

# **Infrastructural services (water supply and sewerage systems): Problems and options for the provision and financing of it in Ethiopian cities(A case study on Bahir Dar city)**

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**Key words:** water supply, sewerage services, provision, finance

## **SUMMARY**

The main objective of this study was to identify the problems and options for the provision and financing of water supply and sewerage services in Ethiopian cities, particularly Bahir Dar city. Both primary and secondary data were used. To analyze the data percentiles, ratios, figures and pictures were employed.

The result of the study disclosed that the sources of water to the city is from two springs and four ground water. In the city there are 16 water pumping motors, 4 working storage reservoirs and 1 storage reservoir under construction. The water line are very limited as compared to the size of the city; and are old aged which are subjected to creating leakages. The result also showed that only small numbers of households are connected to the water supply system. The office is now practicing a top-down service provision approach. The result of the study also pointed out that there are no any sewer lines in Bahir Dar city. They are now using vacuum trucks to emptying the septic tanks.

The office is now getting very low amount of revenues from very limited sources which are totally traditional. The study also identified the major problems in view of this such as backward service provision approach, limited and traditional sources of finance, loss of water, collection inefficiency of users charges, non-standardized land use planning for infrastructural service provisions, failure in applying the existing rules and developing further rules by the office. On the basis of the findings, it is recommended that the office has to increase the number of sources of water, increase the km in water lines and replace the old ones, has to revise the existing provision and financing approaches, has to follow international standards, apply the existing ones and create new rules and make awareness of the community, develop efficient monitoring system, and work in close relation with all stakeholders.

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## **Introduction**

### **1.0. Overview**

World over there is an increase in the growth rate of urbanization. In the less developed regions the 50 per cent level of urban population will likely be reached around 2019<sup>1</sup>. Most recent United Nations information (World urbanization Prospects: The 2007 Revision) indicates that the world urban population is expected nearly to double by 2050, increasing from 3.3 billion in 2007 to 6.4 billion in 2050. By mid-century the world urban population will likely be the same size as the world's total population in 2004. Between 1950 and 2007, the world urban population grew at an average rate of 2.6 per cent per year and more than quadrupled over the period, passing from 0.7 billion to 3.3 billion. During 2007-2025, the world urban population is projected to grow at an average annual rate of 1.8 per cent, which, if maintained, would lead to a doubling of the urban population in 38 years. During 2025-2050, the urban growth rate is expected to decline further to 1.3 percent per year, implying a doubling time of 52 years.

The regional analysis indicates that all of the world's population growth will be absorbed by the urban areas of the less developed regions, whose population is projected to increase from 2.4 billion in 2007 to 5.3 billion in 2050. The urban population of the more developed regions is projected to increase modestly, from 0.9 billion in 2007 to 1.1 billion in 2050. Globally, the level of urbanization is expected to rise from 50 per cent in 2008 to 70 percent in 2050. More developed regions are expected to see their level of urbanization rise from 74 per cent to 86 per cent over the same period. In the less developed regions, the proportion urban will likely increase from 44 per cent in 2007 to 67 per cent in 2050<sup>2</sup>.

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<sup>1</sup> United Nations, 2007

<sup>2</sup> ibid

Even if the extent to which it manifests itself is different to different nations in the world, urbanization affects peoples positively and negatively. In some parts of the world, developed world, it helped them to brought sustainable development through adequate provision of infrastructure. However, on the other parts of the world, developing world like Ethiopia, the rapid growth of the rate of urbanization has made a situation where infrastructure is becoming inadequate and is deteriorating<sup>3</sup>.The ever increasing population has also feeding serious challenges for infrastructure finance as much as the economic bases of these countries are viable to various shocks. Urban population growth, particularly in the developing world, has not been matched with investment in the requisite infrastructure and services. Investments in new infrastructure always lag behind demand. Operation and maintenance of existing stocks is also compromised. It has become common to have overcrowded and over utilized facilities. While low income countries represent about 39 percent of the world's population, they only possess about 13 percent to the estimated value of the world's infrastructure stock<sup>4</sup>.

