CHALLENGES AND OPPORTUNITIES OF WETLAND CONSERVATION: THE CASE OF MENDIFFA WET LAND MISRAK SILTI WOREDA, IN SILTE ZONE, SNNPRS ETHIOPIA

MA THESIS

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Advisor Approval Sheet

This is to certify that the thesis entitled challenges and opportunities of wetland conservation in the case of Mendiffa wetland misrak silte woreda, in silte zone, Submitted for the requirements for the degree of master's with specialization in Development Planning & Management the graduate program of development studies and has been carried out by Yirdaw Ali with I.D No. SSHGR /017/13, under our supervision. Therefore, we recommend that the student has fulfilled the requirements and hence here by can submit the thesis to the department.

Name of major Advisor Signature

Tamru Berafe (Assistant Professor) ----------

Name of co-Advisor Signature

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Board of Examiners' Approval Sheet

As members of the Board of Examiners of the final Master's degree open defense, we certify that we have read and evaluated the thesis prepared by Yirdaw Ali under the title challenges and opportunities of wetland conservation**. in the case of mendiffa wetland Misrak** Silte Woreda in Siliti Zone SNNPR, Ethiopia "and recommend that it be accepted as fulfilling the thesis requirement for the degree of Master of **Development Planning & Management /DPM/** with Specialization. Board of examiners want accept it

Name of the Chairperson	Signature	Date
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Name of Internal Examiner	Signature	Date
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Final approval and acceptance of the thesis is contingent upon the submission of the final copy of the thesis to the Dean postgraduate studies through the Dean Post graduate studies of the candidate's department/School.

Approved by Dean postgraduate studies	Signature	Date
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DECLARATION

I hereby declare that this MA thesis is my original work and has not been presented for the award of any degree or examination at any other university and that all sources of materials used for this thesis have been duly acknowledged.

Name: __Yirdaw Ali Yesuf_____

Signature: _____ Date:_____

This MA thesis has been submitted for examination with my approval as a thesis advisor.

Name: _____

Signature: _____

Place and Date of Submission: _____

Abbreviations and Acronyms

A.M.S.L	Above Mean Sea Level
ASLNP	Abijiata-Shala Lakes National Park
CSA	Central Statistical Agency
DA	Development Agent
EMA	Ethiopian Mapping Agency
EPA	Ethiopian Environmental Authority
ETB	Ethiopian Birr
EWNRA	Ethiopian Wetlands and Natural Resources Association
FAO	Food and Agricultural Organization
FGD	Focus Group Discussions
GBO	Global Biodiversity Outlook
GDP	Growth Domestic product
GOs	Governmental Organizations
HH	Heads of Households
IBA	Important Bird Areas
IBCR	Institute for Biodiversity Conservation Research
ITCZ	Inter-tropical Convergence Zone
IUCN	International Union for Conservation Nature
KII	Key Informant Interview
NGOs	Non-Governmental organizations
MSWAO	Mesrake silit Woreda Agriculture Office
SCBD	Secretaries of the Convention on Biological Diversity
SNNPR	Southern Nations, Nationalities and People's Region
SPSS	Statistical Package for Social Sciences
UNDP	United Nations Development Program
UNESCO	United Nations Educational Scientific and Cultural Organization
WBISPP	Woody Biomass Inventory and Strategic Planning Project
WVE	world vision Ethiopia

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ABSTRACT

Now a days changes in land use management system to meet the demands of a growing global population are inducing a shift in the socio-economic and ecological function of the wetlands. Wetlands are basically areas where water is the primary factor controlling the environment and the associated plant and animal life. The main objective of this study was to identify challenges and opportunities for Mendiffa wetland in Misirak Siltie woreda in Siltie zone southern Ethiopia The data was collected from both primary and secondary sources. Out of 1652 target populations of 125 samples were selected in multi-stage sampling techniques. The collected data was analyzed by using the statistical package for social science (SPSS, version 22) and a mixed (qualitative and quantitative) research approach was designed. Methods were employed to collect and analyze data. The study found that Mendiffa Wetland was degrading due to human activities such as irrigation, hunting, and grass cutting; agricultural activities near the wetland; and using fertilizer in upper catchment areas of the wetland to improve productivity were among the major challenges that impeded conservation of the wetland. And also, sedimentation, overgrazing, lack of conservation, improved drainage, deforestation, intensive cultivation, the engagement of investments nearby, lack of knowledge, and weed infestation were identified as the major threats to the wetland. On the other hand, the existence of local mechanisms for conservation, the participation of different stakeholder's the practice of different rules, and the involvemental watchdog of NGOs to protect the wetland were found to be opportunities. Finally, based on the findings, soil conservation practices should be given priority to protect the downstream sediment impact on the Mendiffa wetland. The aforementioned recommendations were forwarded, and issues that need further studies were defined by the researcher.

Keywords: Mendiffa, wetland, conservation challenge, opportunities

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Wetlands are among the most productive ecosystems on the planet. They are biological diversity's cradles, providing the water and primary productivity that countless plant and animal species rely on to survive. They are important stores of plant genetic material and support large populations of mammals, reptiles, amphibians, fish, and invertebrates (UNESCO, 2006).

Wetlands are defined differently in different countries. There is no consensus on the precise definition of wetlands. At the international level, the Ramsar Convention (UNESCO, 2006) defines wetlands as "areas of marsh, fen, peat land, or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish, or salt, including areas of marine water where the low tide does not exceed six meters."

Wetlands are areas where water plays a major role in regulating the environment and plant and animal life. They happen when the water table is at or near the land's surface, or when the land is covered by shallow water. Because of their ability to perform a variety of environmental functions and produce a variety of products that are both socially and economically beneficial to communities, wetlands are increasingly being recognized as important natural resources in developing countries. Wetlands are important natural resources in terms of environmental functions and products that are widely used by people (Dixon and Wood, 2003).

The interactions of physical, biological, and chemical components of a wetland, such as soils, water, plants, and animals, allow the wetland to perform many important ecological functions, such as water storage, storm protection, and flood mitigation, shoreline stabilization and erosion control, groundwater recharge, groundwater discharge, water purification, retention of nutrients, sediments, and pollutants, and stabilization of local climate conditions. Water supply (quantity and quality); fisheries; agriculture; timber production; dry season grazing through the

maintenance of water tables and nutrient retention in floodplains; building materials; firewood, income-generating activities, energy resources; wildlife resources; and a variety of other benefits, including herbal medicines; recreation, tourism, and cultural opportunities (Emerton, 2005). The direct harvesting of wetland resources provides a number of important benefits for human basic materials (Choowaew, 2007). As the population grows, these urban centers or settlements have become a major source of pollution, endangering the ecosystem's stability (Lemlem, 2003).

Because of population growth, which puts a strain on water resources and undeveloped land areas for settlements, higher agricultural and industrial production, and infrastructure expansion, wetlands loss and degradation has been a persistent problem in many parts of the world (IUCN, 1999). More fundamentally, wetlands are lost or degraded because human institutions and policies do not adequately appreciate or value their products, functions, and attributes. The unsustainable use of wetland resources can be attributed to a combination of information gaps, market and policy failures, or intervention failures, as well as other socioeconomic factors.

According to the Misrak silti Woreda rural agricultural development office report (2021), the Mediffa wetland has been threatened by the following agricultural activities: overgrazing, lack of awareness about wetland use, poverty, sedimentation, the extinction of animals such as hippopotamus, loss of tall grass, the lake becoming infested with weeds, and other related problems. As a result, the study sought to identify the challenges and opportunities of the Mediffa Wetland. Mesirak Silti Woreda of Siltie zone, southern Ethiopia.

1.2. Statement of the Problem

According to the Millennium Ecosystem Assessment (2005), more than half of certain wetland types have been lost in the twenty-first century, and the amount of wetlands lost globally varies between 30 and 90 percent, depending on the region (Junk, et al., 2013). The majority of studies that have measured wetland extent change suggest high rates of global wetland area decreases, possibly as much as 1.5 percent annually, according to the Global biological outlook-4 technical report.

Wetlands in Africa are among the world's most productive ecosystems, and they play an important role. When compared to Europe or parts of North America, it still has a significant number of pristine wetland. However, some wetlands are under severe threat from human activities, the most serious of which are drainage for agriculture and settlement, excessive exploration by local communities, and improperly developed activities, as well as other threats to Africa's wetlands such as the effects of industrial effluent and agricultural pesticides, siltation from highland catchment areas, and introduction of alien species of flora and fauna leading to colonization by single s. (Kabii, 996).

Wetlands are the most productive ecosystems on the planet, but they are also the most endangered. Even at the government level, destruction and alteration has been and continues to be seen as an advanced mode of development. Wetlands and their importance are still poorly understood, and their extinction is becoming an environmental disaster. Draining wetlands for agricultural purposes has been practiced in some parts of Ethiopia for over a century, particularly in Southwest Ethiopia. Inadequate drainage mechanisms, double cropping, and the cultivation of perennial crops such as sugar cane within the wetlands ecosystem have all become major threats to the wetlands' survival. Past and present wetlands areas in Ethiopia have been and continue to be important grazing areas for livestock. Wetlands, in particular, are frequently a last resort for pastoralists in most parts of the country during the dry season. However, rising livestock populations, fodder shortages, and simultaneous agricultural expansion have all contributed to increased grazing pressure on wetlands. Wetland characteristics have changed as a result of grazing pressure (McKee, 2007).

Wetland resource overexploitation or harvesting is now a major threat in several Ethiopian wetlands. Excessive resource exploitation can also result in the wetland's direct collapse in some cases. The initial cause of silt accumulation in a wetland ecosystem is deforestation and loss of vegetation within the catchment area. The accumulation of silt within the wetland usually causes a complete change in the ecosystem, resulting in biodiversity loss, reductions in the wetland's water holding capacity, and, in the worst-case scenario, the wetland's collapse (Lemlem, 2003). "While wetland loss rates are documented for the developed world, the limited study of these ecosystems in countries like Ethiopia leaves us with little to say wetland

loss is evident wherever major developments such as dams, irrigation schemes, and conversion projects are present in the developing world." (Marti, 2011).

In fact, different research projects related to the study have been carried out in Ethiopia and around the world. For example, Degele, (2007) and G/Michel, (2008) investigated the challenges of tourism resource conservation and management in Abijiata-Shala Lakes National Park (ASLNP), while Gemechu, (2010) investigated the socio-economic significance of the Abijiata Lake Wetlands case. Hayal (2006) investigated the biological diversity and richness of wetland resources in the Jimma Zone of Oromia National Regional State Southwest's Boye, Kitto, and Koffe wetlands.

However, the previous researchers were unable to address the concern of the threat to the conservation of the Mendiffa Wetland in the cases of Mesirak Siltie Woreda Siltie Zone, SNNPRS, and Ethiopia. Therefore, this study is intended to fill the gap by conducting research on the challenges and opportunities of wetland conservation in Mendiffa Wetland of Mesirak Silite Woreda, Silite zone.

1.3. Objective of the study

1.3.1 General objective

The general objective of this study was to identify challenges and opportunities of the conservation of Mendiffa Wetland of the Mesirak Silti Woreda, Silte Zone, Southern, Ethiopia.

1.3.2. Specific Objectives of this study are:

- To assess the challenges in conserving the Mendiffa Wetland.
- To identify the threats for the existence of Mendiffa Wetland.
- To identify the opportunities for the conservation of Mendiffa Wetland.

1.4. Research Questions

This research work was guided by the following research questions:

- What was the main challenge of the conservation of Mendiffa Wetland *its* effect?

- What are the causes of the threats of the Mendiffa Wetland?
- What can opportunities for improved Mendiffa Wetland *use* are identified?

1.5. Significance of the Study

The importance of this study is that it will fill a research gap and offer various solutions for the conservation of the Mendiffa Wetland. Also, government institutions, interested groups such as non-governmental organizations (NGOs), policymakers, and others benefit because it paves the way for more research in the area and serves as a reference for researchers who want to do research in the same or related area. Finally, this study demonstrates that the pattern of problems is related to the conservation of the Mendiffa wetland, as well as providing an initial view and supplementary information for researchers interested in a different perspective on the problem in the area.

1.6. Limitation of the Study

The researcher has faced several constraints like time and finance. Some respondents were not interested in giving responses in the study area, and a shortage of adequate secondary sources in a related area challenged the researcher. Even though the problems were inevitable throughout the entire study, the researchers used different mechanisms so as to overcome these limitations. For instance, the researcher has tried to find different NGOs to sponsor the thesis fee and to manage the time so as to accomplish the thesis as scheduled. Further, the researcher strongly informed the respondents as their confidentiality was kept and meant only for academic purposes. The researcher has got their attention through informing the respondents about the contribution of the study in overcoming the threats to the wetland in the study area. Moreover, the researcher has received consultation and received constructive comments from the advisor throughout the final submission of this thesis.

1.7. Scope/Delimitation of Study

For the sake of a thorough understanding of a particular issue, each research has its own delimitation. Because of time and financial constraints, this research is limited both in terms of location and problem identification. It is bounded by the Mesirak Silti Woreda in the Silte

Zones of Ethiopia's Southern Nations, Nationalities, and People's Regional State in terms of location delimitation. The problem is defined in terms of identifying the Mendiffa Wetland's challenges and opportunities.

1.8. Organization of the Thesis

The thesis was organized into five chapters. The first chapter is an introduction that includes the study's background, problem statement, objectives, research questions, significance, limitations, and delimitations. The second chapter focuses on a review of literature and conceptual frameworks. The third chapter emphasizes the methodology and methods of the study. Here, a description of the study area, target population, location, and methodology utilized in the study, sampling technique as well as methods of data collection and data analysis were emphasized. The fourth chapter emphasizes data presentation, analysis, and interpretation. The fifth chapter focuses on the conclusions and recommendations. Finally, the references and appendix were fastened at the end of the document.

1.9. Operational Definition of Key Terms

- **Wetlan**d is the most common definition for wetlands at International level is given by the Ramseur Convention (UNESCO, 2006), Wetlands are defined as: "areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water of which at low tide does not exceed six meters.
- **Conservation** is a young science its management largely depends on adoptive monumental approaches protecting ecologically sensitive wetlands and water shed their biodiversity specific biophysical characteristic and obtaining optimum benefits of ecosystem goods as well as services.
- **Opportunities** is refer to with in research topic to make the conservation of mendiffa wetland calls for strong consideration for the conservation the current global and local support for polices provision of environmental protection authority of mendiffa wetland eco system a good opportunity for protect and wise use communal land we call it mendiffa to engage environmental watch dog like NGOS GOS werabe university institutions

working to hand to glob collaboratively serve protect mendiffa wetland. in participatory approaches bottom to up and voiceovers that can be applied in the local level to assist to Mendiffa wetland conservation vital natural resources existence of local mechanism to conservation participation of different stakeholders practice of different rule and involvement NGOS kin situation to protect Mendiffa wetland

- **Challenges** is refer to inadequate funding of wetland conservation lack of political good will policy and lack of wetland management plants and strategy to guide towards wise use of wetland, in adequate community participation in wetland conservation ,in sufficient collaboration among stack holders NGOS different government institution
- **Threat:-** is refer to according this research topic mendiffa wetland threatened by high natural and anthropogenic factor population growth un proper wise use of traditional and modern agricultural practice, destructive and over expulsion and an wise use of natural resource as well as wide spread deforestation over grazing sedimentation Risk of warning for despairing dry of mendiffa wetland and distraction of the study area wetland major spill is ecological health wetland in danger.

CHAPTER TWO

LITERATURE REVIEW

This chapter provides the review of theoretical literature that guides this study as conceptual frame work

2.1. Concepts and Definitions

Wetland is the most common definition for wetlands at International level is given by the Ramseur Convention (UNESCO, 2006), Wetlands are defined as: "areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water of which at low tide does not exceed six meters

Environmental degradation it refer a process when humans have exceeded a resource´s natural replacement rate and the available supply has begun to shrink (Miller & Spoolman, 2011).When an ecosystem is under attack as a result of natural or man-made disturbance it is extremely difficult to calculate the ripple effects throughout nature. When two or more Ecosystems are being degraded the probabilities of synergistic destructiveness multiply. In Other words, environmental degradation is the deterioration of the environment through Depletion of resources such as air, water and soil, the destruction of ecosystems and the Extinction of wildlife. According (park, 2007) environmental degradation is depletion or destruction of a potentially renewable resource such as air, water, or wildlife, by using it at a rate faster than it can be naturally renewed.

Forest degradation it refer a change process within the forest which negatively affects the characteristics of the forest. The combination of various forest characteristics forest quality can be expressed as the structure or function, which determines the capacity to supply forest products or services (FAO 2001). Taking place within the forest, degradation is different from deforestation which denotes change process from forest to non-forest. According to the classification used by the FAO Global Forest Resources Assessment, non-forest can be other wooded land or other lands (Simula, 2009).

