

UNIVERSITY OF KWAZULU-NATAL

**WATER RESOURCE MANAGEMENT IN ETHIOPIA:
THE CASE OF ADDIS ABABA**

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**WATER RESOURCE MANAGEMENT IN ETHIOPIA:
THE CASE OF ADDIS ABABA**

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DECLARATION

This dissertation was carried out in fulfilment of the requirements for the degree of Master in Geography and Environmental Management in the Discipline of Geography School of Environmental Science, University of KwaZulu-Natal, Pietermaritzburg, from February 2009 to December 2009 under the supervision of Dr. Sagie Narsiah.

This dissertation is wholly the original work of the author and has not been submitted in any form for any degree or diploma to any other University. Where use has been made of the work of others, as well as the author's work used for external publications, it is duly acknowledged in the text.

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ABSTRACT

The provision of an improved water supply service to the poor urban areas of Addis Ababa, Ethiopia is essential, given that large numbers of people living in the city have problems of access to a reliable and adequate potable water supply. Only 62% of residents receive an adequate water supply in the City. Clearly, much still needs to be done in this regard. Additionally, water resources need to be managed far more efficiently. This study examines water resource management in Ethiopia using the political ecology framework focusing on issues of equity with regard to access to safe and clean water in the poor areas of the city of Addis Ababa. The key objectives of this study are: to evaluate existing water resource management practices in Ethiopia; assess access to drinking water and; propose sustainable and social justice based management strategies to water resources in Addis Ababa. Qualitative and quantitative research techniques within a purposive sampling methodology are used in this study. The study covers water use and consumption patterns; availability and reliability of water; gender; income; monthly water expenditure and time taken to fetch water from existing sources. The results indicated that more than 37% of the sample households use less than 20 litres per person per day. Most households pay a relatively high price for drinking water with the average cost of ETB 12.87/m³, or 9.19/m³ Rands for water. The majority of households are willing to pay for a new improved water supply. However, the initial connection fee has to be in small instalments linked to their level of income. An innovative financing and cost recovery mechanism is required to increase the coverage of a reliable and safe water supply at an affordable price.

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ABBREVIATIONS AND ACRONYMS

AACA	=	Addis Ababa City Administration
AAWSA	=	Addis Ababa Water and Sewerage Authority
Birr	=	Ethiopian Currency
CSA	=	Central Statistical Agency
CFDRE	=	Constitution of Federal Democratic Republic of Ethiopia
DEAT	=	Department of Environmental Affairs and Tourism
DWAF	=	Department of Water Affairs and Forestry
DHS	=	Demographic and Health Survey
EIA	=	Environmental Impact Assessment
EWRMP	=	Ethiopian Water Resources Management Policy
EWCA	=	Ethiopian Water Works Construction Agency
FAO	=	Food and Agricultural Organization of the United Nation
FDRE	=	Federal Democratic Republic of Ethiopia
GWP	=	Global Water Partnership
Ha	=	Hectare
HH	=	Household Head
IWRM	=	Integrated Water Resources Management
LPCD	=	Litre Per Capita per Day
MFED	=	Ministry of Finance and Economic Development
MOI	=	Ministry of Information
MWR	=	Ministry of Water Resources
MDGs	=	Millennium Development Goals
NBE	=	National Bank of Ethiopia
NGO	=	Non-Governmental Organization
NEPA	=	National Environmental Protection Authority
Rand	=	South Africa Currency

SNNP = Southern Nations Nationalities and Peoples
SPSS = Statistical Package for Social Scientists

GLOSSARY/TERMS

Bega:	Dry season (October-January).
Belg:	Short rainy season (February-May).
Kifleketema:	Sub-City
Kiremt:	Long rainy season (June-September).
Kililoch:	Ethnically, and Nations and Nationalities based regions
Derg:	Military Government that Existed in Ethiopia from 1974-1991.
Kebele:	The smallest and lowest administrative unit in an urban centre.
Woredas:	Sub-district (the lowest administrative unit).

CHAPTER ONE

INTRODUCTION

1.1. Introduction

Water resources have been one of the most important areas of concern during the past three decades. Moreover, since the turn of the 20th century, the utilization of freshwater for economic purposes has been challenging (Arsano, 2007). Globally, water is an increasingly scarce resource requiring careful economic and environmental management (Department of Environmental Affairs and Tourism (DEAT), 2007). In developing countries the situation is exacerbated by rapid population growth and urbanization. As the demand for water for human use has escalated, so has the competition for water used for agriculture and industry (World Bank, 2000).

At present, sub-Saharan countries, in general, and Ethiopia in particular, are facing major challenges related to the growing competition for this precious resource. The equitable management of available water resources to meet the ever increasing needs of the growing population, industry, and agriculture is also of major concern. Agriculture is the backbone of the economy of these countries, and is rain-fed. Thus, people are at the mercy of the climatic cycle.

Ethiopia with a total area of 1.13 million km² has a total population of 73.9 million with an annual growth rate of 2.6 % (Central Statistical Agency (CSA), 2007). About 61.9 million (84%) live in rural areas while 11.9 million (16%) live in urban areas. Although the country's renewable surface and ground freshwater amounts to 122 and 2.6 billion cubic metres per annum, respectively, its distribution in terms of area and season does not give adequate opportunity for the sustainable growth of the economy (Ministry of Water Resources (MWR), 2002). Ethiopia's economy is heavily dependent on agriculture for generating employment, income and foreign currency. Agriculture accounts for 46% of GDP and 85% of employment (Ministry of Finance and Economic Development (MFED), 2002).

The increase in population, where coupled with the high dependence of the economy on agriculture, contributes to increased demand and increased competition for limited water resources. This calls for efficient management of the resource (Shewaye and Adam, 1998). Therefore, in light of the growing scarcity and competition for water resources, there are

different options for developing and using water for different uses, including food production. The options include, among others, rainwater harvesting, use of surface water and ground water, and reuse of municipal wastewater which, based on the principle of the Integrated Water Resource Management (IWRM), aims at decentralization, integration, greater reliance on pricing and cost recovery (World Bank, 1995). The demand for such resources particularly in Addis Ababa (the capital city of Ethiopia) has been increasing over time as a result of uncontrolled urbanization and the population increase resulting from natural growth, as well as rural-urban migration¹. Under such circumstances planning for efficient, equitable and sustainable water delivery systems in both the short run and long run is critical to ensure that the population receives adequate water supplies.

Studies in developing countries indicate that while 20 litres per person per day is considered adequate for domestic use (UN, 2001), in Ethiopia, the average per person water consumption varies between 10 and 20 litres per person per day in some urban areas and 3 to 4 litres per person per day in rural areas. The sanitation situation of the country is even worse². Sanitation coverage in the country is estimated at 28% (World Bank, 2005). Urban coverage is 46% and that of rural areas is 8% (MWR, 2002). As a result, three quarters of the health problems in Ethiopia are due to communicable diseases (such as diarrhoeal), which is caused by lack of access to safe and adequate water supply and unhygienic/unsanitary waste management (MWR, 2002).

According to the World Bank (2000) in order to address this problem and to achieve the necessary coverage of this basic service there is a need for the adoption of a comprehensive policy framework and treatment of water as an economic good, combined with designing a key strategy for enhancing its implementation. In this regard, taking into account water supply and sanitation services in the development of the water sector, poverty alleviation programmes are an essential step in promoting effort towards attaining the desired coverage of the services within the framework of an integrated approach to water resource management (UN, 2001). For a long time, provision of water supply and water resource

¹ The city's population has been growing at an annual rate of 2.1 percent between 1996-2004. Migration from other parts of the country and people displaced by famine and poverty has added to the increase in population (Federal Democratic Republic of Ethiopia (FDRE) and Central Statistical Agency (CSA), 2006).

² Provision of drinking water supply means the access to safe quality and quantity of drinking water to the people. Sanitation also refers to the immediate household and community need for human waste management required for private and healthy living conditions to yield a clean environment (Mehta M. & Knapp A, 2004; cited in Teshome, 2008).

development and management activities were not given adequate attention in Ethiopia. It was carried out without any policy framework. However, since 1999, due attention has been given by the Ethiopian government to address the problem of access to safe water supply and rapid socioeconomic development through better health care and productivity, and by formulating a water resources management policy.

According to the Water Resource Management policy document, the policy aims to provide impetus for the development of water supply for human and animal consumption. It focuses on key areas such as increasing the coverage, quantity, reliability and acceptable quality, taking the existing and future realities of the country into consideration. After being implemented, the policy is expected to achieve the objective of enhancing the well-being and productivity of the Ethiopian people through the provision of an adequate, reliable and clean water service that meets water users demands.

The policy envisages supplying an improved potable water service for urban areas with tariff structures that are based on "full cost recovery and self reliance", while rural water supply pricing aims only at operation and maintenance cost recovery. The aim of the full cost recovery programme is to provide incentives for proper use; reduce waste and excessive consumption of water resources. Besides, it aims to release funds for other investment programmes. The policy considers water as a social and an economic good, and it is an integrated one. Full cost recovery requires charging consumers so as to recover the full cost of project construction as well as the operation and maintenance of providing the service (Water Resources Management Policy (WRMP), 1999).

Providing potable water supply to communities costs money. Some communities can afford to pay, while others cannot. All urban dwellers pay for the potable water they consume (United Nations-World Water Assessment Programme (UN-WWAP), 2006). The principle that advocates the "user must pay" for potable water has to consider the willingness and affordability of the communities that get the water services and at the same time the cost of the water schemes. Therefore, charging consumers for water should be done carefully because if prices are set too low, revenues may not be sufficient to cover the full costs of supplying water. If, on the other hand, they are set too high, households may not be able to afford consuming the water, and again revenues will not be sufficient to cover the full cost. Therefore, to set the required tariff, water demand management and pricing are needed, since

reliable information on the ability and willingness of consumers to pay for such services is essential.

In this regard, in order to control water use and abuse, progressive tariffs or prices are used whereby higher units of consumption are charged at a higher rate (Winpenny, 1994). As a matter of principle, these water tariffs pose a dilemma: how to provide a basic service to those who are extremely poor and yet ensure cost recovery, especially in areas where the costs of water extraction and delivery are high and/or continually mounting due to pressure on the resource (Water Guide EU, 1998).

Winpenny (1994:44) contends that “for reasons of equity, public health and amenity, there is a strong case for providing a minimum amount of water at low unit prices”. According to Winpenny, for household consumption, a certain minimum volume necessary for basic needs can be provided at an affordable price, with higher-level volumes subject to higher tariffs. This will ensure that higher levels of consumption are not subsidised. Public subsidies are legitimate to achieve certain benefits (for example, provision of supplies to the underprivileged and underserved). However, these subsidies need to be transparent, targeted, and budgetary practicable and sustainable (UN, 2001).

Generally, tariff structures according to the Ethiopian Water Policy are site specific and are determined according to local circumstances (Ethiopian Water Policy, 1999). The same water policy also advocates that tariff structures (water prices) should be based on equitable and practical guidelines and criteria. The water policy states that urban water supply tariffs need to be progressive and tied to consumption amounts, while flat rate tariffs should be developed for communal services. Consistent with the application of water demand management and pricing, the Ethiopian Water Resources Management Policy strongly emphasizes that tariffs should neither be too low, leading to the abuse of its use, nor should it be too high, discouraging consumption. The parties that are involved in the decision-making process of tariff setting are obliged by law that tariffs should be set based on the circumstances prevailing in the city or towns in question. Therefore, as the supplies of clean and safe water in most of the urban centres are not available in abundance, pricing has started to operate in order to deter an extravagant and unacceptable usage of this scarce resource. It is however clear that water tariffs/prices are being used to manage demand in order to ensure efficiency and effectiveness of use.

Therefore, the implementation of the country's water supply policy should also focus on the demand side. That is, in order to implement the existing policy for the provision of water supply in urban areas of the country, the price mechanism and regulatory environment should receive the necessary attention. Besides, pricing of water is the key component of an appropriate incentive for efficiency, sustainability and accountability (Winpenny, 1994). Therefore, pricing water, if implemented and enforced fairly and equitably would generate revenues that could be used for sector improvement. There is a need to research the demand for the service. The key argument for pricing water is that it helps to understand the fundamental value the consumer places on the improved water service, so that the price that reflects both the ability and the willingness of the poor to pay for the improved water services is increased (Moriarty & Butterworth, 2003; Moriarty, Butterworth, Vankoppen and Soussan, 2004; IWMI, 2006), and as a strategy for cost recovery, can be established.

1.2. Structure of the dissertation

This dissertation has five subsequent chapters. Chapter two has two sections. The first section is a conceptual framework, and the second section deals with the literature review. The third chapter describes the methodology and study area. Chapter four describes the political ecology of water resource management in Ethiopia and provides an explanation of water development schemes at the national and local levels. Chapter five discusses the findings of this dissertation covering descriptive and qualitative analysis of the survey data. The chapter describes the historical overview of the use of water resources in relation to current policies and management practices with regard to the water resources in Addis Ababa; and the perception and general attitude of household respondents regarding water sources, water uses and consumption patterns as well as availability of water and reliability of existing water supply in relation to tariffs or cost of water. It goes on to discuss the views of the stakeholders regarding water resource management practices. The final chapter provides a summary of conclusion and recommendations of the study.

CHAPTER TWO

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

2.1 Introduction

Water is the basis of life and is a driving force for economic and social development and for poverty reduction. The provision of adequate supply of potable water in urban areas in both developed and developing countries is essential for life. For instance, in developing countries the provision of adequate potable water supply in addition to drinking and cleaning, improves health by reducing incidence of water-related illness such as diarrhoea and cholera (WHO, 1995). This also helps to reduce both mortality and morbidity rates.

Since all life depends on water, present trends of water waste and pollution threaten the earth's basic life support systems.

Already, 1.1 billion people do not have access to safe drinking water and almost 2.5 billion do not have access to adequate sanitation, by 2025 almost a third of the world's population will face water shortages and will have to divert water from irrigation and food production to household consumption, implying further underdevelopment (World Water Council, 2003; in Baris and Karadag, 2007:24).

In order to address these problems, effective management of water resources is essential for sustainable growth and poverty reduction.

Water resources have been one of the most important areas of concern during the past three decades. Since the turn of the 20th century, the utilization of fresh water for economic purposes has posed a big challenge. Arsano (2007:23) contends, "In as much as water resources are shared, the upstream and downstream users will have to agree on principles and mechanisms of water and water resource management". This would thus require that the various sectoral interests come together and are dealt with in conjunction acknowledging all major aspects of the water system, while seeking to balance the various interests involved (Arsano, 2007). The challenge is to find appropriate structures and strategies to coordinate policy, planning and implementation holistically.

2.2. Conceptual Framework

A number of empirical studies have been conducted in different countries on the issue of water resource management. Many of them dealt with specific concerns such as its relation to decentralization, community participation, involvement of the private sector, access to clean water supply and sanitation coverage. None of these studies analyse this issue holistically. Thus, acceleration in the competition of the main water uses domestic, industrial and agricultural in the cities of developing countries calls for effective and sustainable water resources management, hence, the need for a holistic approach to water resources management (GWP, 2000).

Based on the treatment of water as an economic good, combined with decentralized management and delivery structures, and with greater reliance on pricing, this research approaches the issue of equity in access to water to poor urban areas of Addis Ababa through political ecology framework. The framework tries to link the divide between human development issues and environmental concerns found in the “sustainable city” literature (Pugh, 1997).

This growing literature combines growing concerns over urban environmental devastation with the declining quality of life of the urban poor, who are most often exposed to the dysfunctional environmental features of urban processes, or what has been termed, the ‘brown’ agenda³ (Hardoy and Satterthwaite, 1997).

Rather than integrating environment and development issues, the literature perpetuates the discrete approaches to these topics by focusing on either the development issues associated with the problems of the poor, or the unsustainable patterns associated with negative human impacts on the environment (McGranahan et al., 1994:3).

According to Marvin and Laurie (1999:343), “water resources management in cities of developing countries asserted that the logic of production are based on dual circuits of supply”. The primary (Formal) circuit is operated by the government through public utility. The secondary (Informal) circuit is operated by private water traders or water vendors. Both circuits are operated within the diverse feature of the socio-economic geographical area (Montgomery, 1988). People who lived in high income areas of the city are directly connected to the formal water distribution networks. These water users tend to be supplied

³ The Brown Agenda involves the conventional environmental health agenda and includes concern for poor quality, overcrowded housing, lack of basic services, hazardous air and water pollution and unmanaged solid waste (IIED, 1999:17).

with water that is underpriced considering the infrastructure and labour expenses associated with maintenances. Generally, high quality and unlimited supplies of water operate as a form of state subsidy to formal network users. “As the formal circuit usually operates at a single rate, the low rates charged by the public utility are rarely high enough to pay for the expansion of existing infrastructure to accommodate new users. Compared to informal circuit, the quality of service and water supply is usually higher in the formal circuit” (Marvin and Laurie, 1999:344).

The informal circuit run by private water traders provides water distribution to poor urban areas of low income households, especially in rapidly urbanizing areas found at the peripheral of the city and not connected to the formal circuits of water provisions. Vendors run water supplies based on the logic of cost recovery and maximizing profit. As a result they charge much higher prices to informal water users. Those communities who are not categorized in the formal water network and fetch water from public stand-points are forced to buy water from vendors (kiosks), do not have reliable supplies and have frequent interruption (World Bank, 1993a). Black (1996:6) points out that “some urban users pay from ten to four hundred times as much for water through the informal circuit than the price paid by household users accessing private water connections”. The social and environmental costs of irregular, poor quality and expensive water supply to poor people in urban areas have been well documented in the “sustainable cities” literature (Hardoy and Satterthwaite, 1997).

“The spatial inequality of these dual circuits is broadly characterized and enforced separation, between informal and formalized systems” (Marvin and Laurie, 1999:344). Although each circuit operates under vastly different technologies, the interrelationship between formal and informal circuits is dependent on social relations that institutionalize unequal access to water resources (Swyngedouw, 1997). For instance, the enormous costs associated with extending bulk infrastructure force the public utility to depend on the informal sector to service areas that the state cannot reach. In return for providing a service to the state, informal water traders get subsidized rates for purchasing water. This subsidy is, however, rarely reflected in prices charged to the poor by water vendors (Hardoy and Satterthwaite, 1997). In general, the contradictions of supply-side management of water resources are well articulated by Marvin and Laurie (1999).

One of the main problems in water supply provision in cities in Africa is the inability of municipal governments and public utilities to deliver and maintain basic infrastructure services for their growing populations (Carter et al., 1999). The traditional supply orientation of governments has tended to produce an overemphasis on facilities rather than a focus on services and emphasis on public sector provision rather than on effective approaches to complementary partnerships (Manikutty, 1998). The effects of this are most severely felt in low-income urban areas which often remain outside the reach of basic municipal services. The result is an increased burden of health care, a lowering of the quality of urban life and reduced urban productivity (Jaglin, 2002).

Literature on sustainable cities discuss that the health implications of poor urban water supply and inadequate sanitation (WHO, 1993, 1995). Examining water-management issues at the state-level, in terms of regional administration, are an important first step in understanding how power relations shape the production and consumption of water at the city-level. High population growth, increase in the rate of migration and greatly accelerated industrial and residential expansion have rapidly increased for many developing countries the demand of water supplies (Gilbert, 1992). These may also have an impact not only on the social and economic situations but also on the situation of the available water resources of the city. “Depending on grant and finance for capital expenditures, the supply-based orientation of public services has been criticized for failing to recover costs, resulting in the lack of finance for operations and maintenance” (Jackson, 1997: 3).

2.2.1. Economic value and allocation of water

A sense of the economic value of water implies the attachment of different values to different uses of water. These values will vary from setting to setting as decided by the community, although it is invariably the case that survival and public health uses will be high-value uses; whereas recreational uses will be comparatively lower-value (Easter et al., 1997). For instance, “the physical features of the country of Ethiopia are composed of highlands, plateaus and lowlands; the highlands are mostly associated with high rainfall, several springs, lakes, streams and rivers” (MWR, 2003: 36). Because there is plenty of water in the highlands, people do not value water very much. In the lowland areas, where water is scarce; people give more value to water.

According to Easter et al., (1997), where water is becoming scarce, it is desirable to discourage low-value uses. Where users have entrenched rights to water supply, reallocation is only possible if they can be encouraged to sell some of their water to others presumably for higher-value purposes (Winpenny, 1994). The possibility of reallocating water to high-value purposes should be investigated as an alternative to, or in parallel with, developing new sources of supply; in this context the use of water markets can be appropriate. Others however, argue that the introduction of water marketing and pricing would violate human rights (Bakker, 2001). Bakker (2001:154) further points out that “Rather than being driven by social equity goals which focus on the payment capacity of the population, the market reflects economic equity criteria. Because of the cost, poor users will be discouraged from using water for necessary basic needs”; what Narsiah (2010:15) terms “the market becomes the regulator of human rights. The recognition of human rights is thus determined by the ability to pay (i.e.) human rights are determined in economic terms”. Despite the fact that the “allocation of values to water uses helps in the following areas: balancing scarce resources with increasing demand; the reduction of wastage and loss, conservation of the resource, and shifts in consumption towards higher value uses” (Water Guide EU, 1998:49).

In order to have sound management of water resources there is a need to embody the concept of equity and give priority to the satisfaction of basic needs. It is imperative that existing facilities be utilised and maintained to the optimum, so that water losses are minimised and available supply capacities are fully used (World Bank, 2000). In this regard, it is essential to carry out integrated water resources management. The water policy issued by the Ethiopian Government in 1999, when fully implemented, creates an enabling environment for water resources development and allocation among competing demands. In meeting this policy’s clear stipulation that water has to be considered both as an economic and social good, pricing of water has to be geared in order to promote economic efficiency, social equity and ecological sustainability (World Bank, 2000).

In this regard, the proper pricing of water is one way of resolving a number of problems in the sector. The proper pricing of water will (1) result to more efficient allocation of water; (2) encourage conservation of water; and (3) greater efforts in the part of suppliers to reduce non-revenue water (Water Guide EU, 1998). Pricing water, if implemented and enforced fairly and equitably, would generate revenues that could be used for sector improvement.

The most important role of water valuation relates to demand management and better allocation of water among the various uses. The value of water depends on its quantity, quality, location, access reliability and time of availability. Valuing water is linking the concern that water uses must be able to meet different social, economic and environmental functions.

Water resource development and management strategies can be viewed in terms of economic and non-economic measures. Pricing policy and allocation of property rights over the use of water is considered economic measures in demand-oriented approach. Whereas the use of regulations to control water demand, promotion of public awareness about the importance of water, reduction of reticulation and other losses of water production, and the use of water efficiently in a sustainable manner are included in non-economic measures. Economic measures have been applied in Ethiopia in order to promote the allocative efficiency of the use of water. For example, pricing policy has been applied to a smaller extent in urban areas.

The Ethiopian government developed a comprehensive National Water Management Development (2000) strategy that shows more commitment to the use of non-economic measures of water demand management than the previous supply-oriented plan. It suggests that the use of water tariffs to reduce water demand must be complemented by educational campaigns on water conservation and the use of water saving technologies (MWR, 1999).

The fundamental aim of an economic approach to fresh water management is the efficient use of the available water resources at a given time and under given environmental conditions (Figueres et al., 2003). The economic management of catchment water resources can best take place at a basin-wide, sub-basin or regional level. Recent reviews of the basin-wide approach designed primarily on hydro-geological rather than administrative boundaries, could provide the basis for pursuing an integrated approach to water resource management and for solving regional and sectoral conflicts (Easter, 1999). This economic approach could spark the beginning of new institutional arrangements that provide water users incentives to manage their catchment water resources. This, however, presupposes water resources must be treated as an economic and social good between the upper and downstream water users. Under the neoliberal umbrella, the Cold War period, Hirshleifer et al. (1969: 2) underscored the appropriation of water as a commodity and, just like other goods, societies need it in order to satisfy the needs of their members. The basis for the economic argument is that water has

an economic value and therefore is a commodity that must be bought and sold as any other commodity. It is further asserted that full cost recovery and business principles became the guiding principles of service delivery. “This is indicative of the organisational and institutional restructuring under a neoliberal regime” (Narsiah, 2010:17).

The proponents of water economics explain that water scarcity could easily be solved with market instruments because it is a renewable and reusable resource. They explain that there is more than enough water worldwide. According to them, the challenge is a question of spatial and temporal distribution. Overcoming this challenge depends largely on the willingness of the people (especially the state and other actors) to use water resources economically.

2.3. Political Ecology

This section discusses how and the ways in which a political ecology framework is used to examine the relationships between the water policy objectives adopted by the government and the outcomes at the local level. The dominant discourse in water resource management draws heavily on the economic and social aspects of development. It focuses on access to and the control of water resources for human use. It also places emphasis on the majority of poor people in developing countries like Ethiopia who do not have access to clean and safe drinking water.

Perhaps the most important line of recent social scientific thinking about environment and development is “political ecology.” “The origins of the term are found in the early work of the anthropologist, Eric Wolf (1972), when it emerged as a response to the theoretical need to integrate land-use practice with local-global political economy” (Peet and Watts, 1996:4) and a reaction to the growing politicization of the environment (Cockburn and Ridgeway 1979; cited in Peet and Watts, 1996). Political ecology, subsequently, became an analytical framework in the study of how political, economic, and social factors affect environmental issues.

The majority of studies analyze the influence that society, state, corporate, and transnational powers have on environmental problems and influence environmental policy (Peet and Watts, 1996). There are many approaches to these issues, and some scholars give weight to the role that access to natural resources plays in structuring political and economic life: particularly

how land degradation, freshwater resource deterioration, and deforestation shape a range of social relations and political struggles (Bryant, 1992).

Subsequently, the majority of scholars of political ecology are drawn from the academic disciplines of anthropology, geography and history (Atkinson, 1991). Its articulation in studying the intersection between environment, political economy and cultural ecology is perhaps most closely associated with the work of Blaikie (1985) and Blaikie and Brookfield (1987). In their view, political ecology combines the concerns of ecology with “a broadly defined political economy” (1987:17). Accordingly, environmental problems in the Third World, for example, are seen as less a problem of poor management, overpopulation, as of social action and political-economic constraints. Standing at the centre of the above scholars political ecology is the “land manager” whose relationship to nature must be considered in “a historical, political and economic context” (Blaikie and Brookfield, 1987: 239).

Thus, Peet and Watts (1996) point out that political ecology can be perceived as an interdisciplinary approach to the study of humans and their environments incorporating studies from geography, sociology, economics, history, political science and anthropology (Watts, 1983; in Peet and Watts, 1996). It brings together political, economic, environmental and socio-cultural issues. No single predominant definition of the term exists but Bryant and Bailey (1997) describe it as an inquiry into the political sources, conditions and ramifications of environmental change.

The political, social, economic and environmental facets are used to locate the actors in the Ethiopian water sector in their multiscale situations where they interact at multiple levels of decision-making, from the community to the national scale. In Ethiopia, the official documents and legal frameworks increasingly view water as a scarce commodity (as an economic good) shifting from the previous social good concept. This shift is conspicuously placed in the Dublin Principles, the World Water Council and Global Water Partnership documents (Ministry of Water Resources (MWR), 2001a).

The government of Ethiopia showed its political commitment to changing the existing lower coverage of water supply and sanitation by providing an enabling environment and introducing a water resource policy in 1999, a water resource strategy in 2001, a water sector development programme in 2002, a water supply and sanitation master plan in 2003 and a

Universal Access Programme (UAP) in 2005. The government target aims to increase access to improved water supply to 84 percent and access to improved sanitation to 80 percent by 2010. Moreover, the UAP is expected to achieve 100 percent sanitation and 98 percent drinking water supply in the rural area at the end of 2012. In terms of the urban areas, coverage is expected to increase from 80 percent water supply and 51 percent sanitation to 100 percent at the end of the planned year for both water supply and sanitation (Teshome, 2008). Various experts in the water sector believe that as things stand now the current rate of urban water supply development will at best merely be keeping up with the population increase. The percentage of the Ethiopian population with access to safe and clean drinking water remains almost stagnant below 65 percent overall. In urban areas it is 94 percent, and 56 percent in rural areas (CSA and ORC, 2005).

The establishment of a legal institutional framework on shared water resources is essential, because upstream and downstream water users will have a guarantee to use the water efficiently. The existence of such an institution like the catchment of the Akakai River has an essential effect on enforcement, water allocation mechanisms, and achieving better water resource management. In a country, specific principles pertaining to the use of national water should be consistent with those principles widely accepted to apply internationally (United Nation, 1992a). Therefore, countries have developed their own specific ways of solving the issues of planning, developing, allocating, distributing and protecting water resources. Upstream and downstream users in the river catchment must agree to the water rights definition with the respective states. In Ethiopia all water is the common property of the people and the state. The state has a responsibility to allocate users rights or permits.

The recent interest for establishing legal rules for managing water utilization in watershed management must be looked at in terms of its political foundations. Political ecology helps to understand how the issues of different actors in the global system shape the way ideas (science) are formulated and leveraged toward particular ends (Agrawal and Gibson, 1999). This notion is also similar and compatible in the context of the watershed domain, where multiple actors see in the approach a means to accomplish disparate objectives. This has brought multiple actors towards a different outlook on watersheds. In this regard it is viewed differently by various actors. For instance, for the water resource sector and policy-makers, it is seen as a means for enhancing environmental services and public goods emanating from upper catchments for the society at large (FAO, 2000). Among social scientists and others,

watershed management is seen as a framework for enhancing collective action and equity in natural resource access and governance, or livelihood problems that cannot be solved at the level of the farm or household (Meinzen-Dick, Knox, Place and Swallow, 2002).

The political ecology of watershed management needs to be understood. In terms of who benefits and whose agendas are furthered by the approach is for whom? clarification of the intended beneficiaries, whether local users, society at large or diverse external stakeholders, is needed to define everything from political ecology of watershed management objectives to watershed boundaries, stakeholders and methods. If implemented for the benefit of local users, for example, boundaries can be defined by the issue at hand –whether inscribed within a set of contiguous farms, the micro-catchment at other spatial scales. If the aim is water provision for society at large, then boundaries become the basin (Hinchcliffe, Guijt, Pretty and Shah, 1995). So this approach is relevant for the Akaki river catchment of Addis Ababa to be integrated within natural and social systems that aim at providing sufficient water for the society at large. It is therefore essential that this approach operates within the Akaki river catchment since boundaries become the basin.

According to Pottinger (1999: 9) “a catchment (or watershed) is an area of land from which all water drains into a common river, stream, lake, wetland or estuary. It includes a geographic community of humans, plants and animals, as well as all non-living things such as buildings, roads and geological formations. Catchments come in all sizes, and large ones contain many smaller ones. All land on earth belongs to a catchment.”

IUCN (2000) argued that catchment boundaries do not necessarily coincide with social and political boundaries. Given the threats of human activities to river catchment as well as the possibility of conflict over shared water resources and administrative (or political) boundaries, it is important that an integrated approach to catchment of up and downstream users be used. In Ethiopia the need to develop a method of integrated river basin approach has been recognized. This is evident given the provisions in the Ethiopian Water Resource Management Policy (1999) responsible for legislation with regard to the utilization and protection of water resources as well as the sustainable management and allocation of water between regional governments. Within the emerging framework of demand responsive approaches, the role of government is changing from service provision to facilitating and providing an enabling environment (UN-WWAP, 2006).

Decisions concerning water resources management should be made at the lowest appropriate level, which means adopting the principle related to the decentralization model. The rationale behind decentralized water resources development and management is to change from a centralized (supply-oriented) type of management system to a decentralized, flexible, demand-oriented way of doing things (Roberts, 1975). The World Bank is the leading institution that induced this trend in the Third World. It can be argued that legal and institutional frameworks are essential for guiding and regulating up and down-stream cooperation over the utilization of shared water resources. Without clearly a legal/institutional framework the utilization and management of available water resources and their proper development is elusive (Arsano, 2007). Therefore, this approach argues that a community of interests in the catchments will have to be established through a holistic approach and on the basis of the accepted fundamental water resources management policy introduced in 1999 by government of Ethiopia, and issued in 2000.

2.4. Water Resources Management

Water resource management involves a great variety of actors interacting in numerous ways and at diverse levels. According to the World Bank (1995) policy paper, “Water resource management that follows the principles of comprehensive analysis, opportunity cost pricing, decentralization, stakeholder participation, and environmental protection and investments across sectors, promote conservation, and improve the efficiency of water allocation” (World Bank, 1995:27). Integrated Water Resources Management (IWRM) is concerned with the management of water resources, demand and supply (Global Water Partnership (GWP), 2000). In this regard, it is possible to achieve sustainable water resource use through a holistic multi-disciplinary approach. “The need for IWRM arises from regular interactions, uses and interests of interdependent groups that converge around a uniform whole” (GWP, 2000:17). Integration ensures respect and consideration of the needs and interests of each stakeholder. The challenge is to regulate water resources use to ensure sustainable and equitable use among various groups.

The general objective of IWRM is to promote in an environmentally sound, equitable and sustainable manner the utilization and development of water resources. At the international Conference on Water and Environment held in Dublin January (UN, 1992b) also recognized the importance of IWRM and proposed that direct attention should be paid to the following six areas. These were namely the following:

- Integrated water resources development and management
- Water resources assessment, and protection of water resources
- Water quality and aquatic ecosystems
- Drinking water supply and sanitation
- Water and sustainable urban development, and
- Water for sustainable food production and rural development.

In the absence of the proper management of water, conflicts within countries often arise from competing water uses, and from overlapping and competing jurisdictional mandates of agencies dealing with water issues (Yilma and Donkor, 1997). An integrated approach has therefore important institutional dimensions that would help to avoid conflicts related to water management. Continuing water scarcity that is experienced in most sub-Saharan countries necessitates the adoption of IWRM approaches (UNFPA, 1999).

In these premises the integrated approach to dealing with them is critical. Integrated Water Resource Management (IWRM) is attempting to meet all interests of various stakeholders and to coordinate them. Department of Water Affairs and Forestry (DWAF) (1996: 18) stated that:

The conceptual basis of integrated catchment management relies on recognition that the different components of the hydrological cycle are intimately linked to one another and each component is affected by changes in every other component. Therefore, they cannot be managed effectively as separate or disconnected units.

DWAF (1996) further states that the sustainable management of the water resources of a catchment becomes increasingly difficult if there is a fragmentation of institutional, political and administrative boundaries within the catchment. Therefore, the integrated nature of social and environmental systems calls for an integrated approach to management of these systems (Berkes and Folke, 1998).

Given that Ethiopia is a developing country it is useful to review the important case study of Indian experiences regarding water resource management. Watershed management approach came into prominence in India during 1980s and 1990s as a result of the recognition of the link between environmental degradation and poverty. There is recognition in India that ‘Water knows no boundary’ and watersheds have no social or political boundaries.

