UTILIZATION, ECOLOGICAL STATUS AND THE CONTRIBUTION OF BUOL WETLAND TO THE WELLBEING OF LOCAL COMMUNITY; THE CASE OF LARE DISTRICT OF GAMBELLA REGIONAL STATE SOUTH-WEST ETHIOPIA

[1] **Bol Puoch Deng** , [2] **Prem Kumar,** [3] **Abiyot Mamo Terfa**

Gambella University, Ethiopia, Corresponding author: bchuolp12@gmail.com

ABSTRACT

Wetlands are ecotone habitats, stretched between terrestrial and aquatic habitats, seasonally or permanently saturated with water (Ramsar 2015a). Hydric soil and anaerobic conditions result in specific vegetation which distinguishes wetlands from other aquatic and terrestrial ecosystems. However, these benefits and contributions are not well researched at specific localities and ecosystems and less promoted. The study aimed to assess the ecological status, the way of utilizing the wetland resource and the contribution of Buol wetland to the wellbeing of local community in Lare District Gambella Regional State, Ethiopia. The study was composed of both primary and secondary data. Where the Primary data was collected through household survey, focus group discussions and filed observations. The secondary data were collected by reviewing published documents relevance to this study. The collected data were analyzed using descriptive statistics and Chi-Square Test. Chi-Square Test was used to analyze the socioeconomic activities and their effects on wetland ecosystems and households' attitudes toward conservation and sustainable management of wetlands. The result indicated that socioeconomic activities had fitted to the Chi-Square model with the level of significant at p<0.01. The conservation scenarios of wetland resources fitted to the model, however, the households' attitudes on cultivation, grazing and fish stock is significant (p<0.01). Therefore, the study revealed that, wetlands are being degraded due to the different households' socioeconomic activities which are usually

exercised on wetlands. Poor management and unsustainable uses are the main factors for wetland degradation. Conservation mechanisms are essential in order to avoid the wetland degradation.

Keywords: Utilization, Ecological Status, Contribution, Wellbeing, Local community, Lare.

1. INTRODUCTION

Buol Wetland has economic, ecological, aesthetic, socio-cultural and religious values to the societies residing around the areas. It provide habitats for several species of wild animal and diversified fish species which existed through varying seasons in the year. Buol wetland seemed to be important ecosystems and utilized for the benefits of humankind. Crop cultivation, fishing, grazing of domestic animals and the collection of wetland products are basic activities performed by local people. Likewise collection of wild fruits such as wild rice, water lily, cow lily and the others are the important parameters that contribute significantly to the wellbeing of local community. Buol wetland also play great role especially by providing indirect services to the local community such as swimming and other aesthetics activities. However, adverse effects remark in many cases: many rural communities have poor knowledge on sustainable utilization and more often conflicts arise for the use of wetland resources. According to Utsala Shrestha (2016), wetlands are crucial for their rich biodiversity (32 species of mammals, 461 species of birds, 9 species of turtle, 20 species of snake and 28 species of fish- in Terai) and also for maintaining various sources of underground water, preventing lands slides and controlling the loss of nutrients. Religiously, lakes and rivers are important for many festivals such as the Chhat festival in the eastern and central Terai. Furthermore, people living near Koshi river system (Barahachetra), Narayani river system (Devghat) and Karnali River consider the Gangetic Dolphin as a deity and as reincarnation of god (IUCN, 2004). Since the sustainable utilization and the conservation of wetland resources depend on the degree of involvement of local communities, it is important to prioritize programs of bringing user groups together for conservation. Definitely, Buol wetland seem to be under threatened conditions, as the people residing around the wetland have been exploiting the wetland resources indiscriminately without considering its impact. The possible way of utilizing the wetlands in a sustainable way has become an extreme necessity to promote the community's welfare in terms of the resource use. In

some areas, local communities have already begun to replicate the conservation development program without any external help (Rijal, 2001). Importance of community role in wetland conservation programs should rely on understanding of livelihood resources and management of resources through their own skill and knowledge. Nevertheless, the conservation of wetland requires public support, appropriate government legislation and conventions as well as conservation programs.

1.1. Objectives of the Study

To assess the ecological status of the wetland

To ascertain the utilization practice that leads to the degradation of wetland and the way should be minimized

To assess the contribution of Buol wetland to the wellbeing of local community

3. MATERIALS AND METHODS

3.1. Description of the Study Area

The study was conducted in Lare district, which located in western part of the Gambella Regional State (Fig 1) to the border of South Sudan, and it has 80km away from Gambella town with an estimated area of 1765 square kilometers (Dereje, 2003). Gambella Regional State is located in south western part of Ethiopia at a distance of 769kms away from Addis Ababa the capital city of Ethiopia. The Region is bounded to the North, North East and East by Oromiya National Regional State, to the South and Southeast by the Southern Nations and Nationalities People's Regional State.
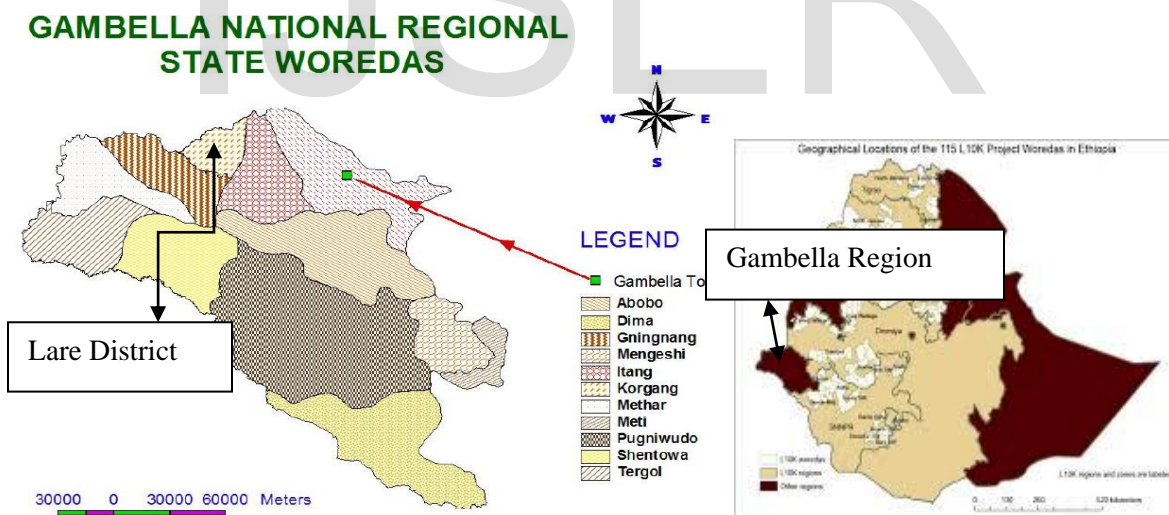

Figure 1.Ethiopia and Gambella Maps, adopted from Yilmaz (2008).

