

Effect of Collective Action on Willingness to Accept (WTA) in Payment for Environmental Services in Northern Ghana

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Abstract

The use of payments for environmental service (PES) schemes as an alternative conservation and resource management tool is progressively becoming popular worldwide. Collective action in PES is receiving considerable attention as a way of reducing transaction costs of PES as well as influencing PES success. However, little is known about how collective action will influence the reward to participants. This paper examines the effect of collective action on smallholder farm households' willingness-to-accept (WTA) for soil and water conservation technologies, specifically soil and stone bunds, in northern Ghana. Using a hypothetical conservation plan, data were collected from a sample of smallholder farmers through stated choice experiment (CE) and contingent valuation (CV) methods. Bayesian estimation of the mixed logit and interval-data regression models were applied to the CE and CV data respectively to determine the effect of collective action on farmers' WTA. Estimates of collective action from both sets of data were found to significantly reduce farmers' WTA. For achieving cost effectiveness, careful inclusion of collective action in the design of payment for environmental service schemes in Ghana may offer a means to reduce the amount of reward payment made to resource managers for supplying environmental services (ES).

Keywords: Collective action, Choice Experiment, Contingent Valuation, Willingness-to-Accept, Payment for Environmental Services, Ghana

1. Introduction

Globally, though land degradation is a serious problem currently, it is particularly so in Africa. Two-thirds of Africa's productive land is estimated to be affected by land degradation and nearly all its land area is vulnerable to soil and environmental degradation (FAO, 2011; Jones et al., 2013; UNCCD, 2013; Vlek et al., 2008). In Sub-Saharan Africa (SSA), more than 320 million hectares of land have been rendered unfit for agricultural use owing to soil erosion, deforestation, overgrazing and mismanagement of land resources (Sant, 2001). In Ghana, land degradation is pervasive, but is most severe in northern Ghana which lies within the Guinea and Sudan Savannas (Asiedu et al., 2016; World Bank, 2006). By the 1960s, 35% of Ghana's land had already been susceptible to desertification especially in northern Ghana (Upper East, Upper West and Northern Regions) (Adanu et al., 2013; Kenworthy, 1995).

Activities of humans are the key drivers of land degradation in Ghana. The human-associated drivers of long-term soil and vegetation degradation in Ghana include unsustainable farming practices, removal of vegetation cover (including deforestation and overgrazing), mining activities, and urbanization and industrial activities caused by increased population growth pressures. Land degradation has therefore made huge areas of croplands, especially in northern Ghana which were hitherto fertile unfertile, thus affecting human livelihoods by threatening farm incomes and food sources. Land degradation has also led to environmental consequences including loss of grasslands, woodlands and forests as well as natural drying up of water bodies due to prolonged droughts and sediments deposition into water courses (Adanu et al., 2013).

Agriculture was once the dominant sector of Ghana's economy, however, its dominance has steadily declined over the years. Agricultural GDP dropped from 29.8% in 2010 to 18.9% in 2016 (MoF, 2017), though it remains the main source of employment and livelihood for more than half of Ghana's labour force. The decline is partly due to stagnant or declining yields/productivity resulting from land degradation chiefly in the form of soil erosion and nutrient depletion. Unchecked land degradation therefore poses a serious threat to continued and sustained agricultural production, economic growth, land-based livelihoods, and poverty reduction.

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Several soil management programmes and projects have thus been undertaken over the years and substantial resources and efforts have been invested to promote soil and water conserving and nutrient-enhancing technologies to smallholder farmers in the northern regions of the country. Stone and sand bunds are barriers of stones and soil respectively laid along contour lines to create terraces to reduce run-off and erosion. However, these programmes and projects have largely failed to achieve the desirable environmental outcomes because of weak regulatory and enforcement institutions (Swallow & Meinzen-Dick, 2009). The increasing rate of degradation, even in the project areas only points to the fact that past interventions, which have been characteristically conventional instruments, mainly 'command and control' limitations imposed on local people, and donor funded integrated conservation and development projects/approaches (ICDPs) (Richards & Jenkins, 2007; Wunder, 2006a) as well as the provision of some minimal level of subsidies to farmers have failed in achieving their set objectives of voluntary soil and water conservation technology adoption.