**1.1. Background of the study and research problems-**The Ethiopian economy has readjusted in the last decade to the urbanization, because the relative contribution of the agricultural sector to the GDP fell from 57 percent in 1999 to 42 percent in 2005, while the service sector has increased from 34 percent to 47 percent. In the last three years, the Ethiopian economy has grown at around 8 percent of the GDP, but Ethiopia is still one of the poorest countries in Africa with a per capita gross national income of less than one-fourth of the average of all sub-Saharan countries, and 80 percent of the population live on less than US \$1 per day<sup>5</sup>.

Ethiopia's population was estimated in 2007 at 81.2 million and is projected to reach 170.2 million in 2050.Although the level of urbanization is very low at less than 17%, Ethiopia is one of the fast urbanizing countries in the world. Ethiopia's urban growth rate of 4.5% is not the highest in Africa, but it is much higher than the 3.2 % average for the continent<sup>6</sup> , and the same as the average for least developed countries. It places urban governments in lack of adequate infrastructure provisions, thus culminating in to increased slum and informal settlements growth. In this regard, the major challenge for the municipality governments would be the provision of adequate and sustainable infrastructure not only for the well-being of residents but also for optimal economic development to all cities and towns and by extension to the nation. The provision of adequate and sustainable infrastructure and the

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<sup>3</sup> Singh and Tai,2000

<sup>4</sup> Bannon, I., Hahn, S. and Schwartz, J., 2004

<sup>5</sup> Munoz and Cho, 2003

<sup>6</sup> MUAD, 2008

proper utilizations of the services require the existence of capable and up-to-date actors who can provide the services in a very efficient ways<sup>7</sup> .

Poor provision of infrastructures can lead to exposition of urban populations to health risks, limiting productivity through service cuts, increase in household and investor costs through property damage and increasing production costs through congestion, accidents and traffic jams.<sup>8</sup> .

Urban infrastructure services can be provided by a variety of organizations, depending on the institutional and policy arrangements in place. External agencies, non-governmental organisations, and public sectors have often attempted their best infrastructure provision so as to reduce supply shortfalls. External donor funded projects have made significant contributions in the facilitation and development of community support infrastructure in the region<sup>9</sup>.The problem is given this kind of support; can African countries including Ethiopia continue to depend on this type of assistance? In Ethiopia, private sector participation is limited, with the responsibility mainly shouldered by municipal and regional governments<sup>10</sup> .

Public financing, a conventional infrastructure finance typology, has failed to satisfy the increasing demand of infrastructure in heavily indebted countries. In this type of financing system, the private sector has only passively participated, surely with commendable effect<sup>11</sup>. The main problem affecting infrastructure provision in Ethiopia is that the government, which is the main funder of infrastructure projects, is faced with series budgetary constraints<sup>12</sup>.

As put by Bannon, I., Hhan, S.and Schwarz (2004), the existing local public finance system is not able to generate substantial revenue flows and tax setting restrictions by the region undermine local accountability. Even if the region now update the lower and upper limits of tax rates more regularly, the current own revenue sources are too short winded.

However, the current practice in most of the countries showed that they are working on an alternative financing and managing options of infrastructure and in this regard, the private sector is assumed to take the front. The level of participation successes and sustainability will be effective and expected to give the desired return if and when justified interventions are made from the public<sup>13</sup> .

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<sup>7</sup> Esubalew Alehegne, 2008

<sup>8</sup> Werner, J. and Than, D.N. 2007

<sup>9</sup> Esubalew,2008

<sup>10</sup> Nyarirangwe et al.2007

<sup>11</sup> Murphy &Peter, (2000).

<sup>12</sup> Nyarirangwe et al.2007

<sup>13</sup> Suresh,2000

The Ethiopian government has institutionalized, very recently, the urban development policy. This policy put urban areas as the growth engines of the economy of the country at the heart of it is infrastructural development. Even if it is a good start, the document, however, kept silent regarding urban population momentum, which is a cause of inadequate infrastructure and urban life strain. Furthermore, intervention strategies that make urban infrastructure sustainable and, cities and towns to function properly and become comfortable for the people to live there was not thoroughly documented and analysed. Lack of these analysis will definitely be resulted in to the deficiency of infrastructure and hence reinforce poverty.

