Review Article

Critical Challenges, Implications and Sustainable Options of Potable Water Management in Mutengene, South West Region, Cameroon

Abstract

Sustainable management of potable water has been an outstanding problem faced by the world and a greater challenge of it is seen in Africa. The rapid growing population in all the regions of Cameroon has led to a critical challenge of potable water management especially in Mutengene, south west region of Cameroon. This study examines the critical challenges and implications of potable water management and supply in Mutengene. A combination of research methods like the literature reviews; interviews and reconnaissance field appraisal have been used in this study. A community based cross-sectional survey was conducted from December 2021 to February 2022 using quantitative and qualitative approaches. Then the assessment of water supply challenges was done with a semi quantitative approach. Two hundred and twenty-five (225) questionnaires were administered while qualitative data was collected through Focus Group Discussions and in-depth interviews. Our findings revealed that there are frequent shortages of potable water supply in Mutengene. The results obtained from the questionnaires administered indicated that 60% of the water supply challenges were as a result of frequent water shortages in Mutengene town. Meanwhile 22% of the respondents stated that longer distance is being undertaken every day to fetch for potable water. While 18% of the respondents were of the opinion that the critical challenges of potable water supply is as a result of limited access to potable water leading to a continues

search for potable water in longer distant places. The need to meet up with these critical challenges has been emphasized in Sustainable options of potable water management. That is, the government and the local community of Mutengene urgently need to set up a budget together with a stronger team to manage and supply potable water to the town of Mutengene.

Keywords: Critical challenges, Implications, Sustainable options, Potable water management, Mutengene, Cameroon.

Introduction

Increasing health problems in Cameroon like that of cholera outbreak taking away many lives currently in the city of Douala, the towns of Buea, Limbe and Mutengene indicates government weaknesses in managing potable water resources. Without readily available water in sufficient quantity, and free of disease-causing agents, man's progress is hindered (Malika *et al*, 2019). Also, there is frequent water shortage in Mutengene coupled with the critical challenges of potable supply in town; the Cameroon government together with the local community of Mutengene urgently needs to set up a good management team that would be responsible in creating and managing large water catchments that can sustain the increasing population of the sub-division. If this can be achieve, then the critical issues of potable water supply challenges would be limited. Besides, the use of potable water for drinking, bathing, cooking, and for hand sanitizing will no longer be a major problem in the face of rapid urbanization.

It is a certainty that without water there would be no life of any kind on earth, and without readily available water in sufficient quantity, and free of disease-causing agents, man's progress is hindered (Malika *et al*, 2019). This is true in that man cannot live for up to a day without drinking or using water in cooking or bathing. As such frequent potable water shortages in Africa, Cameroon and precisely in Mutengene, south west region of Cameroon is leading to many implications.

Among African countries, Cameroon ranks second in water resources potentials after the Democratic Republic of Congo (Sigha-Nkamdjou, Sighomnou & Lienou, 2002). However, despite the abundance of water in the country, the resource is not being harnessed efficiently to satisfy the needs of her increasing population (United Nations International Children's Emergency Fund/World Health Organization [UNICEF/WHO], 2008). Besides, managing the few catchments in the country is equally a difficult task because of its inadequate technology and uncoordinated management board.

The quality of drinking water is a major concern in low resource settings like Cameroon where waterborne diseases happen to be a yearly epidemic (WHO, 2018; Mbah. et al, 2019). Waterborne diseases are the second and third leading reported weekly epidemiological disease under surveillance in Fako division, South West Region of Cameroon (Ministry of Health, 2019). Recently, there has been a cholera outbreak in Buea, Limbe and Mutengene towns of the south west region of Cameroon that has affected about 300 people and 27 deaths have been recorded (Public Health Minister, 2022).

The Water Development Project in Mutengene town has not yielded significant results due to poor institutional and developmental policies (Njoh, 2006). This statement is correct because of poor management and over dependence on old

water facilities. Furthermore, a comprehensive water law does not exist even to date (Kouam et al., 2006).