Owing to failed past conservation interventions, environmental scholars and practitioners have looked for other ways to better incentivize the adoption of conservation practices by local individuals and communities. The use of PES as an alternative conservation and resource management tool is progressively becoming popular in developing countries. In PES schemes, mechanisms that enable environmental externalities to be brought to the marketplace for beneficiaries of environmental services to pay for their provision and the providers to be paid for this service are developed (OECD, 2013). Thus unlike other approaches that charge producers of negative externalities, the PES approach compensates those who provide positive externalities (Pagiola et al., 2005). Payments compensate individuals for the extra costs of ecosystem service conservation and sustainable use, over and above that which any existing regulations require (OECD, 2010). The increased popularity of PES in developing countries is due to their potential to achieve greater conservation objectives and reduce poverty by paying poor natural resource managers (Pagiola et al., 2005; Sims & Alix-Garcia, 2017; Wunder, 2007).

Two important components of PES costs are the transaction costs of the programme faced by the service buyer, and the environmental service provider's "opportunity costs". This "opportunity costs" is the profit foregone from abandoning the first-best land-use plan and includes the service provider's WTA PES (Wunder, 2008). Transactions costs include all costs associated with PES programme implementation excluding expenses incurred in the actual production of the ecosystem service itself (Jindal & Kerr, 2007). A key barrier to PES implementation mainly in developing countries is the high transaction costs associated with smallholder participation (FAO, 2007; Jack et al., 2008; Jindal et al., 2008; Lipper et al., 2009; Peterson et al., 2015; Wunder, 2008). The high transaction costs of implementing PES programmes have led many to question whether the PES approach is an efficient way of achieving natural resource management and conservation objectives. Also, given that most PES schemes are funded with public money (Porrás et al., 2008; Stanton et al., 2010) which are limited, particularly, in developing countries, designing cost-effective schemes that provide the greatest environmental amenities is critical for PES sustainability as a viable option to promote sustainable agricultural development and address environment-related market failures in developing countries. Cost-effectiveness means that a PES scheme provides the same level of environmental benefits/services at a lower cost than other potential approaches.

Collective action is increasingly receiving considerable attention in the PES literature as a probable means of reducing transaction costs of PES programmes especially when numerous smallholders are involved through economies of scale (FAO, 2007; Jindal & Kerr, 2007; Kerr et al., 2014; OECD, 2013). However, since transaction costs are not the only costs associated with implementing PES programmes, PES implementation designers must also look at the possibility of reducing the other cost component of PES, i.e., provider's WTA. Past studies on agri-environmental payment schemes have estimated WTA of farmers acting individually and ignored the possible effect and importance of the institutional context, e.g., collective action on farmers' WTA. For instance, preserving landscape quality generally requires the involvement of numerous farmers working within the same locality.

In this paper, the influence of collective action on the size of farmers' WTA to adopt on-farm soil and water conservation (SWC) technologies, specifically soil and stone bunds and the direction of its influence if any is investigated using data collected from smallholder farmers in northern Ghana through both the choice experiment (CE) and contingent valuation (CV) methods. It employs the mixed logit (ML) and the interval regression models to the CE and CV data respectively. The main contribution of this paper is the exploration of how the institutional context (collective action) influences individual resource managers' (service providers) preferences and value expressions and hence their price determination. Such knowledge may provide further insight into the role collective action plays in the design of PES.

The rest of the paper is organized as follows. Section 2 discusses the literature on collective action and PES. The survey design is explained in section 3. Section 4 focuses on statistical analysis. The results and discussion is presented in section 5 and finally section 6 concludes and provides the policy implications of the results.

