



School of Graduate Studies

Institute for Peace and Security Studies

**WATER USE COMPETITION AND CONFLICT AMONG
MULTILEVEL ACTORS AROUND LAKE ZIWAY, ETHIOPIA**

By

KASSA ASRAT

JUNE 2019

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**A THESIS SUBMITTED TO THE INSTITUTE FOR PEACE AND
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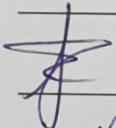
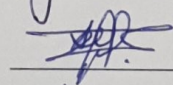
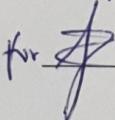
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Abstract

Conflict over water use is becoming a serious concern. This study was conducted to explore the nature and extent of water use conflict in Lake Ziway catchment. The research was designed to seek answers for questions on the practices, the dynamics, cause, the impact of conflict over water and the efficiency of the existing institutional arrangements regarding water use in Lake Ziway catchment areas. In the conceptual framework for water use competition and conflict were explored with the attributes of water users, of natural resources and institutional arrangement on water from post-1991 up to present. A qualitative approach was employed that includes 16 key informant interviews, 21 in-depth interviews, four focus group discussions, and field observations. Data was collected from May up to 16 June, 2018. The findings show that demand for water resource is increasing and leading to intense competition for and overexploitation of water in the study area. In addition to increasing demand for water, decrease in water and structural scarcity tighten the competition for and conflict over water. The effect of water use conflict has created instability and insecurity among water users, in the study area. The existing institutions and the structures in place are not effective enough to ensure water use management in the area due to a lack of proper enforcement mechanisms. If the current water use conflict and competition are not properly addressed, they are likely to create serious social impacts, specifically displacement, overpopulation, water shortage, health) and environmental (e.g., water pollution, water degradation) challenges. Until further and better conflict management strategies are put in place, there is a need to organize platforms for regular stakeholders' discussions and do environmental protection activities together with the community- this is empowering customary institutions.

Keywords: *water use competition, water use conflict, Lake Ziway Catchments, institutional arrangements*

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List of Acronyms, Figures, and Table

List of Acronyms

CSA	Central Statistical Agency
CSOs	Civil Society Organizations
CPRs	Common Pull Recourses
EPA	Environmental Protection Agency
IWRM	Integrated Water Resource Management
MoA	Ministry of Agriculture
MoWIE	Ministry of Water, Irrigation & Electricity
NRSOWMEB	National Regional State of Oromia Water, Mineral and Energy Bureau
NGOs	Non- Governmental Organizations
OECD	Organization for Economic Cooperation and Development
OMN	Oromia Media Network
OWWDSE	Oromia Water Works Design & Supervision Enterprise
PISDES	<i>Pacific Institute for the Studies in Development, Environment, and Security</i>
RBOs	River Basin Organizations
SNNPRs	Southern Nation Nationalities and People Regional states
UNEP	United Nation Environmental Program

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CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Natural resource scarcity is a critical life-threatening issue around the world. And water scarcity has come to be among the few critical issues of a growing concern all over the world (Gebrehiwot, 2016). According to water war logical perception, water use is the subject of contention within a politically fragile state situation. This means that water scarcity and the need for a reasonable use of scarce resource has become a point of dispute. A reasonable use of shared resources is advocated to ensure the sustainability of a scarce resources such as natural water. The future global war will be on the issue of utilization of water among the communities and different states (Alam.2002). Population growth and the increase in global consumption exert pressure on renewable natural resources utility. Natural resources such as fresh water, cropland, rangeland, forests, fisheries, and other wildlife are getting scarce and becoming points of conflict. Quality deterioration and competition are the main cause for triggering conflict over declining renewable resources, on land and water around the globe (UNEP.2012). Similarly, Barry. and Sidel (2011) stated scarcity of freshwater is a rising violence risk on public health in many parts of the world.

Moreover, McGill (2012) stated violent conflicts over renewable resources arise over the issues of power who should have access to and govern over resources. Influential personality in decisions making on allocation to share benefits from natural resources has a key role in Africa. Mostly, lack of access to natural resources leads to a violent conflict in the continent. The situation could be worse in the context where lack of access arises from unfair natural resources management. There is the observable linkage among ethnic polarization, high level of inequity, poverty, injustice and poor governance which fuel violence (UNEP, 2012). Sterner, and Coria, (2013) noted that water is necessary thing for life and is a substantial natural resource needed for all purposes of life. To mention just a few, water is needed for agricultural activities, industrial undertakings, power generation sector and for various other aspects of life (Ibid).

Additionally, OECD (2005) report, 10% of water extraction is used for domestic use, 20% for manufacturing, and 70% for agriculture at the global level. Furthermore, water has considerable significant expressive and token value for religious rituals¹. Water is also essential for managing natural ecosystems relationship in, for example, protecting the wetland healthy. In addition, OECD stated that the main distress for increase freshwater supplies could be based on various factors. Among which, population growth, economic development, lack of access to freshwater are a cause for exposure waterborne diseases while poverty, political instability, economic benefit and water pollution are considered as prominent causes of water conflict. Users' competition for water use and conflict on water distribution by water governors for usage can be a serious threat. Solving the threat may grow into intrastate or interstate violence. Violent and armed conflicts have already been seen between countries and groups over water use (OECD, 2005).

Similarly, Homer-Dixon (1999) described natural resource scarcity as a trigger of conflict, particularly in weak states that fail to deliver security and basic services to their citizens. Weaknesses to deliver security and basic services to citizens can lead to violent conflicts. The scenario could be worse in the context where the weakness is caused due to lack of proper economic management, political legitimacy, absence of regulatory quality, lack of social inclusion, and institutional ineffectiveness (UNEP, 2012). Ohlsson (2000) has argued that the loss of livelihoods due to lack of arable land and water was one of the reasons which enabled the mobilization of the population that contribute to Rwanda's genocide.

On the other hand, Kramer (2004) has explained that conflicting interests over water use is unavoidable due to the coexistence of various interests of water users around water point. The main competing different interest parties are agriculture, industry and different population groups. Water quality is another contentious issue. Additionally, the decrease in water quantity by water pollution raises serious threats to human and environmental health. Water quality reduction can

¹ Water symbolism in the Ethiopian Orthodox Church context at the celebration of Epiphany (January 6th), (BRIC,2009) and Tajoo ritual performed annually in Arfaasaa (spring) as a new year celebration at the river or at the Lake by Waayyuu Oromo Arsii to pray for peace ,fertility and prosperity (Lenin and Dejene ,2015)

be a source of dispute between those who cause degradation and affected groups. Public protest can raise due to the increasing impact of water pollution caused by industrial and domestic wastewater or agricultural pesticides (Ibid).

According to the World Bank report (2005), there are places where there are frequent attacks between pastoral, semi pastoral and agriculture clan groups to capture and govern land for crop cultivation, grazing and water points usage (World Bank, 2005 p31). At present, environmental natural resources scarcity disputes in Sub-Saharan Africa are becoming a source of conflict (Almer, and Oechslin, 2017). Environmental uncertainty will be led to political manipulation which at the right time threatens human security. Similarly, Franco, Mehta and Veldwisch (2013) use "land grabbing" and "water grabbing" in the same sense as processes or phenomena concerning the seizing of power to control land and water resources to govern the benefits of its use that provoke conflict.

Furthermore, Eva's (2016) exploration, after the years 2007-2008, there have been crises in food prices worldwide. Ethiopia is among the countries that fell victim to foreign investors regarding farmland. Eva's (2016) exploration shows that large-scale farming development increased the pressure on land and water use resources at Akobo - Sobat sub-basin in Ethiopia. According to Eva, the development of land transferred to the investors in the Nile River basin will increase water use competition and conflict (Ibid). Moreover, Ketema (2013) stated that the current dynamics of common-pool resources (CPRs) implication includes massive livelihood, economic and socio-cultural systems that are highly dependent on one another at Lake Tana Ecosystem. As a result, Lake Tana ecosystem is under severe fears of development burden and resource degradation. Several development activities with the inclusion of water use competition by different actors have been latently negative externalities that took place in and around Lake Tana (Ibid).

Similarly, Tigist (2009) reported that the Central Ethiopian Rift Valley where lakes such as Ziway, Langano, Abiyata, and Shalia are found, has faced severe degradation of natural resources and climate variability. This is a threat to the local community. Azage (2011) also reported the existence of conflicts due to the exploitation of water and grazing land in the Awash River Basin and the rift valley

areas. The problem of water use has in general become a critical issue of research concern worldwide

The site selected for the present research is Lake Ziway water catchment. Lake Ziway water catchment area is one of the rift valley freshwater lakes. This water catchment covers a total surface area of 420 km². Water from the lake has continuously been used for various purposes. For example, the lake is a source of Ziway town's water supply. Flower farming industry and small-scale water farm irrigation practiced among the surrounding communities are largely dependent on the water from this lake. In addition, Lake Ziway water is used for local consumption, cleaning, animal watering, fishery and for balancing eco-tourism (Malefia, 2009).

At present, water consumption by different irrigated agriculture in the study area is nearly 150 million m³per years (Hengsdijk, et al., 2009). Around Lake Ziway, economic growth for inhabitants is increasing the demand for water. The settlement of large-scale foreign and national horticulture, floriculture enterprises, and small-scale irrigated agriculture in the area largely attract employment. Different governmental organizations and NGOs are providing water pumps to poor farmers to ensure extra water withdrawal. Due to competition for water utilization, there is a growing water abstraction and degradation of natural resources around Lake Ziway. The use of gravity irrigation by inhabitants and economic progress as well as the settlement of large-scale foreign and national horticulture and floriculture enterprises are challenging claims on land and water resources in the area.

The downstream shares of the catchment, along the Bulbula River and in the terminal Lake of Abiyata has a decrease in the outflows of water and become smaller both in size and depth. Furthermore, there is depletion in the volume of water because of unwisely utilized natural resources. Water abstractions are mismanaged with the very restricted degree of regulatory frameworks and monitoring capacity of (NRSTOWMEB, 2016). Overall, the water quality of Lake Ziway has become seriously polluted and unsuitable to meet the various purposes that water is needed to meet (Malefia, 2009).

Open field vegetable furrow irrigation, flower farming and fruit growing are activities practiced in the area. These activities have created severe scarcity in the availability of water resource. Added to the scarcity is the mismanagement of even that scarce resource. There is also an inappropriate water usage in the area. Inappropriate water usage is mainly caused by over-irrigation, soil salinization, diversion, damming of rivers, construction of water for soda ash and deforestation. The impact triggers water use conflict (NRSTOWMEB, 2016). The impact of the use of water for irrigation on natural resources is the loss of aquatic birds' life and reduction of the fishing of lake Ziway. This has a great influence on the economic life of the surrounding society. This, in its turn, triggers water use conflict (Alterra Report 2227, 2011). The need for the present study arose from the recognition of such causes of water-related conflicts. The study has therefore been designed to describe the situation among selected users of water from Lake Ziway in Dugda Woreda. Dugda Wore is located around Ziway town.

1.2 Problem statement

Water use in the Rift Valley Lakes basin has been tremendously increasing over the last years. For examples, water is used for small scale irrigation, for fishery, and for eco-tourism. There is also a high demand for water to grow commercial flowers in the Rift Valley Lakes basin. Development expansions in recent years also appear to go beyond the carrying capacity of the catchment area. On the other hand, there appears to exist 'irreconcilable' differences among the interests of water users around the Lake. The prevalence of differences among the interests of water users is often considered to be a cause for conflicts in the area. Therefore, investigating the cause of water use conflicts and competitions among the different local actors in the study area (i.e., the causes of differences among the interests of water users in the area) is a timely issue.

The issue of water usage among different communities, households, and development actors of water users should be considered as a reference point in any attempt to be made to settle water use competition and conflict among the communities in the area (NRSTOWMEB, 2016).

According to a pre-research survey carried out by this author, issues of water use conflicts had frequently been raised during their earlier meetings. However, none

of the discussions they held during their meetings led to any solution to the causes of the conflicts. This was the author's major source of information about the prevalence of water use –based conflict in the area.

There are regular conflicts among different users of water at Ziway Lake. The local people, flower farms, and local fishermen are among those who compete for better share of the water (NRSTOWMEB, 2016). Accordingly, identifying the actors as well as water use conflicts and causes of competition is one of the main tasks of the researcher in the study area.

In addition to the above-mentioned problem, Ethiopian government policies and legal framework pertinent to water use will be examined for information on the principles underlying water use from Lake Ziway among the concerned parties. Furthermore, an attempt will be made to identify the gap in exploring renewable natural resource use in the study area. This means that factors that influence actors of water use competition and conflict in the Lake Ziway catchment area will be an aspect of the focus of this study. This can be done by focusing on the practical framework of water use in connection with parties' behavior, with managing or supplying induced scarcity in water use competition and conflicts Lake Ziway (Team, et al., 2010). Investigating the water policy perspective on institutional reform and clean water supply in the central rift valley of Ethiopia is required.

An increase in the local community population growth has the power for competition for water use among the local community. Members of the community need water for all their cultivable land. They need to bring into use the cycles of fallow to rest the soil and encourage fodder for specific livestock (NRSTOWMEB, 2016).

On the other hand, issues of natural resources, competition, and water use conflict in the Lake Ziway does not seem to have so far been adequately researched. The Ziway -Meki sub-basin in the central rift valley lakes has the greatest potential supply for effective development. The central rift valley lakes have favorable agro-climatology and socio-economic situations that attract investments mainly in the agricultural sector of the economy (Abebe, and Kassa, 2016).

As mentioned earlier, research in water use competition and conflict is scarce in the local context in general. Water use competition and conflict among the users

of Lake Ziway environment is comparatively less explored and less understood. This research therefore primarily aims to identify the problem between the social characterization of the stakeholders - water resources use competition and conflict - among multi-level actors surrounding Lake Ziway.

The study aims to investigate the existing situation vis-a-vis past experiences. This is hoped to show the trend of water use competition and conflict among the multi-level actors in the study site. From the geographical point of view, an analysis of the interrelations among stakeholders' water competition will make information that helps in the management of water resource for policymakers available. This adds a new perspective to the already existing ones in water use competition and conflict.

This study also aims to address the complex relationships between communities and the endowment in the rift valley in Lake Ziway ecosystem. Lake Ziway is in a state of disaster, diverse development pressures and resource degradation cast uncertainty on the sustainability of the Lake's ecosystem. Stakeholders in the area are in a continuous debate on resource management and governance. If the current practice of natural resources management and governance at the local/user level is sufficiently addressed, some hope will be there to state that the dynamic patterns of interactions between human groups and their environment can be arranged in the state structure (McGinnis, 2011).

Analyzing and understanding the water use competitions and the causes of conflict in Lake Ziway water use systems can help find necessary strategies of addressing the causes of the conflicts. Putting in place fair strategies of use of water will eventually guarantee proper and efficient use of water from the Lake basin (Ketema, 2013). This study can therefore be considered as an aspect of such endeavors

1.3 Research Questions

The study attempts to answer the following research questions:

1. What are the practices of water use in Lake Ziway?
2. What are the dynamics and the cause of water use competition and conflicts?
3. What are the impacts of water use conflict?

4. How efficient is the institutional arrangement put-in-place to manage water use competition and conflict in Lake Ziway catchment area?

1.4. Objectives of the study

1.4.1. General objective

The general objective of the study is to explore the nature and extent of water use conflict in Lake Ziway catchment area and to explain factors that influence it.

1.4.2 Specific objectives

The specific objectives are to:

- identify the nature and cause of water use competition and conflict among local actors;
- explain the effect of communities and household's attributes/characteristics on water use competition and conflict;
- assess the efficiency of institutional arrangement put-in-place to manage water use competition and conflict.

1.5 Significance of the Study

This study was designed to generate knowledge that would initiate policymakers to develop strategies pertaining to the effective use of water from lakes. The findings may also provide information that supports farmers and other stakeholders to develop a positive attitude and knowledge to improve their methods of use of scarce resources and their management practices.

The study could be used as an academic reference in creating originality of research knowledge on this research topic. In addition, the findings are hoped to play a significant role in motivating other researchers to do further studies in this area.

1.6 Delimitation of the study

This study analyzed, interpreted and reported the causes and consequences of conflict in the Ziway catchment area. The water in Lake Ziway at Oromia Regional State is found in the Ethiopian rift valley analyzed from the perspective of common resource value and utilization. The study area was selected due to the researcher's previous knowledge of the prevalence of conflict in the area. Addis Ababa, the researcher's location of academic institution and residence, is close enough to Lake Ziway, which is the site of the present research. Accessibility of the research site to the researcher's place has therefore been considered in the choice made about the research site.

CHAPTER TWO

REVIEW OF THE LITERATURE

2.1. Introduction

The major aim of this chapter is to describe and present the conceptual and theoretical framework of the thesis. It summarizes definitions and concepts related to the research questions and the problems concerning water use competition and conflict among local actors in Lake Ziway catchment area. It begins with a brief definition and description of institutions, strategies, norms, and rules of power. In addition to that discussion that addresses the interactive theoretical debate on the ‘environmental natural resources scarcity’ and empirical studies of natural resources of water use competition and conflict in the Ethiopian context are presented. Finally, based on the concepts, theories and Ethiopian water law discussed, the conceptual framework that guides the roadmap to the research is presented.

2.2 Concepts and Definitions of natural resources and conflict

2.2.1. Conflict

According to Ketema (2013) conflict refers to a social situation in which two or more parties (individuals, groups, states) struggle for their respective interests. It is mismatched, to begin with, or strive for a common resource pool, that can only be influenced by one party; and/or want to service incompatible resources to realize a certain goal. However, there is no internationally accepted definition of what constitutes a natural resource conflict. Up to now, sharp opposition differences in power and in shared values across involved stakeholders make conflict integral in common natural resources management and governance. There are conflicts occurring from different stakeholders exploiting the lake basin’s resources for several goals. Several use values of resources by different stakeholders often with divergent interest in and power over these resources has resulted in multidimensional conflicting situations. In the case of conflict over resources, the drivers of change which further aggravate through competition are population pressure, uncontrolled resource use pattern and unclear property

rights. A challenge for implementation with time (long-lasting) and costly legal procedures attached to the enforcement gap (Ketema, 2013)

On the other hand, Atkilt (2003, p.32) defined conflict as:

the prevalence of different violent clashes between or among different communities resulting casualties, disruption of production and hostilities. Conflict is a phenomenon demonstrating the dimension of relationships between the conflicting parties and creates an event of precedence (Atkilt, 2003).

The term "water conflict" or water use conflict can be defined as any disagreement or clash over or around water use competition between different parties. Interference is very important to resolve the existing problems from within as well as outside the institutions of social, economic, legal, political and military units. A "true" water war can be defined also as carrying guns conflict to fight between different countries with the interest of gaining access to water (Ashton, 2007). Moreover, the word conflict refers to disagreement and differences between persons, groups, and structures. The disagreements and differences converted to conflicts when they have disturbing effects on the persons. Conflicts derived from poorly managed limited natural resource upon reduction of changes which are inevitable elements of individuals livelihood. The change can be in form of water use competition over certain benefits which each individual or institution feels its merits in an environment where there is no suitable modality of moderating or rationalizing needs (Fredrick, 2015). In similar articles, natural resource conflict can be defined as a disagreement among different groups who are competing for the governing of using resources. Additionally, as a resource becomes polluted or degraded, its availability for use is diminished. Thus, we may refer to the comparative scarce resource as to dimensions of depletion and degradation (Green, 2005)

The PISDES (2018) asserts that the water conflicts chronology shows a history of conflict and tensions over water resources, the water use arrangement as weapons during war and targeting of water systems during conflicts. Terrorism, development disputes and control over resources are the other causal issues of water conflict. Moreover, Azage (2011), further defined specific water conflict as dispute occurring over the use of water resource consumption between a group of

water users' activities because of an existing water use tension circumstances because of poor governance of water resources and availability of biased water right allocation (Ibid).

Similarly, Teshome (2010) noted that conflict emerged in a social and historical context with different scope and magnitude. Water use competition and conflict may originate from several different sources, including Water use competition over natural resources and access, the difference in political ideology, religion, culture and tradition (Teshome, 2010). Conflict is normal and natural; it exists at different levels and exists with the life of people in each society. In actual terms, conflict takes different forms of cultural perceptions (Kelemework, 2013).

2.2.2 Natural Resources

World Trade Report (2010: 46) defines, natural resources as “materials that occur in nature and are essential or useful to humans, such as water, air, land, forests, fish and wildlife, topsoil, and minerals.” Natural resources can be also categorized as renewable or nonrenewable. Renewable resources are like cropland, forests, and water. Renewable resources are frequently maintainable. Nonrenewable resources such as diamonds, minerals, and oil are naturally created in restricted amounts, and their value rises as supplies decline. Natural resource conflict holds different forms. It may hold legal and political contests, civil conflicts or in some cases violent clashes over natural resources (Ratner, et al, 2013). The conceptualization of natural resource scarcity intended here refers to the relative abundance or plenty of renewable natural resources and not enough or shortage of natural resources to meet the desire of human livelihood (Green, 2005). Natural resources are demarcated as the “actual or potential sources of wealth that occur in a natural state, such as timber, water, fertile land, wildlife, minerals, metals, stones, and hydrocarbons”(UNEP, 2012).

Similarly, Homer-Dixon (1999) explained that environmental factors are viewed as only renewable sources of livelihood. Environmental factors such as land, water, fish stocks, and timber may not be available to all people in a physical area and may be degraded by practice or mismanagement (Ibid). Moreover, Fredrick, (2015) has explained that water resource depletion and increasing demand on limited water supplies have an effect in pushing people to a risky situation by

creating conflicts to some of the water-related development investments. However, conflicts can happen in the existence of local institutions such as village councils. But still, water use conflicts continue existing to open fighting with varies different depress of the clash, property damages and in some places have led to the killing or wounding of people (Ibid).

According to Kahl (2008), the role of natural resources in conflict struggle over the land of territory which has been the major form of conflict and it frequently causes territorial fights. If then, how are these resources linked to the complex dynamics of natural resources in conflict? Scholars have suggested two theories to explain the role of natural resources in conflict. One point to scarcity, called the Neo-Malthusian view, and the other points to the abundance potential presence of natural resource at specific area, as stated by Kahl Colin (2008) “The Neo-Malthusians argue that rapid population growth, environmental degradation, resource depletion, and unequal resource access combine to exacerbate poverty and income inequality in many of the world’s least developed countries. These deprivations are easily translated into grievances, increasing the risks of rebellion and societal conflict.” Internal disagreements could arise from local environmental degradation, for example, when industrial unit releases and pollutes a main freshwater source. Ethnic clashes can arise while population migration increases demand for scarce resources such as water or timber. The natural resources abundance refers to an incentive to fight for capturing the power and to get access to the mineral wealth. Mostly, natural resources can help finance the rebellion (Ibid).

