Factors influencing willingness to pay for watershed services in lower Moshi, Pangani Basin, Tanzania

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Abstract: This study investigated factors that influence the Willingness to Pay (WTP) for watershed services and conservation in Tanzania with the case study of the Lower Moshi Irrigation Scheme in Pangani Basin, Tanzania. A total of 99 farmers were selected randomly from the Mabogini ward for interviews using a Contingent Valuation Method. There were also focus group and key informants' interviews. Structured and semi-structured questionnaires were used to gather information. Data were analysed using multi-linear regression model. Results showed that 80% of the respondents showed a WTP for additional cost of watershed services. Findings further showed that parameters of education, farm size and household income were found to be statistically significant at p=0.05. However, there was inverse relationship between WTP and farm distance, probably due to the perceived risk of decreasing water availability as distance to the water intake increases. The results also showed R^2 = 0.845 suggesting that as high as 84.5% of the variation in the dependent variable (WTP) had been explained by the variables included in the model. For effective WTP, the observed weaknesses should be addressed. These include environmental education, participatory basin management approach and good governance of basin resources.

Keywords: watershed services, WTP, smallholder irrigation scheme, Pangani basin, Tanzania.

INTRODUCTION

Lack of appropriate and effective approaches for the management of the forested watershed areas is a colossal challenge facing the developing world in its ambition to realize both environmental protection and s community's livelihoods security. Poor conservation of environmental services has lead to its serious degradation in the last 50–60 years (1). Studies show that more land was converted to cropland since 1945 than in the 18th and 19th centuries combined; 35% of mangrove area has been lost in this

time; the amount of water in reservoirs has quadrupled since 1960; and withdrawals from rivers and lakes have doubled since 1960 (1).

In Tanzania, changes in land use to agricultural conversion have caused a chronic loss of natural forest in river basins. The average annual rate of deforestation has increased over the past decades from -1.02% between 1990 and 2000, to -1.1% between 2000 and 2005, and to -1.16% between 2005 and 2010 (2). In 1990, the forest area in Tanzania was about 41.5 million hectares. This area has now decreased to 33.4 million hectares or about 38% of the total national territory (2). There is concern that if the past 20 years rate of loss of 400 000 ha/year escalates, demographic and economic pressures will mean Tanzania will consume all its forest cover in the next 50-80 years. An example of deforestation is the loss of 41 sq km of natural forest cover in the southern slopes of Mount Kilimanjaro over the past decades. This loss is mainly due to the expansion of intensive crop cultivation, growing population settlements, and logging, burning trees for charcoal production, livestock grazing, and landslides due to logging on steep slopes (3, 4).

In Pangani Basin water availability has decreased over time while population has been increasing. During the past decade and half, population in the catchment area has grown by 32% to about 3.2million people in 2002 from 2.4million people in 1988. The decrease in water availability is mainly due to environmental degradation particularly that which affects the catchment areas of Mount Kilimanjaro and Usambara (5). Streams in this mountain are drying up due to degradation of the catchment. Global warming may also be affecting the snows of the great mountain causing a change in the hydrological flows (5,6,7).

The emergence of PES as the ecosystem services conservation mechanism indicates a paradigm shift from the former predominant use of command-and-control mechanisms and conventional approaches to its hoped, more flexible and efficient ecosystem protection (8,9). Unlike conventional approach of conservation, PES is a direct approach to conservation whereby service providers receive payments that are conditional on acceptable conservation performance. Under PES, payment should entail a voluntary transaction between at least one provider and one user for a well-defined environmental service. Thus, conditionality is the characteristic that most distinguishes PES from previous approaches.

In Tanzania PES has been established in carbon sequestration, watershed protection and biodiversity protection. Good examples being “Equitable Payment for Watershed services (EPWS) at Uluguru Mountains” and “Pangani Basin Management Project”. Tanzania started to implement EPWS in 2009 in Uluguru Mountains. The theoretical proposition of the PES/EPWS approach is to make payments to individuals or communities in order to increase the level of desired environmental services (10). Theoretically, EPWS promotes mechanisms which provide services cost effectively and in a sustainable way. Thus, EPWS schemes try to establish appropriate payment mechanism which change the behavior of land users and improve the sustainable provision of environmental services (11).

However, despite the success of PES in different parts of the world, particularly in USA and Latin America there have been a number of challenges of PES implementation and these challenges are more prone to Africa compared to other parts of the world. For PES to be effective and sustainable it will depend on the WTP by the downstream users (12).