2. Collective action and PES

Successful delivery of conservation outcomes is key in PES schemes. In the scientific literature, one of the identified threats to PES effectiveness is non-compliance by resource managers with contractual conditions. Monitoring of resource management practices to assess if promised changes are being made and sustained form the basis of payments. Monitoring is therefore vital for the success of any PES scheme. However, most implementers of PES in developing countries are unable to adhere to this conditionality due to their unwillingness to upset their relationship with poor rural smallholder farmers by withholding payment (Scherr et al., 2006; Wunder, 2006b; Wunder et al., 2005). Sellers/farmers and buyers/government of ES agree on a contract spelling out what sellers must do to produce certain ES which buyers are prepared to pay for and the terms of the payment (Meijerink, 2008). Enforcement of the contract on the part of farmers is not a problem so far as it is in their interest. Without institutional constraints, however, it is likely that farmers, who rationally exhibit self-interested behaviour (Bowles, 2004) can take actions that lead to moral hazard (Laffont & Martimort, 2001).

In the past, PES programs typically focused on having agreements with and making payments to individual resource managers for environmental service provision (Kerr et al., 2014). Collective action may thus not be a needed requirement for PES when only two individuals are involved in the PES contract/exchange (i.e., one buyer and one seller of ES). The literature on PES suggests that collective action can serve as an institution for farmers to take on the duty of monitoring programme activities and complying with contractual agreements to supply ES especially when numerous farmers are involved as is the case in developing countries from implementing agencies. Scott (2014) defined collective action as an “action taken by a group or organization in pursuit of members’ perceived shared interests”. Meinzen-Dick and Di Gregorio (2004) also defined it as an “action taken by a group to achieve common interests.” Both definitions include a form of mobilization of people and resources toward accomplishment of a shared goal. In this paper, the OECD’s (2013) definition, “a set of actions taken by a group of farmers, often in conjunction with other people and organisations, acting together in order to tackle local agri-environmental issues” (OECD, 2013) is adopted. Collective action could be important for supplying an array of agri-environmental public goods or decreasing negative externalities linked with agriculture such as landscape, biodiversity, and water quality, as well as useful when externalities beyond the individual farm level is concerned (OECD, 2013). Collective PES involves contracts made with groups of neighbouring landholders, or with communities that hold land and resources under common title and responsibility for contract execution as well as the payment of rewards is collectivized (Kaczan et al., 2017). Group members in a collective PES arrangement have to collaborate to settle on the conditions of the arrangement or contract they will go into together and then monitor each other to enforce the conditions of the agreement (Kerr et al., 2014).

Collective action in PES schemes has some advantages over uncoordinated individual actions. Collective contracting can allow for more communication and information sharing between group members and result in the realization of better environmental objectives (Narloch et al., 2017). Collective contracting may also result in people being more compliant to contract terms to achieve intended objectives owing to social influence and strong group cohesiveness (Abrahamse & Steg, 2013; McGrath et al., 2019; Narloch et al., 2017). Under favourable institutional circumstances, and with sufficiently many members motivated by social preferences, high levels of voluntary provision of public goods can be sustained, so that by sharing information, equipment, and skills, for example, group members can exploit economies of scale that is unattainable by less cooperative groups or individual acting independently, and reap substantial benefits (Bowles, 2004). Social capital and trust amongst the parties involved in PES, mainly on an intermediary’s side, is likely to decrease transaction costs, aid in conflicts resolution and enhance sustainability (Kerr et al., 2014; OECD, 2013). Also, the flexible nature of collective action as well as the diversity of its members with different knowledge and skills allow collective action to deal with local issues in a manner not done by central authorities or individuals (OECD, 2013). Narloch et al. (2017) found, among others, the following about collective contracting that: first, collective payments could eliminate some potential rent-seeking behaviour; second, where collective action is robust, collective payments seem to provide stronger conservation incentives than individual payments and finally, group-level contracts may produce strong incentives for contract compliance.

However, collective action comes with its own challenges. One challenge is that people in groups of shared environment or interest are typically faced with the dilemma to either cooperate toward a shared goal to achieve their collective interest or not to cooperate whereas others cooperate in order to be better off (Ones & Putterman, 2007). “A collective action problem (free-riding) arises when two or more individuals have the potential to jointly coordinate on some mutually beneficial action, but do not face the right incentives to act in this manner” (Sethi, 2008), i.e. collective action problems occur when people choose actions in mutually independent circumstances (Ostrom, 2010). Collective contracting of PES resource managers can suffer from free riding which can affect the objectives of the scheme in a negative manner (Kaczan et al., 2017).