2.2.3 Environmental Scarcity and Resource Conflicts

Environmental scarcity is a cause of natural resources competition and conflict whenever there is a shortage of natural resources. According to Homer-Dixon (1999), social and environmental conditions combine to cause scarcity or shortage of natural resources which has maintained by three sub-forms of socially constructed scarcity. Scarcity is a social construction of physical conditions, which can be described as the shortage of natural resource particularly water that has three forms of scarcity which have identified by (Homer-Dixon,1999: p48), includes: “1. Supply-induced scarcity (supply decreases indicate demand cannot be met); 2. Demand-induced scarcity (demand increases and cannot be met by

existing supply); and 3. Structural scarcity (inequities in distribution creates relative scarcity. “The social effects of environmental scarcity are demographic (population changes) and economic (constrained productivity and rent-seeking which in turn can contribute to social subdivision and the weakening of institutions) (Ibid). On the other hand, these social effects, Ruckstuhl (2009) specified that it can lead to violence in the form of localized and politicized group identity conflicts; coups d’état; and insurgency. Scarcity motivated conflicts that are more probable to occur with spread out non-renewable resources, such as water and land, as these are vital to the daily existence of multitudes population (Ibid).

Furthermore, Mohamoud, Kinyiri, and Nor (2015) explained that natural resource scarcity is the level of shortage in which valuable natural resources, like water, land, and fuel, are accessible for use by individuals. Some natural resources, like coal and oil, are considered non-renewable while others, like fresh water and forests, are considered renewable. Thus, natural resource conflict is simply operationalized as the interaction among two or more self-regulating resource users, in this case among various lake water users over shared environmental resource or common-pool resources such as land, pasture, and water points or fresh lake water. Water resource use conflict arises between different local actors on water use competition and conflict of interest to access water that can be expressed in a violent and nonviolent manner. In this thesis, both violent and nonviolent conflicts are considered (Ibid).

Violent causal relationship in Africa has occurred among natural resources and society with diverse features. Even if natural resources in the region have played an important role in several violent conflicts, their behavior is rooted in grievance history in the perspective of social, economic and political issues. There are very limited cases that natural resources are the only cause of insurgency or rising active revolt to the national state. During the cause of fragile societies, natural resources have been the key driver of social violence (Sylvester, 2012). Moreover, the East African nomads traditionally follow their cattle for looking to access water and green pastures. Their movement is not limited to territory alone, they cross local administrative and international boundaries alike. These water use competition in a fragile economy has had serious consequences for the economic

security that attributes of communities and households internally displaced people (Kumssa, and Herbert 2009). Similarly, Azage (2011) explained the frequent water resources conflict between the Afar and the Issa in Ethiopia as the main related distress pressure in the region. The demand for freshwater source has gotten increasing in all parts of the globe not only in developing regions but also in developed regions. The effect of local water use conflict has several dimensional challenges that have affecting millions of vulnerable communities in Africa for migration and economic displacement. Access in controlling over water resources point has been the basic cause of local conflicts. It has been identified and sensitized on growing water-related conflict with government projects and construction of infrastructure. Water-related and inefficient ways of controlling utilizing and managing farmland have observed, that distress the local community in the Awash River Basin of Ethiopia (Ibid).

2.3 Institutional Arrangement for Conflict Prevention and Management

According to Saleth and Dinar (2004 p 25), the institutional arrangement is defined as” a set of fundamental political, social, and legal rules that establish the basis for production, exchange, and distribution”. Institutional arrangements are governing several issues of the water sector for water resource development over allocation, utilization, and management. The arrangement can be formal or informal which has been formulated to accomplish at least one of the following tasks: to provide a structure, within its members to make cooperation, to obtain some more income that is not existing outside the structure. The institutional arrangement may contain a single or group of individuals voluntarily cooperating with the government (Saleth and Dinar, 2004). According to Ostrom (1990), institutional arrangements are referring to a process that needs information regarding time and place with socially accepted rules. It is the sets of working rules that have mandated power and function for eligible persons to make decisions in common-pool resources in a certain locality to allow or forced to be excluded and not included. The rule has a common pool resource usage procedures and disciplinary enforcement commitment to punish anyone who does not follow the rules of the firm. The institutional arrangement that has formed can be modified, monitored and sustained by the user of renewable resources (Ibid).

Accordingly, she understood institutional arrangements with three points of concepts (strategies, norms, and rules) that are often used interchangeably in social science literature. Strategies refer to plans of action in which to apply reasons to achieve ideal results forecasts. Norms are related to treatments about activities on short-term material settlements to person. On the other hand, rules may be made at the national regional and local levels or with international areas. Rules refer to verbal statements like norms as well, but rules carry an additional, assigned sanction. Particularly to administrate natural resources, the application of rules must exist to govern human interaction and common-pool natural resources like lake water use and monitoring, auditing and sanctioning for efficient usage at the welfare of society (Ibid).

2.3.1 Sources of conflict

According to Ajayi and Buhari, (2015), there is a different view of explanation on the source of conflict. The sources of conflict can be economic reasons (such as property inheritance, land-related issues, trade imbalance, non-payment of loans, etc.). And it can be cultural reasons that refer to the breaking of a communal taboo, breach of holy sanctions, breakdown of the covenant, negligence of social responsibility, etc., are the major sources of conflict (Ibid)

Similarly, Schellenberg (1996) agreed that the source of conflict is deep-rooted in our physical biology (inborn character). Conflict is not only taking place within social life but also it is a biological fact present within all human being. He demonstrated sources of conflict as the approach of individual character that focuses on the act. Thus, human conflict is inevitable not because it is part of social life, but also it is a biological fact lying within all our behavior. Sociologically, he explains that human beings are the product of their social environment which refers to certain societies act in the framework of the social structure (Ibid).

UNEP (2012: 18) reported that the main sources of water conflict include:

Competition between different water sectors (agriculture, industrial and domestic). Competition between different livelihood groups (farming, livestock, and fishing). Degradation of water quality caused by pollution (industrial, agriculture and urban). Reduction of water supply caused by

development/infrastructure projects. Lost access to water supplies and/or exhaustion of supply. Natural variation in water availability and sudden shrinkage of supply. Exclusive control of water resources and access. Conversion from the public to private management and changes in the pricing structure. Unclear water uses and access rights (Ibid).

2.4. Typology of water use conflicts

There are two fundamental categories of the typology of water use conflict, i.e., Water-demand in relation to water use actors and Water supply in relation to water management. Within the categories of Water-demand, there are several subcategories have been established in relation to the feature of the water resources. Water use refers to the extractions of water from the lake, the rivers, and the ground. Another category connected within the lake is fishing as a resource revenue. Too much fishing overexploited (more than the lake carrying capacity) by rural and urban society for their livelihood. Because fish harvest from the Lake has gotten direct income with high revenue. Water in relation to the economic interest situation has a significant effect on the conflicts at the present-day. The difficult feature of water is, it combined with other lands, ethnic, social and economic conflicts. (Fayos, 2002).

Furthermore, Fayos (2002) explained that there is a wide variety of household/stakeholders' attributes users of water with different interests and by different capacities of powers that are active in water resources. They are grouped as intensive water users, small irrigation farmers, fishers, water governance officers', environmentalists and pastoralists. Intensive water user is high investment farming such as flower farming, animal, crop farming, and tourist activities. Small irrigation farmers are those who live covering their basic needs, i.e. food, housing, and schooling. They practice furrow irrigation with a small settlement establishment. Fishermen of both (legal and illegal) groups have a different character. Their interest is mainly economic. The value attribute to them is plentiful fish stock. Legal fishers are those who registered and have the license for fishing, illegal fishers do not have licenses. They engage with destructive activities such as non-sustainable for fishing, nets of small size that capture small fish have not bred yet and destroyed the breeding ecosystem of fish. Water

governing managers office on each level of the state is mandated to manage and implement the law. But they are unable to deal adequately with society according to water management plans (Ibid). Similarly, there is an implementation gap between the policies and strategies relevant to productive water use with institutional setup in the Ethiopian context (Oxfam America Evaluation Report, 2014)

There are four main sources of conflicts as shown in Figure 1: The first is Factual Disagreement which refers to a disagreement on the facts of a case when the opinions differ from the impacts of certain actions invoke with relevant laws that create complex risks. Uncertainty in the results and uncertainty in the rules. Another causes Factual disagreements when the parties in conflict often have different information, and the limited capacity of individuals to process information. The second source of conflicts is conflicting goals between the stakeholders. The conflicting goals denote the desired situation, interests as goals refer to personal gains or losses and values as goals are traditionally determined. The third source of conflict is relational aspects between the stakeholders which can raise conflictual circumstances. They are related to mistrust caused by communication among different individuals or groups for power struggles to hold the position. The fourth source of conflicts structural sources which refer to the ambiguity in the distribution of tasks and responsibilities between the managers together with a scarcity of funds to respond to actions (Fayos, 2002).

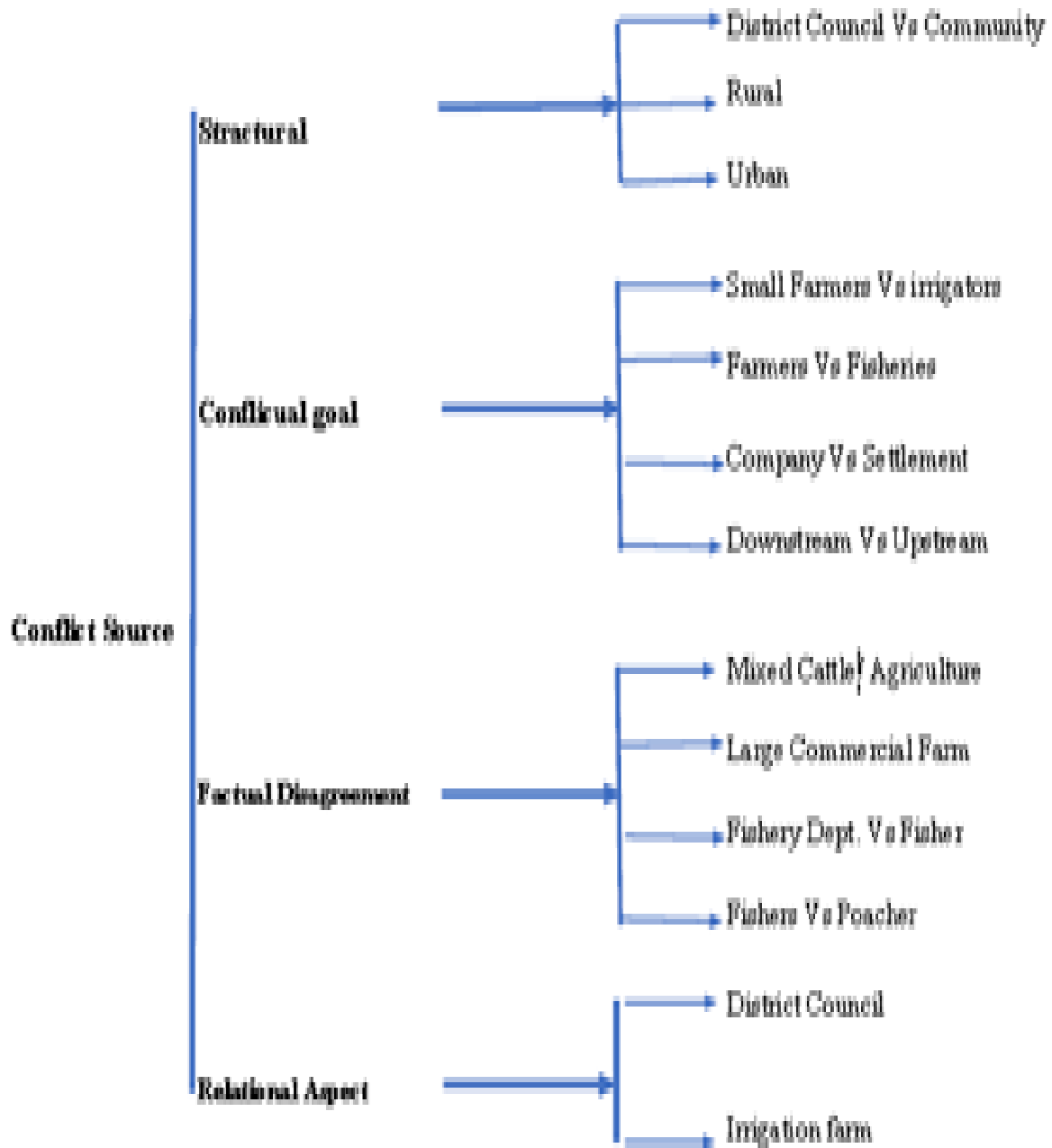


Figure 2. 1: Conflict classification according to their resources picture

Sources: Adapted from (Fayos, 2002 p84)

2.5 Theories of Natural Resources Use Conflict

Introduction

This sub-topic highlights some of the relevant natural resource use conflict theories pertinent to this study. Natural resource conflict explained by social science scholars as a cause of violence between different groups competing to control over natural resources and access (Green, 2005). According to his summary discussion on natural resource conflict, there is a different theoretical approach in social science in this aspect. Malthusian Theory because of population increase consumption decrease the availability of natural resources causing negative social outcomes like war, disease, and famine, Classical Economic Theory of approach (Smith) explains that the structure based on supply and demand will bring a dynamic arrangement of capacity in addressing scarcity. Scarcity discourages over-consumption and spurs technological developments and substitutions, which minimizing the need for disputes over resources. Marxist Theory approach explains that Free markets bring into existence the division of class in wealth which can generate conflicts of interest between the “haves” and the “have-nots”. Postclassical Sociological approach discussed that Macro-structural changes in social organization that influence social adaptability. This has an impact on population growth and competition for resources is the result of an increasingly complex division of labor. Schnaiberg and Gould Theory approach explains that, the Economic development that causes social difference and natural resource degradation and depletion, which can raise conflict. And Homer-Dixon Theory approach explains that natural resource scarcity can cause conflict indirectly or directly by triggering a social breakdown, weakened state, and decreased economic productivity (Ibid).

The researcher prefers to use Homer- Dixon Environmental Scarcity Theory of approach with its definition and conceptual framework. Because it has a very rich practical application with long year devoted research in the field of natural resources scarcity in different geographical regions of the state. To investigate whether environmental scarcity on natural resources in water use competition contributes to violent conflict with local actors at Ziway Lake is an ideal Theory. Homer- Dixon Environmental Scarcity Theory is directly connected to water use

competition and conflict rather than Malthusian Theory, Classical Economic Theory, Marxist Theory and Schnaiberg, and Gould Theory.

Environmental Scarcity Theory

In many parts of the world growing demands for water use for irrigation, municipal, industrial, and environmental natural resources for vital water resource uses are producing scarcity that is shortage natural resources which raises water use competition and conflict. Nevertheless, competition for water is also a key task for causes of conflict at the local level, affecting water availability shortage inside sectors for many uses and users (Kahl, 2008)

Homer-Dixon (1999: 104- 6) on his conclusion, environmental scarcities leveled in specific cases of natural resources on water use competition, sometimes possibly will trigger violent conflict. Even if this assertion is old but it has come up with revived significant practical application (Simon 2002). Homer-Dixon has strength by the presentation of his argument systematically in developing these claims. He explored that environmental scarcity is neither a necessary nor enough cause of conflict but environmental scarcity plays a key role in many conflicts. Homer-Dixon further clarifies that, when environmental scarcity is a root cause of conflict, its effect is clearly assisted by social, political, and developments of economic factors (Ibid).

Additionally, Matthew, Gaulin, and McDonald (2003 p 858) briefed some valid criticisms on environmental scarcity. They believe and expressed their feeling with “expressively most influential arguments in the field have concluded that environmental stress is linked to conflict indirectly”. Therefore, according to Matthew’s explanation that this linkage varies from case to case. But still, the link is expected because environmental scarcity is entirely affected and reduce the adaptive skill of most societies. And simultaneously it is facilitating and enforcing conflict and can create instability among communities (Ibid)

There are observable drivers on accessing natural resources like ethnic polarization, high levels of inequity, poverty, injustice and poor governance are some of driving factors. (UNEP, 2012). Moreover, Homer-Dixon (1999) discussed that natural resource scarcity can sometimes raise conflict among different groups. Negative consequences of scarcity include human migration and

exclusion, accessibility to the insurgency, decreased economic productivity, and weakened state. According to Homer-Dixon, environmental scarcity is the declining availability of renewable natural resources such as freshwater, soil, forests, and fish. He further explains that there are three major ways in which environmental scarcity can arise: Demand-induced scarcity, Supply-induced scarcity, and Structural scarcity.

Furthermore, demand-induced scarcity refers to population increases that pressure resource-consumption levels. The shortage of resources to meet the need of the rising population and with other factors. The effect of population pressures creates risky environmental natural resource scarcities. Supply-induced scarcity defines 'natural resource change' decrease of quality and quantity resulting from depletion and/or degradation of a natural resource which has an effect diminishing resources that are rising violent conflicts and competition among local communities. The structural scarcity which refers to the unequal distribution and access to natural resources by a few elites on which, resources concentrate in their hands while most of the population are exposed to greater scarcity. Structural scarcity has procedural linkage of resource capture that refers to resources being concentrated in the hands of a few elite. And ecological marginalization that refers to a process where a high population in the areas combined with a lack of information and wealth to protect the local area. The interaction resources process concentrations can cause severe environmental damage and chronic poverty. Then the outcome effect to other groups, are relatively marginalizing from unequal access to disproportionate resources by, a few elites of powerful groups in the society (Ibid).

Moreover, according to Levy and Sidel (2011 p 788) demonstration, conflict over water between different groups and countries are increasing with an alarming rate. However, few of these conflicts have led to violence. Major underlying reasons for these conflicts include (1) low rainfall, inadequate water supply, and dependency on one major water source; (2) high population growth and rapid urbanization; (3) modernization and industrialization; and (4) a history of armed combat and poor relations between countries and among groups within countries. Exclusively water scarcity is the cause of violence, however, it is occasional for the cause of armed conflict over water (Ibid). Similarly, Wolf, Kramer, Carius,

and Dabelko (2005) explained that the root cause of natural resources competition and conflict between local actors are getting access to scarce natural resources with the increase of consumption. The context refers mainly to renewable resources such as water, pasture, and pastureland. The competition and conflict arise due to reduced supply (depletion or degradation), increased demand and/increasing inequality of distribution.

Therefore, the attributes on water use competition and conflict at a locality on natural resources scarcity denote facts of incompatible of interests, which means that the chance of one actor is limited by the opportunity of other activities (Wolf, Kramer, Carius, and Dabelko, 2005). Moreover, conflict risks have created an issue within the producing and consuming communities at diverse levels that have a relationship among themselves. However, the phenomenon of competition for natural resources among different actors that leads to conflict directly is not observed practically in every case. An unclear and direct causal connection between resource scarcity and conflict is empirically hard to ascertain. (Mildner, Richter, and Lauster, 2011).

Homer-Dixon (1999), projected the reducing supplies of actual manageable environmental resources, like clean water and fertile agricultural land can aggravate interstate “simple scarcity” conflicts or resource war. Concurrently, the effect of natural resource conflict may often increase in economic deprivation and disrupted of key social institutions, such as civil strife and rebellion (Percival and Homer-Dixon, 1996). In effect, conflict implies “a dispute or incompatibility caused by the actual opposition of needs, values, and interests” (UNEP, 2012). However, Percival and Homer-Dixon (1996) explored that, causal connection, the interaction of environmental natural resource scarcity with causal factors must be examined with practical on the ground (Ibid).

To conclude, environmental scarcity theory helps to explain specific cases of natural resources on water use competition and conflict. The chapter has discussed the dynamics of water use that occasionally triggers violent conflicts. Natural resource scarcity can cause conflict in the forms of a mismatch between demand and supply, together with structural scarcity.

2.6 Empirical Review of Natural Resource on water use

Natural resources depletion on renewable resources, together with environmental degradation and climate change, brought fundamental pressures to human security as well as natural resource scarcity at the global level. The Middle East and North Africa are mostly affected by unevenly distributed water, which resulted in economic scarcity that raises water use conflict (OECD, 2005). Currently, environmental natural resources scarcity dispute in Sub Saharan Africa is becoming a source of conflict (Almer et al., 2017).

According to (Degefa and Baudouin, 2004) statement that, in Ethiopian history, there has been violence among various actors on natural resources users of competitors that have made by many interconnected factors like population growth, lack of adequate resource and inequitable government policies during the previous regime. The exercise has marked that there were conflictual relationships between smallholder peasants, growers using irrigation, and commercial farmers on water use (Ibid).

2.7 Water resource use conflicts in Ethiopia

Water resource use, as Ketema (2013) explained, as a common pool natural resource played an important portion as a means of total revenue earning for the rural and urban population in Ethiopia. Due to lack of access to water resources, there is a challenge on the Lake Ziway water usage. He observed that natural resource environmental degradation on common-pool resources has accelerated and threatened the sustainability of the ecosystem. Around the lake common pool resource, there are several stakeholders with multi-interest with power over the water resources and frequently leading to competition and conflict. Whereas, water use competition can be specified as a practice where two or more parties fight physically or verbally to achieve scarce water resources for their goals within a normative situation (Bantider, Mohammed, and Baudouin, 2013).

Moreover, (Fayos, 2002) defined conflict as a possible force for positive social change as its presence is a visible protest of society familiarizing the new political, economic and physical environment. This is very applicable on the case of the rural areas of developing countries, where multiple new technologies, commercialization of common property resources, privatization of public

services, growing consumerism, new government policies, new agricultural patterns, etc. exert high pressure on individuals and community groups towards change (Ibid)

Moreover, Ketema (2013) demonstrated that institutional arrangement was responding for complaints of the local community. Lake Tana sub-basin community cannot exercise their given power and were not effective and efficient to governances the common pool water resources. It only shows that “top-down and non-participatory policy formulation”. His conclusion was that uncontrolled resource use patterns and critical water resource demand, are increasingly subject to intense competition and overexploitation in Ethiopia and in Lake Tana sub-basin. Due to unclear property rights, unclear boundaries between land use and bordering kebeles and/or districts, incompatible interests of stakeholders and scarcity of resources, conflict over common pool resource of water in Lake Tana sub-basin is growing (Ibid). Particularly, water use competition and struggle have the consequence of social effect with the decrease of diversified natural resources scarcity. The effect of relationship to other social, political and economic issues it becomes unmanageable to handle the case on hand. It needs diligent consideration to the area of natural resources practice at land and water usage (Degefa and Baudouin, 2004).

