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Economic Contribution of Range Land and Its Willingness to Pay For Rehabilitation In Pastoral and Agro-Pastoral Areas of South Omo Zone, Southern Ethiopia

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Abstract

The study was initiated to assess the economic contribution of range land and its willingness to pay for rehabilitation in pastoral and agro-pastoral areas of South Omo Zone, with the objectives of identifying determinants of Willingness to pay for Rangeland rehabilitation in Pastoral and agro pastoral area, to estimate the contribution of range lands in pastoral & agro pastoral areas and to identify major constraints faced by pastoralists and agro pastoralists in the study areas. Data were collected by employing focus group discussions, household survey using a structured questionnaire, and key informant interviews. Economically range land contribute as source of income from firewood(charcoal), honey production, medical plants, raw materials for agriculture, housing materials, home furniture and more of the time for grazing. The respondents show their willingness to pay in terms of labor days and money. From these the average minimum labor days were recorded in Gurimamero, which is 24 labor days/household and the average maximum labor days were recorded in Ocholoch, which is 184 labor days/household. In terms of money the average minimum ETB were recorded in Sitnba kebele, which is 13.90 ETB/household and the maximum were recorded in Gurimamero kebele which is 32.33 ETB/household. The major livestock production constraints in the study area were drought, feed and water shortage, and animal health problems. There are no rangeland improvement practices undertaken in the study area to improve the condition of the rangelands. Mobility is one of the measures taken to solve a shortage of livestock feed and water in the study area. But many of the pastoralists replied that they often face conflicts during migrations. The pastoralists or agro-pastoralists indigenous knowledge about range-livestock management and decision making about their environment should be incorporated while the government, non- governmental organizations and research centers found in the area are planning about range- livestock development projects for the study districts.

Key words: - pastoralism, rangeland, rangeland management and willingness to pay

Introduction

Rangelands provide numerous goods and services that have great economic, social, cultural, and biological value in all geographical aspects: locally, nationally, and globally. Rangelands are usually found in dry areas with low and variable rainfall. They cover a variety of different ecosystems, resulting in a patchwork of vegetation types, different vegetation states, and variation in the limiting factors of water and soil nutrients (Mortimore 2009). The diverse key components of rangelands (land, water, nutrients, and energy) are highly interconnected: changes in one component will affect the others. The capacity of rangelands to produce commodities and to satisfy societal needs on a sustained basis depends on internal, self-sustaining ecological processes such as soil genesis, water and nutrient cycling, energy flow, and the structure and functional dynamics of plant and animal communities. Humans depend on these natural processes and their capacity to regenerate and restore the ecosystem after natural and human-induced disturbances.

Rangeland species and ecosystems have developed unique strategies to cope with low and sporadic rainfall. They recover quickly or even positively benefit from prevailing disturbances such as fire, herbivore pressure, and drought. Plant species, for example, often have large below- ground root or tuber systems to store water and nutrients, or corky bark to insulate living cells from desiccation and fire. Pastoralist communities have engineered pastoral, hunter-gatherer, and farming systems that are adapted to these conditions and have sustained the livelihoods of inhabitants for centuries. They have acquired extensive knowledge of species, habitats, and key ecological processes in grazing lands, and they have developed efficient management skills for these systems (Rugadya 2005; Dubasso et al. 2012).

The Greater Horn of Africa region is home to a significant number of pastoralists whose livelihood system is based on production in the arid and semi-arid lands. These areas are characterized by low and erratic rainfall, high temperatures, and consequently, high evaporation rates. Across the region there have been tightening cycles and intensities of drought and flooding, and concomitant problems such as food insecurity, human and livestock diseases and other crises. These have challenged the human capacity to cope, eroded the livestock, natural resource and other asset bases and gradually diminished the capacities of pastoralist communities to rebound. These impacts are exacerbated by other pressures, such as loss of land, widespread and endemic resource-based conflict, poor infrastructure and service provision, and general marginalization (Helen Bushel, 2010). Governments in the region continue to hold that Pastoralism is unsustainable and a barrier to development (Naomi Kippur and Andrew Ridge well, 2010). However, pastoralist communities are often unable to harness the immense resources of their land due to internal and external pressures related to land tenure and use. This is because the policies that relate to the use and access of pastoral

land do not adequately promote pastoral rights (Pastoralist and Land, Land Tenure, Administration and Use in Pastoral Areas of Ethiopia, 2010).