In Mutengene precisely, potable water supply has become an increasing problem as a result of increasing population, inadequate water facilities and poor management. As such many water users hardly know when to expect water or when not to, because of the poor management strategies involved. Furthermore, there is little documented information about the critical challenges people face in accessing potable water in Cameroon at large and in Mutengene in particular. The purpose of this study therefore was to examine the critical challenges of potable water supply and its implications in the Mutengene locality, with the hope of generating information which will be useful in deriving sustainable options to water crisis by government and stakeholders involved in water management.

MATERIALS AND METHODS

The Study Area

The town of Mutengene is situated within Tiko sub-division, in the Fako Division, South West Region of Cameroon. It is located between latitude 4° 5' 58" North and longitude 9° 18' 29" East of the Prime Meridian. The general climate of the area is equatorial type, largely comprised of sub-humid tropical climate (Molua, 2002; Lambi and Molua 2006). The weather is largely controlled by equatorial and tropical air masses, characterized by average mean temperatures of 25^{o} C and rainfall of 1,700mm (Molua, 2002).The main human activities in the region are agriculture, petit businesses and works in factories and plantations. Geologically, Mutengene has a volcanic rocks type which range from massive basaltic lava flows and lava flows around the upper slopes of Mt. Cameroon to pyroclastic materials further down slope (Manga et al., 2013).

Socio – economic characteristics of Mutengene

Data gotten from Mutengene council workers and from internet in March 8th 2022 shows that the population of Mutengene is estimated to about 47,478 inhabitants. Most of the inhabitants were plantation workers of Cameroon Development Corporation (CDC). In the late 1960s most the parents who settled there together with their families were workers of the CDC plantation farms, but as years goes by they gradually started involving themselves in small businesses. As of now, the inhabitants of Mutengene are mostly involved in subsistence farming. And they sell their little output along the roadside to passengers travelling to Douala in the Littoral region, Limbe and Buea in the south west region of Cameroon. They equally have government primary schools, secondary schools with private mission primary and secondary schools. One of the largest government police training school in Cameroon is also located in Mutengene with many churches within her environ. The respondents equally indicated that there are only few health facilities with limited numbers of qualified staff. Also, about 51% of the settlements are connected to national electricity grid with frequent blackout and pipe born water is available in the locality, but the standard is very low (Tanjong, 2014).

Study design

This was a cross-sectional study design in which the primary source of information was field observations, interviews conducted with some officials of the CAMWATER and some community water supply schemes in Mutengene. The study also made use of randomizes sampling and focus group discussion with the community members and the council workers in Mutengene to analyze the responses gotten from the field. Two hundred and twenty five questionnaires were administered to the community members within the Mutengene locality to identify

their views as per the critical challenges of potable water supply and its implications. Secondary data was gotten from peer reviewed scientific articles, CAMWATER reports and community reports. The questionnaires used for collecting data were divided into sections. Section (A) targeted critical challenges of potable water management and section (B) was based on the causes of potable water management in Mutengene. Also, section (C) of the questionnaire indicated the implications of potable water management and (D) focused on the sustainable options of potable water management in Mutengene, south west region of Cameroon.

Data Collection

A check list was used for data collection with the challenges that were observed on the drinking water catchment, location of public taps and the distance taken by the inhabitance of Mutengene to fetch for drinking water. We then used this information to assess the critical challenges of potable water supply in Mutengene using an adapted semi quantitative approach and possible sustainable options. Also, we used a FGD and an IDI guides for qualitative data. We conducted three FGDs with each lasting 50 minutes. Group 1 was conducted at the police station just beside the Mutengene main market where there is a lone public tap. Most of the inhabitance trek for longer distances with many containers to fetch for drinking water at the lone public tap. Here, field data was obtained from the local population and the stakeholders involved in potable water management. And group 2 was toward the highway leading to Douala, around the Mutengene government police training school area where data was obtained from some of the medical personnel's and members of the area involved in water treatment and management. Besides, Group 3 field data was obtained from the inhabitance of Mutengene settled along the road leading to Limbe with Cameroon Water Utilities

Corporation (CAMWATER) officials involved in potable water management and supply. During the FGD with stakeholders involved in potable water management, they were probed on awareness of the diseases contracted as a result of potable water supply challenges, its implications and sustainable options.