The following diagram shows the activates on lake Ziway by a diverse group of water users. And it can also explain competitions for claims for land and water resources in the Central Rift Valley which tends to have water use conflict. The Rift Valley Lakes Basin Master plan project, the Ministry of Water Resources concludes that Lake Ziway is very fragile and sensitive in terms of water use conflict report (Ministry of Water Resources, 2008)

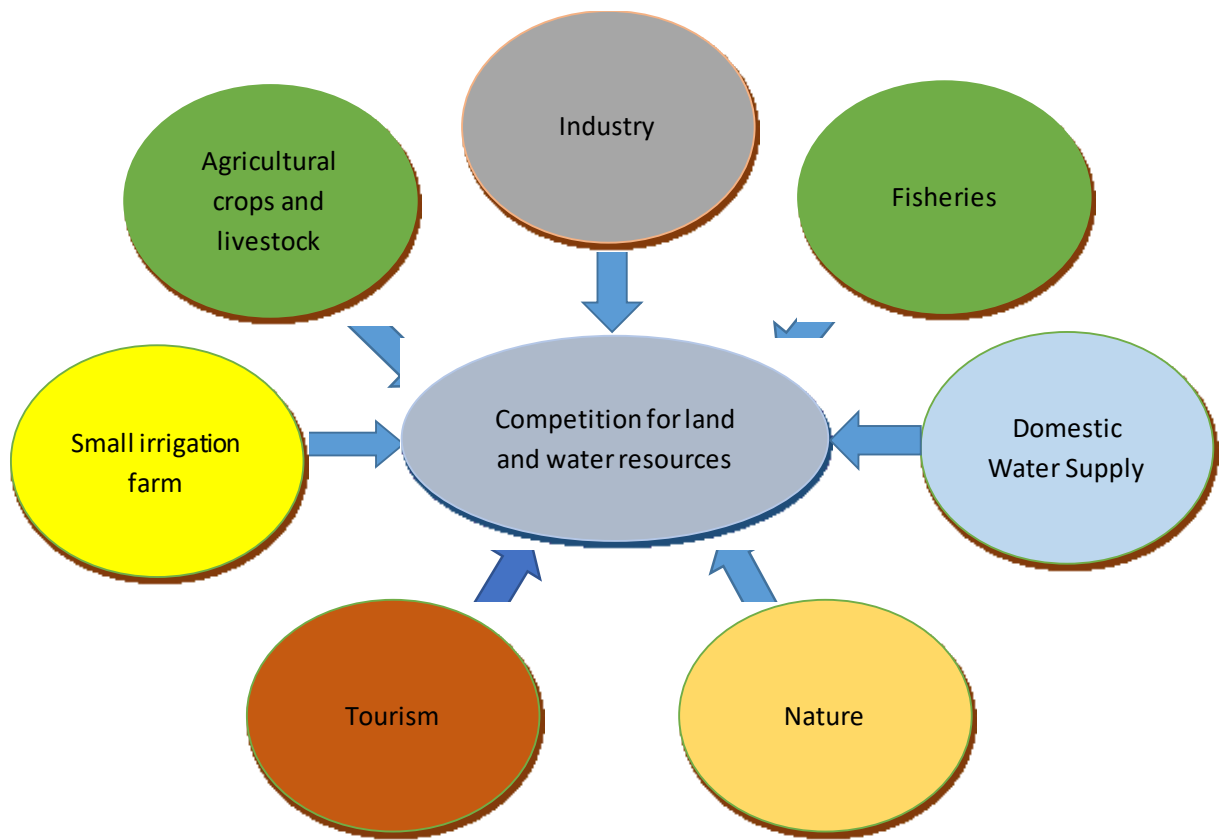


Figure 2. 2: Competing for claims for land and water resources in the Central Rift Valley

Source: Adapted from (Hengsdijk, Huib Jasmina van Driel, Kidanemariam Jembere, & Boone, 2009 p 6).

Habtamu, (2015) has explained on physical assessment of irrigation water use impact. He said that Lake Ziway has a freshwater, but this valuable resource is threatened due to different group overexploitation water straight from the lake and river diversion from feeder rivers such as Meki and Katar. The results showed that irrigation water use for the whole existing and potential irrigable area brings an extreme impact on Lake Ziway and the downstream area that benefit from the lake. He further explained that irrigation water abstraction carries 9.31% of the initial volume of Lake Ziway and it decreases the 0.4m/year water level of the lake. This decrease of (0.4m/year) may lead the lake to dry after 27.5 years. It also turns out to be the cause to stop the downstream flow through the Bulbula river after 6.25 years. This in effect in the year 2021 Bulbula river probably going to stop flowing. Moreover, the results presented indicated that 7.74% of the lake

water reduction is due to irrigation. Therefore, the study area needs water resources management to sustain life (Ibid).

According to Karner (2012), water access and allocation are driven by political and social factors as determined by hydrogeological ‘realities’, it is necessary to review the institutional, legal, and technical frameworks in place of water governance. Some of the case studies included in UNEP (2012) show that environmental scarcity on natural resources may trigger competition and water use conflict. The cause can be an increase of population, shortage of water resources, degradation and overexploitation of natural resources. There is a high risk for the probability of conflictual goal. Water scarcity in the Middle East and North Africa highlights several demands for water, particularly and supply-side (availability to distribute natural resources) events that are demonstrated to address water scarcity. In many parts of the world, natural resource phenomena have trigger violence, particularly on common water use competition and conflict among different local communities’ actors (Ibid). It further stated that “The most significant indirect and secondary environmental consequences of the various episodes of conflict that culminated in the 1990-1994 war and genocide include: (i) extensive deforestation and encroachment on national parks and wetlands; and (ii) the loss of human and institutional capacities for natural” (UNEP, 2012 P.65).

Moreover, various authors from the natural sciences including Abebe and Kassa have explored the Lake Ziway water situation, in their research findings. The impact of existing and future water demand on economic and environmental aspects which is on the physical natural science of ecology has explained effectively. But they have not discussed social interaction, water use competition, and conflict among Ziway Lake water users. Water use conflict has an impact on environmental natural resources water scarcity which needs to be explored. Environmentally, sustainable aspects in relation to development scenarios and water demand pressures of the development of the economy have implications on environmental aspects. As future development scenarios and the comparison of water demand in all growth situations have been analyzed by Abebe and Kassa (2016). Moreover, water resource use is a major source of conflict challenge to future sustainability relating to long-term water availability and irrigated agriculture on water use in the Lake Ziway region (Oxfam America Evaluation

Report, 2012). According to Abebe and Kassa 's (2016) assessment, one of the competing water resource areas were irrigation development, local users, soda ash industry and gap on environmental natural resource protection. Because of suitable climate and geographical location, there is water demand for expected future development. It shows that there is a huge water demand competition in the areas to consume for different development activities. Due to insufficient water from the lake the expected future development situations which is discouraging agricultural growth on the conflictual interest of the goal.

Furthermore, they explained, the impacts will lead to the mistreatment of the basin and give rise to competition on water use and conflict. These tend to influence pressuring Ziway Lake water use irrigation, Katar irrigation diversion and Meki irrigation from dam and Ziway Meki irrigation demand sites. The assessment of water demand in all development scenarios result in the model shows that there is water supply or access to water is a root of tensions increasing in the ongoing development circumstances and in the coming development situations. Moreover, they discussed the impacts on the natural science of ecology to the normal surface water obtainability of the catchment is deteriorating. This is possible to have significant impacts on the ecology of the Bulbula River, in relation to Abyata Lake. Lake Ziway will be a terminal (deadly) lake on pressurized effect (Ibid)

2.8 Institutional Arrangements Since 1991

This section reviews the overall question of “what are the existing institutional arrangements governing natural resources of water and its institutions/Rules-in-use and Rules in form?”. The objective of this section is to describe the overall natural resource management and governance framework in Ethiopia. The water policy, proclamation, and regulation of Ethiopia reviewed with research articles. This section is derived mainly from secondary sources particularly, documentary analysis of policy documents. The natural resource governance system in this research context refers to the range of political, social, economic and administrative systems that are mandated to control and regulate natural resources of water use (federal, regional and local/user level).

The document analysis reveals the policies, legal and institutional frameworks that shape the Ethiopian natural resource management. Overall governance

systems are the main instruments to govern multiple divergent interests of stakeholders. The Federal Democratic Republic of Ethiopia Constitution (hereinafter called the FDRE Constitution) is the supreme law of the land that governs all laws in Ethiopia.

2.8.1 The 1995 FDRE Constitution

The FDRE Constitution has several provisions which have a clear policy, legal and institutional implications for the governance of natural resources. The federal government has the mandate to enact laws for the utilization and conservation of land and other natural resources including water, fish and wetland resources of the country (Article 51/5), while regional states have the mandate to administer land and other natural resources in accordance with federal law (Article 52/2/d).

The Constitution specifies that the Federal government shall determine and administer the utilization of the waters of rivers or lakes linking two or more Regional states or crossing the boundaries of the national territorial jurisdiction of the country. The three pillars of Ethiopian natural resources are land, water and environmental were discussed in policies, proclamations, and regulations. They have a fundamental impact on their derivative to the overall land-based resources (Article 51/11). Even though, the 1995 constitution has a purpose and nature about providing a broad framework that water is state property and provision of a clean and healthy environment for all. It has also a limitation on water basin organization was not recognized; customary water institutions were sidestepped and unclear the roles of the federal and regional governments in the basin (Reta, Degefa & Getnet, 2018)

2.8.2 Ethiopian Water Resources Management Policy (1999)

Ethiopia is considered as a ‘water tower ‘of the Horn of Africa. The country is gifted with a substantial amount of water resources. Ethiopia has 12 river basins with an annual runoff volume of 122 billion m³ of water, and an estimated 2.6 - 6.5 billion m³ of the groundwater source. This makes an average of 1,575 m³ of physically available water per person, per year; which is a relatively large volume. However, due to a lack of water storage infrastructure and large spatial and temporal variation in rainfall, there is not enough water for most farmers to produce more than one crop per year (Awulachew et al. 2007). According to the

World Bank (2006) report, the irrigation potential level of Ethiopia is estimated by 3.7 million hectares. However, in the year 2007 irrigation is (approximately 200, 000 hectares) which is less than 5% of its below potential irrigation level (World Bank, 2006).

Some of the guiding principles of Ethiopian Water Resources Management Policy (1999) are: The perception of water as a vital socioeconomic resource and scarce to be managed and planned as an economic good strategically; Stakeholders to be involved in water resources management, through the participation of user communities and support for community's own initiatives in water resources management are minimal. Water development and management should be based on rural-centered, with participatory approaches and with a lawful order for community participation, as workable, in the development of dams and reservoirs. The policy overall goal is enhancing and promoting all national efforts towards efficient, equitable, and optimum utilization of available water resources of the country for the significant socio-economic development on a sustainable basis. Above all, the policy provided a framework to implement water resources management and development for river basin management. (Ethiopian Water Resources Management Policy, 1999). However, this policy criticized for centralizing most powers and duties regarding water resources management. It also provided little space for the involvement of 'external bodies' such as donors, private sectors, as well as the local community in the process. The principle of water resource development, use, and allocation are mainly centered on the permit system. All uses require licensing from relevant government authority on the belief that permit-oriented water management could create a fair distribution and sustainable use (Reta, Degefa & Getnet, 2018)

2.8.3 The Ethiopian Water Resources Management Proclamation No. 197/2000

The proclamation is currently the basic legal instrument governing the management, planning, utilization and protection of water resources in the country. The purpose of this proclamation is to ensure water resources protection and to utilize for the maximum social and economic benefits of the people of Ethiopia. To supervise and to follow up that they are appropriately conserved and management of water resources is carried out appropriately to ensure that the

damaging effects of pollution of water are prevented. (Proclamation No 197/2000, Article 3).

Article 8/1 of Proclamation No 197/2000 also defined the responsibilities, powers of minister's, water permit and dispute resolution guidelines. Ministry of Water and Energy (MoWE) is clearly identified as the supervising body in charge of enforcing the provisions of the proclamation. It shall also have the necessary powers of planning, management, utilization administration and protection of water resources for the execution of its duties under the provisions of this proclamation (Article 8/1). The proclamation also states that management shall give permit system by having priority over and above any other water uses to domestic use in accordance with any of the water resources of Ethiopia (Article 6/4) and (Article 7/1). The proclamation allows access rights to utilize water resources without holding a permit issued by the supervising body of Ministry of Water and Energy (MoWE) for the following purposes; to dig water wells and use water from hand-dug wells, use water for traditional irrigation, artisanal mining and for traditional animal rearing, as well as for water mills Proclamation No 197/2000, (Article 12/1). The law allows access rights to utilize water resources without holding a permit issued by the supervising body. Whereby fisheries activities are governed by fisheries development and utilization proclamation no 315/2003. It has institutional setup and regulation Article 16 (1) of proclamation no 2015/2003 stated offense and penalty on fishery activities. Fish activities without a permit or in contravention to the terms of the permit shall be punished with imprisonment for not less than a year and not exceeding three years or with a fine up to Birr 10,000 (ten thousand Birr) or with both.

Accordingly, the Oromia state has delegated by the Federal government to administer regional water resources policy. Draft regulation for the management of water resources has also already been prepared by the Region. State of Oromia has the constitutional mandate to administer land and other natural resources within Oromia boundaries (FDRE, 1995 Art 52(2) (d)). However, to administer natural resources is crucial to empowering local peoples to own and utilize their land in a fair manner, the Federal Government often takes the position of power and leases a massive land to private investors (Fasil, 2013). Moreover, this proclamation has purpose and nature to plan the water resources of Ethiopia to

the highest social and economic benefits for its people through appropriate protection and due management to introduced RBOs and IWRM approaches. However, the Ministry centralized major responsibilities by delegation to the region or a basin authority. And the permit systems (pollution control) standards are vague and ignored customary water institutions (Reta et al., 2018)

2.8.4 Water Resources Management Regulation No. 115/2005

The objective of the regulation was to provide detailed and specific provisions for the effective implementation of the Water Resource Management Proclamation No.197/2000. The regulation further explained the application process for a permit, issuance, duties of the Supervising Body, discharge of water after use, and conditions for termination, suspension transfer or variation of water use permit. According to Regulation No 115/2005, Article 2 (7) defined “Supervising Body” means the Ministry of Water Resources or any organ delegated by the Ministry pursuant to Article 8(c) of the Proclamation No 197/2000. It also provides for the payment of fees and water charges for use to the Supervising Body (Regulation No 115/2005: Article 4 (1-4),6 (1-7) and Article 30-34). Oromia Water, Mineral and Energy Resources Development Bureau management manual Article 2.2 defines the responsible Government Organization for the overall development and utilization of water resources in Oromia. The purpose and nature of this regulation was the comprehensive implementation of the Proclamation No. 197/2005 such as the permit systems, water quality control, water users’ cooperative societies, fees and charges, dispute settlement, and other miscellaneous provisions. However, it is delayed for 5 years between the publicizing of the Proclamation and Regulation; centralized key powers and duties such as to permit system and conflict arbitrations or conflict resolutions (Reta et al., 2018).

2.8.5 Ethiopian Environmental Policy (1997)

The Environmental Policy on its preamble issued to provide overall guidance in the conservation and sustainable utilization of the country’s environmental resources in general. The specific objectives are ensuring the conservation, to achieve development and sustainable use of essential ecological processes and life support systems, biological diversity and renewable natural resources and the empowerment and participation of the people in environmental management.

According to Clement (2010) noted that, even though there are inadequacies in implementation and a gap in the enforcement of law on environmental compliance at the local level, But Ethiopia has shown its commitment to ensuring environmental sustainability by establishing environmental protection agencies at the Federal level and in all regional states. There are numerous proclamations, including environmental impact assessment proclamation, pollution control proclamation and Ethiopia is a party to various environmental protection and conservation conventions at the international level. Hence there is a gap on implementation law and regulation to govern environmental natural resources (Clement, 2010).

2.8.6 The Environmental Impacts Assessment Proclamation No. 299/2002

Based on the preambles this proclamation is used to forecast and manage the environmental effects of proposed development activity. Environmental Impacts Assessment is important in the design setting, construction, operation, because of its modification. However, Mohammed and Elias, (2017) argues that the proclamation no 299/2002 was rather a legal framework document not having a law enforcement effect on the flower farming industry at Ziway. Whereas the assessment impacts help as public instrument provides an effective means of harmonizing and integrating environmental, economic, cultural and social considerations into a decision-making process in a manner that promotes sustainable development. It would be fostered by the prediction and management of likely adverse environmental impacts, and the maximization of their socio-economic benefits. However, Ethiopia pollution control proclamation remains weak (Mohammed and Elias,2017)

The proclamation states as general provisions that, without authorization from the relevant Regional Environmental Protection Authority (EPA), no person shall commence implementation of any project or development activities that require environmental impact assessment as determined in a directive (Article 3/1). Further, it explains that any licensing agency shall, prior to issuing an investment permit or a trade or an operating license for any project; ensure that the Authority or the relevant Regional environmental agency has authorized its implementation

(Article 3/3). The EPA is given the legal mandate to assess the impact of any project or program that may threaten the health of the water and the aquatic biodiversity.

Particularly, the Ethiopian Horticulture Producer Exporters Association has enacted a code of practice called EHPEA code of practice version 4:0, 2015 for sustainable production. An initiative results from the flower sector to introduce continuous professional and technical development. The main objective is monitoring and self-regulation to address market and civil society concerns for standards of environmental development and social performance guidance in the sector. EHPEA is committed to working with the regulation to ensure minimum standards, and by setting standards level such as Bronze, Silver, and Gold level. Bronze level refers to compliance of regulation no 207/2011 code of practice for the flower sector that set minimum acceptable standards to run the flower sector. Silver level refers to international recognized standards for good agriculture practice with good products of the international market, environmental protection, and responsible employment practice. Gold level set refers to higher standards and challenges beyond the sector benchmarks. Flower farm at a gold level can involve in Corporate Social responsibility, Environmental Conservation on natural resource water, forest, fish, etc. code of practice as to bringing sustainable development for the national government (EHPEA code version 4.0, 2015).

Getu (2013) stated that the Environmental Impact Assessment reports on the floriculture industry at Ziway were assessed to identify the reviewing process, environmental monitoring/auditing, and public participation. However, the finding shows that there are gaps in policy and strategy comprise institutional uncertainties and sector fragmentations from the community up to federal levels. This resulted in poor coordination and discouraged the actual implementation of the strategies, particularly in connection with mandate issues with negligence responsibility at Ziway Lake (Getu,2013,).

2.9 Analytical framework for water use competition conflict

UNEP (2012) identified the basic analytical framework for analyzing drivers of water use conflict and its effect relationship. An analytical framework to build

cause and effect relationship for water use competition and conflict. The growing scarcity of renewable natural resources, poor natural resources, and environmental governance, and transboundary dynamics are leveled as basic causes of water conflict. The effect indicated on the contested resource which refers to water, fish, and forest. The user's behaviors can be root causes for violence which refer to key actors' beliefs, interests, information, and relationships. The key actors with their dynamics interest are referring to communities, authorities, companies, NGOs, CSOs. The level or scale of conflict that can influence local, sub-national, national, regional and international. The human interaction has implication with other stress factors which refer to the consequences of sustainability of political, socio-economic and security on water use conflict (UNEP 2012).

2.10 Conceptual Framework

Conflict is a complex phenomenon and cannot be grasped in relation to one single factor. Conflict results from complicated communication and joins with several conflict matters. For this study, it is important to map out the causes of water use conflict from the viewpoint of several practical subjects. Figure 3 shows a framework of analysis adopted from Homer-Dixon (1994: 3 cited in (Maphosa, 2012). In this specific case, the resource-based conflicts remain to be clarified in relation to scarcity-based theories. It is presented to explain water use competition and conflicts with the cause of intervention on the attribute of a struggle over scarce resources of Lake water. The conceptual framework, the boxes, and drawing outlined only aim at identifying and mapping key analytical factors explored during the process of study. The purpose of applying this framework should be to establish a process, which will assist to arrive at some mutual thoughtful of the key analytical components displayed in figure 3.

These environmental scarcities can drive alone or in mixture with weak governance issues produce a variety of negative social effects, including agricultural and economic efficiency, increased migration, increase social division, and disrupted institutions. These social effects are often interconnected, under certain situations, and will create violent conflict (Ibid)

It has been concluded that environmental scarcity is not the only cause of conflict. There are other variables that can be the issue of conflict such as the institutional structure of the state, its development policies, and weakness of governance connection to the society at large which have bigger environmental degradation influence, but also environmental scarcity that have interacted with social variability and to create conflict tension (Howard and Homer-Dixon, 1996)

To conclude, the conceptual framework of water use competition and conflict mapping is the roadmap used to guide the author of this study in the process of carrying out the research. The main task of this conceptual framework was, therefore, to help the author establish the cause-effect relationship among the multi-level actors related to water use and arrive at analytical factors explored during the process of the study. In this specific case, the resource-based conflicts were described in relation to scarcity-based theories. The conceptual framework helped the author to identify the causes of scarce resource-based conflicts and to suggest strategies of lessening the effects of the consequences of the conflicts. Activities of the multi-level actors, including unchecked population growth, and the use of products of technology that are unfriendly to the environment have been identified as causes of competition and conflict among the actors

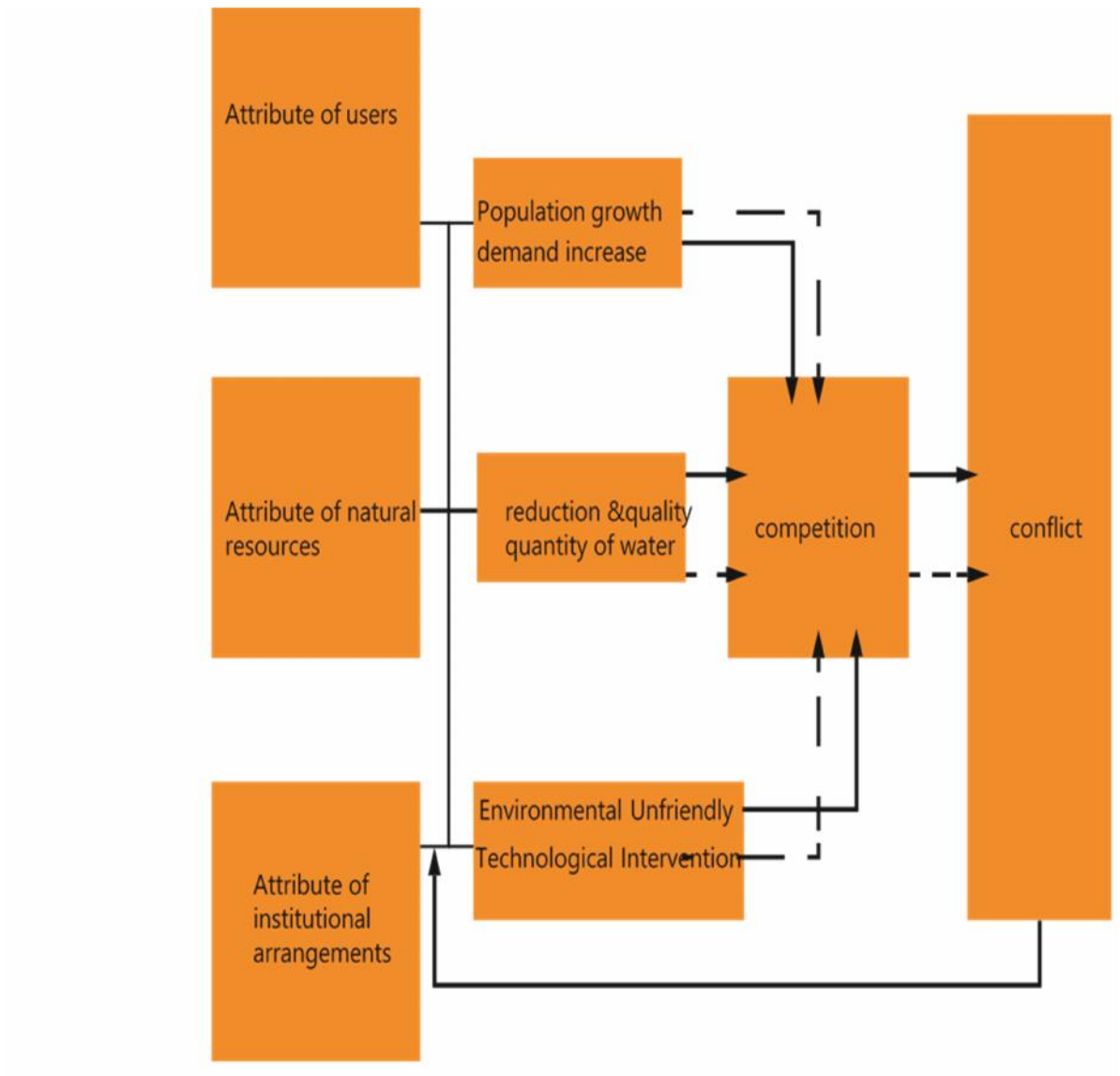


Figure 2. 3: Conceptual FrameWork for water use competition and conflict

Source: Adapted from Homer-Dixon (1994: 3 cited in (Maphosa, 2012)

- > Note: line indicates continuous automatically lead to water use conflict occurs
- -> Breaking line indicate sometimes with intervening variables lead to hinder water conflict occurs

Political ecologists have reported that local “scarcities” may occur in the situation of local abundances. The actual existing reality of human interaction with natural resource effect or else the impacts of institutional arrangement on resource governance. This could occur because of bad management of distribution and the supporting of one group over the other (Smith, 2017). With a similar expression that, water resources scarcity is

that, water resources scarcity is focusing around distribution and discrimination that give rise to scarcity, not the actual quantity or quality of a resource (Buhaug, Gleditsch and Theisen 2010).

