Environmental Resources Degradation and Poverty Reduction in Mbeya City, Tanzania

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Abstract. The problems of poverty and environmental resources degradation still persist, despite successive anti-poverty and environmental resources conservation programs by the Tanzanian government. This study argues that since the two problems are interrelated, the solutions to them must be undertaken simultaneously and in an integrated manner rather than independently of each other. However, one major obstacle to the solution is property rights (i.e. Secured land ownership rights). Past studies argued that without property rights the poor would not be willing to participate in the environmental resources conservation. Besides, studies have indicated that most of the anti-poverty benefits do not reach the target group. Hence, it is inevitably necessary for this study to first of all identify the 'real poor' and the categories of the poor multidimensionally. This research attempts to address rural poverty and agricultural land degradation with regards to property rights (land ownership rights) simultaneously. Hence, the main objective of this study is to investigate how credit-based PES can potentially reduce rural poverty and agricultural land degradation, with regards to property rights (ownership rights). To achieve this, acknowledging that identification of the 'real poor' is the gateway for environmental resource conservation is unavoidable. Multistage sampling technique was used to choose 491 respondents in Mbeya City local farmers. Consequently, grouping of the poor into different categories, as to benefit from the incentive-based PES is essential. This was achieved with the aid of Alkire and Foster (2010) and Alkire and Santos (2011) multidimensional poverty assessment methods. The results and recommendations were presented finally.

Key words: payment for environmental services, property rights and environmental resource degradation, Tanzania

Introduction

The problems of poverty and environmental resources degradation still persist (IFAD, 2016), despite successive anti-poverty and environmental resources conservation programs by the Tanzanian government. This proposal argues that since the two problems are interrelated, the solutions to them must be undertaken simultaneously and in an integrated manner rather than independently of each other (Kronenberg & Hubacek, 2013). However, one major obstacle to the solution is property rights (i.e. Secured land ownership rights). Past studies argued that without property rights the poor would not be willing to participate in the environmental resources conservation (Massay & Kassile, 2019).

Besides, this research indicated that the anti-poverty benefits do not reach the target group. Hence, it is inevitably necessary for this research to first of all identify the 'real poor' and the categories of the poor multidimensionally. This research attempted to address rural poverty and agricultural land degradation with regards to property rights (land ownership rights) simultaneously. Hence, the main objective of this research was to investigate how credit-based PES can potentially reduce rural poverty and agricultural land degradation, with regards to property rights (ownership rights).

Most of the past literatures focused on addressing poverty and environmental resource degradation independently (Obayelu, 2013). This is due to lack of understanding that, both poverty and environmental degradation are intertwined. This research distinguished itself by recognizing that, there exist cause and effect associations between the two problems. On this note, this research addresesd the two problems simultaneously. This was achieved by the introduction of PES (an incentive mechanism) to solve them simultaneously. With this, the study was able to bridge this hitherto existing gap. In the light of the above, this research was able to uncover the possibility of conserving environmental resources without an absolute property rights (ownership rights).

Previously, researchers have observed property rights as the perceived constraint to environmental conservation (Cooksey, 2011). This has posed a major setback to the management and sustainability of environmental resource, especially in the rural communities, where the communal land system was in operation. However, the above couldn't have been achieved, without the recognition of real poor people. Past empirical evidences, have shown that one of the reasons for the failure of anti-poverty programmes was that the benefit of the programmes does not reach the real poor (Moore, 2018). This research contributed to poverty by identifying the real poor in a multidimensional manner. Thus, poor dimensional categorization was achieved. With this development, poverty reduction was addressed in a more holistic manner. Finally, the research was able to identify all the above research gaps. It also made a concerted effort in offering solutions to the identified gap. Therefore, this research contributed to the field of development and environmental economics. The research was investigate that if credit-based Payment for Environmental Services (PES) has the potential to tackle rural poverty and agricultural land degradation simultaneously, without the poor having absolute ownership rights of the agricultural land.

In spite of the numerous programs embarked upon by successive Tanzania governments to reduce poverty over the years, impeccable statistics have revealed beyond reasonable doubts that poverty is still on the high side in the rural environments (IFAD, 2016). The cause of rural poverty is not unconnected with environmental problems associated with agricultural production (IFAD, 2013). Rural poverty reduction and protection of environmental resources are one of the major challenges threatening the Tanzania rural society presently (IFAD, 2013). In the past, various Tanzania governments made concerted efforts, in responding to both challenges independently.

