Impact of rejection of non-industrial wastewater treated origin: savex case in batambo district of second Bangui

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ABSTRACT: For many years, cities around the world in general and the CAR (Central African Republic) in particular have seen a very alarming pollution problem sometimes sparking fears. This pollution is due both to industrial activity than human activity in the case of deforestation for agricultural reasons. The growth of the urban population of the city of Bangui foreshadows an increase in demand for goods and services at all levels of environmental pressures resulting from the activities of the latter. The degradation of the urban environment in Bangui is the corollary of several factors that require adequate resources to cope. Which implies the establishment of a suitable environmental policy in order to save not only the wells for the consequences of pollution are many factors and other waterborne diseases but also people of the dangers against pollution.

KEYWORDS: Impacts, Wastewater, Industrial, Savex, Bangui.

I.   INTRODUCTION

Environmental Protection requires special attention with regard to industrial activities which, because of the processes of manufacturing and processing of raw materials into finished products, use a significant amount of water. (Arnaud, 1998)

Wastewater chemical composition some of which may possibly have a toxic character more or less marked, and contribute to the deterioration of the quality of groundwater percolation into the ground.

The growing success of industrialization corollary of diversity including the pollution of surface water and groundwater. Today, the use of water is more than necessary in the manufacture of various products including the residual waste (solid, liquid or gaseous) are dangerous for the environment such as air, water and soil. (Balkiabiya, 2008)

The protection of the environment in African cities in general and in particular in Bangui poses enormous problems. The establishment of the plant in an urban setting generates unprecedented degradation of the urban environment populations Batambo in the second district of Bangui.

Faced with damaging consequences to the environment caused by the discharge of industrial effluents on processing defined by the WHO, it is necessary to analyze the need for treatment of effluent prior to discharge into nature to realize the harmful nature of the effects they produce on the environment.(Diawara, 2010)

However, industrial development in the city of Bangui, and implementation of SAVEX soap in the second district specifically Batambo the neighborhood, which pours its liquid toxic waste in the canals and kouanga Dékongo directly pollute surface and ground water causing danger and nuisance's effects for the well being of the residents of that neighborhood.

In Bangui, the high filling of wetlands and stagnant sewage in living environments, floors and drains reflect the dysfunction of sanitation of solid and liquid waste and the difficulty to maintain wellbeing. (Dorier - April, 2002)

Water, a natural resource essential to life, has become directly or indirectly, the leading cause of death and disease in the city of Bangui in general and in particular, Batambo. Water stocks on earth should be able to renew themselves naturally, but unfortunately, some human activities (domestic, industry and agriculture) seriously pollute ground water, *sources 'potable water.*(Miras C, .2010)

In general, the Man eats and drinks about 80% of water and in developing countries, 80% of diseases are caused by water. According to the WHO 1.6 million children (21% of infant mortality) die each year due to unsafe water, lack of basic sanitation and poor hygiene.

Two decades after the United Nations Conference on Sustainable Development held in Rio de Janeiro (Brazil) in 1992, the world is always striving to achieve the ambitious goals that have been set. An estimated 1.5 billion people still lack access to safe drinking water and 2.5 billion lack access to sanitation services. Also, nearly one billion people live in slums, a figure expected to double over the next 30 years

1. *http://www.eau-artois-picardie.fr/article.php3?idarticle=p14*

The industry is characterized by considerable use of water, and therefore rejects a significant amount of waste water, carrying different manufacturing residues which chemicals are associated. In this context, our study will focus on determining the impacts of wastewater discharged by SAVEX that seeping into the soil and contaminate well water.
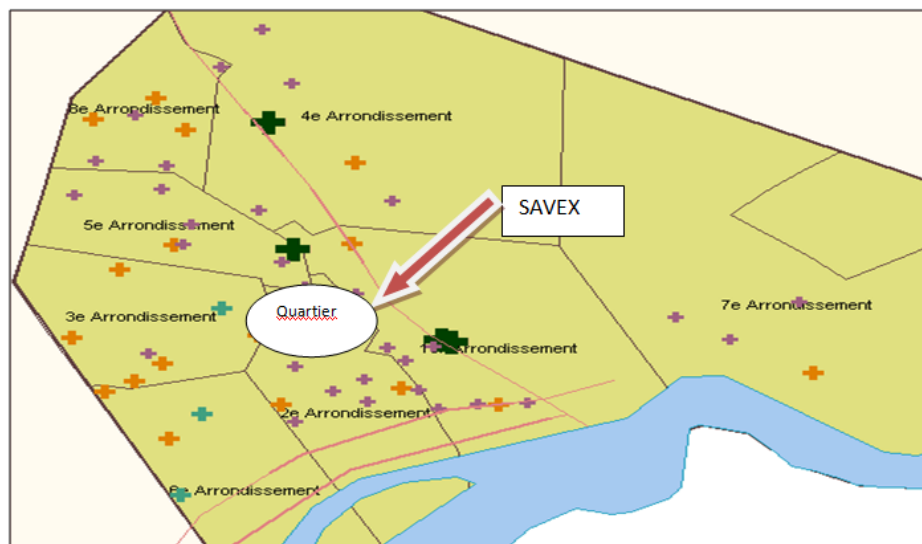
2. Study area

Photo 1: SAVEX plant Bangui

Bangui (CAR) covers an area of 623,000 km². According to the General Census of Population and Housing 2003 (RGPH03) and projection 2012, the RCA has 4,663,731 inhabitants.