Similarly, Maphosa, (2012) stated that under certain conditions water use competition can lead to conflict whenever population growth upon migration rural to urban. These social effects can then, cause ethnic conflicts, Moreover, on the issue of the power of exclusion's explained that the use of belonging or owning resource as a principal of standard of entitlement clashed with unsatisfactorily groups and sometimes violently with others motivations of interest (Hall, Hirsch, and Li 2011: 4).

According to Wolf, Kramer, and Carius (2005), all water use conflict can be attributed to one of three issues: quantity, quality, and institutional operation on the allocation of water to different uses and users. Quantity of water is the most obvious reason for water-related conflict that is competing for the issue to get entitlements for limited resources. (Ibid). To manage the scarce natural resource when there is a pressure on limited resource and to allocate resource to different users and users can be extremely challenged. The first issue is as people become more conscious of environmental issues and the economic value of ecosystems, they also demand water to support the environment and the livelihoods for a sustainable period. Moreover, the second controversial issue is water quality. Low quality of water contaminated by pollution from wastewater and pesticides or excessive levels of salt, nutrients, which make water unsuitable for drinking, bad for the industry, and agriculture. Water quality and quantity are declining due to flood water pollution from overflowing sewage around the Sher Ethiopia flower industry, urban derange sewage to flow to the lake and agricultural activates sector which increases the strength of pollution that causes water use conflict. The third significant issue is institutional scarcity which is the potential for pressures over-allocation of resources. This rises when a natural resource like water is scarce or not enough to meet the demand of a certain community. Water and land have a high value of attraction for institutions and communities which can create competition and trigger conflict upon the disproportional allocation of water resources. Consequently, the institutional operational designs for river diversion construction dams on inlet river for development is frequently challenged. Upstream users, for instance, the release of water from reservoirs that can attack

with flood the downstream, whereas downstream users might need it for irrigation in the dry season (Ibid).

Additionally, Wolf, Kramer, and Carius (2005) explained water flow designs are vital to preserving freshwater ecosystems that depend on seasonal flooding. Conflicting interests about water quality, quantity, and institutional over-allocation of water can arise conflict on many geographic scales, but the changing aspects of conflict play out in a different way at international, national, and local level (Ibid).

Similarly, Ostrom (1990) stated that to govern natural resources there must be rule and norms to monitor and sanction on the users by legitimate authorities. The establishment of formal institution of the informal institution that acts in accordance with institutional arrangement articles of law. The rule and norms framed with three concepts i.e. strategies, norms, and rules to administer human interaction. According to her, strategies refer to identifying under which condition a certain group is willing to take collective action with face to face communication agreement. Norms refer to the social agreement to self-organize to manage natural resources without sanctions. Rules refer to a specific group of actors under which circumstance has right and obligation binding with clear terms to meet goals of managing. This helps to manage natural resource use right and enforce the rule of law with the aim of structuring human interaction and securing resources (Ibid).

Following this argument, the water use conflict justification also predicts that communities will trigger conflict to protect their access to water resources. Water use competition and conflict among countries are leveled each group as enemies due to a wider conflict. In particular, the use of public statements by key decision-makers can be taken as evidence of future water wars and shown to be defective. Controlling access to water is a key instrument for national security and, can be highly consumed for political manipulations issue (Alam, 2002).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Description of the study area

The study area is the Ziway lake catchment area which has eleven Woredas, which are in Oromia and Southern Nation Nationalities and Peoples Regional (SNNPR) states. The study area will cover one of Oromia Zone that is East Shewa at Ziway Dugda woreda. The focal point of the study area is Lake Ziway which is found in Adami Tulu, Jiddo Kombolcha Woreda of East Shewa Zone, which is at 163 km from Addis Ababa in a southwest direction to Awassa main road (NRSTOWMEB, 2016)

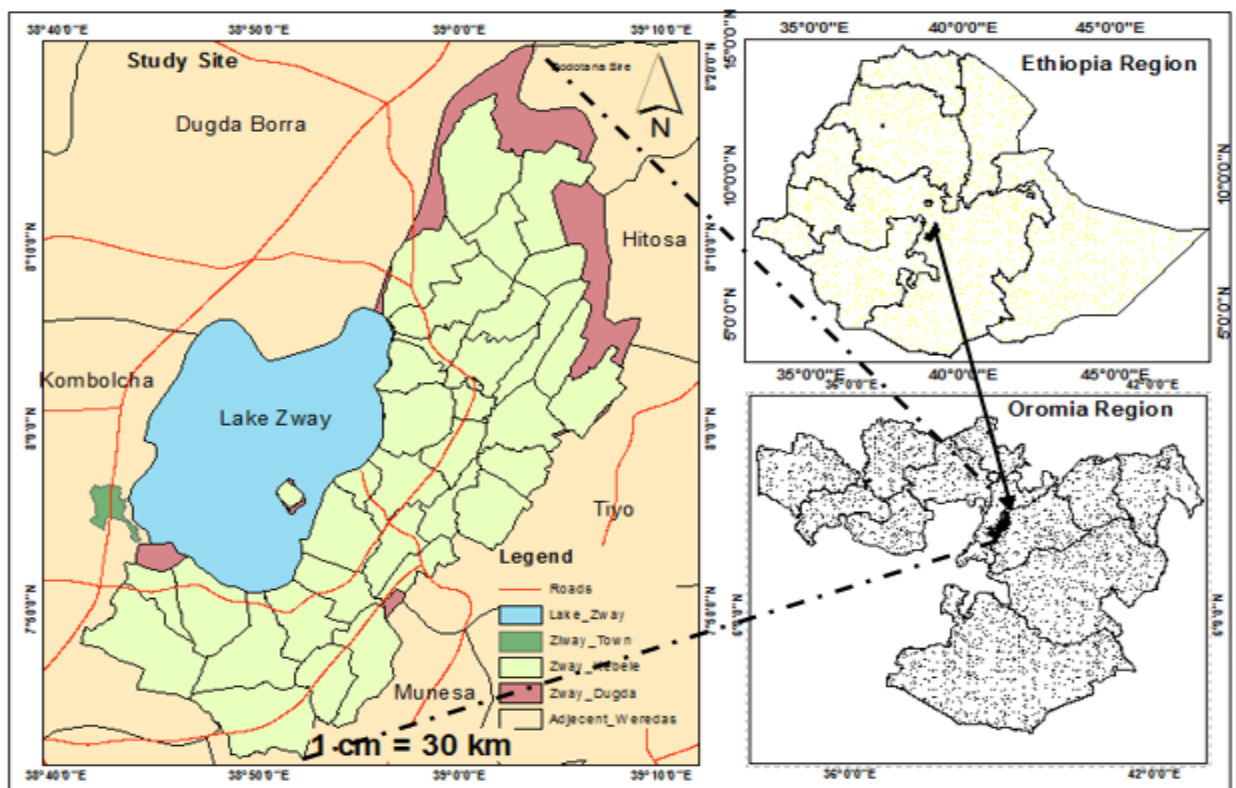


Figure 3. 1: Location map of the study area: Source: Hayal, Brook and Stellmacher (2017)

Source: CSA (2011)

The total population of the Ziway Dugda is estimated at 155,264 and the population of Ziway town is 70,436 (CSA, 2013). According to the NRSTOWMEB (2016) assessment report water resources and supply conditions of the area is

under high pressure with the different interest of activities on the water resource utilization in the study area. Especially, during dry seasons there is a high concern in case of drinking water supply and irrigation water utilization. Due to this and other similar reasons, conflicts among community members were observed (Ibid).

According to Graichen (2011), the rift valley lakes of Ethiopia are often located near urban areas. The agriculturalist and other natural resources users in driving sustenance needs along the lakes and surrounding land accessible to market (i.e. for agriculture, forestry, and fishing) production. Agriculture is the main livelihood for most people living in the study area; hence, the overall economic growth of these areas is highly dependent on rainfall and irrigation success. The water management policies or economic policies have played a vital role in shaping the sustainability of community with good governing natural resource. Yet, there is mismanagement for the current and future of Ethiopian lakes water usage. The influence of human interaction force has threatened water quality in the local catchment area that is exposed to risky situations. Factors of water use competition and conflict have attributed to the local communities and households with negative impact (Ibid).

Similarly, Spliethoff et al. (2009), the water quantity of Lake Ziway fluctuates due to rainfall variability. Tributary rivers of Meki and Kara discharge low water to Ziway Lake during the long dry season. In the year 2015 and 2016 drought season, there was a critical situation in addition to the shortage of water. There were growing water use demand conflicts, due to the existence of different water user's competition on water use for different propose. Lack of water flow has caused a critical water shortage for the surrounding community particularly for people living at downstream of Lake Ziway and their livestock the suffer to get water for travel long distances. Yearly, the volume of Lake Ziway is getting smaller yearly by three meters due to the growing practice of water consumption by different irrigation and investment industry in the upstream of Ziway town. The water quality of the Lake has decreased due to excess irrigation that has caused salinization of farmlands on the topsoil and precipitation of salts on the soil surface. The water quality of the lakes affected by dissolved salts during the soil that is leached by occasional surface runoff. Additionally, the human technological application of agrochemicals activities such as pesticides and

fertilizers has increased the impact of the water and soil chemistry around the area. On the other side, Lake Ziway attracts environmentally with its natural value of beauty and aesthetic quality of a wetland. A home for wildlife and shelter for the rich diversity of plants, aquatic birds and fish and the bush trees are defending against wind and storm. The lake gives potentially suitable services for the vegetable farm, flower industry, breeding, and nursery places for fish and has a reputable potential for the development of tourism. However, with occurrence of high rainfall enriches the lake with fertile nutrients entering as runoff through its tributary rivers, and the growing impact of human activities such as, overfishing on the shores of the lake deforestation and misuse of water farming activities in the upstream area have created unforeseen impact on the health of humans and the economy of Lake Ziway fishery which need responsive action (Spliethoff, et al 2009:9-12).

According to the assessment report of the NRSTOWMEB (2016), there is a high demand for water resource utilization in the study area. Drinking water supply and irrigation water consumption during dry seasons is a critical issue. Because of the means for revenue earning and other similar reasons, water use competition and conflict raised among community members in different areas of the Lake Ziway catchment area. The surface water resources such as rivers, lakes including groundwater such as boreholes, shallow and deep wells are vital sources of water supply facilities of the study areas (Ibid).

3.2 Sampling strategies

This study prefers to adopted qualitative methods since the research purpose was exploring the nature and extent of water use conflict in the Lake Ziway and communication of community knowledge. Qualitative data, as Silverman (2013) has argued, helps to map inner experiences, language, culture, and forms of social interactions to develop a deep contextual understanding of a phenomenon. This method provides rich descriptions and explanations of processes in local contexts as it is conducted through an intense and prolonged contact with the situation being studied (Miles, Huberman, and Saldaña, 1994) Given the nature of my in-depth and continuous involvement in the field, I have been engaged in collecting various forms of qualitative data through multiple mechanisms. More specifically, data collection methods used in the study included semi-structured interviews, participant field observation, and

secondary data collection through reviewed documents including forms, manuals, and strategic plan documents.

3.2.1 Primary Data Sources

The primary data was collected from different water users' associations, government officials, locally elders and foreign and local investors enterprises around Lake Ziway catchment area using the methods of key informant interviews FGDs (focus group discussions), and field observations.

3.2.2. Secondary Data Sources

In addition to the above-mentioned primary sources, secondary sources such as books, articles, internet sources, and journals were used to collect all the necessary data. Reviewing relevant and existing study documents, reports, books, etc. were considered for theoretical substantiation. Relevant reports and documents were analyzed and were used as secondary sources of data.

3.2.3. Key Informant Interview

Key informant interview carried out with knowledgeable, aged people and experienced rich personalities, who have good and longtime experience working on water use sectors. These are Government officials from Federal up to Woreda, the fish association at the lake, traditional irrigation, Industry, domestic water supply, and Tourist industry were the target key informants. Sixteen persons were purposively selected and interviewed from Federal Officials, Woreda Oromia Region Officials, and Environmental Protection Agency Experts. These are 2 federal, 3-Oromia regional government officials.11-experts from the different water-related office of Ziway woreda interviewed as a key informant. Out of this 3 from Non-governmental that work on irrigation farm investment members. These are the Sher Ethiopia flower industry. Cassel Vinery farm and Factory, and Pesticides factory together with the community were water consumers from Lake Ziway. Twenty-one persons were used as an in-depth interview from community elders at different places of Ziway town kebele. They are the number of local community residents who live near Lake' young females and elders' were administered. In addition, relevant researchers and officials were consulted from each office, especially regarding water use conflict on agricultural farming,

livestock production, grazing land and water resources management at Lake Ziway water consumers in Ziway Oromia office. These persons are knowledgeable of the historical trends, existing rules, and regulations, and the overall situation of Water Use competition and Conflict among Local Actors Surrounding Lake Ziway were interviewed.

3.2.4. Focus Group Discussion

This technique is utilized as a prime technique of data collection. Accordingly, four groups of candidates were selected to form focus groups. The numbers of participants in the focus groups range from five to eight. The focus group discussion was conducted among Lake Ziway water users with a total of four groups (particularly from Irrigation vegetable farming association, Abba Gedaa Oromo traditional elders' councils, members of youth association and members of fishery association). The first three groups having 7 members and one group has 9 members with a grand total of 30 persons of members. According to Bryman (2012) note, focus group discussion was imperative to understand how people respond to each other's views and build up a view out of the interaction that takes place within the group. A series of FDGs were conducted with community members selected from different water users at Lake Ziway. Different age groups and gender disparity as to gather information were administered. The researcher served as a facilitator at the focus group sessions with a great precaution not to be too intrusive and with minimal intervention. Allowing the discussion to flow freely and intervening to bring out information from silent group participants. To encourage them to share their views and discourage systematically not take other time by speaking too much, who dominate the discussion is the key rule for facilitation (Ibid). Each discussion session lasted for about an hour and was tape-recorded.

3.2.5 Unstructured Observation

According to Bryman (2012), unstructured observation methods are carried out in real-world settings that attempt to observe things 'as they are'. Observation without any intervention or manipulation of the situation itself by the researcher and attempt to 'tell the story' of what is happening in a given situation (Ibid) Observation provides direct access to the social phenomena under consideration.

Instead of relying on self-report, such as asking people what they would do in a certain situation, the researcher going to observe and record their behavior in that situation (Ibid). In this study based on real-life nature and narrative methods of observation were used. Unstructured observation is referred as notes taken by an observer on the behavior of participants involved in the study area. During the observation, the author may note key disadvantages and advantages to the practice of water use or service being observed. Recording sheets and checklists, observation guides and field notes were used as data collection methods. In addition, with careful ethical consideration such as requesting permission and convincing the subject, photo and video cameras were used. However, precautions were taken to avoid the researcher's bias towards the phenomenon under consideration. Subjective bias on the part of the researcher was triangulated by other means of data collections, such as key informant interviews with document analysis and water resource government officials.

Structured Field observation was applied to observe the various impacts of water user's competition activates especially on irrigating on and communities water consumption in the study area. The field observation may help to understand the actual practice on the field whether there is water competition and to observe the impact of conflict on the community's livelihood.

3.2.6. Document Analysis

Document analysis was used to examine the major trends of water use, in identifying water use problems and searching solutions. Document analysis is also important to use as a data-collecting instrument as a secondary source. Moreover, research works, related and available reports and printed materials were consulted and used as secondary sources.

3.3 Methods

3.3.1 Design of the Study

The qualitative approach was employed. Research following a qualitative approach is exploratory and seeks to explain 'how' and 'Why' questions, as to explore the perceptions of individuals or groups on the issue at hand. To draw a sound conclusion about the research problem raised in the study, different data

collection methods were employed to collect relevant qualitative information from different actors competing for water and engaging in water use conflict surrounding at Lake Ziway. The methods will be used to collect different data on the conflicts and competitions in the study area.

3.4. Methods of Data Analysis and Interpretation

Different methods of data analysis pertinent to the variables in the study were employed. Collecting, organizing, processing, analyzing and interpreting primary and secondary data and information was the main task of the researcher. All the data were analyzed qualitatively i.e., content analysis; thematic analysis, and the narrative will be used during the detailed analysis.

The data collected through open-ended questions, interviews, focus group discussion, informal discussion, field observation, and document analysis were summarized and analyzed qualitatively.

3.5 Ethical Considerations

In collecting data from respondents, the privacy of respondents was kept as a legal corporation constituted and using others ideas in the research will be confidentially secured. It is perceived that the researcher is directed by serious research ethical rules and conduct. To minimize bias, the researcher makes the necessary effort to achieve objectivity and neutrality in conducting the interview. The researcher struggled to avoid bias in the assigned tasks of data analysis, interpretation and drawing conclusions depends only upon the collected data rather than personal decisions and prejudice. Concerning confidentiality, the researcher is having an obligation to protect the privacy of the individuals that give their will and to take part in the study either through the interview or by FGDs. Furthermore, individuals' intellectual property seriously respected through proper acknowledgment of works as well as preventive from using un-published sources without authorization.

CHAPTER FOUR

FINDINGS AND DISCUSSION

This chapter presents and analyses data and its interpretation and covers four main topics. The topics are : Natural resources scarcity on Lake Ziway water use; Types of water use conflict; Impact and Water (in)security at Lake Ziway; Institutional arrangements response for water use compliant. The findings are compared and explored with previous studies. The chapter identifies findings and incorporates them through discussing significance practical change at Lake Ziway water use competition and conflict.

4.1 Natural resources scarcity in Lake Ziway water use

4.1.1 Demand induced scarcity

According to key informants and focus group discussion statements², the degradation, and depletion of a renewable resource interact with customs practice and population growth which produce severe water demand scarcities. Sharing limited common lake water among different users with a rising population intensifies water demand. Population growth, rising average resource demand, and persistent inequalities in scarce resource access ecologically stressed in resource. These ecological stresses are making to suffer the life of community on scarcities resource. There is the increasing number of populations who are engaged in an irrigation farm that depends on Lake Ziway. Communities are engaged in different farming and home water use for occupational interest. There is Demand induced scarcity of water raised as the demand for various water uses is increasing. The study area is one of the most crowded rift valleys lakes where many people gathered together to use freshwater. Water utilization pressure brought the study area under competition for water resource particularly on irrigation. Lake Ziway water is surrounded by governmental organization and

² Key informant: Team leader, Oromia State office, irrigation farmers association establisher and coordination code 35, Deputy Administrator, Ziway Woreda, Water resource and design office code 36, Expert community Mobilization, Ziway Woreda, Water resource and design office, code 37, Team leader, small irrigation farm, Rift valley small irrigation supplier at Ziway Batu Woreda office, code 38, Deputy Manager, Tourism & culture, Tourism and culture office at Ziway Batu Woreda office, code 39, Team leader, women and child., Women and Children at Ziway Batu Woreda office, code 40, Farm Manager, Castell Vinery farm and Factory, code 44 & Focus group discussions (FGDs): Irrigation farmer, age 56 code 17).

non-governmental organizations, industries, small vegetable irrigation farms, fishery, fish research centers and schools. Moreover, water from the Lake is used for rural and urban domestic water consumption, hotel and tourism service, road construction and other businesses. They often change in consumption behavior with social relations to demand water resource

According to the focus group discussion and key informant³, Lake water plays significant role in the livelihood of Ziway town residents. There are fifty-five small irrigation farmer associations. This includes 20,218 female, 61,840 male, and total 82,058 members who are registered to use the Lake water by utilizing donated motor pumps⁴. There are also six fishery associations that comprise 387 registered members. Other individuals who are not registered are also engaged in fishing production activities. The demand for water is high and has attracted most of the young and migrant physical labor force to work on irrigation and investment farm. This influences the division of small share of water among multi-level actors upon an increase in population size. The increased demand of water resources for their livelihood at small irrigation farm sector and investment farms reduced the availability of water. Furthermore, there is a lack of accessing water due to a shortage of water since the lake is below its normal volume and depth⁵.

There is a huge expansion in irrigated farming, mainly by the Sher Ethiopia floriculture complex and Castle winery and grape winegrower farming. Among them, Sher Ethiopia flower industry investment is increasing water demand and extracting water by five electric motor pumps with high volume from limited Lake water resource for its activities. The flower growing activities need a lot of water. The motor pumps used by Sher Ethiopia are fast and can extract high volume of water to their reservoir tank. The key informants⁶, also explained that water demand causes rivalry due to the reduction of fish stock from the decrease of water in quantity and agrochemical contamination. Lake water use is

³ Focus group discussions (FGDs): small irrigation farmer, age 62, Code 20 and Team leader, small irrigation farm, Rift valley small irrigation supplier at Ziway Batu Woreda office, code 38

⁴ Key informant: Expert community Mobilization, Ziway Woreda, Water resource and design office, Code 37key informant: Deputy Manager, Tourism &culture. Deputy Manager, Tourism &culture. Code 39

⁵ key informant: Deputy Manager, Tourism &culture. Deputy Manager, Tourism &culture. Code 39

⁶Key informant: Expert community Mobilization, Ziway Woreda, Water resource and design office Code 37 and key informant: Director, and senior researcher, Institute, Fish research center at Ziway, code 41

dominated by only one economic actor so much that it reduces water volume and harm other water users.