Data Analysis

Data obtained using checklist from observations around catchments and within the Mutengene locality was entered, cleaned and prepared for tabulation using an in-depth semi quantitative approach. The data were categorized in two groups; quantitative for the assessment of the critical challenges of potable water supply and qualitative to have a detailed explanation of the results of the latter. We assessed the drinking water catchments in Mutengene to see if they met up with the sustainable development goals, and fitting the results in an adapted semi quantitative approach to propose sustainable options.

RESULTS

Number of Sample Questionnaires Distributed and Estimation of the Total Response Rate in Mutengene

Of the 225 questionnaires distributed in the locality of Mutengene, a total response rate of 100% was recorded (Table 1).

Table 1. Number of questionnaires distributed and estimation of the total response rate in Mutengene

Locality	**Questionnaires Distributed**	**Response rate (%)**
Mutengene main market	75	35

area		
Mutengene training police school area	75	35
Mutengene inhabitance towards Limbe road	75	30
Total	225	100

Demographic Characteristics of Respondents in Mutengene

The demographic characteristics obtained included; the age group, family status, gender, level of education and origin of participants wherein, the dominants age group ranged from 25 to 50 years amounting to 71.8% of the sample population as against 28.2% who are those below 25 years.

Table 2: Demographic Characteristics of Respondents in Mutengene

Indicator	**Category**	**Frequency**	**Percentage**
Age Group	Below 25	34	28.2
	25 - 50	86	71.8
	50+	27	22.3
Family Status	Married	61	51
	Divorced	40	33.2
	Single	71	59.3
	Widow	23	19.3
Gender	Male	42	34.8
	Female	86	71.8
Educational Level	Elementary school	52	43.2
	High school	41	36.5
	Higher education	20	14.8

Origin	Indigene	24	18.5
	Immigrant	69	57.8

Critical Challenges of Potable Water Management in Mutengene

Data obtained from the field shows that the challenges of potable water management in Mutengene are in a continuous increased (figure 1).