The main objective of this study was to investigate the WTP and factors that influences for watershed services at Lower Moshi Irrigation Scheme, Pangani Basin Tanzania. Specifically, the study intended to:

(i) To determine farmers willingness to pay for watershed services in the Lower Moshi Irrigation Scheme

(ii) To identify factors influencing WTP for watershed services in the Lower Moshi Irrigation Scheme.

Lower Moshi Irrigation Scheme was selected due to the fact that the scheme falls within the Pangani basin which has experienced severe decline in water in recent years (13). Water scarcity has resulted into low productivity and water use conflict between different stakeholders within and outside the scheme. Findings from this study will inform policy and decision makers on how best EPWS could be implemented to enhance economic growth, ecological integrity and poverty alleviation. It also contributes to the body of knowledge in areas of PES and poverty alleviation in developing countries.

A theory on payment for ecosystem services (PES)

According to (14) PES is defined as a voluntary transaction in which a well-defined environmental service (ES), or a land-use likely to secure that service, is being purchased by at least one ES buyer from at least one ES provider if, and only if, the ES provider secures ES provision, i.e. conditionality. FAO (15) define PES as an approach to environmental management which uses cash payments or other compensation to encourage ecosystem conservation and restoration. It includes direct payments from ecosystem service beneficiaries to land stewards, as well as indirect payments earned through eco-certified production.

Different terms are used for PES by different authors (16). In some cases PES is used interchangeably with other terms such as Compensation for Environmental Services (CES) (17), Market for Environmental Services (MES) (18) and Reward for Environmental Service (RES) (18). However, in other cases a clear distinction is tried to be made among these terms. MES is widely used to indicate an approach associated with economic incentives in the presence of multiple actors, choices and competition (19). The term reward is used in place of payment to overtone entitlement and justice for service providers (20) while compensation for environmental services indicates payment provision to service providers who bear costs for supplying environmental services (17).

Equitable Payment for Watershed Services (EPWS) is one of the PES approaches. It is a management activities of a specific land and water use in the upstream part of the watershed that provide beneficial outcomes to downstream water users in terms of improvement or stabilization of water flow (quantity) and maintaining low concentration of sediment and chemical elements in the water flow (quality). These beneficial uses are thus defined as environmental services to downstream users (21).

From an economic perspective, the term EPWS refers to the approach that internalizes external benefits and follows the principle that people who benefit from the consumption of environmental services should compensate those who make it possible to generate environmental services (17).

In EPWS schemes, payments provided to service providers must ensure that the net benefits from one land use are at least equal or greater than those derived from an alternative land use (22, 23). In economic theory, such benefits from alternative land use are called opportunity costs. A scheme is likely to be effective when downstream benefits are high and upstream opportunity costs are low. It is possible, but difficult to implement EPWS scheme when both downstream benefits and upstream opportunity costs are high since margins will be small. If both downstream benefits and upstream opportunity costs are low, EPWES can be created but will hardly be effective. Where upstream opportunity costs are high and downstream benefits are low, EPWS is not feasible (24)

Similarly, payments must be less than the value of benefits to downstream populations otherwise they would not be willing to pay for it. This aspect is referred to as willingness-to pay in economics (11,25).

Overview of EPWES Worldwide

Payment for environmental services schemes, have already been instituted in other countries such as United States, Costa Rica, Ecuador, Lao PDR, France, Colombia, Australia and Brazil.

In the United States, New York City agreed to invest $1.0 to $1.5 billion over ten years in the Catskill and the Delaware watershed programmes principally financed by a 9% increase in the taxes on water bills over a five-year period. The watershed program consisted of purchasing conservation easements from farms, promoting forest and agricultural best management practices, and other conservation programs.

In Costa Rica, the government has been involved in a scheme to help users such as hydropower companies to pay farmers to maintain forest cover in watersheds, while in Quito, Ecuador, water companies are helping to pay for the management of protected areas that are the source for much of the capital's drinking water. Similarly, hydroelectric utilities finance upstream restoration, which has lead to the increased forest cover on private land, expansion of forests through protection and regeneration.

In Colombia they put in place what they call Environmental Services Tax for Watershed Management- through this mechanism industrial water users and municipalities pay some extra fees, which is given back to the managers of the watersheds as incentives. This has resulted to the improved forest management and forest expansion and hence continuous flow of water.

While there has been global experimentation with EPWS schemes for almost a decade, only a couple of schemes exist in sub-Saharan Africa. North Africa has no documented EPWS schemes (26). The two African EPWS programs that are currently making payments are both located in South Africa. They are essentially public works programs oriented toward securing hydrologic services. Given that the most common definitions of Payments for Environmental Services (PES) in the literature do not include such public works programs (e.g 27;28), one could reasonably argue that there are no EPWS schemes currently operating in Africa.

