficial or less disruptive to alternative land uses [20,37,51]. For example, a Mexican study found that some farmers did not participate in a forestry carbon project because of lack of time to invest in project activities which they perceived as less profitable [20]. On the other hand, individuals may be eligible, desire to participate but lack the ability to execute project activities.

Consequently, most PES projects have been dominated by the educated, larger and wealthier land owners [2,7,8,22]. Literature also shows that poor peoples' participation appears not to be a priority for most PES projects and is thus limited. Poor people often lack the financial resources to invest and may not meet the eligibility criteria [36]. In contrast, PES promoters that are more concerned about equity issues may design 'pro-poor' projects that target marginalized community groups such as the landless [50]. Despite such targeting, evidence from a REDD+ project in Nepal shows that cash payments specifically to women did not enhance their participation in forest governance and management [42].

While previous studies emphasize the role of cash payments in enhancing participation [15,49], evidence reveals that such payments are sometimes inadequate to attract participation [26,36,40]. In Mexico, Hendrickson & Corbera [20] found that farmers had sustained their agroforestry carbon plots even when cash payments had ceased, and non-participants had replicated project activities. Such findings reveal that other non-monetary factors largely influence participation. There is evidence to show that PES projects which support local livelihoods are more likely to attract participants [6,17,47]. For example, access to forest products by forest user group members in Nepal was found to be a major incentive for participation in the REDD+ pilot project [42]. However, when projects restrict natural resource use, poor households that highly depend on such resources are less likely to support and participate in PES activities [27,43].

Other factors such as technical assistance [7,16,27], ability to self organize, access to information, positive conservation attitudes [53], clear tenure arrangements, and trust among stakeholders [26,27,49,51] have also been found to influence participation. Given that most PES projects are externally initiated, project promoters or intermediaries are very critical in enabling participation [36]. However, some studies attribute non-participation to mistrust for project promoters [27,44].

While factors that determine participation are widely documented in PES literature, most lessons are drawn from Latin America (e.g. [8,22,27]) and Asia (e.g. [7,38,42]). African studies remain few (e.g. see [5,25,43]), and tend to focus on specific participation factors such as tenure arrangements, fairness in benefit distribution, and willingness to participate. In Uganda, similar studies have focused on the role of cash payments [11,15,21], and institutional arrangements for implementing payment-based mechanisms including the REDD+ program [31,44]. Yet, it has been argued that a more complete understanding of factors that enhance or discourage participation in PES may serve as a crucial first step to assess and develop capacity of such innovations to provide livelihood goals [8]. Despite the need for comprehensive evaluation, few studies have employed a multi-dimensional analytical framework [22] to understand how individual, project design and stakeholder related factors interact to influence community participation in PES projects. To fill this gap, this study sought to identify and examine determinants of participation in PES projects implemented in Uganda's state and private forests. The aim was to understand how different PES project designs create opportunities for rural communities to participate in forestry activities. Such a study provides useful insights and lessons to policy makers and conservationists interested in the design and implementation of effective participatory REDD+ projects in sub-Saharan Africa.

2. Methods

2.1. Study area and population

The study was conducted in communities adjacent to four forestry carbon projects located in Western and Central Uganda (see Figure 1). The projects include; the Nile basin small-scale afforestation and reforestation Clean Development