The Convention on Biological Diversity's Inter-Seasonal Second Meeting of the Ad Hoc Technical Expert Group on the Review of Implementation of the Program of Work on Forest Biological Diversity in 2005 stated that forest degradation is a loss process covering a combination of several environmental components soil fertility and compaction, forest cover, natural function, Stalinization and qualifying it to impede or retarding natural recovery unassisted forest recovery through secondary succession (UNEP , 2005).

Wetland degradation it refers to define the impairment of wetland functions as a result of human activity. In practice, wetland loss is rarely independent of wetland degradation, since the loss of part of a wetland is likely to impair the functions of the remaining wetland area. Conversely, wetland degradation frequently occurs without the loss of wetland area, through upstream impacts on hydrology and water quality, etc. Thus, both wetland loss and degradation related to the change in quantity and quality of the wetland resource around a baseline (Moser et al. 1996). Overexploitation and wetland degradation is more than 50% of the world's wetlands have been altered, degraded, or lost in the last 150 years. The main causes of these losses are anthropogenic and include a decline in area changes in water regime and water quality, and introduction of alien species. Excessive exploitation and the resulting degradation of wetland resources have attracted enormous concern from researchers (O'Connell 2003) According to (Xie et al. 2009) reported a loss of wetland habitat from excessive resource use and subsequent degradation in China, In general, the livelihood-generating actions of the poor communities that reside near wetlands and their dependency on the wetland resources have degraded wetlands. Thus, a wide range of human activities have altered wetlands around the world and caused their degradation (O'Connell, 2003).

2.2. General Global trends on wetland

According to Junk, (2013), the amount of wetlands lost around the world varies between 30 and 90 percent, depending on the region under consideration, according to the Millennium Ecosystem Assessment (2005), more than half of the area of certain wetland types was lost during the twentieth century in parts of Australia and New Zealand, Europe, and North America. Davidson (2014) claims to have the most up-to-date and comprehensive picture of historical wetland losses. In his study of 189 wetland assessments, he estimated that wetland

losses in the twentieth century were 64-74 percent. However, in some regions, particularly Asia, natural inland wetlands have consistently lost more and at faster rates than natural coastal wetlands. The extent of inland wetlands declined 69-75% during the 20th century, while the coastal wetlands declined 62-63%, Losses in natural wetlands continue in the 21th century the GBO-4 provides amide-term assessment of progress towards the Aichi Biodiversity Targets (SCBD, 2014) Target 5 calls the for habitat degradation and fragmentation to be reduced, similarly Target 14 calls for ecosystems that provide essential services, including these related to water, to be restored and safeguarded. According to the GBO-4 finds, however, that wetlands, including river systems, continue to be fragmented and degraded and that ecosystems particularly important for service, The underlying GBO-4 technical report offers further detail to support the conclusion that wetlands are in serious decline despite the Aichi targets that are designed to stimulate practice and policy to prevent such loss (Leadley et al. 2014).

Nonetheless, "the majority of studies that have measured wetland extent change suggest high rates of global wetland area decreases," possibly as much as 1.5 percent annually, according to the GBO-4 technical report. The Wetland Extent Index is "a new method to estimate the average rate of wetland extent change with incomplete data, establishing a baseline for the status of wetlands globally," according to the report.

2.3. Wetlands: A Source of Livelihood

Wetlands are well known for providing a variety of ecosystem services that benefit human health. Fish, fiber, water supply, water purification, climate regulation, flood regulation, coastal protection, recreational opportunities, and tourism are some of the major ecosystem services provided by wetlands (Millennium Ecosystem Assessment 2005). The importance of wetlands in poor people's livelihoods is especially important in developing countries. Wetland activities, for example, provide more than half of the dependent population's monthly income at the Pace Wetland in Uganda (Opio et al. 2011). Nearly 90% of the population of the East Godavari Delta in Andhra Pradesh, India, relies entirely on mangrove wetland products to survive (Dahdouh - Guebas et al. 2006).

2.4. Institutional Enhancement and Local Participation for Resource Conservation.

The importance of community participation in wetlands conservation and management is widely recognized (Williams, 2002). Traditional methods of protection such as prohibition, legislation, and guarding are losing favor. Restricting local people's access to natural resources that have sustained their livelihoods for generations can be beneficial to conservation only for a short time. Studies show that the higher the level of community participation, the higher their compliance with resource conservation; community inclusion is essential for long-term conservation. Resource conservation is cost-effective and sustainable when legislation, policies, and programs include local people in the decision-making process (Andrade and Rhodes, 2012).

Wetland conservation is difficult in developing countries, where food security and poverty reduction take precedence over environmental protection, because local communities do not recognize the importance of wetlands (Wood et al. 2002). Local communities should be fully aware of the importance of wetlands as parts of water cycles, as well as the nature and effects of human impacts, for successful conservation and management. Indigenous communities can help resource conservation while meeting their daily needs by using their traditional knowledge, skills, and practices (Williams, 2002).

2.5. Wetland Ecosystem of Ethiopia: Distribution and Classification Wetland Ecosystem

Wetlands are found in all ecosystems, from alpine (high mountains) to desert ecosystems in low-lying areas, and in all traditional climatic zones (Wood, 2001). Wetlands are found throughout Ethiopia, in all climate zones. In the country, there are several significant swamp areas. Riverine wetlands can be found all over the country. The floodplains of the Aawsh, Abay, Baro, Gibe, Wabe-Shebelle, and Dawa Rivers have particularly extensive wetlands (Getachew, 2004).

Wetlands are complex systems with many different characteristics that can be used to describe and classify them (Ibid). Wetlands can be classified into biomes at the macro level. Wetlands can be classified on a local and more specific level based on the type of habitat, as well as

physical and biological characteristics (Dugan, 1990). Based on ecological zones, hydrological functions, geomorphologic formations, and climatic conditions, Ethiopian wetlands can be divided into four major categories. These categories connect to form four major biomes, which also describe Ethiopia's climate. The Afro-tropical highlands, Somali-Masai, Sudan-Guinea, and Sahelian transition zone biomes are among them (Tilahun et. al, 1996; Leykun, 2003).

The Afro-Tropical wetland systems are made up of Ethiopia's central, western, and eastern highlands, which serve as major water catchments and rivers' sources. The Great Rift Valley is largely responsible for the existence of the Somali-Masai wetland system. Its wetlands include the Great Rift Valley lakes in the south and the Awash Basin lakes in the north, as well as the associated swamps and marshlands. The Sudan-Guinean wetland system is found in Ethiopia's western lowlands, while the Sahelian transitional wetland system is found in Ethiopia's far northeast (Tilahun et.al, 1996).

Wetlands are classified into 30 categories based on habitat type, basic physical and biological characteristics, and nine men created them (Dugan, 1990). Ethiopian wetlands are classified into the following major groups based on the Directory of African Wetlands: lakes, such as Lake Tana and associated wetlands; the Ashenge and Hayk lakes; wetlands of Bale mountain; wetlands of the western high lands; lakes of Bishoftu; lakes and associated wetlands of the south western Rift Valley; lakes and Swamps of the Awash River system; lakes of the Afar Depression; western river flood plains and Artificia; western river This classification is primarily based on the drainage systems of rivers and lakes (Hughs, 1992; EPA, 2004).The classification is not complete and will need revision. Because they are numerous, not all Ethiopian wetlands are listed. The classification scheme is, however able to show the diversity of wetland types in the country. It is not able to cope with the many different forms of wetland e.g. Alkaline, fresh or seasonal.

2.6. Characteristics of Wetland Ecosystem

The presence of water, either at the surface or within the root zone, the presence of vegetation adapted to wet conditions (hydrophytes), and the presence of unique soil conditions that differ from adjacent uplands distinguish the wetland ecosystem from the surrounding environment (Getachew, 2004). Look for ecosystem characteristics that can be easily recognized or

measured for classification purposes (EPA, 2004). The national wetland ecosystem classification is created in such a way that the results will best serve conservation, sustainable use, and proper environmental policy implementation.

2.7. Functions and Services of Wetland Ecosystems

Wetland ecosystems play an important role in human life by providing ecological functions such as ecosystem stability, habitat for various fauna and flora, and climatic stabilization; a socio-esthetical service such as ecosystems' role in the development of cultural heritage; intrinsic value, which is the value inherent in the environmental asset itself; and economic functions by providing resources such as food, water, and raw materials (Kirsten, 2005).

2.8. Environmental Values of Wetlands

Wetlands play an important role in maintaining environmental quality, sustaining livelihoods, and supporting biodiversity. They also absorb and process waste products, which helps to keep the environment clean. Carbon dioxide, methane, and hydrogen sulfide are biologically cycled in wetlands. They sequester, trap, and release carbon, which helps to control climate change. Wetland peat deposits account for only 3% of total land area but store 14-16% of the global carbon pool (Deribe, 2008).

Many of the functions of wetlands are beneficial to people. However, social and economic factors frequently lead to pressure to make wetlands work harder, such as through agricultural use. They slow storm floods, trap sediments and act as a carbon sink, protect downstream property from damage, and aid in wastewater treatment and dam siltation. Wetlands also help to mitigate the effects of unfavorable climatic variations, according to studies. More minor goods and services have become apparent as scientific understanding of wetlands has grown. Because of the extensive food webs and rich biodiversity they support, wetlands have been referred to as "the kidneys of the landscape" and "biological supermarkets" (Mitsch W, and Gosselink. J, 1993).

Wetlands support numerous species from all major groups of organisms, from microbes to mammals, and thus provide a significant source of biodiversity. Wetlands, in general, serve as a gene bank in the ecosystem. Wetlands are important ecologically for water storage, filtration,

and supply, flood control, water purification (sediment and toxin removal), nutrient cycling functions, and habitat for both flora and fauna biodiversity (Abebe, 2003). Wetlands also play a role in groundwater recharge and discharge. Their flood control and sediment trapping abilities protect associated water bodies from pathogenic substances, while also purifying the water for the biota that lives in the water bodies and the rest of the wetlands (Tenalem, 2002). According to (Wassie, 2015), the wetlands and floodplains that surround Lake Tana are Ethiopia's largest wetland area and an important component of the Tana ecosystem. These wetlands are used for breeding, which is also done in wetlands like Chew Behir. Swimming and boating are popular sports and recreation activities in most of the wetlands' water bodies (EPA, 2004) Lake Abijiata and its wetlands provide essential services for eco-tourism development and economic development in the surrounding communities. Similarly, the fauna and flora of the Lake Tana area are diverse. When it comes to tourism, it is considered one of Ethiopia's best birding destinations (Shimeles, 2015).

2.9. Current Trends in Agriculture

The Millennium Ecosystem Assessment recently revealed that global food production has doubled in the last 40 years, keeping up with the growing human population (Hassan et al., 2005). However, the assessment revealed that this significant achievement came at the cost of significant biodiversity losses, global element cycle disruption, eutrophication and toxification of our freshwater resources, and the loss of regulating ecosystem functions.

The challenge for the next 25 years will be to increase food production by another 50 percent just to keep up with projected population growth. Given that there are still food shortages, and that large segments of the human population are beginning to shift their eating habits to be more animal-based, the pressure to produce more food per area, as well as to reclaim more land for agriculture, is expected to increase significantly (FAO, 2003).

Another trend that will result in increased demand for agricultural land and increased production is the increased use of first-generation biofuels as a fossil-fuel alternative (Smeets et al., 2007).All these developments together will inevitably lead to reclamation of natural or marginally used land for intensive crop production. There will be increasing pressure to use

wetlands for growing crops so that an evaluation of the feasibility of such a use is urgently needed.

2.10. Challenges of Ethiopian Wetlands

Ethiopia is known as Africa's water tower due to its diverse landforms and climatic conditions, which have resulted in an extensive wetland system across the country. Wetland ecosystem values range from direct benefits and tangible subsistence uses to intangible goods and services and the fulfillment of human needs. Wetlands' hydrological and ecological functions, which support various economic activities, life support systems, and human welfare, are indirect uses. Groundwater recharge, flood control, nutrient cycling, erosion control and sediment traps, climate regulation, migratory wildlife habitats, and pest control are all examples (Dugan 1990). Fishing, fiber production, water supply, recreational opportunities, and increased tourism are all examples of direct use.

Wetlands are among the most productive ecosystems on the planet, but they are also among the most endangered. Even at the government level, wetlands destruction and alteration has been and continues to be viewed as an advanced mode of development. This shows that wetlands and their importance are still poorly understood. Another factor that makes them vulnerable is that they are dynamic systems that are constantly changing.

As a result, many wetlands are transient features that appear, vanish, and reappear over time (Barbier et al. 1997). 'The most acute trade-off between environmental protection and development resulted from the dynamism and complexity of wetlands,' (Matthew et al. 2006) summarized. Though wetlands face a variety of natural threats around the world, the majority of those threats have been caused by direct or indirect human interaction with the wetlands (Dugan, 1990). According to Dugan, 65 percent of wetland disturbances are caused by humans, while the rest are caused by natural factors. 73 percent of these disturbances are thought to be caused by direct human actions, while the remaining 27% are thought to be caused by indirect sources. The truth could not be further from Ethiopian wetlands. The majority of threats to Ethiopian wetlands, as in other African countries, are the result of

unhealthy human interactions, both direct and indirect. Natural factors play an important role in influencing outcomes.

Natural and environmental issues Climate change and recurrent droughts pose a threat to the country's wetland ecosystems (EWNRA 2008; Matthew et al. 2006). Warmer temperatures are affecting wetlands and other ecosystems as a result of global warming. Such events have a negative impact on hydrological cycles, which in turn have a negative impact on wetlands' biodiversity and various services. The pressures on wetlands are severe during recurrent droughts and dry periods, as they are the only major sources of water, fodder, and crop production, and they save human, livestock, and wild biodiversity lives. Though they have their own beauties and various advantages, rugged terrains and mountains of the country have their own contribution, especially in enhancing soil erosion and runoff agrochemicals into the wetland ecosystems and contributing to eutrophication and siltation of wetlands (Dereje, 2003).

Human-induced threats: Conversion to agriculture through draining, overharvesting of resources, the appearance of invasive species, the introduction of perennial vegetation, and overgrazing are all major threats to Ethiopian wetlands (Afework, 2005). The majority of Ethiopia's lakes, rivers, and reservoirs are currently experiencing serious ecological issues (Abebe, 2003). Around some Ethiopian lakes, habitat degradation is a common problem. Water diversion around Lake Awash, for example, is common in the catchment areas of rift valley lakes (Abegaz et al., 2010).

Agriculture and horticulture activities have a major impact on wetland resources (Yohannes, 2003). Temperature rises, increased evaporation, reduced precipitation (in some areas), and increased storm intensity are all factors that have a negative impact on freshwater wetlands. Furthermore, the lack of clear awareness among the general public, decision-makers, and policymakers, as well as the lack of clear policy and direction on the wetlands issue, are all contributing to the issues mentioned previously. Wetlands are living ecosystems that change over time as a result of subsidence, drought, erosion, and siltation. Water and land-based human activities are putting severe strain on wetlands, jeopardizing the natural services they provide. Habitat loss occurs as humans develop land and water for agriculture, grazing

livestock, and unsustainable uses such as draining wetlands and deforestation for agricultural land, as well as polluting the air, soil, and water with chemical compounds such as herbicides, insecticides, and other pesticides. Significantly impact biodiversity (IBCRb, 2001).

Natural change is normal and expected but the direct and indirect anthropogenic measures are the one considerably affecting the vital functions, values, and attributes of wetlands (Gemechu, 2010). Wetland degradation could lose their ability to perform their valuables and functions. Improper agricultural practices and expansions draining of wetlands for agricultural purpose is a century-old practice in some parts of the country mainly in Southwest Ethiopia. Long-term draining interferes with the ecological recovery of the wetland system and will fasten its drying up (Mc Kee, 2010).

Shortage of agricultural land derived from increased human and livestock populations, the low awareness of communities regarding the ecological benefits of wetlands and the lack of technical and financial support for wetland conservation are underlying factors exerting pressure on the wetlands (EPA, 2004). The natural resource base in Ethiopia such as land, wildlife, and water are vital sources of domestic and national income. Such provides the basis for farming, fishing, energy production and tourism. However, these resources have been degraded due to high demand for agricultural land and home energy use resulting from high population pressure. Hence, environmental degradation has been and will remain a major cause of low agriculture production. Particularly, in Ethiopia, wetlands are converted to farmland and sometimes used in an uncoordinated way, due to lack of information on its environmental benefits (Deribe, 2008).