Even though there are such and other problems in these areas, not much effort has been done on it so far. Thus this study was intended to fill this gap by exploring the answer for the following leading questions: Who is responsible for the provision and financing of water supply and sewerage services in Bahir Dar city? How is the situation of water supply and sewerage services in the city; and how infrastructural services are provided by the responsible body or other organizations in the city? What are the main problems with regard to provision of infrastructure services? How these services are financed? What are the problems with financing of it? Are there any alternative way of providing and financing infrastructure services in the city? Who are the actors of these infrastructure developments?

**1.4. Objectives of the study**-The general objective of the study is to identify the problems and options with related to the provision and financing of infrastructure services in Ethiopian cities, particular reference to Bahir Dar, a capital city of Amhara Regional State.

**1.5. Methodology of the study**-With regard to the methodology of the study, the paper has used different types of methods in order to meet its objectives. Accordingly, the study has used descriptive and theoretical analysis. The study has used both primary and secondary data. To collect the primary data the researcher selected samples from the three groups of households living in the city. The researcher sorted the population in to three parts such as *slums* (informal settlers), *households who are living in the periphery of the city* and *households living in the down town*, based on geographical locations and legality. The researcher did this because these groups can fully represent the city. But if the researcher has used the whole populations of the city as a sampling frame one, from the group, may dominate and then the conclusion from the findings may not be appropriate. The total sample size is 150 which comprise 50 sample households from each group. In addition to this, Key Informants Interview (KII) has also been employed in acquiring primary data from the concerned officials. Secondary data was collected from different sources such as different published and unpublished materials, books, reports, magazines, articles, journals, etc, which dealt with the area under investigation. The collected data from the sample households has

been presented using tables, figures and charts .The paper has employed both qualitative and quantitative methods to analyse the collected data.

### III. Results and Discussions

**3.1. Water supply in Bahir Dar City-**Water supply in Bahir Dar city and its surrounding areas (rural kebeles) are taken care of by the Bahir Dar Water Supply and Sewerage Service (BDWSS) office. The BDWSS is a semi-autonomous enterprise which is number one responsible body in the area of water supply in the city as per the explanation of Ato Mebet Admasu, the general manager of BDWSS office. BDWSS office is doing this task by having collaboration with others which are discussed under section 4.6.

- **Water Sources-**Water supply in the city is from two types of sources namely, from springs and deep ground water. As can be seen from the following table, now days the city is getting 12946.16 meter cube water from the two springs and 3388.22 meter cube water from the deep ground water.

**Table 1: Sources of water supply in Bahir Dar city**

No.	Type of source	Amount of water per day(in meter cube )
1	Areke spring	8363.50
2	Lome spring	4582.60
3	Cherchera ground water	631.44
4	Gordema ground water	542.88
5	Gudo Bahir ground water	1240.00
6	Asherf ground water	972.00
Total		16332.42

Source: BDWSSS Brochure, 2009

The above data revealed that much of the water is from the two springs (Areke and Lome). Others are relatively low. Almost all of the sample households responded that there is lack of water in the dry season. That is, there is a problem of reduction in water production in all the sources. In addition to this, there is a fast growth in population in Bahir Dar city. As the population increases from day to day, it is undeniable fact that the water demand will also increase.

- **Storage reservoirs-** Once the water is produced there should be convenient and good storage reservoirs .In this regard, with in Bahir Dar city there are storage reservoirs with different size. Accordingly, there are four storage reservoirs which are working now with the total capacity of 4500m<sup>3</sup>. In addition to these, there is one storage reservoir under construction with the capacity of 500 m<sup>3</sup>. So, when it starts to work there will be a total capacity of 5000m<sup>3</sup> in the city.
- **Water pumping motors-** Producing water from the springs and ground water sources are only a necessary condition in the water supply process. That is, as soon as the water is produced from the sources it is impossible to distribute it to the consumers without taking it somewhere up. To do this, what is important is water pumping motors. In this regard, there are 16 water pumping motors in the city with different powers in kilo watt which ranges from 18 to 45 kilo Watt.
- **Water Lines-** Water lines refer to lines through which water flows from one place to another in the water supply process. Accordingly, in the city there are three types of water lines: Primary lines (around 26 km), Secondary lines (around 80km) and Tertiary lines (around 436 km).In general, up to 2009 fiscal year, there are different lines which cover more than 542 km in the city.
- **Number of customers and Water supply coverage in the city-** From the information in BDWSS, up to May 2009, the total number of customers who have signed a contract with the office and utilizing the services are 17440. From these ,15774 constitutes household connections,1034 commercial connections, 505 government connection,75 industry connection and 52 public connections. The following table summarizes progress of customer connection from 2003-2010:

