

## Role of Cheffa wetland to the local communities around Kemissie, Oromia zone, Amahara region, Ethiopia

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### Research Paper

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The Study was conducted from June 2012 to February 2013 in Dawachefa and Kemissie Districts. The objective of the study was to assess the contribution of Cheffa wetland on crop production, animal husbandry and fisheries. Dawachefa and Kemissie districts were purposely selected for their high agricultural production and access for fishery resource. PRA and semi structured questionnaires were used to collect primary data. A total of 70 households were selected randomly and the response of these individuals was supported by personal observation. Moreover, secondary data from Kemissie Zonal Office of Agriculture and Dawachefa Environmental Protection and Land administration and Use office were collected. Fruit and vegetables, grains and perennial crops produced in quintal in Dawachefa district using irrigation system in 2012/2013 were higher in Dawachefa (438107, 30247 and 299486.4) than Kemissie (25420, 7989.6 and 8590) respectively). However the spices produced in quintal in Kemissie district was higher (10260) than Dawachefa (6130.4). Dawachefa is supporting high cattle population

both for local and migrants. In 2012, a total of 20,600 cattle came to Dawachefa for dry season grazing and watering. Cheffa wetland has two fish family (Cyprinidea, Chlaridea), three genera (*Gara*, *Clarias* and *barbus*) and five fish species (*Gara dembecha*, *Clarias gariepinus*, *Labeobarbus intermediate*, *Labeobarbus Nedgia* and *Labeo horii*). The only fish used by the fishermen and the local people was *Clarias gariepinus* (Catfish). The price of cat fish was ranged from 5-100 ETB based on its size. Fishermen have lack of fish processing skill and access for fishing gears to improve their livelihood from the fishery sector. Cheffa wetland in Dawachefa and Kemissie districts is facing problem of overgrazing, destruction of macrophytes (breeding ground of fishes) and excessive cultivation of *eucalyptus* tree resulting scarcity of water for irrigation, therefore all concerned bodies should work together for sustainable utilization of Cheffa wetland.

**Key words:** Cheffa, Fishery, *eucalyptus*, macrophytes, wetland

### INTRODUCTION

Wetlands are amongst the Earth's most productive ecosystems, providing a diverse array of important ecological functions and services, ranging from flood and flow control to groundwater recharge and discharge, water quality maintenance, biodiversity, carbon sequestration and other life-support functions. These ecological functions and services translate directly into economic functions and services such as flood protection, water supply, improved water quality,

commercial and recreational fishing and hunting, and the mitigation of global climate change (Brander et al., 2006). Wetlands are lands saturated long enough with water, and are an integral part of the landscape. As the term might suggest, they are areas where water covers the soil, or is present either at or near the surface all year or at least for substantial parts of the year, especially during the growing season (Ramsar, 1971).

Ethiopia is endowed with rich wetland resources that

include lakes, marshes, swamps, etc in various parts of the country from lowlands to highlands. However, their area coverage has not yet been known exactly. Thus, different estimates have been given regarding the total wetland area of the country. According to some individuals, the total area of wetland may exceed 2% (22,500 km<sup>2</sup>), a figure that corresponds with the estimated remaining forest area of the country. However, Hillman, (1993) estimated that Ethiopian wetlands cover the total area of 13,699 km<sup>2</sup> (1.4%) of the country's land surface. It is also estimated that only 9% of the total annual discharge from 12 river basins (120x10<sup>6</sup> m<sup>3</sup> of water) remains in the country in the various water forms including lakes, rivers, bogs, swamps, springs and marshes; water retained in wetland formation is estimated to cover 18,587 km<sup>2</sup> (1.5%) of the total land area of Ethiopia (EPA, 2003), distributed throughout the country.

Wetlands in Ethiopia have different socio-economic values. These include food crops supply through agriculture by draining and recession, important sites for dry season grazing, resource extraction, raw materials (reeds for papyrus, etc) supply, fish harvesting, source of medicinal plants and sites for tourist attraction and various traditional ceremonies. They are also part of the rural people's economy as they traditionally play an important role for rural communities through the provision of water, and other materials, for both humans and livestock.

Historically, many wetlands have been treated as wastelands and drained or otherwise degraded (Barbier et al., 1997). To this day, they are under increasing pressure from anthropogenic activities such as conversion to intensive agricultural, industrial and residential uses; drainage as a result of excessive irrigation in agriculture; and pollution due to nutrient runoff from intensive agricultural production, and industry. Other factors adversely affecting the sustainable management of wetlands include poverty and economic inequality, pressure from population growth, immigration and mass tourism, and social and cultural conflicts (Skourtos et al., 2003).