Sadly, these efforts could not yield the desired goals as expected. This was made evident by the unpalatable statistics of high degree of rural poverty and land degradation (CBN/ World Bank, 2012, IFAD, 2016). Evidently, literature submitted that poverty is the cause of land degradation, hence they should be addressed simultaneously (Obayelu, 2013). Therefore connecting payment for environmental services (PES) with the rural dwellers could be the entry point of solving these two challenges concomitantly (Kronenberg & Hubacek, 2013). Introduction of PES could halt the loss of ecosystem services and thus save the environmental resources from being degraded. Aside saving of the ecosystem, PES can provide opportunity for other source of income which could lead to improved living standards of the rural poor (Wunder, 2009).

However, author such as argued that most of the incentive-based program (PES inclusive) benefits does not get to the 'real poor'. He submitted that often the non-poor benefit mostly from the incentives that are meant for the poor. Also in the Tanzania context, most of the Tanzanian anti-poverty programs could not achieve the expected headway (Moore, 2018). One of the major reasons for the failure of these anti-poverty programs is that the poverty policy was based on the monetary assessment only (Cooksey, 2011). Income/consumption measurement of poverty had been critically proved to be inadequate to identify the 'real poor' (Wagle, 2008). It is therefore evidently necessary to first ascertain the 'real poor' as the

gateway for the PES to achieve its objective of rural poverty reduction and environmental resource conservation. Based on this, need for identification of the poor in a multidimensional manner cannot be a trade-off issue. Since multidimensional poverty measurement takes care of other indicators (such as education, living standard, health, social inclusion) other than income/consumption.

Having discussed the need for the identification of the 'real poor', land ownership rights (property-rights) also should be given a deserved attention for the enhancement of rural dwellers participation in the PES programs (Hope et al., 2005). Sequel to the above, there are unequivocally submissions that, property-rights security is a 'needful dose' if rural people will effectively participate in the environmental resource conservation (Ajayi, et al., 2012). Massay & Kassile (2019) submitted that, farmers will not be motivated to invest in the land if there is no assurance of secured property rights (land ownership rights).

In line with the above, Gottlieb & Grobovšek (2019) advanced three arguments for the positive link between land rights and investment. First is the freedom from expropriation, especially by the public authority, an individual will not be willing to invest if he/she is not sure of what the future holds, in terms of ownership of such an investment. Secondly, if a well-defined land right makes it possible to use land as collateral, this would in turn eliminate funding constraints of an investment. This would encourage an individual to invest in the land. Finally, presence of possibility for gains from trade would encourage investment, that is, if an individual has been insulated with the rights to sell or even transfer his land (Gottlieb & Grobovšek, 2019).

However, this research anticipated that provision of property rights may not be a 'compulsory' factor for participating in the PES program by the rural Tanzania farmers. In view of the above arguments, notwithstanding many studies such as David J. et al. (2019), on incentive-based environmental conservation have ignored the links between poverty and environment, especially with respect to secured property rights and identification of the 'real poor'. As a result of this, existing policy result in marginal group (the poor) being relegated to fragile economic environments.

It is on this premise, which this research determined empirically and investigate how Credit- based PES could solve rural poverty and agricultural land degradation with regards to property rights (land ownership rights). The study also investigated the need for the property rights security in the context of rural poverty reduction and agricultural conservation. To the best of the researcher's knowledge, few researchers have investigated empirically, on poverty reduction- natural resource conservation, with regards to PES, especially with regards to property rights security in the Tanzania rural environment. Based on the aforementioned explanations, it could be succinctly review that both rural poverty and environmental degradation are intertwined. The duo is a threat to the Tanzania rural environment, hence adequate attention in this direction is inevitable. According to (Wunder, 2009) only a limited number of PES projects in the developing world exist, hence this study seeks to contribute to the literature on rural poverty, natural resource conservation, in the developing economy. Hence, objectively the study endeavoured; (i) To identify the poor and (ii) To establish categories of the poor in the study area. To consolidate above objectives, preferred options of the poor for the hypothetical credit-based PES attributes, with regards to rural poverty reduction and environmental resource degradation is of paramount desire. Therefore the study sought. (iii) To determine the preferences/perspectives of farmers with regards to the choice of hypothetical credit-based PES attributes. This study will not adequately address rural poverty and environmental resource degradation, if the well echoed need of property rights (land ownership rights) as a pre-condition for conservation of environmental resource is un-attended to. On this background, the study empirically aims to. (iv) Determine if property rights is a necessary factor in the conservation of the agricultural land in the study area.

