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The Poor Sanitation and Access to Clean Water in Rural Areas: Case of Bossangoa (Central African Republic)

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Abstract

Inadequate access to water services and sanitation associated with poor hygiene practices continues to kill millions of people in rural areas of developing countries especially in Africa. Access to safe drinking water has a great influence on health, economy and good life of the people. This paper is a case study of the poor sanitation and access to clean water in a rural area of Bossangoa district in Central African Republic. The research had three broad objectives: to assess the relevant literature on water sanitation and health, assess water sanitation and health condition in Bossangoa area, and provide the public with information on good practices of water supply and sanitation for sustainable and environmental management. To achieve these objectives, the study combined several methodological approaches. An experimental approach was to visit and observe all supply water points. Quantitative household survey and a qualitative approach by organizing group discussions for data collection were also used. The data were processed using Excel and analyzed with descriptive statistics. It is clear from the analysis that: despite the existence of traditional wells and boreholes, people adopt practices that affect the quality of drinking water. Their social and economic situations lead to alternate different types of water, most of which are polluted by solid and liquid waste; and the consumption of untreated water is the source of waterborne diseases in the city and its municipalities. We suggest that the government and other stakeholders should intervene in provision of safe drinking water by educating people, eradicating poverty and improving water sources.

Keywords. Safe water, water sanitation, water borne diseases, environment management.

INTRODUCTION

Lack of water and poor sanitation leading to water borne diseases is a major problem affecting and killing millions of people in developing countries. Access to safe drinking water has a great influence on health, economy and good life of the people. But meeting this need is a major challenge facing the rural communities in Africa. The variation of water resources in the world is linked to climate change and population growth. Pollution also has adverse effects on the quality of drinking water in the world. Central African Republic is also facing this problem of

having safe drinking water because of poverty, war and poor technology. The recent civil war of 2013 destroyed all available existing drinking water infrastructures and the population of the rural area of Bossangoa is the most affected. 70% of households in Central African Republic do not have access to sanitary water supply whereby their water supply are from open source such as rivers, water ponds and wells that are most contaminated by disease causing microorganism.

Most rural people are engaged in agricultural activities with low incomes living in small scattered settlements with poor supply of sanitary water. Government interventions towards water supply in rural Bossangoa are through the provision of boreholes and wells. These sources of water are little especially in dry season and sometimes are subject to frequent breakdowns; leading to water crisis and shortages. This situation obliges households especially women and children to spend more time walking long distances in the dry season to fetch water mainly from unprotected water sources (lakes, river wells and springs) channeling it for domestic purposes. Water supply in Bossangoa has not being able to fulfill the growing demand.

Despite of Government efforts, about 100,000 people do not have access to safe drinking water. Government launched a program to provide access to sanitary water for all households and stop water shortages by 2020. The average water usage per person in a day is about 20 liters of drinking water and other domestic activities.

There are two challenges which face the population of Bossangoa on water supply and are categorized as follows; Lack of access to drinking water and water for household use, which remains a luxury for a large segment of the population, with a rate of access to drinking water from 31.8% in urban areas and 27.6% in rural areas. The country does not reach half of the set objectives for sanitation with less than 10% rate of access to hygiene and basic sanitation; hence the situation is more serious. If the current trend continues the ruling government will not be appointed at 2020. There are many consequences of consumption of questionable water quality on the health of the population. Consumption of poor quality water is the cause of several cases of water-borne diseases such as malaria, cholera, diarrhea, dysentery and typhoid fever. In Central Africa, 70,000 people which are 5% of the population are annually affected by water-borne diseases.（WHO。2011）。

It is in this context that the present a study entitled '' The poor sanitation and access to clean water in rural areas: Case of Bossangoa (Central African Republic)" was conducted. It is also to improve knowledge and practices in Water, Hygiene and Sanitation. First, we review related literature concerning sanitation, the location of Bassangoa and Central African Republic, then look at the materials and methods, findings, conclusion and finally, suggestions.

BRIEF LITERATURE REVIEW

Water Sanitation is the subject of considerable attention recently following the declaration by the General Assembly of the United Nations that the 1980s was the International decade of drinking water and sanitation. According to WHO, each individual has access to drinking water if it is served by a network or a pump within 200 meters of the house (ZERAH, 1999). A person has easy access to quality drinking water when the water is on the spot or within 15 minutes' walk from home and needs an average of about 20 liters of drinking water each day to meet their daily metabolic, hygiene and domestic needs (Nzuzi and MBUYI, 2004). In this case, an individual has access to drinking water if he has a drinking water tap at home or next to or at a distance that ensures the quality of the water.

Water is a natural resource vital to the lives of people, animals and plants. Having it available in sufficient quantity and quality helps to maintain human health. But it can also be a source of disease if polluted by industrial waste, sewage, household or agricultural waste, excreta and other organic wastes (Scalon et al., 2005; El-Naqa et al 2007 and Eblin et al., 2014). Moreover, lack of access to safe water supply contributes to the disease and death, especially in children.

Thus, the improvement of access to clean water is crucial in reducing mortality rate and morbidity, particularly in poor rural areas of Bossangoa. Water access means that women and children should not pass their productive and considerable time looking for water in far distances from their homes. According to the World Health Organization, about 1.1 billion people lack access to safe drinking water and 2.4 billion people lack adequate sanitation. More than 2 million people, mostly children under five in developing countries die every year from water-borne diseases (WHO, 2011). But worldwide, nearly 90% of diarrhea is attributed to the poor quality of drinking water and inadequate sewage treatment.