For example a Working for Water (WfW) programme was a public works initiative that was launched in 1995 with the intention to remove invasive plant species that are established in about 10 percent of South Africa's total land area. However, WfW was created with the intention of contributing toward the

newly elected (1994) democratic government's goals of alleviating poverty, creating jobs, empowering the poor economically, and rectifying inequities created from decades of apartheid rule. Although it does little environmental targeting, it engages in strict social targeting. Unlike most of the PES programs in Africa that depend funds from external sources and hence jeopardizes their sustainability, much of the WfW budget came within the South Africa internal sources. Ferraro (26) noted that WfW's annual budget was a little more than 500 million Rand (over US$70 million). Most of the budget (80%) came from the general tax revenues from the central government through its Poverty Relief Fund.

Another similar project was the Sasumua Water Treatment Plant treats water for the Nairobi Water Company, which provides water services to the Kenyan capital. The plant draws water from a few small watersheds in the Aberdare Mountains. The plant expends funds each year to clear its intakes of silt ($50,000/year) and treat the water prior to delivering it to consumers ($100,000/year). The sedimentation and pollution originate mainly from runoff from upstream land users and from effluent from towns. A project is exploring the potential for the plant to pay upstream land users to alter their land use in ways that reduce sedimentation and agricultural pollution (29). The costs of engineering approaches to removing silt and pollution serve as the benchmarks from which EPWS scheme will be evaluated. The necessary payments are anticipated to be needed on an ongoing basis and would be paid either out of the existing treatment plant budget (from cost savings in avoided dredging and treatment costs) or through additional "conservation fees" to water users.

EPWS in Tanzania

The Uluguru Mountain watershed is home to 48 villages and an estimated population of 90,000 people. Forests in the watershed are believed to be important for downstream hydrologic services that benefit Dar es Salaam, the coast, and the Morogoro region. Deforestation is threatening these forests. A scoping project—run by WWF, CARE, and IIED, and entitled "Equitable Payments for Watershed Services"—is exploring the potential for EPWS in the watershed. ICRAF has recently become involved in this project through its Pro-Poor Rewards for Environmental Services (PRESA) initiative in Africa (30). This scoping project is currently documenting hydrologic relationship and the potential buyers and sellers of watershed services. Preliminary evidence suggests that the watershed's forests can no longer hold enough water during the wet season, which leads to water shortages downstream. The goal of the project is to "help mountain communities stabilize and improve the productivity of their farms as well as prevent further forest loss." Downstream water authorities and private sector corporations are the intended buyers of the hydrologic services, but the scientific case is being developed before the buyers will be approached for participation.

However, neither of these studies has shown WTP with respect to small scale farmers particularly in irrigation scheme. Also factors that influence the WTP are not clearly known. This study is an attempt to fill the gap. The main hypothesis to test is that farmers' WTP for irrigation water depend on income, distance to the intake, land size, environmental education, gender and age.

