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Influence of Awareness as Ecosystem Service Provider in Payment for Ecosystem Services

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ABSTRACT— Environmental protection is everyone's responsibility but who will ultimately bear the burden? Environmental intervention protection program usually involves stakeholders in order to facilitate its mechanism to conserve the ecosystem. The principle payment for ecosystem services posits that upland dwellers (farmers) will be compensated to shift from its traditional land use practice to sustainable farming technology. The compensation however will be from lowland ecosystem beneficiaries (water users). This paper aimed to determine if the compensation or incentive provided will affect upland farmer's participation in payment for ecosystem services (PES) program as an additional source of income. Social and human capital, farm characteristics and environmental awareness and membership in organization were subject to multinomial logit regression. The analyses show that neither land tenure, agroecosystem, offered bid amount and off farm income predicts the willingness to accept land use change among upland farmers. Apparently, upland farmers where majority are living below the poverty threshold are the ones bearing the brunt of the environmental protection activity while receiving less than there supposed monetary incentives based on ecosystem value. Nevertheless, awareness as ecosystem service provider appears to be significant predictor in enrolling to the program. Hence upland farmers should always be involved in planning for environmental management and protection.

KEYWORDS: Calbayog Pan-as Hayiban Protected Landscape, economic value, bequest values, non-use values, economic valuation, pro-poor

1. INTRODUCTION

Poverty and environmental degradation is closely linked [24]. Often the marginalized poor suffer the most consequences of environmental degradation resulting from poverty and lack of access to resources since they are directly benefiting from it [19]. In fact, the poor carry the burden of environmental stewardship with or without market and institutional support [26]. Accordingly, market and institutional failure plays a key role in poverty and environmental degradation [8]. As such, to deal with poverty alleviation along with environmental protection that would lead to sustainable development, it is worth trying to conceptualize the benefits of protecting the environment from the purview of ecosystem services (ES) approach since it is assumed to contribute in poverty alleviation, although achieving this still is unclear [29]. Nevertheless, it could not be undermined that participation by local communities to ES programs leads to successful project implementation no matter how complicated is the process especially in securing poverty alleviation [20]. Conversely, the multidimensional definition of poverty which encompasses an individual's access to resources, social, economic, health and environmental aspects [23] makes difficult to understand the individual behaviour especially in attracting participation of development intervention programs. In this light, multisectoral approach involving various key actors are seen as necessary for the sustainability of projects which is also widely practiced in what we called as Payment for Environmental Services (PES) [15]. In PES, the service providers and buyers should have agreed on what possible trade-offs and benefits that each may get. Theoretically, implementing PES should consider high willingness to pay and low opportunity cost to service providers and should also consider fairness, efficiency and effectiveness and equity to both parties'

upland and lowland [16]. In many parts of the world, PES has been considered as one of the most used framework in engaging community as stewards in the environment and at the same time for rural development and poverty alleviation. But it is worth noting that poverty should not be understood as a requirement for participating in PES because its scheme is voluntary [25]. The PES does not only have impact on the lives of people but also in the natural resources and wildlife (Chen et al., 2020). In the Philippines, it is used to capture ecosystem value [17] not only on farmers but also to fishermen in marine protected areas (MPA) through Conditional Cash Transfers for Environmental Services (eCCT). However, study shows varying results on the welfare of farmers in participating in eCCT compared to non- participating farmers [1] which can only make significant results if being corrected. While there are many studies conducted on ES and Poverty alleviation especially in Sub-saharan Africa and latin America, few of these papers focused on examining poverty alleviation interventions that would somehow help improve the ES [29]. Nevertheless, PES case studies show there is low to medium social outcomes particularly in livelihood and equity [1]. That is some participants are doubtful about the impacts of PES to their income [27]. Thus, this paper tries to present the case in Calbayog Pan-as Hayiban Protected Landscape (CPHPL) in designing PES and its benefits for the poor farmers.