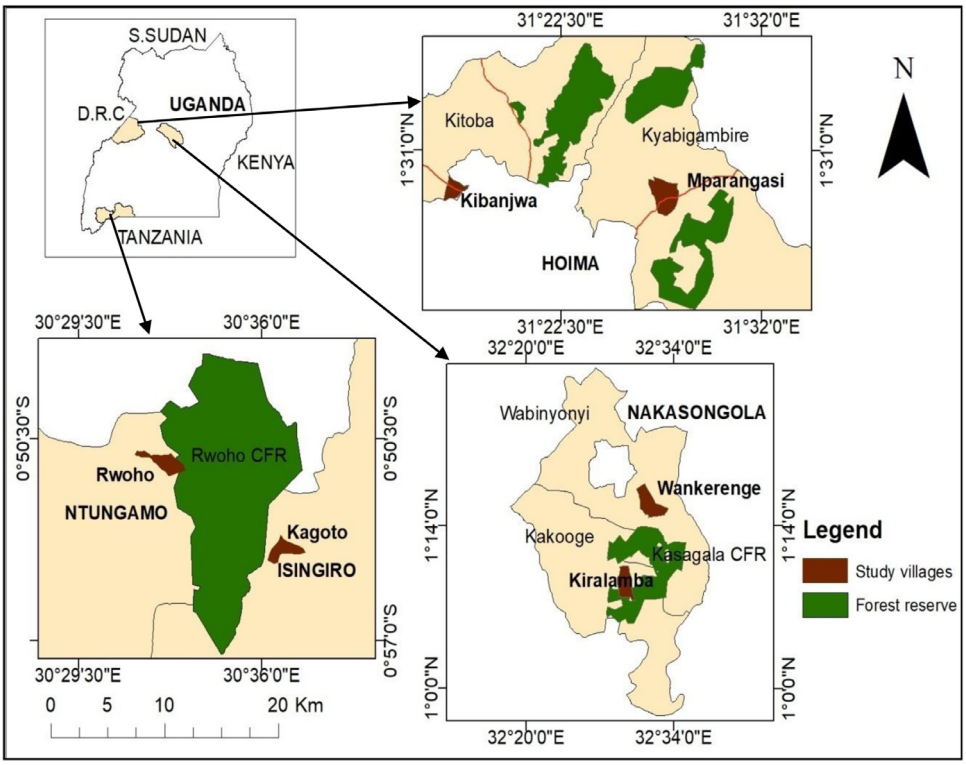

Figure 1. Map of Uganda showing PES project areas and study villages. The Undisclosed site is not indicated on this map.

Mechanism (CDM) project located in Rwoho Central Forest Reserve (CFR) in Ntungamo and Isingiro districts, the Sustainable Charcoal Production CDM project in Kasagala CFR in Nakasongola district, one named 'Undisclosed' (for reasons of confidentiality[1]) located in a Central district and the Murchison-Semliki REDD+ pilot project in Hoima district (see Table 1). In the next sections, these projects and proximate communities are referred to as Rwoho, Kasagala, Undisclosed and Hoima respectively.

Forestry carbon projects (hereafter referred to as PES projects) were selected as case studies because they are among the most common PES schemes that are relatively well established in Uganda and provide greater opportunities for direct participation of poor rural communities [36,48]. Forest-based PES projects in Uganda started in the 1990's, and have since expanded to about eleven similar projects [14]. While these projects are generalized as carbon offset projects implemented within the same policy context, they differ significantly in terms of the technology used to generate carbon credits (e.g. afforestation, reforestation or forest protection), actors involved (e.g. government, NGOs, private companies, community groups or individuals), type of carbon markets (regulated or voluntary), and the local context [36]. Based on these differences, the four case studies were selected to represent projects implemented in either state or privately managed plantation and natural forests (see Table 1). In addition, project managers' willingness to provide information also determined which projects to include in the study. The aim with these case studies was to compare how different PES designs enhance or limit local community participation in emission reduction activities.

Rwoho and Kasagala are state projects implemented in plantation forests, while the undisclosed is a private project implemented by a large-scale tree farming company that owns (leasehold) and manages a plantation in a formerly degraded CFR. The Hoima project is implemented by private natural forest owners (PFOs) in collaboration with a consortium of six conservation organizations working in the Albertine region (see Table 1). While state projects were fund based (that is; received funding from World Bank), those in private forests depended on voluntary carbon markets.

Community involvement in PES project activities varied (see Table 1). Communities adjacent to state forest reserves participated through collaborative forest management (CFM) arrangements. CFM refers to the partnership between a local interest group or a community living besides a government forest reserve and the responsible government authority for the management of forest resources in the reserve ([30] p.58). Under CFM, roles, responsibilities and benefits are shared among all stakeholders. In private forests, community members participated through community-based organizations (CBOs)

[1] During preliminary field visits, the management of a large scale tree farming company granted us permission to work in their area, but requested we do not disclose who they are. The manager argued that as a business, they do not wish to expose themselves to their competitors. We signed a memorandum of understanding to this effect.

Table 1
Summary of PES Projects in the Study
North Albertine Rift Conservation Group (NARCG)* comprises of six conservation organizations including Wildlife Conservation Society (WCS) as the lead in the REDD+ pilot project, Chimpanzee Sanctuary and Wildlife Trust (CSWT), Jane Goodall Institute (JGI), Ecotrust, World Wide Fund for Nature (WWF) and Nature Harness Initiative (NAHI). RECPA refers to Rwoho Environmental Conservation and Protection Association, FSC refers to Forestry Stewardship Council and FPIC refers to Free Prior and Informed Consent.