Even if the pastoralists held majority of the land coverage of all cultivable land in the country in general and southern Ethiopia in particular, its productivity, utilization efficiency and effectiveness, total yield per hectare is still very low and so lower as compared to any other East African Countries level of productivity due to various reasons. Some of the major constraints that hindered range land use are: lack of appropriate management option, low attention given by government to the sector and lack of information on the sector, lack of best practices and utilization system adopted, social and environmental role of Pastoralist that stems from the lack of appropriately collected organized and assembled database, erratic rain fall, high temperature, lack of awareness, weak linkage between research institute, universities, nongovernmental organization, invasion by unwanted, dangerous, unpalatable and hardy plant species. Accordingly, South Omo Zone is one of the Zones in Southern Region which faces the same problem that are mentioned above. Therefore, in order to assess economic contribution of range land and its willingness to pay for rehabilitation in the study area and so as to forward scientific information for further research and development intervention and remedial policy measures to be taken, it is timely and indispensable to undertake research over contribution of range land for pastoralists is mandatory for the study area.

Objective of the study

General objective

To identify the economic contribution of rangeland and pastoralists/agro-pastoralists willingness to pay for rehabilitation in South Omo Zone, Southern Ethiopia

Specific objective of the study

- To identify the major economic contributions of rangelands for pastoralists and agro- pastoralists in the study area
- To identify the constraints faced by pastoralists and agro-pastoralists in the study areas
- To identify the willingness to pay for rangeland rehabilitation by pastoralists or agro- pastoralists in the study area

Methodology 2.1.Description of the study area

South Omo zone is one of the 14 administrative zones found in the Southern Nations, Nationalities, and People's Regional State in Ethiopia. It is located at 4° 27'- 6° 26' north and 34º 57'–37º 49' east bordering Gamogofa and Keffa zones; Konta and Besketo special districts to the north; Konso and Derashe special districts to the east; Borana zone to the southeast; Kenya to the south; Sudan to the southwest, and Bench Maji zone to the west. The total land area of the zone is 22,360.76 km^2 and lies at an altitude ranging from 380 to 3,300 m.a.s.l. (DAO, 2003).

The study was implemented in the major pastoralist and agro pastoralist areas of Dasenech and Bena Tsemay woredas in South Omo Zone of SNNPRS. Dasenech Woreda is found in South Omo Zone in SNNPRS and bordered by Kenya in the South, Salamago Woreda in the North and Hammer

Woreda in the East. Astronomically it is located at 5˚.14' N latitude, 36˚.4' E longitude and is 225 km from Jinka, the Capital city of South Omo Zone. Also, Bena-Tsemay is one of the woredas in South Omo Zone of the SNNPRS, Ethiopia. BenaTsemay woreda is bordered on the South by Hamer, on the West by Selamago, on the North by Bako Gazer and Malle, on the Northeast by the Dirashe woreda, on the East by the Konso woreda, and on the Southeast by the Oromia Region. The Weito River separates it from Konso woreda and Oromia Region. Western part of the Bena Tsemay woreda is included in the Mago National Park. The administrative center is Key Afer.

Data type and Source

This study employed both primary and secondary data. The primary data to determine the contribution of the rangelands to the pastoralists and agro-pastoralists were collected from household survey through structured questionnaire. Also, focus group discussion, Key Informant Interviews, and field observations were used as source of primary data. While secondary data were gathered from both published and un-published data sources. The major data categories collected in this study includes economic contribution of rangeland, management options and the major problems faced by pastoralists and agro-pastoralists.