**Table 2: Progresses of customer connection in Bahir Dar Water supply service.**

Year	No of customer	Percentage increases
2003	10415	-
2004	11562	9.92%
2005	12400	6.76%
2006	14164	12.45%
2007	16000	11.45%
2008	17520	8.68%
2009	17866	1.94%

Source: BDWSS and own calculations

From the above table one can understand that even if there is an increase in the number of customers it is with a decreasing rate. According to the report by the Central Statistics Agency (CSA, 2007) there are 45,000 households in Bahir Dar city, but the above figure shows that there are only 15,774 households who have actually connected to the BDWSS, up to May 2009.

The following table shows the proportions of sample households who are connected to the BDWSS water supply.

**Table 3: Percentages of sample household connections to the BDWSS water supply in Bahir Dar**

	Connected		Not –connected	
	No.	%	No.	%
Informal settlers	3	6%	47	94%
Periphery	21	42%	29	58%
Down town	43	86%	7	14%

Source: Field Survey

As can be seen from the above table 94 % of the informal settlers do not connect to the system. On the contrary, 86% of the households in the down town are connected to the system. There are also significant proportions of the households who do not connect to the system in the periphery areas. Sample households from the informal settlers responded that the BDWSS office has no water supply service in their area. However, the responses by the sample households from the periphery and down town are almost similar, that is financial problems which are caused by the situation where the BDWSS distributive lines are relatively far away from houses as discussed in the above. There are two ways of getting water: from public water post and from neighbours who are already connected to the system. From both, they are buying water with a very expensive manner relative to the user charge by BDWSS office. Even though the researcher put ranges in the questionnaire regarding questions on how long have they been in the area, sample households from the informal settlers put years which are greater than 30 years.



### **3.2 .Water Supply approach in the city-**

**Table 4: Participation by households in the water supply processes**

Question item	Yes	No
Have you participated in the provision of services so far?	19 (12.7%)	131 (87.3%)

Source: from field survey

The above table revealed that 87.3% of the sample households did not participate so far. Even 12.7% of the sample households have participated in other areas other than water supply such as cleaning of their surroundings, paying for access road construction etc. However, in connection with water supply it is hardly possible to say that there is community participation. It can be said that, community participation comes when households want to be connected to the distributive lines. Households which are relatively far away from the distributive lines make some coordination between them so as to be connected to the system. Households who feel that they couldn't have that money will not apply the service instead, as explained before; buy the service from others with more money. Unless households apply for the service no one will ask them to be connected to the system. That means, the system is directly or indirectly benefiting only the richer ones than urban poor. In connection with this, sample households were asked which party in the society is being benefited the least from the system, and the responses from them are summarized in the following table:

**Table 5: Percentage of the least beneficiaries from the existing system in Bahir Dar city**

Parties	No.	Percentages
Urban in general	27	18%
Urban poor	99	66%
NGOs	3	2 %
All parties benefit equally	21	14%
Total	150	100%

Source: Field survey

From the above table we can see that 66% of the respondents revealed that the one benefiting the least with the existing system is the urban poor.

**3.3. Sewerage System in Bahir Dar City-** In Bahir Dar city, let alone having sewer lines, there are only about 5% of the households who have flush toilets with septic tanks. The majority of the households, i.e. around 67%, have access to pit latrines (Milda L., 2009). The city is using vacuum trucks for emptying the septic tanks. The problem in this case is that there are no any facilities for the treatment of the waste; and wastes are not disposed off in a proper way and area in the city.

### 3.4. Financing of Water Supply and Sewerage System in the City-

According to Prof. A.C. Mosha, the very large gap between demand and supply of infrastructural services in developing countries is due to restricted sources of revenue and inadequacy of their financial regulations and procedures they are applying. Similarly, responses from the sample households showed that households understood this fact as summarized in the following table.