Project Characteristics	State Projects		Private Projects	
Name of Project	The Nile Basin Small-Scale A/R CDM project in Rwoho since 2006	The Sustainable Charcoal Production CDM project in Kasagala from 2009-2012	Undisclosed A/R CDM project by a large-scale tree farming company –Undisclosed since 2002	Murchison-Semliki REDD+ pilot project in Albertine region- Hoima since 2012
Location	Ntungamo and Isingiro Districts	Nakasongola District	Undisclosed Central District	Hoima District
Forest ownership	State[a]	State	Private[b]	Private
Type of forest	Plantation	Plantation >90% degraded woodland forest	Plantation	Natural forests (river line) on private land (0.5 – 230 ha)
Nature of carbon markets	Fund-based (World Bank)	Fund-based (World Bank)	Voluntary carbon markets	Voluntary carbon markets
Project intermediaries	National Forestry Authority (NFA)	NFA	Undisclosed private company	North Albertine Rift Conservation Group (NARCG)*
Form of community participation	5 Collaborative Forest Management (CFM) groups	2 CFM groups	Out-growers' Community-Based Organization (CBO), CSR policy	Private Forest Owners' Associations (PFOAs)
Participation requirements	Variations based on CFM groups	Membership fee of 10,000=	Must have planted trees on own land	Natural forest on own land
	e.g. Buy a share at 200,000/= in RECPA	Physical participation in forestry activities		Member in PFOA
Contract details	Group	Group	Private company certified and verified by FSC and Gold standards	None
	Verification after 5years	Now defunct		FPIC process completed
Members received cash payments	Yes	No	No	No

Source: Data from key informant interviews and project documents
[a] State forests are forest estates set aside by government to permanently conserve biodiversity, protect environmental services and sustainably produce domestic and commercial forest products [29]
[b] Private forests are forests that are owned and managed by individuals, communities, institutions and commercial companies on private land [29].

registered by the respective district authorities. All study projects were implemented in rural areas inhabited by smallholder farmers who largely depend on subsistence farming for their livelihood. Like in other rural areas of Uganda, over 90% of households in the study areas depend on fuel wood for their source of energy for cooking [33].

2.2. Study Design and Sample Selection

We identified, compared, and synthesized findings across the four PES projects described above and in Table 1. We employed a comparative case-study design because it allows broader and deeper understanding of policy contexts – in terms of either how a PES policy is implemented in a range of settings, or the kind of policy designs that are needed to address a range of contexts [39]. Furthermore, comparative case studies are known to reduce bias and allow generalization [4]. Consequently, this study aimed at generating theories about differences and similarities ([34], p.48) between forest-based PES projects. We conducted preliminary interviews with project managers and community leaders in seven potential study areas between August and December 2015. These interviews were important for setting the study context by providing background information on PES designs, community participation requirements and project implementation status. Our choice of the four case studies was based on the nature of project management (i.e. state or private) and the managers' willingness to provide information. In each case study, two participating villages were purposively selected to include those with a relatively high number of participants.

In each village, we stratified households into participants and non-participants. Participants in this study refer to households with membership in a forest user group that implements a PES project, while non-participants are households in the same village but with no membership in the said groups. We included both participants and non-participants in the study

Table 2
Number of Households Participating in PES Projects by Study Village
Rwo =Rwoho, Kag =Kagoto, Kir =Kiralamba, Wan=Wankerenge, A= Undisclosed A, B= Undisclosed B, Mpa=Mparangasi and Kib=Kibanjwa; HHs = Households; * = sample size per village includes participants in PES projects (N=85) and non-participants (N=155); ** = 15 out of 27 participants in Kibanjwa village were randomly selected.

	State Projects			Private Projects					
	Rwoho	Kasagala		Undisclosed			Hoima		
HHs in study villages	Rwo	Kag	Kir	Wan	A	B	Mpa	Kib	Total (N)
Total number of HHs	145	100	143	81	135	81	123	200	**1018**
Total number of HHs in a PES project	12	7	7	11	7	14	12	27**	**97**
Sampled HHs*	30	30	30	30	30	30	30	30	**240**