3.2. Methods

Study site selection: According to CSA (2007) Lare District has 27 administrative kebeles with total population of 58,218 and the total household number of 19,406. From the combined report by (LDAHB) Lare District Agricultural and Healthy Bureau (2015), the selected three

administrative kebeles involved in this study has total population of 2139, of which male are 1582 and female are 557. The study area is composed of selected wetland which is Buol Wetland. Buol Wetlands was selected purposely because; the socioeconomic activities of many people in the area are usually obtained from that wetland. Three administrative kebeles namely; (Pal-buol, Metduerkoang and Tandar) which allocated near to the Buol wetland were also selected purposely because the respondents of these kebeles have good knowledge about the wetland and their socioeconomic activities largely depend on that wetland.

Sources of Data: Both primary and secondary data were collected during the study. The primary data was collected from the households living adjacent to the Buol wetland. Household survey was conducted using semi structured questionnaire interview, and focus group discussion was also used to substantiate the data. Direct field observation was also used. The secondary data was collected by reviewing the published documents related to this study, the reports from Lare District Agriculture and Health Bureau.

Sample size determination: to select the household respondents from both male and female a stratified random sampling technique was used. In order to select the sample size of 138 from total household's population sizes of 2139 a Krejcie and Morgan, (1970) formula was used.

$S=X^2NP (1-P)/D^2 (N-1) +X^2P (1-P).$ Where,

S = required sample size.

X^2 = the table value of chi-square at 5% the desired confidence level (3.841).

N = the population size.

P = the population proportion (assumed to be 50% since this would provide the maximum Sample size).

D^2 = the degree of accuracy expressed as a proportion (0.05).

Therefore, to determine the sample size of each Kebele from total population sizes of three Kebeles, a Cothari, (2004) formula was used.

N. P/I   Where,

N = the required sample size and

P = the population size of each Kebele

I = the total population size of three Kebeles.

Therefore, the sample sizes of 138 households were selected from total household population of 2139 of three Kebeles (Table 1). Accordingly, Pal-buol has 48 from 740 households' population Metduerkoang has 47 from 734 households' population and Tandar has 43 sampled from 665 households' population sizes (Table 1). The sample sizes which drawn from the population size of three Kebeles were indicated by three strata of populations such as; N1 (strata 1), N2 (strata 2) and N3 (strata 3). Therefore,

- ❖ N1 (Palbuol) = 138*(740/2100) = 48,

- ❖ N2 (Metduerkoang) = 138*(734/2100) = 47,

- ❖ N3 (Tandar) = 138*(665/2100) = 43.

Table 1.Number of the respondents interviewed per Kebele

Name of the Kebele		N1, Palbuol	N2, Metduerkoang	N3, Tandar	Total
	Male	30	32	27	89
Sex	Female	18	15	16	49
	Total	48	47	43	
Sample Size		138 (740/2139)	138 (734/2139)	138 (665/2139)	138

3.2.1. Methods of Data Collection

Household Survey: the data on the household's parameters such as; age, sex, marital status, education and family size were collected. The ecological status, the ways of utilizing the wetland resources and the contribution of Buol wetland to the wellbeing of local community were collected through household interview, focus group discussion and field observations.

Focus group discussions: The study had conducted focus group discussions among the respondents of three Kebeles. Ten focus group discussions were carried out. Each focus group consisted of 10 members, and the total focus group discussions of the participants were summed up to be 100 respondents. It was also used as a tool to support the data from individual respondents.

Field Observations: Direct field observation by the researcher was conducted in order to clarify the information given by the respondents both individually and focus group discussions.

3.2.2. Methods of data analysis

The data collected through field observations, group discussion and semi-structured questionnaires were entered into excel and analyzed using "SPSS" (Statistical Package for Social Science Version 20. The descriptive statistics such as frequency, percentage and graph were used to describe the demographic characteristics and households' perceptions and their implications on the uses of wetland resources. The method also used to analyze the major benefits of wetlands and its contribution to the wellbeing of local community.

Chi-Square Test: Households' attitudes to the conservation and sustainable management of wetland resources, the socioeconomic activities and their effects on wetland ecosystem were analyzed using Chi-Square Test. This method of analysis was used to compare the significance of the two parameters such as "(agree or disagree)" on households' attitudes to the conservation and sustainable management of wetland resources. The study also used this methods of analysis to compare the significance between "Yes and No" from the respondents for if; "the Buol wetland has contribution to the wellbeing of local community or not.

4. RESULT AND DISCUSSION

4.1. General Information of Households

Age of Households: the age of respondents ranged from 25-50 and above 51-70, and 71-80 respectively, and the majority (44.20%) being the age of 25-50, (39.90%) are the age ranged from 51-70 followed by 15.90% respondents whom are ranged from 71-80 (Figure 2).
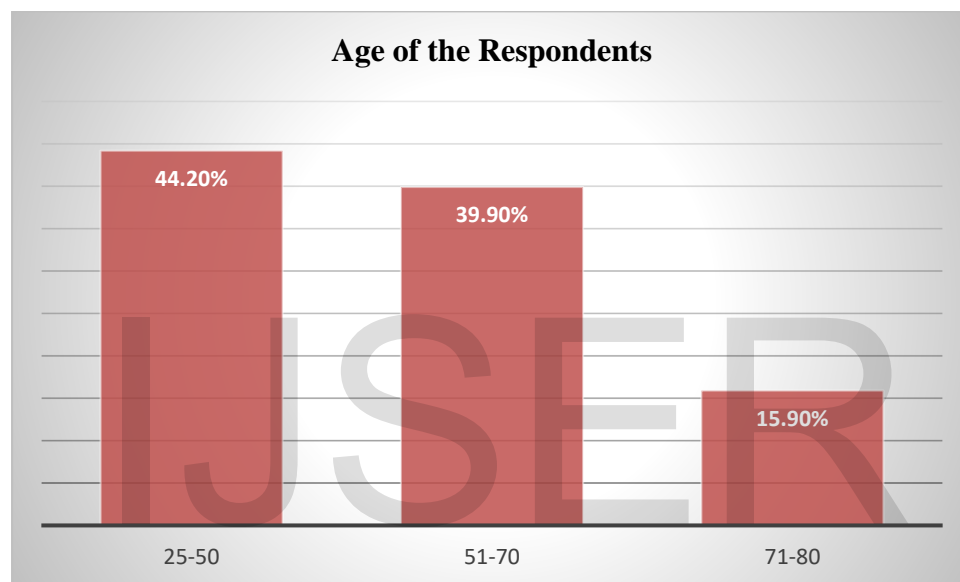