**Table 1: weights of different basic factors for the performance of giving the services given by sample households.**

Factor	No	Percentage
Finance	77	51.3%
Gov` t willingness	20	13.3%
Public readiness and willingness	39	26%
Skill of workers	4	2.7%
Other	10	6.7%
Total	150	100%

Source: Field survey

According to the above table, sample households gave the first priority to finance. In most cases, developing countries, including Ethiopia, are characterized by not having enough source of revenue for financing these services. The situation in Bahir Dar City is not also different from this fact. According to the data from the BDWSS office, their way of financing is totally traditional. The major component of traditional financing system is user charges/ user fees.

The major components of the sources of finance for BDWSS office are the following:

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- **Water Sales Revenue-**Water sales revenue constitutes the larger share of source of finance for the office. It includes domestic bill revenue, public fountain bill revenue, and revenues from hydrant water sales. Among these, domestic bill revenue which refers to the monthly user fee of all customers takes the larger share. The current water tariff rate of the office is the lowest in the region which ranges from 1.25 birr/cubic meter to 2.50 birr/cubic meter. For public taps the tariff is independent of the consumption level of users. The tariff rate is 1.25 birr/cubic meter for public taps regardless of the level of consumption. However, in the case of connection users, user charge is on a progressive tariff rate system which ranges from 1.50 birr/cubic meter to 2.50 birr/cubic meter. The details for tariff rate connection user are the following:

**Table 7: Present water tariff rates in Bahir Dar Water Supply and sewerage Service Office**

Consumption	Tariff( birr/cubic meter)
0-5 m <sup>3</sup>	1.50
5.1-10 m <sup>3</sup>	1.75
10.1-25 m <sup>3</sup>	2.00
25.1-40 m <sup>3</sup>	2.25
40.1 m <sup>3</sup> and above	2.50

Source: from responsible person in BDWSS

Information from BDWSS indicated that this tariff is not revised for a number of years; and it is also very low as compared to the water tariff rate in other towns in the region. Therefore, the water tariff situation in the city is in line with the argument by Prof. A.C. Mosha -local authorities are charging very low amount of money i.e. under charging, and also charge rates are not frequently revised. Thus, having these problems the revenue generated from user fee/charges may only cover operating costs but it cannot cover other investment costs.

- **Application Revenue-** It includes the meter rent revenue, reconnection (penalty); excavation revenue and sewerage service income. Much of the application revenue is from the meter rent<sup>14</sup>. From the components of the application revenue, only meter size revenue

<sup>14</sup> Meter rent revenue is calculated based on the meter size which the customer is using; information for BDWSS indicated that ½” meter size is charged 2.00 birr, ¾” meter size is charged 2.50 birr and 1” and above meter size are charged 3.00 birr per month.

can be obtained with certainty. Others are uncertain because the revenue for them cannot be correctly predicted. For example, if the entire customers pay their credit within the time provided by the office, revenue from penalty cannot be obtained. Similar situation can happen on the excavation revenue and sewerage service income too.

- **Estimation Revenue**-Estimation revenue is also another source of revenue which the office is now using it in annual budgeting. Within estimation revenue they put revenue from technical service income, revenue from estimation and permission and material sales.
- **Other Income and Donated incomes**- revenues from other incomes received when other infrastructural service providers such as Ethiopia Electric Power Corporation (EEPC), Ethiopia Telecommunication Corporation (ETC), Ethiopia Road Authority (ERA) cause a damage on the water lines which the office constructed when they are doing their own tasks. Ato Mebet also added that since all service providers are not following international standards when providing infrastructural services, the damage on the water lines by other always exist. The other one is donated income which constitutes grants in cash from externals. This source includes grants from the Amhara National Regional State Water Resource Development Bureau and Grants from Bahir Dar City Administration. These are revenues which are not certain and not continuous. The other problem here is that, donors give the money only for the specified task and the remaining balances, after the accomplishment of that task, are expected to be returned to the donors.