The lakes buffering capacity to deal with stress is reduced from sediment loads and conversion, destruction and encroachment of important natural buffers like wetlands. Despite this high diversity of fauna and flora, several of the existing species are endangered due to loss and fragmentation of habitat. In particular, the degradation of forests and wetlands has caused severe habitat destruction for both flora and fauna. As a result, many wetlands are temporary features that disappear, reappear and re-create themselves over time (Barbier, 1997).

It is evident that Ethiopia has suffered a lot from natural resources degradation and the severity of the problem has urged the government to make environmental protection a top

agenda of the country and assure sustainable development. Wetland ecosystem is under pressure emanating from conversion into agricultural lands; especially for rice production, overexploitation of wetland resources, deforestation, soil erosion and land degradation, siltation, settlement, climate change and pollution. Lake Tana catchment now threatened from sedimentation (silt load) as a result of upstream intensive agricultural activities and deforestation. Invasive species such as water hyacinth are becoming threats to aquatic ecosystem of the country. Deforestation and recession agriculture coupled with high erosion from the high lands of Lake Tana catchment resulted in high sediment deposition (average annual sediment yield of 30-65 tons/hectare; (Gebriye et al., 2009).

The low economy level it plays a great role in threatens wetlands. In an attempt to use wetland resources to make their livelihood, people over-exploit these resources (Gemechu, 2010). Vegetation resources in almost all wetlands have been alarmingly denuded that siltation of water bodies is becoming major problem and birds and other wild animals are leaving wetland areas because of nesting and resting shelters distraction. This is due to the fact that trees have been cut down and grasses have been overgrazed (EPA, 2004).

Water abstraction for agricultural crop irrigation and industrial use is also severely threatening some lakes including Lake Tana, Ziway, Abijiata, Shalla, Abaya, and Chamo (Abebe, 2003). Therefore, the economic factors are aggravated by poverty and population pressure. As population pressure increases, the newly formed farm household i.e. the youth has limited access to farmland. These farmers encroach in on wetlands and forest areas for conversion. Moreover, poor households sell firewood and charcoal to cope with food insecurity (Michael, 2008).

According to (Gemechu,2010) Lake Abijata and its associated wetlands are degrading progressively due to natural and human factors such as farmland expansion, sand mining, mineral salt extraction, overuse of water for irrigation and other development intervention like soda Ash factory are among the major threats of wetland management.

The livestock grazing this is one that identified as a threat to wetlands in addition to the above factors. When grazing follows continuous cultivation; wetlands easily become degraded and lose their natural characteristics. Predominantly cattle; lead to some consequences which

include soil compaction and vegetation loss (Coates, 2010). Livestock tramples the soil and compact it and destroys natural vegetation. They erode drainage channels leading to gullies and increase water outflow (Afework, 2005). These effects often result in the complete degradation of wetlands by reducing the water table and by changing the original vegetation.

As such, wetlands produce an ecological equilibrium in the environmentally maintaining the integrity of life support systems for sustainable socio-economic development. Yet, many wetland ecosystems particularly flood plains and swamps are regarded as wastelands and continue to be depleted at an alarming rate throughout Ethiopia (Abebe and Gheb, 2003).

Weak institutional capacity is one of the factors on Wetland management in Ethiopia also suffers from capacity limitations such as lack of skilled manpower, finance, and technology. Wetland focused training programs are very scarce in higher learning institutions of the country. Institutions have responsible for land administration, and other natural resources management. However, there is little or no awareness of current status, threats or values of wetlands, lack of capacity to implement the government policies (EPA, 2004). Or even the need for their conservation and sustainable utilization. Although there are various organizations/institutions with some sort of wetland expertise and awareness, no coordination exists between these institutions for the conservation, management and wise use of wetlands in Ethiopia (Abebe, 2003). Efforts in wetlands management in Ethiopia are being challenged due to poor legal supports resulting from an insufficient political will that failed to incorporate sufficiently the sustainable management of wetlands in the land use policy (Mengistu, 2003).

2.11. Consequences of Wetland Losses in Ethiopia

To consider the impact of wetland loss on the local community, there are good examples of wetlands which are already lost (Haromaya Lake) and in a loss such as Abijata and Cheffa (EWNRA, 2008). Moreover considering the rapid conversion of the Illubabur wetlands is also very important. Bringing these wetlands into mind, the communities dependent on these wetlands for fisheries, dry season food crops, raw materials for construction, water, feed for animals, medicinal plants, income from the sale of the products including handicraft, have lost or is in loss of the stated uses. For example, the conversion of wetlands in Illubabur (south

western Ethiopia) is a means to loss the natural sedge (which is collected for roofing), drying of about 150 springs causing extra loads to women and poor , loss the use that medicinal healers gained from medicinal plants collection (Fricker 1999 ; Wood 1996).

Considerable health problems like malnutrition of children also reported for this area due to the complete conversion of the wetlands (Abebe and Geheb 2003). Thus, at community level since the significance of wetlands in poverty reduction and ensuring food security is immense, their losses cause starvation. Since wetlands are sources of water and forage for livestock at the dry season, it is a major asset next to land in agricultural areas and may be asset number one in pastoral communities (Wood, 1996).

The consequence of wetland loss extends to aggravating climatic disturbances by increasing carbon build up in the atmosphere and biodiversity loss in Ethiopia is prone to desertification and recurrent drought, the effects of wetland loss could be more visible in complicating the situation locally. It can also affect hydrological cycle or rainfall patterns. Rivers and streams may lose their strength. This will create a shortage of water and narrow opportunities for irrigation-based agriculture. Wetlands are the prominent shelter of aquatic and terrestrial biodiversity. Endemic fishes, birds and other life forms depend on wetlands. Hence, the loss of these wetlands is devastating to several endemic species and particularly to wetland-dependent species (Abebe and Geheb 2003; EWNRA 2008).

2.12. Review of empirical studies on wetland

Gemechu (2010) found that more than 83% of people depend on the wetland for different types of subsistence including fodder, fuel wood, mining and mineral salt extraction. In recent years, however, these wetlands are degrading progressively due to natural and human factors. Farmland expansion, sand mining , mineral salt extraction ,over use of water for irrigation and other development intervention like soda Ash factory are among the major threats of wetland management. And he concludes that high dependence of the local people on Abijiata wetland resources for their livelihood, however, these resources are under continuous threats. Managing the wetland on the basis of basin concepts and involving local people in alternative

income generating activity has been suggested as a means of reducing pressure on land use and also reducing the threats to Abijiata lake wetland.

Hayal(2006) he conducted to assess the status of, Boye, kitto and Koffe wetland in jimma. In his study the result shows that the catchments have been subjected to human stress, notably agriculture, settlement, intensive grazing and brick manufacturing. And 100% of the households reported the disadvantages of living around the wetlands due to high incidence of malaria despite the many economic and societal benefit they gained out of wetlands, 99% of the households judge that human activities did not have no any undesirable effect on the resources and he conclude that unless conservation measures are applied, these valuable resources will soon be at risk of degradation or even disappearance**.**

Among similar work on the this issues the study by Adugna Babu, Bogale Teferi (2015) titled "assessment of human induced threats to warameda wetland dalaworeda southern Ethiopia" In this study, the wetland has been highly encroached by human settlement eucalyptus plantation pollutions sand extraction overexploitation of resource from the wetland and agricultural activities. Based on that the result of the study the authors recommended the concerned bodies to alleviate the impact of human pressure from this wetland. Accordingly; the wetland has been highly encroached by human settlement eucalyptus plantation pollution sand extraction overexploitation of resources from the wetland and agricultural activities. Based on the result of the study the authors recommended the concerned bodies to alleviate the impact of human pressure from this wetland.

Adugna (2015) differently studied on the title "assessment of challenges and opportunities of wetlands management in Bule Hora Woreda, Borna Zone Southern Ethiopia". The result of the study indicates that, Bule Hora woreda has many wetlands, which they use for different purposes including for grazing, for traditional house making, for fresh water supply, for cultivation of some crops and for other purposes. Results of the study Indicates that, Bule Hora woreda has many wetlands, which they use for different purposes including for grazing, for traditional house making, for fresh water supply, for cultivation of some crops and for other purposes. According to this study , some of the degraded factors of these wetlands

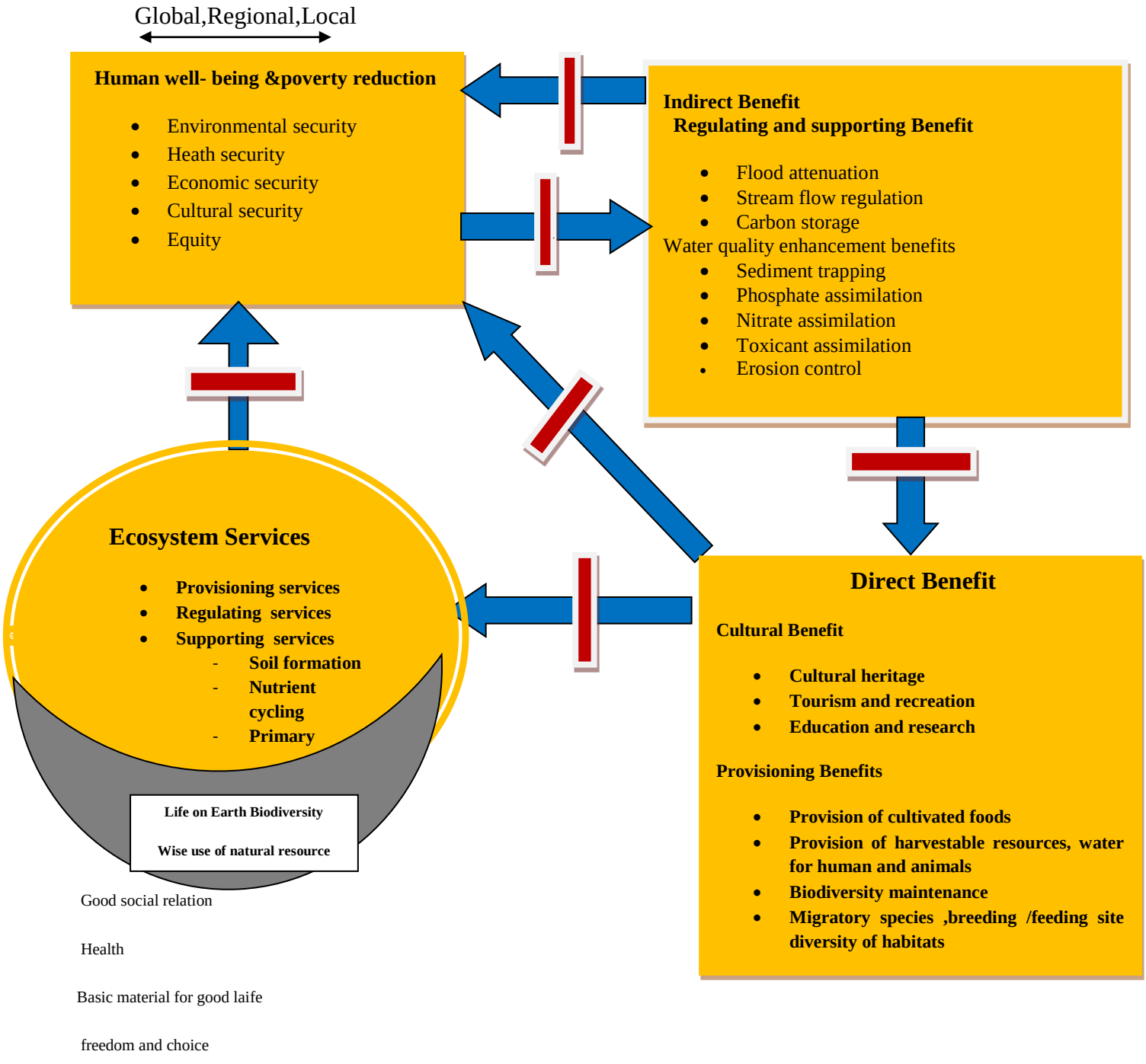
including unplanned settlement ,eucalyptus plantation, deforestation ,agricultural practices ,overgrazing practices and gold extraction particularly for Rophimegada wetlands.

According to Kassahun (2015) in his study titled "socio-economic impact of wetland cultivation in south-Benc, south west Ethiopia" the result indicated that the shortage of subsistence food (65.5), shortage of cropland (64%),declining of upland crop productively (63%.5)and increasing demand of agriculture products produce in wetland (40.48%) were the driving force wetland conversion and cultivation the majority (65.48%) of the households benefited from wetland cultivation through different crops. However, cultivation of wetlands created deterioration of social-economical valuable ecological factors. Among the ecological degradation, about (61.21%) of the households of perceived the degradation of quality and quantity of the domestic use of water, (91.27%) perceived the decreased of grass for thatching, (100%) households perceive the loss of grass for plastering, and also for fodder. Therefore, wetland management needs legal supports and institutions, planning of wise use and strategies for improving the productivity of upland cropland and for minimizing the load on wetland utilization for cultivation.

2.13. Conceptual Framework

The major benefits obtained from wetlands Ecological benefits are highly influenced by a human being and other natural calamities. Here, the conceptual framework places human well being as the central focus, while recognizing that biodiversity and wetland ecosystems also have intrinsic value and the people take decisions concerning ecosystems based on considerations of well being. The assumption is that there is a dynamic interaction exists between people and other parts of wetland resources, with the changing of human condition serving to both, directly and indirectly, drive change in ecosystems and with changes in ecosystem causing changes in human well-being. At the same time, many other factors independent of the environment change the human condition, and many natural factors are influencing the wetland ecosystems.

Figure 2.1A Conceptual Framework



A Conceptual Framework for the Wise Use of Wetlands and the maintenance of their ecological character, and the application of the guidelines in the Ramsar 'toolkit' (2006)

CHAPTER THREE

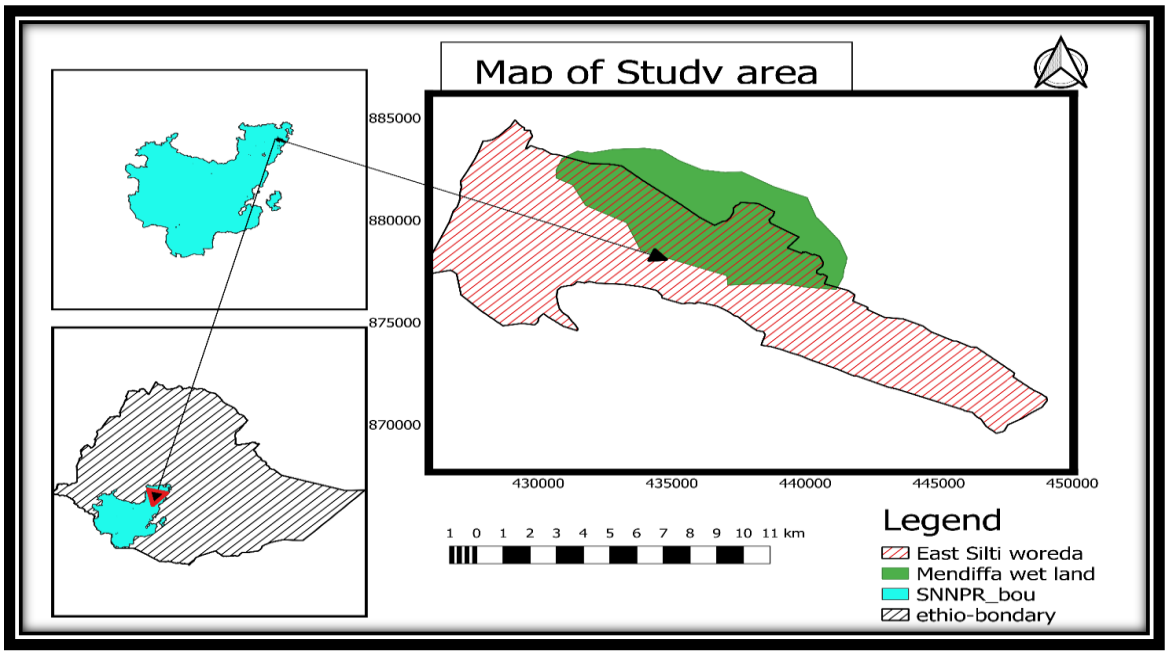
METHODOLOGY OF THE STUDY

This chapter briefly presents the methodology and all the procedures that are supposed to be applied in conducting this study, it describes about the study area, the research design, type and source of data techniques, data gathering instruments and method of data analysis sample size reliability, validity and ethical consideration are highlighted .