According to the related theory of Homer-Dixon (1999), environmental scarcity on renewable resource's stock, such as freshwater, forest, and fertile soil are depleting because of various forms of scarcity. Environmental resource scarcities are critical to freshwater which can easily cause mass violence in several areas of the world. This violence affects different group's interests and economic relations, provoking migrations, and generating complex humanitarian disasters that divert militaries and attract enormous amounts of aid (Ibid).

Similarly, Abebe and Kassa (2016) on related studies in Ziway Lake described the socio-economic activities of the population as follows. The demand for water increased competition on irrigation development, local users, and the soda ash industry. Accessing water is the main source of tension due to the increased huge water demand for different development activities and purposes. Continuous population increases can cause soil degradation, pollution, and water scarcity, and in turn, harm future development. Increasing investment in the ongoing development circumstances resulted in a crucial demand for water use at Ziway Lake (Ibid).

Likewise, Habtamu (2015) state the total catchment area of Ziway Lake is about 7380 km². Lake Ziway. Initially covered land area of 500,000,000m² and the water volume was 2,124,000,000m³. During the year 2015, the overall Ziway lake level reduction rate was reported to be (0.4m/year). This reduction rate may risk the Lake to disappear suddenly and can convert the area to dry land after 27.5 years. Additionally, there is fluctuation in lake level and volume as there are variation in inputs from rainfall and rivers discharges. Irrigation water utilization requirements of the study area is more than 197,844,647.3 m³. This is directly implying there is scarcity of water and community is suffering by demand induced scarcity of water in Ziway lake area, threatening the peace and security (Ibid).

On the other side, Kramer, Annika (2004) explain that conflicting interests over water use is unavoidable due to the coexistence of multi-level actors-interest of water users around water point. The reduction in water quality can make water unsuitable for various purpose and further aggravating water scarcity. Moreover, Dutch documentary film, Caroline, (2014) collected from the Federal Democratic

Republic of Ethiopia, Ministry of Environment, Forest and Climate Change, demonstrated overexploitation of water. by flower investment at Ziway lake has increased stress pressure in social life on the demand of water use which trigger conflict. Approximately, 2000 Olympic size pool of water is exploited each year by the Sher Ethiopia flower company. One of the key informants⁷ confirmed that there is a growing demand for Ziway Lake water. But the Lake water cannot meet the need of users due to environmental degradation and water depletion which call stakeholder's coordination to maintain sustainable development.

However, the dominant water consumer of Ziway Lake that makes over exploitation and polluter is the Sher Ethiopia flower industry which need a lot of water to grow flower and export. Since the industry earn hard currency benefit and the government collects high tax revenue from them, little accountability and less attention has been given to the scarcity of water affecting most people living near the Lake. (Ibid).

The Central Statistical Agency of Ethiopia, shows the actual Population of Ziway town as follows:

Table 4. 2:Population Growth rate of the Study Area

Period of the year	9 May 84	11 Oct.1994	29 May-07	1July 2015 projection
Total no of population	6585	20056	43330	64200

According to Siegel, and Swanson (Eds) (2004), the intercensal growth under the exponential growth model assumption (annexed at 2)⁸ from 1984 to 1994 (r1) is 11.13%and from the year 1994 to 2007 (r2) is 5.98%. The year lapsed from 1984 to 1994 is ten years period and the year lapsed from 1994 to 2007 is thirteen years. The population growth rate r1& r2 has a different growth rate due to the year difference. In both cases, it can be concluded that there is a significant population

⁷ Key informant: Team leader on pollution, The Federal Democratic Republic of Ethiopia Ministry of Environment, Forest and Climate Change, Code 32

⁸Population growth rate computational mode source 1, Siegel, J.S. and Swanson, D.A. (Eds) (2004), the Methods and Materials of Demography, 2nd edition. Elsevier Academic Press. California, USA, 819 pp

growth every year over the past two decades which causes an increased demand for water.

The population growth rate has increased with two different interval period of the year by 11.37% and 5.98 % respectively. It can apply to population surrounding Ziway town who live on irrigated land; there is also an increase in the number of fishermen and those who are engaged in commercial farm water abstractions

This shows the real practice of water use demand that has increased due to the population growth of Ziway town which is directly tied with the lake water for socio-economic activities. However, demand-induced scarcity of water use in relation to its dynamics has become a challenge for water management. Lack of access, overutilization of water and lack of coordination on common pool lake water utilization have increased which can trigger conflict and insecurity. However, a regular plate forum for sustainable development in the local community is required to sustain peace and security in the study area. Hence, water use practice stressed Ziway Lake which creates under critical water resource demand. The population growth rate has increased with two different interval period of the year by 11.37% and 5.98 % respectively. It can apply to population surrounding Ziway town who live on irrigated land; there is also an increase in the number of fishermen and those who are engaged in commercial farm water abstractions.

This shows the real practice of water use demand that has increased due to the population growth of Ziway town which is directly tied with the Lake water for socio-economic activities. However, demand-induced scarcity of water use in relation to its dynamics became a challenge for water management. Lack of access, overutilization of water and lack coordination on common pool lake water utilization have increased which may trigger conflict and insecurity. However, a regular plate forum for sustainable development in the local community is required to sustain peace and security in the study area.

Hence, the stress arising out of Ziway Lake water creates critical water resource demand due to the growing population and overexploitation of water by various activities. Distribution of limited water resource for multi-level actors, make the share division smaller for each group and create grievance on various activities of water users. The growing demand resulted in scarcity of water and increased

competition and have caused conflicts. Ziway Lake water is the main source of income for small irrigation farmers, fishery, hotel and tourism sectors. According to CSA (2013), there were 155,264 rural and urban populations living in Ziway town in the year 2018. Out of the total populations, 82,439 were earning a livelihood from water use activities based on the information from Rift Valley Irrigation Office⁹. This means that about more than 50% of the population in the study area is directly dependent on agricultural income which is related to Ziway Lake. The major activities of water users are agricultural crops, livestock, vegetable production, and fishing activities. At present, fishermen have lost access to fish due to the degradation of fish stock in the lake. The finding of this research further provides evidence on increasing demand for water leading to scarcity, tension, and conflict. Due to overexploitation, there is a reduction of water at the Lake. Accessing water from Lake Ziway is the main cause of tension among weak water users. Because of the existence of multiple activities, there is a massive water demand competition. To access limited freshwater from Lake Ziway is not compatible enough to satisfy different groups equally and proportionally. The overcrowded existence of the multi-interest of water users around water points creates the demand induced scarcity of water at the lake site, rising water conflict and threatening peace and security. This research explores factors producing scarcity is the contesting issues in the Lake water utilization. And has left for further research, whether industry or farm irrigation practice is harming the sustainability of peace and security in the region.

Despite exploding population pressure land redistribution in rural Ethiopia, which was more frequent in Derge region did not happen in FDRE except in Tigray and Amhara region after civil war ended (Mulat 1999). Unlike in Tigray and Amhara regions, there has been no land redistribution in Oromiya region after the major distribution in the mid-1970s. Consequently, land has become a scarce resource (Tefera et al 2002)

⁹ Team leader, small irrigation farm, Rift valley small irrigation supplier at Ziway Batu Woreda office, Code 38.

4.1.2 Supply induced Scarcity on water use conflict

According to the key informant¹⁰, depletion and degradation has produced a decrease in total resource supply. The previous Lake water color has changed to gray and is not clear and clean. There are different interested groups on water use activities that have decreased water supply and have raised water use conflict. There is a lack of access due to the shortage of water supplies in relation to silt deposition. The supply of water dropped because of varies irrigation investments and industries coming up that has depleted the water in quality or degraded in quality of water with pollution. The practices of environmentally, unfriendly agrochemical by both small irrigation farmers and industry have contaminated the Lake water and have reduced its supply.

There is also misuse of water with furrow irrigation system by small scale irrigation farm that influences water supply that raised making a water shortage and induced scarcity. According to the key informant and focus group discussion¹¹, there is high competition for exploitation of water from one common resource which is exhausting in quantity and, quality. The level of water in the Lake is falling and the volume of water in shrinking. Similarly, the key informants¹² reported that, due to the unsaved water supply from the lake, the authority of Ziway town municipality was forced to change the water source point from Ziway Lake to Tuffa underground water source after a long effort and discussion with the community.

Currently, water supply from the Tuffa water source, which is 42 kilometers away from Ziway town is becoming irregular and town residents are complaining for poor water supply. There is interruption of water for three or four days due to pump breakage and lack of spare parts for maintenance which appear worse in-service supply of water.

Moreover, some key informants¹³, noted that climate change in the form drought and particularly the 2015/16 El Nino, have worsen the water supply scarcity,

¹⁰ Key informant: Expert community Mobilization, Ziway Woreda, Water resource and design office Code 37

¹¹ FGDs: Team Leader, Youth association at Ziway town, age 28, Code 25

¹² Key informant: Public relation officer, Sher Ethiopia flower Industry, Code 46, Women irrigation farmer at Downstream, Small irrigations at downstream women farmer, code 47 and, Contract Irrigation farmer, Small irrigations at downstream contract worker code 48

¹³ Key informants: Expert community Mobilization, Ziway Woreda, Water resource and design office Code 37, Director, and senior researcher, Institute, Fish research center, code 41 and Women irrigation farmer at Downstream, code 47

which trigger water use conflict for the last two years. Soil deposition in the lake by a small stream and river flood and degradation of wetland made access to water resources difficult. Salinization of Lake water and wetland degradation has a negative effect on fish production. At present the unique fish that live in clean water called *Labeobar busintermedius* with local name *Daltuadi/Faranji* has extinctic from Ziway lake. Previously Ziway lake fish stock production was estimated 3000 to 3500 tons at present it has reduced below 1000-tons fish stock. On the other hand, one of the key informants¹⁴ stated that factors related to water conflict are shortage of water for downstream small irrigation farms that flows out from Ziway Lake water via Bulbula River. Bulbula outlet and floriculture passage are significant source of variation in some of the physicochemical parameters in the study area. Diversion for irrigation on the inlet of river Katar and river Meki shrinks water resource supply and raised the issue of water conflict.

On the other hand, one of the key informants¹⁵ stated that the water resources potential shows incredible spatial and temporal climate variability, a challenge on the development and management of water resources. Particularly Ziway rural and urban communities that depend directly on water from the Lake suffered severely on scarce water supply. On the other hand, in one of the focus group discussions¹⁶, siltation was found responsible for reduction in the volume of the Lake water, and it appeared the Lake is drying up. Siltation has increased the distance of water from the farm field and has become a challenge for irrigation, especially in dry seasons.

Other key informants¹⁷ has confirmed that the Lake water cannot meet the need of users due to environmental degradation and water depletion. The dominant water consumer of Ziway Lake that makes over exploiter and polluter is the Sher Ethiopia flower industry which needs a lot of water to grow flowers for export. As a result of this practice of supply induced scarcity of water insufficiency is affecting livelihood of most people who live near the Lake.

¹⁴ Key informant: Team leader on pollution, The Federal Democratic Republic of Ethiopia Ministry of Environment, Forest and Climate Change at Addis Ababa, Code 32

¹⁵ Team leader on pollution, The Federal Democratic Republic of Ethiopia Ministry of Environment, Forest and Climate Change at Addis Ababa, Code 32

¹⁶ Focus group discussions (FGDs): Small irrigation farmer, age 41 Code 21

¹⁷ Key informant: Team leader on pollution, The Federal Democratic Republic of Ethiopia Ministry of Environment, Forest and Climate Change, Code 32

On the contrary, one of the key informants¹⁸ argued that water quality and quantity are not depleted and degraded by Sher company activities. The informant strongly defended the acquisition by demonstrating a water reuse practice system at one of the sections, and showed the environmental audit certificate obtained. The informant further explained how the company is contributing to the community development through building hospital and school. And denounces the release of chemical wastewater to the lake and acknowledges the company use of new technology of water reuse system. According to Sher Ethiopia flower Industry the local traditional small irrigation farmers are water polluters and responsible for reduction in water quality and quantity. The lack of knowledge has led to indiscriminate use of agrochemicals by the farmers.

On the other side, Mengistie (2016) noted that there is a lack of appropriate agrochemical registration, distribution, and auditing system in Ethiopia. There is also lack of coordination between MoA and pesticide advisory on implementation of state pesticide policies. To reduce potential risks of pesticides on water pollution, there is a need enforcing pesticide regulation strictly. Berhan et al (2016 p1) explained the Lake changing situation aspects of pesticide concentrations and physicochemical parameters studied from the data gathered for the years from 2009 to 2015. The results show that “physicochemical parameters, including pH, potassium and iron, over 50 % of the values were above the maximum permissible limit of the Ethiopian standard for drinking water. The fungicide spiroxamine poses a high chronic risk when the water is used for drinking water.” The influences of the water quality and quantity of Lake Ziway were high.

On related studies, Abebe and Kassa (2016) explained the cause of water conflict is overexploitation by different activities and misuse on limited water resources, resulting in unbalanced expectations from future development projects discouraged agricultural growth. On the other hand, Oxfam America Evaluation Report (2012) concluded that overexploitation with crowded use on water resources is a major source of conflict that challenges future sustainable development. This threatens long-term availability of water development for

¹⁸ Farm Manager, Castell Vinery farm and Factory, Code 45.

agriculture, and there are concerns that Lake Ziway might dry up and become unproductive land (Ibid).

Moreover, environment, scarcity and violence theory of Homer-Dixon (1999) demonstrated the cause of water use conflict that natural resources water scarcities which is referred as shortage: water supply reduction leads to raising water use conflict “supply-induced” (a consequence of resource depletion and degradation)”. Both the total increase demand for water resource and decrease of water supply which influence the water use resource by depletion or degradation simultaneously increase demand induced and supply induced scarcity.

Similarly, he stated rising supply induced and demand-induced scarcity are cause of resource capture by the behavior of powerful groups called elites. These elites use their power to grab water resources. Rent-seeking and greater scarcity for weak groups leads to increase in violence to access water resources. By legitimate social system, they are motivated to capture resources in the name of public interest. But it is reasonable to conclude that water scarcity and development economic effects contributed to the grievances that lead to water use conflict. Similarly, Kramer (2004) stated decrease in water quantity by water pollution raises serious threats to human health. Water quality reduction can raise a dispute between those who cause degradation and affected groups. This can raise public protest due to the increasing impact of water pollution through industrial and domestic wastewater or agricultural pesticides, upon livelihoods and the environment (Ibid).

Hence, this research findings proved that the dynamics of water use competition and conflict with a related article by exploring the cause that raises water use competition. The existence of multilevel groups of interests has created supply induced scarcity on the resource of the lake. The assessment of water for use practices showed that there is a difference in the economic power balance capacity for the competition of water extraction that drop water supply among the water users. And rotational irrigation watering system raised competition among small irrigation farmers. There is depletion of water by agrochemical pollution, but not identified who is pollutant within the community registered for appropriate implementation of agrochemical use. It is controversial to blame irrigator farmers or flower industry as water polluters without proper investigation. Shortage of

water supply and degradation of water and fish contamination has increased conflict tensions. The fish stock reduction below 1000 tons has created a risk for loss of fishery employment in the lake. Overexploitation of fish and improper fishing by the harmful instrument has triggered conflict in Lake Ziway. Supply-induced scarcity of water use triggers conflict and can be a cause to create instability for peace and security. Weak and absence of rules and regulations for implementation on common resource usage can lead to intensifying or sustaining violence. Therefore, this fragile water management practice may in danger the local community peace and security that need attention.

Siltation and neutral element increase have worsened the quality of water. Spatial variations in climate change are expected to cause considerable shifts in the study area on agricultural patterns and stress the already serious spatial mismatch between water supply and demand. The occurrence of Elnino climate change which is warming extremely in the dry season and unexpected high rainfall consistently throughout the year are expected to cause considerable impact on water use competition and conflict. When both total demands increase for the resource, and it can both decrease supply by making a causal effect on the resource's depletion or degradation. Growing populations and greater per capita water resource demand can thus simultaneously increase demand induced and supply-induced scarcity in Lake Ziway.

4.1.3 Structural scarcity

One of the key¹⁹ informants stated that the type of water use conflict is caused by unequal distribution of land and water. Resource distribution favors the investment owner group by some of the state authorities for a development project. Large agricultural land sector near Lake Ziway were disproportionately allocated to flower exporters groups without consultation of the local community. Other local farmers hold small land to sustain their livelihood which can link to conflict. Occasionally drought and lack of severe water and food shortage can open structural scarcity. Supply induced scarcity combined with poor water governance can increase grievance and water use violence.

¹⁹ Key informant: Team leader, women and child, Women and Children at Ziway Batu Woreda office, Code 40.

The informant further explained that the other type of water uses conflict is the contradiction between low and high economic superior relationships with unequal economic standing to bargain position compared to other parties. Negotiation among competing groups helps diffuse scarcity costs and encourage market mechanisms with the development of new technology. And structural disagreement on disproportional distribution water resource by water governance from federal up to woreda office level will favor one group of users over the others group. Authority interest relations with investors mean that domestic community water users are always neglected, which is leading to water use conflicts. A fall in the quality and quantity of water resource interacts with population growth encourages powerful elite groups within a society to shift resource distribution in their favor.

Similarly, the key informants²⁰ stated, there is a lack of water supply infrastructure which create difficulties in the community to get water for domestic use. Where there is little support from the authorities to resolve the water problems, it is further undercut by budget crises. Moreover, one of the interviews²¹ said that the downstream riparian Lake water users have complained to water governance officials on the little distribution water as they face shortage of water for their irrigation.

Furthermore, the key informant²² explained that at present there is a federal government institutional setup, parallel with the state which is directly related Oromia state structure. Oromia state which has the constitutional mandate to administer land and other natural resources within Oromia boundaries in accordance with federal laws (FDRE, 1995 Art 52(2) (d)). But, to administer natural resources by local peoples to own and utilize their land in a fair manner is crucial. They often favor large-scale development projects for public interest to collect tax revenue. 500 hectares of land near the Ziway Lake were transferred from state-owned agricultural land to foreign investment of the Sher Ethiopian flower company. This transfer has been blamed by the community of having

²⁰ Key informants: Expert community Mobilization, Ziway Woreda, Water resource and design office, Code 37 and Team leader, small irrigation farm, Rift valley small irrigation supplier at Ziway Batu Woreda office, Code 38.

²¹ In depth interviewer: Fisherman, age 78, at Ziway town Code 52.

²² Key informant: Team leader on pollution, The Federal Democratic Republic of Ethiopia Ministry of Environment, Forest and Climate Change at Addis Ababa, Code 32.

illegitimate nexus between investors and politicians, leaving powerless young farmers without having land for agriculture.

He further explained, there is a shortage of water supply and access for small irrigators in Bulbula downstream. The intended measures were not effective regarding auditing water pollution. There were complaints about water use on the state office of Oromia environmental protection on the case of Lake Ziway water use conflict but no effective actions were taken. Moreover, one of key informant²³ stated there are formal institutional arrangements which are often weak and fragile with overlapping responsibility in the implementation of activities at the grass-root level. There are also customary institutional arrangements in Ziway town. The customary institutional arrangement at the local level is governed by customary groups rule of resource access and dispute resolution successfully.

Similarly, an empirical review of Ketema (2013) explored that the process of water use management and managing conflict are common problems over the resource. The predispositions by structural and proximate causes on the common resource by formal and customary governance rules are practiced by water management groups. The institutional arrangements which are responding to complaints of the local community, cannot exercise their given power and were not effective and efficient to govern the common pool water resource. It only shows “top-down and non-participatory policy formulation,” whereby unclear incompatible interests of stakeholders and scarcity of resources, water use conflict over common pool resource in Lake Tana sub-basin is growing (Ibid).

Abdalla, A. (2002) also explained that institutional arrangement and structures are formal setups to manage natural resource and resolve the water resource conflict dynamics. The structural violence is not directly caused by people but by the economic and political ideology system in place causing poverty (Ibid). Similarly, Ostrom (1990) stated that formal or informal rules which refer verbal statements like norms. However institutional rules carry an additional, assigned sanction to manage the natural resources. Rules help to govern natural resources that are linked to common-pool natural resources. Lake water use needs

²³ Key informant: Team leader on pollution, The Federal Democratic Republic of Ethiopia Ministry of Environment, Forest and Climate Change at Addis Ababa, Code 32

monitoring and sanctioning must exist to enforce rules to manage natural resources (Ostrom, 1990). There is no legal provision or indemnity clauses in the water laws with penalty provisions for ensuring the accountability of officials, water suppliers, and users in Ethiopia (Reta, Degefa, & Getnet, 2018). However, the Ethiopian Horticulture Producer Exporters Association has the best-detailed code of practice for sustainable flower production to address market and civil society concern but not yet implemented (EHPEA code of practice, 2015).

According to Oxfam American Evolution of water program report in Ethiopia (2014) statement, there is an institutional arrangement on water resource governance. To assess the discovery of institutional arrangement put-in-place to ensure water use competition and conflict, the interface of formal institutional arrangement with community demand is mismatched on the development investment scheme for the public interest.

Hence, this research has proved the practice of water use on structural scarcity in relation to the above articles. At Ziway lake there is structural scarcity with inequality justice tension which focuses attention. Land distribution in relation to water use has triggered conflicts because of unequal access to water and resources. No supervision and auditing according to investment proclamation No 769/2012 rather provide incentives for investors and guaranties the protections under article 23-27. However, in the study area, there are formal and customary institutional arrangements for common resource water for the community in general. Moreover, this research finding explored that there is a lack of water supply access for small irrigation use at Bulbula downstream.

Reduction of fish stock in Lake Ziway has little support from authorities. Due to interdependent relationship, authorities weakened the responsiveness in water governance and create ambiguity in resource distribution. Structural differentiation scarcity of funds creates structural tension and can raise water use conflict. There is disproportional resource allocation on fertile land and near water in the name of public interest large investments are favored. Structural scarcity is aggravated when some groups get disproportionately large shares of water resource, particularly through government projects and commercial farms, while other groups and local individuals get shares that are too small land which is far from the water source. To export flower for profit-making business that reduces

poverty and supports development are ideal to encourage foreign and local investments. But it is causing poverty increase to disregard the water need of local community without compromising. Proportional water use management for all water users is effective as it brings coordination among the community. Improving water infrastructure must be prioritized with water conservation and sustainable water use. The customary institution of Oromo Abba Gadaa elders' council's committee, is an active voice for powerless and effective to resolve community level civil dispute together with formal court. To empower customary institutions and community participation on water management are important in resolving water use conflict and to bring coordination in development in lake Ziway.