Methods

To investigate the questions raised as well as to achieve the objectives of the study. Methods of Alkire and Foster (2010) and Alkire and Santos (2011) were used for the assessing multidimensional indices. This method was preferred to other poverty measurement approach, because of its decomposability (which is useful for targeting) attribute into different categories of the poor. It also allows the usage of both generalized and equal weights in dimensional aggregation. The study used farm household as the unit of analysis. This is because some of the indicators used, e.g. toilet, source of drinking water are jointly owned mostly by the community/farm household. It is therefore difficult to obtain data of such indicators if an individual is used as the unit of analysis. The choice of dimensions for categorization of the poor, was based on the judgments of the respondents on the nature of poverty, they are experiencing (Hallerod, 1994), as well as choice of dimensional guidelines proposed by Alkire and Foster (2010), consequently, four categories of poverty were identified; (i) multidimensional (ii) education (iii) consumption (iv) housing/living standard. Deprivation cut off point for education dimension is; if a household does not have at least seven years education or if a school age child is not attending school. For the consumption dimension; any household where the adult consumption is below $1 per day (2700/day) is said to be deprived in consumption and for the living standard dimension; any household is adjudged to be deprived if it does not have/live in a decent house, have improved sources of drinking water, have decent toilet, using charcoal/grass and wood for cooking, have no decent flooring material (e.g. un-cemented floor), un-cemented wall and unimproved roofing materials, owing no bike, no television and radio. To ascertain dimensional poor household, the criteria for educational poverty (k=1/2) is if the household is deprived in at least one out of the two indicators for education and otherwise. For consumption (k=1), a household is poor in consumption dimension, if its consumption per adult equivalent is less than $1 per day (TSH 2700). Also for housing/standard of living dimension (=5/10), a household is said to be poor in this dimension if out of 10 indicators is not deprived in 5 of them (i.e. only deprived in 2/10 indicators). A household is pronounced poor multidimensionally, if it's poor, in at least 1 out of the 2 dimensions.

In designing of choice experiment, a credit-based PES was employed (access to micro credit was based on participation in PES program). The following attributes with different levels were used (i) amount of loan (ii) payback period (iii) interest rate (iv) ask to perform (v) land provision (vi) labour provision and (vii) guarantor provision. A multi- stage sampling technique was employed for obtaining the sample of the respondents. Probit model was used for the estimation of the factors that determine multidimensional, dimensional poverty and preferences for the PES attributes. Also the study used logit model to ascertain the willingness of the respondents to accept to participate in the Credit-based PES program with regards to the three bidding offers. Cramer's V statistical approach was used to ascertain how strong the relationship of the significance level of the respondents' perspectives on Credit-based PES program. The paired T-statistic method was used to ascertain the difference between the mean for the preferences of the respondents. Thus, the perspectives of the poor and their preferences for the options of the PES attributes on rural poverty reduction and agricultural land conservation were identified. Multistage sampling technique was used to choose 491 respondents in Mbeya City.

Results and Discussion

From the table 1, below five variables (i.e. Education attainment, previous knowledge of PES, landownership rights, number of the dependants and provision of micro credit were used to determine the preference of the respondents for PES attributes. Out of these variables, previous knowledge of PES and provision of microcredit are significant at 5% each, while land

ownership rights are significant at 10% in the educational poverty group. In the consumption poverty group, previous knowledge of PES is significant at 5%, while land ownership rights are significant at 1%, respectively. Housing/living standard poverty group previous knowledge of PES and land ownership rights is significant at 5% each. All the significant variables were positively related to the respondents' choices (preference), except land ownership rights that is negatively related to the respondents' choices (preferences).