In general, many wetlands in Ethiopia are being affected due to over-extraction of wetland resources beyond their rejuvenating capacity by the surrounding societies. Draining for growing food crops, the appearance of invasive plant species due to mismanagement of the resources, and the introduction of perennial crops e.g. eucalyptus into the wetland ecosystem are the major threats that are posing a danger to the country's wetlands (Zerihun and Kumlachew, 2003). Cheffa wetland is one of the largest wetlands of Ethiopia found in Amahara Region, Oromia Zone, however there is limited data on contribution of the wetland for livelihood improvement of the local people. Hence the objectives of the study were to assess the direct contribution of Cheffa wetland in

crop production, livestock and the indirect contribution through handicraft in Kemissie and Dawachefa districts and suggest sustainable management of the wetland.

## MATERIALS AND METHODS

### Study Area

The Cheffa Wetland/Cheffa Flood Plain (also known as the Borkena Valley) is about 82,000 ha, including marshes, fluvial sediments, alluvial fans, piedmont slopes and a few isolated hills (EPA, 2003). The wetland type comprises seasonal intermittent freshwater marshes on inorganic soils, including sloughs, seasonally flooded meadows, and sedge marshes. There are hot springs on the eastern side of the flood plains. The main feeder of the wetland system is the Borkena River, which is heavily silted during periods of rain.

### Methods of Data Collection

PRA, Semi- structure questionnaires, personal observation and checklists were administered in two Kebeles found in Kemissie town ( Amrach and Mesena ) and other two Kebeles found in Dawachefa( Gerbi and Tuhe) selected purposely for their location in Cheffa wetland and activities of communities in agriculture and handicraft. A total of 70 households were selected randomly. More over secondary data about current irrigation potential, production of different crops produced in 2012 and current challenges and opportunities of Cheffa wetland were collected.

**Statistical Analysis** :Descriptive statistics (line graph, bar graph and tables) were used to analyze the collected data.

## RESULTS AND DISCUSSION

### Wetlands' Contribution to Water Resources in Cheffa wetland

Due to their role in the provision of water, regulating flows, and improving water quality, wetlands are increasingly perceived as an important component of water infrastructure (Emerton and Bos 2004). The supply of freshwater to human populations is recognized as one of the foremost natural benefits of wetlands (MEA 2005); inland wetlands provide the principal supply of freshwater for almost all human use (McCartney and Acreman, 2009). Groundwater recharge is an important wetland function in some places. For example, the Hadejia-Nguru wetlands in northern Nigeria play a major role in

**Table 1.** Statistic on animal migration to Chefa wetland in 2012.

District from	Current supported in District	Kebele	District PA	Duration	No of cattle	No of HH
Artuma Fursi	Dewachefa	jirota	Higira	15-30 days	6000	140
Jile Tumuga	Dewachefa	jirota	Higira	15-30 days	1200	34
Dewey harewa	Dewachefa	jirota	Higira	15-30 days	900	25
Dalfagie	Dewachefa	jirota	Higira	15-30 days	1000	60
Bati	Dewachefa	Bedeno	Derka	15 days	3500	51
Afar Zone 2	Dewachefa	Bedeno	Derka	10 days	4000	29
Afar Zone 2	Dewachefa	Blida	Muti	10 days	4000	50
Sum					20600	

recharging aquifers which provide domestic water supplies to approximately one million people as well as supplying water for agriculture (Hollis et al., 1993). Similar to the study conducted in Nigeria on Hadejia- Nguru wetlands, Cheffa wetland at Mesina kebele mainly have huge potential in irrigation from underground potential. Farmers are getting water from 2-4 meter depth and irrigate different horticultural crops such as tomato, onion and green paper, and crops such as maize, sorghum and teff.

### Cropping

Because of their relatively high soil moisture and nutrient levels, wetlands often provide premium locations for cropping compared with surrounding landscapes, and are thus favored places for cultivation, particularly in the drawdown period and dry season (Kotze et al., 2002). The net income that arises from the additional productivity is the value derived from cropping in wetlands (Kotze et al., 2002). It must be borne in mind however, that cultivation of wetlands displaces any value associated with the natural habitats that have been replaced by that cultivation.

Smallholder's mixed farming is the main activity for those engaged in agriculture. Few have engaged themselves in irrigated agriculture, using water from rivers feeding the wetland. Cheffa wetland every year will receive fertile soil from highlands during rainy season when Borkena flooded; therefore farmers till the wetland and encroach its size year to year. Since 2010 people have started building houses for the purpose of using the land, because it is open access. Using the wetland sustainably, without destruction of fauna and flora is possible; Similar to other wetlands of Ethiopia, Cheffa wetland has significant contribution for improvement of production and productivity of agriculture in Oromia zone as indicated from (Figures 1 to 6).