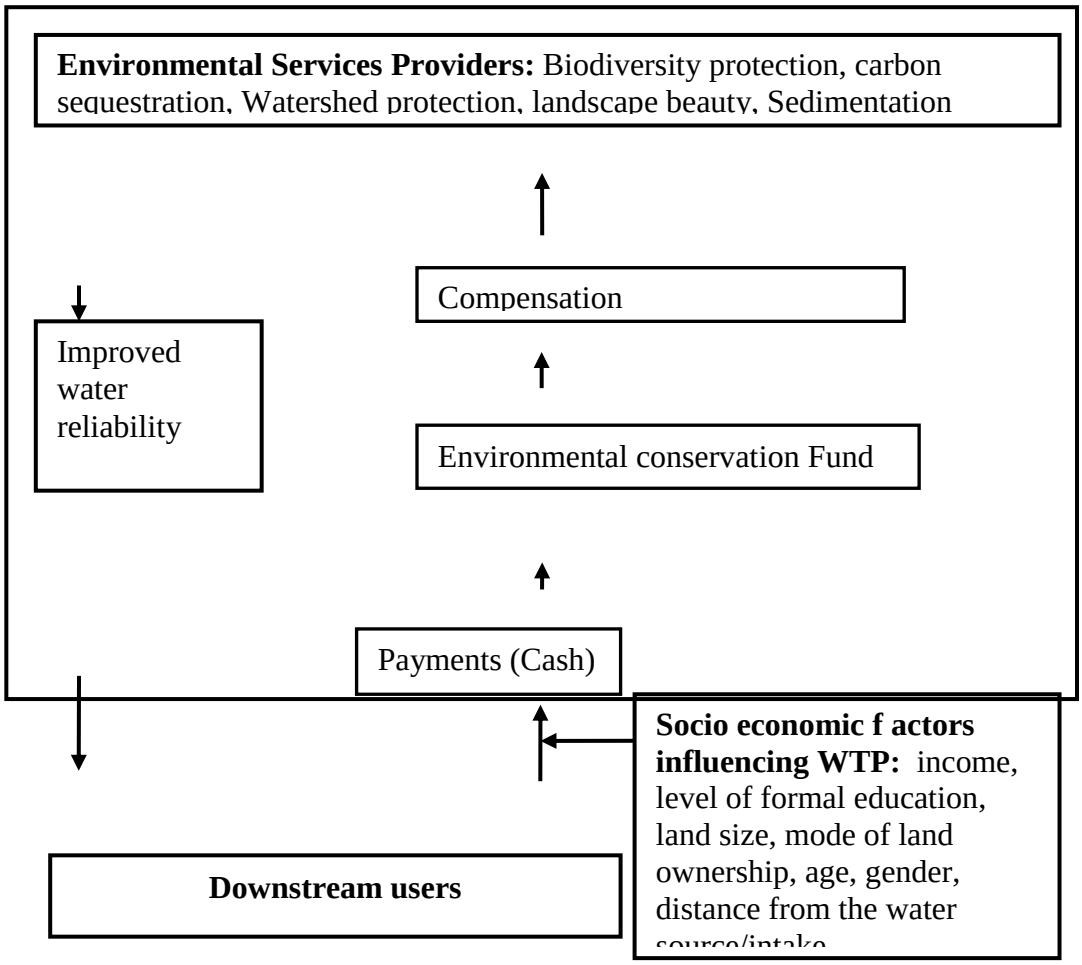
Conceptual framework of the study

The conceptual framework as indicated in Figure 1 guided this study. According to (31), the factor that may affect WTP may include household income, education level, environmental education, land size, land tenure, water reliability, family size gender and age. The payments made by the downstream water users will be used to compensate the upstream landowners to refrain from environmental degrading activities.

Environmental Services provided include biodiversity protection, carbon sequestration, Watershed protection, landscape beauty, Sedimentation prevention, Water user (Figure 1). Improved water availability due to upstream watershed conservation will benefit downstream irrigators. As a result they will be willing to pay for environmental services. However, WTP will depend on income, level of formal education, land size, mode of land ownership, age, gender, distance from the water source/intake (31).The paid funds by downstream users will enter into Environmental Conservation Fund which be used to compensate upstream service providers and conservation activities.

However the study will not deal with upstream users and the mechanism involved in compensation.

Figure 1: Conceptual framework of the study



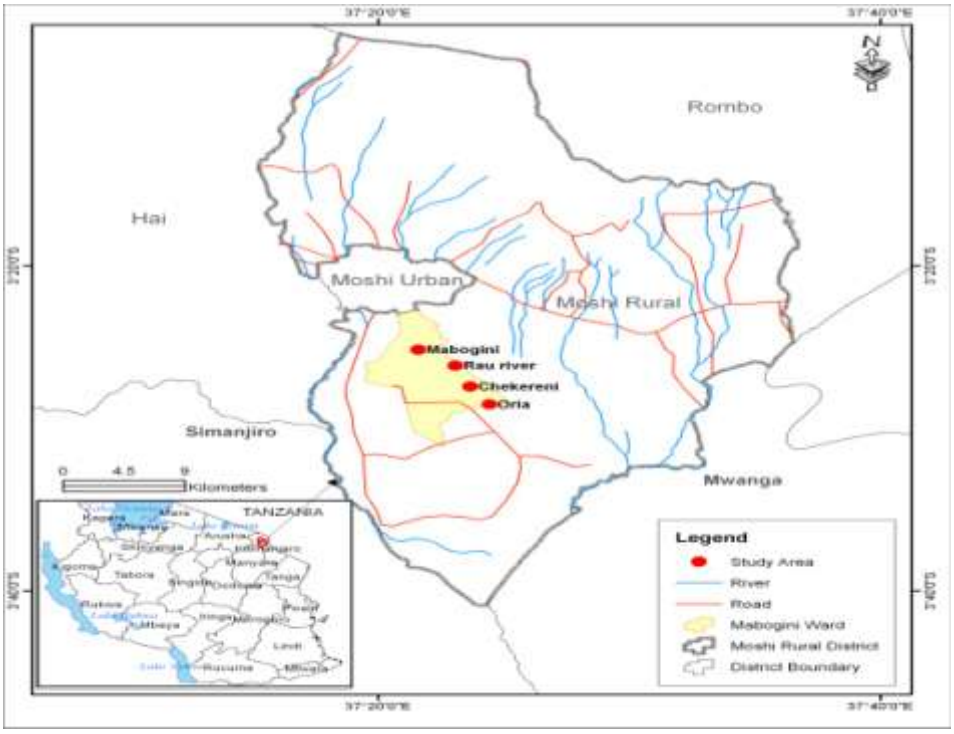
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3.0 Materials and methods