The water resources planners of a region must ignore the political boundary to harness and explore the resources in an integrated manner, making sure that it strikes a balance between the drinking, agricultural, fisheries, navigational and environmental needs, not only for the nation, but most optimally for the region (Ahmad, 2003:181).

Therefore, water resources in the watershed should be managed in a holistic manner. Projects in watershed management now have ultimately been linked to the sustainable development framework of local level focus. The guidelines issued by the Indian government under the Ministry of Rural Areas and Employment (MRAE) in 1994 cover four government watershed management programmes and outline the procedure for implementation by changing the water sector planning from a top-down technocratic approach to a bottom-up grassroots approach. The goal is to establish a participatory water management environment with establishment of institutional structures at all levels to monitor the functions of the programmes. The guidelines emphasises local participation in the design and implementation of the programmes (Baumann, 1998). The holistic and participatory approach to catchment management developed in India is important and very relevant to the Ethiopian water resource management context.

Given that decentralization is an important issue in the management of Ethiopian water resources, cognizance needs to be taken of the Indian approach. In this regard, there is a need for the establishment and maintenance of appropriate institutional structures for the management of resources. It is argued that water resource management entails not only an understanding of issues pertaining directly to standing and flowing water, but also an understanding of issues pertaining to the management of the entire catchment. Therefore, the IWRM approach argues that there is a fragmentary approach to water resources management and is one of the challenges hindering water resource development in Ethiopia. For this issue the best solution is a holistic approach to integrated water resources management.

2.4.1. Economic use of water

The economic management of water is possible within the catchment of the river system of Addis Ababa. One way of water management is that of recycling, using markets for water quantity allocation or quality renewal. Until recently, water utilization and management in the Ethiopia River basin has been far from a basin-wide approach. Water development strategies were not coordinated. However, Integrated Water Resources Management (IWRM) is emphasized in the policy document and thus the policy recognizes the hydrologic boundary

or basin as the fundamental planning unit and water resources management domain. Increasingly, the river basin is emerging as a unit of management of land, water and other natural resources in an integrated fashion. Besides, since 1999 due attention has been given to alleviate the problem of access to safe water supply and achieve rapid socioeconomic development through better health care and productivity by formulating a water resources management policy.

The acceleration in the competition of the main water uses: domestic, industrial and agricultural, calls for effective and sustainable water resources management. Hence, the need for a holistic approach to water resources management. The government of Ethiopia has developed a comprehensive National Water Strategy, and goes a long way to meeting the criteria of rational decision-making based on the principles of Integrated Water Resource Management as discussed at the Dublin conference. Among others, the strategy emphasises strategic issues under general water resource management, and a detailed elaboration of issues relating to water supply and sanitation, hydropower development, and irrigation development within the context of integrated water resource management from a basin perspective (MWR, 2001a).

Most of the established projects have been sector oriented and as a result there is a conflict of interest between the different water users. Projects are often plagued by the lack of a cohesive approach. For example, The Koka dam, Tis Abay Dam and Melka-Wakena Dam were originally planned and designed for a single purpose that is to generate power to meet the increasing need for electricity. However, these dams have become useful to regulate the high flood season and supply water for the downstream irrigated land and water supply for downstream towns and villages after they generate electricity.

There is growing recognition that planning considerations extend far beyond the interest of single purpose projects. The government of Ethiopia has increasingly been recognized that water resources management viewed from basin-wide perspective. From the state water development policy point of view, it seems that the integrated river basin approach is being accentuated to a significant degree (Arsano, 2007). Effective river basin management is essential for sustainable growth and poverty reduction; to protect loss of ecosystem and biodiversity; to reduce loss of life from floods; and to provide improved drinking water services for local communities (UN-WWAP, 2006). This results in creating strong inter-

sectoral allocation of water that enable sufficient supplies for irrigation, hydro-electric, municipal water supply and ecosystem maintenance. For example, the Fincha dam in addition to generating hydroelectric power is also designed to serve irrigation purposes for production of sugar cane which is essential for the Fincha sugar industry. The other important example is the Gilgel Gibe project. The government is being made an attempt to develop additional Hydro-Electric Power (HEP) project along Omo River. Such attempts include the development of Gilgel Gibe HEP Project which has led to the construction of three phases of dam generation of 2474 Mega Watt (MW) along Omo River in the Southern Ethiopia.

The Gilgel Gibe project level I produces 184 MW (completed) and level II produces 420 MW and is close to be completed while level III is under construction. When completed, it is estimated that 1870 Mega Watt of power can be produced, which is expected to supply power beyond the demands of the country and for regional countries, such as Kenya, Sudan, and Djibouti (The Reporter, 2009). This is evidence of integrating water resource development and management in the context of the economic use of water resources in a regional context. They need to be viewed at the river basin level. Hence, they are multipurpose development in nature, providing many benefits associated with human well-being such as a secure water supply, irrigation for food production, hydroelectric generation, flood control and watershed management. The hydropower potential of these reservoir sites is the most significant aspects of water resource development in Ethiopia, since per-capita energy consumption and access to safe water supply in Africa is among the lowest in the world (The Reporter, 2009). Recent advances in integrated water resource management are appreciated from a basin perspective, especially for the economic use of water.

2.4.2. Water-demand approach

This approach has been included here in order to assess its usefulness in explaining issues of water use and management and to illustrate the shift to a demand-side approach. Furthermore, it shows how the path towards increased private sector participation in the delivery of public services has entered the discourse of water supply and development.

The conventional paradigm of water/wastewater management has been characterized as supply-driven, centralized and large-scale. This approach has led to the over-exploitation and depletion of renewable water resources, the mining of non-renewable groundwater resources and the deterioration of water supplies (Rahmato, 1999).

After a series of micro-level studies examined the weaknesses of the productionist logic of supply-side management in the 1980s, the World Bank became a leading agent in shifting the discourse to demand-oriented management (Gulyani, 2000). In contrast with the supply-side approach, a demand-oriented logic takes into account the value of water in relation to its cost of provision, and introduces measures to relate their usage more closely to those costs. It entails treating water more like a commodity, as opposed to an automatic public service (Winpenny, 1994). It focuses on variations in the volume and pattern of water use by individuals, households, farmers and industry and aims to ensure that a given supply of water is distributed to accord closely with its 'optimal' use pattern.

Another area of criticism of the supply-side approach came from the voluntary sector. NGOs increasingly argued that users should be involved in the management of water and sanitation networks. Marvin and Laurie (1999:345) point out that "a series of projects revealed that NGOs were capable of playing intermediary roles between formal water networks and community-based organizations by facilitating the legal and institutional context of self-help schemes". Finally, environmentalists provided another critique by pointing to the environmental impacts of large-scale water projects, as well as the tremendous waste of water due to leaks in poorly maintained urban infrastructure. One of the best known examples is "The desiccation of the Aral Sea in Central Asia; the Sea has shrunk to a fraction of its former volume, depth and area, causing a collapse of the fishing industry, dust storms, and widespread salt deposition" (Frederick, 1991, in Winpenny, 1994:4). Urban ecologists in particular have developed numerous methods of making water-systems more resource-efficient through design techniques that can reuse waste water by reintegrating it back into the energy cycle of the city (Hough, 1995).

As a result of these criticisms, many governments in developing countries embraced a new set of conditionality in order to secure external support for the reform of water utilities. These involve: removal of subsidies and implementing pricing and other regulatory measures to limit the demand for water and to channel its use to the most productive economic sectors; institution of decentralized management with greater stakeholder participation and responsibilities; promotion of an integrated approach to water management both ecologically through a focus on river basin/catchment management, as well as across economic sectors and ministries; recognition and protection of the rights of the environment itself to water; and increased social equity in access to water and voice in water-related institutions. "There was

also private involvement in the provision of water services; and increased consideration given to smaller-scale water projects that caters to demand-oriented technologies” (Marvin and Laurie, 1999: 347).

The previous focus on supply-side dynamics - particularly state provision of infrastructure such as dams, irrigation schemes, and potable water and sanitation facilities - is being replaced by a demand-side orientation. The demand-oriented discourse has thus become concurrent with a shift in funding styles that moves away from large infrastructure projects to focusing on administrative streamlining so as to enhance the institutional capacity of water providers in cities (World Bank, 1996). This is in line with some recent thinking that calls for participatory water demand approach (Carter, Tyrrel and Howsam, 1999). This approach encourages communities to define their own needs for water. This is surely incompatible with the supply-side structure of the provision of water services top-down. The result of this policy shift has been greater promotion of private sector participation in water provision. “By promoting a demand-driven approach entailing the removal of cross-subsidies and levying of user-fees, the private sector motto is that user charges can recover full costs, improve service delivery and reliability, while expanding services to cover a greater number of people, namely the poor” (Gulyani, 2000: 9). In this regard, Narsiah (2008:22) points out that,

The private sector is viewed as the most efficient provider of goods and services to society. But this view is the product of a historically constituted discourse – the collapse of the Keynesian state intervention approaches of the post-Second World War era and its supplanting by the conservative monetarist school. Privatisation is thus a discursive strategy aimed at constructing a subjective reality.

The demand-oriented approach depends, however, on few problematic assumptions.

The attempt to move towards a more flexible mode of delivery, be it household tap or a community stand-pipe for meeting the diverse demands of unconnected water-users rests on a crucial variable, the price people are willing to pay for water (Gulyani, 2000: 12).

The private sector involvement in water provision is often perceived by a cash-strapped public sector for its technical capacity to provide demand-led, smaller-scale technologies in service provision. “It is believed that this smaller-scale technology can deliver services more quickly; as a result, people should have access to simple, cheap and environmentally friendly water technologies” (Rahmato, 1999:28). Yet the involvement of the private sector often leads to weeding out state subsidies which enables access to water for low-income

households. Thus, the policy move to private sector involvement threatens to further marginalize low income households. Laurie and Crespo (2007:853) refer to this as,

Access to and use of water is a human right; water, firstly is a social and cultural good, and not an economic good; water belongs to earth and all living beings, including humans; water management must be public, social, communitarian, participative, equitative, and not profits seeking; Water must be excluded from all free trade agreements.

As water is vital to life, people will always be willing to pay user fees in order to access water. However, if user fees for water tend to absorb disproportionate amounts of household incomes, in previously marginalized communities, the privatization of water will only serve to further exacerbate existing trends of power differences between various people and/or communities.

“In contrast to the public sector monopoly of water utilities that, ultimately, aims for universal access, private sector suppliers rely on a narrower financial cost-benefit analysis geared towards cost-recovery and maximizing profit in a market setting” (Taylor, 2004:16). This approach however, neglects the negative externalities that stem from excluding access to those who are unable to pay fees for water. Moreover, “the new approach extends to management through ‘degoverning’ that is using the market as a mechanism of governance through privatization and commodification of public goods” (Narsiah, 2010:14). Hence, the social costs of poor public health resulting from denying low-income communities access to a vital resource, such as clean drinking water begin with higher infant mortality rates, and increased household illness (WHO, 1995). In the context of Ethiopia, such negative externalities serve to reproduce poor living conditions (poverty). In short, the basic ethical question of water provision is altogether absent in the “cost-effective” ideology of the private sector. This is evidenced in Ethiopia where various organisations have been involved in the provision of water supply both in urban and rural areas over the years to increase access figures through a multitude of programmes and projects within humanitarian and ecological movements but the shortfalls continue.

The move from supply-side management to a demand-oriented approach asserted that the government should not be involved in providing public services and it should provide the enabling environment to encourage user participation and management in service delivery (Bromley, 1995). In this regard, Narsiah (2010:10) points out that:

The new economic framework is discursively linked to a broader neoliberal logic which, in the water sector, is informed by the following key principles: water resources should be treated as an economic good and should be freely traded on the market; water should be provided by the private sector because the private sector is more efficient than the public sector; state intervention should be minimized with water services self regulating through market mechanisms; the water sector must be open to competition and regulation facilitating competition must be implemented by the state; users of water become consumers and customers of the private sector.

Consequently, NGOs and private enterprise will have to play a more active role. The responsibility of the state will then have to be to create the enabling environment for greater NGO and private sector interventions. Small, user-managed schemes work best if there is no state intervention or if such intervention is kept to a minimum (Rahmato, 1999). The state should focus on providing needed services such as credit and finance and on building up basic infrastructure. Bromley, (1995) points out that, “it is a shift away from the state using a distributive justice framework synonymous with welfare’s orientation, to a procedural notion of justice which adopts a policy of market environmentalism” (Bromley, 1995:46) aimed at ensuring a more ‘efficient’ allocation of scarce resources. Market environmentalism basically argues that human use of resources is better organized by market prices in the form of charges than by direct government control (Beckerman, 1994).

The predominant discourse on water management draws heavily on the economic and social aspects of development. It focuses on access to and the control of water resources for human use. The dominant discourse emphasised in Ethiopia, in particular, which has had a long history of weak water resource management and development, and where access to clean and safe drinking water and water for livelihoods is a major concern, users participation and management in the water development schemes should be justified on the grounds of increased social and economic benefits. In the Ethiopian context, therefore, the demand-oriented approach for water programmes is much more meaningful than the narrower supply-oriented criteria noted above (Rahmato, 1999).

2.5. Water resource management at the global scale

“Freshwater resources around the world have been over used, polluted, fought over and squandered, with little regard for the human and ecological consequences” (Glieck, 1998: ix). Unsustainable use of water is the order of the day throughout the globe. Conflicts over scarce water are mounting. Dramatic drops in the water table as well as the seasonal drying up of large rivers before reaching the sea are signs of the unsustainable use creating havoc for millions of people.

Glieck (1998: 574) defines the sustainable use of water as “the use of water that supports the ability of human society to endure and flourish into the indefinite future without undermining the integrity of the hydrological cycle or the ecological system that depends on it”. However, the layers of complexity that underpin that definition can be found in the diversity of human society, which is divided by political, social, cultural and economic boundaries.

According to the United Nations Water Conference (1977:127) “all peoples, whatever their stage of development and their social and economic conditions, have the right to have access to drinking water in quantities and of a quality equal to their basic needs” (UN,1977 cited in Gordon et al., 1994: 127). It is also recognized that human excreta and sewage are important causes of the deterioration of water quality in developing countries, and the introduction of available technologies, including appropriate technologies, and the construction of sewage treatment facilities could bring significant improvement (McGranahan and Satterthwaite, 2004).

During the past few years there has been an increasing realisation of the importance of water management in the continuing well-being and development of the developing countries, especially those located in the arid and semi-arid regions (UN, 2001). Furthermore planners and decision-makers have started to realize the critical importance of efficient water management for the sustainable development of their countries.

While water covers some 70% of the planet’s surface, less than 3% of this is freshwater (Samson and Charrier, 1997). Much of the world’s freshwater resources are frozen in the polar ice caps or deep underground (Biswas, 1991). Surprisingly, in most parts of the world availability and quality of freshwater is taken for granted. “Without being overly alarmist, figures and trends appear to indicate otherwise; serious questions relating to global freshwater

quantity and quality are rapidly emerging-apparently unknown to the general public and authorities in general” (Falkenmark, 1994:16).

New sources of water are becoming scarce, more expensive to develop, and requiring more expertise and technological knowhow for planning, design and implementation (Anderson, 1998). Accordingly, water can no longer be considered a cheap resource, which can be used, abused, or squandered without much consequence for mankind’s future.

Currently, water is considered a critical resource for the survival of the arid and semi-arid countries. Political tension between neighbouring countries over the use of international rivers may escalate to the point of war during the early part of the Twenty-First Century (Biswas, 1991). Especially in areas where water supplies are already scarce and conflicts of sharing the international water supplies already exist (example, The Jordan Valley, the Nile, the Tigris and the Euphrates), there is also a danger of conflict over water which may lead to future wars to control the water in the region (Global Water Partnership, 2000; Giordano and Wolf, 2003; Clausen, 2004; Cai, Ringler and Rosegrant, 2006).

The world’s population is increasing steadily. Consequently, water requirements for domestic, agriculture and industrial purpose and for hydroelectric generation are also increasing. This of course is not a new trend. For example, current estimates indicate that the total global water consumption during the first 80 years of the 20th Century (1900-2000) saw a 200 percent increase in the world’s average per capita water use, which accounted for a remarkable 566% increase in withdrawals from the world’s freshwater resources (Jackson, et al., 2001). This massive increase in water extraction coincides with another debt on the water ledger: a significant portion of these resources have now become unusable due to industrial and agricultural pollution (Baris and Karadag, 2007). Since all life depends on water, present trends of waste water and pollution threaten the earth’s basic life support systems (Pottinger and Horta, 1999; Jackson, et al., 2001).

The general trend is likely to continue well into the coming decades because of the steady increase in the world’s population. Present estimates indicate that the current world population is likely to reach 10 billion by the Year 2050. Of these the less developed countries will contribute nearly 80 percent or 8 billion (Jackson, et al., 2001). Biswas (1991) correctly declares that while there is no direct relationship between population and water

requirements; it is clear that with a substantial increase in world population, the total water requirement will increase as well.

Early in the Twenty-First Century, more than half of the world's population will be living in urban areas. By the Year 2025, that proportion will have risen to 60%, comprising some 5 billion people. Rapid urban population growth and industrialization are putting severe strains on the water resources and environmental protection capabilities of many cities" (Gordon et al., 1994: 97).

According to The United Nations 80 percent of all sickness and death among children in developing countries is related to unsafe drinking water that is due to water pollution problems. "Chief among point sources of water pollution is municipal sewer systems, industry, and power plants" (Marsh, 2005: 283).

Scarcity of freshwater resources and the escalating costs of developing new sources have a considerable impact on all forms of national development and economic growth (industrial, agricultural and human settlement). Better management of urban water resources, including the elimination of unsustainable consumption patterns, can make a substantial contribution to the alleviation of poverty and the improvement of health and quality of life of the urban and rural poor (Falkenmark, 1995).

As human activities increase, more and more waste products are contaminating available sources of water. Among the major contaminants are untreated sewage, agricultural chemicals, and industrial effluents. These contaminants are seriously affecting the quality of water.

Since comprehensive water quality monitoring programmes in nearly all developing countries are either in their infancy or even non-existent, a clear picture of the status of water pollution and the extent to which water quality has been impaired for different potential uses is simply not available at present (Biswas, 1992: 4).

Freshwater is a finite and vulnerable resource essential to sustain life, development and the environment. Its sustainable management demands a holistic approach, linking social and economic development with the protection of natural ecosystems, close links should be maintained between land and water uses across the whole of a river basin or a groundwater aquifer (Marsh, 2005).

2.6. Water resources in Africa

While Africa is among the most endowed continents in terms of freshwater resources, its people have the lowest access to clean water for drinking and sanitation; the lowest per capita food production; and the lowest access to the water-dependent services such as electricity (hydropower). More than 40% of Africa's population has inadequate access to water as opposed to 15% in Latin America and 20% in Asia (World Bank Council and Global Water Partnership, 2001).

Africa has over 50 significant water basins spanning nearly all countries. For 14 of these, practically their entire national territories fall within shared river basins. There are also large inland water bodies such as lakes Victoria, Chad and Kariba. In Sub-Saharan Africa (SSA), international river basins constitute the principal source of water resources. About one-third of the world's international river basins are found in SSA. Thirty five countries in the region share the 17 major river basins. Furthermore, international rivers also include 11 river basins between 30000 and 100000 sq. km. (Yilma, et al., 1997). These international rivers have implications for long-term management of water resources.

The distribution of water in major parts of Africa is characterized by complex patterns and striking paradoxes which exhibit an abundance of rainfall over the equatorial zone contrasted by extensive and extreme aridity of the Sahara desert in the north and the Kalahari desert in the South. About 50 percent of the total surface water resources of the continent are in one single river basin (i.e.) the Congo basin and 75 percent of total water resources are concentrated in eight major river basins (i.e.) the Congo, Niger, Ogoague (Gabon), Zambezi, Nile, Sanga, Chari-Logone and Volta (Yilma, et al., 1997). In Africa, only a minimal amount can currently be used as viable fresh water. Besides, several rivers and lakes have undergone a marked reduction in flow rates and surface area (UNESCO, 2005). Groundwater wells are also threatened by desertification.

According to Yilma et al. (1997) in the past 20 years, available freshwater resources in Africa have greatly declined due to severe and prolonged drought. Water pollution resulting from industrial effluent, urban run-off, sewerage and agro-chemicals are on the increase and continue to deteriorate freshwater quality and affect its quantity. "The sharp decline in availability of freshwater supply due to hydrologic, climatic and environmental change is visible even in the Congo-Zaire basin" (Yilma, et al., 1997:35).

The meteorological and hydrological services in the African region are not efficient due to government budgets. As a consequence, there is insufficient data to support water development projects and the development of national plans for water resources management. Rivers are the main sources of freshwater in the region. However, several of the rivers and lakes in Africa are undergoing a marked reduction in flow rates with Lake Chad facing the most serious problems (World Bank, 2004b).

With regard to water use and management, the major water-consumptive uses in Africa are for agriculture activities and human settlements (Beekman and Pieterse, 2007). However, there has been an increasing use of water in the industrial sectors which is affecting water quality. It is predicted that by the Year 2025 several African countries will experience water scarcity. As it stands now, 11 countries are experiencing water stress and are countries undergo water scarcity conditions (World Bank, 2004b).

Rapid population growth, expansion of irrigation areas and industrialization has put pressure on the available water resources. For the developing countries of Africa, a major portion of the needed increase in safe drinking water and sanitation facilities is expected to come from existing fresh water rivers through sustainable use of water resource management. In Sub-Saharan Africa, urbanisation heightens the relationship between available water quantity and water quality. Cities are faced with mounting costs of water shortages, water treatment, well deepening and development of new sources (ECA, 1995).

Most fresh water resources in Sub-Saharan-Africa are located in trans-boundary watercourse systems and shared river basins. "Management and protection of these shared basins is required through a strong commitment to regional collaboration, for example, within sub-regions the Southern African Development Community (SADC). Similarly, "the environmental initiatives of the New Partnership for Africa's Development (NEPAD) framework is a key initiative for improving water resource management for social, economic, and environmental security in Africa" (DEAT, 2007:166). A high proportion of big industries are located along river banks and coastal zones of West Africa. Such an arrangement leads to pollution from municipal and industrial discharges, which, combined with overexploitation of available water resources threatens the river catchment environment as well as the supply of freshwater resources (World Bank, 2004b).

More than 50% of the lake basin of East Africa's population do not have access to piped water (WHO and UNICEF, 2004). They depend on natural sources like springs, streams and rivers. Such sources should be protected from any form of degradation. Unfortunately, urban centres along the shores of the lake and river throw their industrial and domestic waste into the river and other water bodies. Government departments that are supposed to control pollution or degradation of water resources are still not decentralized in their operations. They lack finance and human resources to effectively carry out their mandates.

Integrated Water Resource Management (IWRM) seeks to address in an integrated, coordinated and balanced way, the needs of upstream and downstream users, current and future beneficiaries, different water uses (such as environmental, agricultural, pastoral and industrial uses), supply and demand factors, social and economic benefits, and other aspects of water management (Mc Granahan and Satterthwaite, 2004).

IWRM is based on the Dublin principles, of which subsidy and participation of water users in management are important elements. The principles agreed at the International conference on Water and Environment, held in Dublin in 1992, are as follow

- Freshwater is a finite and vulnerable resource, essential to sustain life, development, and the environment.
- Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels.
- Women play a central part in the provision, management and safeguarding of water.
- Water has an economic value in all its competing uses and should be recognized as an economic good.

The use of the hydrological basin and catchment units for planning purposes rather than administrative units, and improved coordination between different sectors and government department are significant.

Pollution from untreated municipal and industrial wastes is causing health-threatening conditions in surface water resources. At the same time, over-abstraction and contamination are depleting groundwater resources.

At present in many developing countries, it is estimated that about 85% of available water resources are used for agriculture, 10% for industry, and 5% for domestic supplies; this distribution of water resources will need to be re-evaluated, especially where water resources are scarce (Gordon et al., 1994:114).

In summary, the quality of freshwater is declining in Africa and in many parts of the world due to human induced land degradation, salinization, and pollution by toxic compounds and domestic, industrial and agricultural contaminants, including farmyard manure (Yilma, et al., 1997). Therefore, water resource management should cover the utilization and development of water resources in an efficient, environmentally sound, equitable and reasonable manner in order to satisfy society's demand for water. The following section presents the main aim and objectives of this research thereby illustrating the motivation of the study of water resource management in the urban areas of Addis Ababa is essential.

2.7. Motivation

The provision of an improved water supply service to the poor urban areas of Addis Ababa, Ethiopia is essential, given that large numbers of people living in the city have problems of access to a reliable and adequate potable water supply. Indeed, in addressing the growing demand for water, the establishment of an integrated water resources management system has the potential to contribute directly to meet the country's Universal Access Programme (UAP). Very often the urban poor are not the direct users of urban water supply systems, and even worse, the poor get little attention from, or are neglected by, the urban water utilities that struggle to meet increasing water demands. Addis Ababa's water utility is no different, squeezed between rapid urbanization and population pressure, and the ensuing increased demand and urban poverty.

Addis Ababa covers an area of about 530 km² with a population of about 2.7 million people (Central Statistical Agency (CSA), 2007). It is a developing city, which is going through rapid urbanization and subsequently suffers from a shortage of water, which is especially acute in the poorer areas of the city. Currently, the responsibility of managing this scarce resource rests with the Addis Ababa Water and Sewerage Authority (AAWSA). This authority is responsible for the water supply and sewerage service in the city. AAWSA is the biggest Public Water Utility in the country and provides water to almost 2.7 million inhabitants of the city. The city water supply in house connection coverage is 98% but the supply covers 62% of the demand (AAWSA, 2008).

According to AAWSA (2004) only about 25% of the population in its service area have in house connections and use on average 80 to 100 litres per capita per day, while the remaining population (75%) are served by yard taps, and public taps and use between 15 to 30 litres per capita per day. To make matters worse, according to the AAWSA (2008) assessment, the existing water supply is sufficient to meet only about 62% of the total water demand of the city. In spite of considerable investments in water supply in the city at different times, the majority of the people living in poor urban areas do not have access to a reliable and safe water supply.

Despite these existing situations in the city and a very low level of water supply coverage, no systematic studies or research have been undertaken a holistic approach using political ecology of water resources management framework to understand and deal with the interests of urban poor water users and various stakeholders involved in water resource development in the city. For this reason, the study of water resource management in the urban areas of Addis Ababa is essential since Ethiopia is categorized as a low-income developing country in general and Addis Ababa, the capital, in particular faces the problem of poor water resource management.

2.7.1. Aim of the study

The main aim of this research is to evaluate the current water resource management policies and practices towards urban water supply of Addis Ababa in general and Akaki sub-City in particular in order to propose various strategies for the management of water as a scarce resource and more specifically, to draw up some policy implications based on the findings. The study limits itself to the use of water for domestic purpose for residents of the Akaki Sub-City in Addis Ababa, which use the Akaki river water for various household purposes. Issues of sustainability and social justice will also be addressed in this study.

2.7.2. Objectives of the study

The objectives of this study are:

- To provide a historical overview of the use of water resources in Addis Ababa
- To evaluate present policies and management practices with regard to the water resources in Addis Ababa
- To assess the access to drinking water of the poorest of the population in Addis Ababa

- To ascertain the different uses and abuses of the water resources, and
- To propose management strategies which take into account sustainability and social justice

2.8. Conclusion

This chapter described how water demand management, political ecology relating to water and other environmental issues reflect that a paradigm shift is needed for water resources development and management. Water is a basic necessity to sustain life. The people of Ethiopia have the fundamental right to have access to potable water supply. Since there are several demands for water, and at the same time water is being unevenly distributed in the country, there is a need for fair, equitable and sustainable access to clean water. The water policy of Ethiopia provides a conducive environment for having clean and safe water, by giving domestic water supply the highest priority followed by water for livestock.

The discussion suggests that much still needs to be done before the full coverage of this basic service for the people of Addis Ababa, Ethiopia is attained. Parallel to increasing the coverage there is a need to consider the efficient management and proper use, of the resources and sustainability of the service. According to Laurie and Crespo (2007:853) “We cannot live without water; therefore water cannot be a private business ... (because) it violates human rights. Water must be a public service; it is not possible to privatise the basic services, particularly water and sanitation”.

Sustainable management of water resources with due respect to ecological, economic and ethical sustainability requires a holistic and integrated approach. Ethiopia faces challenges in efficiently developing and managing its water resources. There is a need to continue to develop its water resources in order for its economic and social development to keep pace with its rapidly growing population. Management approaches and organizational arrangements need to be reviewed to address the critical issue of water resource management.

CHAPTER THREE

METHODOLOGY AND STUDY AREA

3.1. Methodology

3.1.1. Introduction

Methodology is an important process that determines the direction of research. According to Hoggart, Lees & Davies (2002), it is a philosophy of the research process, which includes assumptions and values, which are the basis for research, and the criteria for data interpretation and drawing up of conclusions. The data were used for this work gathered from various sources. The main sources include field site visits and interviews.

The main approach to this study was to make a closer evaluation of the existing water resources management policies and practices in urban areas of Addis Ababa in particular, and to gain an understanding of the institutional development and management context of water resources in Ethiopia. Based on this, objectives were set and scientifically based procedures were developed. Accordingly, the required data/information was obtained from both primary and secondary sources.

The primary data were collected from household surveys and through key informants' interviews. Both open and closed ended questions were used. Secondary data collected and used from the relevant literature and institutions. Both qualitative and quantitative techniques were explored, because they complement each other (Neuman, 2000). Qualitative data is essential because it provides insight into the lived experiences of respondents and supports the quantitative data. (Neuman, 2000; Robson, 2002; Yin, 1994).

3.1.2. Sampling Method

A non-probability purposive sampling strategy was used in this study. It is possible to make the study both quantitative and qualitative using open and closed ended questions regarding water resources management and consequently to have an appropriate unit of analysis to get the attitude of the target population. Further, this sampling strategy allowed me to use flexible interpretations with regard to the type of respondents to choose (Hoggart et al., 2002). A non-probability sample is a type of sample in which elements are selected in a nonrandom manner on the basis of convenience, and every element in the population does not have a non-zero probability of being included in the sample (Neuman, 2000).

A non-probability purposive sample is often used in applied social research where circumstances to do the selected sampling technique is feasible, practical or theoretically sensible (Thompson, 1997). This is used primarily when there are a limited number of people that have expertise in the area being researched. This type of sampling method is often used in qualitative research and relies on one's experience and knowledge of theory and previous research findings. Therefore, respondents are selected that are considered to be representative of the population being studied. Compared to probability samples, non-probability sampling is considerably more advantageous than doing probability sampling in applied social research (Thompson, 1997).

Advantages of Non-probability Samples

- Costs less than probability (cheaper)
- Can be conducted more quickly
- Produces samples that are reasonably representative
- Used when sampling frame is not available
- Useful when population is so widely dispersed that cluster sampling would not be efficient
- Often used in exploratory studies (e.g. for hypothesis generation)
- Some research is not interested in working out what proportion of population gives a particular response but rather in obtaining an idea of the range of responses on ideas that people have.

Based on the above mentioned advantages, a non-probability sampling framework was applied in order to obtain a sample that was appropriate for the study. Given that the interest of the research is specific to the utilization and management of water resources around the Akaki sub-city of Addis Ababa, using purposive sampling can be very useful to reach a targeted sample quickly and to get the opinions and interests of the target population. Further, in order to apply the researcher's knowledge about the study area and to identify the major problems such as access to potable water and reliability, and environmental water resources problems of the area, a purposive sampling method was necessary. For this, descriptive evaluation with a non-probability sampling approach was adopted because it was an appropriate strategy for asking 'what, how and why' questions. It required no control over behavioural events and had a contemporary focus (Yin, 1994). The result may not be generalized to other places of the country but; it intends to reflect the management practices and the water use pattern of the Akaki sub-city of Addis Ababa. Substantial information was required on the use of water resources and management practices.

3.1.2.1. Sample size and selection

In order to ensure homogeneity in the grouping of households in the selected Sub-City, the urban (and thus the eight kebeles) were divided into three clusters through the sampling technique used on the basis of two principles: conformity to the stated objectives and theoretical approach; and comparability the case studies combined with other urban areas of the city. The former ensured the relevance of the research work and the latter helped to ensure that it was applicable to others (Yin, 1994). These principles gave rise to set homogeneity of the groupings of households which were applied to eight Kebeles.

Accordingly: areas where adjacent to the Akaki river; in the centre of the urban; and downstream. These groupings were determined from a review of the literature (socio-economic and geographical information from the Akaki sub-city administration) and from information given by the people of the area. The number of households was obtained from the 2007 population and housing census of Ethiopia for each kebele. The proportion of the number of households in each kebele to the total number of households in the urban unit was calculated and this proportion was used to determine the number of sample households from each kebele to be included in the sample. Therefore, proportional allocation of the sample was made on the basis of homogeneity of the socio-economic groupings. The required sample

households were then selected within each kebele. Table 3.1 below provides a sample distribution and the corresponding target household in the study area.

Table 3.1: Distribution of the sample household by grouping in the study area (2009)

Grouping of Sampled Area	Kebele	Total number of People	Total number of Households	Number of Sample Households	Sample as a % of total selected household
Areas adjacent to the Akaki River	K07/08/09	42298	10071	35	23.33
	Kilinito,	5119	1218	5	3.33
	Golanigora	3901	929	3	2
Total	3	51318	12218	43	28.67
In the centre of the urban	K10/11	45805	10906	38	25.33
	K12/13	27080	6447	22	14.67
Total	2	72885	17353	60	40
Down Stream Households	K01/03	25460	6062	21	14
	K02/04	13972	3326	12	8
	K05/06	17567	4182	14	9.33
Total	3	56999	13570	47	31.33
Total	8	181202	43141	150	100

3.1.3. Data collection

A number of data collection methods were considered (Robson, 2002; Yin, 1994), in this study. In addition to gathering of written document related to water resources management, semi-structured interview (See Appendices II) was chosen as the primary instrument of investigation. Semi-structured interviews allow specific questioning along a theme but maintain the flexibility of unstructured interviews to respond to informants and the openness to receive unanticipated information (Robson, 2002; Yin, 1994). This method provides a depth of information not possible from surveys. The gathering of written documents proved to be a valuable source of information and was used to “corroborate and augment evidence from other sources” (Yin, 1994:81).

The research was carried out by conducting a household survey and interviews with major informants who represented from the community, kebele administration, NGOs and relevant sectoral offices of the City Administration including Addis Ababa Water and Sewerage Authority. The interview with major informants focused on issues on water resource use and management; social aspects of development were raised and discussed with these key informants. Accordingly, six key informants, two from the community, two from the Sub-City Administration, one from NGO, and one from the AAWSA have been interviewed. The important aspect of this inquiry is that it helped us to assess past and present situations and anticipate future directions of improvement for the provision of clean and safe water supply for urban people in Addis Ababa.