Table 1. Factors that Determine Respondents' Preferences for PES attributes

Educational Poverty Respondents' Preference			
Variable	Coefficient	Std Err.	P-value
Education Attainment	0.135	0.175	0.439
Previous knowledge of PES	0.159	0.168	0.034**
Land Ownership rights	-0.071	0.048	0.101*
Provision of Micro Credits	0.079	0.102	0.044**
No of Dependant	-0.017	0.023	0.469
Constant	0.657	0.315	0.388
Pseudo R^2 = 0.0219, Log likelihood =-147.22497, LRchi^2(5) = 5.99, Prob>chi^2 = 0.03073, No. of observation = 142 * ** significant at 1%, 5% levels respectively.			
Consumption Poverty Respondents' Preference			
Variable	Coefficient	Std Err.	P-value
Education attainment	-0.008	0.163	0.962
Previous knowledge of PES	0.195	0.173	0.026**
Land Ownership rights	-0.074	0.053	0.014***
Provision of Micro Credits	0.003	0.008	0.694
No of Dependant	-0.018	0.024	0.445
Constant	0.968	0.513	0.060*
Pseudo R^2 = 0.0238, Log likelihood = -144.00559, LRchi^2(5) = 5.53, Prob>chi^2(5) = 0.0354, No. of observation. = 237 * ** *** significant at 1%, 5%, 10% levels respectively.			
Housing/Standard of Living Respondents' Poverty Preference			
Variable	Coefficient	Std Err.	P-value
Education Attainment	0.041	0.157	0.794
Previous knowledge of PES	0.184	0.164	0.024**
Land Ownership rights	-0.056	0.055	0.030**
Provision of Micro Credits	0.062	0.092	0.500
Constant	0.514	0.251	0.041**
Pseudo R^2 =0.0147, Log likelihood = -178.01828, Prob>chi^2 = 0.06492, LRchi^2(4) = 2.47 No. of observation = 283 ** significant at 5% level respectively.			

Provision of microcredit for farmers to involve in PES, shows a positive relationship with the choice of PES attributes, only among the educational poverty respondents. Provision of micro credit (especially reduction of the constraints attached to the credit facility presented to the respondents) could be the reason for the preference of the poor for the PES attributes. Hence, the pseudo R2, below Table 2 are the evidence for the above

Table 2. Factors that Determine Respondents' Preferences for PES attributes

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Cramer's V statistic shows how strong the association between the variables is. This is done after the Chi-square value might have indicated whether the relationship between variables is significant or not. The decision criterion is that; if the value of Cramer's V is 1 or very close to 1. It means the association between the variables is strong. If it's 0 or close to 0, it indicates no or weak association between the variables in question.The results showed that there were significant differences between the poverty reduction and farmers interest on the contributions of using the Payment for Environmental Services to the rural development. See table 3 below.

Table 3. Perspectives of Respondents on PES

	Strongly agree	Agree	Neither agree/ disagree	Disagree	Strongly disagree	Chi^2 df(2)	Cramer's V
If credit is being provided, will you participate in PES?							
Educationally poor	54	55	25	6	2	13.7***	0.4***
Consumption poor	93	88	44	9	3		
Consumption poor	93	88	44	9	3	18.2	0.2
Living standard poor	115	104	49	12	3		
Educationally poor	54	55	25	6	2	18.4**	0.3**
Living standard poor	115	104	49	12	3		
Is PES a promising mechanism for poverty reduction and conservation of environment							
Educationally poor	68	37	32	4	1	13.2	0.2
Consumption poor	109	56	63	7	2		
Consumption poor	109	56	63	7	2	8.9**	0.1**
Living standard poor	133	74	65	6	5		
Educationally poor	68	37	32	4	1	10.8**	0.1**
Living standard poor	133	74	65	6	5		
Do you think trust between the parties involved is a necessary factor for PES program to succeed							
Educationally poor	88	40	12	1	1	7.4	0.2
Consumption poor	154	67	14	1	1		
Consumption poor	154	67	14	1	1	122.7**	0.7**
Living standard poor	183	76	21	2	1		
Educationally poor	88	40	12	1	1	5.1	0.1
Living standard poor	183	76	21	2	1		
PES associated transaction costs could be an obstacle for my participation in the scheme							
Educationally poor	21	37	49	31	4	13.9	0.2
Consumption poor	36	64	87	45	5		
Consumption poor	36	64	87	45	5	68.7***	0.3**
Living standard poor	50	84	90	53	6		

Note. Significant at *** 1%, **5%,*10% levels respectively.

Conclusion

The main findings of this study revealed that tenancy security of the land is sufficient to attract the poor to participate in land conservation programs. The study also discovered that PES is a viable mechanism for rural poverty reduction and agricultural land conservation. Thus, there is a need for an institutional arrangement for adequate tenancy security provision as this arrangement will enhance the potentials of PES to mitigate both land degradation and rural poverty concomitantly.

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