Figure 2. **Age of Households**

Sex of Households: Majority (64.50%) of the respondents were male, and (35.50%) were female who participated during the study (Figure 3)
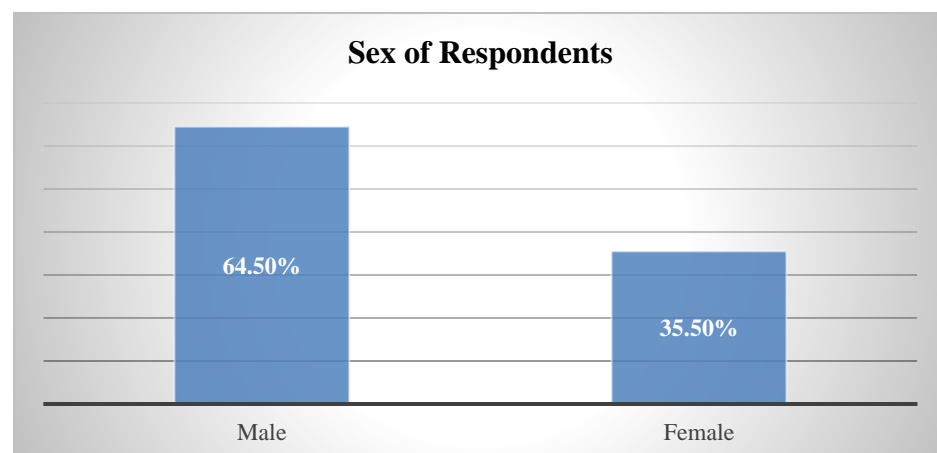
Figure 3.Sex of Households

Marital Status of Households: This study identified different marital status from the participants, and their effects on the uses of wetland resources. The result in (Figure 4) showed that, among the respondents 47.10% were married, 22.50% divorce, 19.50% widow, and 10.90% were unmarried.
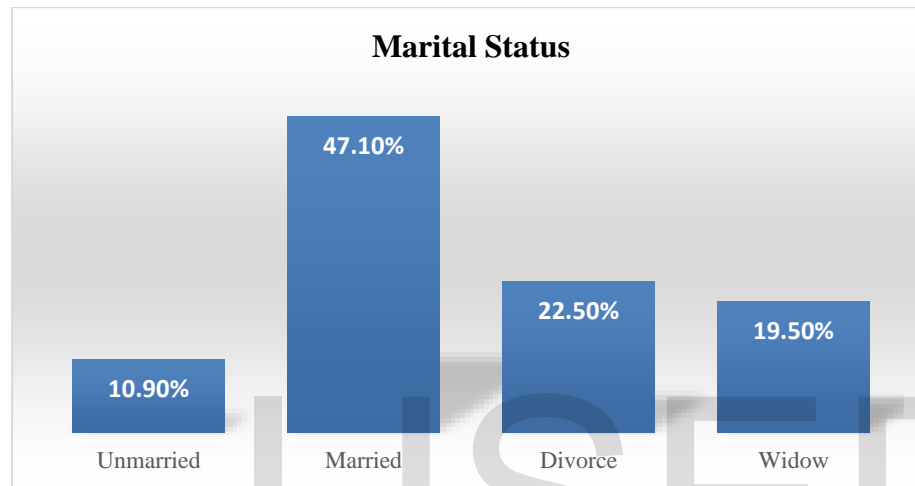
Figure 4.Marital Status of the Households

Educational Status of Households: Wetlands in the study areas are the most useful sources for various incomes supporting the different socio-economic activities of local people. The result indicated that, 42.00% of the households do not have formal education, while 23.90% in the level of primary school, 21.00% were junior students, 9.40% in secondary school, and 4% were in the college level (Figure 5).
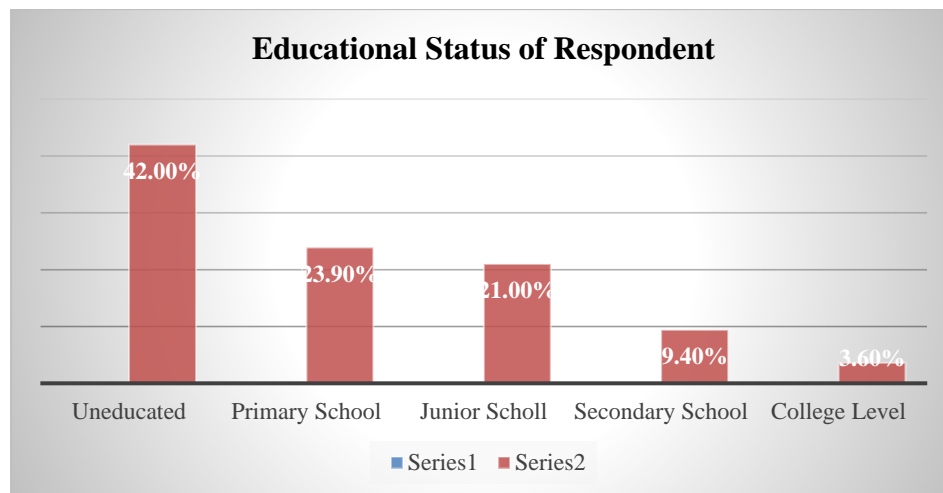
Educational Status of Respondent

Uneducated 42.00%
Primary School 23.90%
Junior Scholl 21.00%
Secondary School 9.40%
College Level 3.60%

■ Series1 ■ Series2

Figure 5.Educational Status

Family Size of Households: The study ranged the family sizes of respondents in to two groups; (from large size to small size). Large family size indicated by >5 members in one household, while small indicated by <5 members in one household. The result in (Figure 6) showed that, 61.60% respondents were from large family size followed by 3840% respondents whom came