**Table 2: Summary of revenues to BDWSSS office from different sources for years 2006-2009.**

Types of sources	Year			
	2006	2007	2008	2009
Water sales	4,404,427.40	4,552,043.12	12,547,405.89	14,582,339.00
Application revenue	436,323.03	532,824.50	616,225.36	658,337.83
Estimation revenue	76,038.64	1,426,094.05	3,013,095.08	3,913,276.52
Other incomes	62,273.00	63,920.00	11,151.31	69,364.28
Donated incomes	148,049.17	225,146.16	-	234,156.20

Source: own compilation of data of BDWSS.

As can be seen from the above table, it is revenue from water sales which takes the lion share of the source of revenue for financing of services in Bahir Dar city.

**3.5. Actors** -In a well integrated system the jurisdiction and responsibility of actors or stakeholders have to be clearly stated. The clear demarcation of jurisdiction and responsibility

with all stakeholders' ' participation in system designing will help to understand the group that will be affected at every level and line of accountability(Yirgalem,2001).As per the explanation by Ato Mebet, the principal actors in the provision and financing of water supply and sewerage services in Bahir Dar include households, Bahir Dar Water Supply and Sewerage service office ,Amhara National Regional State Water Resource Development Bureau, and Bahir Dar city Administration.

**3.6. Problems-** The researcher identified the following major problems which could be the reasons for the low performance with respect to the provision and financing of these services. Problems include the following:

- **Backward provision approach-**The water supply approach is an underdeveloped one which cannot give adequate result. It is top –down approach which the BDWSS office is practicing now. Community participation is almost none existed in the system. This approach is very difficult when we think of the sustainability of the services.
- **Restricted source of finance-**The financing approach in BDWSS office is totally traditional. Much of the money is from the user charges. That means, operation and maintenance, and also expansion of the services are all depend on the amount of money that the office is going to have from the users. However, this kind of financing system may give the money which can only cover the operation and maintenance costs. The office is not even using other sources like money from taxes in the city. Therefore, expansion of the services and also improvement of the existing system is impossible if the office depends only in these sources of finance.
- **Loss of water** -As mentioned in the previous section, there are about 5000m<sup>3</sup> volume of water that the office is losing per day from the total daily water production. That means around 29.5% of the produced water are lost every day. This is because of the fact that most of the water lines are old aged and subject to leakages.
- **Collection inefficiency of user charges-**The major source of finance is from users charge but collection of users charge is inefficient. The customers are expected to come to the office monthly to take their water bill and pay the money. In this way, some of the customers are failed to do so and hence the office may not meet its planned objectives because the office plans its objectives by expecting the full payment by the existing customers. Data from the audited annual report and general ledger account of BDWSS office indicated that for the years 2005, 2006,2007,2008 and 2009, the percentage of account receivables are 8.5 %, 9.74%, 15.43%,18.28% and 15.48%, respectively. This

increase in percentage of outstanding receivables indicates the collection inefficiency in the office.

- **Non-standardized land used planning-** In Bahir Dar there are different organizations and corporations which are providing infrastructural service in the city. From these Ethiopia Electric Power Corporation (EEPC), Ethiopia Telecommunication Corporation (ETC) and Bahir Dar water supply and sewerage service office are the major and interrelated ones. According to Ato Mebet Admasu, they are not following international standards when providing the services. This is directly related to the problem in the land using planning in the city. In Bahir Dar there is no coordination between these service providers. One just come and dig the ground and hence causing damage on the already existed services because they are not following international standards which clearly put where the water lines and others should be in place. These damages causes disconnection of the system for the customers until it is reported to the office and repaired. Thus, this practice is making much inconvenience in adequately doing its activities.
- Finally, failed to apply its rules and regulations when customers break one or more of them. In addition to this, the office doesn't have also further rules and regulations which can help the office to have more larger source of finance; and enforcement of the households to be connected so as to decrease the number of households who are not getting adequate water per day.

## **IV-Conclusions and Recommendations**

**4.1 Conclusions-**The Bahir Dar Water Supply and Sewerage Service office controls the water supply and sewerage service in Bahir Dar city. It is a semi-autonomous enterprise with the responsibility of providing and financing of both water supply and sewerage services in the city in cooperation with others, if necessary. In regarding the water supply in the city, the results indicated that there are six sources of water. Two of them are springs and others are deep ground water .These sources are not enough in reaching the demand for water in the city especially during the dry season. Produced water from these sources is transmitting to the four storage reservoirs by 16 water pumping motors. There are three types of water lines in the city, namely, primary (transmission lines), secondary (distributive lines) and client's lines. Totally, there are around 542 km water lines in the city.