3.1 Description the Study Area

This study was conducted on Mendiffa wetland it located Misrak Silti Wereda in silte zone SNNPR Ethiopia, Werabe Town is the capital and administrative center of Silte Zone located 172 K.m away from the capital of Ethiopia of Addis Ababa and 162 K.m from Hawassa the zone covered total area of about 2786.09 Km^2 which of 12,095.8 Hectare the population of Misrak Silti Woreda around 54,579 Female 11,488 Male 43,091, (CSA1999) and 6,796 HH (source Misrak Silti woreda agricultural office) the study will be conducted in Mendiffa wetland 2 K.M from Gerbiber Town as well as the study area covered 268 hectare (source Misrak Silti wereda agricultural office) the area receives rain full between 1000 and 1490 m.m the hevest concentration from Jun to September and the average maximum and minimum temperature is 26.4 ^oC and 11.5 ^oC respectively the major crop production in the study area is wheat, maize, Sorghum, Teff, Barley mixed agriculture 97 % Kolla 3% Weynadega. Mendiffa wetland is bordered in the North Silti and Mareko wereda in the South Lanfuro and small Abaya Lake as well as in the East Oromia regional state and in West Silti Woreda the district has 9 rural kebeles and 2 urban kebeles. Geographically Mendiffa wetland located 7^0 37^0 “N to 7^0 0.0 “N latitude and 38^0 9’ 36”E to 38^0 31’12”E longitude.

Figure 2.Map of the study area



Source: Misrak Silti Woreda Agricultural office

Demographic Features

Based on the central statistical agency of Ethiopia, misrak silti woreda has total population of 54579 people of which 14.243 men, 11488 are male and the 54579 female 43,091 (CSA 1999) and 6796 HH (source misrak silti woreda agricultural and Rural development office) inhabitants comprise 89.3 % and urban inhabitant's number 10.7% of the population with an estimated area of 2786.09 square kilometers and misrak silti woreda is one of the densely populated woreda among eleven Woreda in silti Zone, and the majority of the inhabitant is of the population reporting that belief, 97% were Muslim and 3% practiced Ethiopian Orthodox Christianity (CSA, 2015).

Climate

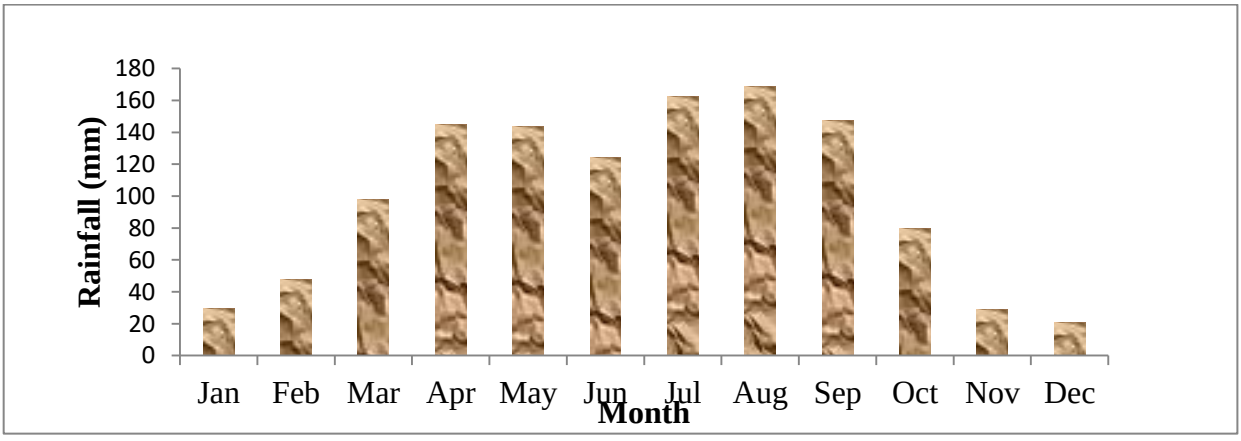
Ethiopians, since antiquity have broadly divided their climate into five Zones based on elevation, each zone has its own rainfall pattern and agricultural production system. In general,

the highland Zones (Dega and WeinaDega Zones) contain most of the agricultural areas, while the semi-arid and arid lowlands Zones (Kolla and Bereha) are dominated by livestock in agro pastoral and pastoral production systems. The altitude ranges of misrak silti woreda from 1876-2257(m.a.s.l) meters above sea level with a predominantly dry kola (hot lowlands) agro-ecology. Its total area is estimated to be 32,320 hectares. Topographically, the district has 26,827 hectares (83%) of flatland, 226 hectares (7%) of slopes, and 3,232 hectares (10%) covered by Lake mendiffa wetland and its surrounding marsh-fields Majority of district population are dependent on agriculture.

Rainfall

The rainfall of the study area is highly influenced by the position of inter-tropical convergence Zone (ITCZ) and the development of Tropical Easterly Jet (TEJ). The rainfall has a bimodal nature in which the months from June to September and March to May; while months from November to February are dry. The long rainy season in the area is between, June up to September, during which crop cultivation takes place in the area. The maximum rainfall reaches as high as 1000 and 1490 mm in August and lowers to 20.9mm in December. The mean monthly rainfall distributions of the study area are shown in (figure. 3).

Figure 3.3. Mean monthly rainfall of the study area (1989-2016)

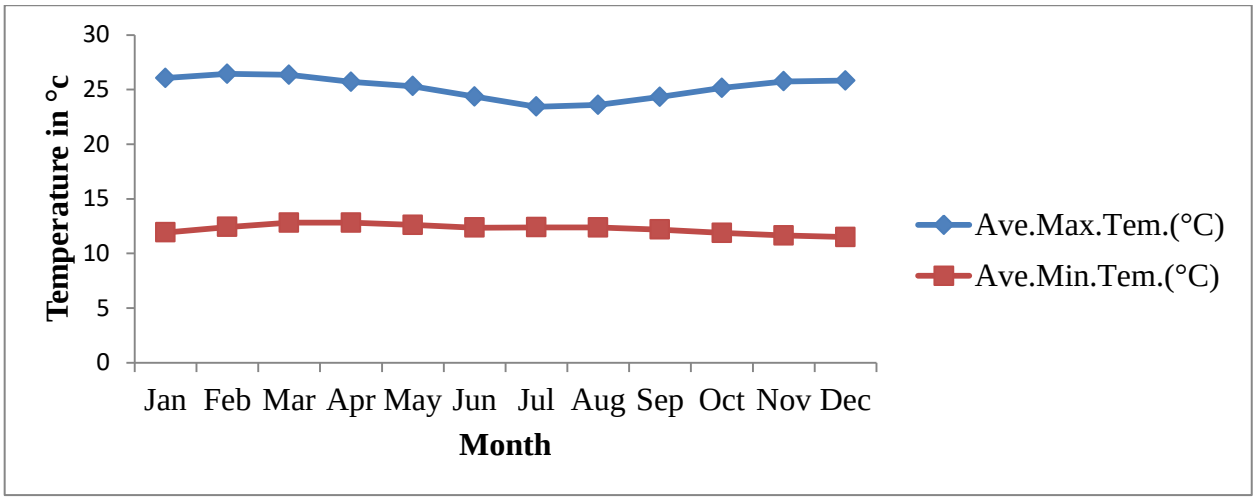


Source: Ethiopian National Meteorological Agency

Temperature

The mean maximum temperature of study area is 26.4^{0}C occurred during February, while the mean minimum temperature is 11.5^{0}C occurred during December. The mean maximum and minimum temperature of the study area are shown in (figure 4).

Figure 3.4. Mean monthly temperature of the study area (1989-2016)



Source: Ethiopian National Meteorological Agency

Vegetation

The common trees species observed in the area are Acacia sp, Cordia Africana, and Eucalyptus sp. These tree species are observed throughout the Woreda, mostly scattered in the cultivated landscape. Due to the, long history of agriculture and high population in the area, vegetation cover is sparse. Consequently, soil erosion problems on the steep slope areas are enormous. Huge gullies are observed towards the southern end of the Woreda and around bobodo River, where soils are totally removed beyond recovery (MSWAO, 2016).

Soils

There are five major soil types found in the catchment, namely: Luvisols, Niotosols, Vertisols, Lithosols and Andosols. Nitosols and Vertisols occur with two horizons which are Dystric and Eutric for the former and Eutic and Pelic for the later. Luvisols occur over 47.2 percent, while Lithosols and Andosols cover 13.8 percent and 12.5 percent, of the catchment, respectively. Luvisols, (with the exception of Letic, Gleyic, Vitric, Albic, Ferric and Dystric soil units)

explained by FAO (2001) are fertile soils and suitable for a wide range of agricultural uses; and require erosion control measures if occur on steep slopes. Andosols are also described as having high potential for agricultural production and are not easily exposed to excessive leaching. The soil is suitable particularly for variety of crops such as sweet potato, vegetables, wheat and paddy rice in low lands. In a natural sense, its existence at steep slopes is said to be supportive for best keeping forests. Thus, the dominance of those soil groups explains the potential for crop production if appropriate management practices are applied (Source: SZAO 2000).

Economic Activity

The major economic activity in the study area is crop-livestock mixed agriculture on which the population depends. Crop production is the main agricultural activity for the livelihood of the smallholder farmer in the study area. The major crops grown include pepper, maize, teff, sorghum, potato, fruits and vegetables. Nearly, all of the crop production in the study area is rain-fed and grown in the main cropping season, the Meher. According to misrak silti woreda finance and economic development office report, from the total area of the district, 20, 834 hectare of land was used for annual crop production in 2014/2015 production year; from the total arable land 3,561 hectare (cultivated land) was allocated for pepper production. From the total land allocated for red pepper production, 95,043.09 quintals red pepper has been produced in the production year (MSWFEDO, 2016).

3.2. Research Design

The Primary objective of this research study was to identify the challenges and opportunities of the conservation of mendiffa wetland the case of misrak silti woreda in siltie zone to achieve this objective the researcher would be employed descriptive survey research design was use full because the major purpose of the research design was to identify the challenge and opportunity of the conservation of mendiffa wetland state practice in the study area. According to best and khan (2008), descriptive survey research design is very important when it is aimed to assess the question of what is? The researcher was also use mixed method for triangulation to provide with relevant and accurate information time efficient research method involves gathering data that describes the events and then organizes, depicts the meaning of the collected data. Quantitatively, the researcher used a survey design to describe data which gathered from the sample population.

The research approach is mixed its research preferable because of one data resource might not be sufficient for the sake of this study the researcher has been use a mixed approach .
This study would be employed descriptive survey research design. Descriptive research design was an approach of descriptive research that blends quantitative and qualitative data to provide with relevant and accurate information time efficient research method involves gathering data that describes the events and then organizes, depicts the meaning of the collected data. Quantitatively, the researcher used a survey design to describe data which gathered from the sample population. Qualitatively, according to (Kothari, 2004) it was concerned with the subjective assessment of attitudes, opinion and behavior in such a research situation researcher's insight and impression. In this study, the researcher used qualitative approach aimed to triangulate the validity of data was obtained from focus group and a key informant interview. It also helps the researcher to insight their attitude and feelings during data gathering.

Research approach According to Creswell, et al. (2002), mixed research is preferable because one data resource might not be sufficient, initial results need to be explained further, a second method is needed to enhance a primary method, and it has multi stage phase. For the sake of this study, the research was use a mixed approach to research it focuses as method, on the collection, analysis and mixing of both quantitative and qualitative data in a single case study
Mixed research methods employed in order to associate or cross-check theoretical data with the existing situation in the study area. It also helps to expand an understanding of both quantitative and qualitative methods, to meet or verify findings from proposed data sources.The research approach is mixed its research preferable because of one data resource might not be sufficient for the sake of this study the researcher has been use a mixed approach to research.

3.2.1 Sources of the Data

For the successful completion of the study, the researcher has been employed both primary and secondary data sources. The primary data would be collected using household survey, focus group discussions, and key informant interview with a different background. Moreover,

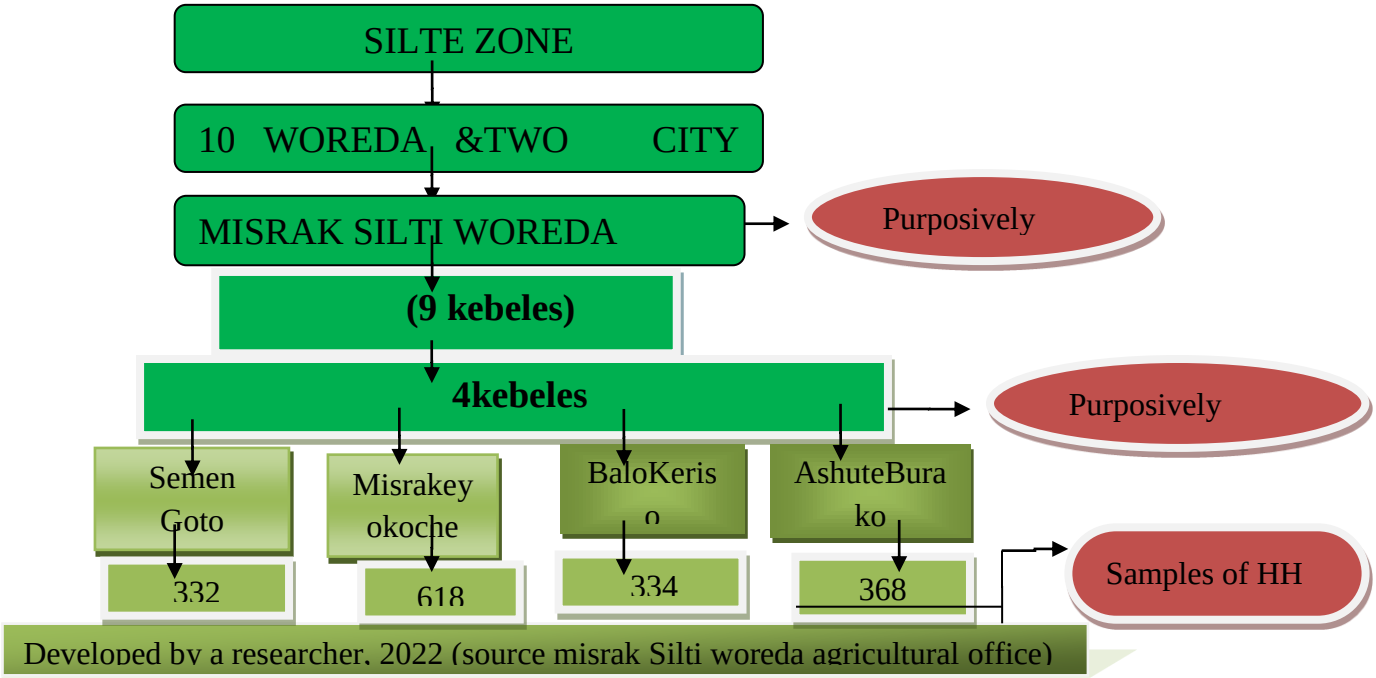
an observation was made. Secondary data used to supplement the survey data. That related document ,studies and other useful written materials needed for the study from internet source , study reports, and other significant published and unpublished documents such abooks and thesis, records, articles and current performance reports used as secondary data sources.

3.2.2. Sample Techniques and Sampling Size Determination

3.2.2.1. Sampling Techniques

For this study out of nine rural kebele administrations in Misrak Silti Woreda, four of the kebeles are adjacent to the Mendiffa wetland and from this due to Homogeneity of the population as well as budget and time constraint, four of the kebeles of the Woreda selected by using purposive sampling techniques for household survey on the basis of their direct interactions (adjacent to) with Mendiffa wetlands. Such as Semen Goto, Misrak Eyokoche, Balo Keriso and Ashute Burako here below as follow

Figure 5.The sampling techniques



3.2.1.2. Sample Size Determination

The study was proposed the multi- stage sampling techniques for selection of the study area and individual households.

First phase, Misrak Silti Woreda of Silte Zone has been selected by using purposive sampling technique because Mendiffa wetland found in Misrak Silti woreda of Silte Zone.

The 2ndphase, for this research out of 9kebeles in Misrak Silti Woreda, four (4) kebeles namely Semen Goto, Misrakeyo koche, BaloKeriso and Ashute Burako were selected as study area. Because, the selected kebeles are found adjacent to the Mendiffa wetland and from this due to Homogeneity of population as well as budget and time constraint, four of the kebeles of the Woreda selected by using purposive sampling techniques for household survey.

The 3rdphase, in this study has been the total population of the selected kebelles is 1652. To select the sample: Carvalho's (1984), sample size determination model used. Hence, the above population size has been categorized in the fifth row; in order to be representative in this study the larger sample size (125 households) selected.