With respect to the survey, the researcher interviewed 150 households in selected localities in the Akaki Sub-City of Addis Ababa, Ethiopia to collect information about access of clean water and management of water resources as well as pollution of the Akaki River. Different kinds of literature were reviewed. These included books, journals, government documents and reports, conference papers, newsletters and the internet. Various official and public documents in the holdings of a range of national water-related institutions have also been reviewed. This included the relevant and accessible documentation of practices in the holdings of The Ethiopian Ministry of Water Resources, Addis Ababa Water and Sewerage Authority (AAWSA), Environmental Protection Authority, Documentation units of Food and Agriculture Organization, World Bank, and World Food Organization in Addis Ababa and other NGOs.

3.1.4. Questionnaire development and field study

Field work was carried out during May and June 2009 in the Addis Ababa Akaki sub-city downstream localities of the Akaki River. Located along its course are urban and peri-urban residents, businesses and large manufacturing industries, and farming communities in Addis Ababa City. During the field survey, information was collected from 150 selected households from the Akaki sub-city.

The study was conducted using structured and unstructured questions for the collection of quantitative and qualitative data. A questionnaire survey was useful for this study because it provided the views of different people. The questionnaires were divided into three sections

based on the objectives and were distributed at the local level. The questionnaires and target group interviews covered water sources; water uses and consumption patterns; their assessment of the right to water use availability; accessibility, and reliability of the system; willingness to pay for piped water or improved water supply systems and pollution of Akaki river. The questionnaires/guidelines were prepared on the basis of the list of indicators that cover issues indicated in the objectives of the study.

3.1.5. Data analysis and coding

Neuman (2000) explains that data analysis involves transferring data from questionnaires to a format that is suitable for statistical analysis. The information collected in the local study is basically quantitative, therefore, it was analysed using the SPSS Statistical Package. Neuman (2000:42) defines coding as “the hard work of reducing mountains of raw data in to manageable piles ... allows a researcher to quickly retrieve relevant parts ...” The quantitative data collected from the survey were presented in statistical form of tables and graphs. The qualitative data gathered through involving key informant interviews, observation and assessment of the researcher was written up in a narratives.

3.1.6. Limitations

The study was based largely on households who were unable to access safe and reliable drinking water and those who obtained drinking water from public taps and vendors. Therefore, the selected sample households may not adequately represent the access of water supply problems of all people of urban areas of Addis Ababa. The other problems arose with documentary sources: documentation was extremely hard to come by as this sort of study had never been widely undertaken in different urban areas of Addis Ababa, Ethiopia. When material was made available to the author it was vague, bearing no relevance to the topic of this dissertation or out of date. Other problems related to transparency and willingness of interviewees to participate in the study, and the readiness of government officials to share official documents that would be relevant to this study. In many instances photocopying was refused, or machines were not available for use to the public. Under such circumstances, gathering of data from documentary sources was challenging.

3.2. Study Area

3.2.1. The Akaki-Kaliti sub-city study site

The Akaki sub-city is one of ten sub-cities of Addis Ababa and consists of eight Kebeles. Akaki sub-city has at about 181202 people (CSA, 2007). There were three major reasons for selecting the Akaki sub-city for this study.

First, the Akaki River originates from the Entoto chain of mountains, north of the city and flows through the south of Addis Ababa city. The river covers the major areas of Akaki sub-city South East and leaves the Akaki sub-city and makes its way to Lake Aba Samuel and becomes a tributary to the great Awash River. The Akaki River is used as a source of irrigation by vegetable and different types of crop producers for market and home consumption. It is, also used downstream for various household purposes including drinking. The crops grown are crops with high market value such as vegetables, and they are the main source of income for the households downstream. Compared to most other urban areas in Addis Ababa, considerable information exists on the major problems of access to potable water and management of water resources, and environment in Addis Ababa City and in the Akaki River Catchment. This indicates that the Addis Ababa region faces many of the same water-related environmental problems found elsewhere in cities of developing countries.

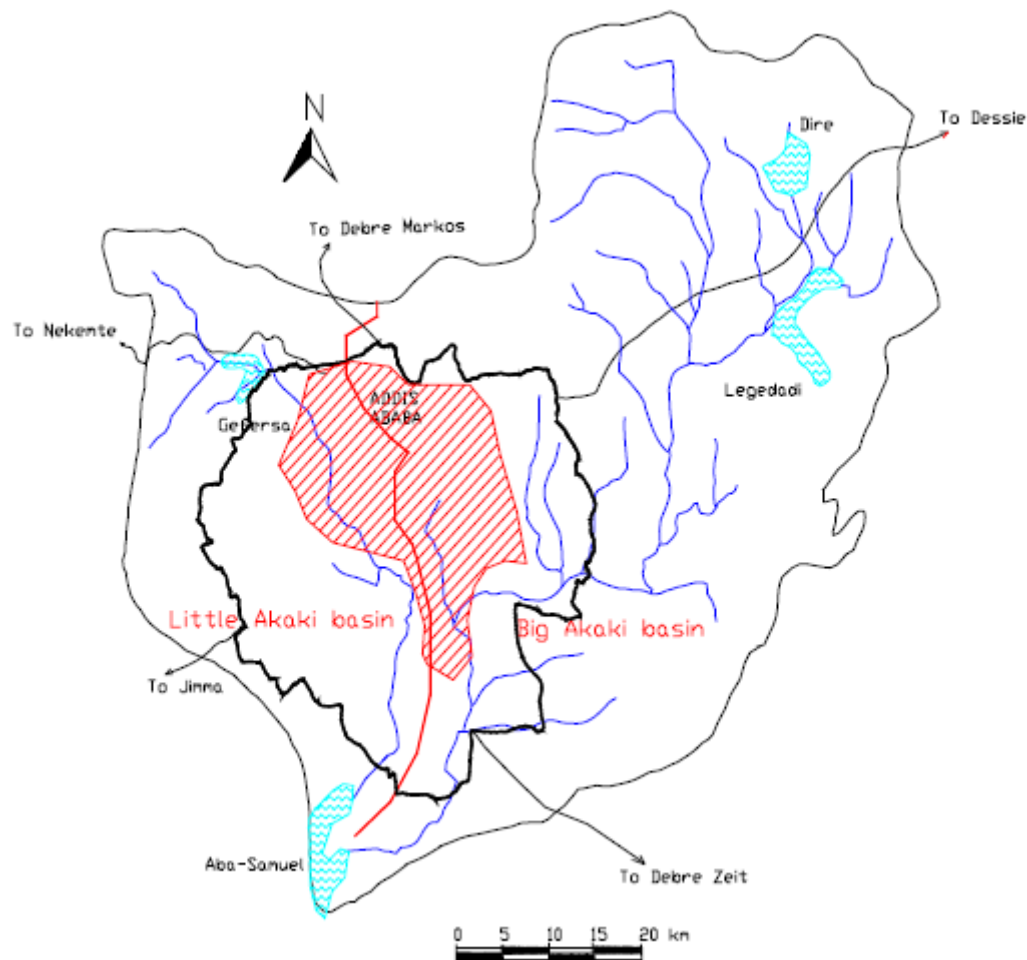


Figure 3.1 Study Area: Akaki River Catchment (in red built up area)

Second, as one of the most affected urban areas of the city, the processes of industrialization and development took root invariably making access to drinking water one of the major societal problems.

Third, these days, the Akaki sub-city is home to various water users, representative of those found in other urban areas of the city. Thus, the Akaki River Catchment of Addis Ababa was selected as a study site because it is a home to many industries of the country.

3.2.2. Addis Ababa and its catchment

Addis Ababa is located at an average elevation of 2408 meters above sea level having an average minimum temperature of 5C°, maximum temperature 27C°, and average annual rainfall of 1188.27 millimetre (CSA, 2004 and Addis Ababa City Administration, 2004). Addis Ababa is constituted as a City Government. The city covers a total area of 530 square

kilometres (53000 ha) (CSA, 2007). Out of Ethiopia's estimated urban population of nearly 12 million, about 2.738248 or 23 per cent of the total lives in Addis Ababa, of which 1304518 (47.6%) are male and 1433730 (52.4%) female. The average number of persons per household is 4.1, and the total number of households in the city is 651970. The rate of growth of the population of the city is estimated to be 2.1% (CSA, 2007). The City has gained international status by being the seat of the African Union, several international organizations and numerous embassies. Addis Ababa is located in the central part Ethiopia and belongs to the western highlands. The metropolis located in the highlands is also close to the Rift Valley. Addis Ababa is bordered by all sides by the Regional State of Oromiya (See Figure 3.5 below).

Addis Ababa is divided into ten Sub-Cities stemming from the 2003 reforms onwards and every sub-city has its own administrative autonomy. The spatial organization (Figure 3.2) shows that Lideta, Kirkos, Arada and Addis-Ketema represent the core or central area where as Akaki, Nefas-Silk-Lafto, Kolfe Keraniyo, Gulele, Yeka and Bole correspond partly to the expansion areas at their peripheries. In general the case of Akaki Kaliti sub-city, the large sub-cities have more dwellers than the small central part sub-cities.

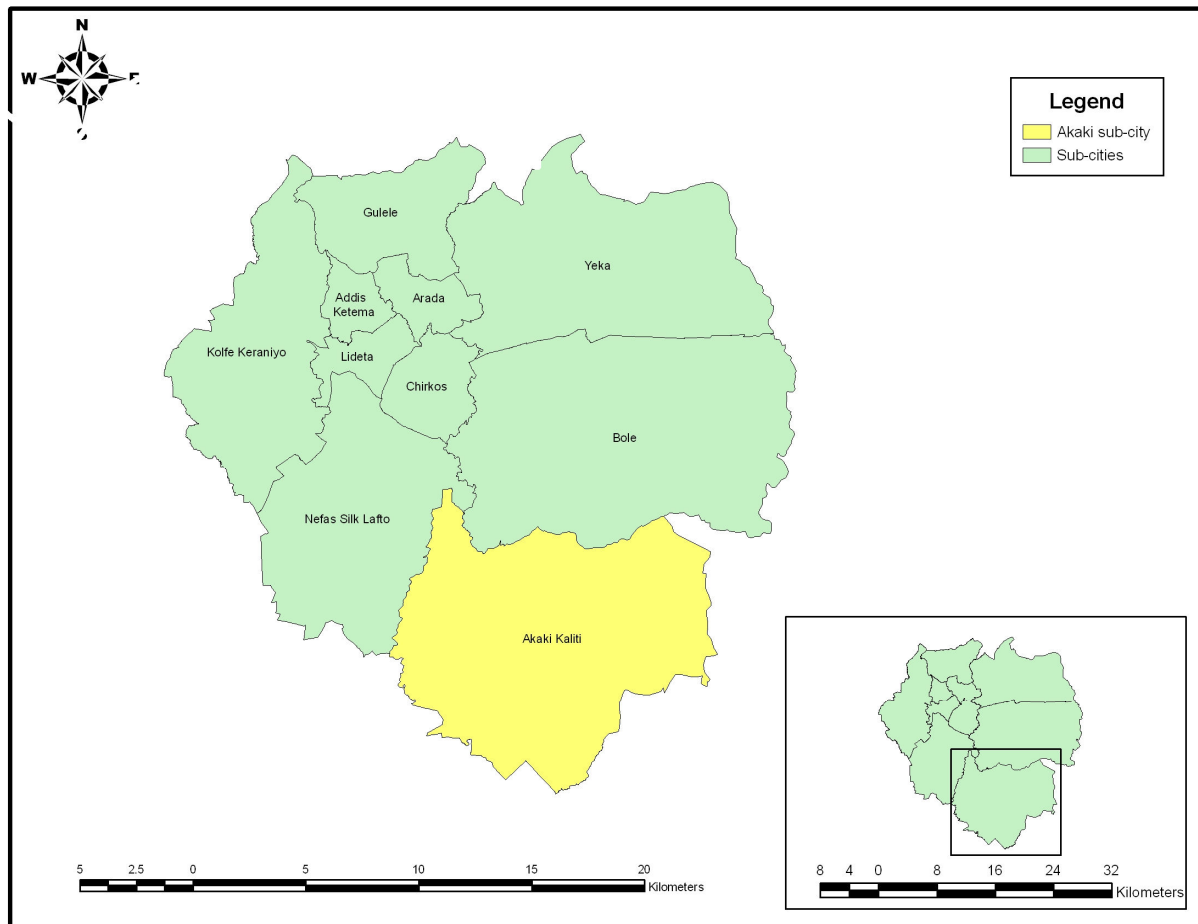


Figure 3.2: The Study Area: Addis Ababa Administrative Division by Sub-City

Data Source: Central Statistical Agency, 2007

These 2.7 million people live in 10 sub-cities and 99 Kebeles divided for administrative purposes. Each Kebele has its own administrative boundary and local empowerment is encouraged since the municipal decentralization reforms. The division by Kebele of cities started with the 1975 law during the socialist government--Derg regime, they had around 10000 city dwellers each. From that time onwards, Addis Ababa had reached a sizeable number of Kebeles. The number of Kebeles has been recently reduced by merging most of them and by giving them more local empowerment. The ten sub-cities are: Addis Ketema, Lideta, Cherkos, Yeka, Bole, Akaki Kaliti, Nefas silk, Kolfe Keranio and Gulele.

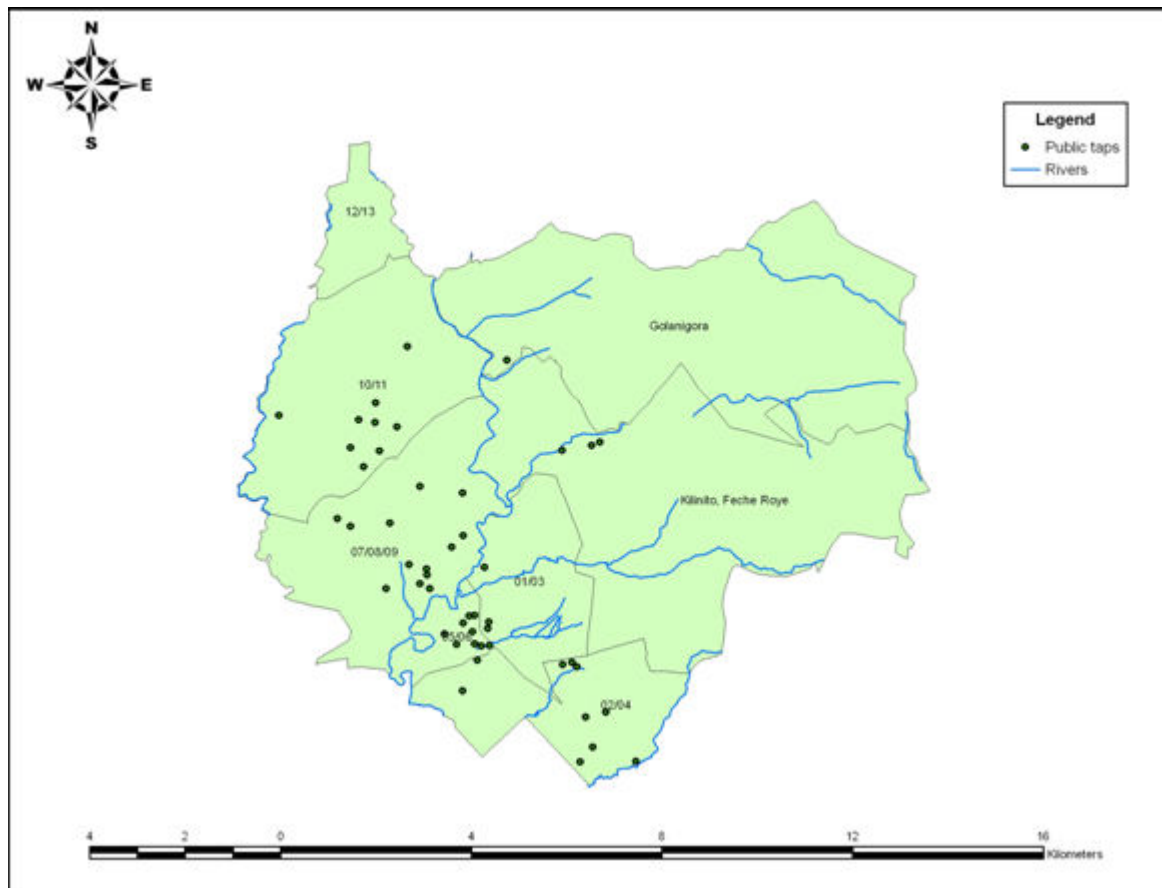


Figure 3.3. Study Area Akaki Kaliti sub-city division by kebeles

3.2.3. Public water demand and resource management

For any metropolitan city, one of the basic and essential services is water supply. Unless and until this demand of the city is met efficiently, the health of the community and development activities will be affected. At present, the city has two conventional water treatment plants located along the two dams of Gefersa and Legedadi. The plants do not produce to their full capacities. Therefore, the total water production of both treatment plants is far below their design capacities being only 150,000m³ in 1995 versus the design capacity being 180,000m³ (Kebede et al., 2003). However, Addis Ababa with its ever increasing population has a critical water shortage. To satisfy the rapidly increasing water demands of the city, the Addis Ababa Water and Sewerage Authority (AAWSA) has done major expansions of the water treatment plant, transmission and distribution facilities (Waltainformation, 2004). In 2010 the requirement for potable water to satisfy all demands plus unaccountable losses is estimated to average 1.11 Million m³/day (Table 3.2). There are three dams with the supply of 173,000 m³/day, springs 10,000 m³/day and Akaki wells supply 30,000 m³/day.

Table 3.2: Potable water demand for Addis Ababa City (2004 – 2020)

Year	Population Projection (Million)	Potable water Demand (Million m ³ /day)
2004	3.1	380000
2010	3.83	565000
2020	5.57	1105000

Source: Shewaye and Adam, 1998

Despite the high coverage in the supply of water service on one hand and critical water shortage on the other, the current demand of the city is said to be 243,000 cubic meters per day (103 litres per capita per day), while the supply is about 140,983 cubic meters per day (60 litres per capita per day) for a total population of 3.1 million (World Bank, 2004a). This shows that 45 percent of the demand of the city is not satisfied. To meet the wide imbalance of the water demand and supply, therefore, the Authority has to undertake different water supply projects such as the emergency Akaki project.

3.2.3.1. Water connections

According to the AAWSA (2008) report, about 63% of the households in its service area have an in-house connection Private water taps and taps in compound shared by more than two households) and use 80 to 100 litres per capita per day while the remaining population of 37% are served by yard taps, public taps and buy water from kiosks and use between 10-30 litres per capita per day. In general, significant numbers of the population of the city does not obtain reliable and safe water from the urban water supply system. However, the demand for potable water has been increasing over time as a result of uncontrolled urbanization and population increase resulting from natural growth and rural-urban migration. Various literature indicated that Ethiopia has a high rate of urban population growth (CSA, 2005). The growth is without proportionate development in the socio-economic service and infrastructure, and the economic capacity of the urban centres to support the increasing population size (Ayenew, 2005). Addis Ababa is also no different from this trend.

3.2.4. Background of Ethiopia

3.2.4.1. Geography

Ethiopia is located in the Horn of Africa and it bordered to the north and northeast by Eritrea, to the east and southeast with Djibouti and Somalia, to the south with Kenya, and on the west and south west by the Sudan (Figure 3.4). The country lies within the tropics between 3⁰-15⁰ N Latitude and 33⁰-48⁰E Longitude. It covers 1.12 million km² in nine regional states, one City Council and one City Administration (CSA, 2006).

Ethiopia is a country of great geographical diversity with high and rugged mountains; flat topped plateaux, deep gorges, river valleys and plains. This diversity in relief makes the country unique in Africa. Ethiopia is the most elevated part of Northeast Africa. The altitude ranges from the highest peak at Ras Dashen (4,620 metres above sea level), in Gonder, down to the Danakil depression (120 meters below sea level), one of the lowest dry land points on the earth, in the Northeast part of the country. The highlands (>1500 metres amsl) constitute around 45% of the total area of the country. In Ethiopia, all lands below 1500 metres in altitude are commonly classified as lowlands while lands above 1500 metres are classified as highlands. There is an essential difference between the highlands and the lowlands in terms of climate, population distribution, economic activities and lifestyle (NMSA, 2002). According to the National Atlas of Ethiopia (NMSA, 1996) the country can be roughly divided into four groups of natural sets: the Western and South-Eastern highlands, the Rift valley composed of the central low lands with depressed area in its north eastern part and with medium altitude in its southern part, finally the outer lowlands at the outskirts of the two highlands groups (CSA, 2007).



Figure 3.4: Map of Ethiopia

Source: (Addis Ababa City Administration, 2004)

3.2.4.2. Population

Ethiopia with a total area of 1.13 million km² had a total population of 73.9 million in 2007 out of which about 61.9 million (84 percent) were rural while 11.9 million (16 percent) were urban. The rate of population growth is in the order of 2.6 percent per annum (CSA, 2007), making it the third most populous country in Africa, after Egypt and Nigeria. However, life expectancy at birth is estimated at 49.8 and 51.8 years for males and females respectively, the average being 50.7 years. The male-female ratio is almost one to one and the size of population is projected to increase to 129.1 million by the Year 2030 (CSA, 2007).

3.2.4.3. Climate

The climate of Ethiopia is mainly controlled by the seasonal migration of the Inter-Tropical Convergence Zone (ITCZ) and associated atmospheric circulations as well as by the complex topography of the country. It has a diversified climate ranging from semi-arid desert type in the lowlands to humid and warm (temperate) type in the southwest (NMSA, 2002). Mean annual rainfall distribution has maxima (>2000 mm) over the South-western highlands and minima (<300 mm) over the South-eastern and North-eastern lowlands. Rainfall decreases northwards and eastwards from the high rainfall pocket areas in the southwest. Temperatures are also very much modified by the varied altitude of the country. Mean annual temperature ranges from $< 15^{\circ}\text{C}$ over the highlands to $> 25^{\circ}\text{C}$ in the lowlands.

In terms of rainfall occurrence one can generally identify three seasons in Ethiopia namely; Bega:- dry season (October - January), Belg:- short rainy season (February - May) and Kiremt:- long rainy season (June- September). Thus, in Ethiopia the general pattern of annual rainfall distribution remains seasonal, varying in amount, space and time, as the rain moves from the southwest to the northeast of the country (NMSA, 2002).

3.2.4.4. Economy

The country's economy is heavily dependent on agriculture for generating employment income and foreign currency. Agriculture which includes crops, livestock, forestry, fisheries and agriculture is the most important sector of the national economy and the main source of livelihood for 80 percent of the population and accounts for about 90 percent of the export earnings (CSA, 2006). It is the source of 40-50% of the national GDP. Food crops, industrial crops, export crops (e.g., coffee), livestock and livestock products are the main components of the Ethiopian agriculture. Subsistence mixed farming (cultivation and livestock rearing) and nomadic pastoralism are widely practiced in the highlands and lowlands, respectively (MFED, 2005).

The country is one of the least developed in the world, with a per capita gross national income (GNI) in 2004 of US \$ 110 (World Bank, 2005). The Ethiopian currency is the Birr, and at present, 1 US dollar is equivalent to about 11.00 birr and 1 South African Rand is equivalent to about 1.40 birr (NBE, 2009). Since 1991, Ethiopia has moved toward a market-oriented economy. At present, the country has one commercial and two specialized government-owned banks and also nine privately owned banks; and nine insurance firms and

seven private insurance companies (NBE, 2008). There are also 21 micro-finance institutions established by private organizations.

3.2.4.5. History

Ethiopia is one of the ancient civilisations with a rich diversity of people and cultures. It has a unique alphabet which has existed for more than 3000 years. Ethiopia's geographical and historical factors have had a great influence on the distribution of its people and languages. Paleontological studies identify Ethiopia as one of the cradles of mankind. 'Dinkinesh' or "LUCY", one of the earliest and most complete hominoids discovered through archaeological excavation, dates back to 3.5 million years (CSA, 2005). Through its long history, Ethiopia has become a melting pot of diverse customs and varied cultures. The country's cultural and architectural heritage include the 17th Century castles at Gonder (the then capital of Ethiopia), the rock hewn churches at Lalibella (one of the UNESCO treasures), the Sof Omar caves in Bale and over 80 languages with over 200 dialects falling in four main language groups; namely, Semitic, Cushitic, Omotic and Nilo-Saharan (MOI, 2004). The modern capital of Ethiopia is Addis Ababa, which means "New Flower" in Amharic, located almost at the heart of the country. Emperor Menelik and Empress Taitu founded the city at the turn of the 19th Century (Pankrust, 1962).

3.2.4.6. Administration and Governance

Ethiopia is a Federal Democratic Republic. Member states of the Federation are nine ethnically based regions (Kililoch) with a population between of 200,000 and 25 million each, these include (Figure 3.5 below)

- the State of (Amhara, Oromia, Southern Nations Nationalities and Peoples (SNNP), Tigray, Harari), where more than 90% of Ethiopians live, and the more pastoralist "emerging" regions (Somali, Afar, Gambella, Benishangul-Gumuz)
- 68 Zones with a population between 100,000 and a few million each;
- 550 Weredas or Districts, with a population between 10,000 and more than 300,000 each;
- A large number of Kebeles (Dwellers), which constitute the smallest administrative units in Ethiopia.

In addition to the nine regions there are two “chartered cities” (Addis Ababa and Dire Dawa), where the lower-level administrative units mentioned above do exist. A policy of decentralisation of authority to regional administration has been pursued since 1991. The development strategy taken by the government is Agricultural Development Lead Industrialisation (ADLI) which is intended to be rural and people focused. Cultural issues, peoples’ rights to self determination and administration and individual entrepreneurship and equity are issues that are stressed under the current Constitution.

The regional/national governments have legislative, executive and judicial power over their administrative areas, except in matters of defence, foreign relations and citizenship, which fall under the jurisdictions of the Federal Government. Promotion of social justice is another important aspect given due attention by Government. Equity is a primary objective of the major policies of the government indicating clearly that priority is given to the rural areas, to the relatively less developed regions and to the low income sections of the people. Besides, The Federal Democratic Republic of Ethiopia is based on a broadly decentralized system, and in recent years the weredas or the sub-cities have reached a high level of autonomy in administering their affairs.



Figure 3.5: The Regional States of Ethiopia

Figure 3.5 shows that Addis Ababa city is bordered by all sides by the Regional states of Oromiya, and also shows the Ethiopian Federal Democratic Republic Regional States boundaries.

The following figure shows sources of drinking water in each regional state.

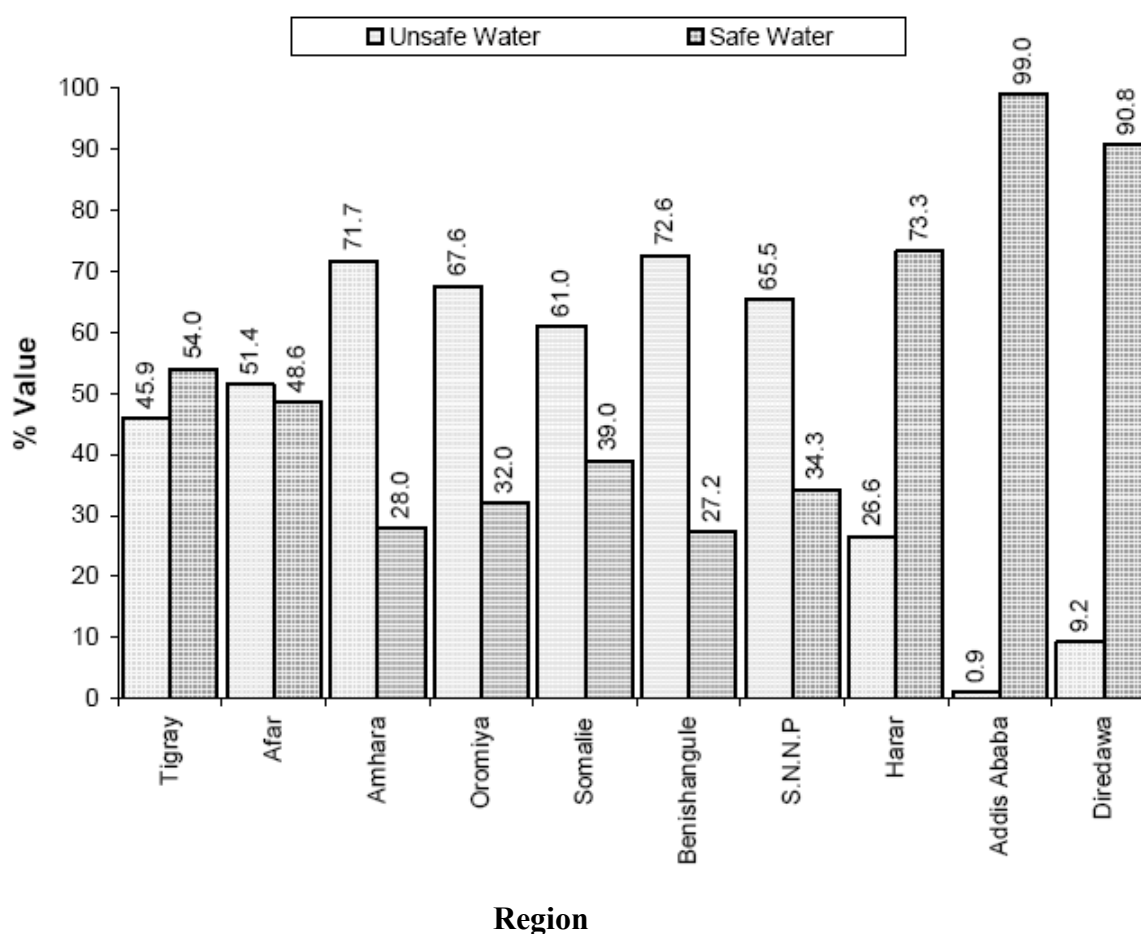


Figure 3.6: Regional distribution of sources of drinking water

Source: (Central Statistical Agency and ORC, 2005)

3.3. Conclusion

The decentralization and regionalization policy has been an enabling environment for the establishment of water institutions at different levels. With this decentralisation of water resource management as part of the political reforms of the government, a good deal of water development initiatives, in particular urban water supply and sanitation services has devolved to the Regional administrations. In this case it has contributed to the fact that local authorities have the opportunity to determine the needs of their areas. The central government is too far away and cannot adequately plan what is beneficial for each local area. Local authorities are closer to the people and should be better equipped to understand local needs and priorities.

CHAPTER FOUR

POLITICAL ECOLOGY OF WATER RESOURCES

MANAGEMENT IN ETHIOPIA

4.1. Introduction

Ethiopia has been described as the water tower of Africa because most of East Africa's Rivers originate in its highlands. The country is endowed with an abundance of water sources: 12 river basins and 22 natural and artificial lakes. Studies indicate that the total annual surface runoff is about 122 billion cubic metres while usable water is estimated at 2.56 billion cubic metres (Tsegaye, 2002).

Though Ethiopia is rich in water resources, these resources have not been exploited properly. Consequently, the fate of the country is still dependent on rain, which is in most cases insufficient or unreliable. Research indicates that only 36% of the total population has access to quality potable water supply within a radius of 3.15km, and only 5% of the irrigable land is developed. Of the enormous hydropower potential in Ethiopia, only about 1% is exploited (Ayenew, 2005). Clearly, these statistics indicate much untapped potential. And, yet Ethiopia is listed among the poorest countries in the world. To speed up water resource development and utilisation, as a way of alleviating poverty, the Government enacted the Water Resources Management Policy in 1999.

The main objective of the water policy of Ethiopia is that of developing the country's water resources for national well-being on a sustainable basis. It also gives top priority to drinking water supply over all other uses, and ensures sustainable water development and provision of subsidies for those segments of the population who cannot afford to pay through more equitable distribution of public services. The Ethiopian Water Resource Management Policy, adopted in 1999, is unique in stating that every Ethiopian citizen has access to sufficient water of acceptable quality, to satisfy human needs as a basic right.

The government of Ethiopia has put in place various policies and laws regarding water resource use management to promote socio-economic development. Since the policy has stipulated that water has to be considered both as an economic and social good, water has to be priced in order to promote economic efficiency, social equity and ecological sustainability (World Bank, 2000). But, there is still a lack of appreciation in accepting water as an

economic value which must be treated in all its competing uses. This has affected sustainability as funds for operation, maintenance, expansion and rehabilitation of projects in particular for drinking and irrigation purposes have not been fully recovered. Thus, the issue continues to be one of the major underlying problems constraining water resources development. There is a key question and debate in the development literature as to why the process, still in its early stages, has not been effectively implemented in the whole country yet. For example, absence of a well defined water policy has been one of the major causes, in the past, for the very low performance of water development. In addition, changing political systems resulted in the consequent and frequent restructuring of institutional and organizational set-ups (Rahmato, 1999). That, in turn, resulted in the instability of the country's institutions to the development of the water sector. The literature is silent, however, on whether public/private partnerships in the provision of water lead in fact to greater equity in access to water.

Any effort to create more equitable service distribution in Ethiopian cities must overcome the legacy of the previous governments/regimes who administered the country for more than five decades before 1991 (Teshome, 2008). The City of Addis Ababa provides an appropriate moment for evaluating whether new decision-making structures of the city are moving towards greater equity in the distribution of potable water, specifically to low-income communities living in poor urban areas, or whether they are reproducing long-term patterns of urban differences (Ayenew, 2005). Exploring how spatial patterns of water provision in Ethiopia underpin urban inequities requires examining water as an economic or social good in terms of socio-economic development, environmental, and legal modes of appropriation (Rahmato, 1999).

The problem of water resources management in Ethiopia is multidimensional. It is possible to categorize the problems into two major groups; institutional and natural. Tsegaye (2002) points out that the institutional aspect of the problem encompasses primarily governance related factors such as, budgetary, planning, implementation, monitoring and evaluation, and sustainability issues (Tsegaye, 2002). The natural dimension of the problem stems from the variability in the availability of water resources with respect to space and time (Rahmato, 1999). These two parameters of the problem are interlinked. With regard to natural aspects of the problem, although there is enough water resources in the country in general, it is not evenly distributed.

The syndrome of ‘water stress’ is widespread. “It has been argued that societies suffer water stress when annual renewable supplies fall below approximately 2000 cubic metres per person at a time when demands for water are increasing in the process of development” (WHO/UNICEF, 2004:9). The United Nations’ Development Programme (UNDP) report outlines a number of detailed factors to create a development index for every country. According to their recent estimate the percentage of Ethiopia’s population with access to improved water sources for the Year 2000 was 24%, while the percentage of population with access to adequate sanitation facilities was only 15%. In addition, in the same year the same report also estimated the percentage of urban population with access to improved sanitation to be 58% (WHO/UNICEF, 2004). With so much fresh water sources at hand, millions of Ethiopians are still suffering from shortage of water and sanitation facilities.