Source: Field Data

Table 3
Definition and description of variables used

Variable name	Variable description	Variable type
a) Dependent variable		
Participation	Household formally registered to implement PES activities through a FUG (1 Yes)	Binary
b) Independent variables		
Age	Respondent's age (in years)	Continuous
Sex	Respondent's gender (1 male)	Binary
Education	Respondent's level of education (1 none, 2 primary, 3 secondary)	Categorical
Household size	Household size is the number of people sharing the same kitchen for about six months	Continuous
Land size	Total land area owned by a household (in ha)	Continuous
Initial meetings	Respondent or household member attended initial PES project meeting(s) (1 Yes)	Binary

with the assumption that their perceptions about projects and differences in their attributes would possibly explain participation determinants. We planned to randomly sample among participants and non-participants, but due to the low number of participating households in most villages (see Table 2), this was only possible in Kibanjwa, with all participants being included in the other seven villages. Non-participants were randomly selected from village lists provided by local leaders, using a random numbers generator ([34], p.69). The sample size choice was based on Newing et al. [[34], p. 289] who suggest that a minimum of 30 or more respondents is required in each group for comparative parametric tests. Although the participants and non-participants' sample size was not proportional, differences in their attributes could help to explain preferences for and against PES projects in state and private projects.

2.3. Data collection and analysis

We structured data collection and analysis around two frameworks. First, we adopted a multi-dimensional analytical framework basing on Kosoy et al.[22] to examine participation determinants. Kosoy et al. suggest that understanding participation requires a holistic approach which takes into account individual conditions, design rules, and stakeholder interactions. Secondly, the capital assets framework (CAF) described by Hejnowicz et al. [19] was used to determine the financial, social and human, natural and institutional capitals required by local people to enhance their participation.

A household survey and focus group discussions were used to collect data between January and March 2017. The survey comprised a total of 240 respondents including 85 participants and 155 non-participants. Survey data generated related to individuals' socio-demographic characteristics (see Table 3), design rules and stakeholder related factors that motivated or discouraged participation. Data related to support for broader participation were also collected through the survey. We conducted two focus group discussions per village; that is one with participants and another with non-participants. These discussions included 6-12 individuals representing farmers, traders, charcoal makers, grazers, and commercial motorcycle operators (locally known as *'boda boda'* riders). This participants' mix was meant to maximize discussions of respondents' perceptions about the projects. Focus group discussions were used for triangulation [34].

We used descriptive statistics and binary logistic regression models to summarize and analyze the data. While individual factors were determined using binary logistic regression models, design rules and stakeholder related determinants were summarized using descriptive statistics. For our exploratory analyses, we assume responses are independent, though we acknowledge that this is an untested simplification and the associated p-values should thus be judged with caution. All analyses were carried out using SPSS (version 23) software. Qualitative data was analyzed thematically and complemented discussion of results generated by statistical analysis.

Table 4
Logistic regression models predicting individual determinants of participation in state and private PES projects
B is the coefficient that describes the direction of the relationship between the dependent and independent variable; Exp(B) is the probability that the response variable will be '1' which means 'yes' for participation; P is a value that explains level of significance, and variables with P ≤ 0.05 (marked with *) predict participation in PES projects at 95% Confidence level; and n.c. implies that the variable was not considered in the model because only one category (participants) attended initial project meetings.

	State Projects						Private Projects					
	Rwoho (n=58)			Kasagala (n=59)			Undisclosed (n=58)			Hoima (n=59)		
Explanatory Variable	B	Exp(B)	P	B	Exp(B)	P	B	Exp(B)	P	B	Exp(B)	P
Sex (males)	1.43	4.18	0.243	1.23	3.41	0.382	0.41	1.51	0.765	-0.99	0.70	0.797
Age (years)	0.09	1.09	0.054	0.08	1.08	0.100	0.14	1.15	0.049*	0.10	1.10	0.002*
Education												
None	-0.42	0.66	0.832	-2.11	0.12	0.434	-21.36	0.00	0.573	-0.36	0.70	0.797
Primary	-1.16	0.31	0.425	-1.12	0.33	0.589	1.41	4.10	0.999	0.20	1.22	0.822
Secondary	1.15	3.15	0.435	-1.05	0.35	0.612			0.291	0.45	1.56	0.696
HH size (no. of people)	-0.23	0.90	0.502	0.01	1.01	0.978	-0.20	0.82	0.426	0.09	1.09	0.578
HH Land size (ha)	0.23	1.26	0.262	-0.07	0.93	0.217	6.54	1.78	0.049*	0.01	1.01	0.689
Attendance of meetings (yes)	4.09	0.02	0.003*	5.02	0.01	0.001*	0.58	0.00	0.008*	n.c	n.c	n.c
Constant	-3.56	0.03	0.115	-0.58	0.56	0.826	-6.76	0.00	0.053	-4.81	0.01	0.003

3. Results and Discussion

3.1. Determinants of participation in state and private projects

We found that the determinants of participation varied among projects. We examine these in relation to individual, project and stakeholder related factors and highlight key insights for policy and management.