Table 1Carvalho's (1984), sample size determination model

Population	Sample size		
	Low	Medium	Large
51-90	5	13	20
91-150	8	20	32
151-280	13	32	50
281-500	20	50	80
501-1200	32	80	125
1201-3200	50	125	200
3201-10000	80	200	315
10001-350000	125	315	500
35001-150000	200	500	800

(**Source**: Malhorta Naresh, 2007)

The study employed probability proportional to size sampling technique has been applied to get the proportional size of the respondents from each selected kebeles. In the last stage, individual respondents from each selected kebeles applied using Systematic random sampling technique.The method is selecting households (HH) every k^{th} item from the list; K = N/n where 'k' refers to the sampling interval, 'N' refers to the population (number of HH in each kebeles) and 'n' refers to sample size of each kebeles. The sample size determination of each kebeles by using proportional sample size technique nh=Nh*n/N, where n= sample size , nh=

determined sample size of each kebelles, Nh =the total households of each kebeles and N= the total number of household in selected four kebeles.

Table 2: Proportionate sampling of kebeles

No	Name of kebeles	No. of household each kebeles	Sample size	K=N/n
1	SEMEN GOTO	332	((332/1652)*125)=25	332/25=13
2	MISRAKEYE KOCHE	618	47	13
3	BALO KERISO	334	25	13
4	ASHUTE BURAKO	368	28	13
	Total	1652	125	

Source: Researcher's own computation (2022)

3.2.3. Data Collection Tools

The data for this study collected through questionnaires, focus group discussions, field observation and key informants interview. The researcher role during interview and discussion is only facilitating, explaining and guiding necessary directions rather than involving.

3.2.3.1. Questionnaires

To collect data, the researcher prepared (both close-ended and open-ended questions) for the heads of household. The closed-ended questionnaires are chosen for it was easy to fill out, takes little time keeps the respondents on the subject, was relatively objectives and was fairly easy to tabulate and analyze, whereas, the open-ended questions used together additional information. In line with this, the open-ended questions are used for that it gives a chance for respondents so as to express their own ideas, feelings and understanding about the issue freely.

For questionnaires, heads of households were selected through systematic sampling. The researcher has taken a sample of target population at 13^{th} intervals. K=N/n 332/25 = 13. It is the approximate quotient of the total sample frame and sample size of the study population.

The Data were conducted by the enumerators distributed to the 125 respondents in English language and translated in Amharic languages for male or female or the spouse in the absence of the head. The researcher selected four enumerators for collection of data which constituted person who are graduates of grade 12. The selection of enumerators based on their

understanding about the issues of the challenges and opportunities of conservation of Mendiffa Wetland and fluency of the local languages (Siltigna) as well as translation skill of English version to the local language. They are also aware of various elements of the questionnaires, specific research issues and objectives of the study. The researcher has accompanied enumerators in order to coordinate and cross-check their works as well as maintain the quality of data collection.

3.2.3.2. Key Informant Interview (KII)

It was one of the methods that used to collect qualitative data. It supplements the data collected from individual heads of households through questionnaire and to have a detailed insight in challenges and opportunities of Mendiffa Wetland conservation. In the area, a discussion covered different topics of guide line with 10 key informants, who were working in the study area. Purposefully selected informants from representatives of the woreda, one kebele health officer, one kebele administrator, three from agricultural office, three environmental office, one Development Agents (DAs) and one woreda administrator were employed .

3.2.3.3. Focus Group Discussion

This was used to support the data obtained from the heads of households through survey and interview with various stakeholders. In all the four kebeles that surveyed discussions held with a group of individuals composed of a different background. Each selected kebele involved to participate in the FGDs. They were asked questions in an interactive group setting by which participants were felt free to talk with other group members. The study have been four focus discussion groups, each group has seven members including one model farmer, two DAs and one Keble administer and three elders for two hours. To follow the participants the researcher has prepared a check lists.

The community elders and youths as well as women's were an important source of information sharing their observations and experiences on the change in the natural resource bases and their values. A total number of participants in one group employed seven people in the group discussions. A checklist has been prepared to lead the discussions. The major focuses of the discussions was generate information at a community level that can complement

the survey data in the value (importance) as well as threats of wetlands. As far as possible, the discussions also had supplemented with field observation of the facts on the ground.

In order to remove any redundancy, from the discussions, the researcher made an effort to create very conducive situation, were the participants of the discussions can speak all information they have without any hesitation. In conducting this, the role of the researcher was taking notes and put necessary concepts on the paper in an organized manner during and after the discussion.

3.2.3.4. Field Observation

Field observation started even writing the proposal and continued on to the whole process of data collection to make sure the validity of acquired information. It was aimed at understanding the condition of local community in terms of their culture, farm practices and traditional way of resources utilization and application of conservation measures, etc. in the four sampled kebeles observed purposefully and frequently.

Table3.3 Summaries of Methods of Data Collection

Data collection methods	Participants of (FGDs, KIIs,Questionnaires)	Number of Participants	Sampling Techniques
FGDs	Model farmer	ONE (1)	Purposively
	Development Agent	TWO (2)	
	Keble administrator	ONE (1)	
	Elders	THREE (3)	
KIIs	Keble administrator	ONE (1)	Purposively
	Agricultural office	THREE(3)	
	Environment office Experts	THREE (3)	
	Health officer Experts	ONE (1)	
	Development Agent Experts	ONE (1)	
	Woreda administrator	ONE (1)	
Questionnaires	Heads of households	(125)	Systematic random sampling techniques

Source: own computation, 2022

3.2.4. Data Analysis

There are two type of data analyzing numerical data were collected through close ended question in the questioner where categorized and organized in to table and analyzed using frequency count, percentage about the quantitative data, the result were then categorized and organized in the table as well as analyzed using frequency count and percentage the result were interpreted by writing description about qualitative data response the open ended questions of the questionnaire as well as those obtained through interview and FGDs were categorized in to thematic and analyzed qualitatively using narratives.

The data analyzed and interpreted based on the concepts of a particular theoretical orientation and empirical evidence. The quantitative data collected from the questionnaires was analyzed by using Statistical Package for Social Sciences (SPSS version 22). Software mainly used a descriptive statistical method. On the other hand, the qualitative data from Focus Group Discussions (FGDs) and Key Informant Interviews analyzed by using the description as well as narration in order to triangulate its validity and reliability with the quantitative data.

3.2.5. Validity and reliability analysis

Although it was impracticable to devise the perfect survey questionnaire, researcher can still make a successful research through questionnaire pretesting. According to Presser et al., (2004) noted that, Pretesting is the only to appraise in advance whether a questionnaire creates problems for interviewee or respondents. Hence, the validity of designated data gathering instruments were done distributing in the study area to selected participants not sampled for the study, but from target population. Accordingly, pretest was made and some modifications were taken place in data collection tools, the reliability coefficient value above 0.7 is generally considered sufficient and reliable (Brown et al., 2004 cited in Kimodo, 2013). Result from reliability statistics of Cronbach's alpha showed that the instrument was reliable at 0.814.

Table 3.4Reliability Test of Cronbach alpha (α)

	No of Items	Cronbach Alpha
	25	0.814

Source: own computation, 2022

3.2.6 Ethical Considerations

Ethical consideration in research was very important since it promotes knowledge, trust accountability, mutual respects, fairness, social responsibility, human right and adherence to the law (Resnik, 2011). In conducting this study, it needs to plan and conduct a community assessment; including collecting data from household members, it was important that the researcher to identify a potential risk or ethical consideration. Before starting data collection support letters and ethical clearance with protocol number was obtained from Wolkite university graduate school and before distributing the questionnaire the researcher clearly explained the purpose of the study; its objectives; and intentions to data collectors, key informants and participants in group discussion verbally. In some occasions, the households were take part in this research with the expectation of incentives. In such cases, an effort has been made to convince them that there was no aid or assistance that had been given as a result of participating in the survey. To assist the process, legal recommendation paper and some identification were used. Efforts have been done to be free from plagiarism and falsification of materials.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter includes the general background of respondents, socio-economic characteristics, and challenges of conserving the Mendiffa wetland; threats to the existence of the Mendiffa wetland and opportunities for the conservation of the Mendiffa wetland.

4.1. General Background of the Respondent

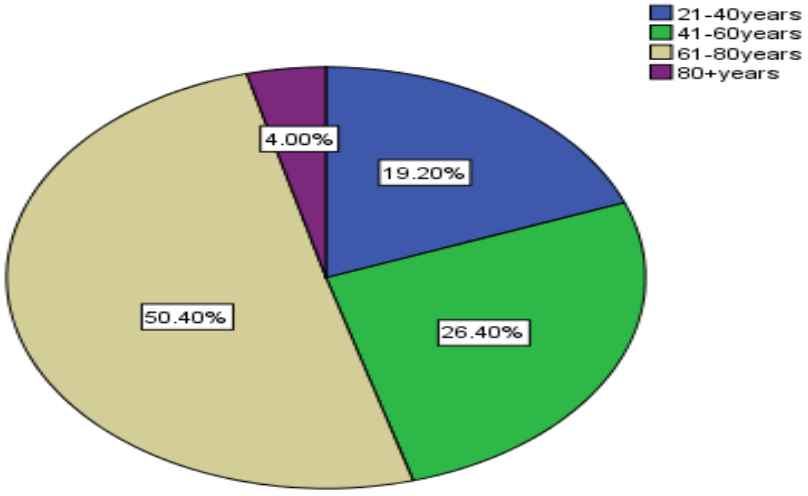
In this section, the general background of respondents like Sex, Age, and residence of households in the area were presented and discussed in the study.

Table 4.1: Demographic Variables

Categorical Variables		Frequency	Percentage
Sex	Male	113	90.40%
	Female	12	9.60%
Age	<20	0	0%
	20-30	4	3.20%
	31-40	20	16%
	41-60	29	23.20%
	61-80	72	57.60%
Educational status	Illiterate	67	0.536
	Read and write	25	0.2
	Primary education (1stand2ndcycle)	13	0.104
	Secondary education (9-10)	12	0.096
	Certificate	-	-
	Diploma	8	6.4
	Others	--	
Family size	Islam	96	76.8
	Protestant	-	-
	Orthodox	29	23.2
	5-Jan	17	13.6
	10-Jun	95	76
	15-Nov	13	10.4
	Total	125	100

As shown in Table 4.1, the majority of households were headed by 113 (90.4%) males and 12 (9.5%) females. In terms of age group, 72 (57.6%) of heads of households were between the ages of 61 and 80, followed by the 41-60 year age group, 29 (23.2%), and then 31–40 years of age, 20 (16%), and 20–30 years of age (3.2%). The result indicated that the majority of the heads of households are found in the age group of 61 to 80 years old in the wetland area. According to educational level, 67 (53.6%) of them are illiterates, 25 (20%) of them can read and write, 13 (10.4%) of them completed primary education, 12 (9.6%) of them completed secondary education, and 8 (6.4%) of them are diploma holders. This shows that the majority of heads of households were illiterate. Regarding the religious composition, the area appears to be quite diverse; people of different faiths and different religions co-exist together in the woreda. However, the data on the religion in the study area shows that 96 (76.8%) of the respondents are Muslims, followed by orthodox at 29 (23.2%). The majority of the respondents were affiliated with Islam and orthodox religion. Regarding family size, the number of family members in each household may be composed of family members, relatives, or other people living within the households for an extended period of time. The survey result shows that the head household size ranges from 1–15, with an average of 6.

Figure 4.1. For how long have you been in this area?



Source: Researcher's own computation, (2022)

When asked for how many years they have been in their respective wetland areas, the respondent stated that they have been 60 to 80 years. 63 (50.4%), 41 to 60 years 33 (26.4%), 21 to 40 years 24 (19.2%) and then 80 years above is 5 (4%). Generally, as shown in the pie

chart, more than (nearly 50.4%) of the heads of households answered about 61–80 years. Wetlands have played a noticeable role in the growth of human civilizations and cultural development. This is true globally, where the majority of pre-historic civilizations, including those on the Nile, Euphrates, and Tigris, have emerged and developed (Finlayson and Moser, 1991, cited in Yilma, 2003). According to the survey results, a majority of the heads of households have settled around for many years in the wetland areas concerned.

4.2. Socio-economic Profiles of Households.

In this section, the socio-economic profiles of the households of the respondents are discussed as follows: based on source of livelihood, total size of land in hectares, livestock holdings by number and type, yearly household earnings linked with the wetland, and family member activities in the wetland in the study.

According to the source of livelihood, 75 (60%) of the households are dependent on crop production, 45 (36%) are dependent on livestock rearing, and five (4.0%) are engaged in the petty trade. As indicated in the previous part, more than 90% of their annual agricultural output is maize and red pepper. The result indicates that the majority of heads of households are dependent on crop production.

Table4.2 Source of livelihood

Source of livelihood	Frequency	Percentage
Crop production	75	60%
Livestock rearing	45	36%
Petty trade	5	4.0%
Total	125	100%

Table 4.3 : Land holding size

	Perennial cropland	Permanent cropland	Forestland	Size of land holding in wetland
0.5 hectare	-	-	-	29(23.2%)
1-2 hectare	-	107(85. %)		12(9.6%)
2-3hectar	-		-	
3-4hectar	-	17(13.6%)	-	
5-6hectar		1(.8%)		
None				84(67.25%)
Total	125(100%)	125(100%)	125(100%)	125(100%)

Source: Researcher's own computation, (2022)

As shown in Table 4.7, the landholding size of the surveyed heads of households ranged from 0.5–6 hectares with respect to the land category. Accordingly, all of the heads of households do not have access to perennial cropland and forestland. With regard to the permanent cropland holding, 107 (85.5%) households have permanent cropland with a holding size of between 1-2he and 5-6he of land. When compared to the size of landholding in the wetlands, 29 (23.2%), 12 (9.6%) of households accounted for holding sizes between 0.5-1he and 1-2he, respectively, and 84 (67.25%) did not have the wetland share in land holding. Having small-sized ownership in wetlands is mainly because the wetlands are considered to be public assets and serve as the only grazing land in Mendiffa wetland. The result shows differences in holding size among the different land category types. The majority of the households (85.5%) owned permanent cropland with a holding size of between 1-2he and 5-6he as compared with the other category types.

Table 4.4 Livestock holdings by number and types

Livestock	Oxen	Cows	Calves	Goats
0	0	3(2.4%)	5(4.0%)	19(15.2%)
1-2	100(80%)	86(68.8%)	95(76.0)	68(54.4%)
3-4	19(15.2%)	27(21.6%)	23(18. %)	28(22.4%)
5-6	5(4.0%)	7(5.6%)	2(1.6%)	7(5.6%)
7-8	1(.8%)	2(1.6%)	0	3(2.4%)
Total*	125(100%)	125(100%)	125(100%)	125(100%)

Source: Researcher's own computation, (2022)

As shown in Table4.8, the result shows that the number of livestock in a household ranges from 0 (having no livestock) to 8. The majority of the households (100%) had more oxen, and the oxen are the most important resource for farmers because they play a crucial role in agriculture activity. According to the survey results, the types and number of livestock with a high economic contribution to the household are 95 (76%) calves, 86 (68.8) cows, and 68 (54.4%) goats. This clearly indicates that the majority of grazing cattle are found in the wetland of Mendiffa. This shows that the main sources are grass and water. When asked, the livelihood is linked to the wetland. 121 (96.8%) of the households are linked; for example, 113 (90.4%) of the households are engaged in wetland grazing, and 12 (9.56%) of the households are engaged in grass cutting. In connection with this, wetlands are used by virtually all households in the western Wellaga and Illubabor zones directly or indirectly. The main uses are social/ceremonial reeds, medical plants, thatching reeds used for housing construction and granary roofing, domestic water supplies, dry season grazing land, water for livestock, and temporary crop-guarding huts of reeds, cultivation, and craft materials (Hailu, 2003).Generally the above results indicate that the livelihood of the head of the households is linked with the wetland.

Table 4.5: Annual income of the household linked with the wetland

Income (EBR)	Frequency	Percentage
500-1000	31	24.8
1500-5000	11	8.8%
5000-10000	-	-
10000-20000	-	-
None	83	66.4%
Total	125	100

Source: Researcher's own computation, (2022)

As shown in table 4.5 with regard to the economic activity that is related to Mendiffa wetland, the yearly average income of households ranged from less than BR500 to more than BR5000. Poor households, particularly women, rely on wetlands for additional income for their families. Hence, wetlands contribute significantly to efforts aimed at poverty reduction and food self-sufficiency. A growing number of people in Ethiopia, in both rural and urban areas, depend on wetland resources for their survival. Many peasant farmers in the western parts of the country make their living from wetlands (Mengesha, 2017). Similarly, wetland resources are critical to the poor's livelihood in developing countries. For example, wetland activities at the Pace wetland in Uganda provide > 50% of the monthly income of the dependent population (Opio et al. 2011). In Zambia, wetlands are estimated to contribute around 5% of gross domestic product (GDP) (Schuy and Brandder, 2004).The result indicated the majority of the heads of households stated that they did not know how much yearly income they earned from the wetland but they were dependent on the wetland directly or indirectly.