There is a direct link between improving access to potable water and sanitation (World Bank, 2000). Communities with safe drinking water are in a better position to maintain a hygienic environment. It is not difficult to understand that improved personal hygiene, development of appropriate sanitation practices, reduction in the prevalence of water related diseases, and overall enhancement of the livelihoods of the public are achievable when there is safe drinking water. The water we use for our daily needs is obtained from lakes, rivers, streams, and groundwater. When water becomes polluted, it not only loses its value economically and aesthetically, but it becomes a threat to our health and environment affecting the survival of all life (Alemtsehay, 2002).

This section will be structured as follows: a short briefing of the context of the study that deals with the national and local context will be examined. Then, the political ecology of water resources management of Ethiopia and water development schemes as well as community participation in water resources management with respect to gender issues within the water sector will be discussed.

4.2. Context of the political ecology of water resources management in Ethiopia

The history of water resource management in Ethiopia shows that water resource development and management has been considered weak. Rahmato (1999) points out two areas of weaknesses: the absence of comprehensive legislation concerning water resources; and absence of the community users and other “stakeholders” participation in water

management planning and decision-making. The latter signifies the prevailing top-down approach at both the federal and regional level. The undeveloped water resource development and management of the country represents a crucially important challenge to the provision of safe and clean drinking water for both urban and rural people. Various studies in this sector have clearly acknowledged that water resource management issues remain very crucial for poverty alleviation and effective utilization of the available resources.

This situation, over the years, has generated a critical need for sufficient water and water resource management to reduce the shortage of freshwater that threatens public health and impedes social, environmental and economic development. This was made even more necessary by the recurrent droughts which adversely affect the water sector as was the case in 1984/85, 1991/1992 and 2002/2003, when 7.9, 7.5, and 15 million people were affected respectively (The Reporter, 2009). The issues of drought and water scarcity are of great significance and they were recently seriously debated in Ethiopia in improving efficient access to, and utilization of, safe water in the context of the economic use of water resources. Therefore, a comprehensive approach to the Ethiopian water resource management question can best be dealt with from the national and local contexts. The socio-economic and environmental conditions also need to be addressed.

4.2.1 National context

Surface water resources are available through their spatial and temporal distribution. The settlement pattern of the population limits their utilization. Ethiopia has a population of over 74 million with an annual growth rate of approximately 2.6 percent (CSA, 2007). Water demand for domestic, agricultural and industrial purposes is increasing rapidly. Ethiopia is an agricultural country dominated by subsistence farming. Eighty five per cent of the population depends on agriculture for their livelihood. Agriculture accounts for 45 per cent of the country's GDP (MWR, 1997:20 – 21).

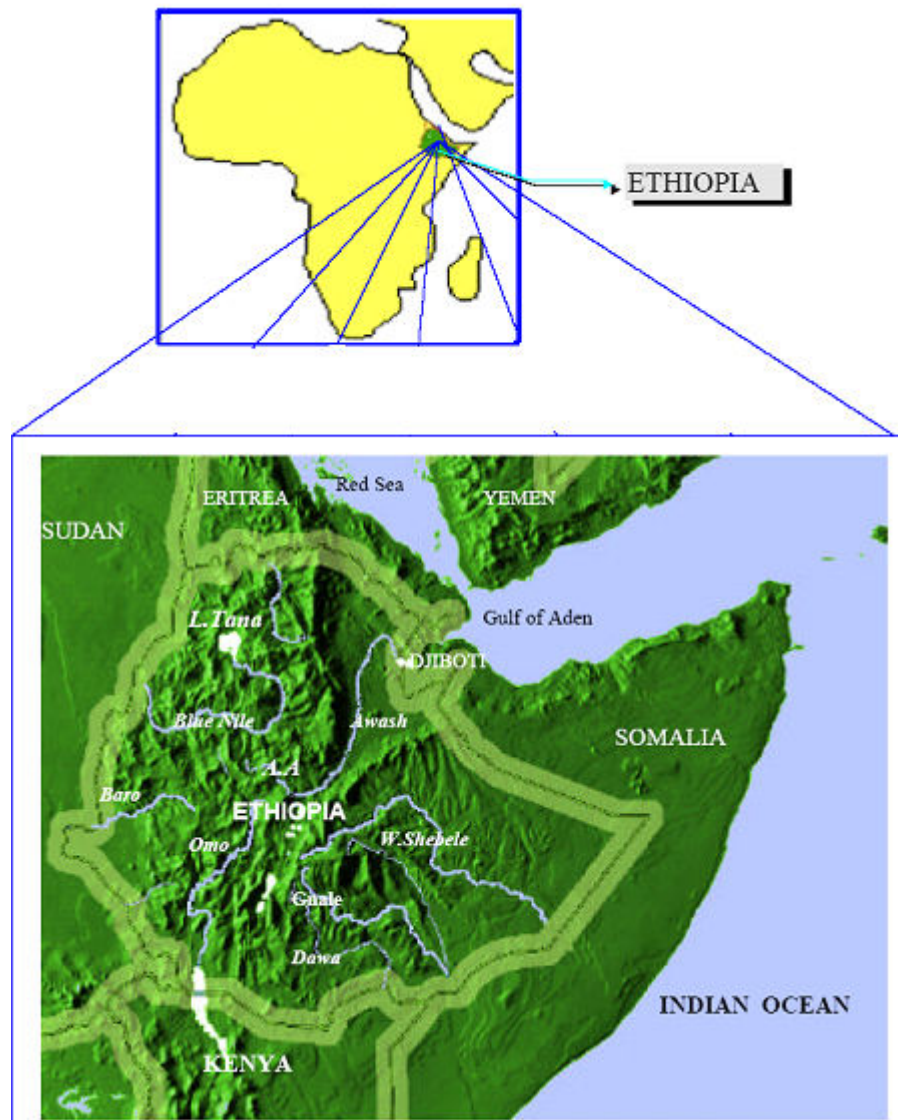


Figure 4.1: Ethiopia's River Basins

Source: Ethiopia National Metrological Service Agency (NMSA, 2002)

The country's annual renewable fresh water resources (Figure 4.1) amount to some 122 billion cubic meters (BCM/yr) in the twelve river basins and about 2.6 billion cubic meters of ground water (MWR, 2002:6). However, only 3% remains in the country. The rest-97% flows to the lowlands of neighbouring countries in all directions. The potential for sufficiently tapping this water for domestic and productive purposes, however, is lessened by uneven spatial and temporal distribution, and unpredictable availability (Arsano, 2007). Various studies show that Ethiopia has considerable water resources. It has been estimated that 2.58 million hectares are available for potential irrigation in all of Ethiopia's basins. So

far, however, only 4.3 per cent of this has been developed (MWR, 2002: 5). However, despite its abundance, it is becoming one of the critical resources for Ethiopians.

4.2.1.1 The Legislative Environment

To speed up water resource development and utilisation, as a way of alleviating poverty, the Government released the Water Resources Management Policy for the first time in 1999, and issued a water management proclamation in 2000. The legislative framework and legislative measures are evidence of a contemporary approach to promote a national effort towards the aspired goals of 'efficient', 'equitable' and 'optimal' utilization of the available water resources in the country. The Ethiopian national water policy document specifically acknowledges that the water resources management of Ethiopia failed to bridge the spatial and temporal occurrence and distribution of the total annual water available in the country (Arsano, 2007). The nation's water development sector is very poor. This has caused the sector to be characterized by a serious lack of physical facilities for the provision of water supply services both in urban and rural communities.

The unsustainable and improper use of water resources of the country is evidenced by the water supply coverage of the country. According to the Ministry of Water Resources (2002) about 74 per cent of urban and 23 per cent of rural populations in Ethiopia have access to clean water. The government has gone through a wide range of challenges to effectively manage the water resources in the country. The government appreciates that there is an insufficient planning and data base with which to develop an adequate planning framework to guide water resources development, hence the apparent lack of coordination among sectors/agencies and weak institutional capacities to regulate and coordinate the activities across sub-sectors. To address water resources management requires the adoption and subsequent implementation of Integrated Water Resource Management (IWRM) based on river basins as the direction for future water resources planning. A holistic approach is needed.

There are some variations in service coverage among the various regions. Table 4.1 gives a summary of the percentage of households who have access to safe water.

Table. 4.1. Access to safe water in Ethiopia by region (2001)

Regional State	Overall %	Rural areas %	Urban areas %
Addis Ababa	70.0	0	70.0
Dire Dawa	59.5	37.0	68.0
Harari	22.7	19.0	25.0
Gambela	17.6	14.0	35.0
Oromiya	31.2	25.0	76.0
Amhara	30.7	23.0	96.0
Tigray	34.1	29.0	59.0
SSNPR	28.6	24.0	83.0
Benishangul-Gumuz	20.3	18.0	43.0
Somali	13.0	7.0	46.0
Affar	16.5	14.0	44.0
Total Country	30.9	23.1	74.4

Source: Ministry of Water Resources (2002)

4.2.2. Addis Ababa

Addis Ababa has a population of 2.7 million. Water demand for domestic, agricultural and industrial purposes is increasing rapidly. One of the perpetual problems of the city of Addis Ababa is that it has not been able to supply enough drinking water to its residents. The Addis Ababa Water Supply and Sewerage Authority (AAWSA) can supply only 62 per cent of the total water demand. This has caused severe water shortages in many areas of the city. It is estimated that between 30-40 percent of the water supply is lost. It is wasted and lost mainly to leaking pipes and aging infrastructure (Bereket, 2006). As a result, rations and interruptions in the water distribution system are frequently experienced in the city. This leads to domestic supply systems being overwhelmed resulting in breakdowns and reduced supply for its final users, which in turn leads to conflict of interest (Carter et al., 1999).

Addis Ababa is the biggest city in Ethiopia accounting for 23 per cent of the nation's urban population. Like any other developing city, Addis Ababa faces multiple challenges that have to be addressed to provide a decent life for the people. Although considerable effort has been made to improve the provision of safe and clean water supply coverage and to address the social and economic needs of the city's population, the poor urban people have been

suffering due to lack of water. According to the AAWSA (2008) report, about 63% of the households in its service area have an in-house connection (private water taps and taps in compound shared by more than two households) and use 80 to 100 litres while the remaining 37% are served by yard taps, public taps and by buying water from kiosks using between 10-30 litres per capita per day (AAWSA, 2008).

One of the causes for the deteriorating urban environment in general and water resource management in particular, is the poor performance of the municipal administration in terms of catering to the interests, needs and priorities of the public, on one hand, and the institutional aspect which encompasses governance such as budgetary, planning, implementation, providing efficient and improved water supply and sanitation services on the other.

The following section discusses the political ecology of water resources management of Ethiopia and illustrates how the ruling class shape the nature and formation of Addis Ababa. Further discusses the subsequent nature of water usage, control, management, allocation and development of potable water supply since that period (late 19th Century) throughout and across successive regimes. The section begins with the development of potable water supply referring to Addis Ababa, thereafter followed by Ethiopia.

4.3. Water development schemes and historical background

The city of Addis Ababa is over a hundred years old. It was established in the late 19th Century by Emperor Menelik II as the permanent capital of the then emerging modern Ethiopian state (Pankhurst, 1962:35; Ayenew, 2005). Over the years, the city has grown into an important urban centre following the process of modernization and economic development which Emperor Haile Selassie I zealously pursued in the aftermath of World War II and turned Addis Ababa into the modern capital of Ethiopia, [which means "New Flower" in Amharic, located almost at the heart of the country]. Pankhurst (1962:35) points out that "The country was beautiful and the army loved staying there. It was Empress Taitu who ordered that the town should be given the name of Addis Ababa". Various literature show that the city's development began after the coronation of Emperor Menlik II as the king of Ethiopia.

It is believed that the foundation and early expansion of the city was started at the Menelik palace around the hot spring which served as a political centre and extended to areas of St. George Cathedral that served as a religious centre embracing the main local market centre hitherto called Aradaa (Oromo market) (Pankhurst, 1962:36).

The availability of spring water and flowing rivers and easy access to the resources attracted the king's family there. Afterwards Addis Ababa became the centre of political, religious and economic institutions as a result of urban sprawl to every direction around these centres. This contributed to the increase of the city's population. Currently, out of Ethiopia's estimated urban population of nearly 12 million, about 22.5 percent live in Addis Ababa, and this qualifies the city as the country's foremost urban centre (CSA, 2007).

The first piped water supply service was started in Ethiopia in 1901, supplying water to the imperial palace (AAWSA, 2001: 10 – 17). The emerging city of Addis Ababa was the first to receive a clean water service in the country. The source of water was a spring located at the foot of the Enttoto Hills. Before this date, all people were using traditional sources. After 1900, water supply services continued to grow gradually; and nominal payment for drinking water was started. In almost all towns, irrespective of the amount consumed, flat rates were applied. People getting their water supply from public taps pay more per cubic metre than people having private connections. This means, poor people who pay 10-20 Ethiopian cents per 20 litre-container from the public taps, pay 5-10 Ethiopian Birr per m³; while those with house connections pay 0.50 or 1.00 Birr per m³ (Bereket, 2006). Even at present, in certain towns, flat rates are used for all consumption including public taps. However, due effort is being made to implement the water policy provision, so that existing tariffs could be amended. It must be noted here that in the country's long history (108 years) of clean water service, the water supply coverage is still only 94% for urban centres and 56% for rural areas (CSA and ORC, 2005). I now discuss the historical overview of the use of water resources in the country, linking this to the institutional development of the water sector discourse throughout three successive regimes.

In Ethiopia, the formal institution regarding water development schemes were started in the second half of the 1950s (Rahmato, 1999). It is believed that the first initiative was taken by the Ethiopian Imperial government, thereby establishing for the first time a Water Resources Department (WRD) within the Ministry of Public Works and Communications in the late 1950s. This institution was set up to carry out some activities relating to photogrammetric

and interpretation of the areal maps of the identified river basins. With the help of this department, large-scale water projects for agricultural purposes and power generation were constructed from the end of the 1950s, and were concentrated in the Awash Valley as part of the agro-industrial enterprises that were expanding in the area at the time. They subsequently spread to the Rift Valley and the Wabe-Shebelle basin. The main focus and interest of the government at the time was almost entirely on large-scale and high technology water projects: hydro-power dams, irrigation schemes, and water supply projects for Addis Ababa and a few major towns (Arsano, 2007).

The Water Resources Department (WRD) was established as a support team for the feasibility studies that were carried out on the Abbai (Blue Nile), Awash and Wabe-Shebelle river basins. These extensive studies of the water resource potential of these river basin projects was carried out jointly by the Ethiopian Government with a German engineering team, and the U.S. Bureau of Reclamation in 1962 and 1964 respectively (Rahmato, 1999). Arsano (2007) states that the main tasks accomplished by the WRD were: providing hydro-metrological services to the study programme; establishing the basis for the future development and expansion of hydro-metrological services throughout Ethiopia; and a water resources inventory and community water supply (Arsano, 2007). At the time when these river basins projects began, there were high hopes for the socio-economic development of the country. But, due to uncoordinated water development programme and the absence of the legal and institutional framework, most of the projects' progress was slow except Awash River basin. However, the imperial development projects have continued until recently and some of them have been completed and new ones initiated. All large-scale schemes in the country have been constructed through the initiative of the government, and managed by state or parastatal enterprises. This continues throughout and across successive regimes.

In this regard government proclamations, established several institutions from time to time with some specific purposes of study or development. For example, the Awash Valley Authority (AVA) was established by Government General Notice No. 299 of 1962. It was the first water management institution in Ethiopia to administer water use and water rights in the Awash Valley, coordinate the activities of all government organs in the Valley and allocate water for irrigation and other purposes.

Later AVA was replaced by Awash Valley Development Agency (AVDA) established by the powers of the Legal Notice No. 53 of 1977. Arsano (2007:129) points out that:

The AVDA was responsible over the waters of the Awash Valley in line with the development and expansion of state farms throughout the country. It was tacitly repealed by Legal Notice No. 118 of 1981 which established the Water Resources Development Authority (1981-1995).

Similarly, in the late 1980s, The Military Socialist Government (Derg), like its predecessor, was keen to promote large-scale and complex water projects, as the water sector development was seen as part of modernization and considered an important investment for improving the country's agricultural economy. With the nationalisation of industrial and agricultural enterprises, the government's emphasis was to promote high technology water development schemes managed by state-controlled agro-industrial and agricultural enterprises (Arsano, 2007).

It was only in the second half of the 1980s, as a result of the devastating famine of 1984/85, that the Derg began to show interest in small-scale water management schemes. The development of small-scale irrigation projects for the benefit of peasant farmers signalled a new approach to water development by the military government. However, progress was slow from the mid-1980s to the fall of the Derg in 1991 (MoA 1986; cited in Rahmato, 1999: 75).

Thereafter, several institutional arrangements succeeded one another, often with specific purposes of facilitating state-sponsored investment projects in water-related development activities.

In general, various studies indicated that the main reasons given for the slow pace of progress in water supply services in the Imperial and Derg regimes were the lack of a comprehensive water legislation, and policy planning and implementation was guided by a strong top-down approach. Moreover, there was no involvement of stakeholders in any aspect of water resource development. The experiences of the two previous regimes have been useful for the current government in a variety of ways, in order to set its water resources management policies based on the lessons of the past and desirous of avoiding the mistakes that were committed.

Another significant institution was the Water Supply and Sanitation Authority (WSSA), which was established in 1981. Between then and 1992, the WSSA was the principal agency responsible for water development in the rural areas and all urban areas except Addis Ababa. During this period, the general policy of the government was to provide water and sanitation

through its own public water sector institution with the supply side approach. In order to strengthen the government owned institutions, the Military government (since 1975) nationalized urban land and extra houses and made them public property. They also nationalized the private sector driller and their equipment and absorbed the Ethiopian Water Works Construction Agency (EWWCA), which was later used to set up the autonomous Water Well Drilling Agency (WWDA) (MWR, 2003). Their management was put under the central economic system. The administration and social changes that the Military government introduced had brought significant change to the utilization of the resources. No water resources development was allowed legally to the private sectors for any kind of activities.

The whole water sector had generally been viewed as a supplier of “free” services which failed to consider the scarcity value of water resources in the country. At that time, tariff and cost recovery could not get full attention due to the socialist economic policy implemented in the country. Tariffs were low and service was haphazard (MWR, 2003). The restriction of the private sector escalated the drilling and hand dug cost of water supply. After the overthrow of the Socialist (Derg) regime in 1991, the current Government introduced free market policies and recognized the water resources problems of the country. The Federal Democratic Republic of Ethiopia (FDRE) considered the development of the water sector as an important element in the overall strategy of the development of socio-economic growth of the country.

The above discussion highlights that, several institutions were established from time to time by government proclamations, with some specific purposes of study or development. Since 1991, the present government has expressed a strong commitment to rapid progress in the provision of safe water to the people of Ethiopia with the establishment and maintenance of appropriate institutional structures for the management of water resources. The Ministry of Water Resources (MWR) was only created in 1995 (FDRE, 1995b:49). It is the first developed executive unit with a full mandate vested in it with regard to protection, management and utilization of the water within the country as well as trans-boundary waters.

The institutional development of the water sector in Ethiopia can be viewed in three phases. First, the Monarchical regime (1900-1974): the water sector was managed by a National Board that was chaired by the Prime Minister. All other ministers were members, and the Director of the National Planning Board was appointed as the secretary. The president of the national water sector was the Emperor himself, while the Crown Prince, the Prime Minister

and the members of the Crown Council were members of the Advisory Council. Similarly, during the Military Socialist regime (1975-1991), the affairs of the national water resources were strictly regulated under the direct auspices of the Council of Ministers, which was chaired by the Head of State. The nation's water institutions were created by fiat, and not by legislative processes. Third, the present regime (1991 onwards), during its period, the Ethiopian water sector was raised to the level of a fully-fledged ministry (Arsano, 2007). Proclamation No. 4 of 1995 formally established the Ministry of Water Resource (MWR). All water development functions of the country thereafter were entrusted to the new ministry.

The Ministry of Water Resources (MWR) formulated a Water Resource Management (WRM) policy that was aimed at enhancing the well being and productivity of the Ethiopian people through the provision of an adequate drinking water supply service. This policy document is based on the principle of equitable, efficient and sustainable utilization of water resources among users. The main goal of the policy was to enhance and promote all national effort toward the efficient, equitable and optimum utilization of the available water resources of the country for significant socio-economic development on a sustainable basis (MWR, 1999). The policy gives an opportunity to all stakeholders to participate in improving efficient access to, and utilization of, safe water in the country.

In conclusion, the present government relatively appreciated because of being the Ethiopian water sector was raised to the higher level of a developed ministry, and by establishing the Ministry of Water Resources it showed a significant departure from the previous institutional tradition of the Ethiopian water sector. The MWR was a new Ministry in the history of Ethiopian water resources management. The overall activities of development in the water sector were better streamlined, with a clearer mandate and organizational set-up (Arsano, 2007). This was a step forward towards enhancing development in the water sector.

4.4. Nature of water management and value of water in Ethiopia

The country has rainfall which varies in space and time. There is abundant water resources, but unevenly distributed. In addition to the above, the absence of a well-defined water policy has been one of the major causes, in the past, for the poor performance of water development. The Government of Ethiopia formulated and issued a comprehensive Water Resources Management Policy in 1999. This water policy serves to enhance the development of the country's water resources to make an optimum contribution to accelerated socio-economic

growth. To translate the water policy into practice a water sector strategy has also been developed.

The policy has given due recognition to the development of water sector. The general objective of the policy is the transfer of economic and social benefits to the people on an equitable and sustainable basis. The fundamental principles of the policy have also highlighted the following, with regard to the value of water: “Water is a natural endowment commonly owned by all the people of Ethiopia. As far as conditions permit, every Ethiopian citizen shall have access to sufficient water of acceptable quality, to satisfy basic human needs” (FDRE, 2000:14).

In the policy, water has been recognized both as an economic and social good in order to improve the management of water resources and development. Additionally the water policy has clearly recognized the disadvantaged groups of the population by stating that, “Although all water resources development ought to be based on the economic value of water, the provision of water supply services to the underprivileged sectors of the population shall be ensured based on a special social strategy” (MWR, 1999:7). Priority in water allocation is given to human and animal consumption, followed by irrigation (MWR, 2002).

4.5. Features of water tariff, water pricing and cost recovery in Ethiopia

Cost recovery from users has not been considered much in the past. Water tariffs did not have a relation to the cost of producing water to consumers. In several urban centres, tariffs are not sufficient even to cover the operation and maintenance costs, let alone capital investment costs. In many places in the country, flat tariffs have been used and remained unchanged for many years; while at the same time the cost of supplying water to consumers has risen steadily (UN-WWAP, 2006).

Currently the situation seems to be changing. The present government with its strategy of devolving responsibility to the regional administrations, going down to woreda (District) level and the formulation and the issuing of water policy in 1999, water pricing has started to change. The water policy has provided a foundation on which progress for recovering costs could be built. However, the process is still in its early stages, and cost recovery has not been effectively implemented in the whole country yet. In this regard, on average, cost recovery is too low to recover operating costs, not to speak of providing adequate maintenance of

facilities. “Recurrent expenditures - estimated at US\$ 29 million in 2001-02 - were financed primarily through user charges (64%), as well as by subsidies from the regional governments (31%) and the federal government (5%); Despite this overall bleak picture, a few service providers recover all operating costs and generate a modest cash surplus” (UN-WWAP, 2006:74).

The coverage of improved water supply in both urban and rural areas of the country it is very low though it is relatively better in urban areas-which is about 94% (CSA and ORC, 2005). This shows that much still needs to be done so that the full coverage of this basic service for the people of Ethiopia is attained. Parallel to increasing the coverage there is a need to consider the efficient management of and proper use of the resources and sustainability of the service. The policy for increasing the coverage as well as the proper use and sustainability of the service requires implementation of a cost recovery system, which can be either full or partial cost recovery.

The guiding principles in this regard are:

- Demand responsive financing: to enable effective expression of demand, the need for some level of self financing of projects and the need to ensure full coverage of operation and maintenance costs by service providers.
- Tariff setting and cost recovery: to promote site-specific tariff setting along with full cost recovery for urban water supply and full operation and maintenance cost recovery for rural water supply while ensuring affordable access for the poor through appropriate mechanism for cross subsidization (MWR, 1999).

However, Narsiah (2010:15) explains that:

The provision of services on the basis of full-cost recovery means that all the costs of production are recovered from the consumer. The full cost of production has to be recovered from the consumer because subsidy mechanisms are removed. This occurs through a process of differentiation, facilitated through accounting procedures.

The regions carry the responsibility of providing and running the water schemes. All water supplied to urban towns has to be paid for by the consumers. Individual connections (consumers) pay according to their metered consumption. Consumers using public fountains pay a public vendor for the quantity that they take. Charging for water services is essential in

order to generate funds for operating, maintaining and investing in systems, ensure that scarce supplies are allocated to essential purposes, and signal to users the real value of the resource (Winpenny, 1994). As a market principle, a service providing water should not give its product away free even to the poorest customer. It is clear that this principle imposes some problems for a country that is trying to address the urban poor (underprivileged) sector of the population, and further also encouraging to dismiss or ignore subsidy as a political and social responsibility of the state, in favour of economic gains and economics of water delivery.

In order to solve this dilemma the tariff structure (water prices) should be fair (there should be some link between payment and the amount of water consumed) and based on equitable and practical guidelines and criteria and should include a special social strategy. Because public subsidies are legitimate to achieve certain benefits (provision of supplies to the underprivileged and underserved). However, these subsidies need to be transparent, targeted, and budgetary practicable and sustainable (for example, covered by surpluses generated elsewhere in the system). In this regard, the Ethiopian water policy advocates that water prices are site specific and are determined according to local circumstances (Water Resources Management Policy, 1999). As a result the market based approach of delivering social good compromised.

The tariffs charged to users for water supply are much lower than the economic cost of supplying water to the consumers. For a long time tariffs for most urban water supplies have not increased; and the revenue obtained from consumers did not cover even the operation and maintenance costs in several cases (UN-/WWAP, 2006). This means that many systems are operating under subsidies from the government. In many cases the standard method of charging for water has been by a flat rate charge of 0.50-1.00 Birr (\$US0.10 cents) per cubic meter for consumers whose consumption is metered. The tariff has been applied uniformly, with no differentiation among service standards or amount of consumption for residential, commercial, industrial and public areas. In many places, at public fountains, where the water is sold by public vendors, the water is still charged at the same rate as that for private connections (Bereket, 2006).

In order to control water use and abuse in whatever form it is-progressive tariffs or prices are needed, whereby higher units of consumption are charged at a higher rate. This means that

tariff rates should be strictly linked with consumption rates. In this regard, Laurie and Crespo (2007:846) states that:

While supporters of metering see it as a way of benefiting the poor by charging them only for what they use, in countries of the North where access to water has been historically established as part of universal citizenship rights under health and hygiene discourses, others argue that the introduction of water metering is discriminatory. They claim that, because of the cost, poor users will be discouraged from using water for necessary basic needs.

In turn, it is argued that this will have a negative effect on vulnerable groups and indicators of absolute poverty. Despite this debate the Ethiopian government pro-poor intervention has increased.

The higher the consumption, the higher is the amount to be paid, or the less you consume, the less you pay. According to the AAWSA (2008) report, the tariff is set in blocks of customers. Public tap users pay a flat rate of 1.75 Birr per cubic metre for all consumption it is the lowest tariff; non domestic customers also pay a flat rate of 3.80 Birr per cubic metre for all consumption. However, domestic customers are made to pay in a progressive rate, that is, 1.75 Birr for using up to 7 cubic metre of water, Birr 3.15 for using 8-20 cubic metres and Birr 3.80 for any consumption above 21 cubic metres of water. The rationale behind this is that water consumption and income are directly related. Therefore, those who consume more water are expected to pay more because they are better off.

According to the Water Aid Ethiopia (2005) report in Addis Ababa the majority of public taps (68%) are under Kebele (Local government administration) management. Others are under community management, while a smaller number of public taps are managed by private individuals, NGOs, Community Associations or Boards of Trustees. However, when water from public supplies is scarce, or the distance to a public fountain is too great, residents are often forced to buy water from houses with private connections (UN-WWAP, 2006). As a result, these public tap users are paying more for their water than domestic connections.

Collignon and Vezina (2000) state that low-income households fetch water from public stand-posts and neighbours, and pay more for it because they do not have their own private tap. The reason is the inability to cover the high initial cost of private connection. The buying price of water from AAWSA is standardized at 1.75 Birr per cubic metre (equivalent of \$US 0.16); however the selling price for customers is not uniform. The selling prices range from

1.75 times to more than 8 times the buying price. The price charged is 0.10 Birr for a 20 litre bucket or equivalent to 5 Birr per cubic metre, or more than 3 times the selling price (Water Aid Ethiopia, 2005). The private water vendors charge a very high price ranging 20-30 Ethiopian cents for a 20-litre container making the cost of water per cubic meter 7-10 Birr. Currently the situation is not being changed for the better. Public water taps provide an important service for the urban poor and public water taps should be regulated that can control the management and operation of public water taps in the city (Bereket, 2006).

Most of these tariff structures are not only uneconomical but they are also not equitable. The subsidies made by the government benefit the higher income group of society who have individual connections and who use relatively large quantities of water. Those who buy from public fountains and who receive a much inferior service, with long queues and frequent shortages, pay the same rate per cubic, meter to the public vendor. The public fountain users can afford less to pay the charges than those with individual connections. If the poorest members of a community cannot afford to pay for water from public fountains, there is a great danger that these consumers will continue to use water from traditional sources. These sources are often polluted, and so the community health benefits that would normally be allocated with an improved water supply scheme cannot be achieved (UN-WWAP, 2006). This is also contrary to the water resource management policy of Ethiopia that proposes subsidised tariff rates for communal water services.

4.6. Legislation and Regulation

The creation of an effective legal and regulatory framework helps considerably to improve water resources development and management. Relevant proclamations, policies, guidelines and directives have been developed and issued to support water resources development and management. The water sector in Ethiopia is undergoing a paradigm shift as a result of the Water Resources Management Policy and Proclamation. The proclamation considers that all water resources of the country are the common property of the Ethiopian people and the State (article 5).

Some of the most significant environmental legislation laws in Ethiopia are

- Proclamation No. 41/1993: establishment of Natural Resources and Environmental Protection Bureaus of regional government
- The water resources utilization proclamation No. 2 of 1994 the main law that deals with water management
- The Health policy (1993) provides for prevention of environmental pollution from hazardous chemical and industrial wastes and
- The Water Resources Management Proclamation (197/2000).

The purpose of the proclamation was to ensure that the water resources of the country is protected and utilized for the highest social and economic benefit of the people of Ethiopia, to follow up and supervise that it is duly conserved; to ensure that harmful effect of water be prevented; and that the management of water resources is carried out properly. All the above including the National Environmental Protection Authority (NEPA, 1997), along with the Constitution (FDRE, 1995) are all included within Ethiopian's Environmental Legislation Framework.

The 1995 Constitution of the Federal Democratic Republic of Ethiopia (FDRE) describes the basis of why Ethiopia needs legislation and policies to be carried out. The Constitution, in article 40 (3) provides: "every citizen the right to clean water and environment; and the right to ownership of rural and urban land; as well as of all other natural resources; is exclusively vested in the state and in the peoples of Ethiopia". In spite of the fact that the three Constitutions of Ethiopia represent three political regimes with three different political systems ("feudalism", "socialism" and "capitalism"), they are consistent in codifying the sustainability principle in the form of public ownership of water and regulation by the state (Arsano, 2007).

The legislative framework includes Legal Notice No. 112 of 1948 which provided for the Addis Ababa municipal water rates, licenses and fees. A partial cost to be covered by urban users was introduced for the water delivered by public investment; the Water Resources Management Proclamation (197/2000); water sector strategy formulated in 2002 which is considered as an instrument to translate the Ethiopian Water Resource Management of the policy; the Health Proclamation; Environmental Legislation; and Several Regional Water

Supply Management Proclamations such as Regulation for the Determination of Water Tariffs and Service Charges of the Towns of the Amhara National Region (15/2000); A Proclamation to Provide for the Establishment of Urban Water Supply and Sewerage Service Enterprises of the Oromiya Regional State (78/2004), to mention a few.

The Ethiopian Water Resources Management Policy (EWRMP) further states that the "User Pays" principle should carefully be harmonized with the ability and willingness to pay principles. While rural tariff settings are based on the objectives of fully meeting the operation and maintenance costs, urban tariff structures (water prices) are based on the basis of full cost recovery (i.e., costs for investment and maintenance and operation cost). However, the reality at the present is not practical, because, the issue of full cost recovery for all urban centres with a population of 2500 and above has a problem since most of them are not able to stand on their own feet and is difficult to implement currently (UN-WWAP, 2006). Therefore, except for Addis Ababa and very few urban centres, there is no urban centre that has so far implemented the pricing policy the Government provided (Bereket, 2006). It seems that it will take some time before these urban towns are able to stand on their own feet. In any case, it is the country's present policy that every effort should be made to commercialize the management of the water supply system in cities and towns of the country with the full participation and involvement of all relevant stakeholders, including the beneficiary communities (Teshome, 2008).

4.7. Institutional Framework

The establishment of institutions were necessary for the provision of water supply and sanitation. In this case “the water sector is characterized by complex institutional arrangements, and a variety of channels and sources of funds are used to finance the sector” (WSP/UNDP, 2006:21). In spite of the fact that the Ethiopian Civil Code (Ethiopia, IEG, 1960) envisages the need to establish a competent institution responsible for water resource development in the country, the institutional development of the water sector has only been modest, often geared to facilitate specific irrigation projects (Arsano, 2007). At the national level, Ethiopia’s water is managed, due to its federal organization of the territory, following a decentralized model. Responsibilities concerning the management of water in the country have been transferred in 1992 from the Central Government of Ethiopia to the Regional Administrations. This model meets the local needs of the people of Ethiopia.

Many nation-states in the post-war period incorporated notions of the democratization process through the devolution of power from the central place authorities to local government and communities. Since the 1980s, and increasingly in the 1990s, most African countries have implemented decentralization programmes. Ethiopia is no exception to this trend. Ethiopia enacted a Local Government Act in 1995 aimed at transferring authority from central government to districts and municipalities. It is generally accepted that decentralization promotes good governance and ensure effective and sustainable management of water resource that promised universal access to public services.

The current government undertook wider institutional and organizational reform. The major reforms of the water sector relate to the overall reform process of decentralization; separation of regulation and service delivery and overall civil service reform. The new development and enforcement of the appropriate management action for water supply and sanitation is to achieve autonomy and commercial viability (UN-WWAP, 2006) which recognizes:

- The regulatory role of the government
- The role of communication in decentralized management
- The use of local skills and resources and
- The involvement of private/informal sector entrepreneurs.