2. Material and Methods

The study was conducted in Calbayog City with upland farmers in Calbayog Pan-as Hayiban Protected Landscape (CPHPL) as its target respondent's. Survey interviews and focus group discussion (FGD) was done to gather relevant data for the research. Basically, the interview was framed using a contingent valuation method (CVM) with Willingness to Accept (WTA) approach which can also be used to design PES program aside from the most common and easier to implement like WTP approach. A total of 294 upland farmers were interview and one (1) FGD was conducted from one community farmer association inside the CPHPL area. Data analysis and encoding were done in MS Excel and SPSS. We used multinomial Logit Regression (MNL) to elicit and examine the factors that would probably affect farmer's participation enrolling to PES program and its impact to economic activity. Multinomial logit (MNL) regression is found useful in predicting nominal dependent variables and used in many contingent valuation studies to derive WTP and WTA among respondents for welfare change [3], [12], [13] which is the basic premise of environmental valuation. Literature reviews on the other hand suggest that land tenure [1], [8], [10], [11], [14], [25], bid amount or offered monetary incentives [13], land use practice and other sources of income [10] IIED, n.d.; [14] aside from farming is significant in predicting WTA for PES program and in cultivating their lands to the fullest. Other explanatory variables like receiving extension services, access to credit or financial services and being a beneficiary of any government program intended for the poor (i.e. 4Ps) was also included to further identify farmer's willingness to accept or enroll in the PES program. Hence the above-mentioned variables were explored using a MNL analysis.

3. Results

3.1 Ecosystem Services in CPHPL

Since PES program is reliant on ES, it is fitting to identify the major ES that CPHPL has offered to the city of Calbayog. Basically, ES is defined as the ultimate benefit that humans get from ecosystems [22], [28]. Accordingly, ES has four categories as defined in [22] such as provisioning, regulating, supporting and cultural services. Of the four ES, provisioning services has been identified as essential interest that needs to be documented because it has clear monetary value unlike the three ESs. Roundtable discussions from Department of Environment and Natural Resources Regional Office 8 (DENR RO8) and documentary review shows that CPHPL is the main source of water supply in the city. Moreover, the landscape also provides various economic and agricultural activity to the farmers. Results from FGD shows that farmers and local residents earned income through abaca and coconut aside from vegetables and root crops (e.g. butig, camote,

gaway, cassava) which is either sold or for own consumption. An estimated Php 21,000 ($434 USD) /ha/year from abaca and Php 33, 600($695 USD) /ha/yr. of coconut can be produced from farmers on the average. While 10,550 ($218 USD) pesos can be generated from one farming household from producing root crops and coconut (e.g. butig, balangahoy, saging, kamote). On the other hand, water supply revenue was at Php 123,127,377 ($2,548,505 USD) last 2017 from Calbayog City Water District (CCWD) supplying 13, 000 households in the city. Based on market value estimates the economic value of ES provided by CPHPL is 134 Million pesos ($2,773,548 USD) [5]. It can be inferred that the water users benefit more than the upland farmers in terms of provisioning services.