An enormous literature on enforcement of collective action exists (e.g., Cohen, 1999; Garoupa, 1997; Polinsky & Shavell, 2000; Polinsky & Shavell, 2007), however, in PES schemes, the voluntary nature limits the range of enforcement/punishment instruments that can be used (Meijerink, 2008). They either are non-existent (Wunder et al., 2005) or restricted to either reducing payment amounts or ending the contract (Meijerink, 2008). For PES schemes in Europe and the USA, the scheme design often includes the likelihood of a fine (Ozanne et al., 2001), but fining poor resource managers without payments could be seen as unsuitable in the developing country context (Meijerink, 2008). The key question is how the buyer should deal with enforcement. An institutional arrangement provides a solution to this problem. An option is to establish a contract with groups of farmers to monitor each other, so that the whole group is punished (i.e., collective punishment) (Macho-Stadler & Pérez-Castrillo, 2001) if the problem of free-riding occurs.

There is evidence to suggest that an enforcement system can develop endogenously from members themselves (Ostrom et al., 1994). This has been used successfully in microfinance programmes in developing countries (Meinzen-Dick & Di Gregorio, 2004). However, in endogenous enforcement, the individual bears a net loss because though he incurs all the marginal costs by punishing a violator, he however earns a very small part of the marginal benefits accruing to all group members (Shogren & Taylor, 2008). No one individual should be willing to use his own resources to punish violators, since his net benefits are negative. Compliance increases when those prepared to punish could police the collective (Fehr & Gächter, 2000) because merely intimating to punish is sufficient to force others to cooperate (Shogren & Taylor, 2008). According to Holmström (1982), such collective punishment can remove the free-rider problem as the group effectively assumes enforcing contracts with individuals. In fact, just as in microfinance programmes, making conservation payments under shared-liability rules appears to motivate farmers to share conservation burdens and to assist each other to comply with the agreed terms of conservation contracts for the success of PES (Narloch et al., 2017).

Rojahn and Engel (2007) and Bowles (2004) however don't agree with Holmström. For example, Rojahn and Engel (2007) believe that such collective punishment has some flaws, including perceived unfairness because complying farmers are necessarily made to make up for miscreants or free-riders to avoid punishment. For Bowles (2004), Holmström's solution is not viable because of: the presence of considerable stochastic influences on the level of group performance (a possibility in PES schemes); limited wealth of group members; and imperfect capital and social insurance markets. However, alternative solutions to shirking other than Holmström's is difficult to find, making Holmström's contribution very vital (Meijerink, 2008). Bowles (2004), however, also believes that even under conditions of collective punishment and under favourable institutional circumstances, and with sufficiently many members motivated by social preferences, collective action can work in PES to achieve the desired benefits.

3. Methodology

3.1. Survey

Data were collected in a survey from 305 households in the three northern regions of Ghana through face-to-face interviews. A multi-stage stratified sampling approach was employed in which a district was first selected from each region. A purposive selection of 25 villages from the 3 districts was then done after which a purposive random sampling was again used to select the farm households from the villages. The SWC are well known to respondents as the communities selected have physical evidence of the SWC structures of interest to the research. Physical evidence is important because for stated preference studies, knowledge and familiarity of the good being valued is useful. Due to the high illiteracy level among respondents, stones, sticks and diagrams were used to explain proportions in the choice experiment tasks to respondents. Questionnaires were checked for errors and omissions and all necessary corrections and additions made before leaving the study areas.

The questionnaire for the survey included a Conservation Plan/Hypothetical Scenarios follows:

“The Government of Ghana is proposing that in areas of highly degraded soils like yours, there is going to be a soil and water conservation programme. The programme will require that farmers adopt any of these soil and water conservation methods, soil bund and stone bund. You are to provide labour and other inputs to construct your chosen technology only on your farm fields that you have secured rights over. In return, government will compensate you with payments of a pre-determined sum of money for every acre of land depending on the type of technology adopted. All participating farmers will sign contracts with the government and the construction will be monitored by technical officers of the Ministry of Food and Agriculture (MoFA). Payment will be made in two instalments. The first payment of 50% will be made when you sign the contract to participate in the programme and the second when construction is half-way through. Payment will be held back if the contract rules are broken and you will be required to pay back all money received. Once the structures have been constructed and payment made, you will be required to maintain them at your own costs, to be monitored by extension agents.