International decade of drinking water and sanitation (1981-1990) proclaimed by the United Nations has instilled a renewed interest in the drinking water supply sector and sanitation. It was given the mission to promote access to drinking water; its target group was the rural and urban low-income communities. Four guiding principles have been proposed to allow fair sharing of water (CREPA, 2003):

Environmental and Health Protection through integrated water resources management and waste (both liquid and solid) recommends the following:

- Institutional reforms promoting an integrated approach, modification methods, attitudes, behaviors, and the full participation of women at all levels; community management services supported by measures to strengthen the capacity of local institutions to implement and sustainably manage supply problems in drinking water, hygiene and sanitation;
- Sound financial management through better management of existing equipment and the widespread use of appropriate technologies. These different axes directly evoke that man is at the heart of all activities to be conducted in the supply sector in drinking water, sanitation and hygiene (WASH) since water is perceived as a commodity precious, conditions and motivates human interactions.

It appears from the study on perceptions and behaviors vis-à-vis hygiene and sanitation populations in 2003 by CREPA that water is a source of social and cultural inspiration: the ways common to people living in the same society, behave, speak, to organize themselves to live together, are largely rituals that are organized around the water. It induced men to vertical and horizontal perception in the demonstrations that integrate in their society and sometimes gives them a status or social class. These characteristics related to water, considered a priority as an element of the socio-economic and health life, deserve to be included in suitable approaches.

It is in this perspective that it is proposed to enter this dynamic that can take into account local practices, perception or the social representation and indigenous knowledge of rural people in finding solutions to health problems and access to drinking water in this environment. This will not only show the relevance of issues related to access to safe drinking water but also the approach that can guide better the actions that arouse in populations of Bossangoa to change

behavior and practice to safe drinking water. To show the extent of the difficulties that should be overcome to reconcile the water, sanitation and health, we rely on wastewater and excreta. Several aspects are discussed in the following in the sections that follow. This study will serve as a scientific contribution and support to the various actions undertaken by many organizations or procurement research centers in drinking water, hygiene and sanitation in the establishment of boreholes, communication for behavior change and socioeconomic measures in favor of disadvantaged communities at the base.

Localization of Bossangoa

Figure 1 Central African Republic Map's locating the town of Bossangoa

Source: Central African government

The sub prefecture of Bossangoa is the capital of the region of Ouham which is located 305kms North West of the capital Bangui and is between 06 ° 29'00.0''N North longitude and 17 ° 27 '00.0' ' E latitude East (Figure 1). It covers an area of 11,850 square kilometers and is bounded by the following sub-prefectures:

- The north by NANA-Bakassa;
- North west NANGHA Bouguila
- North East by Batangafo
- The South by Bossembélé;
- In the East by BOUCA;
- And the West by BOZOUM.

Evolution of water supply in Central African Republic

Water supply in Central African began in the early 20th century in some major cities, and was the lowest administrative level. Among the provincial cities with a drilling system are those of Bossangoa, Berberati. Bouar. Bambari Carnot and Ndele. For over two decades the drinking water supply coverage remained unchanged at 46% in urban areas and 6% in rural areas (WHO, UNICEF, Water and Sanitation 2000) .

The assembly network covered only 22% in 2003 of the total needs of the urban population. There were 11,000 individual connections, 82% were located in Bangui, and almost all of the population was supplied from the backwaters, private or public wells, rarely managed sources, and rainwater, except Bangui the capital or the pastor institute which conducted a monthly bacteriological control, water from other sources were not controlled. According to a study by Mokofio et al (1991), on the bacteriological quality of the well water, springs and boreholes in Bangui showed that over 80% of traditional wells and rivers including those of Bossangoa were defiled by fecal coliform. From such statistical data, it showed that the CAR, a country in Central Africa, and the majority of African countries, still lag behind in terms of drinking water supply.

Water resources and sanitation is one of the sectors that undeniably contribute, direct or indirect ways, to the quality of life, deal with the negative effects of population pressure, poverty activities and the reduction of pollution. For more than twenty years, the authorities of the Central African Republic have recognized the need to develop this vital sector. However, until the late 1980s, no policy with a concrete action plan sector development had been set up with few specific actions. It took the great drought of 1982-1983 and the high prevalence of waterborne diseases to cause awareness of the very poor state of water supply and sanitation conditions in the capital and in rural areas. Since then, several initiatives have been launched by the Government with the support of executions agencies, bilateral and multilateral funding agencies.

Thus, after its accession to the general principles of the international decades of drinking water and sanitation, as well as of international and regional conferences that followed, relating to water and the environment, especially: New Delhi Declaration on water and sanitation, Agenda 21 of the Rio Conference on planet earth and world summit on sustainable development in 2002, the Central African government started to act. It has shown its commitment to strive for the wellbeing of general humanity and in particular to improve the living conditions of its population through the creation of basic conditions for sustainable development by priority axes of its development policy improved regional supply services of water and sanitation, but also the protection of the environment.

To do this, it had adopted in 1980, a national policy document and strategy on water and sanitation that has governed the sector's operations during the 80s.

Also, it was before the reform and strengthening of existing institutions and the creation of the National Water Committee and sanitation, with the main award, inter-sectoral coordination of government departments involved. Two shots of shares listed in successive plans of Social Development and Economy (1983-1985 and the 1986 -1990), was effectively implemented with fairly satisfactory results in general but still remained very low at the huge national need of drinking water and sanitation. The coverage rates in the water and sanitation sector is as shown in the table below.

The figures in the table show that significant progress has been made, thanks to the increased efforts of government, external support agencies, NGOs and communities. But they also show that much remains to be done to improve sanitation and access to drinking water on the one hand, but also to achieve the objectives of development fixed by the government.