4.1.4 Cause of Water Use Competition and Conflict

Cause of Competition: According to a key informant²⁴ statement there is water use competition due to limited water quantity in the lake. It is described that the area around Ziway Lake is overcrowded with no open space left, due to the demand of water for different activities. There is water resources availability reduction for others by one rivalrous economic actor. Water utilization has brought pressure in the study areas under competition for water resource, particularly on irrigation. Scheduled time system to carry out watering vegetables with disproportional timing among different small irrigation farmers creates conflict on water use competition. Some irrigation farmers have large plots of land and need longer timing for watering. While other irrigation farmers have small plots of land and need shorter timing. Moreover, during the evening period, during dry seasons, competition is intensified for watering. There is extreme water shortage, creating intense competition. Water usage sometimes raised by farmer who is cheating by using above the limits of time allocated. The existence of dense irrigation, at certain plots farmers of association create to intensify water use competition.

Moreover, there is water use competition at downstream irrigation farmers against upstream. Due to the Lake water volume reduction below its flowing level and mishandling, water management and shortage of water has raised competition. To

²⁴ Deputy Administrator, Ziway Woreda, Water resource and design office, code 36

supply regular water flow for downstream irrigators, the water level is low in the Lake and the river dries up. Mishandling water management, shortage of water and scheduled timing situation creates intense competition. Lack of water access for the downstream farmers triggered water use conflict between the upper stream and downstream farmers. The other cause of competition is water diversion by using a hidden ditch dam which releases a small quantity of water for downstream local small irrigation farmers through river Bulbual riparian is becoming a critical condition. One of the key informants²⁵, Expert on Community mobilization has said:

“beside small irrigation farmers, there are rent contractors of land for irrigation from Local farm to grow different types of vegetables for the local market. They are aggressively intensifying competition on water use between small irrigation farmers and land tenants to grow vegetables for profit-making business. “

Cause of water use conflict: One of the key informants²⁶ stated the cause of water use conflict is the continuous reduction of water in volume and decrease in water depth. Sher Ethiopia flower industry is the main cause of overexploitation of water use. Around 5000 cubic meters water exploited daily by electric pipe motor reduces lake water and causes water use conflict. Misuse of water by small irrigation farmers with farrow irrigation system and abuse of water usage for road construction are driving cause of water use conflict on factual disagreement. Depletion of the Lake water quality by the release of wastewater from the Ziway town community and agrochemicals usage can be a cause of water use conflict on conflicting goals. Pollution of water has created a threat to health problems and has resulted reduction of fish stock which increase unemployment and rises water use conflict. The negative attitude as a cause of conflict with relational aspect from the community to the Sher Ethiopia flower Industry can be a risk for peace and security.

Similarly, one of the key informants²⁷ explains the cause of water use conflict is irresponsible water governance and the gap of water management system. The construction dam for irrigation on the inlet diversions on river Katar and Meke can raise water use conflict. The downstream farmers were severely affected

²⁵ Expert community Mobilization, Ziway Woreda, Water resource and design office, code 37

²⁶ Key informant: Team leader on pollution, The Federal Democratic Republic of Ethiopia Ministry of Environment, Forest and Climate Change at Addis Ababa, Code 32

²⁷ Expert community Mobilization, Ziway Woreda, Water resource and design office, code 37

particularly in the dry season, there is a loss of farm production and the farmers feel angry with offensive reaction due to lack of access to Lake water. There is strong grievance by irrigation farmers and they express their feeling with bitter anger which leads to conflict. This situation on water use can trigger conflict among rural, upper and downstream together with urban communities that threaten peace and security.

Moreover, one of the key informants²⁸ stated the cause of water use conflict is not only human interaction but also climate change and drought which have brought water shortage and created tension that triggers conflict. El Nino climate cycle was a cause of water use conflict between downstream riparian and upper stream riparian irrigation farmers due to the shortage of water. Salination of Lake water and wetland degradation influences fishing production stock. Pollution of water and reduction of fish has harmed severely Zay ethnic communities that live on Lake Ziway inland and whose livelihood depended on fish. Currently, fish is not consumed like before at the town of Ziway. Contaminated fish due to infection in polluted water in turn has ruined fish market which is a potential cause of conflict. Those who serve fish to their customers at the Lakeshore, on traveling to another place via Ziway town and in the hotel affected by contaminated fish. Consumption of contaminated fish by foreign and national tourist people can polarize violence, on peace and security even at the national and international level.

The expert further explained, there is long-term grievance on the allocation of land which has left the young group landless and no more land is available to distribute for the newer generation. The cause of water utilization has raised intense conflict between irrigation farmers and investors. The other cause of water conflict is population pressure in relation to investment increase and urbanization. Unequal distribution of water resources and environmental natural resource degradation can cause conflict. The Lake water is free common resource for all but getting shrunk in quality and quantity. It is due to poor water management; community suffer from water shortage and create water hazards and conflict. Unemployment is growing at Ziway town near the lake, there can be a significant risk of widespread violence, often leading to social stresses. Young local people

²⁸ Farm Manager, Castell Vinery farm and Factory, Code 45

who are landless comparatively, without work, demand land and water resources to get income.

Therefore, the cause of water use competition and conflict over the lake is a shortage of water for accessing and utilization among the users. Scheduled system of watering irrigation farm has intensified competition. The lifesaving resource is harming the community and overexploitation of water to produce luxury crops and vegetables for investors can trigger water use conflict. On the other hand, geographical location between upper and downstream and land renter and local landowner irrigator is not equally competing. The dynamic interest of actors which intensified water use competition identified. Their activities trigger a conflict that threatens future peace and security.

The cause of water use conflict over the lake is depletion, degradation of water quality and overexploitation of water utilization. Misuse of water is through farrow irrigation and pollution of water by the application of toxic pesticides and fertilizer. Pollution of Lake water is due to irresponsibility in managing water resources to take aggressive measures on polluter. Construction of dam for water diversion on the inlet river for development project triggered water use conflict. The hot dry season always intensifies water use conflict. And the negative feeling attitude toward the Sher Ethiopia flower industry form the community triggers violence that could threaten peace and security around Lake Ziway.

4.2 Type of water use conflict

According to one of the key informant's²⁹ statements, there is verbal attack and hate speech among Lake Ziway fisheries. The conflict is classified as medium type of water use conflict practiced. It is caused by individual fishery with the act of disturbance and looting fishnets. Occasional there is verbal attack and hater among “lawful and unlawful” fishermen. No responsive measure has been taken by local officials on this fighting with the words which caused by overexploitation of fish and with the use of inappropriate fishing instrument by the fishers. There is also aggressive reaction clams by downstream irrigation farmers to open a ditch

²⁹ Water resource Expert, Ethiopia water resources irrigation and Electric Minister Directorate office, code 31 and Team leader on pollution, The Federal Democratic Republic of Ethiopia Ministry of Environment, Forest and Climate Change, code 32

to flow water downward. Water use conflict intensity claim was an important type of indication to the state over the lake water pollution to stop and take measure upon polluter. However, they do not come up with any responsive measure to solve a structural source of water use conflict which threatens the community. On the other hand, the source of water use conflict as a factual disagreement, conflictual goal and relational aspect have been observed over land use, land management and water resource utilization among the community and state.

Similarly, Oromia Media Network (OMN) (2017) demonstrated on documentary film, the impact of the Sher Ethiopia flower company on Lake Ziway. How the Ziway town community had expressed their anger strongly on the cause of water pollution. There is water use conflict intensity on the cause of water pollution which triggers violence. Fishers, irrigation farmers and communities are threatened by pollution and contamination of the Lake water.

On related article Fayos (2002) stated the type of water conflict with the hierarchy of conflicts related to water and the relation between them. The first is the conflicts related to the lake resources (fishing), second the water supply of the town and settlements, and third conflicts related to activities in the upper catchment. Water use conflicts are mixed with other types of land, tribal, social and economic conflicts, and with some emotional-historical factors in relation to the inheritance of past in Lake Naivasha, Kenya (Ibid).

Hence, the type of water conflict is dynamic from time to time with medium and minor intensity conflict type directly on lake water. And indirectly water conflict related to land use land management and resource utilization impact has been observed which needs further research. Sometimes the action happened verbally with feelings leads to physical loss of property and desire to have a quality, possessions. The water use conflict as a source is practiced around lake Ziway with multifactual interest, risks the community future peace and security.

4.3 Impact and Water (in)security at Lake Ziway

4.3.1 Lack of access

A. Land: Key informants³⁰ stated that the situation of land system is practiced with use right land holding system. Land holding area size have significant impact on the area around Lake Ziway. Since FDRE regime the interest for redistribution of land has grown. Only the Amhara and Tigray National states have delivered some form of rules and regulations regarding redistribution of land. Since 1991 in Oromia regional state neither allocation nor land redistribution has been undertaken. It would have been led to the further destruction of cultivation land and rapid deterioration in natural resources. Water use conflict is pressurizing the scarcity on irrigation land for young unemployed youths in rural areas. Subdivision of land through partible inheritance does not satisfied land demand it even makes worst the family relationship that raise conflict. Moreover, one of the focus group discussion participants³¹ explained that the number of lands less youth group is increasing since 1974. On the other hand, most of the land at Lake Ziway area suffers from high to severe wind and water erosion, loss of nutrients, salinization because of climate change, over-irrigation, and light soil caused by the intensification of agriculture. Due to the environmentally unfriendly technological application of agrochemicals to soil and water both by investors and small irrigation farmers have affected water and soil. Degradation of land resources and population growth helped to cause small community agricultural shortfalls, which in turn encouraged a large development scheme. Then a powerful elite changed property rights and resource distribution in its favor through investment law.

One focus group discussion member³² explained:

“there is a high conflictual interest among irrigation farmers on related causes of land lease/rent system with a lack of land access. Whereby, the value of best croplands which is near water are distributed by the state to favored foreign investors to collect

³⁰ Key informant: Expert community Mobilization, Ziway Woreda, Water resource and design office, Code 37 and Team leader, small irrigation farm, Rift valley small irrigation supplier at Ziway Batu Woreda office, Code 38

³¹ FGDS youth association member, an officer, age 31, Code 24.

³² FGDs: Abba Gedaa, Private business, age 62, Code 11 and Abba Gedaa , Elder retire civil servant ,Code 15

taxation that generated hard currency rather than to support the impoverished population.”

Similarly, Tefera et al. 2002 p47 the issue of landlessness is critical problem in Oromia. The population of landless is growing with the estimated of nearly 50% at some localities. It implies that land is pretty much scarce resource and about half of the population is landless in Oromia region. The driving factors are insecure of land tenure, population pressure, poverty, high cost and inaccessibility of inputs, land degradation and labor use intensity.

Hence lack of access to water and fertile cropland for irrigation has an impact in increasing resource scarcity. Legitimate exclusion of water use by the state to the local farmers and small irrigation farmers trigger violence to demand land and water use. Land tenure insecure, landless population pressure, and poverty are a driving factor for water use insecurity at Lake Ziway. Whereby, the state elite favor investors for development income to eradicate poverty rather than to assist at a level of enough necessity for subsistence to its own use of disadvantage society.

B. Water: According to key informant³³ explanation, free access for common resource share and without proper management of lake water has created overexploitation of water resources beyond the limit of environmental sustainability. Lack of ownership right for the lake has an impact on non-sustainable and major ecological and economic damage. But the law for water has stipulated that the state has the power to administer/manage land, water and other natural resources in general. However, the water scarcity crises are rising in Lake Ziway with the increase of population and water demand. Moreover, there is water depletion and pollution which have a critical problem that has an impact on supply induced scarcities of freshwater on irrigation productivity. Using poor quality and quantity of water has a negative effect on health and economic development. Climate change would change rainfall patterns and the overall water supply that suffer prolonged drought. Farm plant dries up with the shortage of water that affects farmers with the economic loss on the vegetable farm and increased poverty. Long-distance from the farm field hinders them from accessing

³³ Key informant: Team leader, small irrigation farm, Rift valley small irrigation supplier at Ziway Batu Woreda office, Code 38

water from the lake. Due to the soil deposition by flood the lake water level has run back or retread back and they remain far from their farmland. There is not enough water flowing down to Bulbula farm from upper stream due to the reduction in-depth of the Lake water level. Some Bulbula irrigators are forced to dig underground water hole while most of the irrigators cannot afford to dig. The consequence of the shortage of water and not enough water for irrigation farms, the vegetable are damage and farmers lead to economic loss.

According to one of the key informants³⁴ statement, there is water usage violence among females to get water from the *water* pipe / common use water tap in Ziway town. They have complained with anger feeling to woreda officials to stop the water stress. But no effective response replied, this raise grievance and water use conflict. Farmers are unable to access water effectively particularly; on the dry season. Therefore, lack of accessing quality water contributes to the deterioration on the livelihoods of the overall population and retard economic development that may triggers water use conflict around the Ziway town community.

C. Water (in) security on water use conflict

Water (in)security at Lake Ziway express motions that results around Ziway town. One of the key informants³⁵ explained, the causes of conflict are human interaction for the demand of water resource utilization with different interest activities. The activities of huge private investment development which are overexploiting the water with the use of powerful electric motor pump is depleting the water. A desire to secure the Lake water for themselves contributed to tensions from the local community. The depletion of aquifers and shortage of water are also a source of water use conflict that raises water insecurity. Mistrust, misconduct, and cheating among themselves, on the use of the water above the limited time allocated are a cause of conflict. Whenever one irrigator is using water without his turn create to raise water use conflict. Not accessing properly, the flow of water in the river Bulbula at the downstream is the other triggering water use conflict.

³⁴ Key informant: Contract Irrigation farmer, Small irrigations at downstream contract worker Code 48

³⁵ Key informant: Contract irrigation farmer, Small irrigations farmer, Bulbula near Ziway town downstream, Code 48.

Moreover, another key informant³⁶ noted that a disagreement occurring between different groups of water users in accessing water created tension on water insecurity. Especially during the dry season, there is tension due to shortage of water and the Lake water point get retreated far distance from farming plots. To pull the water from its place for irrigation needs strong economic capacity. It is a challenge, to buy necessary irrigational input materials such as plastic pipes and rubber tubes.

Similarly, one of the key informants³⁷ stated wastage of water by flood and furrow irrigation by small irrigation farmers and a huge amount of water overexploitation to the reservoir by flower investors are the major water insecurity problems. However, the investor's company is applying (drip irrigation technology use) to fall a small drop of water to the plant system and partially reuse wastewater by using treatment technology systems to secure Lake water. But no technological transfer to the community have observed.

Shortage of water and depletion are damaging the fish stock of Lake Ziway. The water shortage and quality water supply treated unfairly at the Lake water can be serious triggers to civil unrest. The increase in demand for water has created high intensification on livelihood. Population growth on young labor migrants from adjacent rural areas with the attraction of foreign investment employment opportunities is one the factor for water insecurity. On the other side, desertification with careless overexploitation of water and the growing of plant “*Emobch*” are a concern for Ziway Lake. Environmental degradation in the absence protection on wetlands influences threatening socio-economic development that makes insecure water for the future generation.

Moreover, one of Key informant³⁸ whose age is 78-year-old said:

“absence of natural resources protection ownership and silence of response from water governance are a loss for resource with strong influences on water security in relation to peace and security. A lot of fish has been killed in the year 2012, 2013 and 2014, because of the release of chemical into the lake. Furthermore, the key informant³⁹ stated lack of access to the Lake water by a system of “indirect control

³⁶ Key informant: Expert community mobilization, Ziway Woreda, Water resource and design office, Code 37.

³⁷ Key informants: Public relation officer, Sher Ethiopia flower Industry, Code 46,

³⁸ In depth interviewer: Fisherman, age 78, Private Fishery fishing in Ziway Lake, Code 52.

³⁹ Key informant: Expert community mobilization, Ziway Woreda, Water resource and design office, Code 37,

of water uses or by polarizing effect” which causes water conflict and rising insecurity.”

On the other hand, the key informants⁴⁰ noted hotel customers who use fish, vegetable and animals’ products at Ziway town are not reliable on the services due to the insecurity of water contamination threat. The heavy metal water that contaminates fish, vegetable and animals’ product consumers influence water insecurity with relation to peace and security at the local and national level.

Moreover, the articles of UNEP (2012) stated the major sources of water use conflict are competition between varies water sectors and livelihood groups. Water quality degradation due to pollution and the quantity of water reduction supply due to development activities are the main cause of water insecurity. Lack of access to water and exhaustion of supplies with climate variation are increasing. Exclusive control of water resources and unclear water use right is a gap for water management which makes water (in) security and cause water use conflict.

Hence, this research explored the indicators of water use conflict effect in relation to peace and security. The poor quality of water can be the indicators of water use conflict which are highly sensitive that may lead to political lobbying to secure power sharing and wealth for rebellious. The effect of scarcity and poor-quality on water use conflict can pressurize water insecurity, create instability and loss of employment for fisheries among the community due to the reduction of fish stock. The cause of the water pollution situation, environmental degradation with unfriendly technological intervention and absence of natural resource ownership use right protection which has strong water insecurity effect which threatens the livelihood of the community in relation to peace and security. Social harms on water conflict are common in market liberalization and more damaging social livelihood. The cause of water use conflict can be used as a political instrument for manipulation. All persons have the right to use a clean water and healthy environment. But all person who have been displaced to use unclean water or whose livelihoods have been adversely affected because of state programmers or any other have the right to compensation, including relocation with adequate

⁴⁰ Key informant: Expert community mobilization, Ziway Woreda, Water resource and design office, Code 37, Deputy Manager, Tourism & Culture, Tourism and culture office at Ziway Batu Woreda office, Code 39 and Director, and senior researcher, Institute, Fish research center, Code 41

State assistance. Hence to use poor agricultural production with contamination of water need to enforce measure to secure highly sensitive issues of public health. It has strong effects on community's socioeconomic relation and can disrupt peace and security of the local, national and regional level.

D. Fish: Key informants⁴¹ noted that Lake Ziway fish is the most consumable commodity by the local community. However, due to the poor quality of water, fish stock has reduced and contaminated in Lake Ziway. In the previous regime, the Lake had potential on fish stocks but in recent years the fish stock has reduced which either fully exploited or overfished.

Most of the fish which is special with high valued and sweet fish are lost and exhausted from the Lake. The fish stocks which were secured at present they are under threat from illegal fishing activities and environmental pollution. In some cases, pressurized with overexploitation resource use can cause fisheries to collapse employment. One of the key informants⁴² stated that the consequence effect of reduction of fish stock in Lake Ziway is making insecure for fishery unemployment that marginalized fishery communities, especially small-scale fishermen along Lake Ziway.

On the other hand, one of focus group discussions participant⁴³ expressed that, for fisheries, the only option of income is fishing activities on Lake Ziway and not privilege for land-use. At present, because of fish stock reduction at some places of the Lake water, there no fish to catch. In search of fish, fisheries are spending time by moving around on the surface of the Lake area. Occasionally, the location of fishing places in the lake for fishing, has triggered violence competition among fisheries. Between “Lawful fishery” and “unlawful fishery” on fishing activity there is conflict. Illegal instrument of fishing and looting property each other are threatening activity and influences community relationships on abuse of fishing that trigger to water use conflict.

Hence, the misapplication of technology and lack of accessibility of natural resource on land, water, and fish stock are causing factor for triggering water use competition and conflict. Since 1974 land nationalized and distributed for

⁴¹ Key informant: Director, and senior researcher, Institute, Fish research center Code 41, In-depth interviewer: Fisherman age 78, at Ziway town Code 52 and in-depth interviewer Fisherman aged 67 at Ziway town, Code 54

⁴² Key informant: Director, and senior researcher, Institute, Fish research center Code 41,

⁴³ Focus group discussion (FGDs) ; Fishery ,age 50 ,at Abune Girma kebele Code 5.

increased landless young group as a use right to rural community farmers. Even though, there were redistribution of land on the era of FDRE at the Amhara and Tigray National states to landless young generation group. There were further insecure land tenure, destructed cultivation land, and rapid deterioration in natural resources. But, in the study area at Oromia region there has been no land redistribution after the major distribution. Consequently, land has become a scarce resource. Shortage of water and poor quality of water supply for small irrigation farmers who cultivate vegetable suffer with loss due to the damage of vegetable before being mature for the market.

4.3.2 Impact on drinking water

According to the key informant⁴⁴, the consequences of drinking Lake Ziway water had to do with the poor quality which is contaminated by agrochemicals. In this regard, there is a pending dispute file on the court between Cassel Winery farm and Sher Ethiopia flower industry against wastewater released activities and their effect on wine fruit plant. This can be one indicator of the fact that Lake Ziway water is unsafe for drinking and washing clothes due to its low-quality. Moreover, the water quality is worsening because of additional pollution loaded from the irrigation during rain that washed the farm field into Lake Ziway. This rain flood water contains chemicals fertilizers, insecticides, and herbicides which contaminate the water with harmful agrochemicals such as chlorpyrifos and diazinon. Chlorpyrifos is in the organophosphate family of chemicals. It is a known human toxin that can create health problems. It is abundant in all parts of the world Chlorpyrifos can travel through waterways and sediments to enter the food supply by way of farming or the fish/animal supply. Harmful agrochemicals may threaten community and can trigger conflict. Due to unsafe water utility of the municipal water resource has been forced to change. Currently, the source of water supply point is changed from Lake Ziway to Tuffa underground water which is 42 kilometers south from Ziway Lake. Despite this, due to weak water management, there is a lack of access to clean drinking water for domestic use that affects the community. The community is even forced to buy ten liters of

⁴⁴ Key informants: Public relation officer, Sher Ethiopia flower Industry, Code 46, Women irrigation farmer at Downstream, Small irrigations at downstream women farmer, Code 47, and Contract Irrigation farmer, Small irrigations at downstream contract worker, Code 48.

water per packet by twelve Birr or more. For those people who could not afford to buy are forced to consume Lake Ziway. Hence unsafe drinking water had an impact on health. The community is also forced to spend much of their valuable production time in search of clean water and this, in turn, has a negative impact on their economy. The growing population is suffering from water shortage, and there are abuse and misuse of water and agrochemical. Drinking water is getting insecure for community at the study area. The major consequences of such practices are acute and chronic infections such as water-borne diseases.

4.3.3 Health effect

According to key informants⁴⁵, water pollution has attacked community health. Contaminated water use creates conflictual relationships among communities and harms human production activities. Water resource quality deterioration raises risky consequence on human and plant health problem such as sicken itching/sicken irritation disease on irrigation farmers. Transmitting plant infection diseases affected economically who cannot afford to buy medicine for their plant. The consequence of using poor quality of water could permanently damage health.

According to the key informant⁴⁶ statement on the medical report shows for the last two years that there is an increase for abortion, infant mortality and the deformed baby born at Ziway town public hospital. By the release of wastewater to lake water from the Sher Ethiopia flower industry, the lake water can be affected. The documentary film Carolina (2014) demonstrated that some of the young lady's irrigator workers in the Sher Ethiopia flower industry are the victim by chemical water contact while they are irrigating and spraying chemicals. The released wastewater can contaminate the lake water with harmful chemicals and affect community health. The documentary film showed interviewed professional expert response. The Sher Ethiopia flower industrial chemical water caused to harm human health effects such as abortion, physical abnormal born baby, and the dead baby born. The number of abortions has increased with alarming rates at present. However, we did not make research to identify the cause of abortion

⁴⁵ Key informants: Director, and senior researcher, Institute, Fish research center, Code 41 and Medical director, Ziway town Public Hospital, code 42

⁴⁶ Key informant: Medical director, Ziway town Public Hospital, code 42

increase. We know only that the ratio of abortion is increasing may be due to water pollution and industry population increment. The negative impacts of unfriendly agrochemical pesticides application on-farm and misuse and abuse related to water have attacked human and reduced livestock health production. Moreover, ⁴⁷ rural population who use lake water unknowingly are critically insecure in health and getting weak in their activities. Pollution water has also affected the ecosystem, vegetable production, fish, birds and animal health. Similarly, the key informants ⁴⁸ noted, that it is a high concern when the contaminated agricultural product with heavy metals consumed by local and national people that affects health and can trigger conflict.