Family Size of the Respondents

61.60%
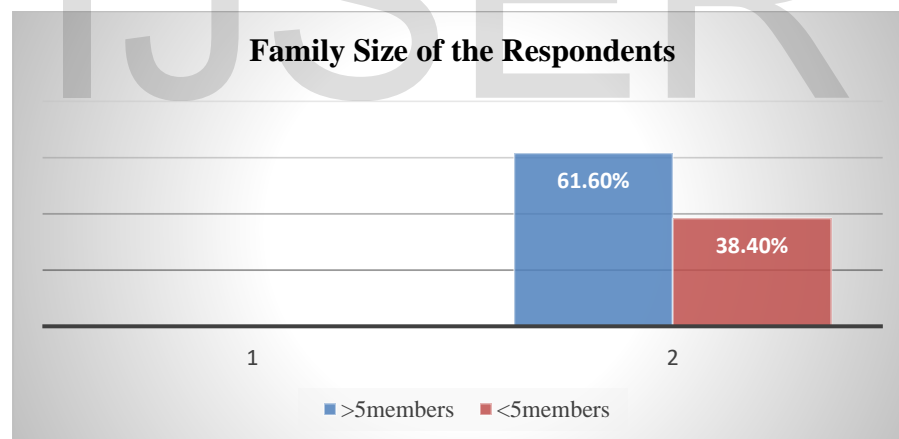38.40%

1   2

■ >5members ■ <5members

Figure 6.Households' family size

Occupation of Households

The households with different occupations have participated in this study. The result in (Figure 10) showed that, among the respondents majority (57.90%) were farmers, 25.40% were government workers and 16.60% were traders.
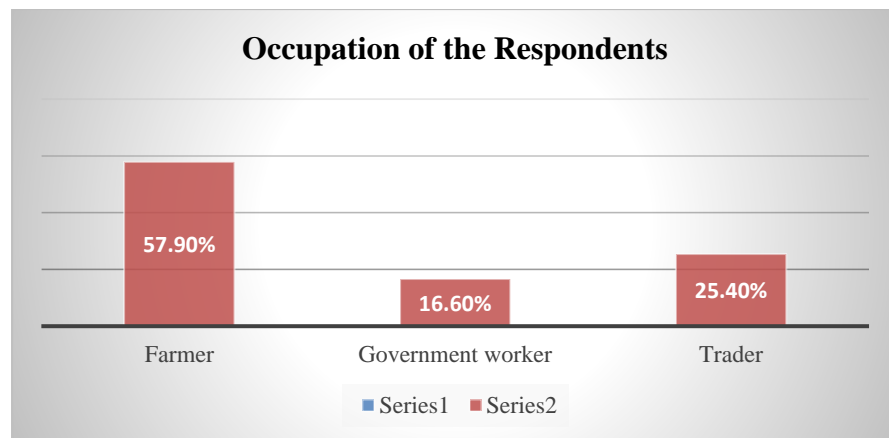
Occupation of the Respondents

57.90%   16.60%   25.40%

Farmer   Government worker   Trader

■ Series1 ■ Series2

Figure 7.Households' occupation

4.2. Benefits of Wetlands

The diverse benefits of wetlands and their rank based on the summation score of the corresponding numbers of values given by respondents is shown in the result (Table 2). Accordingly, cultivation land scored the first rank (R-1) with the highest value of (24), followed by drinking water that scored second rank (R-2) with value of (22), while grazing land scored the third rank (R-3) with value of (18), and fish to the fourth rank(R-4) with the score value of (14).

Table 2. Benefits of wetlands

Benefits	Respondents (N=7)							Score	Rank
	1	2	3	4	5	6	7		
Cultivation Land	4	4	2	4	3	4	3	24	
Drinking Water	3	4	2	4	3	2	4	22	
Grazing Land	2	4	3	2	2	3	4	18	
Fish Stock	4	2	1	1	1	3	2	14	

Note that; (4= Excellent, 3= Very good, 2= Good, 1= Satisfactory).

Direct field observation indicated that, wetlands are providing different types of benefits that offer different values to the local people. However, it provides a significance grazing land and drinking water for human and livestock, and other domestic purposes. Wetlands also provide cultivation land, fishing and wildlife which have essential role to the human survival.

Cultivated plants:

The result in (Table 3) showed the benefits of cultivated plants which obtained from different type of crops that people uses to cultivate around the wetlands. Among, 24.6% were maize, 20.8% sorghum, 19.8% bean, 19.1% pumpkin and 16.2% were sweet potato.

Table 3. Crop types cultivated commonly as described by informants'

Common name	Scientific name	Frequency	Percentage
Maize	*Zea mays*	34	24.6%
Sorghum	*Sorghum bicolor*	29	20.8%
Bean	*Glycine max*	27	19.8%
Pumpkin	*Cucurbita*	26	19.1%
Sweet potato	*Ipomoea batatas*	22	16.2%
Total		138	100.0%

The contribution of wetlands to the economic improvement of local people through crop cultivation becomes relevance. Many respondents (27) in the study area argued that, the cultivation land is the wetland benefit that's used by many people in the study area when comparing to the other wetland benefits.

Fishes: Result of this study indicated that, wetlands are important ground for fish production which in turn improves the well-being of local community. Different types of fish offered by wetland to the local community. Among the identified fishes 18.1% were tilapia, 16.2% carp fish, 15.4% cat fish, 14.7% Nile perch, 12.3% snakehead fish, 11.8% squeaker fish and 11.0% were lung fish(Table 4).

Table 4.Fishes types reported in the study are by respondents

Common name	Scientific name	Frequency	Percentage
Tilapia	*Oreochromis niloticus*	25	18.1%
Carp fish	*Cyprinus carpio*	22	16.2%
Cat fish	*Clarias gariepinus*	21	15.4%
Nile perch	*Lates niloticus*	20	14.7%
Snake head fish	*Channidae*	17	12.3%
Squeaker fish	*Synodontis eupterus*	16	11.8%
Lung fish	*Dipnoi*	15	11.0%
Total		138	100.0%

Residents in the study area have good interest on fishes, and explained that, fish play central role to the survival of local people especially when food is not enough.

Wild animals: Wetlands in the study area provide bundle of wild animal which also contributes significantly to the local households' livelihood. Some respondents mentioned their desire on wild animals, and however explained that, wetland provides diversify useful animals for rural households' consumption. Some wild animals that wetlands provided which local community uses to hunt, among these animals, 29.4% were White eared cob, 27.2% Nile lechwe, 22.1% Warthog and 21.3% Reedbuck (Table 5).

Table 5.Wild animals' as described by respondents

Common name	Scientific name	Frequency	Percentage
White eared cob	*Kobus kob*	41	29.7%
Nile lechwe	*Kobus megaceros*	38	27.2%
Warthog	*Phacochoerus africanus*	30	22.1%
Reedbuck	*Redunca*	29	21.3%
Total		138	100.0%

Birds: Buol wetland become habitat or place for many types of birds which reproduces or breed each other. However, some of them are not useful, while others are useful and essentially being used by local people. The useful birds that local people used to hunt around wetlands, among, 23.9% were Bald Eagle, 21.7% Muscovy duck, 20.6% Yellow bill stock, 17.6% Saddle bill stock while 16.9% were Marabou stock (Table 6).