In Bahir Dar there are 45,000 households. From these, up to May 2009, there are only 15,774 households who have a formal contract with the BDWSSS office, and getting direct services from the office. The result from the sample households also showed that, 94% of the informal settlers, 58% of the periphery households and 14% households in the down town are not

connected to the system. No water supply by the office is the reason by informal settlers. However, in the other categories there is the supply there but the distributive lines are not in a convenient manner, which needs big money to connect from that line by a single household. Households who are not connected to the system are buying water from the public posts and from their neighbours; the money that they are paying is much greater than the money directly paid to the BDWSSS office. In this sense, the existing system is not benefiting the urban poor, rather benefiting the richer ones.

The BDWSSS office is applying a top-down approach in supplying water for the people with a minimum participation by the community. It is not mandatory for a household to be connected to the water supply networks. This is making some difficulties in addressing the overall water born problems in Bahir Dar. With regards to the sewerage system, there are no sewer lines in Bahir Dar city. There are only about 5% of the households who have flush toilets with septic tanks. The majority of the households, i.e. around 67%, have access to pit latrines. They are using vacuum trucks for emptying the septic tanks. The problem in this case is that there are no any facilities for the treatment of the waste; and wastes are not disposed off in a proper way and area in the city.

In the city, the most basic factor, decided by the BDWSSS office and sample households, is the source of finance. The office is depending on the very limited and traditional sources of finance. The sources of finance include water sales revenue, application revenue, estimation revenue, donated incomes and other incomes. Revenue from water sales constitutes the lion share of the total revenues for the office. The water tariff by the office is 1.25 birr/m<sup>3</sup> for water posts, regardless of the consumption level of the users; but it is on a progressive manner for connections which ranges from 1.50 birr/m<sup>3</sup> to 2.50 birr/m<sup>3</sup> according to the consumption level by users. This water tariff is not revised for a numbers of years; and it is low as evaluated by the sample households and compared to the water tariffs by other regional capital cities. Donated incomes are given only for a specified task, and the remaining balance is usually returned to the donors. The existing sources of incomes can only cover the operating and maintenance costs, but it is hardly possible to have extra money for expansions and other tasks. BDWSSS office has collaboration with Amhara National Regional State Water Development Bureau and Bahir Dar City Administration .They are providing some technical, financial and material supports for the office. But, the help by these bureaus is random and very low as compared to their source of income.

Finally, problems are identified as a reason for not having further performance in the provision and financing of water supply and sewerage services in Bahir Dar City. These problems include backward service provision approaches by the office, limited sources of

finance, loss of water due to old aged water lines and some other reasons, collection inefficiency of user charges, non-standardised land use planning with regards to provision of infrastructural services in the city, and the last, but not the least is failing to apply its rules and regulations when customers break one or more of them and lack of further rules and regulations which can facilitate the provision and financing sources for the office.

**4.2. Recommendations**-Based on the findings of the study, the researcher recommended the following:

- BDWSS office should get some permanent income from the city Administration or should change its status. By taking in to account the further increase in population in the city and to supply for the unconnected ones, further efforts have to make in order to increase the water production in the city by increasing the sources of water; and more water lines should be constructed so as to allow more customers to be connected to the system; and also the old aged water lines should be changed because they are the reason for significant water loss.
- The office should create some mechanisms by cooperating with others to supply water for the informal settlers. The office has to revise its service provision approach. The office should create other alternative sources of finance such as loan financing, public-private partnerships, bond marketing, etc
- The office should revise the water tariff; and also has to improve the users charge collection systems, for example instead of expecting the customers to take their bill in the office, providing the bills to their house. The office should follow international standards when constructing water lines and push other parties to do the same in the city so as to avoid damage of water lines by other service providers. Finally, the office should develop further rules and regulations which can improve provision and financing of the services, and should create awareness about the rules and regulations. In addition, the office should strictly apply the rules and regulations when somebody breaks them

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