On the other hand, in one of focus group discussion and key informant ⁴⁹ stated, because of the poor quality of water that has impact on health can also influence negative development productivity. Farmers economically deteriorated due to low income which cannot afford to buy the right medicine and infected farm plants. This has the effect of economic loss on the vegetable farmers and increased poverty. Moreover, the key informants ⁵⁰ stated, the disease which is transmitted and attacked ecosystem, plants and human through water and wind. Farmers are poor and they do not have economic power to dig underground water. Some farmers who can use underground water damage their farm due to salinity problems which burns the plants.

Asogwa and Dongo (2009 p 675-683) state, the practical application of pesticide has contributed significantly to human health, to environmental hazards., particularly on the usage of banned pesticides. These problems can be overcome by using better and properly functioning application equipment and by giving training to the farmers. Otherwise, it risks life and can trigger conflict and damage sustainable peace and security (Ibid).

Hence, the negative impacts on health are related to the impacts of pesticides on human and livestock health due to misuse and abuse of water. The impact of supply-induced scarcities of freshwater on health, on agricultural productivity and

⁴⁷ Key informant: Medical director, Ziway town Public Hospital, code 42

⁴⁸ Key informants: Director, and senior researcher, Institute, Fish research center, Code 40 and Medical director, Ziway town Public Hospital, code 41 and in-depth interviewer, displaced fisherman age 38, code 52

⁴⁹ Focus group discussion (FGDs) fisher man, fisher association number, age 50, Code 5 and Key informant irrigation women farmer, Small irrigations at downstream near Ziway town, age 27, Code 49.

⁵⁰ Key informants: Expert community mobilization, Ziway Woreda, Water resource and design office, Code 37, and Team leader, small irrigation farm, Rift valley small irrigation supplier at Ziway Woreda office, Code 38

ultimately, on economic development are harming the community. Health impacts of water pollution negatively contribute to the deterioration of the overall health of the population. According to key informants⁵¹ the misuse of agrochemicals is causing permanent health damage, abortion, infant mortality, the abnormal baby born, disease, hypertension, and other health-related problems. Some of the photographs shared during the fieldwork are shown below. The socioeconomic implications of poor water quality supply for farm irrigation and domestic use is directly linked to poverty increment. Health attacked due to the poor quality of water can be used as political instruments for threatening future peace and security on water use.

A Health insecurity

According to one key informant⁵² explanation, water pollution from small irrigation farmers are washed water from a farm field, containing fertilizer and pesticide. The disturbances of saline into freshwater systems have affected the quality and accessibility of water for all purposes. Moreover, the key informant⁵³ stated, the natural fluoride contamination is another health-related risk, in the Ziway lake catchment area and in the rift valley. Reduction of Lake water quality has a direct effect on human health. Overexploitation of the lake water reduced the volume and depth by the activities of the Sher Ethiopia flower industry, and the release of waste chemical water influences health insecurity. Rainwater flood wash away containing contaminated soil to water. Then the users use water on agricultural products that can harm public health which is a critical concern. Similarly, one of the key informants⁵⁴ remarked that pollution of water by agrochemical has created health problems. The informant further noted Oromia media broadcast report, which was cited on Aris and Wilkeite University research finding on contamination of Lake Ziway. And her observation at the public hospital clearly shows water use has impact on health insecurity related to contaminated water.

⁵¹ Key informants: Medical director, Ziway town Public Hospital Code 42 and Hospital Manager, Ziway town Public Hospital, Code 43

⁵² Key informant: Team leader on pollution, The Federal Democratic Republic of Ethiopia Ministry of Environment, Forest and Climate Change, Addis Ababa, Code 32.

⁵³ Key informant: Team leader on pollution, The Federal Democratic Republic of Ethiopia Ministry of Environment, Forest and Climate Change, Addis Ababa, Code 32

⁵⁴ Key informant: Expert community mobilization, Ziway Woreda, Water resource and design office, Code 37

Furthermore, the key informants⁵⁵ stated the effect of consuming polluted/contaminated fish also has created insecurity related to health. Reduction in fish stock production and consumption of contaminated Lake fish can trigger health insecurity. Cooked fish service near the Lake and at the hotel is not reliable for customers due to fish quality reduction by water infection. Contaminated fish influences health insecurity that is threatening the service of the hotel and the health of the community. The customer is not confident to eat Ziway fish in the Hotel. Some customers are afraid to eat Lake Ziway fish. Authorities not replying to the grievance and complains of community can make instability and impact peace and security. It is demonstrated on a documentary film interviewing foreign medical professionals about the cause of Lake Ziway contaminated water. He confirmed professionally that the young women employee at Sher Ethiopia flower company who work on irrigation and spray pesticide chemicals to the flower while on duty, they are highly probable to be attacked through touching contaminated water and create insecurity for her health (Carolina, 2014).

Therefore, this research identifies the usage of poor quality of water such as polluted water containing fertilizers and pesticides from farm that are released as wastewater into the fresh water created health insecurity. The community is at risk whenever there is no other optional water rather than to consume the lake water. This consumption of contaminated water and the lake fish rise health insecurity and can trigger water use conflict at lake Ziway area.

⁵⁵ Key informant: Expert community mobilization, Ziway Woreda, Water resource and design office, Code 37 and Team leader, small irrigation farm, Rift valley small irrigation supplier at ZiwayBatu Woreda office, Code 38



Figure 4.3: Abnormality in Birth of babies surrounding Lake Ziway

Source: From Medical⁵⁶, Pictures from Ziway town public hospital (16/06/2018) and Oromia environment, forest and climate change authority, 2017.

Suura du'aatii qurxummii Boyii (canal) Sherii keessa bahee haroo galuu yeeroo koreen qorannoof deeme fudhatame. (Ji'a Hag. 2009ALI)



Figure 4.4: Dead Fish around Ziway Lake

Source: Oromia Environment, Forest and Climate Change Authority, (2017). Which is translated from Afaan Oromo to English “Picture of dead fish floating in the canal of the lake photo captured on June 2017.

⁵⁶ Key informant: Medical director, Ziway town Public Hospital, Code 42.

4.3.4 Displacement effect

According to the key informants⁵⁷, there is a loss of employment in fishery due to the reduction of fish stock so much that it has resulted in displacement. Fishers seek alternative work and need to access another adequate piece of land and water resource. Contaminated water with inadequate supplies, insufficient shelter, inadequate sanitation, serious warm temperature and other forms of environmental degradation can also be a cause for displacement. Unemployment is a chronic problem that overcrowded the Ziway lake area through increase in poor urban population governance. Market forces on investment have attracted state expropriation to access land near water for foreign investment with cheap labor. Moreover, investment excludes small farmers from their land hold. There are also high rates of youth unemployment. Underemployment drives people to move into towns in search of basic needs such as food, shelter, transport, energy, and jobs. In response, governments come under pressure and deals with municipal budget crises. High yielding vegetable /crops with intensive use of irrigation and chemical fertilizers, as well as pesticide technology, have impacted weak economy to purchase agricultural input. This process has a displacement effect eventually on those small and excluded farmers who have a piece of land near water. Fishery due to the reducing fish stock is not beneficial with optional income. Displacement of farmers due to the shortage of water is taking place as more farmers are being forced depend on underground water for which they do not have means for survival. Similarly, one focus group discussion member⁵⁸ noted:

“since 2017, some of Lake Ziway fishermen have been displaced and forced to go to Arbaminch, Wellega, Koka, and Tekeze river, to continue the fishing activities. Degradation of forest and wetland have affected the home of fish in the lake. As well as the illegal fishing has depleted the fish stock. Further, fishermen livelihood is highly affected because of a lack of protection for lake Ziway and depleted fish. No compensation payment for the loss of fishermen employment and for the lost natural resource in the lake.

⁵⁷ In depth interviewers: Fish cook, women Private Cook fish at Ziway lake shore age 36 Code 51, Displaced fisherman, Private formal fish worker at lake Ziway currently working at Akaka river, age 38, Code 53, Fisherman, Ziway at, Bochesa members of fishery association aged 67 Code ,54 and Fisherman, Private Fishery fishing in Ziway lake, age 78, Code 52

⁵⁸ Focus group discussion (FGDs): Fishery, member association of fishery at Abune Grima 02 Kebele, age 45 Code 2, Fishery, member association of fishery at Abune Grima 01 Kebele, age 50 Code 5, and, Fishery, member association of fishery at Abune Grima 02 Kebele, age 59, Code 6

The fishermen are forced to run away to another place instead of succumbing to the released chemical wastewater that pollute the lake water.”.

Similarly, on related studies Dessie (2017), on lake Ziway has demonstrated some unwelcome changes on physical hydrology of lake on water quality. These changes are due to different water use activities putting pressure on water resource, and the effects of agrochemicals on the lake ecosystem. However, this article does not explain the consequence of community interaction and consequence of displacement. But the impact of unfriendly technological agrochemicals can have negative consequences on community peace and security (Ibid).

On related articles Asfaw (2009) explained that these waters use competition in a fragile economy has serious consequences. Seeking access to water generally for human and animal have influence on the economic security to communities and households those who are internally displaced.

Hence, there is work displacement for fishermen to different work such as assistance drivers, farmers and guard. Some are getting retired and sits at home. All these have consequences on socioeconomic life. Increased inequality on water users and non-users in accessing water is the cause of displacement for irrigation farmers. Downstream irrigation farmers are forced to change to underground water which is not affordable economically and leads to increased poverty rather than reduction.

Therefore, lack of accessibility to natural resources like water, land, and reducing fish stock are common causes for triggering water use competition and conflict. This research explores consequences on water scarcity on demand and supply of water. Competition for the purpose of earning income that is leading to water use conflict. Drinking water has exposed health-related problems, work time loss in search of clean water and has a negative impact on the economy. The impact of supply-induced scarcities of freshwater on health, agricultural productivity, and ultimately on economic development are harming the community. Water use conflict in the needs of income generation is growing. Lack of access to lake water put pressure on resource and particularly the impact of displacement on fishermen are the impact of water insecurity in this research area identified. To overcome the conflicting interests before reaching its destructive stage in accessing natural

resources with trade-off proportionally is the ideal system (Oxfam American Evolution report, 2014).

A. Livelihood insecurity

The key informants⁵⁹ noted, if there is no violence on water use conflict there will be peace and security within local people. Absence of lake water ownership use protection, free use of water has created competition and violence among the people which threaten peace and security. This weakens the relationship between development and environmental protection. At present, the situation is getting worst without protection, no rule of law procedure to use lake water and weak law enforcement. These may trigger conflict and can disturb sustainable peace and security.

One of the focus group discussion (FGDs)⁶⁰ participants explained:

“people are afraid to discuss their worries with Sher’s owners because the investors have strong relational with state water management officials. There is water usage violence at the community level among females to get water from the *Bono* pipe / common use water tap.”

Similarly, one of the member focus group discussion (FGDs)⁶¹ stated:

“fish stocks from the lake are deteriorating and displacing more people, who are dependent on the fish sector to secure their livelihood. The environmental degradation of wetlands and plant damage has affected the life of fish in the lake. There is a threat when the lake fish are killed by contaminated water in the lake. The loss of fish also has threatened employments and has created livelihood insecurity. Sometimes water use conflict is used as a political instrument. Because the inlet river brings mud and deposit it in the lake, it is feared that it would lead to desertification like like Abyata lake. At present Ziway lake water level is decreasing, which is a high concern for community livelihood in relation to peace and security.”

According to Homer-Dixon (1999), if the average water availability drops below 1,000 cubic meters, water scarcity on a significant portion of the societies will challenge serious scarcity problems. Whenever irrigated agriculture is restricted due to the dry of water point, the livelihood of residents of rural and urban

⁵⁹ Key informant: Expert community mobilization, Ziway Woreda, Water resource and design office, Code 37

⁶⁰ Focus Group discussion (FGDs): Abba Gedaa members, Private business person, age 62 Code 11 and Elder retire civil servant, age 69, code 15.

⁶¹ Focus Group discussion (FGDs) member: Fishery age 50, members of focus group discussion at Abune Girma, Kebele 01 code 5

settlements and slums often have lacking water for basic hygiene; and rural families often must walk far from their villages to find water at streams and lake. (Ibid).

Similarly, the articles of Simon, and Dorothea, (2013) explained that the implementation of water management on water use conflicts can emerge between the users of water resources over who has the right to use the resource and to exclude others from water use. For example, upstream water users may use water for irrigation, reducing the amount available for downstream users, or different user groups may fight over access to a source of drinking water in different places. The implementation of rule of law action has an effect in relation to peace and security if it is contrary to law and fair action. (Ibid).

Therefore, the impact and water insecurity are identified as triggering threat to communities in this research. The effect of water use conflict can create instability among the community due to the reduction of fish stock. The cause of water pollution, environmental degradation with use of unfriendly technological intervention and the absence of natural resource use ownership have a strong health attack effect. Environmental degradation and population growth in Ziway town are threatening water security, because they are bound to degrade the quality of life and diminish the range of options available to local water governance and communities. The control over resources has combined with severe resource degradation to threaten the livelihood of rural laborers. The water use conflict can be used as a political instrument for manipulation. Community grievance and hotel customers who use fish, vegetable and animals' products at Ziway town are not reliable on the services due to the contaminated water. The effective water use and water management is required to compensate the lives effected by the decrease in the quantity and quality of water. Community empowerment by creating attractive participation from water governing offices is the key in creating a clean environment. Wetland protected by responsible owner of water management supervisory body is needed. Peace and security can be restored through stakeholder's collaboration and contribution by safeguarding for the protection of natural resources. Community water use and management need restrictions with law and rule on the abuse of water to prevent overexploitation, pollution and degeneration of water resources.

4.4 Institutional Arrangements Response for water use compliant

The objective of this section is to describe the overall natural resource management and governance framework response for water use complains in research area. The natural resource governance system in this research context refers to the range of First-order governance (Micro level Customary), User level rules of procedures, bylaws and local convention for the common use of natural resources. And institutional arrangements and productive water use Policies and Strategies that are mandated to control and regulate natural resources of water use (local/user level).

4.4.1 First-order governance (Micro level Customary)

According to Shah and Shah, (2009) statement, Local governance is defined as the formulation and execution of collective action at the local level. To solve societal problems, people usually interact, with their organizations at the local level with first-order governing of new opportunities. Thus, the local level governance recognizes the local level zonal, district and kebele administrations set up acting as and part of the government and the community governed by its own institutions (local rules and regulations) and organizations either formal or informal/ customary (Shah and Shah, 2009).

Markelova and Swallow (2008) explained, for social and economic integration benefits and the agreement have binding effect on the local community members for the management and governance of their commons. Local community agreement as a rule on water resources – micro-level customary governance is important. As to handle disputes and conflict over natural resources, traditional systems such as Abba Gadaa of Oromo councils of elders, ‘Equb’ and ‘Edir’, are very helpful. Resource scarcity, population pressure and lack of support from the formal governance structure are the major factors of challenges that affect community bylaws. As population increases, competition over resources increases and resource users tried to break their own customary rule due to unfair treatment. *Similarly, the key informants⁶² explained, the absence of rules or unclear rules and regulations to govern the resources within the Micro-user level*

⁶² Key informants: Expert community mobilization, Ziway Woreda, Water resource and design office, Code 37, and Team leader, small irrigation farm, Rift valley small irrigation supplier at Ziway Batu Woreda office, Code 38.

is a triggering effect on the cause of water use conflict and competition. Lately there was the measure action passed on Shar Ethiopia to move its campus location 500 meter away from the lake water but the cause is pending not yet implemented. There has been no effective measure taken upon the imposed water restrictions on the claim up to present day. However, the woreda /district office has made some forum discussion without reaching certain conclusion, on water use with local community. The dynamics of water use conflict for the scarce resource (fish and wetlands) to secure livelihood and/or make a profit has increased. Theft of properties (fishing net), and irregular fishing system with the unclear boundary location is frequently occurring at Lake Ziway.

Hence, environmental natural resources scarcity, population growth pressure and lack of law enforcement are contested factor that affect water users. Competition over resources increases due to population increase with the demand of water to secure livelihood. To manage water use conflict over natural resource rule and regulation is mandatory together with customary traditional systems.

4.4.2 User level rules of procedures, bylaws and local convention for the common use of natural resources

Local communities in the rift valley depend to a great degree on a common share of water use, fish and wetlands. In previous years, natural resources were managed and governed collectively by local groups. These groups used to demark the resource boundaries, access and withdrawal rights to these resources. The community members selected local leaders and prepared rules and regulations. However, in recent times the top-down resource governance structure covers up the potential roles that could have been played by the local bylaws. Local by-laws are one of the potential means of attracting trust through the development and official sanctioning of collective choice rules (German et al. 2010).

Particularly, the Ethiopian Horticulture Producer Exporters Association has enacted a code of practice called EHPEA code of practice version 4:0, 2015 for sustainable production. An initiative resulting from the flower sector to introduce continuous professional and technical development. The main objective is monitoring and self-regulation to address market and civil society concerns for standards of environmental development and social performance guidance in the sector. EHPEA is working in trustworthy with the regulation to ensure minimum

standards, and by setting standards level such as Bronze, Silver, and Gold level. Bronze level refers to compliance of regulation no 207/2011 code of practice for the flower sector that set minimum acceptable standards to run the flower sector. Silver level refers to international recognized standards for good agriculture practice with good products in the international market, environmental protection, and responsible employment practice. Gold level set refers to higher standards and challenges beyond the sector benchmarks. Flower farm at a gold level can involve in Corporate Social responsibility, conservation of water, forest, fish etc. code of practice as to bring sustainable development for the national government (EHPEA code version 4.0, 2015).

Local bylaws can facilitate and strengthen partnerships between the natural resource governing bodies and local resource users. They can also fill an institutional gap created by the absence or weakness of federal or regional laws concerning local resource use. The failure of top-down approaches structure in the regulation and administration of natural resources has increased attention. And up till now, community by-laws are key on many governance structures that frame the access, water use, and conflict resolution in Ethiopia and elsewhere in Africa. Community bylaws in this research context stand for the binding rules and regulations enacted by the local community as ‘local convention’ or agreement with the support of kebele administrators (Markelova and Swallow,2008).

However, according to NRSWMEB 2016 impact assessment volume II noted that there is lack of bylaws among irrigation water users. It has been identified as major social and environmental problems which causes overexploitation of water resource in lake Ziway (NRSWMEB 2016)

Similarly, one of key informant⁶³ explained there have been petitions forwarded from community and local farmers on community’s water demand to official body. The community expects the right action to be taken up on fault maker. However, the concerned bodies have no reply either from Oromia regional state or Federal offices. In the past two years, the lake water is highly contaminated because of pollution. Hereafter, the town municipal administration of water

⁶³ Key informants: Expert community mobilization, Ziway Woreda, Water resource and design office, Code 37

supply for community town has changed the resource of water, even though, the supply of water is not efficient for Ziway town community.

Therefore, actions taken to resolve conflict on water use are still on the process. EHPEA code of practice version 4:0, 2015 for sustainable production are not implemented. There is claim and petition to get response from local or federal water resources offices. However, there is no reply silence from local and regional water governance offices. If the silence continuous it may trigger conflict on water use. The community may invoke law of agreement in support, to seek justice on court against major water users and polluters.

4.4.3. Institutional arrangements and productive water use Policies and Strategies

According to Oxfam American Evolution report (2014) structural institutions are necessary to carry out the policies and strategies of the water sector. While the institutional mandates of the MoWIE and MoA is dynamic in changing the regulations, their efforts are undistinguishable and lack accountability. There are several factors that have reduced the effectiveness of productive water use systems, such as unclear mandates for operation and maintenances, lack of clarity with systematic monitoring and evaluation systems on programs and strategies. And moreover, ineffective enforcement of regulations, failure to build more effective indigenous customary institutions and too much dependence on top-down approaches must continue to raise water use competition and conflict. These effects have resulted in poor management and have discouraged the actual implementation of the strategies, mostly in connection with mandate problems. Due to gaps in policy and strategy, the institution cannot respond to the issue of water use conflict. One of the key informants⁶⁴ noted, there are weak implementations of rule and regulation by water resource governing office because of divergent interest group and lack of use ownership right for Lake water. At present, the way in which the Lake water is governed and managed can be a source of conflict. Unclear jurisdictions, overlapping roles, and fragmented institutional arrangements are cause for water use conflict.

⁶⁴ Director, and senior researcher, Institute, Fish research center, code 41

Similarly, this study assessed that the discovery of institutional arrangement since 1991, which was put-in-place to address water use competition and conflict. There is a formal institution that was established by proclamation which has clearly stipulated the function and responsibility. However, most members of the focus group discussion⁶⁵ noted that there is a delay or late response from the formal institution on water use conflict from the water governance office. Moreover, it is weak and fragile with overlapping functional responsibility in the implementation of action observed by water use community's

respondents. On the other hand, there are customary institutions such as Oromo Abba Gadaa elders' council's committee, which is actively working in traditional ways to resolve civil disputes together with the formal court. Abba Gadaa is wise elderly persons who voluntarily give traditional service for the local community at the level of first-order governance (Micro level Customary). One of the services is the traditional alternative dispute resolution. Regarding bylaw Associations such as small farmers irrigation, fishers and youth are doing their work properly according to the articles of association. Most of the water resource governance believed that there is water use conflict between Lake Ziway water users. However, Ziway lake water user is not being implemented with good responsiveness to address the community complains.

Similarly, one of in-depth interviewer⁶⁶ noted it may differ in relation to the law enforcement practice at Ziway Lake. According to him, there are "lawful and unlawful fishery "activities without law enforcement in Lake Ziway whereby registered "lawful" fishery association are complaining of abuse of fishing usage system by unregistered "unlawful" private fishery, without responsive action

On related similar research article Ketema (2013) demonstrated that institutional arrangement was meant responding for complains of the local community. However, they cannot exercise properly their given power and were not effective and efficient to govern the common pool water resources at Tana lake. It only shows that "top-down and non-participatory policy formulation". Due to unclear property rights, unclear boundaries between land use and bordering kebeles and/or districts, incompatible interests of stakeholders and scarcity of resources,

⁶⁵ Focus group discussion (FGDs) Abba Gadaa members elder's council at Ziway town, Private Business person, age 62, Code 11, Elder farmer, age 75, Code 13, Elder retire civil servant, age 69, Code 15 and Local Farmer, Code 10.