Table 6.Birds as described by respondents

Common name	Scientific name	Frequency	Percentage
Bald Eagle	*Haliaeetus leucocephalus*	33	23.9%
Muscovy duck	*Cairina moschata*	30	21.7%
Yellow bill stock	*Mycteria ibis*	28	20.6%
Saddle bill stock	*Ephippiorhynchus senegalensis*	24	17.6%
Marabou stork	*Leptoptilos crumenifer*	23	16.9%
Total		138	100.0%

4.3. The Status of Buol Wetland

Many years back many people not only those from the mentioned three kebeles, but all kebeles residing around Buol wetland are benefiting from that wetland. However, their wellbeing are largely being improved from the benefits obtained from the wetland. According to the result indicated in (Table 9) the respondents have ranked the three scenarios that implied the status of

wetland. Therefore, it seem that the level of Buol wetland is decreased gradually throughout these all years. The reduction of the level of Buol wetland is caused due to the different activities played by the rural households. Among these activities; are over grazing, over fishing and over cultivation. Fish stock is decreasing at alarming rate due to over fishing by local community. The number of wild animals that were existed around the Buol wetland is declined at higher speed due to over hunting.

Table 7.Table 9. Buol wetland Status

Parameters of wetland status	Respondents (N=7)							Score	Rank
	1	2	3	4	5	6	7		
Decreasing	4	4	2	4	3	4	3	24	1
Increasing	3	4	2	4	3	2	4	22	2
Constant	2	4	3	2	2	3	4	20	3

4.4. Contribution of Buol Wetlands to the wellbeing of local community

Rural households in Lare District practices diversify socioeconomic activities on Buol wetland which in turn contributing to the subsistence of local community. The result on the contribution of Buol wetland to the wellbeing of local community is fitted to the parameters that show the roles played by wetland resources to the livelihood of local population. The result in (Table 10) showed that, the parameters of five households' socioeconomic activities on wetlands significantly at $p \leq 0.01$ except the parameter of recreation at $p < 0.06$. This revealed that, there is no significance difference on crop production, livestock production, fish production, water as well as wildlife and bird hunting, while the result shows the significances difference on recreation. Wetlands provide diverse benefits that have significant contribution to the improvement of households' wellbeing.

The result in this study indicated that, wetlands have significance contribution to the socioeconomic activities of local people which serves the life of many families. In other hand, the parameter of recreation shows insignificance level which means it has no more contribution to the improvement of rural households' economics.

Table 8.Households' socioeconomic activities on wetlands as described by respondents

Socioeconomic Activities on Wetlands	Chi-Square	df	Sig.	99% Confidence Interval	
				Lower Bound	Upper Bound
Crop production	5.684	1	0.03	.026	.034
Livestock production	5.000	1	0.05	.046	.058
Fish production	7.500	1	0.01	.009	.015
Water	10.333	1	0.00	.001	.004
Wildlife and bird hunting	8.795	1	0.00	.003	.007
Recreation	3.815	1	0.06	.059	.072

4.5. Effects of Socioeconomic Activities on Wetland Ecosystem

The study assessed the effects caused by different socioeconomic activities on wetland ecosystems. The effects of households' socioeconomic activities significantly affect the well function of wetland ecosystems. Respondents in the study area ranked the parameters of socioeconomic activities based on the degree of effect on wetland ecosystem accordingly. However, the result in (Table 11) showed that, over cultivation scored first rank with the highest value of 23, over grazing to the second rank with value of 19, over fishing to the third rank with value of 17, over uses of water to the fourth rank with value of 15, hunting of wildlife and birds, to the fifth rank with value of 14, while recreation to the sixth rank with value of 12. The degree of effect on wetland ecosystems is determined by the uses of these households' socioeconomic activities in and around the wetlands.

Table 9.Effects of households' socioeconomic activities on wetland ecosystems

Socioeconomic effect on wetlands	Respondents (N=8)							Score	Rank
	1	**2**	**3**	**4**	**5**	**6**	**7**		
Over cultivation	3	4	2	3	4	3	4	**23**	**1**
Over grazing	2	3	2	2	3	2	4	**19**	**2**
Over fishing	4	1	2	4	2	1	3	**17**	**3**
Over uses of water	3	2	2	3	1	2	2	**15**	**4**
Hunting birds and wildlife	2	2	1	2	2	3	2	**14**	**5**
Recreation	3	1	2	3	1	1	1	**12**	**6**

Note that; 4= Excellent, 3= Very good, 2= Good, 1= Satisfactory.

4.6. Households' attitude to the conservation and sustainable management of Buol wetland

The result of household's attitude to the sustainable management has fitted to the model to show the significant level at $p \leq 0.01$ on three wetland resources conservation scenarios(Table 10) . The

study categorized the conservation activities of wetland resources management as; agree and disagree and allowed respondents to choose best alternative scenario by rating "agree or disagree" from the prepared choices of wetland resources. The result in (Table 12) showed that, the farmers have significant attitude on three parameters of wetland conservation scenarios such as; cultivation lands, grazing lands and fish stock.

Table 12. Conservation and sustainable management Scenarios

Conservation Scenarios	Chi-Square	df	Sig.	99% Confidence Interval	
				Lower Bound	Upper Bound
Cultivation lands	6.943	1	0.01	.012	.019
Grazing lands	19.250	1	0.00	.000	.000
Fish Stock	36.837	1	0.00	.432	.458

The result showed the significance agreement among the respondents on sustainable management of three wetland resources conservation scenarios to be effectively managed. This indicated that, rural households have positive attitudes toward sustainable management of cultivation lands, grazing lands and fish stock. The willingness of respondents to choose among the choice sets determined by the function and value contributions of wetland resources conservation scenarios which vary considerably due to the characteristics of resources and the attitudes of respondents toward these resources. Pramod et.al (2015) reported that, approximately 64% of rural households agreed on sustainable management of wetland resources and arguing that, compared to the past, wetland resources at the time of our study fulfilled the family food and monetary demand.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