Table 1 Cover level indicator in water and sanitation

Subsector	Coverage		
Years	End of 1980	End of 1990	End of 2003
Drinking water supply rural areas	1%	18%	34%
Drinking water supply urbane areas	8%	17%	22%
Sanitation		45%	
other uses of water	/	/	/

Source (Central African Government)

MATERIAL AND METHODS

The study took place in the sub-prefecture of Bossangoa in Northwest of the country. In methodology, we used a household survey sampling technique to meet the objectives. A retrospective study on the use of journals, books and other related material was also used. The survey was conducted for 10 days mainly in the villages of Benzambe and Gbangayanga to heads of households, traditional leaders and regional leader's hydraulic services. The concocted figures include hygiene, sanitation and household access to safe drinking water. The study combined several methodological approaches:

- An experimental approach, which involved observation and visit to all supply points of household water.
- A quantitative survey randomly targeted 20 households per village. Our survey was to target women during interviews, because these have generally the burden of household activities related to water, hygiene and sanitation. It should be emphasized that the few men surveyed were part of single-parent households or were single.

Finally, a qualitative survey by organizing group discussions with the heads of households, traditional chiefs and heads of regional hydraulic services for the collection of data was carried out. In total, 40 interviews were conducted covering all households; the collected data was then analyzed and presented.

From the survey that was conducted among the 40 households, 90% of the respondents were women. They were primarily surveyed because they were traditionally responsible for key spots in water management, hygiene and sanitation of households such as fetching water, cooking, laundry, house property, clothing and others. The age of respondents varied between 16 and 55 years with an average of 30 years. It is noteworthy that 5% of people never knew their exact ages.

ANALYTICAL PRESENTATION OF RESULTS

Access to water and sanitation is a fundamental human need and it remains vital for the dignity and human health. But this access is increasingly difficult because of the problems created by the development of cities, increasing populations and various pressure powers exercisable by these populations on water resources.

As the population increases, the problems of the suburbs of large cities become increasingly serious in cities and in rural areas. Currently, 100,000 people in the rural area of Bossangoa

have no access to any sanitation facilities. Millions of children die every year from water-related diseases such as diarrhea (second cause of death among children in this region where two in ten children die before the age of five years).

Water supply in the towns of Bossangoa

Water supply is a major challenge in Central Africa and rural areas of Bossangoa in particular. The issues related to it are many; water rate, the social life of the family or village (Alley et al. 2002). In 1980, in developing countries, excluding China, 3 out of 5 people had no water (Sem, 2002). In this context, the United Nations General Assembly proclaimed the period 1981-1990, International Decade of Drinking Water and Sanitation. States had pledged to consider access to safe drinking water and sanitation as a fundamental right of human beings. The table below shows that women interviewed cited the traditional well drilling and the backwater as potential sources of supply of drinking water. Analysis of the results shows that 22.5% of them often frequent the drilling against 27.5% and 50% who often cater from the traditional well or creek. In the dry season, 91% of women use almost all water sources in their community. In rainy season, the water points as backwaters are abandoned because many women use rainwater for various uses. The water supply is at a distance less than or equal to 800 meters concessions in 45% of cases during an average time of between 0 and 60 minutes (32.5% of responses). The maximum waiting time at the source is 0-40 minutes (55%) and supply takes place before the start of the field by 52.5% of women. In addition, 65% of women are two to three times overworked in the day against 35% who make it once.

Table 2: showing the Current Practices for the drinking water supply phase

Thèmes	Answers	Commone of Benzambe	Commone of Gbangayanga	Cumul	%
Possible source of supply drinking water	Drilling	2	1	3	7.5%
	traditional well	5	4	8	22.5%
	Backwater	13	15	28	70%
Often frequented source get water	Drilling	5	4	9	22.5%
	Traditional well	5	6	11	27.5%
	Backwater	10	10	20	50%
Season in which the points of water are movement	Dry season	17	18	35	87.5%
	Rainy season	0	0	0	0%
	No answers	3	2	5	12.5%
Distance between the drill and the house	0-800	8	10	18	45%
	800 -1500m	10	7	17	42.5%
	1500m and more	2	3	5	12.5%
Time taken to complete the round trip, the water points at home	0-60min	9	4	13	32.5%
	60-80min	7	9	16	40%
	80min and more	4	7	11	27.5%
Maximum wait time at various water points	0-40min	13	9	22	55%
	40-60min	7	11	18	45%
Time of day to fetch water	Before fields	11	10	21	52.5%

	Fields of return	9	10	19	47.5%
Number of turns per day to make water	1 time	6	8	14	35%
fetch water at different source	2 times	7	6	13	32.5%
	3 times	7	6	13	32.5%

Source (Francklin Kamba).

In the big cities of Central African Republic, about 60% of Central Africans have access to quality water source. But in rural areas specifically in the towns of Bossangoa, people (mainly women) still spend a lot of time fetching water in urban areas or where there sources of supply are rarely treated, and about 90 % of the rural population depend on groundwater and sources for their drinking water. (Figure below)

Figure 2: showing households get their water from sources rarely appointed

Source (Francklin Kamba)

Everyone knows that water is not a commodity; it is a collective heritage that must be protected, defended and treated as such. Public authorities or private interests, no one can appropriate this resource. However, the water service has a cost: the water is not supplied by a utility or delegated to a private company under the control of users and state officials. This price must be "acceptable", standing by an optimum value between service, cost of implementation and economic capacity of users.

Source of water supply in the two districts

The drinking water supply sources available in both towns are: wells of large or small diameter, hydraulic drilling and backwaters (Ground water).