Beyond the use of mendiffa for economic purposes from the wetlands, households reported that they used water from the wetland for recreation, e.g., swimming and 3 (2.4%), used for enjoying the view. 3 (2.4) of the heads of household houses benefited for fetching water and animal drinking, 17 (13.6%), for ritual (e.g. sacrificing and feasting). People used to believe in the spiritual force of mendiffa, which was traditionally known as "Tebelywa" and "Zeket"; now, people do Dua (worship) in the mendiffa wetland, which is also used for sanitation, fetching water, and animal drinking. Despite the fact that wetland areas serve numerous social, cultural and ecological functions and services that are critical to local, national, and global society, The value of some of these functions and services could be determined by the market forces of demand and supply. Many of them have non-market values (Mengesh, 2017). Moreover, wetland sites and dependent species have significant recreational, cultural, and spiritual/religious values (IUCN, 2004). This is also backed by FGDs and key informant interviews saying it is important for the local society for animal drinking, enjoying the view, some time for spiritual purposes, sanitation water, swimming in the lake, watching birds and so on. Based on the above analysis, it is evident that the majority of the respondents have

stated that the wetland benefits the community outside of its economic purpose in the study area.

When asked how close they live to the wetland concerned, 117 (93.6%) of the households surveyed answered that they are living very close (within 30 minutes' walk) to the wetland and 8 (6.4%) of the households are living close (within an hour's walk) to the wetland. The result indicated the majority of the households live in the vicinity of the wetland. This could have an impact on the environment. Besides, 115 (92%) of the households responded that there are disadvantages, and 10 (8.8%) responded that there are advantages to living in the wetland, and the majority of the households reported those disadvantages because of fear of malaria infection (98.4%) and the rising water level affecting the farmland mostly during the rainy season (21). Having mentioned the disadvantages they are facing, wetlands in the form of swamps are the breeding grounds for mosquitoes and other diseases (Maria, 2018). The above analysis indicated that the majority of the households fear living in and around the wetland because of fear of malaria infections.

According to the survey results, all of the respondents (100%) answered that their family members go to wetland every day for different reasons, mainly for recreation, playing football, collecting animal manure for fire, and cattle rearing, when they were asked how often and why they go to wetland. As noted by Mengesh (2017), wetlands are often inviting places for popular recreational activities, including hiking, fishing, bird watching, photography, and hunting. Hunting and fishing remain sports that are dependent on wetlands.

Table 4.6: Family member activities in wetland

Family member	Frequency	Percentage
Men	18	14.4
Women	2	1.6
Children	14	11.2
Families	91	72.8
Total	125(100%)	100%

Source: Researcher's own computation, (2022)

As shown in table 4.6, the survey result indicated that the majority of the households (91, 72.8%) are engaged in the activity of the wetland for different purposes. The result indicates

that each member of the households was subject to activities in and around the wetland in one way or another.

4.3. Challenges of the conserving the Mendiffa wetland

Human activities, usually in the catchments, are likely to have an unwanted impact on the wetland. Various kinds of human activities, for example, irrigation, agricultural activity near to the wetland, cutting of grass, hunting, grazing, sedimentation, etc., are taking place in and around the wetland. When the heads of households were asked for their view on the undesirable impacts of human activity, almost 120 (96%) of the households judged that human activities had an undesirable effect on the mendiffa wetland, and 5 (4%) of the households reported that there was no undesirable effect on the wetland. This was also supported by the FGDs and key informant interviews who assert that human activities such as expansion of the farmland and hunting of wild animals like hippopotamus are the major challenges in the mendiffa wetland. Furthermore, illegal hunting of wild animals, particularly the Hippopotamus, has resulted in their extinction, and harvesting of teff, sugar cane, and chat on the edges of wetland, primarily in Balo kerso, Sedagora, and Mera Eykoch mendiffa wetland, is exacerbating the situation.

As a result of this activity, irrigation schemes or water diversions for irrigation have undoubtedly caused adverse effects on wetland ecosystems. At their most severe, these effects have included the submersion of wetlands or their replacement by upland vegetation communities, with consequent effects on the biota that depend on these wetlands and the services that humans have hitherto derived from the system (Glenn et al., 2001). Similarly, Gemechu (2010) indicated that Lake Abijata and its associated wetlands are degrading progressively due to natural and human factors such as farmland expansion, sand mining, mineral salt extraction, overuse of water for irrigation and other development interventions like soda ash factory, which are among the major threats to wetland management. Thus, the above result confirmed that human activities have an undesirable effect on the mendiffa wetland.

Figure 4.2 Mendiffa Wetland is surrounding by the farmland

Source: Mendiffa wetland is surrounding by the farmland (photo: Yirdaw Ali 2022).

Also, when asked how they evaluated the status of the wetland in their lifetime, 111 (88.8%) of the heads of households reported that the wetland of Mendiffa wetland was shrinking and 14 (11.2%) of the heads of households confirmed that the wetland was fluctuating. When asked the possible cause of the shrinking of the wetland as an open-ended question, to elaborate, the reason is that of sedimentation that came from different adjacent areas. Similarly, as explained by the FGDs, the key informant Experts said that the main reason for the shrinkage of the wetland was the accumulation of sedimentation that came from the different areas of the adjacent highland areas that affect the wetland environment. In addition to this, sedimentation affects the wetland soil profile. Native macro invertebrates suffer as the soil profile changes from native to layers of sedimentation. The accumulation of sediments in wetlands caused by upland erosion may reduce wetland volume, shorten the time wetlands retain water, and alter pant community structure (Jurik, 2010). Therefore, the results indicated that sedimentation is a major challenge to the shrinking of the wetland.

With regard to vegetation cover over time on the wetland concerned, the survey result indicated that all heads of households (100%) reported that the vegetation cover on the wetland was decreasing. In line with the clearing of vegetation, which contributes much to the recovery of the wetland, such as sedge and other wetland grasses and trees, which cover and play key roles in protecting loss of water from the wetland through evaporation, are cleared for the purpose of agriculture. Therefore, the wetland has been highly exposed to evaporation, which leads to the complete removal of water. Likewise, soil compaction is another major problem as a result of overgrazing in the wetland, which reduces the soli porosity that allows the movement of air and other nutrients in the soil. When continuous cultivation is followed by

grazing, wetland areas become easily degraded and lose their natural vegetation. They also erode water channels, leading to gulling and increased water outflow. These often result in the complete degradation of wetlands by reducing the water table and by changing the original vegetation (Adugna, 2015).

The above analysis was supported by the FGDs currently the vegetation cover on the wetland has been reducing because of the human activities where the communities used wetland resources such as reeds and grasses unwisely for grazing and roofing of houses which affects wetland vegetation and the sedimentation of soil which is caused by deforestation and contributed for the decreasing of the vegetation cover. Therefore, the result indicated that wetland vegetation were severely affected by the human activities directly or indirectly.

When the households asked whether or not they used any chemical fertilizers of pesticides for the cultivation of crops around the wetland, the survey result exposed that the entire heads households (100%) used the agricultural input. In connection with this, agricultural intensification of the 20th Century, with its fertilizer and pesticide use, has destroyed many of these values, so that many crop fields, pastures and rice fields are very species-poor. Nevertheless, there are wetland areas in many parts of the world where low intensity agriculture is combined with ecosystem services other than food, including biodiversity and flood detention (Millennium Ecosystem Assessment, 2005). According to the key informant interview, the use of chemical in cultivation of crops in one of the activity that could affect the wetland ecosystem functions mainly the aquatic life as well as the plants in it. This would lead to the degradation of the wetland because it would lose its components and will affect its prop er function. From the above analysis it is possible to deduce that using of chemical fertilizers and pesticides for cultivation is another challenge of the wetland.

The households were asked whether they fear that wetland of mendiffa wetland may one day disappear or not. The entire household (100%) said that the wetland will disappear one day in the future and they were asked to elaborate underlying cause of the disappearing as open ended question the reason is the result of siltation and also farmers predicted that at the future wetland become farm land if not conserved well. Similarly the accumulation of silt complete change in the ecosystem biodiversity alteration decreases in the water holding capacity and in the worst case the collapse of the wetland itself (Kostrzewa J, 2003). Furthermore during

FGDs and the key informants different subject matter Experts interview were reported that the major reason for the shrinking in the size of mendiffa wetland all of the respondents said that the accumulation of siltation that came from the different part of the high land area such as Alcho, siliti, woreda and Lafuro woreda areas resulted in the reduction of the depth of lake to 2m depth from where 6m in the past. These is mainly because of the sedimentation of soil in to the wetland also they fear that the wetland may disappear one day. Based on the above premise, the major challenge of the wetland is siltation causing the losses of wetland.

Figure 4.3, Siltation of Mendiffa wetland

Source: Siltation of Mendiffa wetland (photo: Yirdaw Ali 2022)

During the field survey, there were a number of wild life resources observed in the area. For example, there are a great Varity of bird species that resides in the area; Egyptian goose ,Sacred Ibis ,Little egret Spur-winged lapwing ,Red-chested swallow, Yellow billed duck ,Black_ headed heron ,Glossy Ibis Cattle egret are found and Mendiffa wetland has been proposed as a Ramsar site of international importance and it forms part of the IBA. In the Mendiffa wetland it found 78 are found species (IUCN), however, today with different factor such as accumulation of the silt, farming, deforestation, using of fertilizer in the study area are the threat for the birds in the wetland. Because birds are among the most easily defined and readily recognized. Distribution, abundance, reproductive success and behavior of animal species are often sensitive to habitat change caused by human activities. Birds have been particularly useful as indicators to evaluate effects of habitat change because they are easy to watch, and the populations of many decrease or increase when the landscape is modified by such activities (Tsigereda, 2011) despite their importance, many species of birds are in danger of extinction due to human activities. These by the intensive farming, land reclamation, fertilizers, intensive meadow mowing/silage making during bird breeding season, drainage of formerly extensive wetlands, deforestation and widespread clearance of native forest and

woodlands, intensive pine afforestation at the expense of natural broadleaved woodlands, marine and coastal development encroaching on coastal and wetland areas(Birdlife International, 2006).In the study area the researcher observed that there were no do attentions to give by the concerned bodies. Therefore in this situation the wetland bird species will be in the risk unless conservation measure has to be taken.

Figure 4.4 Bird observed in the Mendiffa wetland

Source: Bird observed in the Mendiffa wetland (photo: Yirdaw Ali 2022)

4.4. Threat for the existence of Mendiffa wetland

Wetlands are very important and the most productive environment that produces an ecological equilibrium, considering the impact of wetland loss it is essential to identify the threat of wetlands. One of the specific objectives of this research is to identify the threat for the existence of Mendiffa wetland and in this section dealt with the responsible factor for wetland degradation.

Table4.2 Land holding size

Land holding size	Perennial cropland	Permanent cropland	Forestland	Size of land holding in wetland
0.5 hectare	-	-	-	29(23.2%)
1-2 hectare	-	107(85. %)	-	12(9.6%)
2-3hectar	-		-	
3-4hectar	-	17(13.6%)	-	
5-6hectar		1(.8%)		
None				84(67.25%)
Total	125(100%)	125(100%)	125(100%)	125(100%)

Source: Researcher's own computation, (2022)

As represented in table 4.7, item1 shows that the 59(47.2%) of the households respondent were rated at sever and 48(38.4%) of the households indicated moderate and 18(14%) of the households reported that no factor for the degradation of wetland but the majority of the respondent stated that intensive cultivation is the factor of the wetland degradation in the study area. Intensive agricultural use of wetland has definitely altered their ecological character, because the growth of crops or raising of livestock necessitate reclamation measures such as drainage the growth or tillage in such wetland area ,biodiversity has often been impacted severely and large parts may no longer even qualify as wetland, involving a regime of extensive use without fertilizers or pesticide, the diversity of the wetland landscape may be high , although the species composition and setting differs strongly from that in its pristine situation (Jos T,A.2009).

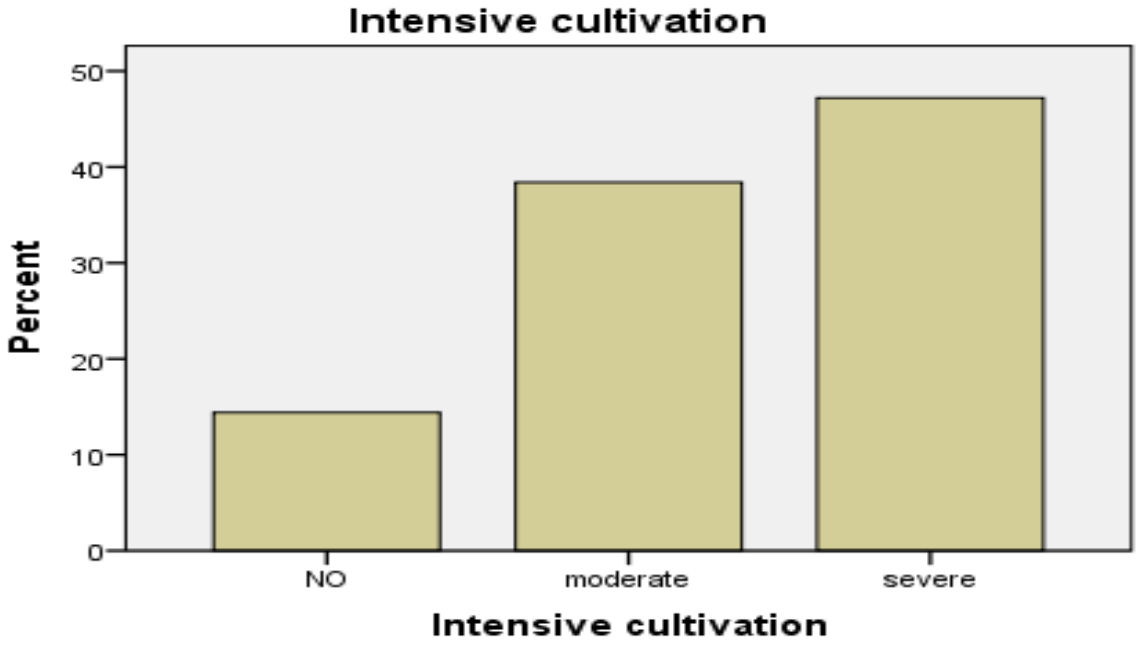


Figure 4.5 Researcher's own computation, Intensive cultivation factor for the wetland degradation

Item number 2 in table 4.7, shows that,119(95.2%)of the households rated at sever and 6(4.8%)of the households reported that moderate therefore the majority of the households stated that overgrazing is the most responsible factor for the wetland degradation of the study area.

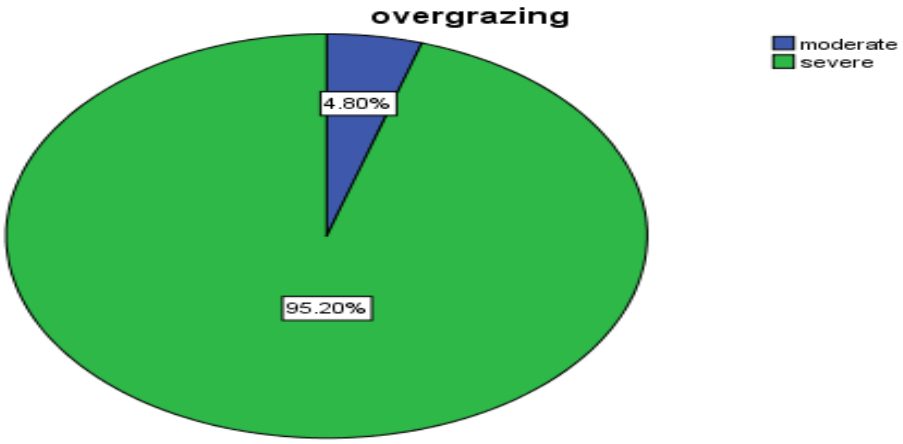


Figure4.6 Researcher's own computation, overgrazing factor for Wetland degradation (2022)

Grazing by domestic stock, predominantly cattle lead to some consequences which include soil compaction and vegetation loss (Coatas, 2010). Furthermore, Combining of cultivation and grazing observed in parts of southwest Ethiopia is a severe problem resulting in soil compaction, reduction of moisture storage and finally drying of the wetlands (Legess, 2007).