Buol wetland has significant contribution to the improvement of the wellbeing of the local people residing adjacent around the wetland area. The households from adjoining of Buol wetland depend on these wetlands for either their own consumption for food or other economic and social benefits. The study identified that, Buol wetland provides non-cultivated plants which are useful for human consumption. Among these plants wild rice, broadleaf arrow head and water lilies were played significant role on the wellbeing improvement of rural people. Some of medicinal plants such as *Asparagus africanus*, *Achyranthus aspera* and *Celosia trigyna* were also founded as useful to local community. These plants have important function especially during some specific treatment for local society. There was great recognition from local society that, Buol wetland is facing disturbance due to the different socioeconomic activities exercised by the people. The effects of different socioeconomic activities seemed to be high on cultivation land, grazing land and fish stock. However, cultivated lands get degraded due to over cultivation, vegetation level reduced due to over grazing and fish stocks decline due to over exploitation of fish from the wetland. The perception of local people adjacent to wetland toward wetland utilization is found to think that wetlands are open excess resource. This became a challenge to sustainable uses of wetlands. Lack of other income sources for household consumptions that can also acts as substitution or reserve for wetlands, leading the local society to intensify the use of wetland resources which in turn causes the gradual decline of wetland resources. In connection to the conservation and sustainable management of wetland resources, there was more or less positive attitude from respondents toward conservation of some specific wetland resources. However, households show their agreement on cultivation lands, grazing lands and fish stocks to be conserved and sustainably managed. The side information during the study showed the

collaboration gap between local people and the government for the conservation of wetlands. Lack of supports from the government for wetland resources conservations such as; financial support, technical and human resources are also other problems for the failure of wetland conservation and sustainable use of the ecosystem.

Recommendation

Based on the identified effects due to the households' socioeconomic activities that continuously affecting the function of wetlands as the result of over utilization, the study recommended the following for the possible conservation and sustainable use of wetland resources:

Based on the relationship between number of livestock and wetland degradation due to the over grazing, the study recommended that, the livestock sectors have to shift their emphasis from quantity (more number of livestock) to more quality of cattle (producing fewer number of cattle with improved qualities) thereby minimizing wetland impact caused by overgrazing. Traditional knowledge which interlinked with spiritual beliefs on wetlands should be maintained and possibly recognized thereby reducing over use of wetlands that resulted to the wetland degradations. Due to the lack of formal education of farmers and lack of knowledge about sustainable uses of wetlands, the study recommended the possible trainings that should be given to the farmers for the effective uses of wetland resources. The study recommended training for sustainable management to all rural households in order to know how to use these wetland resources wisely without being depleted in short time. For wetland conservation and sustainable management program to be implemented, a full support from the government and collaboration between government and local people is needed. Sustainable management and conservation of wetlands need full engagement from all stake holders, local community and government. Therefore, to ensure the future of wetlands and to sustain the benefits they provide to local communities, it is important to put the people at the center of thinking about the sustainable management of the degraded wetlands resources. The improvement of the livelihoods of poor people should be the central goal of policies and practice in Lare District by implementing the sustainable management of existing wetland resources. These local people should be included in all decision-making processes from all levels (local to regional level) with sufficient national support. Therefore, it's advisable to introduce sustainable management of wetland resources to

the local community living adjacent to the wetlands as the most option to restore the degraded wetlands.

REFERENCE

Achigan Darko, 2009. Useful Tropical Plants: Traditional Vegetables in Benin.

Adamus M, 2001. Impacts on Wetland-associated Species from Exotic Fish: the effects of invading species on native fish communities: Wetlands in Washington State Chapter 4 Volume 1 – A Synthesis of the Science.

Afework H, 2000. Nature, Extent and Trends in Wetland Drainage and Use in Illubabora Zone, Southwest Ethiopia, Mettu, Illubaora.

Annie E, 2013. The World Family Map: Institute of Marriage and Family Canada.

Barbier E, 1996. Economic Valuation of Wetlands: A Guide for Policy Makers and Planners. Ramsar Convention Bureau, Gland, Switzerland.

BFAW, 2015. (Basic Fact about the Wetlands). Understand the threats facing our treasured wildlife and what defenders are doing to help.

Birol E, Karousakis K, Koundouri P, 2005. Using a choice experiment to account for preference heterogeneity in wetland attributes the case of Cheimaditida wetland in Greece. Cambridge University press

Bohlen, 2002. Influence of cattle grazing and use on fresh water wetlands in range land ecosystem.

Brummett R, 2008. Role of Aquaculture in increasing water productivity. Challenge Program on Water and Food – Aquatic Ecosystems and Fisheries Review Series 4. World Fish Center, Cairo, Egypt.

Costanza R, Farber S, Maxwell J, 1997. Valuation and management of wetland ecosystems. Ecological Economics, 1:335361.

Cowardin P, 1979. The National Wetlands Inventory, a comprehensive wetland mapping program. Fish and Wildlife Service report "Classification of Wetlands and Deepwater Habitats in the United States.

CSA, 2007: Central Statistic Agency of Ethiopia

Claridge G, 1997. Community Involvement in Wetland Management: Lessons from the Field. Incorporating the Proceedings of Workshop 3: Wetlands, Local People and Development, of the International Conference on Wetlands and Development held In Kuala Lumpur, Malaysia, 9-13 October 1995. Wetlands International, Kuala Lumpur.

CWC, 2010. The importance of wetlands, a news from the Colombia water Center.

Dahl, R, 1990. Impacts from Changing the Physical Structure within a Wetland: Disturbances that directly change the structure of wetlands.

Davidson Nick, D Cruz, Rebecca, Finlayson, C Max,(2005).Ecosystems and human wellbeing:wetlands and water synthesis:

Davis J, 1993. Wetland Benefits. The Potential for Wetlands to Support and Maintain Development. Asian Wetland Bureau Publication No.87; IWRB Special Publication No. 27; Wetlands for the Americas Publication No.11.

DEPSFG, 2011. Department of Environmental Protection State of Florida Glossary. Retrieved 2011-09-25.

Dereje F, 2003. The experience of Gambella Regional state' in ethnic federalism' ' the Ethiopia experience in comparative perspective.

Deribe S, 2008. Wetlands and management aspects in Ethiopia: Situation analysis. Proceedings of the national stakeholders' workshop on creating national commitment for wetland policy and strategy development in Ethiopia. Ethio-Wetlands and Natural Resources Association (EWNRA). Addis Ababa, Ethiopia. pp. 14-25.

Emerton L and Bos E, 2004. Value. Counting Ecosystems as an Economic Part of Water: Infrastructure. IUCN, Gland, Switzerland and Cambridge, UK. 88 pp.