Especially with the decentralization framework in Ethiopia, different responsibilities are emerging for different levels of government: policy and strategy development, project implementation, and monitoring and evaluation (MWR, 2002). Based on the decentralization principle, the Government of Ethiopia established the Ministry of Water Resources (MWR) in 1995 at the federal level. This Ministry is carried out the management of water resources at the national level. The Ministry of Water Resources is responsible for formulating policies for the water sector at national level. It is also responsible for legislation with regard to the utilization and protection of water resources as well as the allocation of water between regional governments. Pursuant to the United Nations 2000 Declaration of the Millennium Development Goals, the government of the Federal Democratic Republic of Ethiopia has continued to further devolve decision-making process, planning and implementation of social and economic activities down to the local levels (Teshome, 2008).

The Institutional Framework in Ethiopia was formed as the permanent institution with a development focus and resource management as core legal principles. Those policies are relevant in water management: The water resource management policy (1999) provides for water quality management and supply; the environmental policy (1997) provides for the “polluter pays principle” and emphasizes the Environmental Impact Assessment (EIA) process; the “polluter pays principle”, which is getting increasing acceptance in environment legislation has been accepted in Ethiopia and is incorporated in the draft pollution control legislation (Hailu, 2000). Market based and non-market incentives and benefits have also been envisaged in the said policy. The developer and the public at large are encouraged through the policy and draft legislative provisions to appreciate the harmony between individual and public interest in environmental matters (NEPA, 1997). The Health policy (1993) provides for prevention of environmental pollution from hazardous chemical and industrial wastes.

Under the Constitution (1995), every Ethiopian is entitled within the limits of the country’s resources to clean water; Article 40(3) places the ownership of water resources within the domain of the state; the Constitution empowers the Federal state to enact laws for utilization of natural resources; the regional states have powers to administer natural resources within their respective regions in accordance with the Federal laws; the water resources utilization proclamation No. 2 of 1994 is the main law that deals with water management; the National Environmental Protection Authority (NEPA) has the responsibilities of defining laws related to water quality standards and EIA (Hailu, 2000).

The Government of Ethiopia established the Ministry of Water Resource (MWR) in 1995 at the federal level. “The Ministry of Water Resources is responsible for formulating policies for the water sector at national level, for long term planning strategies, the setting of generic standards and for the coordination of projects and their funding together with foreign donor agencies. It is also responsible for legislation with regard to the utilization and protection of water resources as well as the allocation of water between regional governments. It also provides technical assistance and advice upon request to the regional governments of the country” (MWR, 2001b). The functions of the Ministry are carried out through seven specialized departments in the MWR. These are:

- Departments of Hydrology
- Basin Development Study
- Trans-boundary rivers study
- Design works
- Contract administration
- Water rights administration and Water resources management and
- Water supply and sewerage department (MWR, 2001b).

In 2001, the government adopted a National Water Strategy prepared by the MWR. The overall strategy includes a water resources strategy, a hydropower development strategy, a water supply and sanitation strategy, and an irrigation strategy. Concerning water supply and sanitation, the strategy aims at: more decentralized decision-making; promoting the involvement of all stakeholders, including the private sector; increasing levels of cost recovery and integrating water supply, sanitation and hygiene promotion activities (UN-WWAP, 2006). Therefore, to achieve management of water governance requires consideration of the political, economic, administrative, social processes and institutions by which government, public authorities, communities and the private sector take decisions on how best to develop and manage water resources and service delivery.

4.8. Community participation in water resources management

Although faced with limited physical, financial and ecological resources to potential water supplies, countries try their best to set the right institutional foundation of their water sector (Meinzen-Dick, 1997). These efforts are reflected in terms of legal and policy reforms and water user organization establishments. Ethiopia has begun to recognize since 1993 the functional distinction between centralized mechanisms needed for coordination and enforcement and decentralized mechanisms needed for user participation and decision-making (Arsano, 2007). The recent example of this ongoing decentralization is utility agencies in the urban water sector. The importance of users participation for effective decision making at the lowest practical level has also been realized.

Water supplies services in most towns and cities in Ethiopia are organized as Urban Water Supply Services established by Government proclamation in many of the big cities and towns

found in Regions. They are autonomous and plan, develop and operate, within the legal and policy provisions that they are required to do (UN-WWAP, 2006).

Recurrent droughts, inadequate clean water supply and the poor state of water resource management in the country have prompted professionals and practitioners to get organized into civil groups and help water development efforts. The Ethiopian Rainwater Harvesting Association was formed in 2000. This Association has been engaged in grassroots level research and dissemination of relevant knowledge to water users both in the rural and urban areas (Arsano, 2007:142).

The Ethiopian Water Resources Association was set up in 2003. Certain Urban Water Supply Services are under municipalities with a leverage to plan and operate in a business-like fashion; in other cases there are Water Boards and/or Water Committees responsible for the management of water systems in their respective constituency. They are expected to contract out service provision to private operators (MWR, 2003). The Addis Ababa Water Supply and Sewerage Authority (AAWSSA), the biggest Public Water Utility available in the country, provides water to almost 2.7 million inhabitants of the city.

In all case of the management types mentioned above, the role of Government representatives is significantly high; as a result the various Management Boards are chaired either by Mayors or Town Administrators (Arsano, 2007). The rationale behind this is that mayors and/or towns Administrator are elected people's representatives.

But, members of the Water Boards Water Committees and the Management Board of the big public water utilities are also drawn from organizations that are considered to represent the general public and also representative from the social and economic entities that are believed to have a stake in the overall plan, development and management of the water systems (UN-WWAP, 2006:131).

According to the EWRMP, in order to enhance readiness to pay and ensure transparency in the financial management and fair and balanced services, users and communities are required to participate in the management of the systems (Bereket, 2006). The full participation of users is very important for effective decision making at the lowest practical level. But, in view of the social and economic complexities prevailing in the urban centres, the decision making process could be through elected representatives in Government and associations organized to meet and support certain social and economic demands of respective urban communities.

The general public is therefore participating in different ways in the development of urban centres and in water demand management. Arsano (2007:144) points out:

Those urban dwellers in Ethiopia are organized into Town Dwellers Associations at various levels, now becoming the sole administrative structures to manage their own social and economic affairs with the support of many stakeholders that are interested to work closely with the municipalities and their branches organized at different Local levels. These urban associations are administratively autonomous and budget, plan, implement and operate within the limit of resources available to them from all sources, including communities' contribution either in cash or other forms.

Since urban associations are managed by and operated with the interests of water users in mind, they tend to substantially reduce the cost of implementing water pricing, such as monitoring and enforcement cost (Easter et al., 1997).

Rahmato (1999) indicated that the formation of civil groups in the water sector is a new phenomenon in Ethiopia, which is hoped to fill the gap left due to the institutional instability in the water sector. These societies are already gathering large pools of membership with diverse expertise and experience. Increased public participation in the water sector will greatly help expand the knowledge about the water sector and will serve as a public watchdog on governmental and business handling of the country's water resources (Rahmato, 1999). The necessity of community participation in decision-making processes, incorporating gender issues in water resource management policies, will be discussed in the following section.

4.8.1. Gender issues within the water sector in Ethiopia

The central role women played in the provision, management and husbandry of water, primarily in the domestic and household context, has gained widespread recognition in recent years. Gender issues need special consideration in relation to water management and use (UN, 1992b). Gender issues were included in the United Nations Conference on Environment and Development Agenda 21 document, among the guiding principles set forth at the 1992 Dublin International Conference on Water and the Environment (World Bank, 1993b).

Gender issues inform and enrich the other three principles focused on at the conference: water as an economic good, water management at the lowest appropriate level, and water as a finite and vulnerable resource. Following the principles requires first, determining what people (consumers) want and will contribute toward; and second, facilitating their participation in water sector development decision-making on the types and levels of service and operation and maintenance (UN, 1992b:54).

Men and women often have disparate roles and motivations in sector activities, and recognizing these differences when determining what communities want, and designing operations and maintenance can increase the chances for water supply sustainability (Rahmato, 1999).

The role women play in the water sector is in many cases to collect and manage water at the household level. “One of the Dublin principles states that water should be managed as an economic as well as social good. Within this it is important to note gender differentials; When analysing water as a social good, it can be instructive to assess benefits separately for women and men” (World Bank, 1995:62). In this regard, Moser (1993: 36) indicates:

Women and girls often suffer the most when water supply is poor and, conversely, benefit the most when supply is improved. When water is of better quality, and is available in greater quantity and closer to home, there are many advantages for females such as, women and girls have shorter trips to make carrying heavy containers, this can have a positive impact to save time, potentially increasing women’s leisure time and the time girls are able to spend in school.

Women may also use their increase in time for income-generating activities (for more productive activities).

When analysing water as an economic good, a demand-based, participatory approach that assesses what users want and are willing to contribute toward is needed. As women and girls are often the primary users of water facilities, determining what kinds of services they prefer can be crucial. The World Bank policy paper notes, “Social analysis can help clarify the gender, socio-cultural, and demographic dimensions that may significantly influence the outcome of programs” (World Bank, 1995:25). Therefore, social and economic assessment that include gender analysis can help determine when and how gender is a factor in a given project context, as well as provide suggestions for addressing the issue of community participation in decision-making process as both in design and implementation (World Bank, 1993b).

Ethiopia has dealt with women’s issues for the last three decades. It has included women in high government positions to address women’s issues, and has an explicit policy concerning women in the water sector. Further, many of the nongovernmental organizations that work with the Ethiopian government to implement water and sanitation projects have clear policies on involving women in development. Yet, when it comes to implementation, women’s

involvement is generally very limited. “The FDRE has confirmed its commitment to the development of women with the announcement of the National Policy on Women in 1993 (referred to as “Women's Policy”), and the promulgation of the new Constitution in 1995” (Gebrehiwot, 2007:29). The Ethiopian Constitution (Article 35) confirmed that men and women have equal rights to acquire, administer, control, use and transfer property, and more specifically they gave equal rights with men with respect to the use, transfer, administration and control of land (Women’s National Policy, 1993; cited in FAO and Gebrehiwot, 2007). In addition, “The water policy of 1999 has formalized the training, participation and involvement of women” (Ethiopia Ministry of Water Resource, 2000). Several international organizations and donor agencies have supported Ethiopia’s development in the water and sanitation sector, many of them since the 1980s.

The government have been taken women’s needs into consideration in 1993. Both the government and the national policy have often noted the need to view women and men as equal partners in the development process, and women’s rights as legal equals are supported by laws on voting, standing for election, equal employment opportunities, marriage and divorce, and landholding, among others (Gebrehiwot, 2007). Yet these laws had little effect on most women’s status, and however, in 1992 the government appointed a woman “Minister with a Portfolio” in the Prime Minister Office to oversee women’s affairs. It has been the national gender focal point and leading to the effective implementation of the Women’s Policy. In 1995 this role was assumed by a division for women in the Women’s Affairs Department of the new Ministry of Culture, Youth, and Sports. Afterwards the location of the women’s ministry started to stand on its own feet, in 1999 becoming part of the new Ministry of Women Affairs.

It is well known in Ethiopia that in both urban and rural areas women and children are mainly the ones fetching water for their households. The participation of women in the development of water schemes is a factor in its sustainability. Women and children travel long distances sometimes taking half-a-day, to bring water for the households (Rahmato 1999). Given that women are the ones responsible for getting water, they should be encouraged to serve as operators of the system since they are the ones who suffer most if the systems fail (World Bank, 1995). Absence of women from decision-making vis-a-vis water resources management and service delivery is both inequitable, and severely hinders the possibility of

realising public health, food production and quality of life of the people. (Arsano, 2007:111) contends that:

At the local level, water committees are being established to run water schemes and to look after the operation and maintenance of the systems; at least 2 out of 5 members of the water committees should be women in order to run the schemes.

Further Arsano (2007) contends that one of the big problems of the water committees is the absence of the legal status of Water Committees. This problem is gradually being solved and the water committees have started to be in a better position to run the schemes. Starting from the Year 1999, the water policy gives the right of full involvement of women in planning, implementation, decision-making and training, as well as empowers them to play a leading role in self-reliance initiatives. Thus, gender-sensitive policies were supported by the coordinated efforts of government, nongovernmental organizations, and donor agencies, most importantly, women were involved at all levels of the projects (Gebrehiwot, 2007).

In conclusion, it is encouraging that women's needs have been taken into consideration in Ethiopia. The participation of women in the development of water schemes is a determining factor for it to be sustainable. The participation of women in decision-making vis-a-vis water resources management and service delivery is both equitable, and promotes the possibility of realising public health, food production and quality of life of the people (Gebrehiwot, 2007). The Ethiopian government has also provided an environment in which rules were enforced: the 2000 Implementing Rules and Regulations supported the 1999 Women involvement in planning, and decision-making Act. given their domestic roles, women are also logical key candidates for educational activity concerning water use and hygiene (Rahmato, 1999).

4.9. Environmental issues

Water resources are the prime environmental and socio-economic resource directly supporting all human activity, vegetation and wildlife habitats (Rahmato, 1999). Although water is a renewable resource there is a limit to the amount available for use at any time. A significant part of Ethiopia is arid land with scarce water resources. Environmental problems in Ethiopia are found in both rural and urban settings. Recent studies indicate that rural Ethiopia, where 85% of the people live, is largely affected by deforestation, soil erosion, desertification and biodiversity loss. These are, by and large, caused by overpopulation and increased demand for agricultural land and energy, without a concomitant increase in economic performance (MFED, 2005).

Urban Ethiopia, on the other hand, because of the increased influx of migrants from the rural areas, is mainly affected by sanitation and waste management problems. In addition, although industrial activities are quite limited, the chemical and other allied industries in particular are causing water and air pollution in and around Addis Ababa and the urban centres of Ethiopia (Desta, 1998). Gleick (2000) points out that, “The nature of connection between water and ecological health, and the links between the health of natural ecosystems and human well-being calls for an integrated environmental approach to management of these systems” (Gleick, 2000:132). Management of natural resources in Ethiopia is enacted by many environmental laws since 1992. In keeping with the country’s environmental problems, government thinking since 1995 has recognized that societal and environmental needs are inter-linked. Ethiopia has developed its legislation in relation to an integrated approach to the management of its water resources. The awareness of the inter-connections between social, ecological and economic paradigms is reflected in the constitution of The Federal Democratic Republic of Ethiopia (FDRE).

Among the many principles enshrined in the Federal Constitution, the principle of “Environmental Rights” is provided for and declared in Article 44, sub-Article 1 that “All persons have the right to a clean and healthy environment. The fact that such environmental rights have been constitutionally recognized and endorsed is a commendable beginning that should be further augmented and implemented through enforceable legislation” (CFDRE, 1995a). This thinking is evident in a range of other legislation passed since 1995, for example the National Environmental Protection Authority (NEPA) and emphasizes Environmental Impact Assessment (EIA).

Under the Constitution (1995), NEPA notes that every Ethiopian is entitled within the limits of the country’s resources to clean water; and everyone has a right to an environment protected by the state through legislation. “The polluter pays principle” has been accepted in the country to prevent pollution and ecological degradation, and to promote conservation and secure ecologically sustainable development while promoting justifiable economic and social development (NEPA, 1997). In line with this constitutional principle, the established Authority is responsible for advising the government, creating awareness at all levels, and coordinating and regulating environment activities in Ethiopia. As this study focuses on the use and management of water resources in Akaki River catchment Addis Ababa it will

concentrate mainly on unplanned urbanization, rapid population growth and inappropriate agricultural activities.

In many other sectors of the developing countries of the world, economic development usually does not take into consideration the possible impact it has on the environment. On the other hand, absence of proper environmental management practices paralleling economic development may lead to irrecoverable environmental degradation (Berkes & Folke 1998). The growth of the industrial sector and urbanization is placing increased pressure on ecosystems as a result of disposing by-products into the environment. This becomes a significant problem particularly when high concentrations enter the environment in large quantities without prior treatment. There are numerous sources of pollutants that could deteriorate the quality of water resources.

In developing countries, sources of pollution from domestic, agricultural, industrial activities are generally unregulated. Likewise in Addis Ababa, where there is no regulated and reliable environmental protection practice, there are a number of pollution sources that continuously deteriorate the quality of surface and ground water of the city. Major sources of pollutants in the study area are industrial establishments, agricultural activities, municipal wastes, fuel stations, garages and health centres (Desta, 1998). In the study area numerous vegetable producers and market areas contribute to the deterioration of the water environment.

Environmental management is not enough to achieve the environmental sustainability of water resources. Public participation is required. In this regard, the country's development strategies, link environmental and social concerns. They go beyond the development of policy to include stakeholder participation in the management of water resources, as well as an awareness of the integrated nature of natural resources. This resonates with growing concern that the management of all of the earth's natural resources needs to adopt an interdisciplinary management approach: one that examines both societal needs and the needs of ecological systems (Berkes & Folke 1998). The IUCN (2000:68) states that "the interdependencies between land, water and segments of human society require NGOs, governments, local groups, private companies and donors, in consultation with stakeholders, to jointly develop and implement an ecosystem-based catchment management approach to sustainably manage water resources." Participatory ecosystem management approaches have

been developed in a number of natural resource sectors, including river catchments (Berkes & Folke 1998).

There are a number of challenges to managing the Akaki River catchment (Alemayehu, 2004). Population growth and misuse of water and land, and urbanization are some of them. Domestic sewage and industry contributes a significant amount. A large share of the wastewater is dumped untreated into rivers and streams. The steadily increasing water pollution could seriously compromise the catchment's capability to provide adequate supplies of good quality water for domestic, agriculture and industrial use (Desta, 1998). Population growth in and around Addis Ababa, as well as movement of people from rural to built-up areas has in many cases caused these places to expand at a rapid rate. Problems with this occurrence arise particularly when naturally occurring ecosystems and habitats are taken over or destroyed as a result of these urban areas increasing in size (Mckinney, 2002). As a result, urban environments become threatened. Thus, it is essential that municipalities implement plans or frameworks to prevent these habitats from being destroyed. Furthermore, the sewer system is insufficient in many urban areas of Addis Ababa.

Uncontrolled urbanization places increasing pressure on the available water resources of the surrounding area. This altered the natural hydrology and degraded the quality of the water, which in turn impacts the users, and ecological services downstream (Zewide, 1994). Besides, the peri-urban agricultural activities in the form of vegetable production; livestock has become increasingly important to livelihoods and food production, and its possible impacts on public health and the environment (Waltainformation, 2004).

Downstream, which lack proper water treatment and filtering facilities, public health is seriously threatened by polluted drinking water (Zewide, 1994). Lead poisoning is also another serious health problem resulting from corroding water pipes (Tamiru et al., 2003). The other surprising aspect of these catchments is that communities use the polluted/waste water from these rivers for irrigation (Waltainformation, 2004). Some studies indicated that 40% of the vegetables comes from the suburb areas and are directly irrigated from polluted river water (Alemayehu, 2004). During dry periods very low flow levels characterize the rivers.

The Little and Great Akaki Rivers are used for various purposes including those which are not environmentally sound. Given that the rivers are polluted, vegetables are also polluted. This water is used downstream (in Addis Ababa, Akaki sub-city and rural areas) for household purposes, including drinking. Environmental health risks in this area of the city have worsened. Pollution of these rivers is a serious threat as it results in the contamination of ground water and other drinking water for humans and animals; unhealthy irrigation of land in which food is being grown; an unhealthy environment for aquatic life; and most of all contamination of larger water bodies, such as the Awash River into which many of these rivers flow.

4.10. Conclusion

This chapter has discussed the legislation, socio-economic and general issues pertaining to water resource management in Ethiopia. It describes how the legal/institutional framework relating to water and other environmental issues reflects a paradigm shift in government thinking which now links societal and environmental needs. The basic tenets of sustainable water use rest on social equity, economic efficiency and ecological integrity (Arsano, 2007). There is also a need for the establishment of an integrated water resource management system, which will serve as a mechanism for equitable and efficient use of the resource for the entire catchment/river basin. It is also argued that efficient utilization of water resources should be a guiding criterion that decreases the rate of abuse, prevents water pollution, and minimizes the conflict between upstream and downstream water users.

The past two successive regimes in Ethiopia (the Monarchical Imperial-1900-1974 and the Military Socialist Derg-1975-1991), show that water resource development and management has been weak. Lack of comprehensive water legislation, and policy planning and implementation was guided by a strong top-down approach contributed to government institutions related to water sector were fragmented, and laws were not consolidated. This explains that there was a limited development of the water sector in the country. Although those regimes have been undertaken various programmes and projects over water resources development, little has been achieved. However, the present government (1991 onwards) has made a rapid progress in water supply services with the establishment of appropriate institutional structures for the management of water resources. Thus, the Ethiopian water sector was raised to the higher level of a developed Ministry, and by establishing the Ministry

of Water Resources it showed a significant departure from the previous institutional tradition of the Ethiopian water sector.

CHAPTER FIVE

RESULTS AND DISCUSSION

5.1. Introduction

This chapter presents the results obtained from the study. Firstly, it presents the historical overview of the use of water resources in relation to water sector policies and management practices. Secondly, details of the different water users household characteristics are presented. Thirdly, the perception and general attitude of household respondents regarding water sources, water use and consumption patterns as well as the availability of water and reliability of existing water supply in relation to tariffs or cost of water is presented. The views of the stakeholders regarding water resource management practices are discussed in each sub-section. This study is mainly concerned with evaluating existing water resources management practices; assessing access to drinking water and proposing sustainability and social justice based management strategies in Addis Ababa.

5.2. Water Supply in Addis Ababa

In this section the development of potable water supply in Addis Ababa will be discussed. As documented in many Amharic manuscripts, the potable water supply for Addis Ababa was initiated for the first time during the reign of Emperor Menelik II during the late 19th century (Adam, 1999). The water supply was realized by constructing a mini-dam (with earth and gravel packs) along the Kebena River at the slope of the Entoto Mountain in the south. At that time, to keep the water quality of this source it was partially treated with lime, sand and charcoal (AAWSA, 2001). Ten years later, another mini-dam (or pond) was constructed along the Kechene River. The public water supply began in 1901 from two water sources namely the Kebena and Kechene rivers. Afterwards, various springs such as Entoto, Membere Kibur, Gojjam Ber (Meti Ber), Wochecha, Kidane Mehrete, to mention a few were developed between 1911 and 1940 (Addis Ababa City Administration, 2004).

The Entoto water treatment plant with ozone treatment facilities having a treatment capacity of 1,500 cubic metres per day was established in 1937 and commissioned in 1938 to treat water coming from the Kebena River and Kidane Mehrete spring(s). Later on in 1944 the first Gafarsa dam construction with a height of 9 metres was completed to hold a capacity of 1,500,000 cubic metres of water. It is situated 20 kilometres west of the city. However, due to the lack of treatment facilities and/or pipelines to convey water to the city, the source

remained unused until 1952 when a 13 km pipe 200 mm in diameter was completed to the first reservoir built near Saint George Cathedral (AAWSA, 2001). Although the water, not treated and full of impurities during the rainy season, seemed clean during the dry season and potable by the standards that prevailed. Subsequently, one accelerator type clarifier with six filters was built and a 400 millimetre pipeline was laid in 1954 to treat and convey 15,000 cubic metres of water per day to the City (Shewaye et al., 1998).

The Gafarsa dam wall was raised to 15 metres increasing storage capacity to 6,500,000 cubic metres of water and the treatment plant capacity was doubled in 1960 by constructing one additional clarifier with six filters to produce a maximum of 30,000 cubic metres of water per day. At this time many of the springs were taken out of service because their quality had deteriorated. In 1966, the raw water storage capacity in the Gafarsa watershed (that of the little Akaki River) was also increased with the construction of another earth dam north of the existing dam.

In 1971, with the establishment of AAWSA as a Public Water Utility, the next major phase of expansion of the water supply facilities commenced with the commissioning of the Legedadi dam treatment plant which was located on the big Akaki River, 33 kilometres east of Addis Ababa. Further development of the water supply facilities was pursued in 1986 under the Water Supply Stage II Project and treatment capacity of the Legedadi Plant was upgraded from 50,000 to 150,000 cubic metres of water per day (Adam, 1999). Along these, the Dire Dam Project was completed to provide an additional 42,000 cubic metres of water per day for the Legedadi Plant. Meanwhile, there are some supplementary sources from ground water points situated at different parts of the City (13 wells & nine springs with a total capacity of about 13,000 cubic meters of water per day).

Currently (2009), the city has two conventional water treatment plants. Although these water plants work at their full capacity for water production, the AAWSA cannot satisfy the demands of the city. According to the Authority the supply covers only 62 percent of the demand. To meet the wide imbalance of the water demand and supply, the Authority has to undertake different water supply projects such as the Emergency Akaki project.

Accordingly, the Addis Ababa Water Supply and Sewerage Authority (AAWSA) has short and long term water development plan (projects) to meet the wide imbalance of the water

demand and supply. This project has to take into account the growing population of the city over time. As we can see below, (Table 5.1) the population of the city has increased since 1961. The water supply shortage is exacerbated by high population growth and various infrastructural development activities and which has resulted in the need for huge investment to control the provision of improved quality of water supply to the city of Addis Ababa. The growth is without proportionate development in socio-economic services and infrastructure, and the economic capacity of the urban centres to support the increasing population size (Ayenew, 2005). The following table illustrates the population growth of Addis Ababa since 1961 when the first formal population count was conducted in the city.

Table 5.1: Population Growth of Addis Ababa (1961-2007)

Year	Population	Average Annual Growth Rate
1961	443,728	4.0
1967	633,530	7.1
1978	1,167,315	7.6
1984	1,423,111	3.0
1994	2,112,737	3.3
2000	2,495,000	2.6
2007	2,738,248	2.1

Source: Compiled from Central Statistical Agency Yearly Abstracts (1995:11; 1999:13) and 2007 Population and Housing Census Report (CSA, 2007)

The increase in population coupled with poor urban land management led to urban sprawl (Gilbert, 1992). Many high density urban areas do not have adequate infrastructure to access formal water supply (World Bank, 1993a). The increasing demand for such water supply services in urban areas of Addis Ababa remains a critical issue that needs urgent resolution. An unplanned land use system and informal or shanty settlements on the periphery including the study area with high population density, and insufficient water supply services to poor urban areas of the centre characterizes Addis Ababa. In general, the supply covers about 62 percent of the demand. However, those households covered by the city's water supply system obtain safe water from tap and protected wells/springs whereas the remaining households use unprotected wells/springs and rivers (AAWSA, 2008), like the Akaki River as a source of drinking water.

Despite the high coverage in the supply of water service on the one hand and critical water shortage on the other, the current demand of the city is said to be 420,000 cubic metres per day (105 litres per capita per day), while the supply is about 270,000 cubic metres per day (60 litres per capita per day) for a total population of 2.7 million (AAWSA, 2009) people. Due to the absence of defined regulation of the public water tap system, various problems are occurring. For example, the public tap users are paying more for their water than domestic connections and the prices at public taps varies widely (WAE, 2005; Bereket, 2006).). It was observed that the public taps in the city were administered by a person who was assigned by the local kebele⁴. The responsible body for regulating the public water tap system is done by a person assigned by the respective Kebele administration in the city.

The AAWSA was unable to supply information about the exact number of public taps which are found in the city. The data given on public taps by the Authority are inaccurate, with many connections wrongly categorized. Therefore, other sources were used. The information was obtained from the Water Aid Ethiopia Office and the 2007 Population and Housing Census Report. Accordingly, it was found that the total number of public taps in the Akaki sub-city were 1753. The Authority reported that their role was supplying the water pipes and also collecting the monthly payment. The daily and routine regulation is the responsibility of the local kebele administration. In general there is no defined regulation of public water taps not only in the study area but also in all urban areas of the city. Although many taps are used by large numbers of households it is believed that public water taps provide an important service for the urban poor. There is no streamlined monitoring of the public taps in the Akaki sub-city as one uniform mandate. As a result, taps are being under-utilized and therefore unsustainable.

According to the AAWSA among the city's 651970 households (residents), 25% (162993 households) have a private water tap and 38% (247748 households) have taps in compounds shared by more than two households. In general, 63% (410741 households) have a tap water connection inside the house and in the compound, 3% (19559 households) of the people use public water taps and the rest 34% (221670 households) of the residents buy water from kiosks. Similarly, AAWSA reports that, among the Akaki sub-city's (the study area) 43141

⁴ Kebele is the lowest administrative unit in an urban centre.

households, 20% have a private taps inside house and 57% of the people use public taps and the rest 23% of the household buy water from other sources.

The AAWSA set as a standard, 40 household users per public tap, and 12 household users per common tap. However, according to the Water Aid Ethiopia (2005) report most of the public taps are functional and others are non-functional. Over half were disconnected due to non-payment of bills to AAWSA. Besides these, most of the public taps are operating a long way below the standard as the Authority believes that there are many public water taps being used by less than 10 households. This could be related to the sustainability of public water taps to generate revenue to cover at least the operating cost. Also, this could reflect the absence of management and operation of public water taps as indicated by WAE (2005) in Chapter three.

In Addis Ababa's long history (108 years) of clean water service in general, and Akaki sub-city in particular, the water supply coverage is still found to be low. There is a wide imbalance in water demand and supply, therefore, the Authority has to undertake different water supply projects by establishing additional pipelines and reviewing its management practices. The low standard of service delivery is observed especially in public water tap service delivery and the concerned body is advised to establish and implement regulatory guidelines within the structure of Kebeles as a unit to effective public tap management. This suggestion is consistent with the observation Bereket (2006) makes that public water taps should be regulated that can control the management and operation of public water taps in the city.

5.3. Existing water supply and water tariffs in Addis Ababa

In order to meet objective two questions were forwarded to AAWSA. Where the available water resource for Addis Ababa does imported from? What is the challenge that the city was facing in the provision of water supply? And how was water tariff determined in Addis Ababa? Based on the information obtained from the City's water supply Authority informants and according to the AAWSA document for the feasibility study of supplying water for the city, it was observed that the existing water supply source is surface water and ground water mainly from two conventional treatment plants located along the two dams of Legdadi and Geffersa about 33 and 25 km east and north west of the city, respectively (Figure 5.1). Both treatment plants supply 173000 cubic metres of water per day, and the Akaki ground water

Well Field south east of the city supplies 30000 cubic metres of water per day. Water from these systems was tapped and stored in reservoirs and diverted through tunnels and pipelines to the city's consumers. Industrial dumping of waste products into rivers threatens the supply lines of water to the city. There are supplementary sources for water supply for all urban areas of Addis Ababa from ground water points situated at different parts of the city (13 wells and 9 springs with a total capacity of about 13000 cubic metres of water per day). Generally, the current production of water is 270 000 cubic metres of water per day.

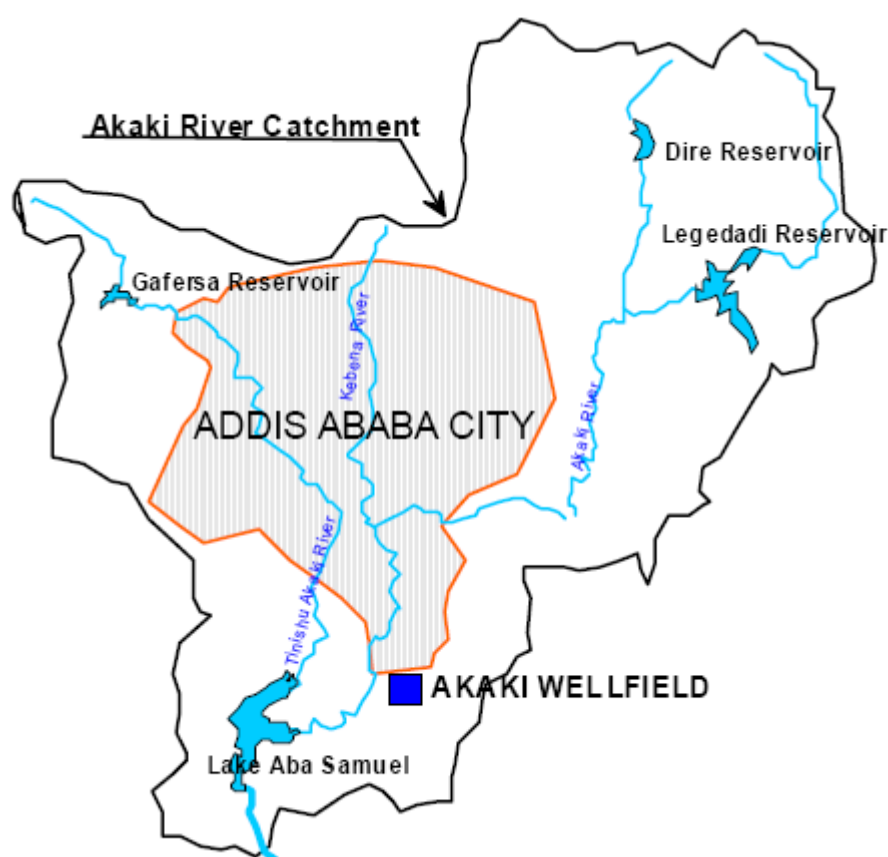


Figure 5.1: Gafersa and Legedadi Reservoirs, Addis Ababa, Ethiopia

The pricing water policy of Ethiopia is based on the fundamental principles of equity, efficiency, affordability and economic value of water. With regard to equity, all citizens of Ethiopia should have access to safe water of acceptable quality, as it is a basic human need. Efficiency implies that every possible attempt should be made to ensure that consumers meet the economic cost of supply whenever it is possible, and this is achieved by basing the price of water on the long run marginal cost of water. Affordability implies that those who do not

have the ability to pay for water should not be denied access to it. Finally, the value of water implies that water has been recognized both as an economic and social good in order to improve the management of water resources and development while taking in to account environmental considerations (MWR, 1999).

The structure of water tariffs in Addis Ababa is aimed at ensuring that affordability and equity are taken account of by a concessionary or lifeline tariff⁵ rate for low consumption, whereas efficiency is achieved by penalizing those who have a high consumption of water by charging higher tariffs. Laurie and Crespo (2007) state that is a way of benefiting the poor by charging them only for what they use. The economic value can be appropriate by the attachment of different values to different uses of water. This allocation of values to water uses helps to promote economic efficiency, social equity and ecological sustainability through balancing scarce resources with increasing demand; the reduction of wastage and loss, conservation of the resource, and shifts in consumption towards higher value uses (Water Guide EU, 1998).

The structure of water tariffs in Addis Ababa has changed since the formulation of the Ethiopian water resource management policy in 1999 in order to achieve an efficient allocation of water resources. The tariff is set in blocks of customers. Public tap users pay a flat rate of Birr 1.75 per cubic metre for all consumption. Domestic users pay Birr 1.75 for using up to 7 cubic metres of water, Birr 3.15 for using 8-20 cubic metres and Birr 3.80 for any consumption above 21 cubic metres of water.