Recently the number of farmers participating both traditional and modern irrigation increased at alarming rate. Due to good price of crops and fruit and vegetables, farmers are using the water of Cheffa wetland beyond its capacity. The dominant crops harvested in Dawachefa

and Kemissie districts are maize, Sorghum, Teff and among fruit and vegetables tomato, onion, green paper are dominant. Sugar cane cultivation in Dawachefa by 11 investors is also has high production potential and contribute a lot to satisfy the demand of people in Kemissie, Kombolcha and Dessie. Among districts found in Cheffa wetland (Artumafursi, Jiletimuga, Dawachefa and Kemissie), Dawachefa has high production potential due to its fertile land and good water source (Figures 2 and 3).

### Animal Farming

The area is known for its high cattle population because of its high feed availability for cattle as the result of Cheffa wetland existence. Most of the households (60%) have at least one ox. There are 15 investors in Dawachefa district that have at least 50 cattle. The number of cattle supported by the wetland increased from time to time both from local and outsiders that came for dry season. The number of animals in Cheffa wetland are above the carrying capacity according to the information obtained Kemissie zonal Agriculture and rural development office. Number of animals that came to Dawachefa in 2012 are indicated in (Table 1).

### Wetland plants contribution

People in Dawachefa and Kemissie use the wetland plants, *Typha latifolia*, *Cyprus papyrus* and *Cyprus* species for animal forage, supporting means while transporting fattened animals, to make mattress, pillow and roof especially. About 75% women in Amrach village, Kemissie are involved in Mattress making as livelihood. Most of the people in this kebele are landless; therefore the sole source of income is mattress production from wetland plants.

The mattress produced from Cheffa wetland plants (*Typha latifolia*, *Cyprus papyrus* and *Cyprus* species) locally known as Kemissie foam. Amrach and Santie are two known mattress production center in Kemissie. The

**Table 2.** Price of different sized mattresses in Kemissie and Dessie.

Locations	Mattress price in birr by size		
	Small	Medium	Large
Kemissie	25	45	60
Dessie	35	60	80

**Table 3.** Three fish composition of Cheffa wetland.

Family	Genus	Scientific name	Common name	Local name
Clariidae	<i>Clarias</i>	<i>Clarias gariepinus</i>	Cat fish	Ambaza
Cyprinidae	<i>Gara</i>	<i>Gara dembecha</i>	Gara species	Askuri
Cyprinidae	<i>Labeobarbus</i>	<i>Labeobarbus Ledgia</i>	Barbus	Nech Asa
Cyprinidae	<i>Labeobarbus</i>	<i>Labeobarbus intermediate</i>	Barbus species	Nech Asa
Cyprinidae	<i>Labeo</i>	<i>Labeo horii</i>	Labeo species	Nech Asa

mean mattress production per month in Amrach was higher (86) than Santie (23). The average monthly net income from mattress in Amrach was higher (928) than Santie (227), because most of the people in Amrach were landless unlike the case in Santie than have additional means of income from crop and animal farming. Three types of mattress produced in Kemissie, small, medium and large sized mattresses. Their price varies in production center, Kemissie and the dominant market area in Dessie (Table 2).

### Fish composition of Cheffa wetland

As shown in table 3 Cheffa wetland has two fish family (Cyprinidae, Clariidae), three genera (Gara, Clarias and barbus) and five fish species (Gara dembecha, Clarias gariepinus, Labeobarbus intermediate, Labeobarbus Nedgia and Labeo horii). The only fish used by the fishermen and the local people was Clarias gariepinus (Catfish). The price of a fish was ranged from 5-100 ETB. Fishermen have lack of fish processing skill and access for fishing gears to improve their livelihood from the fishery sector.

Cheffa wetland was found to be dominated by family Cyprinidae mainly by genera Barbus and Garra. The result of the present study was similar to those of Robert, (1975) and Abebe Getahun and Stiassny, (1998) that fish species in Awash basin are dominated by family Cyprinidae (genera Barbus) and Garra.

Fish diversity of Cheffa wetland was found to be lesser when it was compared to those of other studied wetlands in Ethiopia, yet the abundance was higher. Clarias gariepinus was revealed to be consumed by the people around Kemisse unlike most people living in Amhara Region.