Emerton L and F Vorhies, 1998. Wetland Services- Getting Customers to Pay. Paper for the Workshop on Mechanisms for Financing Wise Use of Wetlands. 2nd International Conference on Wetlands and Development. Dakar, Senegal.

EPA (Environmental Protection Authority) (2004). Proceeding of the national workshop on The Ramsar Convention and Ethiopia, Addis Ababa, unpublished, 130 pp

Ewel K, 1990. Multiple demands on wetlands: Florida cypress swamps can serve as a case Study. Bioscience 40:660-666.

FAO, 1984. Assistance to land use planning, Ethiopia: Geomorphologic and soils, Addis Ababa.

FAO, 2010.Fishery and Aquaculture Statistics, Food and Agriculture Organization (FAO) of the United Nations, Rome, Italy.

FAO, 2011. The state of the world's land and water resources for food and agriculture: managing systems at risk. Rome.www.fao.org/nr/solaw/en.

Filtersfast, 2005-2011. All right of wetlands must be reserved.

Finlayson C, 1999. Global review of wetland resources and priorities for wetland. Inventory. Wetlands International, the Netherlands.

Fow Lakis Polycarpoul,2010;The importance of wetlands, a news from the Colombia water Center.

Fraser, L; Keddy, PA, 2005. (Ist ed.). The world largest wetlands: Their ecology and conservation.

Friis I, 1992. Forest and Forest tree of Northeast tropical Africa: Their natural habitat and distribution patterns in Ethiopia, Djibouti and Somalia Her Majasty's stationary Office. London.

Hagos G Temesgen G, Abraham M, 2014.Wetland degradation in Ethiopia: causes, consequences and remedies. J.Environ. Earth Sci.4 (11):40-48.

Hailemariam B, 2011. Gambella National Regional State Woredas: Action Plan Of Adaptation To Climatic Change.

Hancock J, 2012. (3rd ed). Plant evolution and the origin of crop species. CABI. p. 119. ISBN1-84593-801-1.

Hermanova H, 1999. Ageing populations in rural areas. pp. 192-197 in Ageing and Health: a Global Challenge for the Twenty-First Century. Proceedings of a WHO Symposium Kobe, Japan, Centre f. H. D. compiled by World Health Organization WHO. Kobe, Japan: World Health Organization.

Hogan R, 2010. Wetlands vegetation prevents waterway siltation and eradicates the Poverty

IWMI, 2014-2015 (International Water Management Institute).Wetlands and people Colombo, Sri Lanka:

Job Monkey, 2014 – Aquaculture consulting fish farm wholesale.

John Gorton, 2016. Wetlands and Indigenous values.

John M, 2003. Human Impact on Wetland Ecosystems and its Implications on the Environment: A Case Study of Kisii District, Keny

J Paruelo, 1997. "The value of the world's ecosystem services and natural capital." Nature 387:253-260.

JWAHB, 2015. (Jekow Woreda Agriculture and Health Bureau). Report on the Household number.

Kabahenda M, Omony P, Hüsken, S, 2009. Post-harvest handling of low-value fish products and threats to nutritional quality: a review of practices in the Lake Victoria region.

Kangalawe R and Liwenga E, 2005. The dynamics of farming systems, food security and poverty alleviation strategies in the semiarid areas of Sukumaland, Tanzania. IRA Research Reports.

Kaggwa R, Hagon R, Hall B, 2009. Enhancing Wetlands' Contribution to Growth, Employment and Prosperity.

Kassahun M, Debele H, Endalkachew K, 2013.Socio-economic Impacts of Wetland cultivation in South. Bensh, Southwest Ethiopia.

K. Simpson and N. Day; 1993. Field Guide to the Birds of Australia, A book of Identification

Lehner B, 2004. Development and validation of a global database of lakes, reservoirs and wetlands. Journal of Hydrology 296(1-4): 1-22.

Mahendra B, 2015.Conservation Issues and Utilization of Wetlands in Nepal.

Majule A and Mwalyosi R, 2003. Enhancing agricultural productivity through sustainable irrigation. A case of Vinyungu farming system in selected zones of Iringa. Research Report Submitted to ENRECA, University of Dares Salaam.

Maltby E, 1992. The global Status of Peatlands and their Role in Carbon Cycling. A Report for Friends of the Earth by the Wetlands Ecosystems Research Group,Department of geography, University of Exeter. Friends of the Earth, London

Mapedza E, 2012. Narratives from a wetland: Sustainable management in Lukanga, Zambia. Development Southern Africa 29(3): 379-390.

Marc N, 2015. Association pourla Conservation de la Nature au Rwanda (Birdlife Partner in Rwanda).

McCarty J & Shrum L, 1997. Measuring the importance of positive constructs: A test of alternative rating procedures. Marketing Letters, 8(2), 239–250.

MDINA, 2015. Mediterranean Institute for Nature and Anthropos; Culture and Wetlands

MEDAc, 1997. Environment policy of Ethiopia. Addis Ababa, Ethiopia.

Mesfin D, 2003. Wetlands policy development in Ethiopia.In:AbebeYD, Geheb K(eds) Wetlands of Ethiopia: Proceedings of a seminar on the resources and status of Ethiopia's wetlands. International Union for Conservation of Nature and Natural Resources.pp.81-85.

Mitsch J and G. Gosselink (3rd ed), 1993. Wetlands New York: Van No strand Reinhold.

Mohr P (2nd ed), 1971. The Geology of Ethiopia: University College of Addis Ababa press, Addis Ababa.

Newman, 1991. Impacts on Plants from Changing the Physical Structure in a Wetland.

NMSA (National Meteorological Service Agency), 1996.Climate and Agro climatic resources of Ethiopia. Meteorological research report.series.1 (1):1-137.

Nobel House, 2005. Department for Environment, Food and Rural Affairs.

NSW, 2013. New South Wale.

Obee, Bruce and Graeme Ellis (1992). Elaine Jones, ed. Guardians of the Whales: The Quest to Study Whales in the Wild. North Vancouver, British Columbia: Whitecap Books

Oosterberg, W. 2002. The Socio-economics of Wetlands, Wetlands International and RIZA, The Netherlands.

Paul A, 2010. (2nd ed). Wetland ecology: principles and conservation New York:Cambrdge University.

Peter KL, 1991.A Guide to Freshwater Life in Singapore", BP and Singapore Science Center

Pramod Lamsal, Krishna Prasad Pant, Lalit Kumar and Kishor Atreya, 2015. Sustainable livelihoods through conservation of wetland resources: a case of economic benefits from Ghodaghodi Lake, western Nepal.