The wells

A well is an underground water catchment of diameter generally ranging from 1.0 to 1.8 meters. There are two types of wells. These are:

- Traditional wells, the walls are usually coated by or just a thin coating of non-reinforced concrete, not penetrating into the web as a low height. Their diameters range from 1.0 to 1.2 meters;
- Modern wells or community wells of large diameters, the walls of which are held by reinforced concrete culverts and the height of penetration into the web is much more important. Their diameters range from 1.6 to 1.8 meters. Modern wells are often deeper

than the traditional well and its diameter is larger, it has a concrete curb and a lid. Traditional wells are entirely hand-made by local diggers, with a very limited material, they are dug either by hand (on soft land), the jackhammer (of the toughest land) or sometimes of the explosive in the very hard areas of the base and are then cased.

Figure 3 Different kinds of wells

Source (Francklin Kamba)

Drilling

Compared to drilling, we must remember that this is a work of adduction water catchment Village groundwater small diameter (typically 15 to 40centimètres) realized with significant material resources. The borehole is done using the drill. Once the hole has reached and crossed several meters of the area containing the water, the drilling is stopped. Then is slid into the whole, a plastic tube which is slotted to the level of the water to allow it to penetrate inside the tube and to be pumped. The space between the tube and the hole is filled with gravel at the strainer, then by the impermeable materials such as clay and finally cemented in the last meters before the surface. Drilling observed in the places visited is: the boreholes equipped with hand pumps.

Figure 4 Different kinds of drilling

Source (Francklin Kamba)

Backwaters / unimproved sources.

It is a body of water that runs through the town. It serves not only as source of supply of drinking water but also a place for washing dishes and laundry. It also represents the place for meetings and lectures. The creek has a strong traditional connotation and stands as the headquarters of several deities and protectors of the fetish community (CREPA, 2004).

Figure 5. Backwaters or unimproved water source used by the rural population

Source (Francklin Kamba)

People in charge of collecting household water

Fetching water is used by the household from its source to its storage point. As in most African societies women (mother, daughter and son) are in charge of water collection work. The results of our investigations do not vary regarding the persons responsible for the water chore within households. This task is usually reserved for women in more than 98% .The non-schooling of girls in general is related to this, they spent all morning to fetch water with their mothers

Figure 6 The people in charge of collecting water

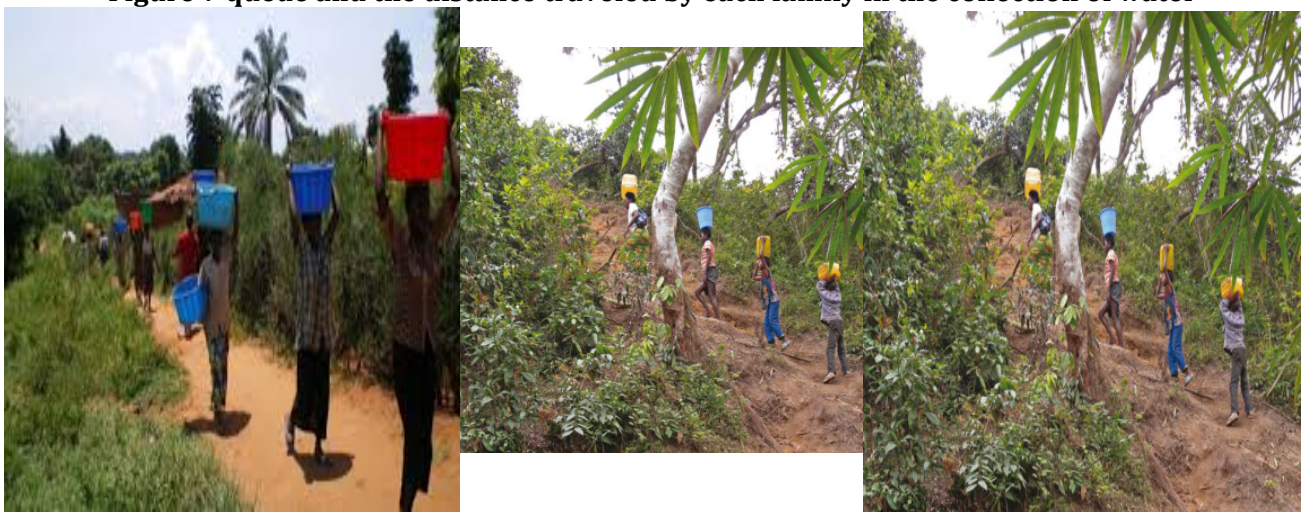
Source (Francklin Kamba)

Distance water points and the queue

The distance to fetch water is at least 800metres to 1500metres for most of the affected households. Women make about two to three trips a day to get water. The time taken to and from the water point to households is approximately over 80 minutes; add to that excessive queuing at water points. it results in:

- Reduction in consumption per person
- The increase in drinking water from surface sources not protected,
- Less time available to persons responsible for collecting water to do other occupations essential to survival and also the non-enrollment of girls in schools.

Figure 7 queue and the distance traveled by each family in the collection of water



Source(Francklin Kamba)

The problems of water points.

Will the users choose the traditional water (figure below), according to the taste of water, the queues, fatigue transport, conflicts around the water point, etc.?

Will she get paid in kind water, bucket, in the form of contributions, both at once? At what price? Should we accept credit or provide free water to some? What constraint exerted on those who do not pay? If payment is "bucket", how to choose a drill or a source arranged to collect payments? How to control the maintenance of the service? Who will have authority for maintenance and operation, knowing that traditional rules do not provide anything suitable (for example in some villages, traditional wells are neither private nor public, but belong to a singular law in which the well the manufacturer has certain priorities)?

Figure 8 Uses are supplying water to various places of their choice

Water supply frequency per day

Water requirements vary by household size, the capacity of available vessels, availability of people at home and the knowledge and practices about hygiene. The amount of water collected by the population varies from 8 to 80 liters per household. On average the amount of water collected per household is 40 liters. However, the average size of households surveyed is 4 people. This means that on average each person consumes about 12 liters per day. This amount

is collected below the indicators defined by the sphere standards (15 liters per person per day). To find water one must wake up at 4 am.