Farmers belonging to organized farmers’ groups will be required to ensure that all members of their group follow the contract to the letter. If any member of the group breaks the contract, all the members of his/her group will be required to contribute to pay back all money received by the defaulting farmer.”

Both CV and CE methods were used to collect data for the estimation of farmers’ WTA. The CV part consisted of a polychotomous-choice multiple-bounded elicitation format of eight bid amounts from GH¢200 – GH¢600 with variations of yes/no answers each (i.e., multiple-bounded uncertainty choice (MBUC)) for stone bund and soil bund.

Table 1: CV question for stone bunds

<i>Example:</i> Which of the values would you be willing to accept for constructing STONE BUNDS on an acre of your own field? Please tick only one option for each value.					
Amount in Cedis/acre	Definitely No	Probably No	Don't Know	Probably Yes	Definitely Yes
200					
300					
350					
400					
450					
500					
550					
600					

The MBUC format allows respondents to indicate if they would accept an amount with certainty or with some level of uncertainty. The amounts used were got from focus groups and discussions with experts. The CV question format for stone bunds is given in Table 1.

In the CE, the set of attributes and their appropriate levels describing soil and water conservation technologies were got from literature, expert discussions, and focus groups. The attributes chosen were based on the needs and benefits of the technology (i.e., labour, area, time and yield), ecosystem services provided by the technology (landscape quality), institutional context of adoption (collective action), and a ‘price’/compensation. The description of the attributes and their levels are given in Table 2.²

Three versions of the CE, each made up of six choice sets, were used. Data were collected from a total of 305 smallholder farmers, providing a total of 1830 choice observations. The choice sets which were generated using shifted design included two designed and a ‘status quo’ alternatives. A shifted design is derived by modifying a conventional fractional factorial main effect orthogonal design (Ferrini & Scarpa, 2007). The orthogonal fractional factorial provides the “seed” alternatives for each choice set (Bunch et al., 1996). For uniform understanding of the landscape quality levels, pictures representing the levels were provided.

²Due to the generally small farm sizes, the levels are on per acre basis.

Table 2: Choice experiment attributes and levels

Attribute	Description of attribute	Levels
1. Labour (man-days)	Labour/acre required to construct technology and includes some limited provision for maintenance	30, 50, 70, 90
2. Area (proportions)	Proportion of area of land taken up by or lost to SWC structures (soil and stone bunds).	1/20, 1/10, 3/20
3. Time (years)	Number of years after construction of technology that a level of yield increases is obtained.	1, 2, 3, 4
4. Yield (proportions)	Potential yield gain due to SWC technology adoption.	0, 1/10, 3/10, 2/5, 1/2
5. Landscape quality	Off-site ecosystem services produced by SWC technologies at the local level.	Deteriorated landscape quality Maintained landscape quality Improved landscape quality
6. Collective action	Institutional context concerned with implications of group membership	Membership required Membership not required
7. Payment (GH¢)	Payment vehicle is payment by government for providing environmental services.	0, 200, 300, 400, 500, 600

On completing the CV and CE tasks, data on household and farm characteristics, including whether a respondent is a member of a farmers' group which is used as a proxy for collective action for the CV analysis were also collected. Table 3 is an example of a choice set.