Sampling techniques and sample size

The study used multistage sampling techniques; in the first stage, the study districts were selected purposively based on the practice of rangeland utilization by pastoralists and agro- pastoralists households. In the second stage, three kebeles from each District were selected purposively based on rangeland utilization practices. The third stage was about selection of sample respondents from each kebele proportional to the total number of households found in each kebele. In this stage the sample households were selected by simple random sampling. A total of 120 sample households were selected and interviewed during the household survey.

Data analysis

The primary data collected from the survey was analyzed by using both descriptive analysis and econometric analysis using SPSS software. The descriptive analysis was used to demographic and socio-economic characteristics of sample respondents. Where as, the econometric analysis was used to estimate the willingness to pay for rangeland rehabilitation and to identify the factors that influence the likelihood of the willingness to pay responses. For econometric analysis binary *logit model* was used. This model was used in order to explain the relationship between explanatory variables and dependent variable.

$$[(Y)] = \left(\frac{[(Y)]}{1-(Y)}\right) = + \quad \text{(1)}$$

The dependent variable Estimated was Willingness to pay for range land rehabilitation in the study area and Explanatory variables: WTP =f (age, Sex, Marital status, education level, economic status, Source of livelihood, Source of income, Type of housing Rangeland ownership and Source of water). Before estimation data diagnosis was made by using different data diagnosis techniques including

muliticoliniarity and normality of the data.

1. Results and Discussion

Demographic and Socio-economic Characteristics of Sample Respondents

In this study information on demographic and socio-economic characteristics was collected. The key variables examined in this section were household heads' sex, age, education level, marital status and family size. The result in table 1 indicates that 85.8% of sample households were male headed households. The remaining 14.2% of sample households were female headed households. In terms of marital status, 97.5% of sample households were married and only 2.5% of households were single. The educational background of the household heads is believed to be important feature that determines the readiness of household heads to accept new ideas and innovations. More educated farmers are expected to adopt new technologies to increase their range land productivity. The result in table 1 shows that 83.3% of the sample respondents were did not attend formal education, 2.5% able to read and write, 2.5% of the respondents attained first cycle education, while 8.3% were primary school. The remaining 2.5% and 0.8% of the sample respondents attained secondary education and certificate and above respectively.

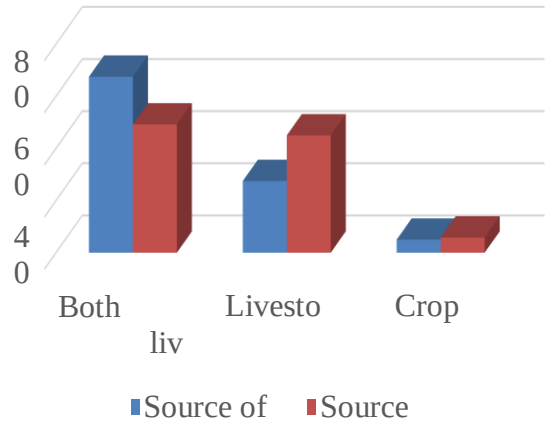
Table. 1 Socioeconomic characteristics of respondents

Variables		Respondents (N=120)	Percentage
Sex	Male	103	85.8
	Female	17	14.2
Educational level	Illiterate	100	83.3
	Able to read and write	3	2.5
	First cycle	3	2.5
	Primary school	10	8.3
	Secondary school	3	2.5
	Diploma and above	1	0.8
Marital Status	Married	117	97.5
	Single	3	2.5
Age of respondents	< 25	1	0.8
	25-35	46	39.2
	36-45	41	33.3
	46-55	27	22.5
	> 55	5	4.2
Family size	≤ 5	40	33.3
	5-10	56	46.7
	> 10	24	20.0
Economic status	Low	77	64.2
	Medium	37	30.8
	High	6	5.0