The level of water decreases as its removal increases, at the same time the water supply frequency decreases, because the closer the water point, more is used. We must also take into account the occupation of the people during the day for agricultural activities. This could therefore justify the small amount of water used on average by households for their daily needs. Our survey has given us an average of 2 kms between households and the water supply point and the WHO standard says that the distance between the water supply point and the household must be less than 1km walk. All the above change, seasonally. Closed containers (can, large pots and canaries) are much more used to store water and also used for the transportation of household water.

Water treatment at home

The water treatment at home is the set of all activity, driving home to improve water quality because it is always better to use water from a clean source for stored under good conditions. About 30% of respondents said that the water quality is not good. Among those claiming that the water quality is not good 55% of households use indigenous methods of treatment by heating the water to drink, 30% use white fabric for treatment and 15% consume water directly without treatment.

Water Sanitation and Hygiene in public

The situation in terms of Water Sanitation and household Hygiene is poor. Access to clean water in sufficient quantity remains a serious concern for people in the study area. All households have no access to a protected water resource. The source of water supply remains a source undeveloped 2 km from the village, the lack of clean water aggravates the living conditions in most regions of Central, this is very serious especially in the Northwest areas country especially rural areas of Bossangoa or individual consumption per household varies between 10 to 12 liters / day / person.

Water systems create very antiquated largely the lack of water .The flooding or runoff regularly destroys traditional wells by guards not coping. The existing hydraulic structures deteriorate due to wear facilities and an unsatisfactory service (operation stop sometimes lack of spare parts). During our stay in both towns, we found the source of the water is very polluted by animals that drink it directly, children bathe and women wash their clothes and will cause many waterborne diseases. Diarrheal diseases spread because of poor hygiene, appropriate means of conservation of drinking water, malfunctioning sewerage and piping system. Storage of water by each household in oxides tanks and sometimes rust is detrimental to their health especially among the most vulnerable people (Pregnant women and children).

What about hygiene and sanitation issues?

The situation in sanitation for households of the village is worrying as in most rural areas of Ouham prefecture. Indeed, 84% of household's practices of defecation in the open, only 4% have access to hygienic latrines. The problem appears to be structural in 2010 in Ouham 68.1% of households practicing open defecation only 13% of households surveyed say they wash their hands with soap or ash, which is a bad result.

The percentage of children with diarrhea is worrying, 51% of children fewer than 5 years had diarrhea, it seems that poor water supply and lack of hygiene means would originally rates high diarrhea. About 50 children die each year from these diseases. The risk of death from

diarrhea in infants is 5 times higher than in developed countries. Diarrhea can lead to severe malnutrition, a phenomenon that contributes to half the mortality of children under five.

What can be done for hygiene and sanitation?

This is put barriers between humans and wastewater to limit the sanitary problems and improve the hygiene conditions of rural populations. Domestic wastewater treatment includes 3 steps:

Evacuation of waste water (toilet, kitchen, showers) their transportation by pipeline to a treatment site. The treatment of sewage before discharge into the environment and disposal of sludge produced during wastewater clarification. In addition to wastewater, there is the collection of solid waste, protection against industrial waste. The access to sanitation is little or no demand made by communities that do not always know where to direct their requests.

Even when demand is felt, it is not necessarily expressed or materialized, partly because of financial constraints on households. Sanitation is important because it is the basis of all matters of health and water resources protection. There are a number of fairly significant investment is needed to provide adequate sanitation. But who will do it? Is it, The Ministry of Health, the Ministry of Water, municipalities, the Ministry of the Environment? Sometimes it is very difficult to know who should take the lead in coordinating environmental activities.

Water-related diseases

The Water, Sanitation and Hygiene bear a heavy burden of overall diseases and morbidity by causing multiple types of diseases, called water-related diseases. (Bradley in 1972) was the first one to establish an etiology of these diseases and distinguished four categories of diseases, based on the mode of transmission of the pathogens, as explained in the table below. As the table below illustrates, waterborne diseases relate to diseases where pathogens are transported in water; water-shed diseases are diseases where pathogens have part of their life-cycle in water and water-based diseases relate to diseases where pathogens multiply in water and pathogens which are transmitted through water-related vectors, such as malaria (WHO and Bradley, 1972). To this, (Dar and Khan, 2011) propose an additional category for chemical contamination of water and metabolic risk from lack of water-carried nutrients.

Table 1 Bradley's classification of water-related diseases

Category	Example
Waterborne	
Classical	Diarrhea, Typhoid
Neo classical	Infectious hepatitis
Water-shed	
Superficial	Trachoma, scabies
Intestinal	Shigella dysentery
Water-based	
Water-multiplied percutaneous	Schistosomiasis
Ingested	Guinea worm
Water-related insect vectors	
Water-biting	Gambian sleeping sickness
Water-breeding	Onchoceriasis

Source: Hunter et al. (2010)

Origin of water related diseases drinking water

Diarrhea disease causes about 1.8 million deaths each year worldwide which is 90% of children under five, mostly living in developing countries. They are due to an essentially limited access to adequate treatment of drinking water for households and the lack of appropriate water storage practices before consumption. A higher proportion of those diarrheal diseases (88%) are attributable to poor water quality, inadequate sanitation and poor hygiene. Today, in the world, in industrialized countries, where individual and collective hygiene is increasingly respected, there are no more outbreaks of infectious diseases related to water for human consumption, is not the case in the third World because of the population explosion

Quality of drinking water

Water quality is an essential dimension to provide safe water for domestic uses as well. Similar to water quantity, no international standards currently exist for water quality. As the WHO (2008) explains, water quality standards should be developed according to local, cultural, environmental and socio-economic conditions. Nevertheless, the WHO (2008) provides detailed guidelines on safe drinking-water. According to these guidelines safe drinking-water "does not represent any significant risk to health over a lifetime of consumption, including different sensitivities that may occur between life stages." Two sources of water contamination exist: biological and chemical.