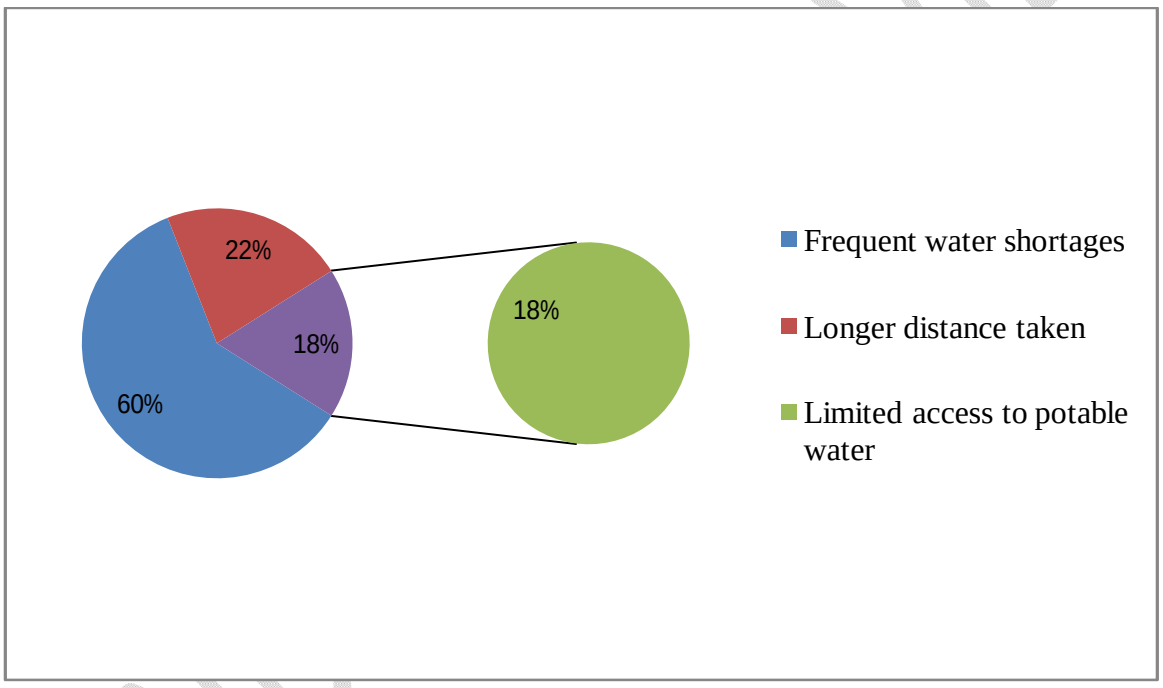

Figure 1: Critical Challenges of Potable Water Management in Mutengene

Besides, 60% of the population stated that there is a frequent water shortage in Mutengene because of inadequate storage facilities and the dependent on old water catchments and old storage facilities. Also, 22% of the respondent indicated that they undertake longer distances in order to fetch for drinking water, figure 2. This is because there are many public taps in Mutengene but only few of those taps are

flowing. As a result, most of the inhabitants undertake longer distances in search of potable water from the few taps that are operating and also in untreated streams and boreholes. More to that, the lowest respond rate of 18% pointed out that there is limited access to potable water supply due to over dependent on old water facilities and less effort is being done in increasing the potable water facilities to suit the increasing demand of population in Mutengene.

Fig. 2: Lone Tap of Mutengene located at a Police Station, people undertake longer distances with many containers to fetch for drinking water here

Causes of Potable Water Management in Mutengene

Furthermore, data collected from the field indicated that critical challenges of potable water supply in Mutengene is as a result of the following causes (figure 3)