3.1.1. Individual Factors

We found that respondents' age was associated with participation in private than in state PES projects (see Table 4). The older people were more likely to participate than their younger counterparts. This could be attributed to participation requirements. Unlike in state projects, participants in private projects were required to commit part of their household land to tree planting or forest conservation. In addition, during a group discussion, participants in Hoima described themselves as older people who are less mobile (resident in the village) and are willing to invest in long-term activities such as forestry compared to younger people (i.e. < 35 years). Instead, younger people reported more interest in income generating activities such as motorbike-taxi (locally known as *'boda boda')* driving, operating hair salons, charcoal making and casual work which give faster returns than tree planting or forest management. Similar results were reported in neighboring Kenya by Musyoki et al. [28] who found that older people dominate community forest associations involved in participatory forest management activities.

Younger people's lack of interest poses a challenge for sustainable forest management, because they are less likely to adopt activities such as forest protection, afforestation and reforestation. Certainly, their views will likely change with time, as they age, but younger people and other non-participants may sometimes undermine project outcomes. Generally, youth involvement is vital for a country like Uganda where more than 70% of its population is below 35 years [45]. Therefore, a key insight from this study is that PES promoters must strengthen and support CFM in state forest reserves because it enhances local people's tenure rights and creates opportunities for intergenerational participation (see Tables 5 and 6). Furthermore, there is need to provide short-term incentives such as vocational training, provision of start-up capital through existing village savings and loan associations (VSLAs) and support in improved farming practices (see Table 7), if participation in PES is to be enhanced. However, a 'one size fits all' approach may not work given that community contexts and needs vary. Therefore PES promoters must be flexible enough to identify and address specific needs and priorities.

Households with bigger land sizes were more likely to participate in a private project (undisclosed) than in others (see Table 4). In this community, households that had planted trees (*Pinus* spp) on their land qualified to register with the out-growers association that worked closely with the private company. Such households possibly had enough land for both tree farming and other land uses. Besides, 23.3% of the non-participant respondents' adjacent to the undisclosed private project reported insufficient land as a limitation to tree planting (see Table 6). Consequently, land holdings can either increase or limit peoples' ability to enroll in project activities implemented on private land. This result supports the idea that individuals' may desire to participate, but may be unable [35] because of limited land as was the case for some households adjacent to private forests. Similar to our findings, Bremer et al. [8] found that small land holders in Ecuador were hesitant to commit their small parcels into the national PES Program because they lacked alternatives for agricultural production. In contrast, we argue that local people's participation may be enhanced if collaborative forest management arrangements are integrated into PES projects implemented in state forest reserves.

Access to information improves trust and participation in PES projects [27]. In this study, those who attended initial project meetings were more likely to participate in both public and private projects compared to those who did not (Table 4).

Table 5
Factors Associated with Participation in PES Projects (N=85)
Forest products* implies access to and control of timber in Rwoho and Undisclosed and charcoal in Kasagala. In Rwoho, the project promotes planting of exotic species (e.g. *Pinus* spp) while the Kasagala project encouraged planting of indigenous tree species (e.g. *Combretum molle*) that is valuable for charcoal production.

Qn. What factors influenced your decision to participate in the PES project? (%)	State Projects		Private Projects		
	Rwoho (n=19)	Kasagala (n=18)	Undisclosed (n=21)	Hoima (n=27)	Total (N=85)
Project-design factors					
Monetary incentives	42.1	16.7	14.3	14.8	21.2
Non-monetary incentives					
Rights to forest products*	26.3	38.9	66.7		30.6
Tenure rights on state land	21.1	16.7			8.2
Tenure rights on private land				3.7	1.2
Access to seedlings		16.7			3.5
Forest protection		11.1	9.5	51.9	21.2
Stakeholder related factors					
Work with others	10.5		9.5	11.1	8.2
Access to savings and loan scheme				18.5	5.9
Chi-square test $X^2 = 76.302$, Sig.(2-sided) = < 0 .001					

Source: Field Data

Table 6
Reasons for non-participation in PES projects (N=155)
Impractical* in column one implies inability to either plant and manage trees or walk long distances (>4km) to project area (e.g. in Kasagala).