Table 3: An example of a choice set

Attribute	Option 1 - Status quo	Option 2	Option 3
1. Additional Labour	0	50	70
2. Area loss	0	1/20	1/20
3. Time	0	4	3
4. Increase in millet yield	0	3/10	3/10
5. Landscape quality	Deteriorating landscape quality	Deteriorating landscape quality	Improved landscape quality
6. collective action	Group membership not required	Group Membership not required	Group Membership required
7. Payment/compensation	0	600	300

Option 1 Option 2 Option 3 Don't know

3.2. Data analysis

The choice of any of the three alternatives in a choice set in the CE or any of the variations of yes/no in the CV represents a discrete choice which can be analysed with a discrete choice model. The mixed logit (ML) or random parameter logit (RPL) model was employed to estimate WTA for collective action from the CE data. The utility individual n derives from choosing alternative i in choice situation or set (or time) t is specified by a utility expression of the form:

$$U_{nit} = g(\beta_n')x_{nit} + \varepsilon_{nit} \quad (1)$$

Where $g(\cdot)$ may take any form (Train, 2003), and is a transformation of the utility coefficients, β_n represents the attribute estimate (utility coefficient), x_{nit} is the attribute which in the current study is collective action, ε_{nit} is a random error term which is assumed to be *iid* extreme value type 1. The ML choice probabilities are expressed as the integral of logit probabilities evaluated over the density of distribution parameters as:

$$P_{nit} = \int L_{nit}(\beta_n)f(\beta_n|\theta_n) d\beta_n \quad (2)$$

where $L_{nit}(\beta)$ is a logit probability evaluated at the vector of parameter estimates β that are random realizations from the density function $f(\beta)$. For obtaining any specific β , the ML probability is:

$$L_{nit}(\beta_n) = \frac{\exp(V_{nit})}{\sum_j \exp(V_{njt})} = \frac{e^{g(\beta_n')x_{nit}}}{\sum_j e^{g(\beta_n')x_{njt}}} \quad (3)$$

The objective is to get estimates of θ with the assumption that β_n may or may not vary in an unspecified and therefore “random” pattern.

With the CE data, several models were estimated, each in both preference and WTA spaces (see Train & Weeks, 2005), and the best performing model based on the logged marginal likelihood chosen (see Balcombe et al., 2009). The larger the logged marginal likelihood, i.e., the smaller the absolute value, the more support for that model.

Data from the MBUC format of the CV survey falls within a range and hence the interval-data model was employed in this study to estimate farmers’ WTA for soil and stone bunds. The interval-data model includes the uncertainties in the given responses to CV questions in the estimation of WTA. The interval-data model improves the efficiency of estimation as compared to single-bound models and gives robust estimates of mean WTP/WTA (Alberini, 1995; Hanemann et al., 1991).

If utility is not observed and denoted by the latent variable y_i^* , and WTA_i is the WTA of the i th individual, then the utility is normally expressed as:

$$WTA_i = y_i^* = \beta' x_i + \varepsilon_i \quad \varepsilon_i \sim N(0, h) \quad (4)$$

where x_i is a vector of explanatory variables influencing respondents’ WTA, β' is the parameter vector related with x_i and ε_i is the error term assumed to be normally distributed with zero mean and standard deviation h . The explanatory variable of interest is group membership, the proxy for collective action.

Group membership was dummied as: 1 if member of a farmer group, 0 otherwise. All model estimations in this study were done using Bayesian estimation methods.³

4. Results and discussion

The estimated means and standard deviations of the WTA from the mixed logit model are reported in Table 4. The mean indicates the WTA, i.e., the marginal WTA for collective action and it is significant at 5% based on pseudo t-value. The estimated mean of WTA for collective action implies that the average individual farmer would need to be compensated by GH¢49.40/acre (GH¢125.30/hectare or US\$88.66/hectare) less for acting collectively in the proposed hypothetical conservation plan.⁴ The negative sign implies that farmers not acting collectively would demand higher compensation. This suggests that it will cost service buyers GH¢49.40/acre (GH¢125.30/hectare or US\$88.66/hectare) more per service provider if collective action is not designed into a PES scheme.⁵

Table 4: ML estimates of transformed WTA (GH¢/acre) for collective action

Estimates	
Mean	-0.494*
S.D.	2.061
Median	-0.001
<i>Quartile</i>	
Lower	-1.683
Upper	0.383
Observations	1830

Note: * denotes pseudo t-value significant at 5%; Within Bayesian inference, the coefficient’s confidence interval excludes zero if the ratio of the estimate of the mean to the standard deviation exceeds 2.