### Bird diversity

It has been an important wetland as feeding site of thousands of ducks such as Northern Pintails, Common

Teal and Northern Shovelers. Other birds like Spur-winged plovers, Senegal Thick-nee and White-faced Whistling Ducks were not uncommon. At present this wetland is at an alarming state where all of the area has dried up and Borkena River which feeds this wetland has also gone because of an increasing water pumping activities by the local people in the area which is encouraged by the government as a strategy for food security without initial study of the impact of the irrigation activities on the river (Mihret and Mekonen, 2013).

In Kemissie and Dewachefa districts in Cheffa wetland besides fish there are other vertebrate animals living in and around the Wetland. These are Nile monitor (*Varanus niloticus*), snakes and different bird species. Some of the birds observed during the study period were Cattle egrets (*Bulbulcus ibis*), Egyptian goose (*Alopochen aegyptiacus*), Grey heron (*Ardea cinerea*), Hadada Ibis (*Bostrychia hagedash*), Sacred ibis (*Threskiornis aethiopicus*) Yellow-billed Duck (*Anas undulata*), African Jacana (*Actophilornis africana*) and Great white pelican (*Pelecanus onocrotalus*).

### Over all beneficiaries of Cheffa wetland

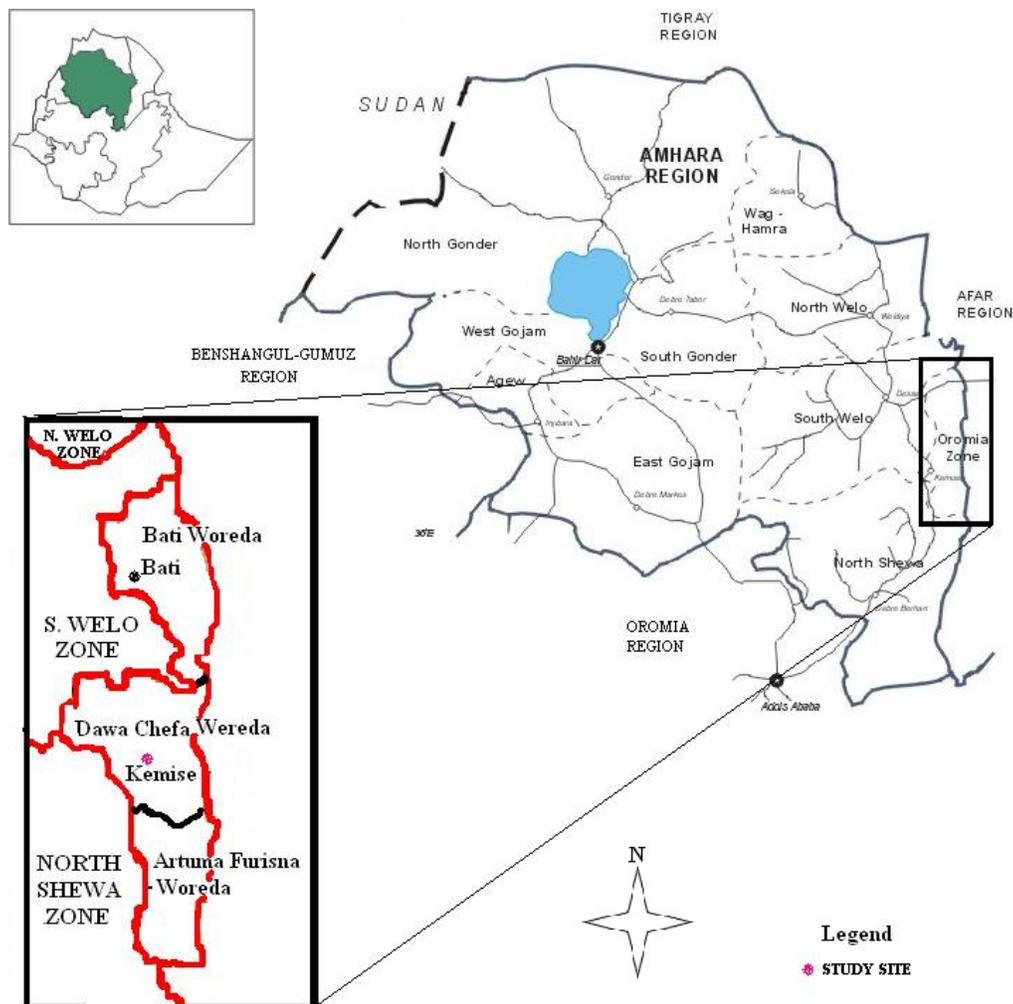
Cheffa wetland in Dawachefa and Kemissie districts have different use for local people and pastoralists that come from Afar, adjacent Oromia districts of Oromia zone in Amahara region such as ceremonial use, dry season grazing, thatching reeds, water for stock, cultivation, domestic water use, craft material. Types of use of Cheffa wetland in Dewachefa and Kemissie districts and estimated household benefit in percent has stated in (Table 4).