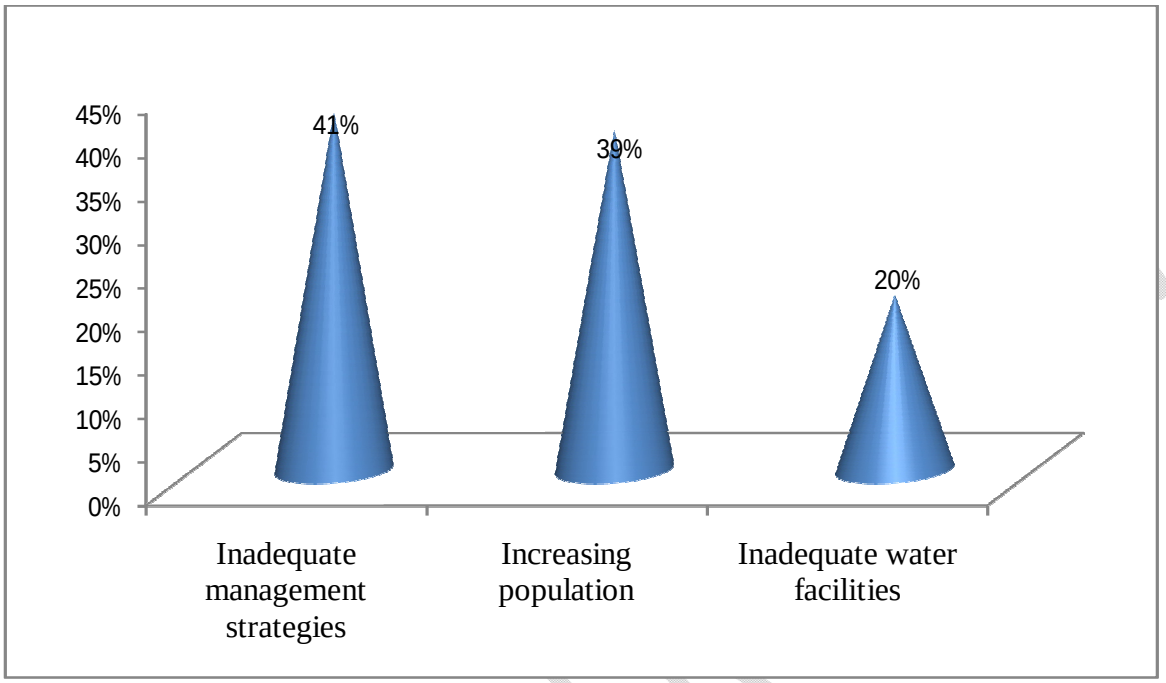

Figure 3: **Causes of Potable Water Management in Mutengene**

From the data collected, 41% of the respondents stated that the major caused is inadequate management strategies employed in managing potable water resources in the town. That is, the concept of sustainable management which entails that managing water or any natural resources should be done effectively in a way that it can satisfy both the needs of the present and future generation is yet to be implemented in the town of Mutengene. While 39% of the respondents were of the opinion that increasing population in the town has resulted to water shortages causing the population to use all types of water sources as a means to survive. And 20% of the respondents pointed out that inadequate water facility are another cause of frequent water shortages in the town. The government and the local communities in charge of water management are not working toward upgrading the

potable water facilities and as such they depend on the old water facilities which cannot supply water to the increasing population of mutengene.

Implications of Potable Water Management in Mutengene

Information obtained from the field equally pointed out that, the critical challenges of potable water management and its causes have resulted to so many implications (figure 4).

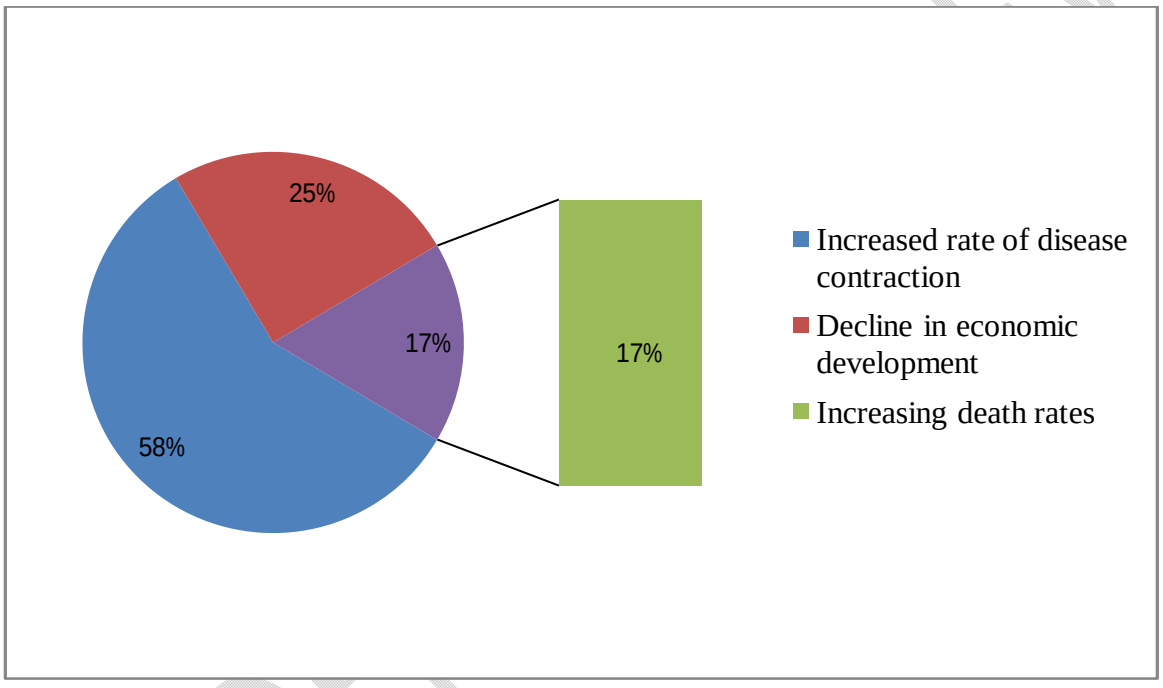

Figure 4: **Implications of Potable Water Management in Mutengene**

As concern the implications of potable water management, 58% of the respondents indicated that there is an increased rate of diseases like cholera, dysentery, diarrhea and typhoid fever in Mutengene as a result of the absent of potable water supply to the entire locality, causing most of the inhabitants to depend on the use of untreated water sources in the town. More to that, 25% of the respondents pointed out that there is a decline in economic development in the town of Mutengene because of the contraction of many diseases which ends up destroying their good

health and their active participation in economic development in the town. Furthermore, 17% of the respondents stated that there is an increased number of death rates recorded in Mutengene every year as a result of the use of untreated water sources. And the worst cases scenario is the outbreak of cholera early this year which has affected many people and currently leading to the death of many as a result of the use of untreated water sources.