Results shown in Table 5 were obtained by the use of uncertainty probabilities in estimation using the interval-data regression model and holding characteristics of the farmer except collective action constant. The estimates of WTA are the unconditional WTA in the population.

³Gauss code for estimation of all models written by Kelvin Balcombe

⁴The CE estimates are multiplied by 100 because the payment/compensation amounts were divided by 100 in Gauss code for ML estimation.

⁵Since the scope of this paper does not include estimation of the impact of individual characteristics on WTA, data on individual characteristics is not presented.

On average, respondents were willing to accept GH¢928.86/hectare (US\$657.28/hectare) and GH¢736.91/hectare (US\$521.45/hectare) for stone and soil bunds respectively. The coefficient of collective action is negative and significant, indicating that farmers who are group members would need less compensation than those who are not. For stone bund, farmers who belonged to a farmers' group were willing to accept GH¢28.09/hectare (US\$19.87/hectare) less than those who did not belong to a group. Farmers who were group members were willing to accept GH¢63.25/hectare (US\$44.75/hectare) less than those who belonged to no group for soil bund. The effect of collective action on WTA is significant at the 95% level of Bayesian confidence/credible interval.

Table 5: Effect of collective action on WTA/hectare for stone and soil bunds

Technology	Mean estimate (GH¢/hectare)	S.D
N=305		
<i>Stone bund</i>		
WTA	928.86	18.808
Collective action	-28.09*	25.464
<i>Soil bund</i>		
WTA	736.91	18.206
Collective action	-63.25*	25.530

From both CE and CV data, it is obvious that collective action does reduce the amount of total compensation that PES service providers are willing to accept. These results confirm that of Swinton (2000) who in a study of Peruvian farmers found that social capital, which he measured using group membership and collective action constitutes a low cost means of contributing to natural resources sustainability. The lower WTA as a result of collective action could also be because according to Kerr et al. (2014), groups with strong social capital will have strong trust among each other and hence incur lower costs in agreeing and monitoring each other. The negative effect of collective action on WTA obtained from this study and Kerr et al.'s (2014) explanation is contrary to Shogren and Taylor's (2000) assertion that endogenous enforcement is costly to individuals. This is probably because the cost of endogenous monitoring to each participant and the possible collective punishment due to free-riding is less than the gain provided by, for example, collective labour and skill sharing among group members. Narloch et al. (2017) found that higher individual bid prices per hectare were demanded by farmers belonging to groups with stronger collective action patterns in the Peruvian site, suggesting that targeting farmers in groups with greater collective action may undermine cost-effectiveness. For the Bolivia site in the same study, Narloch et al. (2017) found greater level of cost-effectiveness owing to significantly lower bid prices and larger conservation areas than the Peruvian site. What can be deduced from their findings is that the nature of influence of collective action on bid amounts may vary with location. The statistically significant effect of collective action on WTA as shown by both CE and CV data of the current study however confirms the theory of institutional economists that institutional context influences preference formation.

5. Conclusion

Investigating the importance of the informal institution of collective action in the present study has revealed some important implications for policy formulation, particularly for PES programmes involving smallholders. Existing PES literature shows that collective action plays a significant role in determining transaction costs of PES. The data of the current study suggests that indeed institutions are important for preference formation by showing that collective action significantly influences WTA. Precisely, collective action reduces the amount of compensation, i.e. WTA that smallholder resource managers may accept to provide an ES in a PES scheme.

The choices of the farmers acting collectively are constrained as well as liberated by the formal and informal conditions, rules, and norms governing and informing them. Endogenous monitoring and enforcement, collective punishment, and the possible sharing of labour and skills are the rules and norms limiting and liberating the respondents in the groups which informed their preferences. The evidence provided by the current study suggests that resource managers/farmers would probably prefer to act collectively in resource management. Farmers would prefer to act collectively probably because farmer organization/collective action offers members the chance to "share information, coordinate activities, and make collective decisions". Therefore to design cost-effective PES for adoption of soil and water conservation technologies specifically and probably for all PES involving smallholder farmers, especially in developing countries, it may be useful for implementers to consider exploiting the benefits of collective action as a cost-saving institutional setting for such schemes.

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