Water is a solvent for many different pathogens. In its 2008 guidelines, the WHO lists at least 12 different types of bacteria, 8 types of viruses, 7 types of protozoa and 2 types of helminthes which are known to cause human related diseases.

Health risks linked to chemicals are typically lower (Schmoll & WHO, 2006), but also less well understood. Typically, the effects of chemical contamination arise after prolonged exposure. The most well-known adverse effects of chemicals in water are linked to fluoride, arsenic and nitrates (WHO guidelines and Schmoll, 2006). An excess of fluoride causes dental fluorosis (in some extreme cases also skeletal fluorosis) with debilitating physical outcomes. Arsenic, particularly predominant in groundwater in Bangladesh and west-India results in skin-diseases and certain cancers, though the entire epidemiology is not understood (Kassahun, Samson 2005).

For nitrate, contrary to other chemicals, even short exposure can have dangerous health consequences causing breathing illnesses and infantile cyanosis.

To prevent water from contamination, sources of water need to be protected. While emphasis is on the type of water source, Fuest, Veronika (2005), recognizes that this alone is not able to guarantee the quality of water as water quality at source often differs from water quality at point of use, due to handling. To protect water from contamination, multiple barriers from the water source to the consumer are needed to protect the water. Protection and/ or decontamination should therefore be provided at different levels :(Source of water and Point-of-use):

Source of water: a first step to manage water quality is to protect the water sources. For this reason, emphasizes on the level of protection of water sources to define "improved water sources «to have access to "safe drinking water». Improved" water sources are piped connections to a dwelling, a plot or a yard, water kiosks (especially in developing countries: (GIZ, 2009), protected dug wells, boreholes, rainwater collection and standpipes and more

generally those that by the nature of their construction, are protected from outside contamination (WHO-UNICEF, 2012). Domestic water comes either from groundwater or surface water. According to(Pedley and Howards 1997) in rural and peri-urban settings in Asia and Sub-Saharan Africa, more than 80% of the water used comes from groundwater, as it is often of good quality and does not require any treatment. Further advantage of groundwater (compared to surface water) is the tendency of storage capacity of the aquifer which buffers short-term variability. By definition, groundwater sources are protected, but recent depletion of water tables, the uncontrolled extraction of water, using unprotected dug-wells, unsafe latrines or sewage leakages, seepage and percolation from irrigated areas transporting salt, fertilizers, pesticides and infiltration from rivers and lakes with pollutants are all sources of contamination in developing countries (Cronin et al., 2006). The increasing report of arsenic groundwater contamination in Bangladesh, Mongolia, China, Vietnam and Thailand, among others, is a recent phenomenon worth mentioning. The impact of groundwater contamination on health has essentially been studied in developed countries. (Schmoll & WHO 2006) citing (Cronin et al. 2006) report that groundwater contamination has been responsible for 68% of all waterborne diseases outbreaks between 1991 and 1998 in the USA.

Point-of-use: In particular for households with non-piped water supply, collection, handling and storage of water are all sources of contamination. Curtis et al. (2000) for example cite a study in 1990 in Sri Lanka that found only 5% of water samples to be contaminated at the source, but 50% of samples contaminated after being drawn. Sources of infection are often linked to handling of water during collection and storage at home. Contamination at the level of point of use is often related to direct health consequences. In their systematic review of relationship between cholera and diarrhea with water quality at point of use Gundry et al. (2004) find a positive correlation between the level of water contamination and cholera, but not with diarrhea. In addition, their study finds that improving water quality at point of use is more effective for health outcomes than at source.

Quantity of water

Water quality is an essential dimension to provide drinking water for domestic uses for Similar to the amount of water; no international standards currently exist for water quality. As the WHO (2008) explains, the water quality standards should be developed according to local conditions, cultural, environmental and socio-economic. However, WHO (2008) provides detailed guidelines on drinking water. According to these drinking water guidelines in safety "does not represent a significant risk to health over a lifetime of consumption, including different sensitivities that may occur between the stages of life." There are two sources of water contamination: Biological and chemical.

Despite the long recognition of the impact of the amount of water on health, no current international standards exist on the minimum requirements of the amount of water levels for a healthy life. As (Howard and Bartram 2003) point out, the standards of the minimum requirements of water per capita per day varies from 15 liters in post-disaster situations 50 liters (Gleick, 1996), but water scarcity is still a problem in Central African Republic inhabitants moved more than 2 to 3 km to find water and it takes 30 minutes to fill a 20-liter container. We have to wake up at 4 am to get water, a situation that does not exist in many countries which also lack hydrography.

In rural areas, the majority of people get water from rivers, lakes, undeveloped sources and open wells. Rain water is also used by people to overcome the problem of shortage of running

water. Despite its episodic nature, these people consider it their "savior" to borrow the phrase of an informant of the Career. It is more explicit when she thinks "rain water is for us, who have no money to buy water sold out at the shop." Thus, everything suggests that this commodity is the exclusive economically needy layers, unable to fund a drilling or "water marketed" .and these people have health problems. In its definition of a safe access to water, depending on the requirement, a minimum of 20 liters per capita per day. These are based on rough estimates of basic needs for domestic water use, which (Thompson 2001) defines four categories: consumption (drinking and cooking), hygiene, equipment and productive use. These estimates are averaged and do not reflect the special needs of some people, like breastfeeding women and people involved in physical labor whose water needs is categorically superior.