3.1 Description of the study area.

The study was carried out in Lower Moshi, 37°20′E 3°21 S and 700 meters altitude, south of the Mount Kilimanjaro in Moshi Rural District, North-eastern Tanzania (Figure 2).

Figure 2: The location of Lower Moshi Irrigation Scheme



According to the Tanzanian National Population and Housing Census (32) the population of the four sample villages was 26,140 people, with 8,583 and 8,453 being female and male residents, respectively. The four villages are made up of 3749 households and the sample villages had a total number of 652 households who were registered in the Rice Farmers Society Register.

Most of the population in the area is engaged in agriculture as main activity. Two Rivers of Njoro and Rau provide water for irrigation in the sample villages. There are two growing seasons, the main one from June to October and the second one involving sporadic cultivation of rice from September to February. Common crops grown in this area include maize, rice, sorghum, cassava and pigeon peas. Domestic animals that thrive well in the area are cattle, goats and sheep.

Currently, farmers are paying flat rate for irrigation water in the so called “water user rights”. However, such payments do not reflect the opportunity cost of the benefits from irrigation agriculture. There is a concern that the water services are underpriced and this leads to degradation.

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Data collection

Both primary and secondary data were collected. Secondary data were collected from various books, articles from journals, reports and publications of various organizations Information from secondary sources helped to create a state of knowledge on the subject and enabled the researchers to establish a gap for field.

Data collection methods

Primary data were collected directly in the field through key informants interview, focused group discussions (FGD) and physical observation of the area.

Primary data collection

Four villages of Mabogini, Rau ya Kati, Chekereni and Oria were selected purposely from the Rice Farmer's Society register. According to Boyde (1981) for the sample to be representative to the true population it should constitute at least 5%. In this study 15% of the respondents were selected randomly from each of the four villages. Structured and semi-structured questionnaires were used to collect information. The questionnaire had both open and closed ended questions.

Contingent Valuation Method (CVM)

CVM was used to collect information on farmer's WTP for watershed environmental services. A hypothetical market was created where farmers were asked a question "how much would you be willing to pay for continuing accessing irrigation water from Kilimanjaro Catchment Forest"?

The data from interviews was analyzed through SPSS version 16 computer program. Multiple linear regression model was used to determine the existence of correlation between socio-economic factors and WTP for watershed environmental services. Regression (multivariate) analysis was run to assess the influence of independent variables on dependent one. The model applied in this study was adopted from that of (33)

$$WTP = ß_0 + ß_1I + ß_2E + ß_3A + ß_4G + ß_5L_1 + ß_6L_2 + ß_7D + e$$

Where: WTP is dependant variable (amount to pay)

ß's are coefficients are to be estimated

B_o is constant coefficient (intercept of the equation)

I is the household monthly monetary income (Tsh)

E is the respondent level of formal education

A is respondent's age,

G is respondent's gender

L_1 is land tenure

L_2 is land/farm plot size (ha)

D is distance of farm plot from the water source/intake (km)

e is random error.

Limitations of the study

During the period of data collection, the study suffered from strategic and respondent bias. In some occasions respondents believed that the bids will actually be implemented and therefore they were offering low bids of payments for water services while others wanted to impress the researchers and hence offered unrealistic high bid WTP. This forced the researchers to go on clarifying the concept of WTP again and again and by telling the respondents that the bids will not actually be collected. Rather, it was an attempt of economic valuation of water resources used for irrigation.

The study also focused on recipient of the watershed services. Upstream service providers were not involved. An ideal study should have involved both parties so as also to know the willingness to accept compensation (WTA) for changing the current land use by upstream users. However, financial limitations led to studying only one part i.e service recipients. Nevertheless, the researchers are confidence that the findings from this study will shed a light on the PES policies that has just been started to be implemented in Tanzania.

4.0 Results and discussion

4.1 Socio-economic characteristics of the respondents.

A total of 99 respondents from the four villages were interviewed whereas 62.6% were male and 37.4% were female (Table 1). The large number of male compared to female could be due to the fact that most of the heads of households are men and they are the ones that own land. The culture and tradition in the study area hinder women in possessing land.