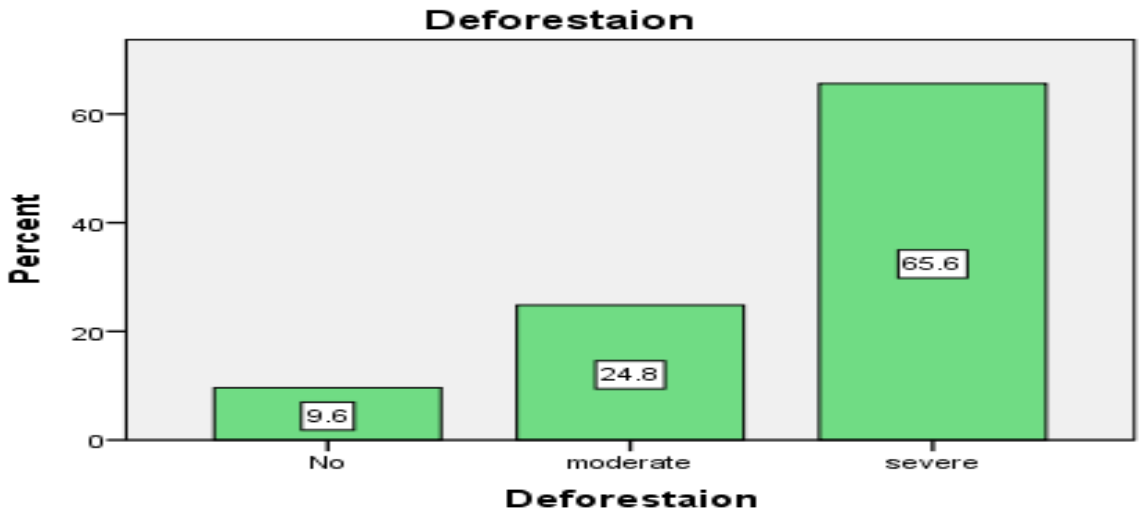
However, this study falls short agreement with the previous research done by (Hayal, 2006). During FGDs and key informants different subject matter experts interview replied that the communal part of the wetland in the hand of sampled kebeles for the grazing purpose. The wetland community takes their cattle frequently for grazing and of the large portion of wetland is communally grazed. Because of it is open access and freely used. As a resulted the continues overgrazing some of the important wetland grasses such as locally known as felia kekaba, are completely consumed and destroyed by the livestock. Due to this factor these ecosystems are degraded and changed to the bare land. According to the respondents, farmers have no awareness regarding the management rather they compete one another for grazing mostly during dry season. In the study area, overgrazing is one of the major threats of the degradation of the Mendiffa wetlandas it was discusses in the above the majority of respondent reported that over 9876 grazing affect to its biological function of the wetland.

Figure4.7 Degradation of the wetland through overgrazing

Source: Degradation of the wetland through overgrazing (photo: Yirdaw Ali 2022).

According to item number 3 table 4.7, shows 82(65.6%) of the households respondents were reported that saver and 31(24.8%) of the households indicated moderate 12(9.6%) of the households reported No effect of deforestation of the wetland degradation but the majority of the households were stated that deforestation is the cause of the wetland degradation in the study area. Similarly as it was discussed by the FGDs and key informant different subject matter experts interview in the study area, deforestation is practiced in the wetland and in the upper catchment or in the high land of the adjacent area mainly for the fuel wood, construction and for cultivation as well as use for other purposes these is one of the threat for the wetland of Mendiffa. Furthermore, deforestation and losses of vegetation within a wetland catchment area is the starting cause for an accumulation of silt within the wetland ecosystem the accumulation of silt with the wetland usually leads to complete change in the ecosystem resulting in biodiversity alteration, in decreases in the water holding capacity of the wetland and the worst case in the collapse of the wetland itself (Lemelm, 2003).

Figure 4.8: Researcher's own computation, Deforestation factor for wetland degradation



Source: Researcher's own computation, Deforestation (2022)

Deforestation has serious effects on wetlands (EWNRA, 2003) the causes of the wetlands degradation are generally the same for all of Ethiopia's catchments. The major ones are deforestation mainly for agricultural purposes, encroachment and settlement as a result of in the catchment area, hence bringing a shorter residence time for water in the wetland and a reduction in groundwater recharge. The absence of forest cover on the uplands may also contribute to a movement of people into wetlands, where alternative subsistence strategies can be pursued (Forum for Environment, 2007). Based on the above analysis deforestation is threat of the wetland in the study area that indicated that the majority of the respondents reported that is the cause of degradation of the wetland.

Figure4.9: Deforestation around wetland

Source: Deforestation around wetland (photo: Yirdaw Ali 2022)

In item number 4 of table4.7, shows, 105(84%) of the households reported that improved drainage is the factor of the wetland degradation and they asked to elaborate the underlying cause as open ended question the reason is that respondent said the drainage it brought eroded soil that came from different part the catchment and 16(12.8%) of the households reported that moderate and4 (3.2%) of the households stated No effect on the wetland on the study area.

Source: Improved drainage (photo: Yirdaw Ali 202)

Figure4.10: Improved drainage

According to the key informant interview reported that the improved drainage it built for the primarily for the protection of the farmers from run of water mostly in the rainy season and open up the way the water out from the Mendiffa lake that is can affect the wetland because of the respondent said that the drainage that transport the soil from the highland area and deposited soil into the lake directly. From the above result indicated that the improved drainage is the threat for the wetland because of the drainage is the cause for the siltation in the wetland.

In table 4.7, item number five, 100%of the heads of households stated that no effect on the wetland, in the study area there is no mineral extraction as researcher field observation. And also the result of investigator's findings is not similar with research done by Gemechu (2010) Based on the result indicated the mineral extraction is not the threat for wetland degradation because of there is no mineral extraction in the study area.

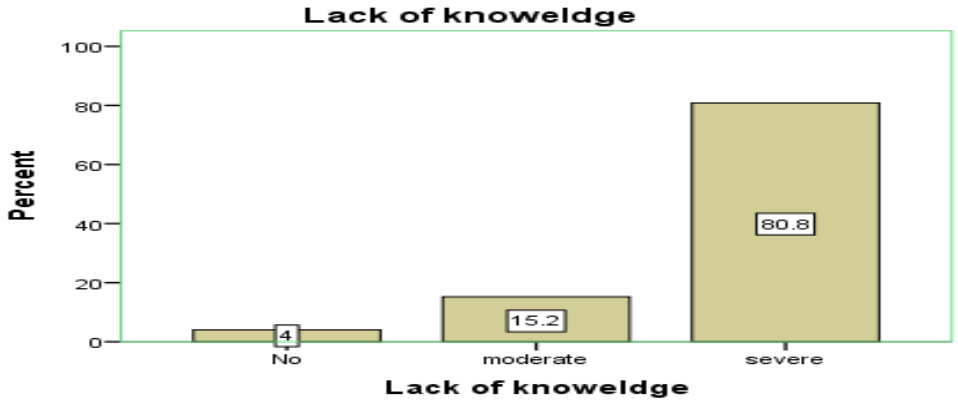
And in item 6, table 4.7,(100%) of the households that reported sedimentation is the main factor for the degradation of the wetland, Accumulation of sediments in wetlands from

highland erosion may decrease wetland volume, decrease the duration wetlands retain water, and change plant community structure. Where sedimentation has affected wetland soils and the native vegetation allowing the dominant invasive species to propagate and replace the native plant species (Jurik, 2010). The result indicated sedimentation the major threat of the wetland as discussed in the above questions before.

In item seven, of Table 4.7, shows that, 101(80%) of the households respondent stated that sever factor for wetland degradation and the 19(15.2%) is moderate 5(4%)of the households reported is no effect on the study area.

Figure4.11 Researcher's own computation, Lack of knowledge for degradation of wetland

Source:



Researcher's own computation, Lack of knowledge for degradation of wetland(2022)

According to FGDs the majority of the respondent said that lack of knowledge about the wetland benefit that cause for the degradation of the wetland use until now most of the farmer they asking the wetland for farming activity and Also the key informant interview they reported that wetland concept new for them because of that no one understand the importance of the wetland. Even wetland conservation is a new and emerging science with several unfamiliar terminologies and concepts which must be well understood to ensure wise use of wetland ecosystems. Conserving these ecosystems therefore requires above average understanding of their ecological interactions with both water and the terrestrial environments (Obiero, 2012).

To manage wetlands effectively and make an informed and sound decision that improve the livelihoods of local people dependent on wetland areas while safeguarding wetland function ,

values and attributes including biodiversity, it is necessary to have adequate knowledge of their status and functioning. In this regard, it is of high priority to assess, carry out national inventory of wetlands and compile a National Directory of wetlands. A strong information database on wetlands, which is currently almost non-existent in Ethiopia, is vital basis for achieving objectives related with conservation and wise use of wetlands (Mengistu, 2008). From the above analysis lack of knowledge is the threat for wetland degradation as the cause that explained by the FGDs and the key informant interview described.

Item eight, of table 4.7, shows 100(80%) of the households of the respondents that saver factor for wetland degradation because of 25(20%) of respondent reported is moderate. At the end item nine, table 4.7, 98(78.4%) stated that factor for the wetland degradation 27(21.6%) also stated that moderate. According to the key informant interview giving of the wetland for the investors that have been the main problem for the wetland in the study area were those who have used the wetland for agricultural purpose and also in the name of creation job opportunity the woreda government has distributing the land near to wetland for the young people this can affect the wetland environment. From this one conclude that giving the wetland for investment is one of the threats of the wetland degradation.

According to the key informant interview and our own field observation it was found that the mendiffa wetland have been started fill with the weed infestation this may one of the threat for mendiffa in the future unless immediate control the weed from the lake Alien plants compete with indigenous plants and destroy or alter the habitat of indigenous plants and animals. According to Zerihun (2015) The Akaki wetland near Addis Ababa has already been totally infested by water hyacinth and the surrounding mud flats, once heavily populated by waders, no longer attract these birds therefore, this result suggest that the same within in our the study area mendiffa wetland infestation by weed may threat for in the future. Figure 4.12: wetland weeds infestation

Source: wetland weed infestation (photo: Yirdaw Ali 2022)

4.5. Opportunities for the Conserving of Mendiffa Wetland

The last objective of this study is to identify the opportunities for the conserving of mendiffa wetland. Therefore, this section presents the opportunities of the mendiffa wetland as follows. Regarding opportunities for the conserving the wetland when the heads of households asked, 97(77.6%) of them said that they use local mechanisms to conserve the wetland. When they asked to elaborate the way of involvement through open-ended question, the respondent stated that they participate through terracing and drainage activities. Of the total respondents, 28 (22.4%) reported that they do not use the local mechanisms in the conserving of the wetland resources. It is important that cultural heritage, indigenous knowledge and local practices appreciated in the wise use of wetland resource and local people's role in the stewardship of wetland area. However, local community dependence on the wetland resources with low involvement in their management, weak, undiversified, and insecure livelihoods based on the direct exploitation of the natural resources causes hindrance in conservation (Penang, 2001). The above analysis indicated that using local mechanisms has better chance to protect the wetland and the natural resource.

Also when the heads of households asked about whom they think responsible to conserving the Wetland, majority of heads of households 77(61.6%) stated that all stakeholder such as local people, government, and the private sector are responsible bodies. 43(34.4%) stated that local community while, 5(4%) noted that it is the responsibility of government. Members of the community, either the individuals or public institutions, contribute for the benefits wetland. As individual the land owners can take direct action to manage wetlands on their property assistance available to them who wishes to manage wetlands as their property. This includes funding, training and access to other resources. Another stakeholder is the public institutions play a pivotal role in the wetland conservation by conducting research, delivering education and training that enhance knowledge of wetland ecology, associated field and develop the skills and knowledge necessary for management and conservation of wetlands. Furthermore, academics also play a valuable advisory role on many committees and collaborative projects. Education in primary and high schools is important to foster appreciation, understanding and respect in children for wetlands. Also NGOs are very important in bringing community concern regarding the implementation of policy and programs to the attention and wider

community. These NGOs serve as environmental watch dogs, by reviewing proposals and draft policies and helping to identify where environmental values are at risk and not being managed appropriately. In other way the local governments have the power to reserve land through their local planning schemes to protect places of special heritage significance to the community (Landmann, 2012).

The joint collaborative work among the concerned institutions and stakeholders is extremely vital in coming up with robust and holistic wetland management approach that supports a more natural, healthy ecosystem one which is cost efficient and secure for people businesses and wildlife. It has to be underlined that local communities are the most important stakeholders when it comes to sustainable utilization of the wetlands. A new partnership, which must involve a directly benefit the local people who live in the wetlands is required if we are to conserve wetlands. Many advantages and synergies can be achieved because of working in partnership with all concerned stakeholders (Temesgen, 2017).When we infer the theme from the above analysis, in conserving the wetland it indicates that all stakeholder are responsible to conserving the wetland. Thus, the participation of the whole stakeholders is an opportunities of the wetland.

When in the survey the heads of households asked about the participation of the government effort in designing of the conservation of wetland, 97(77.6%) reported that the government is participating and 28(22.4%) said are not participating. However, the way that how the government is participating in the conservation issues, 108(86.4%) of the households reported as though law making by different rules and regulation that passed by the woreda legislation to the kebele in controlling the extension of illegal farming in the area of wetland, and 17(13.6%) of the household reported as the government can take part by encouraging afforestation and conservation activities.

According to the participants of FGDs, at the local level there are different rules passed by the kebele administrations in order to conserve the wetland by which the kebele penalized those who damaged the wetland. On the other hand, the key informants has noted that there is shortage of logistic material such as lack transport facility, lack of finical support, lack of attention for the wetland, lack of awareness from the regional government to the woreda level,

lack of sufficient research, the perception of the people and also lack of skilled man power regarding to the wetland on the study area.

However, the key informants stated as they are interested to participate in conserving the wetland even if this challenges are common in conserving the mendiffa wetland. Temesgen (2017) wetland management in As Ethiopia also suffers from capacity limitations such as lack of skilled manpower, finance and technology. Wetland focused training programs are very scarce in higher learning institutions of the country. Programs are not implemented to fill this gap nationally. As a result there is shortage of wetland specialists. There is also awareness problem from grassroots up to decision maker level. The scarcity of wetland focused institutions and weak relation of the country to wetland affiliated global institutions such as the Ramsar Secretariat has hampered its capacity building opportunities (Ibid).Even though, there is different limitation from the above discussion, the result indicates that the existence of opportunities to conserve the wetland through different mechanism.

With regard to the use of wetland, the households were asked if there is any conflict over use of wetland 109(87.2 %) of the respondent reported that there is conflict in the use of wetland whereas, 16(12.8 %) of the heads of households reported there is no conflict. According to (Dixon and Wood, 2003) locally develop institution that include rules and regulations, common values and mechanisms of conflict resolution are increasingly regarded as adaptive solution to resource management problems at the grass roots level since they are seen as being dynamic ,flexible and responsive to societal and environmental change and ,as such ,they promote sustainability. This also supported by the FGDs and key informant interview when conflict happened in the wetland use the local community solves the conflict immediately by employing peaceful negotiation through the help of local leaders. Based on the above premise it is important to solve the conflict with local leaders that is one of the opportunities to conserving the wetland at the grass root level.

The entire heads of the households (100%) reported as they were willing to co-operate in conservation of the wetland. For most of human history, the natural world has been protected from the most disruptive human influences through relatively humble technology, and local laws or cultural or religious taboos preventing overexploitation. The loss of traditional knowledge about resource use is one of the central problems of our times and local people

often have an understanding of wetland ecology in their particular context that is far subtler, and sometime superior to that of outside experts (McNeely, 1993).The result indicated that the entire of the heads of household reported willing to participate in conservation of the wetland. At the end they were asked if there is engagement of any NGOs in the conservation of the wetland and natural resource. In line with this, 83(66.4%) of the household stated that NGOs were involved in the conservation activities while 42(33.6%) of them stated that were not participated. From this, 67(53.6%) of the households reported that participated in planting trees, whereas, 54(43.2%) stated by developing sprigs and the rest4 (3.2%) noted through capacity building. This is supported by the key informant interview by which they stated as there is NGOs engagement in the study area. For instance, World Vision Ethiopia established for different purpose in the study area and they were participated in the conservation activities by planting trees and developing water springs for the community and also they support the woreda environment and forest tree office with different aspect. Also Sustainable Environments for the well beings of community has been one of the organizations working in developmental areas through providing supports. In regenerating the previous areas by trees plantations for reforestations in one way and to create work opportunities for unemployed in another ways to make affordable reforestations that in turn protects the expansion of desertification. Protecting the environment from deforestation, covering the communal land of community with tree, on tracing for flood disasters the organization is given attention to conserve properly the human environment for future sustainable development and poverty reductions. The report states that their primary goals are parallel to governments to ensure the promotions of environmental health for survival (WVE, 2012). Thus, the above all mentioned results indicate that the willingness of the community and existence of NGOs in the study area is an opportunity in conserving the Mendiffa wetland.