Correlation-Water Sanitation and Health

Note that the actual role played Sanitation can only be examined under a much wider angle involving habitat for ecological and geographical sense. Talking Sanitation in this binomial "water-health" leads us to reflect on how to combine and implement the three thematic "WATER-HEALTH and SANITATION" to better understand the impact of sanitation and water on health.

Indeed, the use of drinking water, while necessary, is not sufficient by itself to improve or ensure the health of the rural population of Bossangoa, and their children in particular. What must be involved in food and personal hygiene measures, and safety of habitat measures? "Water and sanitation are essential to public health and access to them in sufficient quantity and quality is a basic right for all living creatures." Indeed, internationally, the experts agree on the fact that water that's life and sanitation is dignity.

The high prevalence of oral-fecal disease is a scourge that should break through a combined intervention on the Water, Sanitation and Hygiene. Facing the transmission of these diseases, sanitation as a suitable device for excreta management constitute the primary barrier, water and sanitation acting as secondary barriers that arises after the fecal matter has contaminated the environment . Sanitation is also unique in its role in breaking the chain of transmission of infectious intestinal worms and trachoma in proportions as water and sanitation cannot reach.

Note, in particular, there is high prevalence of worms and intestinal parasites both in adults and in children. Children are affected by diarrhea. Factors related to water, sanitation and hygiene affect many ways the rights of children to education. When their health status is poor, the children cannot give the full measure of their learning abilities.

Given the diagnosis, access to clean water is still a luxury in rural areas of Bossangoa. Drinking water becomes the main concern of the population, followed by the consolidation of the city and finally the access to local health care.

Current challenges in the water sector, hygiene and sanitation in rural areas of Bossangoa.

The challenges are significant for the Central African government. Congresses, conferences and seminars, although they are useful, will not resolve the problem. It is necessary that the actions of a political, institutional, technical, social and financial nature are implemented.

For a better understanding of the future of drinking water, hygiene and sanitation and why the problems that persist in the coverage of water and poor sanitation, it is first necessary to

analyze issues more closely in the water sector and to identify the challenges in the field. Although the major factors hindering the progress of water, sanitation and hygiene are not different in all rural areas of the country and even in households and individuals, in many cases, the issues that affect the current situation fall into four categories: institutional, financial, cultural and physical.

1. First, the basic services of water, sanitation and hygiene should be top priority for policy makers. Then, the management is to streamline and clarify the role of each stakeholder (public services, private companies.).
2. Must teach children the basic rules of hygiene and the protection of water supplies at school. As a practical way, we must build private and separate toilets for girls and boys, with proper hygienic facilities, without it, girls will continue not to attend school at the age of puberty.
3. Finally, the sanitation problem is to be addressed seriously in connection with drinking water.

DISCUSSION

Taking a brief look at the Central government policy on rural water supply of the country and that of the city in particular reveals that the national targets include the following:

1. To help all rural communities to obtain basic facilities of water supply, while ensuring that aid is directed towards communities that are willing to maintain their facilities.
2. To increase the capacity of local communities, the government must help rural communities to obtain basic services of water supply they can maintain themselves.
3. To increase the capacity of the water sector, the government must dig wells, boreholes and maintain water supply equipment.

To complete the national primary health care program by promoting better health practices, focusing on clean water, good hygiene, control of diarrhea and disposal of excreta appropriately.

We also found that the water points are distant homes, unsanitary water quality, service disruptions, pumps out of service for lack of maintenance, that is the daily life of many towns to residents Bossangoa where basic public services are fragile, failing or even nonexistent. For this, the improvement of conditions of hygiene and access to clean water is often a priority for the populations and the local authorities.

Improving access to water will reduce the water chore that falls mostly to women and girls, free time to devote to economic activities and education, but also to reduce disease through consumption of healthy water and the possibility of having a personal hygiene. By the standards of the W H O on drinking water, a person must use at least 20 liters of water per day for these needs. But we found in the town of Bossangoa and these municipalities, the amount of water used by each household are not sufficient for their needs, or 12 liters per person per day.

This number is below the standard set by WHO. Sufficient water intake also depends on the distance between the household and the water supply point; indeed, the closer the feed point, the more you use too much. Our survey has given us an average of 2km between the household and the most frequented water supply point and the WHO standard said that the distance between the water supply point and the household must be less 1km walk, all the above

changes seasonally. In our two municipalities visited, we found that only 22.5% of households to feed boreholes, 27.5% traditional wells against 50% in the source / backwater. This shows us that the physical accessibility to potable water is still very low in the towns of Bossangoa, because the public water supply was not able to manage the water sector effectively. The result failed to reach more than a small part of the demand for residential and commercial users. Services are a critical shortage. Water services where they exist are unreliable and of poor quality and unsustainable because of difficulties in the management, operation, pricing and failure to recover the cost. Many public water supply systems show significant deterioration and poor utilization of existing capacity because of less maintenance and lack of funds for the operation.

From all the above, we had to determine the impact of the water on diseases of dirty hands, for example, which lead to many cases of simple diarrhea in 2011. Hand diseases cases are more common for people who handle foods and dirty water sources. On these key points, we can conclude our discussion by saying that the quality of water consumed by people of Bossangoa and those of the two joint investigations is not good and does not meet WHO standards on potable water. As to what concerns the problem of hygiene and sanitation, it is to be addressed seriously in connection with drinking water.

Sanitation is a real problem in Bossangoa. The public toilets do not exist in the city and reflects 90% of households have latrines in poor condition or no latrine, the lack of gutters and coring compounds, the problem with a prevalence of parasitic, viral and infectious diseases. There is also a lack of controlled dumps and temporary and insufficient staff of the municipality that do not allow an efficient waste disposal. We all know that sanitation reduces the exposure of the population to diseases by providing a healthy living environment. It is crucial to breaking the cycle "infection - disease - infection cure", resulting from improper disposal of human waste containing pathogens.