Bangui, CAR capital, covers an area of 67 km². It has a population of 778,989 inhabitants, with a density of 11,059 inhabitants per km² (RGPH 2003) projection 2012. The climate is Guinean forest with the alternation of two seasons: a rainy season from March to mid December, with a strong involvement in the pollution of waters swamp and a dry season from January to February. Bangui is divided into eight district which in turn include several neighborhood .These districts are divided into 16 groups and 205 districts.

The second district has been created by Ordinance No. 88/006 of 12 February 1988. It is composed of two groups erected in 26 districts, including the Batambo district is in the second group with a population of 5436 inhabitants according to the general census of 2003. The area is between 04 ° 21.9'58 'north latitude and 18 ° 33.5'75' east longitude.

It is bounded to the east by the Bordeaux area (1 and 2), to the west by the district Yapélé and Bakongo, to the north by Sica 2 district, south by the district and M'bélé Kingoma.

II.   POLLUTION

Pollution is defined as "an adverse change in the natural environment that appears in whole or in part, as a byproduct of direct or indirect human actions, altering the criteria for distribution of the flow of energy from the production level of the constitution physicochemical natural environment and abundance of living species. The changes can affect humans directly through agricultural resources, water and all organic elements. They can also affect by altering physical objects it owns. »

In 1994, RCA began a participatory and decentralized process of preparing its strategy for the management of natural resources and protection of the environment. At the level of policy formulation and the development of environmental programs, the National Environmental Action Plan (NEAP) is the strategic reference framework for environmental planning. As such, it gives a high priority to the integration of environmental considerations into macroeconomic planning. Also, the industrial sector is it arrested in the first place, to the impacts caused on the environment and natural resources, both in construction and by their use. Once again, we do not see the applicability and feasibility of this law by the state.

4.1 The pollution of well water in the neighborhood Batambo
Pollution of water from wells in the area Batambo comes from two distinct factors:

- ✓ The first factor is related to the poor state of waste water pipe containing toxic products from the factory SAVEX and its location relative to the inhabitants of Batambo neighborhood.

4.2. Water pollution
In general, the Man eats and drinks about 80% of water and in developing countries, 80% of diseases are caused by water. According to the WHO 1.6 million children (21% of infant mortality) die each year due to unsafe water, lack of basic sanitation and poor hygiene. Two decades after the United Nations Conference on Sustainable Development held in Rio de Janeiro (Brazil) in 1992, the world is always striving to achieve the ambitious goals that have been set. An estimated 1.5 billion people still lack access to safe drinking water and 2.5 billion lack access to sanitation services. Also, nearly one billion people do they live in slums, a figure expected to double over the next 30 years. In 2006, diarrheal diseases and malaria were respectively 1.5 million and 1.3 million deaths. (UN-Water / WWAP, 2006). In 2002, about 2.6 billion people lack adequate sanitation and 80% of these people live in sub-Saharan Africa and Southeast Asia. This situation is exacerbated by poverty, which is a major barrier to access to adequate sanitation services. In fact, two out of three people do not have access to clean water survive on less than two dollars a day. Reduce the vulnerability of these populations by giving them better access to water and sanitation services is thus a factor in the fight against poverty and reduce waterborne diseases.

The water supply for agriculture is sometimes insufficient in many parts of the globe; the reuse of untreated wastewater in irrigation poses serious health risks because the untreated sewage is a factor conveying pathogens and chemicals hazardous to the human body and all of nature.(Diawara, 2010)

Monitor the quality of water consumed therefore has a fundamental importance for the life of man on earth. Water should be preserved from all stain, not what becomes a disease vector for humans. According to the World Health Organization (WHO) in the world, one billion people lack access to safe drinking water and three-quarter (3/4) live on the African continent.

Such is the case in Central African Republic in general and particularly in Batambo area in the second district of Bangui, which he is the object of our study. Statistics taken from the field show those 75 surveyed households, 50 households or 66.66% are in danger because they use well water to meet most of their daily needs. However, the wells of this district are polluted.