### Major challenges of Cheffa wetland

Although wetland agriculture can bring significant benefits in terms of food security, health and income, ill-considered development often results in wetland

**Table 4.** Cheffa wetland and its beneficiaries.

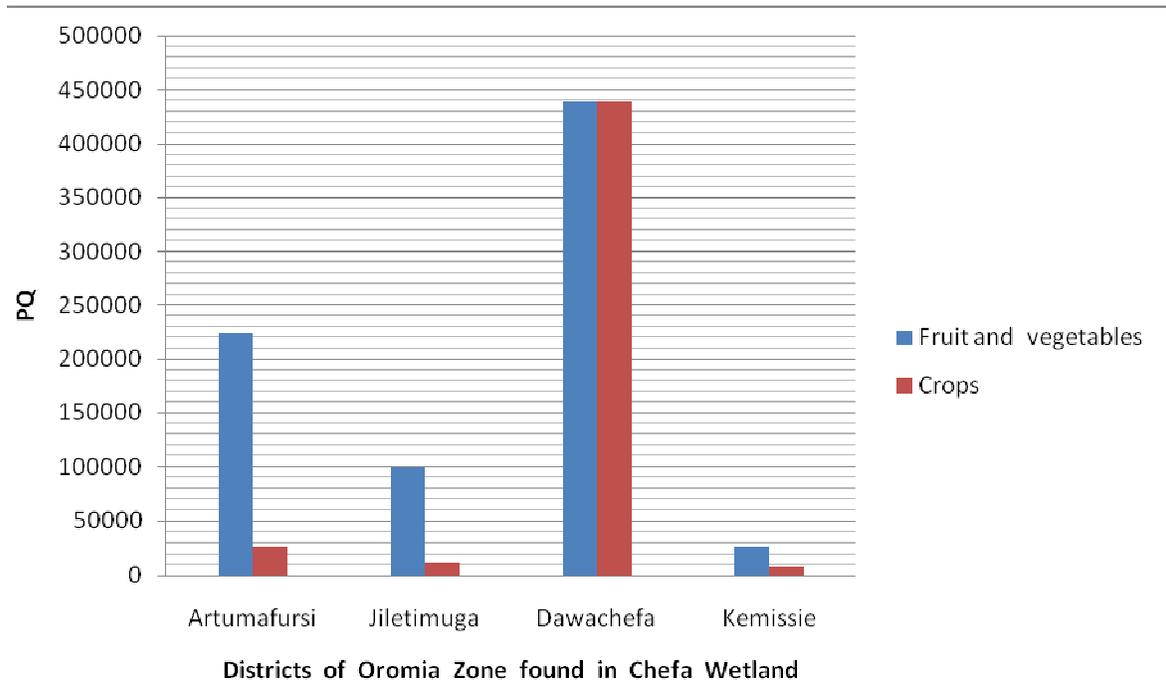
Use	Estimate household benefit (%)
Cermonial use of sedge	100
Thatching reeds	25
Dry season grazing	60 cattle owner
Water for stock	60 cattle owner
Cultivation	70
Domestic water source	100
Craft materials	5
Medicinal plant from the wetland	0

**Figure 1.** Map of the study area, Oromia zone, Amhara regional state. (Source: Oromia Zone Administrative Office, Kemissie).

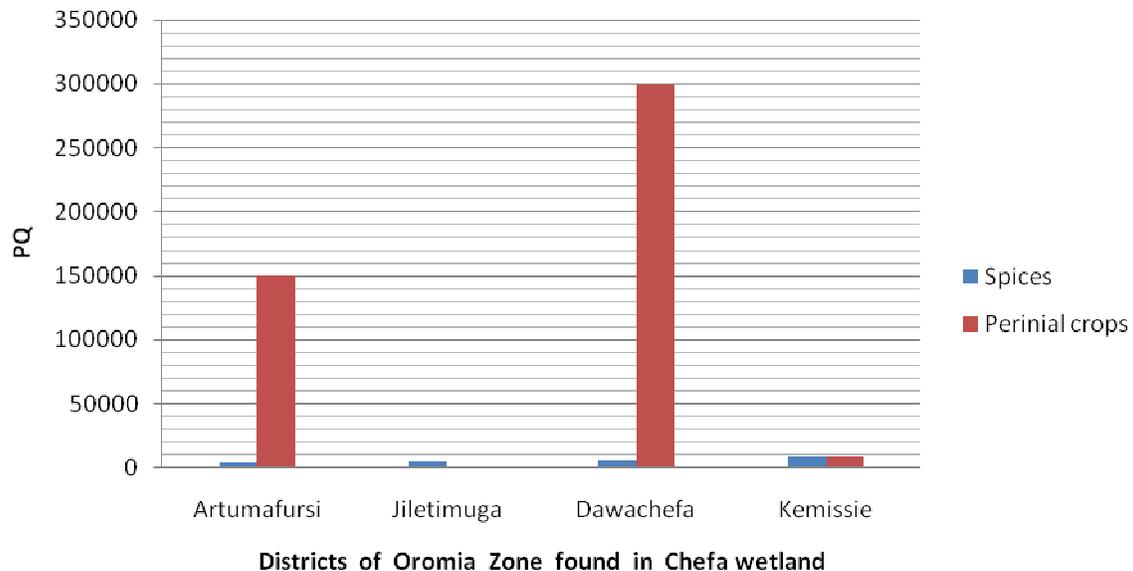
degradation, deleterious environmental impacts and harmful consequences to peoples' livelihoods. Impacts on wetlands can be derived from human activities that occur within wetlands and, because of the interconnectedness of the hydrological cycle, also from activities that take place within the wider catchment. Through removal of water or by alteration of natural flow,