Source: Survey Data Result, 2010

As table 1 depicts, the age of sample respondents categorized in to five classes such as; age of respondents below 25 years, which accounts for less than 1% of the total respondents. Whereas; those with age between 25-35 years, 36-45 years and 46-55 years accounts for 39.2%, 33.3% and 22.5% respectively. Also, the age of respondents > 55 years accounts for 4.2% of the total respondents. According to table 1 33.3% of the respondents have family size of ≤ 5 and 46.7% were those having family size between 5-10, 20% of them have family size of > 10. The result in table 1 shows that respondents were classified in to three groups based on their economic status. These are Low level, Medium level and high level economic status. Based on the survey result 64.2% of sample respondents were categorized under low level economic status, 30.8% were under medium level and the rest 5% were under high level economic status.

Figure 1. The major source of livelihood and income for respondents



Livelihood and Income Source of Pastoralists and Agro-pastoralists

The livelihood system of the pastoralists' differs among the pastoralists themselves in the study area and also from one district to the other district in which the study was conducted. In the study area Pastoralists relay on gathering of fruits in their range lands, hunting of wild animals and livestock rearing. Where as, agro-pastoralists depends both on Livestock rearing and Crop production. The income sources for the two categories of community were from sale of livestock and their products, from sale of crops they produce and that of range land resources such as firewood (charcoal), honey production, medical plants, raw materials for agriculture, housing materials, home furniture and grazing in small scale.

Source: Survey Data Result, 2010

From figure 1 above about 67.5% of the sample respondents indicated that their livelihood depends on both livestock and crop production, 5% depends on crop production while the rest 27.5% of the sample respondents depends on livestock rearing. This shows that majority of the respondents depends on both crop and livestock production whereas a few proportion of the households the minority depends on crop production. While, their source of income was shown in figure 1 above indicated that, about 49.2% of the sample respondents get their income from both livestock, livestock products and crop, 45% from livestock and their product only where as 5.8% from crop sale only. It shows that the majorities of the sample respondents get income from both crop and livestock and their products, while few gets their

income from crop sale only.

The results from this study also shows that 83.3%, 8.3% and 8.3% of the sample respondents across the study area had permanent, semi-permanent and temporary type of houses respectively. The ownership status of grazing land of the respondents in the study area shows 93.3% have their own grazing land where as 6.7% haven't their own grazing lands and the graze on communal lands. The average holding of grazing land is 1.93 hectare and it varies between 0.12 and 8.0 hectares. From the total of 120 respondents about 63.3% were responded that over the past two decades indigenous plant species like "Woyira", "Wanza" and the others were disappeared and also the productivity of the range lands were reduced due to agricultural land expansion, overgrazing, declining rain fall, high run off due to the unwise use of rangeland resources.

Feed sources and Range Land Management

Natural pastures, woody plants and crop residues were the major feed sources for livestock in the study area. The availability of crop residues in the study area was low as straw from maize, sorghum and teff, which were often served as a fed mainly during the dry season. As most of the land was covered with woody vegetation, trees and shrubs they were important sources of livestock feed throughout the year. The pastoralists and agro-pastoralists face a critical feed shortage during long dry seasons. So strategies for coping with feed shortages in the study area include; move to new area, choice to cell animals, supplementation of crop residues and buy of feeds. Range land management practice was a recent practice, which was used to overcome the major constraints of pastoralists or agro pastoralists to enhance production and productivity. In table 2 ways of sustainable range land management and adoption to dry seasons are presented.