⁶⁶ In depth interviewer: Fisherman age 78, Private Fishery fishing in Ziway lake, Code 52

conflict over common pool resource of water in Lake Tana sub-basin is growing (Ibid).

Similarly, on related article Reta et al (2018) stated that *Mallaqa Bishaanii* (water budgeter) in the Fentalle area which manages water acquiring are familiar practice. *Yewuha Abbat* (Father of water) in the Amhara region of north Shewa can be cited as successful customary water resources managers. They are successful in the allocation of water equitably irrespective of economic, social, and gender disparities. Moreover, *Yewuha Abbat* has a responsibility to negotiate water use conflict and representing the need of the community over water access in case water access is blocked. Its function is like WUAs which is responsible for day-to-day water allocation, distribution, conflict management, and determining priority for the users.

Moreover, one of the key informants⁶⁷. explain the practice of water management at Lake Ziway is often weak and fragile with overlapping responsibility in the implementation of activities at the local level. On the contrary, the key informant⁶⁸ stated that there is water resource proclamation but there are weak implementation problems and there is no water use directive, only customary practice implemented through Oromia state at the local level.

Hence, the Ethiopian water resource institutional arrangement legal framework are scattered at different proclamation with duplication function and late response. There is absence of integrated cooperation for responsive water use. No aggressive measure has been taken to enforce the law. Weak implemented measure action has been forwarded. To manage lake water resource are the major challenge that needs regular auditing on water use practice with due diligent. Where a large population depends on subsistence farming and lack of water access for agricultural employment can make a young person more likely to jump into criminal acts. However, the practice water use showed that the state-owned resource water of Lake Ziway has left with weak ownership use right to protect the water resources. Lack of stakeholder's coordination and weak response for community complains has created grievance and trigger conflict.

⁶⁷ Key informant: Team leader on pollution, The Federal Democratic Republic of Ethiopia Ministry of Environment, Forest and Climate Change, Addis Ababa, Code 32

⁶⁸ Key informant: Expert community mobilization, Ziway Woreda, Water resource and design office, Code 37

Customary institutional arrangement practices such as *Abba Gedaa* and Bylaw of the association are effective action takers within internal associational administration rules and customs. However, the function of customary water resources manager *Mallaqa Bishaani* (*water budgeter*) is not practiced in the study area. The function of *Mallaqa Bishaanii* (*water budgeter*) is the key to empower sustainable peace and security. This research assessed the discovery of institutional arrangement put-in-place to ensure water use competition and conflict are not strong enough to address communities demand on Ziway Lake water.

CONCLUSION AND RECOMMENDATION

5.1. Conclusion

Based on the findings obtained, the following conclusions were drawn. Water use conflict is expected strain in the everyday interaction of Ethiopia. Moreover, the socio-economic activities in the catchments of Lake Ziway is characterized by an uncontrolled resource use pattern. Demand for water resources for different purposes is increasing, exacerbating competition over and exploitation of water in the catchments of Lake Ziway.

Water misuse and the application of fertilizers and pesticides have a negative effect on sustainable development. Wastage of water by furrow irrigation, fishing with illegal instrument and fishing prohibited fish type were identified as the causes of conflict among Lake Ziway water users.

The local water users are mainly industries, small irrigation farm and livestock, Water Governance Offices like Ministry of Environmental Protection, Water Resource and Energy Design and local land contractors on small vegetables irrigation farmers, urban and rural water suppliers, fishery (lawful and unlawful), fish research center, and tourism. This study focused only on Ziway town water users, among the different types of water use actors surrounding Lake Ziway.

Conflict over water use has consequences on demand and supply of water due to the existence of multilevel actors. Still, the area needs a further assessment on creating database for water management to identify the social implication of water use allocation with related research. There are some environmentally-sustainable aspects in relation to development scenarios with the dynamics of irrigation development in respect to the undertaking of small-scale producers' initiatives and large-scale irrigation investment are expanding irrigation in the study area. This study found that increasing demand for water has pressures not only on economic development and environmental aspects but also on social interaction and health aspects of the water users.

Similarly, the study also found that water use conflict affects the peace and security in the study area, water use conflict can create instability in the community. This instability situation also may also induce insecurity. The cause of water pollution, environmental degradation with unfriendly technological intervention and absence of natural resource ownership have strong effects on peace and security. Water use conflict can be used as a political instrument for manipulation. Community grievance and hotel customers who use

fish, vegetable and animal products at Ziway town could not depend on the services due to contamination of the water. The issue calls for effective water management.

There is a traditional alternative dispute resolution mechanism in each cultural group. The institutional arrangement for water resources has been assessed. However, most respondents explain that to make a response on water use conflict from the water governance office is a late response. Water user communities were found to be weak and fragile with overlapping responsibility in implementation. On the other hand, there are customary institutions, such as Oromo *Abba Gedaa* Elders' Council, which is active in resolving civil dispute together with the formal court. Among the associations such as smallholders' irrigation that is ruled by the Law of Associations, fishers and youth are the most benefited groups. The scrutiny into water resource governance revealed water use conflict among Lake Ziway water users; and those conflicts were not managed and addressed properly. This research found that the institutional arrangement put-in-place to regulate water use competition and conflict is not strong enough to address community demand on Lake Ziway water.

Moreover, there is a petition by water users to get a response from the Water Resource Governance Office. However, the response and action from water governance officials are delayed. Instead customary institutions such as Bylaw of Water Users' Association and *Abba Gedaa* were effective in responding on local conflict. Nevertheless, climate change in combination with human activities triggered by climate related disasters have turned down the Lake size and weaken traditional methods of water resource management. The frequent changes in rainfall and water accessibility has reduced in rivers flows and in volume of lake. Additionally, there is great fear and challenge of meeting the demands of escalating population water needs for food production irrigation, domestic, municipal, and industrial water uses. Particularly, communities in rural and urban areas surrounding Ziway have affected the capabilities of areas and people that depend on scarce water supply. Consequently, different types of water use conflict over the use of scarce water resources are common in most rural and urban areas.

5.2. Recommendations

Based on the findings of the study and the conclusions drawn, the researcher recommended the following measures:

- To resolve water use competition and conflict in the Lake Ziway catchment, there is a need to organize regular stakeholders' platform for the future generation of water users. To keep a few elders as representative from the community is not effective to address the growing and dynamic need of the public. Rather, empowering the community without political interference, with active participation from stakeholders, the community is a key for water use conflict protection and for sustainable development. Doing investment with the community can create cooperation with the feeling of natural resources use and ownership among water users. The closed water management system can create a gap between different water users. For example, Sher Ethiopia Flower Investment uses a closed system of management that creates a gap with the negative attitudinal relationship among the public. To avoid such gaps, information should be open for the public as a right. Furthermore, chemical pollution of water may cause water conflict and stress on existing politics. The concerned regulatory body must take actions against polluters or fault doers. Consumption of polluted lake fish may cause health problem if people continue to eat fish at this condition. Lake Ziway fish need technological treatment to renew fish stock which threatens peace and security. There are fishermen displaced from their fishing occupation due to the reduction of fish stock. Those displaced fishermen need to be compensated for and chemical release from Sher Ethiopia must stop immediately and application of reuse wastewater technology must be introduced to all water use investment industries. To make the payment of compensation to communities' form polluter for health damage that affected during water uses. This may redress the damage property and harmonized the future peace and security.
- Law enforcement to who misuses the water as to control and regulate water use with the mandate of (federal, regional and local/user level). Regular supervision and water auditing need to be done according to Water Resources Management Regulations. Efforts should be made and water treatment and irrigation technologies, such as drip irrigation system, be introduced to reuse wastewater for farm irrigation. The efficient method of irrigation can save water shortage and improve technical labor input from the surface (flooding and furrow) to forced (sprinkler and drip). Modernizing the irrigation practice in the area is expected from large commercial investment farm in introducing friendly environmental technology to resolve wastage of water. To make legal protection for registered fishery and encourage unregistered fishery to make registration and exclude illegal fishing instruments users.

- To make community empowerment as to coordinate water use at the local level, the Federal, as well as the regional government, should be spelled out or recognize the *Abba Gedaa*'s water use conflict resolution methods, particularly on water issues during the planning stage of water resource management policy. The functions of *Mallaqa Bishaanii* (water budgeter) are important and to empower such customary institution is a key to sustain future peace and security. To make further research on water use is advisable to identify the water use problems. To enhance development water is necessary for life and power which need due regard otherwise water can be a source of violence for the coming generation.

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Appendix I

1. List of Interviewed

Data interviewed taken from Focus group discussions, Different water Governmental Sectors water Expert and Team leaders, Irrigation Investment Sectors manager and Team leader. And Private persons who use Lake Ziway for irrigations, Fishing and for home consumptions at Ziway and Adiss Ababa listed as follow;

1. Upstream at Abune around Ziway small irrigation farms Association leaders.
2. Ziway town Abageda (Yagershemagele) members.
3. Ziway lake Fishery Association different leader members.
4. Ziway town youth different Association leaders' members. Governmental office as key informant interviewer at Ziway town
5. Ethiopia water resources irrigation and Electric Minister Directorate office at Addis Ababa
6. The Federal Democratic Republic of Ethiopia Ministry of Environment, Forest and Climate Change at Addis Ababa,
7. Oromia State environmental, Forest, climate change protection officer at Addis Ababa.
8. Oromia state Water resource and design officer at, Addis Ababa
9. Oromia State office, irrigation farmers association establisher and coordinator, at Addis Ababa
10. Woreda, Water resource and design experts at Ziway.
11. Woreda, Water resource and design depute manager at Ziway
12. Woreda Rift valley small irrigation supplier team leader
13. Woreda Tourism and culture office Team leader.
14. Woreda Women and Children office Team leader.
15. Institute, Fish research center director, and senior researcher at Ziway.

Different private investment development and Community resident Ziway lake water users

16. Share Ethiopia flower investment and its employee
17. Cassel Winery farm and factory
18. Adami Tulu pectize Factory
19. Small irrigations farmer, Women and contract worker, downstream at Bulbula

Ziway.

20. Small irrigations farmers, women, and field vegetable workers upstream at Abune Ziway.
21. Public Hospital Medical director at Ziway.
22. Fishery near the lake while sailing fresh fish.
23. Fish cook near Ziway lakeshore.
24. A formal fish worker at Lake Ziway.
25. Haile hotel resort acting manager at Ziway
26. Ziway community residents water users from lake Ziawy but now from Tufa water resource, 27. Coffee makers at Ziawy street and hotel, 28. A cooked fish customer near lake Ziway shore

2. Date of data collected

Date of Pilate survey or study area observation 14 Mach 2018 –27 March 2018,

Date effected collection of data from 6 June 2018 – 31 July 2018. From 4 Focus

Group Discussions, 16 Key informants and 22 in-depth interviews

3. Profile of interviewer Table

3.1 Focus group discussion, Fishery Association Member at Abune Grima 01 & 02

No	Code	Occupation	Education	Sex	Age	Kebele	Date
1	code 1	Fishery	Grade 6	M	58	Abue Girma 01	22/06/2018
2	code 2	Fishery	Grade 8	M	45	Abue Girma 02	22/06/2018
3	code 3	Fishery	Grade 4	M	55	Abue Girma 01	22/06/2018
4	code 4	Fishery	Grade 6	M	47	Abue Girma 02	22/06/2018
5	code 5	Fishery	Grade 10	M	50	Abue Girma 01	22/06/2018
6	code 6	Fishery	Grade 8	M	59	Abue Girma 02	22/06/2018
7	Code 7	Fishery	Grade 9	M	50	Abue Girma 01	22/06/2018
8	Code 8	Fishery	Grade 8	M	59	Abue Girma 02	22/06/2018
9	code 9	Fishery	Grade 4	M	55	Abue Girma 01	22/06/2018

3.2 Abba Gadaa (Elders councils or Yeager shemagle) Focus group discussion

No	Code	Occupation	Education	Sex	Age	Kebele	Date
1	Code.10	Farmer	Grade 3	M	57	01	13/06/2018
2	Code.11	Private Business	Grade 12	M	62	02	13/06/2018
3	code 12	House mother	Grade 4	F	68	01	13/06/2018
4	code 13	Elder farmer	Grade 2	M	75	02	13/06/2018
5	code 14	Elder Farmer	Grade 6	M	71	01	13/06/2018
6	code 15	Elder retire civil servant	Grade Diploma	M	69	02	13/06/2018
7	code 16	Farmer	Grade 4	M	55	01	13/06/2018

3.3 Focus group discussion on Small irrigation farmers at Abune Girma area Upper stream water users

No	Code	Occupation	Education	Sex	Age	Kebele	Date
1	Cod 17	Irrigation farmer	Grade illiterate	M	55	Abue Girma 01	18/06/208
2	Code 18	Irrigation farmer	Grade 8	M	50	Abue Girma 01	18/06/208
3	code 19	Irrigation farmer	Grade 4	M	42	Abue Girma 01	18/06/208
4	code 20	Irrigation farmer	Grade 1	F	61	Abue Girma 01	18/06/208
5	code 21	Irrigation farmer	Grade 10	M	40	Abue Girma 01	18/06/208
6	code 22	Irrigation farmer	Grade illiterate	M	59	Abue Girma 01	18/06/208
7	code 23	Irrigation farmer	Grade 8	F	27	Abue Girma 01	18/06/208

3.4 Focus group discussion with Youth Association at Ziway Town

No	Code	Occupation	Education	Sex	Age	Kebele	Date
1	code 24	Officer	Grade 10	M	31	Ziway Kebele 01	20/06/2018
2	code 25	Team Leader	Grade Diploma	M	27	Ziway Kebele 01	20/06/2018
3	code 26	Officer	Grade 12	M	26	Ziway Kebele 01	20/06/2018
4	code 27	Coordinator	Grade 10	M	28	Ziway Kebele 01	20/06/2018
5	code 28	Coordinator	Grade 12	M	24	Ziway Kebele 01	20/06/2018
6	code 29	Accountant	Grade Diploma	F	27	Ziway Kebele 01	20/06/2018
7	code 30	Social worker	Grade Diploma	M	28	Ziway Kebele 01	20/06/2018

3.5 Key informant interviewed from different water resource governmental organization

No	Code	Occupation	Name of organization	Sex	Kebele	Date
1	code.31	Water resource Expert	Ethiopia water resources irrigation and Electric Minister Directorate office	M	Addis Ababa	17/06/2018
2	code 32	Team leader on pollution	The Federal Democratic Republic of Ethiopia Ministry of Environment, Forest and Climate Change	F	Addis Ababa	24/06/2018
3	code 33	Depute Director	Oromia State environmental, Forest, climate change protection office	M	Addis Ababa	23/06/2018
4	code 34	Section Head	Oromia state Water resource and design office	M	Addis Ababa	23/06/2018
5	code 34	Team leader	Oromia State office, irrigation farmers association establisher and coordination	M	Addis Ababa	23/06/2018
6	code 36	Deputy Administrator	Ziway Woreda, Water resource and design office	M	Ziway Town	22/06/2018
7	code 37	Expert community Mobilization	Ziway Woreda, Water resource and design office	M	Ziway Town	22/06/2018
8	code 38	Team leader, small irrigation farm	Rift valley small irrigation supplier at Ziway Batu Woreda office	M	Ziway Town	18/06/2018
9	code 39	Deputy Manager, Tourism culture.	Tourism and culture office at Ziway Batu Woreda office	M	Ziway Town	16/06/2018
10	code 40	Team leader Women and child.	Women and Children at Ziway Batu Woreda office	M	Ziway Town	18/06/2018

11	code 41	Director, and senior researcher	Institute, Fish research center	M	Ziway Town	22/06/2018
12	code 42	Medical director	Ziway town Public Hospital	M	Ziway Town	21/06/2018
13	code 43	Hospital Manager	Ziway town Public Hospital	M	Ziway Town	21/06/2018

3.6 In-depth interview from different Ziway town residence and Bulbula village

No	Code	Occupation	Name of organization	Sex	Address/Kebele	Date
1	Code 47	Women irrigation farmer at Downstream	Small irrigations at downstream women farmer	F	Bulbula Farmar Assoc. Near Ziway Town	20/06/2018
2	Code 48	Contract Irrigation farmer	Small irrigations at downstream contract worker,	M	Bulbula Farmar Assoc. Near Ziway Town	20/06/2018
3	Code 49	Irrigation women farmer age 27	Small irrigations at downstream women farmer	F	Bulbula Farmar Assoc. Near Ziway Town	20/06/2018
4	Code 50	Acting Hotel Manager	Haile resort hotel	M	Ziway Town	21/06/2018
5	Code 51	Fish cook age 56	Women Private Cook fish at Ziway lake shore	F	Ziway Town Kebele 01	17/06/2018
6	Code 52	Fishery age 78	Private Fishery fishing in Ziway lake	M	Ziway Town Kebele 01	17/06/2018
7	Code 53	Displaced fishery age 38	Private formal fish worker at lake Ziway now working at Akaka river	M	Ziway Town /AA	20/06/2018
8	Code 54	Fishery aged 67	Ziway at, Bochesa members of fishery association	M	Ziway Town Kebele 01	07/07/2018
9	Code 55	Fishery aged 58	Ziway at, Bochesa members of fishery association	M	Ziway Town Kebele 01	07/07/2018
10	Code 56	House leady aged 47	Ziway community residents water users from lake Ziway but now from Tufa water resource due to water pollution	F	Ziway Town kebele 01	19/06/2018
11	Code 57	Irrigation worker aged 23, male	Sher Ethiopia Flower Industry	M	Ziway Town kebele 01	19/06/2018
12	Code 58	House Leady/Age 62	Ziway community resident water user from Lake Ziway but not from Tufa Water Tap resource	F	Ziway Town kebele 01	19/06/2018
13	Code 59	Cooked Fish customer Age 46	Individuals near Ziway lake	M	Ziway Town kebele 01	19/06/2018

14	Code 60	Coffee maker in Hotel Ziway	Private Traditional coffee maker on Hotel	F	Ziway Town kebele 01	19/06/2018
15	Code 61	Coffee maker in tel Ziway	Private Traditional coffee maker on Hotel	F	Ziway Town kebele 01	19/06/2018
16	Code 62	Irrigation worker aged 21, Female	Sher Ethiopia Flower Industry	F	Ziway Town kebele 01	19/06/2018
17	Code 63	Cutting flower worker aged 22, Female	Sher Ethiopia Flower Industry	F	Ziway Town kebele 01	19/06/2018
18	Code 64	Group leader flower worker aged 25, Female	Sher Ethiopia Flower Industry	F	Ziway Town kebele 01	19/06/2018
19	Code65	Irrigation worker aged 19, Female	Sher Ethiopia Flower Industry	F	Ziway Town kebele 01	19/06/2018
20	Code 66	Cart driver age 52 male	Private cart driver at Ziway Town	M	Ziway Town kebele 01	19/06/2018
21	Code 67	Coffee maker on street of Ziway	Private Traditional coffee maker on the street	F	Ziway Town kebele 01	19/06/2018
22	Code 68	Organizer, integrated water use association	Oromia, Integrated water use Association office	F	Addis Ababa	31/07/2018

Appendix II

A. Focus group discussions question

1. What are your activities
2. Benefit from the water of lake Ziway? Household, Group and community level, in terms of Economic. cultural empowerment aspect
3. Is there water use competition and conflict around the Lake? If yes describe Types of competition and conflict?
4. When did competition happen? between whom there is a competition?
5. When did water conflict happen?
6. What is the cause of conflicts? What happens? Is there displacement, loss of life and property because of conflict?
7. What are the actions taken by you and a response by the concerned body?
8. Is there an institutional arrangement to regulate the activities at present and in the passing year? What were the responses for request?
9. Do this competition and conflict can a threat to peace and security?
10. What is your opinion regarding your livelihood activities on Lake water use competition and conflict?

B. Key informant questions

1. What are your organization activities and your title positions?
2. What is community benefit from the water of lake Ziway?
3. Household, Group and community level, in terms of Economic. cultural empowerment aspect?
4. Is there water use competition and conflict around the Lake? If yes describe
5. What are the Types of competition and conflict?
6. When did competition happen? between whom there is a competition?
7. How and When did water conflict happen?
8. 8. Is there any Physical of property damage to the conflict?
9. What is the cause of conflicts? What happens? Is there displacement, loss of life and property because of conflict?
10. What is the consequence of water use conflict?
11. What are the actions taken by you and a response by the concerned body?
12. Is there an institutional arrangement to regulate the activities at present and in the passing year? What were the responses for request? Are there local institutions alternative dispute settlement procedure? if yes who are they? Are they successful in resolving conflict?
13. Do this competition and conflict can a threat to peace and security?
14. What is your opinion regarding your livelihood activities on Lake water use competition and conflict?

C. In-depth interview

1. What are your professional activities Please tell me about yourself?
2. . How long you have been at Ziway town or around Lake Ziway
3. . Is there water use competition and conflict around the Lake? If yes describe
4. . When did competition happen? between whom there is the competition?
5. . How and When did water use conflict happen?
6. Is there any Physical of property damage to the conflict?
7. . What is the cause of conflicts? What happens? Is there displacement, loss of life and property because of conflict?
8. What is the consequence of water use conflict?
9. What are the actions taken by you and a response by the concerned body?

Appendix III

Ziway town population

Period of the year	09.05.1984	11.10.1994	29.05.2007	2015 projection
No of population	6585	20056	43660	64200
Growth rate result	$r_1 = 0.11137 = (11.137\%)$		$r_2 = 0.0598 = (5.98\%)$	

Source: (CSA, 1984;1994;2007;2015p) Central Statistical Agency of Ethiopia (web)

Note: Intercensal growth under the exponential growth model assumption is as follows.

Let r_1 = the intercensal growth rate from 1984 to 1994; r_2 = the intercensal growth rate from 1994 to 2007 and t_1 is time elapsed from 1984 to 1994 and t_2 is time elapsed from 1994 to 2007.

The intercensal population growth rate from 1984 to 1994 is computed as follow.

$$r_1 = \frac{1}{t} * \ln \left(\frac{p_t}{p_0} \right), r_1 = \frac{1}{t} * \ln \left(\frac{p_{1994}}{p_{1984}} \right) = r_1 = \frac{1}{10} * \ln \left(\frac{20056}{6585} \right) = \frac{1}{10} * \ln (3.0457) = 0.1 * 1.1137 = 0.11137 = (11.137\%)$$

$$r_2 = \frac{1}{t} * \ln \left(\frac{p_t}{p_0} \right), r_2 = \frac{1}{t_2} * \ln \left(\frac{p_{2007}}{p_{1994}} \right) = r_2 = \frac{1}{13} * \ln \left(\frac{43660}{20056} \right) = \frac{1}{13} * \ln (2.1769) = \frac{1}{13} * 0.7779 = 0.0598 = (5.98\%)$$

Population growth = r (Birth, Death & Migration)

Natural increase = (Birth – Death)

Source: Siegel, J.S and Swanson, D.A. (Eds) (2004). The Methods and Materials Demography, 2nd edition. Elsevier Academic Press. California, USA, 819 ppln