Reasons for non-participation (%)	State Projects		Private Projects		
	Rwoho (n=41)	Kasagala (n=42)	Undisclosed (n=39)	Hoima (n=33)	Total (N=155)
Didn't know or understand it	52.5	55.3	56.7	30.3	48.9
Impractical*	12.5	15.8	20	6.1	13.5
Insufficient land			23.3	12.1	7.8
Don't own a natural forest				51.5	12.1
High cost of buying a carbon share	17.5				5
Didn't trust project leaders	17.5				5
Not interested		28.9			7.8
Chi-square test $X^2 = 142.549$, df = 18, Sig.(2-sided) = < 0.001					

Source: Field Data

In the same manner, respondents in all case studies reported lack of or inadequate PES project information as the major reason for non-participation (Table 6). Two critical concerns emerge from this finding. First, one questions whether pre-project community engagements through free, prior and informed consent (FPIC) were adequately conducted, and second, to what extent project affected-persons were involved in these engagements? While PES projects often target those who meet eligibility requirements, it is also important to ensure that such projects do not harm non-participants in the community [13]. If a PES project is not understood or is perceived as a burden by non-participant groups, participation outcomes may be undesirable. The key lesson for policy makers and practitioners is that they must ensure all project affected persons have access to project related information so that they understand how such innovations will affect them positively and negatively. Local voices on how to mitigate negative effects must be incorporated in the design of emission reduction activities, if conflicts between participants and non-participants are to be minimized. If the needs and priorities of community members are ignored, then collaborative PES project activities are likely to be ineffective as was the case in a state project in Uganda (see [3]).

While gender, level of education and household size have previously been linked to participation [2,12,42], this study did not confirm this (see Table 4).

3.1.2. Project-design factors

Incentives influenced participation in all the projects but these varied with project context. For example, the anticipated carbon payments seemed to influence participation in a state project (Rwoho) than in other areas (see Table 5). In a group discussion with participants in Rwoho, a 59 year old male affirmed that; *"by the time the carbon program was introduced in 2006; I was already a RECPA member. So I decided to buy a carbon share in RECPA so that I benefit from future carbon payments".* On the other hand, non-monetary incentives such as increased rights to forest products (i.e. timber and charcoal) in Undisclosed and Kasagala, increased rights to state land through collaborative forest management arrangements for communities adjacent to state forests, access to village savings and loan schemes in Hoima and access to tree seedlings in Kasagala were generally more influential in motivating participation (Table 5). As seen elsewhere, non-monetary incentives are more likely to encourage local participation than monetary incentives [17,20,26,43]. However, this study argues that PES promoters must

understand that local livelihood needs are diverse and thus must be flexible in designing and implementing context specific incentive packages. A *'one-size fits all'* approach may not enhance community participation in PES activities.

Unlike in other areas, the desire to protect forests from further encroachment was associated with participation in communities adjacent to natural forests in Hoima (Table 5). Respondents in this community expressed worry about the future capacity of their forests to support livelihoods and sustain water sources. Some forest owners interpreted the project as an opportunity to halt forest encroachment. To this effect, a 68 year old male asserted that, *"forests protect nature through constant supply of rain water in the streams and rivers on which we depend"*. Such sentiments could be linked to the awareness and sensitization trainings provided by several conservation organizations in this particular community. The trainings seem to have facilitated positive perceptions about forest protection. The positive attitude by private forest owners in Hoima was indicated by the high compliance rate (88%) in monitoring illegal activities during an earlier experimental PES project [21]. In another study in Western Uganda, Fisher [15] found that some community members were motivated by aesthetic values such beautiful scenery and fresh air provided by the forests. In contrast, our study argues that local people's motivations to participate in a forest-based PES project is likely to depend on the nature and functions of the target forest. This was observed when communities adjacent to natural forests expressed their desire to conserve forests as water sources, compared to those adjacent to plantations that were more interested in access to forest products (see Table 5).