Table 2. Sustainable range land management and adaptation to dry seasons

Sustainable range land management options	Frequency (N=120)	percent
Manipulating stocking rate	34	28.3
Rotational grazing	81	67.5
Use of weed herbicides	1	0.8
Sowing of improved forage seeds (like lablab and rodes)	4	3.4
Sell animals	30	25
Move to new area	65	54.2
Buy feeds	25	20.8

Source own survey result, 2010, N= total number of respondents

Health and productive rangelands are vital to all users and uses. To enhance this introduction of appropriate measures to control rangelands within the natural limits will be crucial in halting the degradation of rangelands. In table 2 above, the results of the study shows that 67.5% of the sample

respondents use rotational grazing, while 28.3%, 3.4% and 0.8% uses manipulating the stocking rate, sowing of improved forage seeds species and weed herbicides respectively. Range land enclosures were also usually located around the homestead and farmlands, which were used mainly for dry season feeding of lactating cows, calves, draught oxen and weak and sick animals. Drought (i.e., shortage of rainfall), bush encroachment, poor productivity and lack of proper management of enclosures were considered major constraints to production. To react with this constraints bout 54.2% of the sample respondents were transhumance moving their livestock seasonally in order to exploit areas remote from their permanent settlement sites. 25% choice to sell animals, while 20.8% were used to buy feeds for their livestock. A type of cattle keeping system familiarized in the study area were, 63.3% of the respondents private type of cattle keeping system, 19.2% practice open access grazing, while 17.5% were communal type of livestock keeping system.

Sources of Water

The study shows that the majority of sources of water in the pastoral and agro pastoral rangeland areas were ponds and hand dug wells, natural, self and NGOs sources. However the majority of cattle keepers in the study area get water from government sources while natural source is the second, self-source is the third and NGOs is the last one as presented in table 3 below.

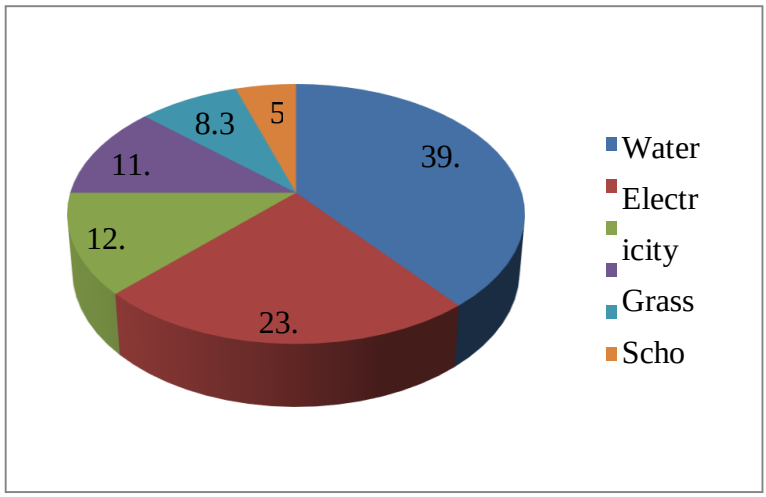
Table 3: Source of Water in the Study Area

Source of water	Frequency (N = 120)	Percentage
Government Source	47	39.2
Natural Source	40	33.3
Self-Source	21	17.5
NGOs Source	12	10.0

Source own survey result, 2010

The result shows that 39.2% was from government, 33.3% from natural source while 17.5% and 10% were from self and NGOs respectively. Government source takes the highest part, but still now it is not enough. So to improve the welfare of the people and increase livestock production government should have to invest more in provision of water in these areas. It is also very important that water harvesting technologies like water ponds and watershed management are developed and irrigation should be encouraged in districts like Dasenech in which one of the biggest rivers (Omo River) found. The respondents in the study area were asked to put their needs in the order of importance if the government was to provide them. The needs of the respondents were presented according to their importance in the figure 3 below.

Figure 3: Ranking of respondents needs



Source own survey result, 2010

The results of the study indicate that water is one of the most important inputs for livestock production and also one of the reasons why the pastoralists move from one place to the other place. According to this study 39.17% of the respondents ranked water as first, 23.33% electricity as second and the others 12.5%, 11.67%, 8.33% and 5% ranked grass, school, health center and others respectively.