3.2 Influence of Social and Human Capital in PES participation

Farmers are vulnerable to adverse effect of socio-political and cultural changes. In the case of CPHPL farmers, majority of them do not receive extension services for the past six months (92.9%). On the other hand, those who mention that they received extension services said that mostly it is from the government (77.8%). Moreover, when it comes to government programs, the study asked the respondents about their awareness of National Greening Program majority (76.2%) were unaware and only one fourth of them were aware. However, this awareness though is due to the seminars (64.9%) probably conducted by extension agents. In addition, sixty-eight percent of the farmers are 4Ps beneficiary however, many of them (89.8%) have no access to credit facility which is a common observation found out in the study area. Eventually, when these variables were analyzed whether these variables would affect the participation of farmers to a hypothetical environmental protection program such as PES using MNL. Results show that the model fits the data well ($x^2 = 12.70$, p-value = .89). However, it does not statistically significantly predict the dependent variable better than the intercept- only model alone (p-value = .731). This would only imply that these services do not affect the decision of farmers to accept the compensation for adopting an agroforestry technology. This would imply that having a membership or access to these government services and programs does not automatically determine farmer's acceptance of the incentives in participating in the program. Based on survey, many of these farmers do not received extension services from the government agency. This is in consonance with [9] study in Leyte where farmers do not really receive much attention from extension workers in contrast with lowland farmers. Moreover, this result would tell us in the future programs and projects to engage farmers and capacitate them to gain and establish trust and confidence to the program implementers. It has been shown that to effectively encourage farmer smallholders to participate in PES programs, trust between the implementers and landowners is important because this is a long-term contract [10]. More so, the essence of PES is to develop trust between implementers (government and local citizens) so that doubts from participants and non-participants of the programme can be eliminated [27]. In addition, access to credit in which in this study many have none, could have encouraged farmers to participate in PES programs. Just like what happened in Nicaragua silvopastoral project, [1] in which participation in PES programs was intensified by access to credit and finance facility. Thus, social and human capital is important in motivating participation among poor farmers in the uplands.

3.3 Influence of Environmental Awareness to PES participation

Environmental sustainability is a key indicator in and primary outcome in PES program, not poverty reduction [21]. As such, outcomes of PES programs appear to have high percentage in terms of environmental sustainability, other outcomes such as equity, livelihood and participation have low to medium outcomes [1] being a secondary purpose. Further, we included in our analysis the awareness of the following variables related to environmental protection such as agroforestry, watershed, ES provider and being a member of environmental organization and related activities to know if awareness of environment and other forms of activities does not translate to protection of the natural resources [18] is still binding. This is because upland farmers have no other alternative source of livelihood just like in Peñablanca Protected Landscape where

farmer admits to be involved in unsustainable practices because they have no other livelihood options [2]. In this study, many farmers were not aware of agroforestry types (75%) and many (86.6%) are not part of any organization doing environmental protection related activities. On the one hand, half of the farmer respondents were aware of watershed and being an ES provider.

Table 1. Environmental Awareness and Involvement

Variables	No (%)	Yes (%)
Aware Agroforestry	75.0	25.0
Aware Watershed	46.9	53.1
Aware ES provider	42.6	57.4
Member Organization	86.6	13.4

Moreover, results from MNL analysis showed that only Awareness being an ES provider significantly predicts farmer's participation to enroll their lands in PES program with up to two (2) hectares of their land rather than 3 hectares or their entire lands. Notably, membership of organization does not really predict farmers in PES participation. This is probably true especially if farmers would only become passive members of the organization and not contributing to its activities. In this sense, being aware that farmers play a role as ES provider is significant in implementation of PES program in order to gain sense of ownership and sustainability of the program.

Table 2. MNL analysis of Environmental Awareness and Involvement vis-a-vis Area to be enrolled for PES

Dependent Variables	Explanatory Variables	B	p- value
portion only (less than 1 ha)	Intercept	3.974	0.004
	aware Agro	-1.106	0.209
	aware watershed	1.600	0.121
	aware ES provider	-2.885	0.006
	member org	-0.904	0.443
1 ha	Intercept	3.853	0.006
	aware Agro	-1.020	0.256
	aware watershed	1.714	0.104
	aware ES provider	-2.705	0.011
	member org	-1.347	0.253
2 ha	Intercept	- 15.362	0.000
	aware Agro	-0.732	0.507
	aware watershed	1.578	0.267
	aware ES provider	-3.952	0.010
	member org	16.705	.
3 ha	Intercept	3.419	0.025
	aware Agro	-2.481	0.052
	aware watershed	1.365	0.461
	aware ES provider	-3.037	0.089
	member org	-2.570	0.072
Entire land	Intercept	- 16.539	0.000
	aware Agro	-0.942	0.508
	aware watershed	1.952	0.354
	aware ES provider	-1.106	0.595

	Member org	15.773	.