Age could influence WTP and perception on watershed conservation and future values of the resource. In this study, the respondents' age groups were separated into groups of 18 and 30, 31 and 50 and above 50. It is believed that younger respondents may highly value watershed services because of the longer life

expectancy, which gives them more chances of benefiting from the good compared to the older respondents.

Findings of the study indicated a generally low level of illiteracy; most of the respondents had primary education. About 48% of the respondents had a primary education and 35% secondary education. There were also a considerable number of respondents (16%) who reported to have never attended any formal education system, and these tended to be older farmers. There was no respondent with tertiary education. Education level is one of the key factors that could influences WTP for conservation. Better educated people may better understand the relationship between forest cover and water. Educated people could also perceive better the future risk of reduced water flows on crop production, and hence may understand the importance of payments for wastershed services as a tool to improve forest conservation.

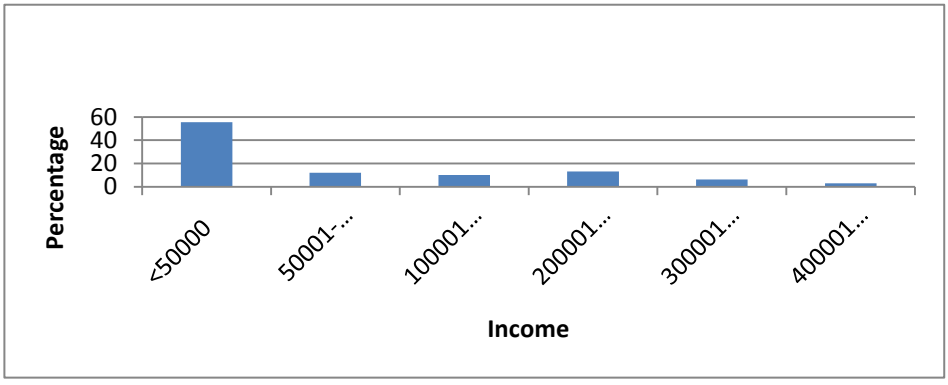
The considerable high level of respondents to have had no any formal education seem to be contradict the belief that Kilimanjaro region is one of the regions in Tanzania with well educated people. The low level of education observed could be attributed by the declined of coffee production and prices. According to (34) decreasing coffee production by smallholder farmers has led to low household Income.

Findings from the study discovered that majority of the households had an average of 4 persons per household, which is relatively lower than the national average of 4.3 (34). WTP for watershed environmental services is likely to be influenced by the family size and number of people in the area. Big family size demand large quantity of food and therefore need for high productivity per unit land through irrigation. This need to enhance agricultural productivity through irrigation could influence farmers WTP. WTP is likely to be higher with big families than otherwise.

Household's income

Income is an important factor which can determine the WTP for watershed services. Several studies have shown a positive relationship between income and WTP for environmental services. (13) noted that income and amount of water consumption emerged to be the most important factors, which influenced the Pangani Basin Domestic Water User's willingness to pay for environmental services. Findings from the study discovered that majority of the study had income level that is less thanTsh.50, 000 per month (Figure 3).

Figure 2: Household income level (%)



Source: Survey data (2012)

Farm size

Farm size is an important factor which could determines farmer's WTP for watershed services. Farmers with big plots are expected to indicate big amount of money to pay compared to those with small plots. This could be explained by economies of scale. Irrigation cost is likely to be low with big farms compared to the low farms. Generally, findings from this study showed land under irrigation to be very small ranging from 0.3 to 0.9 ha (Table 1). This is not surprising as Kilimonjaro region is the third most densely populated region in Tanzania after Dar es Salaam and Mwanza. According to the 2012 National Population and Housing Census the region had 103.4 compared to 1785.6 and 149.5, respectively (34).

Table 1: Respondents plot size

Farm size(ha)	**N=99**
0.3	49.5
0.45	18.2
0.6	11.1
0.75	11.1
0.9	10.1
Total	**100.0**

Source: Survey data (2012)

Main economic activities in the area

Findings from the study indicated that majority of the respondents depend on farming as their major livelihood activity (52.5%). Other economic activities in the area included livestock keeping, formal employment and small business (Table 2).The types of crops grown in the study area were mainly paddy and maize. It was reported that before the construction of the project the average production of rice was 2.0 tons/ha. But after the operation of the project through the use of improved rice varieties, good agronomic practices and well leveled plots the production increased tremendously to an average of 6.5tons/ha far above the Design Projection of 4.3tons/ha.