Management and Utilization of rangeland and its resources

The development of good rangeland management and utilization in the private and communal rangelands provide the way of overcoming the open access grazing problems in communal rangelands and allows coordinated and flexible rangeland use and destocking rates. For rangeland users, regulatory policy might involve environment of destocking to allow rangeland to recover from excessive continuous grazing pressure. Practicing such kind of managements and utilization system is not considered in the study area due to lack of knowledge about effective utilization and management of rangelands. Therefore, training stakeholders and good extension service by government and NGOs in the principles of good rangeland management is needed.

Rangeland Use Conflict

The term conflict refers to ongoing disputes between various ethnic groups over the access to scarce rangeland resources in the study area. This dispute arises between Dasenech and Kenya around border of Turkana Lake, Hammer and Dasenech Worda's ethnic groups the other between Bena-Tsemay and Mago National park keepers, over the last two years the conflicts increased especially in the year 2009 due to the drought happen over the whole country especially in the pastoral and agro-pastoral of the country. This event occurs when the pastoralists or agro-pastoralists search for water, grass, and settlement.

Contribution of Rangelands

The concept of rangeland values underlies a Pastoralists way of life that adapts to marginal environments, characterized by climatic uncertainty and low-grade resources. It has considerable economic value and latent potential in the dry lands, and is central to the livelihoods and wellbeing of millions of the poor. However, the attention given to this sector of the economy is weak. The pastoral system is not simply a mode of livestock production, rather a complex system that needs adequate and careful protection. It is also a life for pastoralists or agro-pastoralists that support millions of mobile pastoralists globally. They are natural resource management systems that provide a wide range of services and products that are nationally

and globally valued, such as grazing, firewood (charcoal), honey, fruits, medicinal plants for many diseases, raw materials for agriculture and housing, gum and home furniture. These values of rangeland in the study area are depicted in table 4 below.

Table 4 Contribution of rangelands for pastoralists and agro-pastoralists in the study area

Rangeland Resources	**Initial cost (cost incurred)/ha**	**Estimate market value/ha**	**Net income/ha**
Firewood (charcoal in quintal)	919.90	8299.90	7580.00
Honey in kg	3579.98	26060.19	22480.21
Fruits in quintal	100.00	650.00	550.00
Medicinal plants in kg	502.00	3986.88	3488.88
Raw materials for agriculture in number	3349.94	11639.90	8289.69
Gum in kg	50.00	720.00	670.00
Home furniture in number	4005.00	30055.20	26050.20
Housing materials in number	8439.90	41474.04	33034.14
Grazing	486945.34	642720.72	155775.38

Source own survey result, 2010

Rangelands are the most extensive ecosystems globally, covering approximately 70 percent of the world surface area and providing many economic values to the pastoral community. As indicated in table 4 above the net income from firewood (charcoal) is 7580.00 ET/ha, that of honey is 22480.21 ET/ha and the others 550.00 ET/ha from fruits, 3488.88 ET/ha from medicinal plants 8289.69 ET/ha from raw materials for agriculture, 670.00 ET/ha from gum 26050.20 ET/ha from home furniture, 33034.14 ET/ha from housing materials and 155775.38 ET/ha from grazing respectively, which is the highest and the base for the livelihood of pastoralists and agro- pastoralists.

Willingness to pay for the rangeland improvement

To improve the rangeland status in the study areas, all respondents were asked if they were willing to pay when a program intended to rehabilitate the range land in the study areas. Grass was replanted and permanent trees were also planted in the area to provide shades for their animals. Improved forages were introduced, unwanted invasive and unpalatable plant species were cleared out from the rangeland, palatable and highly nutritious feeds (legume, browse or grass species) were over-sowed, permanent sources of water were constructed hypothetically, so that they were no longer need to move long distances to water their animals. However when these things were put in place, they need improvement works so that they last forever. To contribute this improvement program every person in the community were asked to contribute his/her labor force/ money per month/ year since this resource belongs to them.