As with most government policies on rural development, water supply in rural areas lags behind its urban counterpart. This situation forces the households in rural areas to adopt an adaptation strategy and rely on open sources which are precursors of the water-related diseases. WHO (2000) and Ryan(2008) reported that nearly 80% of health problems in developing countries can be linked to inadequate water and sanitation, killing nearly 1.8 million children every year and leading to the loss of about 443 million days school for children suffering from water-related diseases.

The underlying premise is that the public water supply in rural communities where it had planned was not able to cope with growing demand. This also follows the incessant disruptions of water facilities, lack of staff to conduct routine maintenance .The rural communities in turn consider this intervention as external and tend to believe it is the responsibility of public authority to maintain water facilities. In most cases, these water projects were poorly designed and implemented haphazardly without recourse to contributions from community members. The result was the crisis and shortages of water constant over the years.

CONCLUSION

To conclude our study, we can confirm the objectives of our research, saying that the situation of water, hygiene and sanitation in rural areas of Bossangoa is bleak and influence considerably on wellness of the populations which is increasingly faced with limited resources. Thus, the center of this issue, water must be managed responsibly to ensure sustainability. Its

collection, distribution, processing, preservation as well as its consumption must obey strict standards of good health.

Maintaining and improving the health of populations are closely related to hygiene. Hygiene lived both individually and collectively, also requires a number of attitudes and behaviors. Human communities, according to their perceptions and ways, often set the rules.

But the main objective of this study is to provide the public information on good practices of water supply, hygiene and sanitation for sustainable environmental management in their respective municipalities in order to improve their living conditions.

The results revealed that over 70% of households in rural communities have no access to improved water supply. They rely only on water sources (open source) such as rivers, perennial rivers, water ponds and unprotected wells, which are susceptible to waterborne diseases such as typhoid fever, malaria parasites, etc. Most rural people especially women and children spend time walking long distances, over 3 kilometers, to fetch water for domestic purposes.

Households that do not have access to drinking water and are vulnerable to many health problems should be assisted. These same constraints will be found in the concept of Sanitation which is also closely linked to water and sanitation. The various wastes of human consumption and activities if they are not properly managed are becoming a problem of human and environmental health.

This is a wakeup call for water supply planners, policy makers, donor agencies and external support agencies to take their share of responsibility and support communities in their efforts to maintain the system that were given to them. They cannot do it alone. Certainly, members of the same community, they should also play a crucial role in facilitating the actives implicated for communities through self-supply project water assistance to be safe and secure; but they are mostly financially unable to raise the funds for the project.

The efforts and community skills are crucial, but their capabilities and motivations must be complemented by capacity and mandates of government agencies, NGOs and the private sector. Together they can create water supply services in which each party bears its share of responsibility in an institutional framework that handles all functions necessary to provide water to the population, including policy , regulation, legislation, financing, support, operation and maintenance.

SUGGESTIONS

On the improvement of sanitation and access to drinking water in Central Africa more specifically in the town of Bossangoa, it is urgent to take adequate measures to try to limit the cases of death due to diseases associated with poor water hygiene. Due to the poor conditions of access to clean water, sanitation, and practical knowledge on hygiene which are not observed in our study area and other places vulnerable to waterborne diseases, we suggest:

At the place of the rural population:
In the neighboring River population and unimproved sources, to solve their problem of drinking water, it would be good to treat water at home (by boiling and filtering).

- To fight poverty,
- To fight ignorance for a radical change in behavior.
- To encourage income-generating activities for both men and women,
- To involve everyone (men, women and youth) in the process of implementation and maintenance of water sources.
- To encourage compliance with the rules of hygiene and sanitation in order to induce long-term reflexes and behavior patterns.
- To implement the financial or physical participation to kind of people in all actions,
- To make and impose the concept of individual and collective participation.

For policymakers (Governmental) and village hydraulic project promoters)

- To support integrated projects (Water, Sanitation and Hygiene).
- Encourage the integration of actions in the drinking water sector,
- To increase research efforts,
- To conduct education sessions on hygiene and prevention of waterborne diseases
- To develop and disseminate messages on hygiene, environmental sanitation, the treatment of water, hand washing, use of latrines and the links between water and disease, and the link between disease and excrement.
- To strengthen the involvement of communities in their own reconstruction.
- To work on the techniques chosen by the people and context (eg rehabilitation or construction).
- OF organize the transfer of skills and the choice of the management system since the implementation of activities (identification of persons or entities in charge, training, formalizing roles in the community ...).
- To improve water point committees management capabilities through better supervision and monitoring.
- To involve the entire rural population in the promotion of a healthy hygienic behavior acting as "change agents" within their towns, their families and their communities.
- To assist the rural water service providers to achieve their objectives.
- To prohibit the use of unimproved water sources.
- For the Water sector
- The awareness about the importance of drinking water;
- The drilling and construction of wells (for groups); to reduce the long distances made by each household during the procurement phase.
- The development and maintenance of natural sources and sinks; the community electrification

For the hygiene and sanitation sector.

Innovative planning for rural sanitation Bossangoa is the outcome of our investigations, we recommend:

- To build public toilets;
- Raise awareness so that each household has its own latrine;
- To build proper latrines;
- Raise awareness on sanitation;
- To form a health committee.
- Establish controlled dumps and landfills
- Establish a health and safety service in the rural community
- To mobilize resources and acquire equipment (Bring garbage removal equipment, making available junk removal bins).

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EPPENDIX




Some photos showing the suffering of the rural population in the water supply