chemical, and sediment regimes, human exploitation of both surface water and groundwater resources can have major detrimental consequences for wetland ecosystem (MEA,2005).

The value obtained from use of wetland resources relates to the demand as well as supply of these resources both from the wetlands as well as from



**Figure 2.** PQ (production in quintals) of Crops,fruits and vegetables procuded using irrigation system in 2012 in Chefa wetland .**Source:**Survey Result 2012.



**Figure.3.**PQ (production in quintals) of Spices and Perinial crops using irrigation system in 2012. **Source:**Survey Result 2012.

surrounding habitats. The demand for wetland resources will be determined by socio-economic characteristics of the area, including the number of households, their level of income and their culture, and will potentially be limited by the type of control over the wetlands. Other factors such as access to markets and availability of substitutes

for wetland resources will also influence demand. Access to natural resources, or property rights, affect the magnitude and distribution of benefits obtained, with values being potentially maximal under a controlled access situation, and the distribution of value (number of households benefitting) being greater under an open

### Land in Hectars

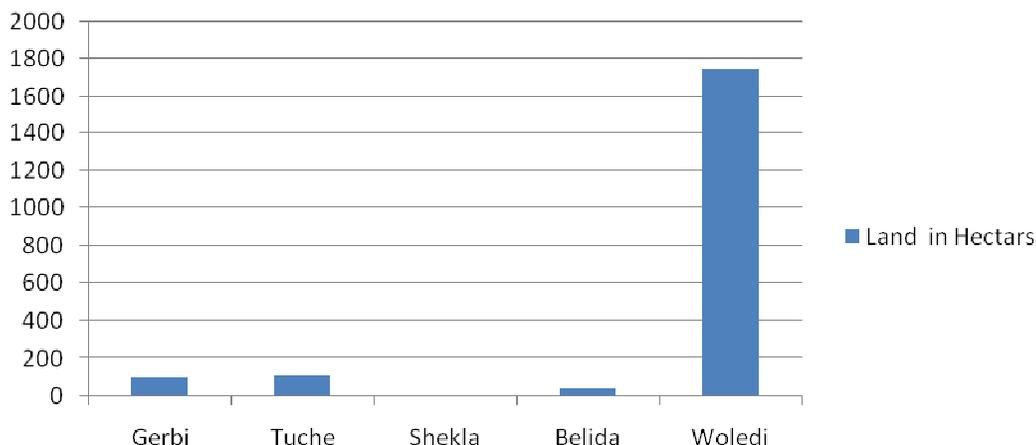


Figure 4. Land owned by Investors in kebeles found in Dewacheffa district.