Table 5.2: Existing tariff structure of Addis Ababa City water supply

Band	Tariff (birr/m ³)
1-7m ³	1.75
8-20m ³	3.15
>21m ³	3.80

Source: Addis Ababa Water and Sewerage Authority, 2009

Here, except public tap water users who pay a flat rate, domestic customers are made to pay a progressive rate as indicated above. The rationale behind this is that the demand for water is

⁵ A lifeline tariff is the rate charged for minimum human basic water requirements (for drinking, cooking and basic sanitation). In some countries, the cost of the lifeline water volume (estimates for which vary between 25LPCD to 50LPCD) is free (Faruqui N, 2003 cited in Figueres C. et al. (eds): 2003).

directly related to the socio-economic status of households with a private water connection. Therefore, those who consume more water are expected to pay more because they are better off. Domestic users pay the cost price of Birr 1.75 using up to 7 cubic metres of water and public tap users pay the same price for all consumption so that almost everyone who has access to water at this price can afford it. However for the unserved urban poor, even if they are able to afford to pay market prices, AAWSA cannot provide water to them. Hence, it is contrary to the stated country pricing of water policy principles that acknowledge that “all citizens should have access to safe water, as it is basic human need, and also those who do not have the ability to pay for water should not be denied access to it” (FDRE, 2000:14).

Hirshleifer, et al. (1969: 2) underscored the appropriation of water as a commodity just like other goods; societies need it in order to satisfy the needs of their members. The basis for the economic argument is that water has an economic value and therefore is a commodity that must be bought and sold and treated water in the same way as any other commodity. The proponents of water economics explain that water scarcity could easily be solved with market instruments because it is a renewable and reusable resource. The study results suggest that protecting the extreme poor from this price is possible through government or regulators by taking a lifeline tariff that requires utilities to deliver basic water requirements to all the unserved urban poor for a minimal cost or for free. This idea is similar to South African water White Policy Paper (1997) where the water policy law guarantees the first 25lpcd free as a right for all of its citizens (Faruqui, 2003, cited in Figueres et al., 2003).

Domestic water supply is provided through house connections, yard connections and public taps. The water tariff in use by the city's Water Supply Authority is given below for different bands. Water is sold at the public tap at a rate of Birr 1.75/m³. On the other hand, water vendor rates are between Birr 8-10.5/m³. During the field survey it was observed that large numbers of people were buying water from kiosks. In this regard, it is possible to suggest that selling of water at small shops (kiosks) has not been given much attention even though their share is significant in water distribution to the final users. vendors sell at Birr 0.30-0.40 cents per 20 litre bucket or equivalent to Birr 13 per cubic metres of water while they pay only Birr 3 per cubic metre, It means that more than five times the wholesale selling price. Consequently, the urban poor are expected to pay at Birr 13 per cubic metre while the nominal full cost recovery tariff cost is Birr 3 per cubic metres of water.

It is worth noting that the existing conditions of urban water tariff rates cannot achieve full cost recovery. Because the price of water as a natural resource should not only be based on full cost recovery so as to recover the full cost of water supply project providing the service. It should also reflect the social opportunity cost which takes into account the external costs and user costs associated with the supply of water. Of course, tariff structures according to the Ethiopian Water Policy are site specific and are determined according to local circumstances (Ethiopian Water Policy, 1999). Arguably, the policy fails to relate prices of water to the marginal private cost of its supply and also fails to relate the prices of water to the social cost (Ayenew, 2005). Thus, the failure to intervene when necessary and the failure to refrain from intervention when unnecessary and detrimental are the major types of policy failure. Such kind of policy failure is the root cause of the unsustainable use of scarce resources. It is unable to ensure the efficient and equitable and sustainable water delivery systems for the Akaki sub-city people of Addis Ababa.

As a market principle, a service providing water should not give its product away free even to the poorest customer (Winpenny, 1994). It is clear that this principle poses some problems for a country that is trying to address the urban poor (under privileged) sector of the population, and further also ignores the subsidy system as a political and social responsibility of the state in favour of economic gains and economics of water delivery (See Chapter four). However, in order to solve this problem the tariff structure (water prices) should be based on equitable and practical guidelines and criteria as well as a special social strategy because public subsidies are legitimate to achieve certain benefits (provision of supplies to the underserved). The Ethiopian Water Policy advocates that water prices are site specific and are determined according to local circumstances (Ethiopian Water Policy, 1999). As a result the market based approach of delivering a social good is compromised. However, according to AAWSA, water tariffs are based on the following factors: willingness to pay, public payment capacity, covering operation and maintenance cost, capital cost covered by government and full cost recovery option (AAWSA, 2008).

5.3.1. Future demand for water in Addis Ababa

The focus here is on an overview of the future demand for water, based on the information from the project document for the feasibility study of supplying water for the city. The Addis Ababa Water and Sewerage Authority (AAWSA) is striving to narrow the gap between the demand and supply of water. In the short run it is injecting the water which is obtained from

medium depth wells into the system. So far 44 wells are operational while 35 are being completed. What is more, 53 very deep wells with an average depth of 600 metres are being drilled, which are expected to yield 120000 cubic metres of additional water. In the short run most of the water constraints are expected to be done away with.

AAWSA is planning to expand domestic water connections at individual household and shared level to abandon the public water tap approach because of its operational management problems. The Authority believes that most of the public water taps in the city are operating a long way below the standard and plan to look into these taps with a view to changing the connections to yard connections. In some areas of the city public taps are providing services to over 40 households each. It is necessary to construct additional public taps in order to increase the accessibility of water to the poor.

The Authority also plans to reduce the current 38% of water demand to 33%. In the short run it intends constructing 313km of 1st grade pipeline and 145 km of second grade pipeline respectively. According to the AAWSA report, parallel to the construction of 458 km pipeline, reuse of waste water and improving or rebuilding and expansion of the existing reservoirs and establishing big water reservoir for solving water supply problem is another important issue of the Authority. Although, the Authority has set nice-looking plans in order to narrow down the gap between the demand and supply of water, it should consider the following issues. First, Bereket (2006) indicates the need for regulation of public water taps. Public water taps provide an important service for the Akaki urban areas of Addis Ababa. There is a need to establish a regulatory body that can control the management and operation of public water taps in the city, otherwise the shortfalls will continue. Second, in order to provide improved quality of water for the city residents, weak and inefficient water supply management and implementation of water policy problems must be addressed.

5.3.2. Challenges to AAWSA

During the household survey in the study area it was recognized that the management and operation of the water supply system of the Authority have encountered major problems. These problems can be considered as challenges for AAWSA in providing quality water to its residents. Water scarcity, power interruption, rapid urbanization, changing living conditions, old pipes and valves are major challenges, whereas unmonitored waste disposal and private ground water exploration, exposing water to pollution, unplanned land use, requiring huge

investment to control and improve water quality, rapid growth of population, environmental degradation and weak and inefficient water resource management are the main issues that need urgent solution for the efficient and sustainable use of water resources to address the problem of access to clean water supply for the urban poor in Addis Ababa. Rahmato (1999) stated that the undeveloped water resource development and management of the country represents a crucially important challenge to the provision of safe and clean drinking water for both urban and rural areas.

All the above mentioned problems are the result of poor water resource management practices. For example, the operators pay a subsidized rate, which is the lowest rate in the tariff block, but are charging a tariff rate which is far higher than the highest rate set for private connections. This is related to Hardoy and Satterthwaite's (1997) observation that informal water traders get subsidized rates for purchasing water and this subsidy is rarely reflected in prices charged to the poor by water vendors. Arguably, this is contrary to the water resource management policy of Ethiopia that proposes subsidized tariff rates for communal water services. Therefore, there is a need to adopt a water demand management strategy in Addis Ababa Water and Sewerage Authority, as the narrow supply oriented approach is not efficient in the management of water supply and does not satisfy the demands of the urban poor in economic, social and environmental terms. Supply-side management of water resources are unable to provide adequate quality water to poor urban areas of low income households (Marvin and Laurie, 1999).

This section has discussed issues related to water supply development schemes with emphasis on evaluating existing policy and management practices from a political ecology of water resources management perspective for Addis Ababa. This satisfies the aims of this thesis in the light of conceptual framework and answering the intended objectives one and two there by addressing the political ecology framework as set out in chapter two and three. The following section presents the characteristics of the surveyed households in the study area of Akaki sub-city, Addis Ababa.

5.4. Households' characteristics

A total of 150 sample households were interviewed in the study. From the total sample respondents, Table 5.3 shows that 105 (70%) were head of the household, of which 48 were

male headed and 57 were female headed. The rest 45 (30%) of the respondents were not heads of the interviewed families. Out of these, 18 were male and 27 were female.

Table 5.3: Status of respondents by sex in the study area Akaki sub-city (2009)

Respondent Type	Number of Respondent	Respondents by Sex (Type)		Percent of total Respondent by type of status in the household
		Male	Female	
Head	105	48	57	70
Non-head	45	18	27	30
Total	150	66	84	100

The average family size of the total sample household is 4.1, and ranges from 1 to 11. Data about the age of the respondents shows that the average age is 42 years. The maximum age of years is 73 and the minimum is 25 years. The education level of the respondents ranged from those not being able to read and write to those with college education. From the total respondents, 12 (8%) can neither read nor write, 30 (20%) can read and write, 60 (40%) have completed primary education, 27 (18%) have completed secondary school and the rest 21(14%) have higher education is summarized in Table 5.4.

Table 5.4: Characteristics of sampled households in the study area Akaki sub-city

General Characteristics	Category	Number of members	Percent
Age of the Respondents	20 - 29	18	12
	30 - 39	35	23.33
	40 - 49	55	36.67
	50 - 59	30	20
	60 - 69	10	6.67
	70 and above	2	1.33
	Total	150	100
Total Household size	1 - 5	93	62
	6 - 10	55	36.67
	11 and above	2	1.33
	Total	150	100
Level of Education of Household Head	Illiterate	12	8
	Read and Write	30	20
	Primary (1- 6)	60	40
	J/ Secondary (7- 8)	10	6.67
	Secondary (9 - 12)	17	11.33
	Tertiary (12 ⁺)	21	14
	Total	150	100

The occupation of the respondents shows that 94 (63%) work in the formal sector, and 56 (37%) work in the informal sector or were unemployed⁶ (See Table 5.5.). The average monthly household income of the total sample is Birr 713.33 ranging from the maximum of Birr 3600 to the minimum of Birr 250 per month (Table 5.6). The Ethiopian currency is the Birr, and at present as of June 2009, one Rand is equivalent to about 1.40 Birr. Furthermore, the majority of the respondents (87%) were below ETB 800 (Rand 571.43 or US\$ 72.72) per month for a family of four. Sixty (40%) of the respondents live in rented housing while 90 (60%) own the house they live in.

⁶ Formal sector workers in this study include those who work in government organization, working in NGO, running legal private trade business while in informal sector are those self employed that running small business and daily worker.

Table 5.5 Percentage of respondents by type of employment in the study area Akaki sub-city (2009)

Type of Job	Number of Household Respondents	Percent
Formal Sector employees includes (Government employees, Private Institutions, and NGOs)	94	63
Informal Sector employees (Self employed, Daily Labour)	56	37

Table 5.6: Households by category of monthly income in the study area (June, 2009)

Monthly Household Income Category (Birr)	Number of household Respondents	Percent
Birr 0 - 250	2	1.33
251 – 400	15	10
401 – 600	53	35.33
601 – 800	60	40
801 – 1000	9	6
1001 – 1500	7	4.67
1501 - 2000	2	1.33
2001 – 3000	-	-
3001 and above	2	1.33
Total	150	99.99

According to the study the average monthly income of the household is Birr 713.33 or Rand 509.52

5.5. Water sources, collection and use in the study area Akaki sub-city

5.5.1. Water sources

Responses regarding the type of water supply source and household uses indicate that all the respondents used piped water from the main source supplied to the residents of the city. However, of the total respondents, 64.7% used public water taps (community taps in public areas), 16.7% used private taps, 9.3% used yard taps and 9.3% got water from Vendors as their primary source (Table 5.7).

Tables 5.7: Source of drinking water in the study area (2009)

Types of sources	Frequency	%
Public taps	97	64.70%
Taps inside house	25	16.70%
Yard taps	14	9.30%
Vendor (Kiosk) taps	14	9.30%
Total	150	100.00%

Therefore, 83.3% of the households depend on primary water sources, public taps, yard taps and vendors or Kiosks while 16.7% of the households use private taps as their primary water source (Table 5.7). All these water sources are supplied by the AAWSA municipal system. In the case of the interruption of municipal water supply, water vendors (Kiosks) are the main source of water supply. This study finding is consistent with other studies done in similar areas both in Ethiopia by Bereket (2006) and Sub-Saharan developing countries (e.g., Kenya) by World Bank (World Bank, 1993a). This indicates that most of the urban poor households in the study area are dependent on public taps, and related to those who were paying high price for drinking water supply, which is discussed in section 5.3 pages 90.

5.5.2. Consumption patterns

On average, 15.33% of households were found to use less than 10 lpcd, 22% of households used 10-20 lpcd, 33.33% of households used 20-30 lpcd, and 16% of households used 30-40 lpcd while the rest, 13.33% of households, used more than 40 lpcd of water (Table 5.8). The mean value of the per capita water use for the total 150 households is 19.98 lpcd. The average per capita water consumption of more than 37% of the sample households is less than 20 lpcd. This is low compared to the WHO recommendation of 20 litres per person per day which is considered as adequate for domestic use or for basic access (UN, 2001). These figures are comparable to AAWSA reported water consumption of 15-30 lpcd for households using public taps and yard taps as well. The finding is also similar to Bereket (2006) results obtained in other urban areas of Addis Ababa.

Table 5.8 shows that the average monthly consumption of water for each household is less than 1200 litres (1.2m^3), which ranges from a minimum of less than 1200 litre (80% of households) 0.6m^3 to the maximum of 2200 litres (9.5% of households) 2.2m^3 per month.

When we see a household's monthly consumption on the existing water supply across the households, the survey result reveals that the majority of households consume less than or equal to 1200 litres of water and it is indicated that these households are from the low income groups. And, they do not have a private connection.

Tables 5.8: Water consumption in the study area Akaki sub-city (2009)

		Frequency	%
Daily Consumption	Less than 10 lpcd	23	15.33%
	10 - 20 lpcd	33	22.0%
	20 - 30 lpcd	50	33.33%
	30 - 40 lpcd	24	16.0%
	more than 40 lpcd	20	13.33%
	Total	150	100.0%
Monthly Consumption in litre	< = 1200	118	80.3%
	1201 – 2200	15	10.2%
	> 2200	14	9.5%
	Total	147	100.0%

5.6. Quantity, availability of water and reliability of existing water supply

In this section distance to collect water, the duration of supply, and interruption of water supply will be discussed. Concerning time spent collecting water: 72.7% of the households get their water from a primary source at a distance of less than 250 metres of which 56.7% get water at a distance less than 50 metres. Only 27.3% of the households have to travel more than 250 metres (Table 5.9).

Table 5.9: Distance travelled by households to collect water in the study area (2009)

Distance in metres	Frequency	%
< = 50	85	56.7%
51 – 250	24	16.0%
> 250	41	27.3%
Total	150	100.0%

Travelling to collect water varies from season to season. In the dry season in Addis Ababa the public taps and yard taps are empty/dry. Because of the lack of water, householders have to travel longer distances (more than half a kilometre) to collect water. The time taken to fetch water is more than an hour including the long queues. Hence, where there is an inadequate amount of water compared to demand, people spend more time fetching water.

The distance to fetch water is not more than half a kilometre. The Ethiopian Water Policy paper states that people should get their water within a radius of 0.5 km. The result is not consistent with that discussed in the literature that people have to travel longer distances to collect water and spend much time collecting water.

Table 5.9 shows that all households do not spent more time in fetching water from the existing water sources since they have to travel not more than 0.5 km. The main explanation for this is that households who did not have piped water fetch water either from public taps, or buy water from vendor or from neighbours' households that already had piped water close to their home. Thus households are exposed to pay more for their water. This is consistent with the observation of Collignon and Vezina (2000) that poor households fetch water from public stand-posts and neighbours and pay for it to meet their daily demand. This indicates that time taken to fetch water is a significant factor not in terms of distance rather when public taps are closed/empty and the availability of water in the public tap only for some hours per day, people forced to buy water from vendors and waste time in fetching water. This suggests that households perceive that by switching to the improved water supply system, they stand to save time spent in fetching water from the existing water source, and thus they are more willing to have private connection.

Due to the absence of a regulatory body to control the management and operation of public water taps (which provide an important service for the urban poor) in the city, the majority of the people living in urban areas of the study area very often are not the direct users of the water supply systems. The times when public water taps are open are erratic. It is usually for a few hours in the morning and sometimes in the afternoon.

5.6.1. Issues related to gender within water resources management and use

Women usually perform the bulk of the domestic activities involving water. They venture far from their homes, travel long distances sometimes taking half-a-day, to bring water for their

households (Rahmato, 1999). Women and men often have different and distinct roles in the water sector. Women are most often the collectors and managers of water in the household, and they are usually the ones who ensure household hygiene (World Bank, 1993b). Men, traditionally, have been more concerned with community construction and management, although in some places women also are involved. Because of their varying roles, men and women may have different preferences and incentives regarding water sector development. In their role as collectors and managers of household water, women may have a considerable amount of knowledge about water sources. They will be the ones who will benefit most from improved water sources, closer to their homes. Thus, their demand for new, improved facilities and their preferences concerning site location and type of facility may be crucial (Kabeer, 1994). Moser (1993) indicates that:

Women may be more motivated to maintain a new system: if the system breaks down, they will be the ones who have to walk long distances to collect water from other sources. In many areas improved systems translate into additional time in a women's day, as less time is spent collecting water. In some cases, this time can be used for productive purposes (Moser, 1993: 36-57).

Table 5.10: Distribution of persons who fetch water in the study area (2009)

	Frequency	%
Adult women	145	96.7%
Adult men	2	1.3%
Female children under 15 years old	3	2.0%
Total	150	100.0%

Responses regarding the responsibility for fetching water indicated (Table 5.10) that 96.7% of adult female members of the family are responsible for fetching water from an outside source. Two percent of female children under 15 years old fetch water while only 1.3% of males are responsible for fetching water for households. From this we understand that there is sex differentiation in collecting water for the household. This result is compatible with the study done by the Ethiopian Demographic Health Survey (EDHS) (CSA and ORC, 2005). Especially during the dry season when there is a shortage of water supply, households are forced to travel long distances where water is available (UN-WWAP, 2006). This implies that the time taken to fetch water from the available area with long queues means that women spends much time collecting water. The adult women are considered as daily labourers

whenever they want to bring water from other sources, particularly from vendors. It is observed in the study area that water vending is the other means of livelihood for some of the household male heads interviewed. They owned donkeys and work five to seven trips per day and earn twenty to thirty Birr per day at five birr per trip.

One of the main problems is the absence of the legal status of water committees in the area (Arsano, 2007). Since women are the ones responsible for fetching water, they should be encouraged to serve as operators at the local level (Rahmato, 1999) and in the water committees system since they are the ones who suffer most if the systems fail. When asked how much they are willing to pay for improved water services (which is discussed in the next section), they give more to the improved water service. The result reflects the actual existing condition prevailing in Akaki sub-city Addis Ababa. The result is similar to the World Bank studies obtained in Nigeria and India. This can be related to the willingness to pay principle which is discussed in the next section. However, the costs of fetching water in terms of distances and time (i.e. as distance increases, respondents are willing to pay more for improved water services). The above studies on household water use suggested that women would attach more importance to improved supplies than men, and thus women would be willing to pay more for such services. They give more value to the improved services.

5.6.2. Availability and reliability of existing water supply in the Akaki sub-city (2009)

Out of the total sampled households, 98.7% said that water is not available continuously. Only 1.3% said it is available both day and night (Table 5.11). However, almost the entire sample said that the time of water availability is also very unpredictable (i.e., sometimes it is available during the day or at night). With regard to the duration of supply, 6% of the sample households get water for less than 4 hours per day, 55.7% get water for 5 to 6 hours per day and the remaining 37.6% get water for 7 to 8 hours per day. Only 1% gets water for more than 9 hours per day.

Table 5.11: Availability of water in the study area Akaki sub-city (2009)

		No.	%
Continuous water supply	Yes	2	1.3%
Interrupted water supply	Yes	148	98.7%
Total		150	100.0%
Duration of water supply	3hr - 4hr	9	6.0%
	5hr - 6 hr	83	55.7%
	7hr - 8hr	56	37.6%
	9hrs and above	1	.7%
Total		149	100.0%
Interruption of water supply in month	<= 8 days	98	65.3%
	> 8 days	52	34.7%
Total		150	100.0%

Water supply interruptions are a perpetual problem in the city of Addis Ababa. According to the AAWSA (2009), the existing water supply is sufficient only to meet about 62% of the total water demand of the city. This has caused severe water shortages in many parts of the city. To make matters worse, of the 62% coverage about 30-40 % of the water supply is lost. It is wasted and lost due mainly to leaking pipes and aging infrastructure. As a result rations and interruptions in the water distribution system are frequently experienced in the city. This situation has been confirmed during the survey in Akaki Sub-City area. The reported frequency of interruption (Table 5.11) is 6 to 8 days per month. For 65.3% of the respondents water supply is interrupted less than 8 days per month, while for 34.7% of respondents water supply is interrupted more than 8 days per month.

All the respondents use the existing water supply for drinking, washing, bathing, cooking and other domestic uses. The households reported that in addition to using other sources of water from wells and streams for other domestic use and where necessary for drinking using purified water by boiling before they drink. It is also common practice in the households to store water for a few days to meet the demand in case of interruption. In general, the city has not been able to provide sufficient water for the people. In terms of reliability, the majority of the households said that the existing water supply was unreliable⁷. One can observe from the

⁷ Reliability refers in this study to the availability of water at the required time and amount.

preceding discussion that the urban poor were getting below standard water services and the existing service is not reliable. Interruptions to the household water supply were frequent. These issues have been discussed in detail thereby answering objective three that assess the access of drinking water of the poorest of the population in Addis Ababa.

5.7. Cost of water in the study area Akaki sub-city (June, 2009)

The number of households served by different sources and average cost of water is summarized in Table 5.14. Households are spending on average approximately ETB 13.21/m³ or Rand 9.44/m³ (US\$ 1.10/m³) for water. The majority of the people who collect water from public taps pay about four times more than the standard water tariffs for piped water supply set by the AAWSA system. This is consistent with the observation of Bereket (2006) WAE (2005). Poor people who pay 10-20 cents per 20 litre-containers from the public taps, pay 5-10 Birr per m³; while those with house connections pay 0.50 or 1.00 Birr per m³. Black (1996) stated that some urban users pay from ten to four hundred times as much for water through the informal circuit than the price paid by household users accessing private water connections. Based on the information obtained during the interview with AAWSA, the water tariff is set in blocks by type of customers (Table 5.12). Public water tap users pay a flat rate of ETB 1.75/m³ for all consumption. Domestic users pay ETB 1.75/m³ for using up to 7m³ of water, ETB 3.15 for using 8-20 cubic metres, and ETB 3.80 for any consumption above 21 cubic metres.

Table 5.12: Water tariff rates for Addis Ababa City by type of customer

Customer Type	Band	Tariff (birr/m ³)
Public Taps	For all consumption	1.75
Domestic users who have Private Taps	1-7m ³	1.75
	8-20m ³	3.15
Non-domestic consumers	For all consumption	3.80

Source: Author (2009)

When we compare household monthly water consumption in Table 5.8 and expenditure on water across the different modes of service (Table 5.13), the survey results reveal that households from the low income areas consume less than 1.2m³ and spend Birr 14.63 per month, whereas households from the private taps consume a maximum of 2.2m³ and above

per month, and spend Birr 10.80 per month respectively. Alternatively, this is to say that households from low-income areas spend, on average, 5.84% of their monthly income, whereas from that of middle (those who have private taps) income areas spend 1.30% of their monthly income on water per month. This shows that households from the low-income areas spend proportionally more but, consume less compared to the private taps users. The reason is that since water is not available at the required time and amount, relative to the other area, these households usually buy water from vendors (whose price is higher than the official tariff). Most of them incurred additional labour cost of Birr 0.5 to 0.15 cents per 20 litre of water to fetch water from this source. This result for monthly water expense is similar to other studies done in other urban areas of Addis Ababa (Bereket, 2006) and other cities of developing countries.

Table 5.13: Respondents monthly average cost of water in the study area (June, 2009)

Mode of Services	Number of consumers	5 birr	6 birr	8 birr	10 birr	12 birr	15 birr	60 birr	Average cost (ETB/m ³) Mean
Private Tap	25	6	-	7	7	2	2	1	10.80
	Total	30	-	56	70	24	30	60	270
Yard Tap	Number of consumers	5 birr	6 birr	10 birr	12 birr	15 birr	16 birr	18 birr	Average cost (ETB/m ³)
	14	-	2	2	2	2	2	4	13.57
	Total	-	12	20	24	30	32	72	190
Public Tap	Number of consumers	5 birr	10 birr	12 birr	14 birr	15 birr	17 birr	18 birr	Average cost (ETB/m ³)
	79	6	12	16	13	12	11	9	13.33
	Total	30	120	192	182	180	187	162	1053
Kiosk /Vendor/	Number of consumers	8 birr	12 birr	14 birr	16 birr	18 birr	20 birr	24 birr	Average cost (ETB/m ³)
	32	2	9	9	6	3	1	2	14.63
	Total	16	108	126	96	54	20	48	468
Total	150	76	240	394	372	288	269	342	1981

Note: Household monthly average cost of water is birr 13.21/m³ or South Africa Rand 9.44/m³

Table 5.14: Household average cost of water by service type in the study area Akaki sub-city (2009)

Mode of Services	Number of consumers	Cost in birr	Average cost (ETB/m ³)
Private Tap	25	270	10.80
Yard Tap	14	190	13.57
Public Tap	79	1053	13.33
Water Kiosk (Vendor)	32	468	14.63
Total	150	1981	52.33

Note: South Africa Rand 1.00 is equivalent to Birr 1.40 at the time of survey.

Some households do not buy from vendors and do not pay labour costs. Thus, the monthly expenditure for water consumption may vary among households even though the volume of water consumed is the same. When this average monthly expenditure (Birr 13.21) is compared to the average monthly income of a household (Birr 713.33), an average household spends about 2% of their monthly income on water supply. It is far below the World Bank's recommendation that a household should not spend more than a maximum of 5% of his monthly income on water. This implies that a household living in the study area can save money if taps are provided and households not spending a lot if it is provided with improved water supply. However, it should be noted here that households using public taps and vendors are spending more without an improved water supply and have an unreliable existing water supply.

Due to the absence of a defined regulation for public water tap users, consumers pay four times the AAWSA rates. People using water from vendors pay higher prices ranging 30-40 cents for a 20- litre container making the cost of water per cubic metre 8-12 Birr when there is an interruption or if taps are closed at the time of demand. Due to this fact, those public stand pipes intended to provide sufficient water for the communities are served for individuals to get excess revenue. Further, this result indicates a lack of streamlining of systems for management and operation. Thus, public water taps are found to be unsustainable. It is consistent with the Water Aid Ethiopia (2005) report that the operators pay a subsidized rate, which is the lowest rate in the tariff block, but are charging a tariff rate

which is far higher than the highest rate set for private connections (WAE,2005). This is contrary to the water resources management policy of Ethiopia that proposes subsidized tariff rates for communal water services. It is the poor who pay the most for water.

5.7.1. Existing price of water in the study area Akaki sub-city (2009)

Only 23.3% of the respondents in Table 5.15 indicated that water was very expensive and not affordable. On the other hand, 76.7% said that the price was affordable. The reason for this low proportion of the respondents saying it is very expensive and unaffordable was due to the fact that some of the households do not have access to the existing water services. As a result if they were not provided the service at a price equal to those who have access to the service and therefore forced to buy water from vendors (Kiosks) whose price is higher than the existing official tariff. Those who said water was expensive are from low-income group. These communities are categorized in the informal water network and fetch water from public stand-points or buy water from vendors. This is most severely felt in low-income urban areas which often remain outside the reach of basic municipal services (Jaglin, 2002). This group of households do not have private connection to the existing water services. They are often forced to buy water from vendors or waste time in fetching water. As a result, they said that the water cost was not affordable. These facts imply that the main problem of the existing service was one reason that the existing tariff was set above the people's ability (income level) to pay. Consequently in setting tariff for water supply the willingness to pay of the beneficiaries should be taken into consideration.

Table 5.15: Affordability of water cost in the study area Akaki sub-city (2009)

Responses	Frequency	%
Affordable	115	76.7%
Not-Affordable	35	23.3%
Total	150	100.0%

The tariff structures set by government was not economical and not equitable. The subsidies offered the government benefit the higher income group of society who have individual connections and who use large quantities of water. Those who buy from public fountains who receive a much inferior services and waiting in long queues pay the same rate per cubic meter to the public vendor. The public fountain users cannot afford to pay the charges for individual

connections. If the poorest members of a community consider that they cannot afford to pay for water from a public fountain, there is a great danger that these consumers will continue to use water from traditional sources. These sources are often polluted, and so the community health benefits that would normally be allocated with an improved water supply scheme cannot be achieved (UN-WWAP, 2006). This is also contrary to the water resource management policy of Ethiopia that proposes subsidised tariff rates for communal water services.

A proportion of the low income group buy water from vendors at a higher price than the existing government water tariff. The average vendor price for water in the sub-city is 0.35 cents for a 20 litre bucket of water (excluding labor cost) or Birr10.50 for one cubic meter. When this is compared to the official tariff rate, which is Birr1.75 for the lowest consumption bundle (1-7m³), it is 400% more. This is consistent with the conceptual framework discussed in chapter two statement of Black (1996:6) observation that “some urban users pay from ten to four hundred times as much for water through the informal circuit than the price paid by household users accessing private water connections”. Since there is a shortage of water and the availability of water is unpredictable, people are spending more by buying from vendors and incur additional labour costs. Hence, they are willing to pay more for the new improved water system in order to avoid these additional costs.

5.8. Willingness to pay for improved water supply

In this section only 116 households that did not have private access to taps were used to provide the data. Out of the total 150 households, only 34 households (22.7%) are connected to water lines through private metres and the rest, 116 households, or 77.3%, are not. They use public taps or yard taps or buy from vendors. However, all respondents were asked whether government water tariffs are helpful (affordable) or not to them. 77.3% of households said that it is helpful and the rest, 22.7% of households, responded that it is not helpful (Table 5.16). Those respondents said that government tariff is not helpful was due to the fact that some of them are connected to water lines and others who do not connected to formal water supply network. The main reasons given were high unreliability of water and high cost of connection fees. These communities said they do not have sufficient income to pay for the water tariffs.

In addition, questions were posed to those 116 households regarding the mode of service they prefer to have. It was found (Table 5.16) that 99.1% of the respondents prefer to have private taps, the other (respondent) 0.9% prefer to have yard taps. The reason the majority of the people prefer to have a private tap is to make sure of the reliability and sustainability of the water supply system as well as to have easy access to water. However, they said that this could be effective if the initial connection fee was linked to their level of income. This is consistent with the observation of Collignon and Vezina (2000) that low-income households fetch water from public stand-points and neighbours and pay for it because of the high initial cost of private connection. However, most of the households (99.1%) were willing to get private access to water. In this regard, questions related to willingness to pay for improved water to AAWSA official was forwarded. He said that there is a shortage of water in the city and even if the people are willing to pay for improved systems, it would not be feasible to provide private taps to all interested households unless the capacity of the municipal water supply system is increased by augmentation of new water sources. As indicated in chapter three, section 3.2.2, in Addis Ababa, 30-40% water produced by AAWSA was lost and wasted due mainly to leakages. Instead of looking for new water sources, it is better to exert effort to reduce the current water losses. As a result water supply in urban poor areas could be improved and considerable water savings could be achieved if the existing water losses in the distribution system could be reduced. For this AAWSA is advised to work in collaboration with NGOs and other stakeholders.

Table 5.16: Respondents attitude towards government water tariffs and service preference in the study area Akaki sub-city (2009)

		Frequency	%
Government Pricing Policy	Affordable	116	77.3%
	Not-Affordable	34	22.7%
Total		150	100.0%
Service Preference	Private taps	115	99.1%
	Yard taps	1	.9%
Total		116	100.0%

Table 5.17 shows that about 35% of the respondents were ready to pay less than ETB150.00, 34% of households agreed to pay the initial connection fee ETB 150 to 250.00 and the rest, 31% of households, said that they could afford more than ETB 250 to the stated price of the initial connection fee in small instalments of Ethiopian Birr (ETB) 512.00. These 31% of people have been spending more by buying from vendors and incur additional labour costs when there is a shortage of water and public taps are closed. Hence, they are willing to pay more for private taps in order to avoid these additional costs and uncertainty. This suggested that the cost of water was the reason for high demand for private connections. Adopting an affordable payment system for the initial instalment and connection fees could encourage private connections and thereby increase the impact of the scheme in terms of health benefits. The result is also consistent with other empirical studies.

Table 5.17: Respondents willingness to pay for improved water supply in the study area Akaki sub-city (2009)

		Frequency	%
Instalment Plan	Agree	112	96.6%
	Disagree	4	3.4%
Total		116	100.0%
Affordability of connection fee ➤	< = ETB 150	40	35.1%
	ETB 151 -250	39	34.2%
	> ETB 250	35	30.7%
Total		114	100.0%

Furthermore, most of respondents (96%) are willing to get private taps if they could pay the initial connection fee in small instalments. About 4% of households would prefer yard taps or public taps because of the high initial cost of a private tap connection (ETB 512) or Rand 366 (US\$ 50.00). Cost of instalment and connection fee is the main reason why households are not willing to connect private taps. The high initial cost of private connection fee is not affordable for many of the households although for some of them this is a matter of priorities rather than absolute affordability. But is this actually the case? The household monthly income data presented in section 5.4, (Table 5.6) shows that most of the households (40%) earn Birr 700 or Rand 500. Some earn much less. UN-WWAP (2006) agrees with these figures stating that “if the poorest members of a community cannot afford to pay for the high

initial cost of a private tap connection and they can afford less to pay the charges than those with households willing to get private taps, there is a great danger that these consumers will continue to use water from traditional sources. So the community health benefits that would normally be allocated with an improved water supply scheme cannot be achieved”.