Table 2: Main economic activities in the study area

Livelihood activities	N=99
Farming	52.5
Farming, livestock keeping	34.3
Salaried job, farming and livestock keeping	10.1
Salaried job, farming, livestock keeping and Small business	3.0

Source: Survey data (2012)

Farmers WTP for watershed services

Findings indicated that about 79% of the farmer respondents are willing to pay an additional fee as compensation to the landowners near catchment forests in return for improved water quality and quantity. The respondents agreed to pay additional fee but with different bids. These findings are consistent with those of (35) in his study on the topic of EPWS in Tanzania.

On the other hand, about 21% of the respondents refused to offer any additional payments from what they are currently paying through the water user right. This group argued that it is the responsibility of the government to finance the conservation activities through the money they are already paying through water user rights. Others showed a lack of trust of the management of the funds. They argued that although they are currently paying for irrigation water they are not getting good service, so they were not ready to pay any additional amount of money until they get assured of reliable water supply and there was consensus for all respondents including those who showed a willing to pay additional fees. Generally, the respondents accused the corrupt government officials for causing deforestation through a illegal forest harvesting through corruption and poor law enforcement. In the respondents view, even if the collection of money for conservation will increase will not help much if the current poor governance will continue.

Factors influencing WTP for watershed environmental services Socio – economic factors

Results show level of education to be significant and positive. ($b = 0.469$, $p = 0.05$). This implies that WTP increases with increased education probably because educated people could better understand the relationship between watershed conservation and water. Educated people may also better perceive the future risk of reduced water flows on crop production, and hence may understand the importance of

payments as a tool to improve forest conservation. In addition educated people could comprehend well the broad picture of watershed values such as scenic values and carbon sequestration (36; see also 37).

Findings also revealed household income to be significant and positive (b = 0.374, p= 0.05). The findings show that 1% increase in household's income will lead into 37.4 % increase of amount WTP. The results tallies with that of (31) study who noted that farmers with high income were willing to pay more for watershed environmental services. In his study (31) found that one percent increase in income levels lead to a 33-39 percent increase in the WTP for water stabilization and quality.

Plot size was also significant and positive (b = 0.320, p < 0.05). One percent increase in farm size (ha) could lead to 32 % increase in WTP. This suggests that farm size is an important factor which determines farmer's decision to pay for watershed conservation. These findings partly tallies with those of (38) who reports that farmers' willingness to consider PES chiefly depends on farm and farmer characteristics.

Table 8: Multiple regression model

Model	**Unstandardized Coefficients**		**Standardized Coefficients**		
	B	**Std. Error**	**Beta**	**t**	**p**
(Constant)	-.698	.413		-1.690	.094
Household total Income/month	.374	.060	.429	6.287	.000 **
Education	.469	.114	.251	4.118	.000 **
Age	.046	.121	.018	.383	.703 NS
Gender	.016	.117	.006	.135	.893 NS
Land tenure	.071	.049	.065	1.450	.150 NS
Farm size	.320	.067	.344	4.743	.000 **
Distance from the water source	-.011	.061	-.008	-5.178	.000 **

R	R Square	Adjusted R Square	Std. Error of the Estimate
.919[a]	.845	.834	.530

** Significance at p=0.05 level; NS indicate not significant.
Source: Survey data (2012)

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Age (b = 0.046, p < 0.05) was positive but not significant. This means that age is important but by itself is not sufficient to influence WTP. On the other hand, land tenure (b = 0.071, p < 0.05) was positive but not significant. This might have happened due to the fact that all crops under irrigation were annual crops and therefore land tenure was not important as even land renters could benefit from paying for water services for that particular season.

Finally distance of the farm plot from the water source (intake) (b = -5.178p < 0.05) was negative and significant. This implies that as the distance increases the WTP for watershed services decreases. This could be due to the perceived poor reliability of receiving water due to distance.

The results also show that the independent variable fit well in the regression in that R^2 was 0.84. This means that the fit explains 84 percent of the total variation in the WTP for watershed services is explained by the tested socio - economic factors.