DISCUSSIONS

An Assessment of the Critical Challenges of Potable Water management in Mutengene

The data gotten from the field through interviews and field observation, after analyzing the result indicated that there is a frequent potable water shortage in Mutengene. According to Harris in 2012, he stated that guaranteeing the supply of adequate water to the world's population from an absolutely finite source is seen as a significant challenge. This is in line with the data obtained from the field which shows that there is a frequent water shortage in Mutengene as a result of poor management strategies employed. The local communities and CAMWATER in charge of potable water management are yet to adopt the strategies of sustainable development in managing potable water in the town. As such, supplying potable water to the entire population of Mutengene is seen as a critical challenge because of the continuous shortages of potable water in the town.

The UN MDG report of 2015 on water, indicates that 97% of the world's population now uses improve potable water sources and of this, 2.6 billion people have gained access to improved sources of potable water since 1990, 1.9 billion people now use piped water on premises. This statement is not in line with the data obtained from the field because of the case of potable water supply in Mutengene

south west region of Cameroon. There is few piped water and the population always faces a frequent water shortages from the pipe water supply and as such, they often go for longer distances to fetch water from untreated sources. According to Folifac in 2014, Sub-Saharan Africa accounted for 6 of the top 10 countries in the world with the largest population without access to improve drinking water sources. This is in line with the current situations of Mutengene as potable water management challenges remained the order of the day. For over many years now the locality is facing a critical challenge as water management is concerned with limited access to potable water supply.

An Assessment of the Causes of Potable Water Management in Mutengene

Besides, data collected from the field and analyzed equally indicated that inadequate management strategies and increasing population are the major causes of critical challenges of potable water supply in Mutengene. Also, Njoh in 2006 pointed out that the Water Development Project in Mutengene town in the Southwest Region of Cameroon has not yielded significant results due to poor management, poor institutional and developmental policies. There is therefore inadequate management strategies employed in managing potable water in this town which is also as a result of poor institutional and developmental policies. As such, the ineffectiveness of government policies is greatly affecting the management board of potable water supply in Cameroon as a whole and the challenge is critical in the town of Mutengene.

According to the United Nation Organization in 2014, Water stress is another feature which is gradually becoming a problem in different parts of the world today especially in Asia and Africa. This is partly due to climate change, increasing water scarcity, population growth, demographic changes and urbanization. In other

word, increasing population in the town of Mutengene portrays aspect of water stress in the area since the supply of potable water is lower than the demand for it. And the worst case situation is the lack of water facilities like large safety tanks to save up enough potable water that can be supplied to areas of frequent shortages. More to that, the government and the local communities involved in potable water management depends on old water facilities and making less effort in creating more water catchments. The inability of the government to create an effective potable water management board and engage in sustainable management of potable water in Mutengene has led to many implications in the town.

An Assessment of the Implications of Potable Water Management in Mutengene

After analyzing the critical challenges of potable management and its causes in the town of Mutengene, its implications were equally assessed. The respondents indicated that there is an increased rate of diseases like cholera, dysentery, diarrhea and typhoid fever in the locality as a result of the absent of potable water supply causing most of the inhabitants to depend on the use of untreated water sources. The United Nations in 2014 indicated that, the call for concern for safe drinking water is as a result of the high rate of diseases that is 75% of all diseases are related to the use of poor water quality. This statement is related to the situation of Mutengene in that frequent water shortages in the town is causing most of the active population to resort to the use of untreated water sources. As such, high rate of diseases is contracted by the local population due to the use of poor quality water which is leading to a decline in economic development in this locality. Statistic gotten from the field survey showed that as more people contract these diseases, their activeness in economic activities in the town reduces and as such there is a decline in economic development.