Despite the positive motivations, some design-related factors discouraged participation (see Table 6). For instance, the high cost of buying a carbon share and non-ownership of a natural forest were reported as limitations to participation in Rwoho and Hoima respectively. Initially in 2006, participants in Rwoho (i.e. RECPA) bought a carbon share at Ugandan Shillings (Shs.) 100,000/=, but this had increased to Shs. 200,000/= at the time of our field work[2] making the program unaffordable to low income earners. This finding mirrors the state of most farmers in rural Uganda who are likely to find emission reduction activities costly given that majority are low income earners [45]. Yet, for a PES project to succeed, stakeholders must be able to meet implementation costs [18]. In this study, implementation costs in the state project (Rwoho) were minimized by broadening membership criteria by allowing social groups to be participants, and by introducing taungya in project activities. Taungya – a farming system in plantation forestry where crops are grown with young trees was incorporated after negotiations between local forest user groups and NFA – the project intermediary. The key lesson here is that flexibility is required among national and local stakeholders implementing payment-based mechanisms, if implementation costs are to be minimized for participating farmers. In contrast, previous scholars report that upfront payments can be provided to minimize costs that are often high in the early stages of PES project implementation [16,24]. In a private project (Hoima), about half (51.5%) of the non-participant respondents indicated that they could not register with the project because it targeted only households with natural forests on their land. This result supports the idea that participation in PES is influenced by eligibility factors [35].

3.1.3. Stakeholder related factors

In three of the four projects (not Kasagala), some participants valued the opportunity to work with other stakeholders (Table 4). For example, some out-growers from the undisclosed community planted trees on their land in the hope of working with the company owners and benefiting from the subsequent commercial opportunities. Private forest owners in Hoima described their interaction with other forest owners and project intermediaries (conservation organizations) as forming a more effective alliance against forest destruction. To the contrary, distrust for project leaders and forest managers in both state projects discouraged participation (Table 6). Such differences in perceptions suggest that top-down conservation initiatives are influenced by past and existing stakeholder relations. The role of project intermediaries has previously been reported to enhance [16] or discourage [17] participation in PES projects. It has also been argued that PES can be effective only when trust exists between stakeholders [18,51]. However, trust can be enhanced if; genuine collaboration between PES promoters and local agencies, relevant project information and local leaders' confidence are achieved [53]. Given that trust building may take time [41], it is necessary to understand the pre-existing stakeholder relations because these may determine whether people will participate or not.

3.2. Support required to enhance local participation

Communities desire a range of financial, human and social, natural and institutional capitals to increase their participation likelihood. The support required is unique to project and community context (Table 7).

We found that access to alternative livelihood opportunities was required in all project areas. For example, access to start-up capital through VSLAs was a popular approach to building capacity among rural farmers. VSLAs provide opportunities for affordable loans to invest in alternative income sources such as apiary, piggery and livestock keeping. In this regard, a 68 year old male participant in Hoima noted that it is less difficult to care for local cows which can be sold when an economic crisis arises. In the same community, some participants felt that the expected carbon payments were not forthcoming, yet such money would support family needs and additional investments. This result reinforces the idea that projects which positively influence people's livelihoods can encourage participation [6,17,50].

[2] The exchange rate of Ugandan Shillings to a US Dollar was at Shs. 1825/= in January 2006 and at Shs. 3572/= in January 2017 (http://www.bou.or.ug/bou/collateral/interbank_forms)

Table 7
A Capital Assets Framework (CAF*) to analyze support required to enhance participation (N=227)
*Adopted from Hejnowicz et al. [19]

Qn. What support do you require to enhance your participation in PES projects? (%)	State projects		Private projects		
	Rwoho (n=55)	Kasagala (n=59)	Undisclosed (n=58)	Hoima (n=55)	Total (N=227)
Financial capital					
Support VSLAs	12.7	22		10.9	11.5
Pay carbon money				14.5	3.5
Reduce fees charged	12.7				3.1
Provide livestock				10.9	2.6
Human and social capital					
Support improved farming		6.8	19	14.5	10.1
Support children's education		10.2	13.8	7.3	7.9
Awareness and sensitization trainings	9.1	6.8		12.7	7.0
Employment opportunities	1.8	3.4	3.4		2.2
Buy carbon shares in groups	3.6				0.9
Support the elderly				1.8	0.4
Natural capital					
Provide tree seedlings	10.9	20.3	20.7	21.8	18.5
Support water supply		6.8	34.5		10.6
Support taungya	10.9	5.1	5.2		5.3
Vermin control				3.6	0.9
Institutional capital					
Promote co-manage through CFM	20	6.8	3.4		7.5
Promote PES on private land	7.3	6.8			1.8
Promote transparency & accountability	10.9				4.5
Relocate encroachers		5.1			1.3
Provide land certificates				1.8	0.4
					100

Increased access to human and social capital through corporate social responsibility policy has potential to enhance participation as was observed especially in undisclosed project. The need to support improved farming, children's education, employment and access to awareness and sensitization trainings (Table 7) were seen as important aspects that would minimize community dependence on forest resources. Besides, meeting the needs and fears of local stakeholders has been linked to PES project success [17]. Private PES schemes can meet local needs by strengthening their corporate social responsibility policies and consequently create positive conservation attitudes; as was observed in the undisclosed communities. However, we caution that a 'one-size fits all' approach may not work for PES projects because specific communities have unique requirements that must be clearly identified and incorporated in designing incentive packages. In this study, it was suggested that entry barriers can be minimized if participation is promoted through existing social groups.