Table 5. Willingness to pay of respondents for rangeland rehabilitation

Variables		Frequency	Percent
Willingness to pay	Yes	105	87.5
	No	15	12.5
Willingness to pay in terms of money	Cash	28	80.6
	Kind	7	19.4
Willingness to pay in terms of labor		70	66.4

Source own survey result, 2010

According to this study the results show that 87.5% of all respondents were willing to pay for improvement of rangeland. Among the respondents who are willing to pay for the improvement program about 66.4% were participate by contributing their labor, while 33.6% were participate by contributing money. Also from those who want to participate in money values about 80.6% were willing to pay the money in cash was as 19.4% were in kind. Table 5 below shows means of contribution and the amount of cash/labor they are willing to contribute. As indicated in the table 5 above the respondents of the two woredas responded that some of them would participate by contributing money while the others by labor. From those respondents who were willing to contribute money was from Ocholoch the minimum amount of birr is 20.00 ETB and the maximum of 60.00 ETB with an average of 25.25ETB, Nikiya minimum 5.00ETB and the maximum of 20.00ETB with an average of 10.12 ETB, Hado minimum 10.00 ETB and the maximum of 30.00 ETB with an average of 14.40 ETB, Sitinba minimum 10.00 ETB and the maximum of 25.00 ETB with an average of 13.90 ETB, Gurimamero minimum 20.00 ETB and the maximum of 100.00ETB with an average of 32.33ETB and that of Mukecha minimum 7.50 ETB and the maximum of 50.00 ETB with an average of 20.50 ETB. While for those respondents who were willing to contribute their labor from Ocholoch the minimum amount of labor day is 84 and the maximum is 300 with an average of 184.6, Nikiya minimum 150 and the maximum of 270 with an average of 162.9, Hado minimum 130 and the maximum of 260 with an average of 150.8, Sitinba minimum 18 and the maximum of 102 with an average of 52.3, Gurimamero minimum 24 and the maximum of 80 with an average of 48.6 and that of Mukecha minimum 48 and the maximum of 130 with an average of 74.2 labor days per year respectively for willingness to pay for rangeland rehabilitation.

Factors affecting willingness to pay for rangeland rehabilitation

Logit model *was* used to explain the relationship between explanatory variables and dependent variable. The explanatory variables include socio economic factors namely; sex, age, marital status, education, economic status, source livelihood, source of income, type of house owned by the household, range land ownership and livestock ownership. Table 7 presents the result of the binary logit model including coefficients of the variables, standard error, and P values of the model.

Table 6 the amount of money or labor/year the respondents are willing to contribute

Name of woreda	Name of kebele	N = 120	Amount of cash in ETB/year			Amount of labor/year		
			Min	Max	Mean	Min	Max	Mean
Dasenech Woreda	Ocholoch	20	20.00	60.00	25.25	84	300	184.6
	Nikiya	23	5.00	20.00	10.12	150	270	162.9
	Hado	17	10.00	30.00	14.40	130	260	150.8
Bena-Tsemay Woreda	Sitinba	16	10.00	25.00	13.90	18	102	52.3
	Gurimamero	19	20.00	100.00	32.33	24	80	48.6
	Mukecha	25	7.50	50.00	20.50	48	130	74.2

Source own survey result, 2010

Table 7: Likelihood estimates of the logit model for WTP (N=120 respondents)

Variables	Coefficients	Odds ratio EXP(B)	Std Err	P-value
Sex	4.996	147.79	2.958	0.091***
Age	0.222	1.248	0.123	0.072***
Marital status	17.107	2.689E7	1.975E4	0.999
Education level	1.182	3.260	2.618E4	1.000
Economic status	5.041	154.552	5.771E3	0.999
Source of livelihood	2.952	19.153	1.779	0.097***
Source of income	1.337	3.806	1.300	0.304
Type of house	-5.160	0.006	1.984	0.009*
Range land ownership	1.875	6.520	1.132	0.098***
Source of water	-4.392	0.012	12.402	0.723
Livestock owned	-1.716	0.180	0.747	0.022**

Log likelihood = 78.232 *, **, *** indicates the variables are significant at 1, 5 and 10 percent respectively.