According to the World Health Organization in the year 2018, they stated that diarrhea is the major killer disease, in 1998 it was estimated to have killed 2.2 million people in the developing countries, and most of whom were children under 5 years of age. And in Mutengene, the use of untreated water sources has resulted to the contraction of diseases like diarrhea, typhoid fever, dysentery and cholera which is leading to an increased number of death rates in the town. The recent outbreak of cholera in the south west region this January 2022 has spread to its nearest towns of Limbe, Buea and Mutengene in particular because of the critical challenges of potable water management. Besides, the increased rate of diseases contracted is leading to a continuous death of many people in the locality as a result of the use of poor quality water sources. There is therefore need for synergy between the Mutengene Council and the government to seek sustainable options of improving on the treatment of water sources and increase the storage capacity and supply rate of potable water to the increasing population of Mutengene.

Sustainable Options Stating how Potable Water can Equitably and Efficiently be Manage in Mutengene, Cameroon.

These sustainable options for potable water management can be carefully observed and implemented in the following guiding principles;

Institutional and management principles: Here, government has a responsibility to develop firm institutions mainly in charge of potable water management in the country. And an integrated water policy at the national level meeting the rational needs of the various users within the limits of available resources, the integrated management board when created will have general manager at the national level with sub coordinators at the level of regions right down to sub-regions. If such an integrated management board is created and implemented in Mutengene, then it

will encourage coordinated activities by including some of the local population into potable water management. In doing so, the critical challenges of potable water managements like the issue of limited access to potable water will easily be overcome by creating many catchments and ensuring an equitable supply of potable water to all the local areas of Mutengene.

Financial principles: This principle entails that the government of Cameroon need to create a strong viable financial board with directors all over the country. If a financial board is created in the town of Mutengene where the government and the local population can contribute and allocate enough financial resources for sustainable management of potable water resources, then the critical challenges of water management will be reduce. With the allocation of these financial resources, the government together with the Mutengene community will be able to purchase new potable water storage facilities, train, employ and encourage many people to be engaged in the management of potable water resources in the town. Besides, with the availability of financial resources, the need to create an effective water management committee will be done. And they will equally ensure that potable water in Mutengene is effectively treated and provided in abundance to satisfy not only the present demand but also to be able to meet up with the future needs.

Educational principles: It entails a society or community to conduct educational undertakings to enable it attain its goals, that is in order to mitigate the critical challenges of potable water management in Mutengene, educational principles needs to be apply. For instance creating more water catchments and treating them needs the ability of those who have gone to school and acquire more knowledge on how to manage these persistent problems. Creating a school in Mutengene purposely to train its population on how to sustainably manage and supply potable water to the entire community will be a major step taken in reducing its critical

challenges faced in potable water management. As such, the importance of educational skills in managing and supplying potable water in Mutengene is highly needed.

Technological principles; It is the application of scientific knowledge to the practical aims of human life. Such technique needed in applying scientific knowledge to sustainable treatment of water sources in Mutengene is inadequate. And as such the locality need to educated and train its people on how to apply scientific techniques in creating and treating potable water sources in order to overcome its implications of contracting many diseases which is leading to an increased death rates because of the use of untreated water sources.

Communication principles: This principle is important in that, communication brings people together and closer to each other. To sustainably manage and supply potable water in Mutengene, a good communication team needs to be created. More to that, the problems or challenges of potable water supply can easily be solve when there is a monitoring team that can identify and communicate existing problems.

Conclusions

Critical challenges of potable water management in the town Mutengene is leading to a persistent problem with many implications. Also, some African countries like Eritrea, Uganda and Libya are currently facing the same challenges concerning the management and supply of Potable water to its citizens. Access to improving on these challenges over the years seems futile as the problems keep increasing. Therefore, the government and the local community of Mutengene urgently need to set up a budget together with a stronger team to manage and supply potable water to the entire locality. Furthermore, if the government of Cameroon together

with the local population of Mutengene can adopt the sustainable options of potable water management as discussed above, then the critical challenges of potable water management with its implications will greatly be reduce in this area.

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