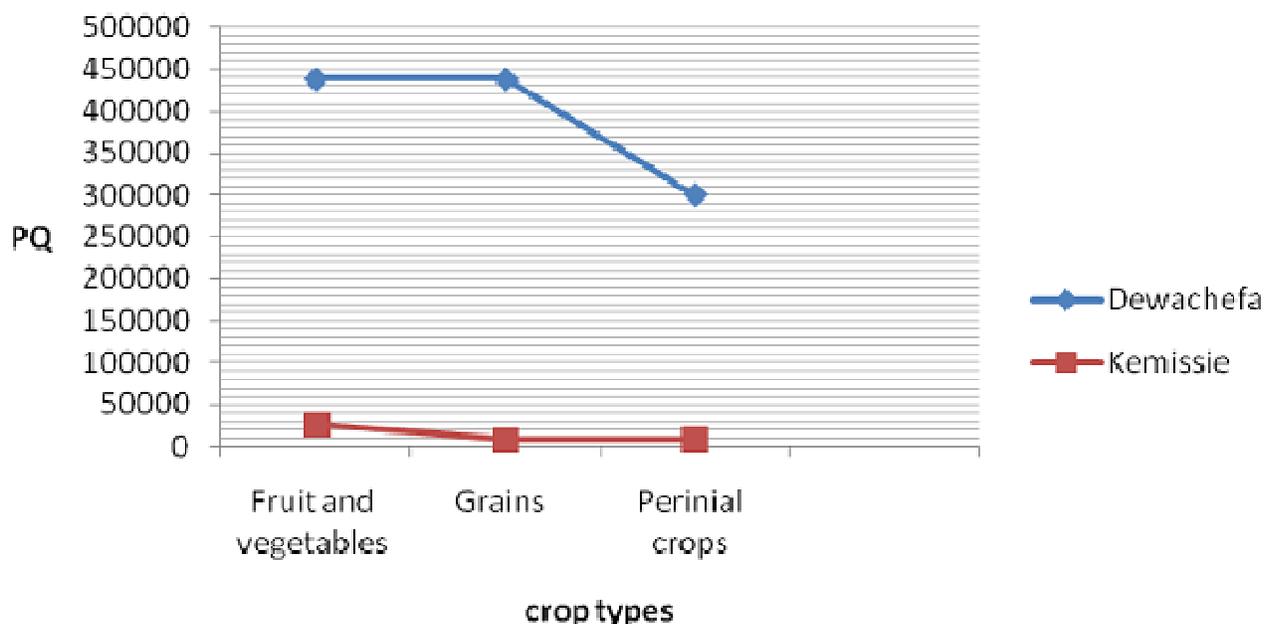
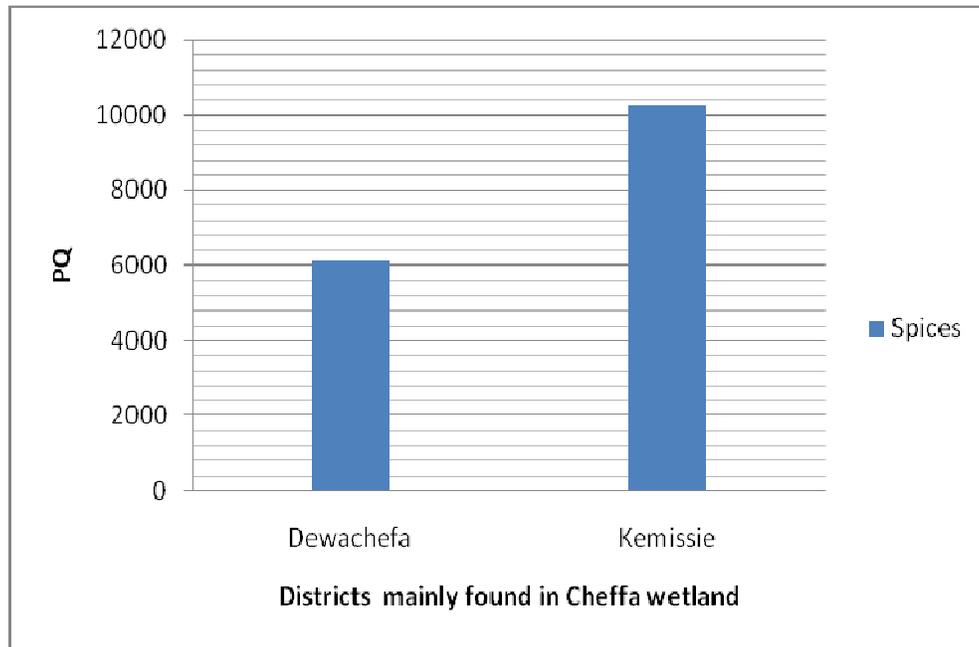


Figure 5. (PQ) Production of crops in Quintal in Dewacheffa and Kemissie in 2012 Production season: Source: 2012 Survey result.

access situation. The value of the wetland may or may not be sustainable.

Illegal land ownership, over grazing, excessive water for irrigation and macrophytes extraction for different household material construction and feed for animal and animal transportation are the major problems faced by Cheffa wetland. Since 2010 many people around kemissie, have constructed their house in Cheffa wetland without legal permission (personal

communication, Muhamed Osman). The result of the current study agrees with the study conducted to design the Cheffa wetland management plan (EPA, 2006) that stated the wetland Cultivation, Overgrazing, Wasteful use of water from feeder streams and Conflict over limited grazing resource reasons for wetland’s degradation. Siltation due to land degradation and agricultural expansion other than overgrazing are some the threats to Cheffa wetland.