Source own survey result, 2010

The result in table 7 shows that source of income, type of house owned, rangeland ownership and livestock ownership significantly affected willingness to pay for the rehabilitation of the rangelands in the study area and the variables are interpreted as follows. The sex of household head was significant at 10% significance level and positively related to willingness to pay for the improvement of rangelands in the study area. This implies that other things remain constant male households are more willing to pay for the improvement of the range land than female headed households. This might be due to lack of labor, cultural believes and low number of livestock owned. The variable age of the household was significant at 10% significance level and positively

related. This implies that other things remain the same, as age of the respondent increases by one year the probability to become willing to pay for range land improvement increases by a factor of 1.248. That is increasing in age is increases the chance of willingness to pay by for range land improvement program in the study area. The variable source of livelihood was significant at 10% significance level and positively related with willingness to pay for range land improvement in the study area. This implies that, other things remaining constant, those households whose livelihood depends on livestock rearing significantly affected willingness to pay for improvement of rangelands at 10% significant level. This means that those households whose livelihood depends on livestock rearing have more probability of willingness to pay for range land improvement by a factor of 19.153 than those households whose livelihood is based on other livelihood.

The variable type of house in the study area was significant at 1% significance level and negatively. This implies that other things remaining the same; the likely probability of those who move from place to place was decrease by a factor of 0.006 in the study area. Range land ownership was also significant at 10% significance level and affects willingness to pay positively. This means when other things remain the same, pastoralists or agro-pastoralist, who have rangeland are more willing to pay by a factor of 6.520 than those who haven't range land in the study area. The variable livestock owned also significant at 5% significance level and negatively affects the willingness to pay for range land improvement. This means when other things remain constant, the willingness to pay for range land improvement of those who have low number of livestock decreases by a factor of 0.180 than those who have high number of livestock in the area.

2. Conclusion and recommendations

Range lands in the study area provide diverse products with that have economic, social and environmental values. Nevertheless, the utilization of these resources from the rangelands remains as traditional. Due to this traditional rangeland using mechanisms the production and productivity of rangeland declining from time to time and their livestock are exposed to feed shortage risks. The pastoralists in the study area are mobile for the search of feed and water for their animals, so when they are searching they face many problems like conflict with in and out of the border, diseases and attack of their livestock by wild animals. The findings from this study show that the households from the study area are willing to pay for rehabilitation of the rangelands by contributing their labor as well as money and also willing to stand along with any organization, which wants to support them. The results from Logit model shows that age and source of water affects willingness to pay negatively, while rangeland ownership, level of education and economic status affect willingness to pay positively and significantly. In order to benefits from the huge economic, social and environmental values of rangelands, appropriate measures and support mechanism like proper rangelands use policy, rehabilitation of the pasture, water and

vegetation, avoiding unpalatable woods and improper uses must be in place to alleviate the real challenges that are threats to the very survival of Pastoralists. In order to maximize the livestock and rangelands productivity the culture and techniques of mobility should be promoted. The traditional institutions have been eroded due to many interventions including the modern system of administrative rules and structures. For sustainable Pastoralism, the positive aspects of traditional institutions and knowledge system need to be rehabilitated and be supported in a way they will be harmonious with the modern system of governance system and structures. To keep the sustainability of these rangeland resources and enhance the production and productivity of the livestock in the study area, management practices supported by research are crucial. Pastoral development policies and strategies (such as range resources management and development, development infrastructure and services provisions) should be based on a sound knowledge of the current and potential, quantified and skilled technicians.

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