P van Beukering, 2002. Institute for Environmental Studies (IVM), Free University Amsterdam.

Ramachandra T, Alakanada N, Rani A Khan M, 2011. Ecological and socio-economic assessment of varthur wetland,   Bengaluru (India). Journal of Environmental Science & Technology, 53(1), 101- 108. Riegels.

R. Cothari, 2004. (2nd ed). Research Methodology: Methods and Techniques: New Age International (P) Ltd., Publishers. Commerce University of Rajasthan, jaipur (India).

Richard Coe, 2001. Analyzing Ranking and Rating Data from Participatory On- Farm Trials.

Richard D. Gregory, David W. Gibbons, and Paul F. Donald, 2004. Bird census and survey techniques

R Krijcie and D Morgan, 1970. Determining Sample Size for Research Activities: University of Minnesota Duluth: Educational and Psychological Measurement. 30.607-610.

RCV, 2011.(Ramsar Convention and Vision). Retrieved 2011-09-25

RCESBF,2011 .Ramsar Convention Ecosystem Services Benefit Factsheets.

RCV, 2013. (Ramsar Conventional and Visions): An intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

Siribuit Y, Ngamsomsuke K and Limnirnkul B, 2008. Socio-Economic Conditions Affecting Small Farmers` Management of Wetland Agro-Biodiversity in Dongsan Village, Akat Amnuai District, Sakon Nakhon Province, Thailand.

Rodger S, 2012. Impacts Of Construction On Wetlands In Bungoma Town.

Solomon M, 2004.Socio-economic Determinants of Wetland Cultivation in Kemise, Illubabora ZoneSouthwesternEthiopia.EasternAfr.Soc.Sci.Res.Rev.20 (1):93-114.SVAD, 2003 :(State of Vermont Agencies & Depts).Access Government24/7About Vermont.Gov Privacy Policy A Vermont Government Website Copyright State of Vermont-All rights reserved.

Super D, 1957. The psychology of careers. New York: Harper & Row.

Svotwa E and P Makombe, 2007. Sustainable Use of Wetlands: A Case for Mwaonazvawo Village in Mutasa District of Manica land Province of Zimbabwe

Thokozani S, 2009.Small Scale Farming on Wetland Resources Utilization: Acase study of Mandlaszini.Rechards bay

Tiner and Burke, 1995. For U.S. Fish & Wildlife Service and Maryland Department of the Environment

Torrissen O, 2011. Atlantic Salmon (Salmo Salar): The 'Super-Chicken' Of The Sea? Reviews In Fisheries Science 19.3: 257-278. Academic Search Premier.Web. 13 Nov. 2014.

USEPA, 2011.United States Environmental Protection Agency. Wetland Ecosystems.

USEPA, 1995-2012. (United State Environmental Protection Agency): America's wetlands: Our vital link between land and water. Office of Water, Office of Wetlands. Oceans and Watersheds. EPA843-K-95-001.

USACEFA, 2014. (United State Army Corps of Engineers and the Federal Agency): Classification of Wetlands and Deepwater Habitats of the United States.

Utsala Shrestha (2016)Community Participation in Wetland Conservation in Nepal Utsala Shrestha 2016);

Van Wart, 1948. The Indians of the Maritime Provinces, "Their Diseases and Native Curses", in the Canadian Medical Association Journal, Vol.59, 1948.

WIA, 2012 (Wetland International Africa): Water supply and sanitation agency.

Wiktor A, Jordan L, Joffre S, 1998.   Introduction to Attribute-Based Stated Choice Methods

William J and James Gosselink, 2000. The Values of Wetlands: Landscapes And Institutional Perspectives: The value of wetlands: importance of scale and landscape setting.

William J, James G, and Gosselink, 2007. Wetlands (4th ed.). New York:

WWF,2016. World Wide Fund; The Value of Wetlands.

Yanda P, Majule A, Mwakaje A. 2008.Wetland Utilization, Poverty Alleviation and Environmental Conservation in Semi rid Areas of Tanzania – The case of Singida Region.

Yilmaz S, 2008. Local Government Discretion and Accountability in Ethiopia (PDF), Working Paper 08-38. International Studies Program. Andrew Young School of Policy Studies, Georgia State University. Pp. 2-5. Retrieved 22 June 2013.

APPENDIX -1.

General Information of Households

Name of the Household_____

Age _____

Sex_____

Marital Status_____

Educational Status_____

Family Size_____

Sources of Wealth_____

Wealth Status_____

Occupation_____

<u>APPENDIX-II.</u>

Major Benefits of Wetland

What are the major Benefits produced by wetland to the local community?

      (a). Cultivated land, (b). Drinking water, (c). Grazing land, (d). Fish

What types of crop cultivated by local community around the wetland?

      (a). Maize, (b). Sorghum, (c). Bean, (d). Pumpkin, (e). Sweet potato

What types of fish available in the wetland?

(a). Tilapia, (b). Carp fish, (c). Cat fish, (d). Nile perch, (e). Snake head fish, (f), Squeaker fish

(g). Lung fish

What are the wild animals available around the wetlands?

(a). White eared cob, (b). Nileshwe, (c). Warthog, (d). Reedbuck

What types of bird available around the wetland?

(a). Muscovy duck, (b). Bald eagle, (c). Yellow bill stock, (d). Saddle bill stock

(e). Marabou stock

What are the Non-cultivated Plants?

(a). Wildrice, (b). Broadleaf Arrow head, (c). Water Lilies

What are the Medicinal Plants pound around the wetlands?

(a). Asparagus Fern, (b). Brickly Chaff Flower, (c). Silver Spinach

What are the social Benefits of wetlands?

(a). Buk, (b). Deng, (c). Biel

APPENDIX-III. CONTRIBUTION OF WETLANDS TO THE HOUSEHOLD LIVELIHOOD

What are the socio-economic activities of rural households on wetlands?

(a). Crop production, (b). Livestock production, (c). Fish production, (d) Water, (e). Recreation

(f) Wildlife and Bird Hunting

APPENDIX IV. EFFECT OF SOCIO-ECONOMIC ACTIVITIES

What are the economic activities that bring the negative effects on wetlands?

(a). Over cultivation, (b). Over grazing, (c). Over fishing, (d). Over uses of Water, (e) recreation

(f). Hunting bird and wildlife

APPENDIX V. HOUSEHOLDS' ATTITUDE TO THE CONSERVATION AND SUSTAINABLE MANAGEMENT OF WETLAND

Scenarios for wetland resource conservation and sustainable management

(a). Cultivation land, (b). Grazing land, (c). Fish stock