The Ethiopian water policy advocates that the “user must pay” principle, especially urban water supply services, has to consider the willingness and affordability of the communities that get the water services and at the same time the cost of the water schemes. In this case it is possible to harmonize the full cost recovery policy with the ability and willingness to pay principle. Full cost recovery requires charging consumers so as to recover the full cost of project construction as well as the operation and maintenance of providing the service (WRMP, 1999). This is similar to Narsiah’s (2010:15) contention that “the full cost of production has to be recovered from the consumer because subsidy mechanisms are removed. This occurs through a process of differentiation, facilitated through accounting procedures”.

Charging consumers should be done carefully because if prices are set too high, households may not be able to afford consuming the new improved water, and again revenues will not be sufficient to cover the full cost. To set the required tariff, water demand management and pricing are essential. This is consistent with the observation in the study area that low income households fetch water from public stand-points and small shops and pay for it to meet their daily demand because of the high initial cost of a private connection. Collignon and Vezina (2000) agree with this suggestion that low-income households fetch water from public stand-posts and neighbours and pay more for it because of the high initial cost of private connection. Thus, even though these households were from the low income group and are unable to afford the required tariff, if they get support from the government, they are willing to access the new improved water services. It is necessary to set the required tariff while ensuring affordable access for the poor through appropriate mechanisms for cross subsidization (MWR, 2000). Therefore, the above discussion satisfies objective four by referring to how the poor pay more for their water. This is linked to the conceptual framework there by explaining that “the effects of the traditional supply orientation of governments are most severely felt in low-income urban areas” this related to the Akaki sub-city which often remain outside of the reach of basic municipal services”. This means that because of the cost, poor users are being discouraged from using water for necessary basic needs.

5.9. Institutional management of water resources in the Akaki sub-city (2009)

Responses regarding the attitude of the respondents towards the management and responsibility of the water supply service (Table 5.18) indicate that out of the 150 respondents, 141 (94.0%) think that the responsibility and administration of the water supply service should be given to the government. Of the remaining nine respondents, five (3.3% of the total) said that the administration should be given to NGOs and the rest four (2.7%) said it should be given to the people of the sub-city Community Association Boards of Trustees. None of the respondents said that it should be given to the private sector. Besides, in the institutional structure aspect, out of the 150 households, 128 (85.3%) said that there is an effective institutional structure to administer and control the management and operation of water supply services. About 22 (14.7%) of households said that, there is no adequate institutional structure for effective management of water.

Questions related to the responsibility and administration of water supply service and the effectiveness of the institutional structure in water resources management were asked of key informants (for community and sub-city administration representatives). Information from them also confirmed the above opinion of 94% respondents said. They argued that the presence of government representatives in water management is essential, because there should be accountability since the administrator is elected by the people. The sub-city that we live in is also home to many large industries and various water users, and most of these industries employ an open discharge system using the Akaki River as the point of their ultimate discharge. Consequently, springs that were sources of drinking water deteriorated due to pollution and over utilization. Each user is also competing for the existing water resource. Thus, if the management is given to NGOs and private sectors, the communities would not be able to articulate themselves. So, in all cases where problems occur such as lack of coordination among the hierarchy of government bodies (organizations) and poor enforcement of legislation, the responsibility and administration of water supply services should be given to the local state.

**Table 5.18: Management and Responsibility of water supply service in the study area
Akaki sub-city (2009)**

		No.	%
Water Services Provider	Local government administration	141	94.0%
	NGO's	5	3.3%
	Community Association Boards of trustees	4	2.7%
Total		150	100.0%
Institutional structure	Effective	128	85.3%
	Not-effective	22	14.7%
Total		150	100.0%

Almost all the respondents 121(80.7%) said that the current management system of the water supply service is good and the reason behind that the respondents have positive attitude towards the current management of water supply service and government management practices. Twenty nine (19.4% of the total) said that the current management of system is poor and it should be improved (Table 5.19). These 29 persons think that the management is weak and inefficient in implementation. Consequently there is no adequate infrastructure provision to access formal water supply. This is compatible with the points of Manikutty, (1998) that the main problems in water supply provision in Africa cities is the inability of municipal governments and public utilities to deliver and maintain basic infrastructure services for their growing populations. The traditional supply orientation of governments has tended to produce an overemphasis on facilities rather than a focus on services (Marvin and Laurie, 1999). The effects of this are most severely felt in low-income urban areas which often remain outside the reach of basic municipal services (Jaglin, 2002). The result is an increased burden of health care, a lowering of the quality of urban life and reduced urban productivity.

Table 5.19: Respondents attitude towards management of water supply service in the study area Akaki sub-city (2009)

		No.	%
The present management of water supply services	Good	121	80.7%
	Poor	28	18.7%
	Very poor	1	.7%
Total		150	100.0%
Household perception of water	As social and cultural good	2	1.3%
	As economic good	51	34.0%
	As human right	97	64.7%
Total		150	100.0%

Only 2 (1.3%) of households view water as a social and cultural good, about 51 (34.0%) of households view water as an economic good (Table 5.19 above). The rationale for viewing water as an economic good (pricing water) is that users have an incentive to use water efficiently when it has a price. If it is free, they will use more than they would otherwise, unnecessarily reducing the availability of water for everyone, and thus competition for, the resource. If ‘the price is right’, users will have incentives to use less water and introduce water-saving technologies, thus freeing water for other uses. This is compatible with the suggestion of Water Guide EU (1998:51) that “Allocation of values to water uses helps to balance scarce resources with increasing demand; the reduction of wastage and loss, conservation of resource, and shifts in consumption towards higher values”.

The rest 97 (64.7%) of the households said that they consider water as a human right. The rationale for considering water as a human right is that water is a fundamental human right and a vital social need, government should provide water free or at a greatly discounted price to the poor and that it could potentially be allocated like any other commodity to those who can afford it. Bakker (2001) agrees with this contention that

The introduction of water marketing and pricing would violate human rights, if the water tend to be privatise and only focus on the payment capacity of the people, the social equity goals would be undermined and therefore the water service reflects economic equity criteria.

Because of the cost, poor users will be discouraged from using water for necessary basic needs; what Narsiah (2010:15) terms “the market becomes the regulator of human rights. The recognition of human rights is thus determined by the ability to pay (i.e., human rights are determined in economic terms)”. Therefore, the study and the above quotes show that the poor pay anyway for water- and even more than the richer sections of society. Thus water must be a public service.

The household perception of water result is in line with the political ecology of water resource management policy of Ethiopia. Since the policy has stipulated that water has to be considered both as an economic and social good, water has to be priced in order to promote economic efficiency, social equity and ecological sustainability (World Bank, 2000). But, there is still a lack of appreciation in accepting water in addition to its social importance as an economic value which must be treated in all its competing uses. This has affected sustainability as funds for operation, maintenance, expansion and rehabilitation of projects in particular for drinking and irrigation purposes have not been fully recovered. Thus, the issue continues to be one of the major underlying problems constraining water resources development

Key informants from the community said that currently the institutional structure related to water resources management is changing, although the necessary institutional elements are not yet put in place. They argued that, for example, some of the community members applied to get access to the existing system yet they still do not have access to a reliable and safe water supply. Further, they said that community participation in the implementation of water related programme is absent.

According to key (two) informants from the sub-city kebele administration provide the following information, the institutional structure at the local level is well organized and that in each community development programme, the community is represented on the implementation programme through the kebele administration elected committee. This is consistent with the observation of Arsano (2007) that

Those urban dwellers in Ethiopia are organized into town dwellers associations at various levels, now becoming the sole administrative structures to manage their own social and economic affairs and that are believed to have a stake in the overall plan, development and management of the water supply system.

In confirmation with the above, information from the NGO key informant does not confirm community participation in the institutional structure related to the water issues implementation programme. He commented and complained only on the implementation programme that the government put the structure but not well organized and poor in implementation.

Based on the above opinion, it is possible to suggest that even though the institutional structure has been put in place, the community has symbolic representation in decision-making process and even in the process of implementation. Given that the institutional structure does not work actively for community involvement in any community development programme in the implementation programme, and only the local state is the main decision makers, this in turn threatens the issue of social justice and the sustainability of water sector development. This implies that the institutional structure is not able to work effectively and remained a lot to do in the overall development and management of water supply sector. This is similar with studies done by Water Aid Ethiopia (2005), and however, is contrary to observation that starting from the Year 1999, the full participation of users in the planning, implementation and decision-making at the lowest practical level has been realized (UN-WWAP, 2006; Gebrehiwot, 2007).

There is shortage of water in Addis Ababa city. In this regard, an attempt was made to assess whether the institutional structure related to water supply is adequate for management of water resources and about the existing capacity to provide enough drinking water to urban people. Key informants from the sub-city administration and NGO indicated that the existing water supply only meets 62% of the total water demand. This has caused water shortages in many areas of the city. Loss of water is common. This is due to system failure; inefficiencies and poor maintenance are considered to be one crucial issue affecting the supply of water to users. However, the household survey result with regard to the above is similar to that of key informants from the city administration and NGO. It is clear that the water resources management is poor. As we observed from the above discussion there is a lack of coordination among the organizations and poor enforcement of legislation. Although considerable effort has been made to improve the provision of safe and clean water supply coverage and to address the social and economic needs of the city's population, the urban poor have been suffering due to lack of water because of poor supply and service

management. These issues need urgent improved management intervention for the provision of an improved quality of water in the urban areas of the Akaki sub-city Addis Ababa.

5.10. Conclusion

The collected data, the literature and the political ecology framework presented in this thesis concerning the water resources management in Ethiopia are generally used to propose management strategies for the sustainable utilization and management of water resources in Addis Ababa by addressing social justice and sustainability issues. These issues have been discussed in the preceding section and point out that there is a need to adopt water demand management strategy in AAWSA, as the narrow supply oriented approach is not efficient in the management of water supply and does not satisfy the demands of the urban poor in Addis Ababa. This helps to ensure access to clean water supply is equitable and helps to ensure sustainability.

It is also indicated that there is no effective water resources management practice associated with any defined regulation of public water taps in the city. Bereket (2006) points out that the need for regulation for public water taps, which provide an important service for the urban poor. Absence of regulation means that the interests of the poor (users) are not protected. Because the poor have less access to improved water supply and they are vulnerable to water vendors (Collignon and Vezina, 2000). This vulnerability is exacerbated by AAWSA unable to provide improved and quality of water for the city residents and also weak and inefficient management of water supply services in the local state are the main issues that need urgent solution. It is observed that the poor pay more for their water without an improved water supply system. Besides, unreliable water supply and poor water management lead to interruption in water supply. Consequently, the urban poor people are not the direct users of the water supply system. Marvin and Laurie (1999:347) state that “supply-side management of water resources are unable to provide adequate quality water to poor urban areas of low income households”. It is clear that sustainability and equity of water supply issues are undermined, perhaps threatened.

This chapter confirms that past water resources management experiences have demonstrated that poor management of water resources will continue to have serious social, economic, and institutional implications both at the local and national level. Such condition has contributed to increased demand and increased competition for the limited water resources. While

AAWSA is unable to provide sufficient water supply for its people there is certainly the absence of good water management and the absence of effective community participation (Rahmato, 1999). As Gebrehiwot (2007:38) states that “while the government thinking and conceptual development on water resources issues has grown impressively since 1999”, the policies, practices and tools for translating that into sustainable management of water resources are not keeping up with the pace of the growing demands of society.

The analysis of the survey data on water collection, water use and other related aspects about the water supply in Akaki sub-city Addis Ababa indicated that the urban poor are still getting below the required coverage of water services in terms of both quantity and service level and paying a relatively high price of water. Most of the respondents (83.3% of households) in the study area are dependent of public taps, yard taps, and water vendors or Kiosks as a primary water source. Only 17% of the respondent households have private taps. The average per capita water consumption of more than 37% of the sample households is less than 20lpcd, therefore the significant numbers of the households can be considered to have no basic access to water supply.

Due to the absence of defined regulation of the public water tap system in the study area, various problems are occurring. During the research it was found that the public tap users are paying more for their water than domestic connections and the prices at public taps varied widely. It was observed that the public taps in the city was administered by a person who was assigned by the local kebele. Many public taps are used by less than 10 households while the AAWSA set standard, 40 household users per public tap, and 12 household users per common tap. The low standard of service delivery is observed especially in public tap services. This could reflect the absence of management and operation of public taps. It is believed that public water taps provide an important service for urban poor. However, there is no streamlined monitoring of the public taps in the Akaki sub-city as a unit to effective public tap management. As a result, taps are being under-utilized and therefore unsustainable.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1. Introduction

Water is necessary to sustain life. The provision of an adequate supply of potable water in the urban areas of Addis Ababa is essential. The people of Ethiopia have the fundamental right to have access to a potable water supply (FDRE, 2000). Since there are several demands for water, and at the same time water is unevenly distributed throughout country, there is a need for fair, equitable and sustainable access to clean water. The water policy of Ethiopia provides a conducive environment for having clean and safe water, giving domestic water supply the highest priority followed by water for livestock (WRMP, 1999). While the coverage of an improved water supply in both urban and rural areas of the country is very low at 56% it is relatively better in urban areas about 94% (CSA and ORC, 2005). The study suggests that much still needs to be done so that the full coverage of this basic service for the people of Addis Ababa City is attained. In addition to increasing the coverage we need to consider the efficient management, and proper use, of the resources and sustainability of the service.

The preceding chapters explained why it is so difficult to provide safe and reliable drinking water for the growing demands of urban poor people in Addis Ababa. All highlights inadequate clean water supply and the poor management of water supply services in the city of Addis Ababa.

This dissertation has attempted to illustrate the political ecology of water in Ethiopia within the context of a water resource management in Addis Ababa. It looked at people living in poor urban areas that do not have access to a reliable and safe drinking water supply. Purposive sampling methodology was used. The study used qualitative interviews, and written documents. The study also used primary data obtained from a survey of 150 households in the Akaki sub-city, Addis Ababa. Besides, the study used a political ecology framework to examine the relationships between the adopted government water policy objectives and the outcomes at the local level. The dominant discourse in water resource management draws heavily on the economic and social aspects of development. It focuses on access to and the control of water resources for human use. It also places emphasis on the

majority of poor people in the Akaki sub-city, Addis Ababa who do not have access to clean and safe drinking water.

In summary, the political ecology of water resources management of the country has been examined in the preceding chapters. There was considering the historical background of water development schemes and linking this to the institutional development of the water sector within the context of economic use of water in a holistic approach from a basin perspective. Also how the community participation in water resources management has been recognized as a public institution, especially gender issues within water sector (Gebrehiwot, 2007). Further the relevance of the political ecology framework has been discussed to illustrate how the ruling class shape the nature and formation of city, and the subsequent nature of water usage control, management, allocation and development of potable water supply (Arsano, 2007; Rahmato, 1999) since the period late 19th Century (1901) throughout and across successive regimes.

One can observe from the preceding discussion the past two successive regimes in Ethiopia (Imperial-1900 - 1974 and Derg-1975 - 1991) show that water resource development and management has been weak. Lack of comprehensive water legislation, and policy planning and implementation was guided by a strong top-down approach contributed to government institutions related to water sector were fragmented, and laws were not consolidated. This explains that there was a limited development of the water sector in the country. Although those regimes have been undertaken various programmes and projects over water resources development, little has been achieved. However, the present government (1991 onwards) has made a rapid progress in water supply services with the establishment of appropriate institutional structures for the management of water. Thus, the Ethiopian water sector was raised to the higher level of a developed Ministry, and by establishing the Ministry of Water Resources it showed a significant departure from the previous institutional tradition of the Ethiopian water sector. In addition, the current regime in terms of policy articulation and legislation, the water sector development is encouraging. Arsano (2007:167) points out that, “the nation’s water resources have increasingly been perceived as an essential means of mitigating the ever-worsening poverty situation and meeting the nation’s food security”. The past three (including the present) successive political regimes in Ethiopia have, irrespective of their ideological (Monarchical, Military Socialist and capitalist ideology) differences, they

were keen to determine the water resource potential of the country's and articulated the urgent need for water resources development.

6.2. Summary of findings

6.2.1. Public water supply and resource management of Addis Ababa

The AAWSA is unable to provide sufficient water supply for its people. There is certainly an absence of good water management and effective stakeholder participation (Rahmato, 1999). While the government thinking and conceptual development on water resource issues has grown impressively since 1999 (Gebrehiwot, 2007); the policies, practices and tools for translating that into sustainable management of water resources are not keeping up with the pace of the growing demands of society.

The analysis in chapter five confirms that the problems of access to safe and reliable water supply in Addis Ababa is primarily poor management associated with the population increase resulting from natural growth and rural-urban migration. Gilbert (1992) agree with this suggestion that one of the main problems in water supply provision in cities in developing countries is the inability of municipal governments and public utilities to deliver and maintain basic infrastructure services for their growing populations. Therefore, I believe that there is little evidence to suggest that the Ethiopian people in general, and Addis Ababa's people in particular, are facing a physical scarcity of water. However, there is sufficient information to suggest that where people suffer a lack of clean water supply this is caused by poor or mismanagement of this precious resource. In this regard, Rahmato (1999) points out two areas of weaknesses in water sector development in Ethiopia: the absence of comprehensive legislation concerning water resources; and absence of the community users and other, stakeholders' participation in water management planning and decision-making.

6.2.2. Sources of drinking water and consumption patterns in the Akaki sub-city

The analysis of the survey data on water collection, water use and other related aspects about the water supply in Akaki sub-city Addis Ababa indicated that the urban poor are getting low level of water services in terms of both quantity and service level and are paying a relatively high price of water. Most of the respondents (83.3% of households) in the study area are dependent of public taps, yard taps, and water vendors or kiosks as a primary water source. Only 17% of the respondent households have private taps. This is similar with the observation of Collignon and Vezina (2000) who state that low-income households fetch

water from public stand-posts and neighbours and pay more for it because of they do not have their own private tap.

The average per capita water consumption of more than 37% of the sample households is less than 20lpcd, therefore these households can be considered to have less access to water supply. This figure is low compared to WHO recommendation of 20 litres per person per day which is considered as adequate for domestic use or for basic access (UN, 2001). The findings showed that the low level of per capita consumption does not favour the government introducing a Universal Access Programme (UAP) in 2005 that aims to increase access to improved water supply to 84 percent and access to improved sanitation to 80 percent by 2010. In terms of urban area the UAP is expected to achieve 100 percent at the end of planned Year 2012. Hence, the results of the study suggest that a quarter of the respondent households do not have access to improved water supply.

6.2.3. Availability, reliability and cost of water in the study area Akaki sub-city (2009)

The results of the study showed that about 77% of the respondents reported that they do not have private connection to the existing water service. About 98% of the respondents said that the existing service is not reliable. Supply interruptions, were a perpetual problem in the city of Addis Ababa.

Households were spending on average approximately ETB 13.21/m³ or Rand 9.44/m³ (US\$ 1.10/m³) for water. People using water from vendors pay higher prices ranging 30-40 cents for a 20-litre container making the cost of water per cubic metre 8-12 Birr, when there is an interruption or public taps are closed or empty at the time of demand. The survey result showed that the average water price ranges from 10.80 to 14.63 ETB/m³, depending on the type of water sources. However, most respondents pay a relatively high price for drinking water. This is contrary to the water resources management policy of Ethiopia that proposes subsidized tariff rates for communal water services. It is the poor who pay the most for water.

When the average monthly expenditure for water of ETB 13.21/m³ (Rand 9.44/m³) is compared to the average monthly income of a household Birr 713.33 (Rand 509.52), an average household spends 3% of their monthly income on water supply. It is not far below the World Bank's recommendation that a household should not spend more than a maximum

of 5% of their monthly income on water. This implies that households using public taps in the study area are spending more without an improved water supply and have an unreliable existing water supply.

6.2.4. Issues related to gender within water sector development

The central role played by women in the provision and management of water, primarily in the domestic and household context, has gained recognition in recent years in Ethiopia (MWR, 2003). Gender issues need special consideration in relation to water management and use. The survey result showed that fetching water for households is the responsibility of women. The survey indicated that 96.7% of adult females were responsible for fetching water from an outside source. This showed that there was sex differentiation in collecting water for households. This is compatible with the observation of Rahmato (1999) that women and children travel long distances, sometimes taking half-a-day, to bring water for the households. The time taken to fetch water from the existing water service is more than an hour.

It is observed during the survey that women and girls often suffer the most when water supply is poor. They also benefit the most when the supply is improved (Moser, 1993). Therefore, providing an improved and adequate water service is imperative. When water is of better quality, and is available in greater quantity and closer to homes, the improved supply service can have a positive impact to save time, which has an opportunity cost (World Bank, 1995; Moser, 1993). Besides, the result suggests that household would pay more for an improved supply when costs in terms of time of obtaining water from the existing sources are higher than if this cost were low. Therefore, the survey results on household water use argue that women would attach more importance to improved supplies than men, and thus women would be willing to pay more for such services.

6.2.5. Willingness to pay for improved water supply by respondent in the Akaki sub-cty

The results of the survey showed that water use and consumption pattern, availability and reliability of water, gender, income, monthly water expenditure, and time taken to fetch water from the existing source are important parameters that explain willingness to pay for improved water service.

One of the most important elements is that of household monthly expenditure for water. The result of the study indicates that those households who spend more on the current water system are more willing to pay for the new improved water system. Where there is a shortage of water and availability of water is unpredictable and uncertain, people are spending more by buying from vendors and incur additional labour costs. Hence, they are willing to pay more for the new improved water system in order to avoid these additional costs. This is consistent with the observation of Collignon and Vezina (2000) who state that low-income households fetch water from public stand-points and neighbours and pay more for it because of the high initial cost of private connection. This suggested that the cost of water was the reason for high demand for private connections. Similarly, the affordability results show that 96% of households of the study area are able to pay for the new improved water service, if the services are provided at small instalment initial connection fee linked to their level of income status.

6.2.6. Institutional management of water resources

In terms of policy articulation, legislation, institutional streamlining and strategic planning, the present state of Ethiopia's water sector looks promising. The study's results indicated that with regard to management and responsibilities of water supply services, out of all the respondents 94% think that the government should be responsible for the administration of the water supply service and 81% of the respondents have positive attitude for the current management of water supply service and they said that it is good. The reason behind that the institutional structure related to the water supply service has been put in place, this would have helped the communities able to articulate themselves with the current service and government management practices. However, about 19% of households in the study area complained that the current management system is poor and should be improved. The reasons for this is as they think that the management is weak and inefficient in implementation, as a result there is not adequate infrastructure provision to access formal water supply. This is similar with the suggestion of Manikutty (1998) that the traditional supply orientation of governments has tended to produce an overemphasis on facilities rather than a focus on services. The effects of this are most severely felt in low-income urban areas which often remain outside the reach of basic municipal services (Jaglin, 2002). The result is an increased burden of health care, a lowering of the quality of urban life and reduced urban productivity. Consequently, I suggest that emphasis has not been given to segments of the poor for equitable and economic use of water resources. Besides, there is a lack of enforcement

legislation concerning water resources, and lack of community participation in the water management in the study area Akaki sub-city Addis Ababa. Hence, the imperatives needed to dovetail all water resources management system include demand management, equitable access of water, improved policy regulatory and institutional frameworks, and an inter-sectoral approach.

A concerted effort is needed to expand the water service to a larger segment of the urban poor population within a reasonably short time. The involvement of government, NGOs and communities in this endeavour is essential. This is in line with some recent thinking that calls for a participatory water demand approach (Carter, 2007). This approach encourages communities to define their own needs for water. The water management requires the involvement of government, civil society and the private sector.

In connection with the above, due to the absence of defined regulation of the public water tap system in the study area, various problems are occurring. During the research it was found that the public tap users are paying more for their water than domestic connections and the prices at public taps varied widely. This study result is compatible with the studies of Bereket (2006) and WAE (2005). Observation in the study area reveals that most of the public taps are operating below the standard. Although the AAWSA set as a standard, 40 household users per public tap, many public water taps being used by less than 10 households. This water use management could be related to the sustainability of public water taps to generate revenue to cover at least the operating cost. Also this could reflect the absence of management and operation of public water taps (WAE, 2005). Hence, the low standard of service delivery is observed especially in public water tap service delivery and the concerned body is advised to establish and implement regulatory guidelines within the structure of Kebeles as a unit to effective public tap management.

6.3. Policy Implications: Towards effective water resources management

At present (2010), the government has a clear policy on water tariffs for urban settlements. Users often obtain water for a fee. In Addis Ababa, tariff rates vary according to the source of water used. However, tariff rates are affordable. The tariff is set in blocks (AAWSA, 2008). Water from home taps costs less than water from public fountains. In other words, the poor pay more for the same quantity of water than the rich. In this regard Black (1996:6) points out that “some urban users pay from ten to four hundred times as much for water through the

informal circuit than the price paid by household users accessing private water connections”. The operators pay a subsidized rate, which is the lowest rate in the tariff block, but charge a tariff rate, which is far higher than the highest rate set for private connections (WAE, 2005). Arguably, this is contrary to the water resource management policy of Ethiopia that proposes subsidized tariff rates for communal water services. Therefore, there is a need to adopt a water demand management strategy. Government can mandate other targeted, transparent subsidies for the extreme poor who cannot afford to pay the price for water.

Given that the existing water supply system cannot satisfy the existing demand, which leads to the interruption of supply, the poor people of the city are forced to buy water from vendors or waste time in fetching water. This is related to Carter et al’s., (1999) suggestion that this leads to domestic supply systems being overwhelmed resulting in breakdowns, and reduced supply for its final users which in turn leads to conflict. However, if improved water services are supplied to the households and the water utility installed metered connections, the authority could increase the number of private connections. This may urge households to use more water, which in turn will increase revenue from water sales (WAE, 2005). An increase in water consumption leads to an increase in sales volume of water. More specifically, based on the findings, it is possible to draw the following policy implications.

The study findings indicated that there is a growing demand for improved water supply services. Hence, adopting an affordable payment system for the initial instalment and connection fee could help poor people to get a reliable and safe water supply and thereby increase safe water usage. This would create a greater demand for water and at the same time would also increase the water utility revenue to cover the operation and maintenance costs, as well as the cost of expanding the system. This is similar with the suggestion of Water Guide EU (1998) that “more efficient allocation of water and encourage conservation of water, would generate revenues that could be used for sector improvement” (Water Guide EU, 1998:37). Furthermore, since the respondents are provided with the paying back of fee for connection, the city’s water supply authority should look for means to cover the connection fee a priori so that the beneficiary will pay the connection fee in the form of amortization. The other option is for the local utility (Authority) to look for a means to replace the payment especially for those who are ready to pay the initial connection fee in small instalments so as to harmonize the full cost recovery policy with the ability and willingness to pay principle. This would be encourage the implementation of the water resource management policy of

Ethiopia that proposes subsidized tariff rates for the poor through appropriate mechanisms for cross subsidization (WRMP,1999).

It has been recognized in the water policy that increasing the coverage as well as the proper use and sustainability of the service requires implementation of a cost recovery system, which can be either full or partial. Gulyani (2000:9) points out that “By promoting demand-driven approach possible to improve service delivery and reliability, while expanding services to cover a greater number of people, namely the poor”. It must be noted that this research did not study the economic theory of water pricing as well as financial management aspects. Thus, the full cost recovery policy implied by this study may be questioned unless the pricing of water policy principles reflect the social opportunity cost which takes into account those who do not have the ability to pay for water and who should not be denied to access it through government a special social strategy. Also the fees from the sale of water must be utilized only for activities related to the water supply service.

Charging for water services is essential in order to generate funds for operating, maintaining and investing in systems; ensuring that scarce supplies are allocated to essential purposes; and signalling to users the real value of the resource. It was observed from the analysis that there was a concern about the management and responsibility of the water supply service scheme through government agencies for the administration of the water supply service (WAE, 2005). The Authority also explained that additional water supply is likely to be needed in order to ensure coverage of the gap between demand and supply. This would be achieved by investing in the development of new sources. In this regard it is important to note that the investment cost for water supply construction should be covered by government.

The conceptual and political ecology framework and the study findings also confirmed that the price of full cost recovery should reflect the social opportunity cost which takes into account the external costs and user costs associated with the supply of water. It is essential that the water policy needs to relate prices of water to the marginal cost of its supply. This would help the government to address the urban poor (unserved) sector of population taking into consideration subsidies as a political and social responsibility of the state because public subsidies are legitimate to achieve certain benefits (provision of supplies to the underserved) (MWR, 2002). It is also advocated in the water policy that water prices are site specific and are determined according to local circumstances (WRMP, 1999). Therefore it is possible to

ensure the efficient and equitable and sustainable water delivery systems for the urban poor people of Akaki sub-city, Addis Ababa. However, the most feasible means of generating sufficient revenue to cover the operation, maintenance as well as investment cost, would still depend on an increase in both supply coverage in connection and in water consumption rather than an increase in tariff rates in favour of economic gains.

The AAWSA's water resources management practice is becoming increasingly incapable of supplying sufficient water to its residents. The study shows significant numbers of households obtain their water by buying from vendors spending more and incur additional labour costs. Households are willing to pay more for improved water supply than the existing and unreliable water supply services in order to avoid these additional costs. The government should not underestimate low income households' responsiveness to their willingness to pay for improved access to reliable and safe water supply. Many households in the study areas of Addis Ababa appear willing to sacrifice a valuable share of their incomes to acquire access to safe water. Through gathering information about the service infrastructure and distribution of water supply system, considering the urban poor, AAWSA or/and water agency is advised to establish a regulatory body within its structure as a special unit, to provide basic water services to unserved poor urban people.

The participation of the community and women in decision-making processes including user participation, and the employment of different instruments regarding water supply in urban poor areas of Akaki sub-city Addis Ababa, are a major concern to increased both social and economic benefits (Rahmato, 1999). Therefore, the issue of equity in access to water to poor urban areas of Addis Ababa could be addressed through a demand-oriented approach (Pugh, 1997). Thus, treatment of water as an economic good combined with decentralized management and service delivery structures are important elements for addressing social justice and sustainability issues.

6.4. Recommendations

The effective management of water resources is a core issue for the provision of reliable and safe water supply. By recognizing the reality of key water resources management practices from the study, alternative options can be identified to propose effective management instruments and better institutional arrangements to address the problems of access to clean

water supply for the urban poor in Addis Ababa. The following recommendations should be considered.

- There is a need for the regulation of public water taps. Public water taps provide an important service for the urban poor of Addis Ababa. There is a need to establish a regulatory body that can control the management and operation of public water taps in the city otherwise the shortfalls will continue.
- In order to provide an improved quality of water for the city residents, the Authority has to undertake different water supply projects by establishing additional pipelines and reviewing its management practices, and inefficient management water supply and implementation of water policy problems must be addressed.
- To make available or improve access to water to meet the realistic water needs of urban poor people of Addis Ababa requires the development of water infrastructure. Figueres et al., (2003:203) state that “The scale of infrastructure should be range from a single borehole with a hand pump to large water supply schemes and wastewater treatment plants for the city as a whole”.
- Attention must be given to the institutional aspects of the water supply schemes framework to ensure the demands of the urban poor people are better addressed and the city resident’s problem of access to reliable and safe water is reduced. Some ideas to consider are: An innovative financing and cost recovery mechanism should be put in place with the joint effort of AAWSA, municipality and the government in order to cover these unserved or poorly served areas with safe and reliable water supply.
- Investigate the possibility of reducing the household tariff by cross-subsidizing with increasing per capita water consumption level.
- Carry out income and affordability studies to determine appropriate tariff levels for household water supply and integrate this with the existing conditions of the society in specific socio-economic characteristics.

- A holistic approach to water resource management is an important strategy in all water development schemes. If water schemes are to be managed efficiently and are to be sustainable, it is important to promote beneficiary participation based on the above mentioned strategies. To meet this goal, participation by all stakeholders is essential. “Addressing social justice issues and moving towards sustainability requires the joint efforts of all stakeholders; in addition, give local communities, especially women a say in the development of water schemes” (Rahmato, 1999:76).

6.5. Concluding Remarks

There were a number of issues relating to water resources management in Addis Ababa that were covered in this study. The result of issues rose in the study it was perceived that there is a need to develop a holistic approach to the management of water resources in Ethiopia.

Water resources management similarly impacts upon many women in their domestic and community roles. Thus, gender issues need to be taken into account at all stages of the planning and implementation of water-related activities, with consideration given to the different social, economic and cultural roles assigned to men and women in a given setting (Gebrehiwot, 2007). Given existing situations in the use of water resources within households and communities at the local scale in particular, a targeted effort will probably be needed to enable women to take a meaningful role in the consultation and decision-making process relating to water sector development and management practices.

The management of water as a critical resource should be done in a sustainable manner taking into account the needs of the present and future generations. In this respect, sustainable management of water resources should take into consideration the principles that water resources management should be decentralized, participatory and community-based and conducted at the lowest appropriate level. It is also recognized that women play a central part in the provision, management and safeguarding of water resources and should be represented in decision-making process with regard to water resources management.

Ethiopia faces challenges in efficiently developing and managing its water resources. There is a need to continue to develop its water resources in order for its economic and social development to keep pace with its rapidly growing population. Towards this goal the

management approaches and organizational arrangements need to be reviewed to address the critical issue of water resource management.

REFERENCES

- ADDIS ABABA WATER AND SEWERAGE AUTHORITY (AAWSA) (2001) Addis Ababa Water and Sewerage Authority, Hundred Years Pipe Water Service, in *Water for life*, Vol. III, No. I, July 2001, pp. 10-17. *AAWSA Yearly Magazine*. Addis Ababa, Ethiopia, AAWSA.
- ADDIS ABABA WATER AND SEWERAGE AUTHORITY (AAWSA) (2004) Addis Ababa Water and Sewerage Authority, *Draft Sectoral Development Program.*, Addis Ababa Water and Sewerage Authority, Addis Ababa.
- ADDIS ABABA WATER AND SEWERAGE AUTHORITY (AAWSA) (2008) Addis Ababa Water and Sewerage Authority, *Formulating an Appraisal Study for Addis Ababa Water Supply and Sanitation Coverage*. Addis Ababa Water and Sewerage Authority, Addis Ababa.
- ADAM, A. (1999) Water Supply up grading projects-their potential impacts. *Integrated Development for water supply and sanitation, 25th WEDC Conference*, Addis Ababa, Ethiopia, 1999.
- ADDIS ABABA CITY ADMINISTRATION (2004) Addis Ababa in 4 years: Plan, Performance and Problems, <http://www.ethiopar.net/English/basinfo/infoadds.html>. Accessed 10-10-2008.
- AGRAWAL, A. & GIBSON, C. (1999) Enchantment and disenchantment: The role of community in natural resource conservation. *World Development* 25 (4), 629-649.
- AHMAD, Z. (ed.) (2003) Forgetting political boundaries in identifying water development potentials in the basin-wide approach: The Ganges-Brahmaputra-Meghna issues. In: *Figueres C., Tortajada C. and Rockstrom J. (eds), Rethinking Water Management, Innovative Approaches to Contemporary Issues*. Earthscan, London.