**Figure 6.** Production of Spices in Quintal in Dewachefa and Kemissie in 2012 production season. Source: 2012 Survey result.

### **National policy on wetlands and Cheffa Wetland management condition**

#### **National policy on wetlands**

Wetlands are productive ecosystems with multiple functions that could support million's life systems. Proper legislature and legal frameworks should be there to determine their use, allocation, development and protection as well as the involvement of users in decision making process. Policies are the key instruments which play a significant role in this process. Despite their importance, there is no clear legal policy in Ethiopia regarding wetlands. Currently either the strategic documents or national policies of Institutions dealing with wetlands such as Ministry of Agriculture, Environmental Authority, failed to provide or backed by clear legal framework in how wetlands should be managed and utilized. However, these institutions mentioned wetlands on their strategic documents based on their interest.

According to the constitution all natural resources are owned by the state and the people of Ethiopia (FDRE constitution article 8(1)). The system has given the regional states the right to manage natural resources under their jurisdictions. Though it is not mentioned, wetlands are among these natural resources. On the other side, Ethiopia has not yet ratified the Ramsar conventions on wise use of wetlands (EWNRA, 2008). But Governmental organizations such as MoWR, MoARD and EPA are some of the main actors which have been

playing a key role in wetland related activities. These organizations adopt strategies which suits their objectives. Accordingly, the way they treat wetlands can be different. To begin with MoWR, Wetlands are hardly mentioned on the 1999's Water resource policy apart from their hydrological and socioeconomic benefits. But the 2001 water sector strategy has mentioned about "reclaiming" existing wetlands and "preventing" the formation of new ones. It also described the need to "under take inventory" of wetlands in the country as well as developing "guidelines" in order to achieve these objectives. On the other hand, EPA has been involving actively in wetland related activities. The authority recognizes the functions of wetlands and promotes conservation of water bodies including wetlands. They conduct the first inventory of wetlands in the country and list out 43 wetlands (EPA, 2003). Recently they have also prepared a draft law on "wise use and conservation of wetlands", though it has some vague terms, and missed some key points. The other organization is MoARD which have hardly mentioned wetlands but highly exploits the resources for agricultural activities. The strategic document does not specify wetlands, rather focuses on watershed management and water harvesting with the aim of agricultural expansion (MoARD, 2010).

This shows that, the wetland management approaches is sectoral and policies are fragmented. As it is mentioned, some organizations have overlapped responsibilities due to the lack of policy or legal framework that facilitate the required coordination

management systems. However, the resource has been utilized for different purposes by different users. There are signs that indicate threats to wetland loss as they are under lots of pressure (Abebe and Geheb 2003).

### **Cheffa wetland management condition**

The situation in the wetlands of Awash River basin is complex and messy. For instance, the local people (farmers and pastoralists), organizations such as Ministry of water, EPA and agriculture and rural development officers, health experts or those in commercial farming and industries have different views on the development and utilization of wetlands.

Recently there is no any Government and non government organization that works for sustainable utilization of Cheffa wetland. In Dawachefa and Kemissie there is high demand for land to be used for agriculture and agro processing industries. The Ministry of Agriculture, Federal Environmental Protection Authority, Environmental protection, Land administration and Use offices at different level of Amahara Region and ORDA (Organization for Rehabilitation and Development Association) are the major responsible organization for Cheffa wetland Management. However this organization contribution for wise use of Cheffa wetland is insignificant.

### **Conclusion and Recommendation**

Cheffa wetland has high socio-economic value for local people living in Dawachefa and Kemissie and also for outsider that come to the wetland for water and forage supporting their cattle during dry season (January to June) every year. The wetland is also a good opportunity for investors that use environmental friendly technologies. Currently the 15 investors in Dawachefa are creating temporary job opportunity for about 15000 people and 150 permanent works. However the huge cattle number that came from different zones of Afar Region and the nearby Districts of Oromia zone is beyond the carrying capacity of the wetland that aggravate the soil erosion caused by Borkena River when it floods. Eucalyptus tree cultivation in these districts also is covering large proportion of the area that can affect water budget and biodiversity of the wetland. Structured study on wetland valuation should be conducted. Moreover community based Cheffa wetland should be implemented in the area. According to Ethiopian Environmental Protection Authority, All types of agriculture within 30 meters in wetland should have Full EIA. Therefore all investors in Cheffa wetland should have full EIA (Environmental Impact Assessment) report before the beginning of their investment.

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