3.4 Factors affecting PES participation

To further find out the factors that would affect farmer's participation in PES program, a base scenario category was applied i.e. willing to accept in land use change in exchange for incentives. Based on table 2 (above), we came up with a model to statistically predict the dependent variable. In the model fitting criteria, it appears that p-value is .003 which is significant in predicting the dependent variable. Moreover, Pearson chi-square result (40.734) in the goodness of fit suggest that the model is fit with the data. In addition, likelihood ratio test suggests that land tenure, offered amount and Land Tenure, off farm income is significant in predicting borrowed the area allocated for the PES program (Table 3).

Table 3. Likelihood ratio test

Farm Characteristics	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi- Square	df	Sig.
Intercept	49.786	0.000	0	.
Land Tenure	97.949	48.163	24	0.002
Agroforestry	70.208	20.421	16	0.202
Offered Amount	78.074	28.288	16	0.029
Off Farm Income	72.594	22.808	8	0.004

However, further analysis on each parameter appears to have no significant predictor values. This would imply that although the above predictors are significant in the final model, parameter estimates in sub- variables (like for example multi-storey system, tenant for land tenure and others) did not predict the farmer's willingness to accept land use change in relation to area allocated in PES program. The probable reason might be that farmers do not yet appreciate the kind of program and believed that this not useful to them or this would not compensate their efforts in protecting the landscape.

4. Discussion

In principle, PES recognizes two major actors in its implementation along with the activities that both parties should take part. Upland farmers are paid for conserving the environment (e.g. change in land use practices) while receivers (downstream users) pay for ES (e.g. watershed protection) [10]. Based on the study conducted, water users from water districts were identified as buyers of the ES. An estimated of 284/yr ($6 USD) per household [5] will be the contribution of lowland water users. However, this would not suffice the amount that upland farmers are requesting which is 15,000 per year per hectare [4]. While this study is focused only on water users directly benefiting from water district and upland farmers, it is important to note that some other agencies are also benefiting from the ES (e.g. water) in CPHPL. These groups like National Irrigation Administration and SAMELCO can be a potential buyer of the ES from PES program. Literally, imposing high transaction cost to service buyers will impede PES implementation. This means that making PES pro-poor could be taxing to the service buyers making it hard for PES to be acceptable among them. Hence donors are necessary for poverty reduction not only the buyers [25]. In the other side of spectrum, sustainable livelihood framework can further highlight the benefits of PES to the beneficiaries [15] both upland and lowland.

5. Conclusion and Recommendation

The researchers in this study concludes that although PES program as environmental protection seemed promising and indeed helped a lot of upland farmers in many parts of the world. It can also be argued that designing PES should be enticing to farmers and can provide enough alternative source of income. Although voluntary, it should not be restrictive because of the types of agroforestry technology, land area tenure and the amount of incentives offered. The implementers (i.e. government or independent private groups) should have a clear policy to service providers to eliminate doubts of the program and gain full support among them. Our analysis shows that farm characteristics (e.g. land tenure) and PES program (e.g. type of agroforestry or land use, amount offered/incentives) although a significant parameter in designing PES does not really influence farmers to support PES even enrolling a portion of their lands in the program. This further suggest that farmers are not better off even under PES program. Upland farmers though considerably fall below poverty threshold has able to survive in its environment with or without PES program. Access to natural resources makes upland farmers rich compared to lowland communities. However, access to social and human capital makes them marginalized poor. Thus, environmental protection programs like PES should not be an end itself but as a means to capacitate farmers and provide the necessary safety nets and access to resources (social, human and economic). In so doing, this would reduce farmer's vulnerable situations making environmental protection pro-poor rather anti-poor, otherwise is considered the latter. What needs to be done is to educate both parties (e.g. service providers- farmers and service buyers- lowland communities) that they play an important role in environmental protection which is everyone's responsibility and the same time leveraging PES to reduce poverty in upstream communities.

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