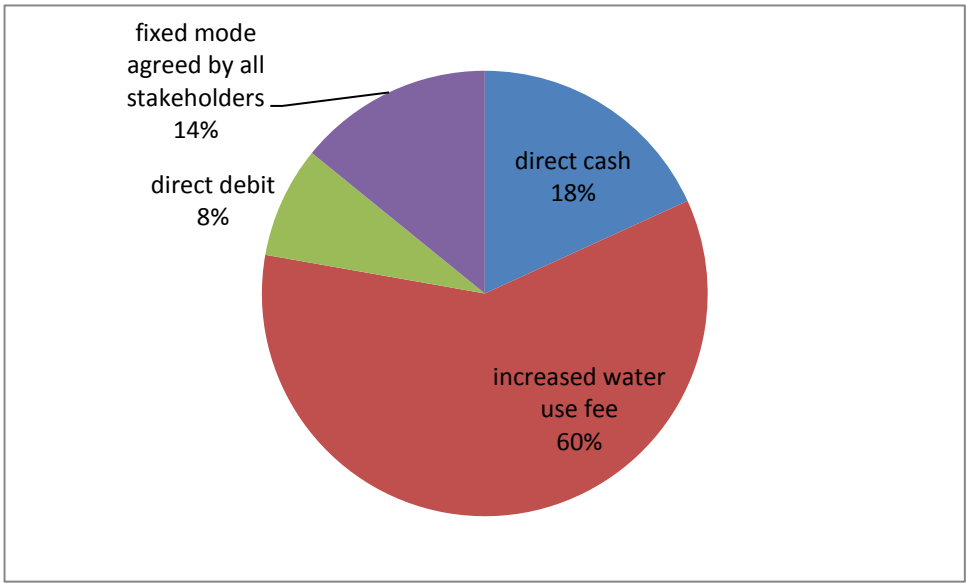
4.3.2 Mode of Payment in collecting compensation

Mode of payment, also influence WTP for watershed environmental services depends on how the respondent perceives the proposed mode of payment. Water users can make their payments in various forms. They can use tax systems, a fraction of existing users' fees or raise additional fees for payment for environmental services. Service providers on the other hand, can get payments in terms of cash (e.g. subsidies, transfer payments, certificates, credits) or in-kind (e.g. technical assistance, equipments) (39).

Findings from this study indicated that 59% of the respondents have given priority in choosing increased water use fees as a mode of payment in collecting compensation of water services (Figure 4). During the discussions with FGD, the participants supported this mode of payment by arguing that it is simple and transparent since all farming costs will be under one roof. Such a method of payment has been used also in Cauca Valley (Columbia), downstream water users' associations voluntarily agreed to increase the user fees paid to the Cauca Valley Corporation (CVC) in order to improve the watershed management in upstream of Cauca Valley so that water users in downstream can have increased water quality and quantity. On the other hand, 18% preferred direct cash payments while it was fixed amount and direct by 14%t and 8% of the respondents, respectively (Figure 5). The small percent in direct debit was due to the fact that most farmers did not have bank account so they opted for direct cash and increased water user fee. Supporters of direct debit argue to CHAWAMPU bank account for transaction.

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Figure 5: Proposed mode of payments from water users



Source: Survey data (2012)

Conclusion

As (40) observed, PES is a highly promising conservation approach that can benefit buyers, sellers and improve the resource base. However, there are a number of factors that could influence service recipient to be WTP for environmental services. In this study about 80% of the farmers interviewed showed willingness to pay additional fees as compensation to the upstream landowners in catchment areas for them to change their current land use. The difference in the willingness to pay is attributed by largely socio economic factors. Findings from this study show that education, income, distances to farm as well as farm size were statistically significant in determining WTP while gender and land tenure were not significant but positive suggesting that these attributes could be influence WTP but nevertheless by themselves are not sufficient to influence WTP. They need other factors like income, farm size and education.

Generally, the results show that the independent variable fit well in the regression in that R^2 was 0.84 suggesting that the dependent variable (WTP) has been explained by the parameters (independent) in the model by 84%.

The respondents also prefer to pay through increased water use fees (60%) compared to fixed payment (14%) and direct deduction (8%). There is generally a high level of skepticisms about the governance of funds and forest resource in that it is full of corruption and mismanagement and there was a consensus between both who showed a willingness to pay and those who refused to increase payment from the current payment from water user rights.

Based on the findings from this study and literature review it is strongly recommended that factors of education, incomes and productivity per unit land should be enhanced through improved market access, prices, input availability and extension services.

There should be environmental education on mainstreaming in both primary and secondary education. The Tanzania government should further provide environmental education and awareness to the public e.g through training, media etc and raise awareness on the importance of PES policies and how this could benefit both the environment and people's livelihoods

The findings have further indicated that about 80 percent of the respondents have shown WTP for watershed environmental conservation. On this ground therefore it is recommended that the policy and decision makers should start implementing the PES policies. However, this should go hand in hand with improving the governance of the collected funds for improving conservation and water flows. Furthermore, it is recommended that all stakeholders should be represented in water resources decision making and management.

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