CHAPTER FIVE

SUMMARY OF MAJOR FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1. Summary of Major Findings

This chapter concludes the main objective of the study, aimed at identifying challenges and opportunities in the conservation of Mendiffa Wetland in the Misrake Selti Woreda, Silte Zone, and Southern Ethiopia. It also synthesizes the major findings of the study based on presentations and triangulations of results in previous

The first finding of this was that human activities in the Mendiffa wetland are likely to have an unwanted impact on the wetland. The expansion of farmland and hunting of wild animals like hippopotamuses were the major challenges. Illegal hunting has resulted in their extinction, and harvesting of teff, sugar cane, and chat is exacerbating the situation. As a result of this activity, irrigation schemes or water diversions for irrigation have undoubtedly caused adverse effects on wetland ecosystems. At their most severe, these effects have included the submersion of wetlands or their replacement by upland vegetation communities, with consequent effects on the biota that depend on these wetlands and the services that humans have hitherto derived from the system.

As previously stated, the majority of respondents reported that overgrazing has an impact on the biological function of the wetland. According to the key informant different subject matter experts interview and our own field observation, it was found that the mendiffa wetland has started to fill with the weed infestation. This may be one of the threats to mendiffa in the future unless immediate control of the weed from the lake is Alien plants compete with indigenous plants and destroy or alter the habitats of indigenous plants and animals. The Akaki wetland near Addis Ababa has already been totally infested by water hyacinth, and the surrounding mud flats, once heavily populated by waders, no longer attract these birds (Zerihun, 2015).

Regarding the opportunity, the heads of households were asked. 97 (77.6%) of them said that they use local mechanisms to conserve wetlands. Of the total respondents, 28 (22.4%) reported that they do not use the local mechanisms in the conservation of the wetland resources. Local governments have the power to reserve land through their local planning schemes. Education in primary and high schools is important to foster appreciation, understanding, and respect in children for wetlands. NGOs are very important in bringing community concern regarding the implementation of policies and programs to the attention of the wider community.

5.2 CONCLUSION

The catchments of the Mendiffa wetland have been mainly subjected to agriculture, grazing, irrigation, hunting, and harvesting plant material for various purposes. It is therefore clear that the general ecosystem of the wetland is subjected to perturbation due to these human activities. Although the general state of the wetland in terms of biological and environmental conditions appears to be poor at the moment, the natural ecosystems and species in the areas are being impacted by the aforementioned various human activities. In addition, no follow-up activity has been put in place by the responsible body to undertake the conservation of the wetland resources for maintaining the ecological balance and biological diversity. This is a good indicator of hippopotamus extinction at Mendiffa wetland and the loss of different grass varieties unless conservation measures are implemented; these wetland and resources will soon be at risk of degradation or even extinction unless conservation measures are implemented.

Another threat to the existence of the wetland that contributes to the causes of the degradation of the wetland, including sedimentation, lack of knowledge, overgrazing, improved drainage, lack of conservation of wetland, deforestation, intensive cultivation, and investment, is respectively in the study area of the Mendiffa wetland. In order to reverse these emerging problems, there are opportunities to conserve the Mendiffa wetland. The findings of this study have shown that the majority of the households were aware of the adverse impact of human activities on the wetland. Further, it means that they were willing to participate in the conservation of the wetland and also indicates the existence of a local mechanism to resolve conflict. In addition, the opportunities involved the engagement of NGOs in environmental

protection activities and the government's role in issuing different regulations in the local area concerned by the Mendiffa wetland.

5.2. RECOMMENDATIONS

The local government should give due attention to the wetland conservation issues by facilitating the logistics of the logistics office to participate in conservation issues and work in close proximity to the adjacent woreda and zones such as Alecho woreda, Lafuro woreda, and the Silti woreda gurage Zone, in order to engage in afforestation activities and with the different NGOs and GOs, because of the wetland, which is a concern of all stockholders before it disappears.

- The local communities should formulate rules and regulations among themselves to limit and judge the number of livestock that can be grazed in the wetland from each and every house to control overgrazing beyond the carrying capacities of the wetland.
- There is a need to control clearing of trees in and around the wetland by the kebele administration and developmental agents. This is because forests are important to enhance the down movement of rain falling into the ground and add to the amount of water that the wetland can store. Also, being there for the wetland vegetation is also paramount in controlling erosion in and around the wetland.
- Soil conservation practices should be given priority to protect the downstream sediment impact on the Mendiffa by giving priority to several micro-watersheds.
- Soil conservation and management practices should be done, giving priority to bare lands and cultivated lands in the upper catchment and in the downstream.
- Awareness-creation programs should be prepared at the community level to ensure the sustainability of the wetland for its economic and societal benefits and to protect the environment as a whole.
- Link it with the national wet land data base. The wetland is supporting a large number of livestock without proper management. In this regard, the kebele administration and development agents need to create awareness among the farmers. That means. The communities living in and around the wetland should limit the number of their livestock to what the wetland can hold.

- More research should be undertaken in the areas of biological and environmental aspects by the different researchers and institutions that incorporate the conservation of wetland natural resources as one of their objectives. Further studies are required to fill knowledge gaps about this wetland

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WOLKITE UNIVERSITY COLLEGE OF SOCIAL SCIENCE AND HUMANITIES DEPARTMENT OF GOVERNANCE AND DEVELOPMENT STUDIES

CHALLENGES AND OPPORTUNITIES OF WET LAND

CONSERVATION THE CASE OF MNDEFA WET LAND MISRAK SILTI WEREDA, IN SILTE ZONE, ETHIOPIA

GRADUATE PROGRAM (2022)

APPENDICES

I. Household Survey Questionnaire

Questionnaire to Be Filled By Head of Household

Introduction:

Dear Respondents, the purpose of this question is to collect data for the study entitled with "challenges and opportunities of wetland conservation of Mendiffa of Misrak Silti Woreda in Silte Zone". The information you provide in this questionnaire will be kept confidential and will be utilized for research purpose only. You genuine and frank response to the questionnaire is highly voluble for the achievement of this Objective of this study. Please provide your response, and hence I appreciate your cooperation in advance.

Thank you very much for your time!

I: GENERALINFORMATION

- Enumerator ----------
- Name of the enumerator: _____
- Signature of the enumerator ensuring completeness of the questionnaire and correctness.

  Sign: _____ Date: _____

1. General Background of the respondents

Woreda: /_____ Kebele: _____

Questionnaire: / No. _____

1. Sex:1.Male2. Female
2. Age____
3. Religion:
   1. Islam 2.Orthodox Christian 3.Protestant 4 . Catholic5. Others, specify

4. Family size Male _____Female_____
5. Educational status 1.Illiterate2.Readandwrite 3. Primaryschool1st and 2ndsycle 4.Secondary school (9-10)preparatory (11-12) 6.Certificate 7.Dipolma 8.others, specify ----------
6. For how long have you been in this area? _____Years
7. Source of livelihood (you may thick more than one)
   1. Farming 2.Livestockrearing 3.Fishin 4. Handicraft/wood work 5.Collectingfuel wood6. Charcoal 7 .Pettytrade8. Others, specify_____
8. Land Holding size

8.1. Total Size of landholding(in hectare)

1. Perennial cropland___ 2. Permanent crop land___3.Forest/bush land_
4. Wetland ___ 5. Grazing land__ 6. Fallow land ___ 7. Others,_____

8.2. Size of land holding in the wetland (in hectares)_____

9. Livestock

9.1. Types and Number

1. Oxen_____2. Cows_____3. Calves_____4. Goats_____
2. Sheep_____6.Donkeys____7. Horse_____8.Other_____

9.2. How frequent do you take them to the wetland of Mendiffa/ for grazing?

1. Everyday2.Very Often (weekly)
3. Often (may be monthly) 4. Rarely

10. Do you have any livelihood that is linked to the wetland of Mendiffa?

1. Yes 2.No

11. If yes, in what ways your livelihood is linked? (You may circle more than one)
    1. Cultivation of crops/vegetables/fruits on the wetland
    2. Fishing around the wetland
    3. Grazing
    4. Collecting wood for household energy
    5. Collecting wood for house construction and furniture
    6. Cutting grass
    7. Others, specify_____
12. How much (in Birr) on average does the household earn from economic activities Linked to the wetland per year? _____

13. What purposes others than economic do you get from the wetland? (You may circle (More than one)

1. Recreation(e.g. swimming)
2. Enjoying the view
3. Mark of identity

4. Rituals (e.g. sacrificing and feasting)
5. Sanitation(e.g. washing clothes and bathing)
6. Fetching water and animal drinking
7. 7.Others, specify _____

14 How close do you live from the wetland?

1. Very close(within 30 minutes' walk)
2. Close(within an hour walk
3. Further away from the wetland (more than an hour walk)

15. Are there any disadvantages of living around the wetland?

1. Yes 2. No

16. If yes, what are the disadvantages? (You may circle more than one)

1. Malaria infection
2. Wild animal attack (what animal?) ----------
3. Increased salinity affecting farmland
4. Rising water level affecting farmland
5. Animal diseases (List names in Amharic) _____

17. How often do you go to the Wetland?

1. Everyday
2. Very often (Almost every week)
3. Often (every month)
4. Rarely (May be every six months)

18. Which house hold member is mostly associated with activities undertaken in and around the wetland?

1. Men
2. Women
3. Children

19. Please justify why men /women /children are more associated with the wetland----------

II. To assess the challenges in the conserving the Mendiffa wetland

1. Do you think human activity (farming and fishing) in and around the wetland having undesirable effects on the wetland?
   1. Yes
   2. No
2. In your life time, have you seen the wetland?
   1. Expanding
   2. Shrinking
   3. No change
   4. Fluctuating

3. If expanding what do you think of the possible cause's_____
4. If shrinking, what do you think of the possible cause _____
   1. Yes
   2. No

5.1. In recent years have you heard of any hunting in and around the Mendiffa?
   1. Yes
   2. No

5.1.1. If yes, what animal? _____

5.2. Vegetation covers over time
   1. Increasing
   2. Decreasing
   3. Nochange

6. What is the main source of household energy? _____
7. Have you ever used any fertilize/pesticides for the cultivation of crops around the Wetland?
   1. Yes
   2. No
8. Do you fear that the wetland of Mendiffa may one day disappear?
   1. Yes
   2. No

III. To identify the threat for the existence of Mendiffa wetland

11. Which of the following factors do you think have been responsible for wetland degradation?

No	**Factors**	**Degree of impact**		
		No	Moderate	Severe
1	Intensive cultivation			
2	Overgrazing			
3	Deforestation			
4	Improve drainage			
5	Mineral extraction			
6	Sedimentation			
7	Lack of knowledge			
8	Less participation in conservation issues			

9	The expansion of investments		
10	Others		

IV. To identify the opportunities for the conserving of Mendiffa wetland.

1. Are there any local mechanisms in place to conserve the natural resources in and around the wetland?
    1. Yes
    2. No
2. If yes what are they? _____
3. Who do you think should be most responsible for managing the wetland?
    1. The local community
    2. Government
    3. Private sector
    4. Others, specify,_____
4. Have you seen or heard about any government effort designed to manage the Wetland?
    1. Yes
    2. No
5. If yes, in what ways have the concerned government departments been involved in the management of the wetland? (You may thick more than one of the following).
    1. By passing legislations
    2. By providing training on how to conserve the wetland
    3. By offering some financial and material incentives
    4. By supporting fishermen cooperatives
    5. By encouraging forestation and conservation activities
    6. Others, Specify _____
6. Has there been any conflict over the use of the wetland resources in the Community?
    1. Yes
    2. No
7. If yes, what is the nature of the conflict? _____
8. How was the conflict resolved? _____
9. Will you be willing to cooperate with any future management plan protect the wetland even this will affect our livelihood?

1. Yes
2. No

10. Are there any NGOs involved in Natural Resource Management in the Misrak Silti woreda?
    1. Yes
    2. No
11. If yes, what are the conservation activities?
    1. Planting trees
    2. Building terraces
    3. Developing springs
12. Have you ever been engaged in conservation activities?
    1. Yes
    2. No
13. .If yes, what activities?

Appendix 2

Checklist for the Focus Group Discussions (FGD)

IV: Check list for Focus Group Discussions

1. Land use system:

1. Identify list of crops grown and animals reared in the area?
2. What is the share of wet land in the total land holding of an average house hold? What are the means used by the people to increase access to land? (Land sharing among relatives, renting, share cropping, etc.)
3. Discuss land availability and changes in land size over time? If there is a sense of land shortage, what are the reasons? Rank the reasons. What is its implication for sustainable utilization of the wetland resources?
4. How does the value of wetland differ from the other land type?

2. Forest/trees/grasses

5. What type of trees/ grasses grows in your area? Where are they kept (garden, farmland, communal land, mosque (church compound, etc?)
6. What are the purposes of the steers/grasses (direct use value, indirect use values such as conservation adoption values such as inheriting to children, recreation, biodiversity, etc.).
7. Do people view trees/water/wetlands/grasses/ as opportunity or threat?
8. What are the best ways of conserving/ grasses /trees/water/wetlands? What should be done?

A. To identify the threat for the existence of Mendiffa wetland

9. What is the cause of the threat of the Mendiffa Wetland?
10. Do you observe the settlement expansion in the area in the past years?
    A. Accelerated and resulted terrestrial land aquatic habitat destruction by clearing forests in to other land use
    B. Enhanced local people's needs of making charcoal, fuel wood, cutting trees for various purposes?

C. According to your opinion, what are the major causes of wetland degradation in the area?

11. In your perception and observation does settlers activity causes wetlands activity causes wetland depletion in the area?
12. According to your indigenous knowledge and experience, what are the major changes have been observed on the area/wetlands recently?
13. If there is change in the major resources of these wetland catchments, please make list of specific change you have perceived on forest, rivers or lake (streams).
14. Do you think that the lake/ plant/ animal species in the wetland may still be used in the future?

B. To assess the challenges in conserving the Mendiffa wetland

15. What is the major problem/challenge in conserving the Mendiffa wetland?
16. What is the consequence of Mendiffa wetland if not conserved well?
17. Who is the responsible in conserving the Mendiffa Wetland?

C. To identify the opportunities for the conservation of Boyo wetland

18. What can opportunities for improved Mendiffa wetland use are identified?
19. What kind of opportunities can be obtained if the Mendiffa wetland is conserved?
20. How can these wetlands resources be conserved/ saved?
    A. When protected by Government
    B. When protected by Community
    C. When distributed to the local community
    D. I don't know
21. From your observation to mitigate the wetland/natural resource degradation in the area. What is expected from?

A. State policy makers at regional and national levels?
B. Wetland/ Natural re source conservation and management projects working in the area:
C. Woreda's administration offices
D. Kebele's administration offices
E. Local institution
F. The local community living in and surrounding the area

Concluding remark, if you have anything to add to our discussion please, specify

Appendix 3

Interview guide line for Key Informants (KII)

ANNEX-3

V. Check list questions for office different subject matter Expert representations

1. For how long you have known the mendiffa wetland it's surrounding?
2. What is the current lake wet land mendiffa community looks like?
3. What contribution does this wet land has
    - For the local community
    - In enhancing the economic development of local ,regional and country
    - In conserving biological diversity
    - In conserving ational heritages having scientific and historic values
    - In enhancing the eco-tourism industry in the area?
4. How do you see the present status of the lake (mendiffa Wetlands) in comparison to the past?

A. To identify the threat for the existence of mendiffa wetland

5. What are the factors that contributed for this Wetland degradation/threat?
    - Lack of farming land: how?
    - Losses of vegetation: how?
    - Losses of wild animals: how?
    - Sedimentation of lake: how?
    - Settlement expansion: how?
    - Environmental policy constraints: how?

B. To assess the challenges in conserving the mendiffa wetland.

6. What is the main challenge in the conservation of mendiffa wetland you face?
7. What efforts you made to obtain any necessary cooperation from high level officials /organizations and local community in this mendiffa wetland conservation?
8. What is the factor that affecting in conserving of mendiffa wetland?

9. Have you ever consulted the local community if they can cooperate in the Mendiffa lake wetland conservation?

C. To identify the opportunities for improved Mendiffa **wetland use to be identified**

10. What kind of opportunities can be obtained if the mendiffa wetland is conserved properly?

11. Do you think the local community is beneficiary from the lake mendiffa wetlands? If yes, in what aspects?

- Please explain
  What the country, regional state and local community of the surrounding is a benefit if the lake mendiffa wetlands as well sustained?
- What the local, regional/ country losses if the lakes mendiffa wetlands are threatened/ disappeared?
- What options/ alternatives you suggest in bringing sustainable mendiffa wetland conservation in the area?

Thank you in advance for your cooperation