- ALEMAYEHU, T. (2004) Assessment of Pollution Status and Ground Water Vulnerability Mapping of the Addis Ababa Water Supply Aquifers, Ethiopia. *Leaflet distributed during the workshop*. Nov. 10th-12th/2004, Addis Ababa, Ethiopia.
- ALEMTSEHAYE, B. (2002) *Assessment of the fertility and pollution status of irrigated vegetable farms around Addis Ababa City Agricultural Office. Final Report*.
- ANDERSON, E. (1998) Water: the next strategic resource, In: Starr R. and Stoll B. (eds) *Sustainable Water Resources Management, Sustainable Water Resources Management*, 1-7. Oxford University Press, Oxford.
- ARSANO, Y. (2007) Ethiopia and the Nile dilemmas of national and regional hydroponics, *Centre for Security Studies, Swiss Federal Institute of Technology, Zurich, Switzerland*. Zurich, thesis presented to the faculty of arts of the University of Zurich, for the degree of doctor of philosophy.
- ATKINSON, A. (1991) *Principles of Political Ecology*, Belhaven Press, London.
- AYENEW, T. (2005) Water Management Problems in the Ethiopian Rift: *Challenge for Development*. Addis Ababa University, Department of Earth Sciences, Addis Ababa.
- HOGGART, K, LEES, L & DAVIES, A, (2002) *Researching Human Geography*. Arnold. New York.
- BAKKER, K. (2001) Paying for water: water charging and equity in England and Wales *Transactions of the Institute of British Geographers* 26 (2), 143-164.
- BARIS, M. & KARADAG, A. (2007) Water Resources Management Issues in Turkey and Recommendations. *Journal of Applied Sciences*, 7 (24): 3900-3908.
- BAUMANN, P. (1998) *Panchayati Raj and Watershed Management in India: Constraints and Opportunities*. Overseas Development Institute, London. Working Paper 114.

- BECKERMAN, W. (1994) *In Defence of Economic Growth*, Jonathan Cape, London.
- BEEKMAN, H. E. & PIETERSEN, K. (2007) Water Resources Management in Africa Issues and Opportunities, *Proceedings of the Biennial Groundwater Conference 2007*. Bloemfontein-South Africa, 8-10 Oct.
- BEREKET, B. (2006) *Evaluation of Water Supply Systems in Selected Urban Areas of Addis Ababa, Ethiopia*. (Unpublished MSc Thesis) MWI 2006, The Netherlands.
- BERKES, F. & FOLK, C. (eds.) (1998) *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*, Cambridge University Press, Cambridge.
- BISWAS, A. (1991) Water for sustainable development: A global perspective. *Development and Cooperation*, 5: 17-20.
- BISWAS, A. (1992) Water for Third World Development, a perspective from the South. *Water Resources Development*, 8 (1), 25-41.
- BLACK, M. (1996) *Thirsty Cities: Water Sanitation and the Urban Poor*, Water Aid, London.
- BLAIKIE, P. (1985) *The Political Economy of Soil Erosion*, London: Methuen.
- BLAIKE, P. & BROOKFIELD, H. (eds) (1987) *Land Degradation and Society*. Methuen, London. pp.239.
- BROMLEY, D. W. (eds) 1995) *The Handbook of Environmental Economics*, Blackwell, London.
- BRYANT, R. (1992) Political ecology: an emerging research agenda in Third World Studies. *Political Geography*, 11, 12-36.

- BRYANT, R. & BAILEY, D. (1997) *Third World Political Ecology*, Routledge, London.
- CAI, X., RINGLER, C., & ROSEGRANT, M. (2006) Modeling water resources Management at the Basin level methodology and application to the maipo river basin. *Research Report 149, International Food Policy Research Institute. Washington, D.C.*
- CARTER, R., TYRREL, S. & HOWSAM, P. (1999) Impact and Sustainability programmes in developing countries. *Journal of The Chartered Institute of Water and Environmental Management*, 13, 292-296.
- COLLIGNON, B. & VEZINA, M. (2000) Independent Water and Sanitation Service Providers in African Cities: Full Report of a Ten Country study. . Washington: UNDP-World Bank WSP.
- CENTRAL STATISTICAL AGENCY (CSA) (2006) *Statistical Abstract 2005, Federal Democratic Republic of Ethiopia*, Central Statistical Agency, Addis Ababa.
- CENTRAL STATISTICAL AGENCY (CSA) (2007) *Summary and Statistical Report of the 2007 Population and Housing Census*. Federal Democratic Republic of Ethiopia Population Census Commission, Addis Ababa.
- CSA & ORC (2005) *Ethiopian Demographic and Health Survey 2005*. Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Agency and ORC Macro.
- DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND TOURISM (2007) *South African Environmental Outlook. A Report on the state of the environment*, Department of Environmental Affairs and Tourism, Pretoria.
- DESTA, M. (1998) *Industrial Waste Management and its Effect*, Addis Ababa University, Addis Ababa.

- DEPARTMENT OF WATER AFFAIRS AND FORESTERY (DWAF) (1996) *The Philosophy and Practice of Integrated Catchment Management: Implication for Water Resources Management in South Africa*. Water Research Commission, Pretoria. WRC Report No. TT 81/96.
- EASTER, K. (1999) The Transition of Irrigation Management in Asia: Have We Turned the Corner Yet? *Paper presented at the 6th Conference of the International Water and Resource Economics Consortium*. Hawaii.
- EASTER, K., BECKER, N. & TSUR, Y. (1997) Economic Mechanisms For Managing Water Resources: Pricing, Permits, and Markets, *In: Biswas A.K. (eds): Water Resources: Environmental Planning, Management and Development* Mc Graw-Hill, New York.
- ECONOMIC COMMISSION FOR AFRICA (ECA) (1995) Water Resources, Policy and Assessment, *Report of UNECA/WMO International Conference, Addis Ababa*, Ethiopia.
- ETHIOPIA, CONSTITUTION (1995) Constitution of the Federal Democratic Republic of Ethiopia.
- ETHIOPIA, GOVERNMENT (1995) Proclamation No. 4 of 195, Federal Democratic Republic of Ethiopia, Addis Ababa.
- FALKENMARK, M. (1994) The Dangerous Spiral: Near-future Risks for Water Related Eco-Conflicts, In ICRC. Water and War. *Symposium on Water in armed conflicts, Montrevx, 21-23 November 1994*. International Committee of the Red Cross, Geneva.
- FALKENMARK, M. (1995) Land and water interactions: A synopsis Land and Water Integration and River Basin Management. *FAO Land and Water Bulletin, No 1, 15-16*.

- FOOD AND AGRICULTURAL ORGANIZATION (FAO) (1995) Water Resources of African Countries, United Nations, Water Sector Policy Review and Strategy Formulation: A general Framework, *FAO Land and Water Bulletin*, 3, 23-25.
- FOOD AND AGRICULTURAL ORGANIZATION (FAO) (2000) *Food and Agriculture Organization of the United Nations, Statistical Data Base*. FAO, Rome.
- FARUQUI, N. (2003) Balancing between the eternal yesterday and the eternal tomorrow: Economic globalization, water and equity. In: Figueres C. Tortajada C. and Rockstrom J. (eds): *Rethinking Water Management, Innovative Approaches to Contemporary Issues*. pp. 49-54. Earthscan, London.
- FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA (FDRE) (1995a) *the Constitution of the Federal Democratic Republic of Ethiopia, Proclamation No. 1/1995*, Government Printer, Addis Ababa.
- FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA (FDRE) (1995b) Executive Organs of the Federal Democratic Republic of Ethiopia, Proclamation No. 4/1995, Negarit Gazeta, Addis Ababa, Federal Democratic Republic of Ethiopia.
- FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA (FDRE) (2000) Ethiopian Water Resource Management Proclamation No. 197/2000. Federal Democratic Republic of Ethiopia. Berhanena Selam Printing Press, Addis Ababa.
- FIGUERES, C. (ed.) 2003) Let's pump money into the water sector! In: Figueres C. Tortajada C. and Rockstrom J. (eds): *Rethinking Water Management, Innovative Approaches to Contemporary Issues*. pp. 203, Earthscan, London.
- GEBREHIWOT, M. (2007) *Gender Mainstreaming in Forestry in Africa Ethiopia*. Food and Agriculture Organization of the United Nations, Rome.
- GILBERT, A. (1992) Third World Cities: housing, infrastructure and servicing. *Urban Studies*, 29, 435-460.

- GLEICK, P. (ed.) 1997) Water and conflict in the 21st century. In Parker D.D. and Tsur Y. (eds): *Decentralization and Coordination of Water Resources Management*, Kluwer, Boston.
- GLIECK, P. (1998) Water in Crisis: Paths to Sustainable Water Use. *Ecological Applications*, 8 (3) 571-579.
- GLEICK, P. (2000) The Changing Water Paradigm. A Look at Twenty-First Century Water Resources Development. *Water International*, 25 (1) 127-138.
- GORDON, J., DOOGE, I. & RODDA, J. (1994) *Global Water Resource Issues*. pp. 97-132. Blackwell, London.
- GULYANI, S. (2000) Delivery and Financing of Infrastructure Services, In: *Urban Management: A Book of Selected Readings*. World Bank, Washington, D.C.
- GLOBAL WATER PARTNERSHIP (2000) Integrated Water Resources Management. Global Water Partnership Technical Advisory Committee, Denmark, Background Papers No.4.
- GLOBAL WATER PARTNERSHIP (2001) *Tool Box Water Resources Management: Sharing Knowledge for Equitable and Sustainable Water Resources Management* Global Water Partnership, Stockholm.
- HAILU, G. (2000) Environmental Law in Ethiopia. In: *International Encyclopaedia of Laws*, Kluwer, Law International Leuven, Belgium.
- HARDOY, J. & SATTHERWAITE, D. (1997) Building the Future City. In: *Gugler J. (ed.) Cities in the Developing World*. Oxford University Press, New York.
- HINCHCLIFF, F., GUIJT, I., PRETTY, J. & SHAH, P. (1995) New horizons: The Economic, Social and Environmental impacts of participatory watershed development. *IIED Gatekeeper Series*, 50, 3-20.

- HIRSHLEIFER, J. (1969) *Water Supply Economics, Technology, and Policy*, University of Chicago Press, Chicago.
- HOUGH, M. (1995) *Cities and Natural Processes*, Routledge, New York.
- IMPERIAL ETHIOPIA GOVERNMENT (1960) *Civil Code of the Empire of Ethiopia, Proclamation No. 165 of 1960*. Imperial Ethiopia Government, Addis Ababa.
- INTERNATIONAL INSTITUTE FOR ENVIRONMENT AND DEVELOPMENT. (1999) *Addressing Environment and Development in Urban Areas*. pp. 4-26.
- IUCN. (2000) *Vision for Water and Nature, A World Strategy for Conservation and Sustainable Management of Water Resources in the 21st Century*. World Conservation Union, Geneva.
- INTERNATIONAL WATER MANAGEMENT INSTITUTE. (2006) Taking A multiple-use approach to meeting the water needs of poor communities brings multiple benefits. Water Policy Briefing. Issue 18. *International Water Management Institute (IWMI), Colombo, Sri Lanka*: www.iwmi.cgiar.org/waterpolicy/briefing/index.asp. Accessed on: 16-07-2009.
- JACKSON, B. (1997) Private Sector Participation in South Africa's Water Sector: pressures, policies and lessons from experience, Paper presented at a seminar on. *Cost Recovery: sustainability and equity in the provision of urban services*, Washington, D.C.
- JACKSON, R., CARPEATER, S., DALIM, C., MCKNIGHT, D., NAIMAN, R., POSTEL, S. & RUNNING, S. (2001) *Water in a Changing World*. Ecological Society of America, New York.
- JAGLIN, S. (2002) The right to water verses cost recovery: participation, urban water supply and the poor in Sub-Saharan Africa. *Environment and Urbanization*, pp 33-44. SAGE, International Institute for Environmental and Development.
- KABBER, N. (1994) *Reversed Realities: Gender Hierarchies in Development Thought*,

Verso: London.

LAURIE, N. & CRESPO, C. (2007) Deconstructing the best case scenario: Lessons from water politics in La Paz-El Alto, Bolivia. *Geofrum*, 38, 841-854.

MANIKUTTY, S. (1998) Community Participation: Lesson From Experiences in Five Water and Sanitation Projects in India. *Development Policy Review*, 16, 67-71.

MARSH, W. (2005) *Environmental Geography: Science, Land use, and Earth System*, (3rd ed.). University of British Columbia.

MARVIN, S. & LAURIE, N. (1999) An Emerging Logic of Urban Water Management, in Cochabamba, Bolivia. *Urban Studies*, 36 (2) 341-357.

McGRANAHAN, G. & JACOB, S. (1994) Wealth, health, and the urban household: weighing environmental burdens. *Environment*, 36 (6) 4-14.

McGRANAHAN & SATTERTHWAITE, D. (2004) Improving Access to Water and Sanitation: Rethinking the way forward in light of the millennium development goals. In: Bigg T. (eds). *Survival for a Small Planet: The Sustainable Development Agenda*. EarthScan, London.

McKINNEY, M. (2002) Urbanization, biodiversity and conservation. *Bioscience*, 52, 883-890.

MEINZEN-DICK, R. (1997) Farmer Participation in Irrigation: 20 Years of Experience and Lessons for the Future. *Irrigation and Drainage Systems*, 11, 103-118.

MEINZEN-DICK, R., KNOX, A., PLACE, F. & SWALLOW, B. (2002) *Innovation in Natural Resource Management: The Role of Property Rights and Collective Action in Developing Countries*, IFPRI, Washington D.C.

MFED (2002) *Sustainable development and poverty reduction programme* MFED, Addis Ababa.

- MINISTRY OF FINANCE AND ECONOMIC DEVELOPMENT. (2005) *Sustainable Development and Poverty Reduction Program Annual Progress Report (2003/4)*. Development Planning and Research Department, Ministry of Finance and Economic Development, Addis Ababa.
- MONTGOMERY, J. B. (1988) The informal service sector as an administrative resource, In: Rondinelli D.A. and Cheema G.S. (eds). *Urban Services in Developing Countries*, 89-111. Macmillan: Hong Kong.
- MORIARTY, P. & BUTTERWORTH, J. (2003) *The productive use of domestic water supplies: how water supplies can play a wider role in livelihood improvement and poverty reduction*. , Thematic Overview Paper, IRC International Water and Sanitation Centre, Delft, The Netherlands. Available at: www.irc.nl/page.php/256. Accessed on 17-07-2009.
- MORIARTY, P., BUTTERWORTH, J., VANKOPPEN, B. & SOUSSAN, J. (2004) *Water, poverty and productive uses of water at the household level*. In: *Beyond domestic*., IRC Technical Papers Series 41. IRC International Water and Sanitation Centre, Delft, The Netherlands, p.19-47. Available at www.irc.nl/content/download/6802/105351/file/TP41BeyondDomestic.pdf. Accessed on 17-07-2009.
- MOSER, C. O. N. (1993) *Gender Planning and Development*, Routledge, New York.
- MINISTRY OF WATER RESOURCES. (1997) *Ministry of Water Resources: Water and Development, Quarterly Bulletin of the Ministry of Water Resources*, Ministry of Water Resources, Addis Ababa, Vol. 16. No. 14. September 1997.
- MINISTRY OF WATER RESOURCES. (1999) *Comprehensive and Integrated Water Resources Management Policy*, MWR, Addis Ababa.
- MINISTRY OF WATER RESOURCES. (2001a) *Ethiopia Water Sector Strategy*. Ministry of Water Resources, Addis Ababa.

- MINISTRY OF WATER RESOURCES. (2001b) *Water and Development, Quarterly Bulletin*, Vol. 20, No. 20, December 2001, Ministry of Water Resources, Addis Ababa.
- MINISTRY OF WATER RESOURCES. (2002) *Water Sector Development Program-Project ETH/98/001, Ethiopia*, Vol. I, Unpublished Final Executive Summary, June 2002, Ministry of Water Resources, Addis Ababa.
- MINISTRY OF WATER RESOURCES. (2003) *Water and Development, Quarterly Bulletin of the Ministry of Water Resources, Addis Ababa*, Ministry of Water Resources, Addis Ababa.
- NARSIAH, S. (2008) Discourses of Privatization: the case of South Africa's water sector. *Development South Africa*, 25 (1), 21-36.
- NARSIAH, S. (2010) The Neoliberalisation of the local state in Durban, South Africa. *Antipode: A Radical Journal of Geography*. 42(2), 1-45.
- NBE (2008) Quarterly Bulletin, 46 (3). Central Bank of Ethiopia. Addis Ababa <http://www.heritage.org/index/country/Ethiopia>. Accessed 20-09-09.
- NATIONAL ENVIRONMENTAL PROTECTION AGENCY. (1997) *Environmental Policy of Ethiopia*, National Environmental Protection Authority, Addis Ababa.
- NEUMAN, W. (2000) *Social Research Methods: qualitative and Quantitative Approaches*. (4th ed.). Allyn and Bacon, New York.
- NATIONAL METEOROLOGICAL SERVICE AGENCY. (1996) *Climatic and Agro-Climatic Resources of Ethiopia*, National Meteorological Service Agency of Ethiopia, Vol. 1 No. 1. Addis Ababa, January 1996.
- NMSA (2002) *National Meteorological Services Agency Annual Report*, Addis Ababa.

- PANKHURST, R. (1962) 'The Foundation and Growth of Addis Ababa to 1935. *Ethiopian Observer*, 6 (1), 34-36.
- PEET, R. & WATTS, M. (1996) *Liberation Ecologies. Environment, development, Social Movements*, Routledge, London.
- POTTINGER, L. (1999) *River Keeper's Handbook, A Guide to Protecting Rivers and Catchments in South Africa*, International Rivers Network, Berkley.
- PUGH, C. (1997) *Sustainability and Sustainable Cities*, In: Pugh C. (ed.), *Sustainability, the Environment and Urbanization*. 135-179. EarthScan, London.
- RAHMATO, D. (1999) *Water Resource Development In Ethiopia: Issues of Sustainability and Participation*, Forum for Social Studies, Addis Ababa.
- REPORTER (2009) Private Weekly Megazin, Index 14 No. 50/952. Published by Media and Communication Centre, Addis Ababa. [www. Ethiopianreporter.com](http://www.Ethiopianreporter.com) Accessed 15-07-2009.
- ROBERTS, M. J. (1975) River Basin Authorities: A National Solution to Water Pollution. *Harvard Law Review*, 83, 1527-1556.
- ROBSON, C. (2002) *Real World research. (2nd ed)*, Blackwell, Oxford.
- SAMSON, P. & CHARRIER, E. (1997) *International Freshwater Conflict, Issues and Prevention Strategies*, Green Cross International, Prague. May.
- SHEWAYE, M. & ADAM, A. (1998) Public Water Supply Demand and Resource Management Problems in Urban Ethiopia: The Case of Addis Ababa City, Addis Ababa, Ethiopia. *25th WEDC Conference*. Addis Ababa, Ethiopia.
- SWYNGEDOUW, E. (1997) Power, nature, and the city. The conquest of water and the political ecology of urbanization in Guayaquil, Ecuador: 1980-1990. *Environment and*

Planning, 29, 311-322.

TAMIRU, A., SOLOMON, W. & YIRGA, T. (2003) *Surface and ground water pollution status in Addis Ababa, Ethiopia.*, <http://www.un.urbanwater.net/cities/addababa.html>. Accessed on 10-10-2008.

TAYLOR, M. (2004) Responding to Neoliberalism in Crisis: discipline and Empowerment in the World Bank's new Development Agenda. *Research in Political Economy*, 21, 3-30.

TESHOME, A. (2008) *Performance and Future Prospect of Water Supply and Sanitation in Ethiopia. Part II*, <http://www.netwas.org/newsletter/article/2005/09> Accessed on 24-02-2009.

THOMPSON, M. (1997) *Theory of Sample Surevey: Monographs on Statistics and Applied Probability*, Department of Statistics and Acturial Science University of Waterlow. Waterloo, Canada.

TSEGAYE, B. (2002) *Ethiopia Grappling with Water Resources Polices.* <http://www.netwas.org/newsletter/article/2005/09> Accessed 05-03-2009.

UNITED NATIONS EDUCATION SCIENTIFIC AND CULTURAL ORGANIZATION (UNESCO). (2005) *Groundwater Resources Map of the World of the World-wide Hydrogeological Mapping and Assessment Programme*. UNESCO, New York.

UNITED NATIONS FUNDS FOR POPULATION ACTIVITIES (UNFPA). (1999) *The State of the World Population, 1999*, United Nations Population Fund, New York.

UNITED NATIONS. (1992a) *Hand book on the Peaceful Settlement of Disputes between States*, United Nations, New York.

UNITED NATIONS. (1992b) *Report on the International Conference on Water and Environment, Dublin, Ireland*. International Conference on Water and Environment Dublin, Ireland.

- UNITED NATIONS. (2001) *World Population Prospects: The 2000 Revision*. United Nations, New York.
- UN-WWAP (2006) *World Water Assessment Program: National Water Development Report for Ethiopia*, Ministry of Water Resources, Addis Ababa.
- WATER AID ETHIOPA (WAE). (2005) *Exploring public water tap management in Addis Ababa, Briefing Note 2*, Water Aid Ethiopia, Addis Ababa.
- WALTAINFORMATION. (2004) *Vegetables Cultivated Along City's Polluted Rivers Posing Said Danger to Health*.
<http://www.waltainfo.com/EnNews/2003/Mar/18Mar03/Mar18e7.htm> Accessed 16-08-08Waltainformation Media Centre, Addis Ababa.
- WATER GUIDE, EU. (1998) *Towards Sustainable Water Resources Management. A Strategic Approach: Guidelines for water resource development co-operation.*, Luxembourg, European Commission.
- WORLD HEALTH ORGANIZATION (WHO). (1993) *The Urban Health Crisis: Strategies for Health for All in the Face of Rapid Urbanization*, World Health Organization, Geneva.
- WORLD HEALTH ORGANIZATION (WHO). (1995) *A Review of the Operation and Future Development of the WHO Healthy Cities, Programme*, World Health Organization, Geneva.
- WHO/UNICEF. (2004) *Joint Monitoring Programme for Water Supply and Sanitation: Meeting the MDG drinking water and sanitation target: a mid-term assessment of progress*.
- WINPENNY, J. (1994) *Managing Water as an Economic Resource*, Overseas Development Institute, London.
- WOLF, E. (1972) Ownership and political ecology. *Anthropological Quarterly*, 45, 201-5.

- WORLD BANK. (1993a) Water Demand Research Team, "The Demand for Water in Rural and Areas, Determinants and Policy Implication". *World Bank Research Observer*, Vol.8, No.1
- WORLD BANK. (1993b) *Water Resources Management. A World Bank Policy Paper*, World Bank for Reconstru and Development/The World Bank-1818 H Street, N.W. Washington D.C.
- WORLD BANK. (1995) *Water Resources Management*, World Bank Washington, D.C.
- WORLD BANK. (1996) Measuring Economics Benefits for Water Investments and Polices. *World Bank Technical Paper 338*, Young, R.A. Washington, USA.
- WORLD BANK. (2000) World Development Report, 1999/2000. The World Bank, Washington, DC. USA.
- WORLD BANK. (2004a) World Bank, Ethiopia Country Office: Sanitation Strategy Final Draft Paper, Water and Sanitation Programme, Addis Ababa, Ethiopia.
- WORLD BANK. (2004b) *World Development Report, Making services work for poor people*, Oxford University Press, Oxford.
- WORLD BANK. (2005) Water Resource, Growth and Development, *A Working Paper for discussion prepared for the panel of Finance Minister, Addis Ababa*. Addis Ababa, Ethiopia.
- WSP/UNDP. (2006) Getting Africa on Track to meet the MDGs on Water and Sanitation. *A Status Overview of Sixteen Africa Countries*, pp.21.
- WWDSE. (2001) Water Works Design and Supervision Enterprise: Water Sector Development Program (Project ETH/98/001). Ministry of Water Resources, Addis Ababa, Ethiopia.

- YILMA, E. & S.M.K. DONKOR (1997) Strategic Issues of Fresh Water Management in Africa. *Journal of Africa Development, United Nations Economic Commission for Africa (UNECA), Addis Ababa, Ethiopia.*
- YIN, R. K. (1994) *Case Study research: design and methods*, (2nd ed.), Applied Social Research Methods Series. Vol. 5, 36-38. Sage Publication, London.
- ZEWIDE, A. (1994) *Water Resource Development In Ethiopia: An Evaluation of Present and Future Planning Concepts; A Management Method for Analysing A Key Resource in a Nations Development*, Ithaca Press, Reading, UK.

APPENDICES

Appendix 1 Annex Table 1: Summary of Household selected Variables and mean for columns 3 to 7

Variables Name						
Household population	Sample Size of Household	Average Family Size	Average Age of the Respondent	Monthly Average Income	Average Consumption of Water/Month (m ³)	Average Water Expense/Month (Birr or Rand)
182202	150	4.1	42	Birr 713.33 or Rand 509.52 (\$US 60)	1.2m ³	Birr 12.87 or Rand 9.19 (\$US 1.07)

Annex Table 2: Summary of respondents cost of water variables in the study area (2009)

Service Type	No. of Respondents	5 birr	8 birr	10 birr	12 birr	14 birr	15 birr	16 birr	17 birr	18 birr	20 birr	24 birr	60 birr	Aver. cost (ETB/M ³) Mean
Private Tap	25	6	7	7	2	-	2	-	-	-	-	-	1	10.80
	Total	30	56	70	24	-	30	-	-	-	-	-	60	270
Yard Tap	14	2	-	2	2	-	2	2	-	4	-	-	-	13.57
	Total	10	-	20	24	-	30	32	-	72	-	-	-	190
Public Tap	79	6	-	12	16	13	12	-	11	9	-	-	-	13.33
	Total	30	-	120	192	182	180	-	187	162	-	-	-	1053
Kiosk/Vendor	32	-	2	-	9	9	-	6	-	3	1	2	-	14.63
	Total	-	16	-	108	126	-	96	-	54	20	48	-	468
Total	150	70	72	210	348	308	240	128	187	288	20	48	60	1981

Household average monthly cost of water is 13.21 birr/m³ or Rand 9.44/m³

Appendix 2 Questionnaires to be filled by sample Households

To be filled by household head. Fill the answer in the blank space or mark in the box.

1.1: Household General Information

1. Sub-City _____

2. Keble _____

3. Head of the household 1. Yes ☐ 2. No ☐

4. Name of the respondent (if willing) _____

5. Age: _____

6. Sex: 1 Male ☐ 2. Female ☐

7. Marital Status: 1. Single ☐ 2. Married ☐ 3. Divorced ☐

4. Widowed ☐ 5. Separated ☐

8. Level of education 1. Illiterate 2. Read and write 3. Primary (1-6)
4. J / Secondary (7-8) 5. Secondary (9-12) Tertiary (12 +)
9. What type of work do you have? 1. Self employed
2. Working for someone else
3. Government, NGOs
4. Employee of private firm
5. Other specify _____
10. Monthly income or how much you earn per month _____
11. Total number in the household _____

Questionnaires

This questionnaire is prepared to evaluate the water resource management practices in Akaki Sub-City Addis Ababa and involving examining target group interviews based on water sources, water uses and consumption pattern. In addition the study is used to assess accessibility, availability (quality and quantity), reliability (the system and the supply), competition, willingness to pay for tap water and the right to water use parameters to capture from different types of users

1.2. Section one: Household questions

Primary water sources

1. where do you get drinking water?

1. public taps (community tap in public area)	<input type="text"/>
2. taps inside house	<input type="text"/>
3. vendors/Kiosk	<input type="text"/>
4. yard taps (tap in compound shared by more than two households)	<input type="text"/>
5. other source	<input type="text"/>

Water use

2. How much water do you use per month in litre?.....
3. How much water do you use per day for household consumption?

1. less than or equal to 10 lpcd (Litre Per Capita Per Day)	
2. 10-20 lpcd	
3. 20-30 lpcd	
4. 30-40 lpcd and	
5. more than 40 lpcd	

Availability of water and reliability

4. How far do you spend collecting water?Distance
- 5a. Who usually goes to this source to fetch the water for your household?

1. Adult women	
2. Adult men	
3. Female child under 15 years old	
4. Male child under 15 years old	
5. other, specify	

- 5b. Do you have a continuous water supply?

1. Yes	
2. No	

If your answer is yes go to Q. 7

6. For how many hours do you get water per day?hrs a day

1. 1hrs--2hr	
2. 3 hrs—4hr	
3. 5hrs—6hr	
4. 7hrs--8hr	
5. 9hrs and above	

7. Is the water supply interrupted during the month? For how long?.....

Tariffs or water price/cost recovery

8. On average how much money do on the water that you use from different modes of services you spend per month (or cost per cubic metre charged by public utilities)?.....

Households served by different modes of services and average water costs		
Modes of services	Average cost (ETB/m ³)	
Private tap		
Yard tap		
Public tap		
Water kiosk		
Water vendor		

9. Is the water cost affordable?

1. Yes	
2. No	
3. don't know	

Willingness to pay for improved water supply

10. Do you think that the Government water charging policy is helpful to you?

1. Yes	
2. No	
3. I am not certain	

11. Which mode of service do you prefer to have?

1. private taps	
2. yard taps	
3. public taps	

12. If the answer is 2 or 3 for the above question specify the reason for not preferring a private tap

1. the high initial cost of private tap connection	
2. being low income level and the cost is not affordable	
3. the inability of the municipality water supply system to provide private tap	
4. all of the above	

13. Are you willing to get a private tap if you could pay the initial connections fee in small instalments?

1. Yes	
2. No	
3. Not sure	

14. What is the initial connection fee?

Regarding Institutions

15. Who manages the water service or is responsible for the provision of water service in your locality?

1. Local Government Administration	
2. Under Community Management	
3. Private Individuals	
4. NGOs	
5. Community Associations or Boards of Trustees	

16. Is the institutional structure in your locality adequate for effective management of water resources?

1. Yes	
2. No	
3. I am not certain	
4. If No, explain	

17a. what is the present condition of the water resource management?

1. poor	
2. good	
3. very practical	
4. very poor	
5. others specify	

17b. A water users, how do you view water?

1. as social and cultural good	
2. as economic good	
3. as a human right	

Regarding to Akaki river

Please choose one of the following five choices in each of five statements below

1. Strongly agree
2. Agree
3. Neutral
4. Disagree
5. Strongly disagree

18. The freely availability of Akaki river water affects sustainable use of water and public health.	
19. Akaki river water is polluted by up-stream sewage disposal.	
20. Akaki river water is polluted by municipal sewerage system.	
21. Water quality in the Akaki river is monitored	
22. The quality of Akaki river water worsens from time to time.	
23. The community around Akaki sub-city is aware of the pollution of the river.	
24. The government departments (at regional and local levels) are aware of the pollution of the river	

THANK YOU!

Appendix 3 Guideline for key informants/organizations

2.1: Section two

The purpose of this questionnaire is to evaluate public water supply and demand, and resource management practices in Addis Ababa and designed only to AAWSA

General Questions

1. When was AAWSSA established as a Public Water Utility in the country to provide water and sanitation services for residents of the city?.....
2. Does the city have conventional water treatment plants? 1. Yes 2. No
How many? Are they sufficient?
3. Do the water plants work at their full capacity for water production?
1. Yes 2. No
4. How many public taps are found in the city?.....
- 5a. Currently, do you think that you are providing sufficient water supply for the residents of Addis Ababa? Discuss water supply in urban poor area could be improved related to the people willing to pay for improved systems
- 5b. What percentage of residents receive water from AAWSSA?
6. What percentage of households in the city has private water connections (inside house or in compound)?

Public water service

7. Who manages or administer, the public taps in the city?.....
- 8a. Are there different actors who operate the public water taps in the city?
 1. Yes
 2. No
- 8b. If yes, who are they?.....
9. Who is responsible body for regulating the overall operation of public water taps?
10. Is there defined regulation of public water taps in the city?
 1. Yes
 2. No
12. How much do public tap users and domestic users pay for water?
13. How are tariffs determined?
14. What are the levels of cost recovery?
15. How many users does each public tap cater for?
- 16a. Are all public taps functional?
 1. Yes
 2. No
- 16b. If no, what percentage of public taps does not work?

Give the reasons why some of public taps does not work
17. What are the future plans of the organization regarding to the municipal water supply system?
18. Please can you discuss the capacity of the municipal water supply system in general, and the reasons that water loss is higher in the city?
19. Discuss the general problems of provision of water supply and management with reference to urban poor people?

2.2: Section three

This section is designed for NGOs and community representatives

Respondent: 1. Institution/Organization/community:

If Institution /Organization/ the position of the respondent

1. General Manager
2. Expert
3. Department/section head
4. Team leader

Please choose one of the following five choices in each of the 16 statements given below.

1. Strongly agree

2. Agree

3. Neutral

4. Disagree

5. Strongly disagree

1. The present legislation is adequate to manage water resources effectively

2. The government is already committed to water resources development and management

3. The importance of water as an economic good is recognized by you and around your residents

4. The institutional structure related to water supply services in your locality is adequate for effective management of water resources

If so, do they have clear, legally defined mandates?

1. Yes

2. No

3. Not sure

5. Others, specify

5. What is the present condition of the water resource management?

1. Poor

2. Good

3. Not sure

4. Others, specify

6. How effective is the enforcement of water-related laws and regulations?

1. Very effective

2. Less effective,

3. Not at all,

4. Don't know

2.2.1. The following questions are a general question that focuses on your opinion or attitude or view towards institutions and community participation in water sector development and management

1. Please discuss the role government institutions could play in improving water supply services to urban poor people in your area?

2. Who of the following shall be better to administer and manage water services in this area? Local state, community management, private sector and NGO, please specify your view in detail

3. How do the urban water utilities plan to address the shortage of water supply in urban areas of the city?

4. What do you think of community participation in water related development programmes? Probe for involvement and challenges of the community

Regarding to Akaki river

1. Is water quality in the Akaki River monitored? 1, Yes, 2, No
2. The quality of Akaki river water worsens from time to time. ☐
3. Akaki river water is safe both for human and animal drinking. ☐
4. Akaki river is polluted by the households who are using the river water for various household purposes ☐
5. Akaki river water is polluted by up-stream sewage disposal. ☐
6. Akaki River should be used by any household/industry freely (that is without any restriction). ☐
7. My organization (or My household) disposes wastes into the Akaki river ☐
8. The Akaki irrigation agricultural products (like vegetables, maize, fruits) are subjected to health hazards. ☐
9. The Akaki water users abide by the Ethiopian environmental policy. ☐
10. The community around Akaki sub-city is aware of the pollution of the river. ☐
11. The government departments (at regional and local levels) are aware of the pollution of the river ☐

Thank You