The need for tree seedlings was reported by both the participants and non-participants across all projects (Table 7). The desire to plant trees on private land could be linked to the current restricted access to forest products such as firewood, poles and timber in project areas. Such restrictions are more likely to motivate rural farmers to plant and manage trees on private land and consequently support conservation of natural forests ([32], p.121). Similar to this result, Hendrickson & Corbera [20] found that lack of forest products induced wider community participation in agro-forestry practices in Mexico. Therefore, access to forest products remains fundamental to gaining and sustaining project support. In our survey, locals generally preferred *Eucalyptus* spp which are perceived as fast growing and with a ready market. Therefore, people's choice of tree species should be recognized. This is important because it suggests that people have the capacity to establish, maintain and consequently benefit from the established woodlots. Woodlots may help to reduce pressure on the conserved natural forests.

Furthermore, improving water supply through construction of boreholes and valley dams emerged as important needs in the undisclosed community than in other areas. Interactions with members of this community and forest managers revealed that some villages adjacent to the reserve had already received similar support through the company's corporate social responsibility (CSR) policy. Therefore providing people's needs is likely to win their support for natural resource conservation [51].

Institutional capital is vital for community engagement in carbon emission reduction activities. From our case studies, local people adjacent to state managed projects require institutional changes and improvements (Table 6). For example the need to support more CFM groups was evident in Rwoho where it was observed that land allocation in state reserves improves tenure rights and hence people's ability to enroll in projects [35,49]. The need for creation of new CFM groups was vital because joining existing groups was expensive (e.g. RECPA) and another group (i.e. Kanywamaizi Development Association-KADA) was closed to new members. Furthermore, corruption was reported as a major challenge to collaborative forest management in state projects. Respondents alleged that forest officials take bribes and fail to protect the forest. In a group discussion with participants, an 80 year old male participant in Rwoho noted that;

"We are not happy with NFA officials who instead of protecting the forest are 'finishing' it. They allow illegal logging in natural belts, and during plantation thinning; they cut 'good' trees and leave 'bad' ones. All this is happening because of greed for money. When we reported to the sector manager, all that was done was to transfer the culprits. Those who replaced them were not any better. I think NFA needs a total overhaul because the way its staff work, gives a bad example to us as a community".

Weak and distrusted management discourages local participation. Projects implemented in situations of distrust are likely to attract limited community attention. Therefore building reliable institutions, related social capital and trust are fundamental to conservation innovation uptake and success.

4. Conclusion

Despite being promoted as a cost-effective mechanism that can mitigate climate change and improve livelihoods, community-based PES mechanisms remain voluntary and uncertain [7]. This comparative case study sought to contribute insights to the critical question on who participates in PES projects and why. The aim was to provide lessons on how different PES projects are (or can be) effectively designed and implemented in different community contexts. Building upon the multi-dimensional analytical framework suggested by Kosoy et al. [22], our study found that local peoples' participation in PES projects depends on the socio-ecological contexts in which such projects are implemented. Evidence from the analyzed case studies shows that determinants of participation varied within and between state and private PES projects. While improved tenure rights through CFM seemed to enhance community participation in state projects, limited land coupled with unclear tenure rights discouraged participation in private projects. On the other hand, the PES approach used to reduce carbon emissions (e.g. plantation establishment vis-à-vis natural forest conservation), and the level of trust between forest managers and community members also account for variations in determinants of participation. More importantly, we observe that communities require varying support especially in the short-term to enhance their participation likelihood. Given such variations, future payment-based mechanisms including REDD+ must critically identify and incorporate area specific factors or conditions necessary to attract wider community involvement. However, this should be done in the early stages of project development. Local people must have access to project information, and their needs, expectations and concerns should guide the design and implementation of PES projects. PES implementers must also be sufficiently flexible to address such context specific requirements if effective community participation is to be achieved.

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Declaration of Competing Interest

To the best of our knowledge, we as authors declare no conflict of interest in any way.

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