Figure 2: Network contamination of wells
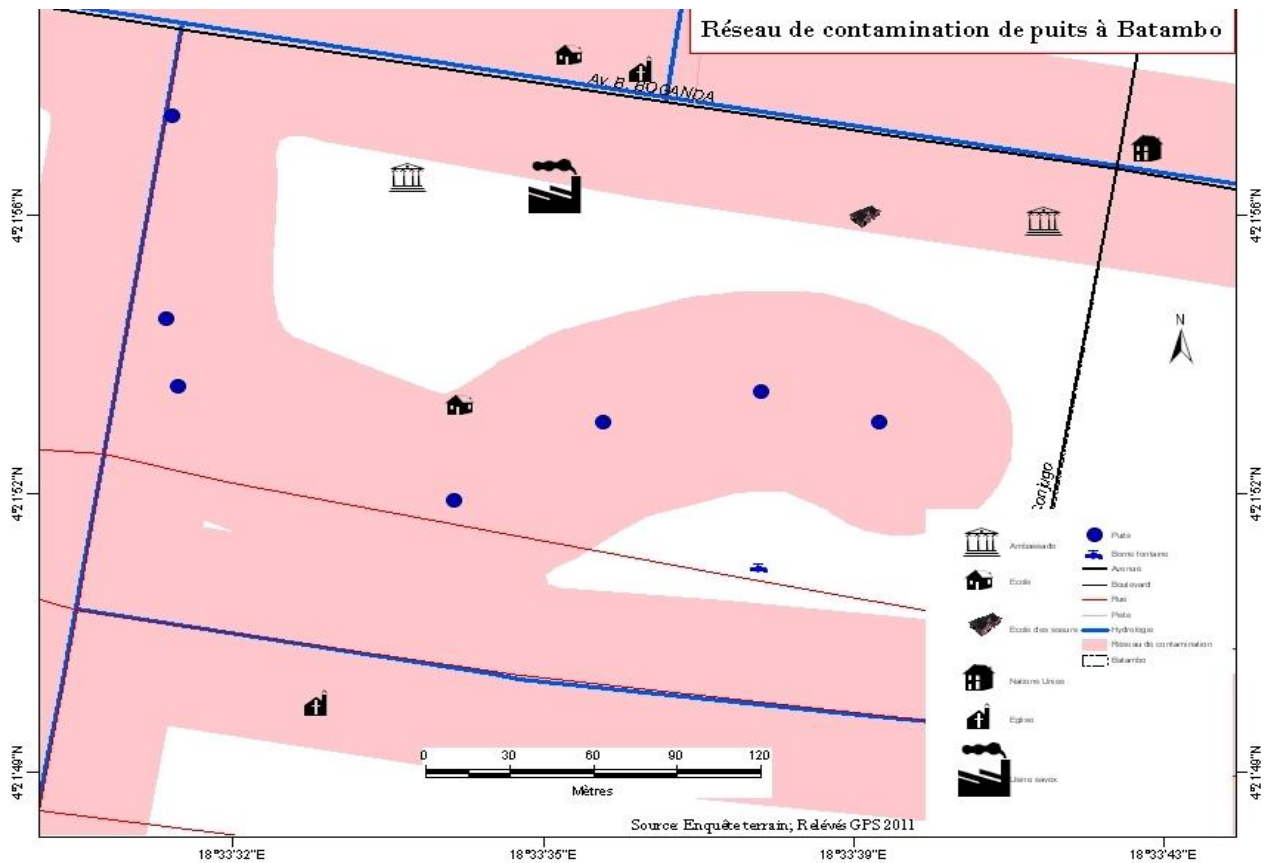
Source: Laboratory of Geographic and Cartographic Climatological Studies (The ACCEG)

The residues of products used for the manufacture of soaps are made in the shallow drainage channel which is located on the Avenue Bartholomew BOGANDA. (ATEUKENG 2012) In 2002, about 2.6 billion people lack adequate sanitation and 80% of these people live in sub-Saharan Africa and Southeast Asia. This situation is exacerbated by poverty, which is a major barrier to access to adequate sanitation services. In fact, two out of three people do not have access to clean water survive on less than two dollars a day. Reduce the vulnerability of these populations by giving them better access to water and sanitation services is thus a factor in the fight against poverty and reduce waterborne diseases.

The image below shows the discharge channel wastewater from Savex (Figure 4)

Photo 4: discharge channel wastewater from SAVEX (Source: ML Koyassambia, 2010)

A less rain, the canal waters containing residues of toxic products of plant SAVEX beyond his usual bed and walks in plots adjacent to it and create flooding. These flood waters, their towers and flow into the wells of the area that are Batambo plant downstream. Therefore, the well water of this town takes the yellowish color.

✓ The second factor is related to the construction of wells that are still in the traditional way and does not take into account the rules of hygiene and sanitation required by WHO.

The wells in this area are in circular shape, surmounted by a drum cut in half and build a curb which consists of a few pieces of scrap metal recovery that is consolidated with the earth. This artisanal construction does not guarantee a true seal the wells, as shown in this figure below.

Photo 3: Water color and without the disorder (SOURCE: Landry KOYASSAMBIA)

In some wells, we observed a lack of coping. They are in constant contact with the outside world: water runoff, dust, leaves etc.

Furthermore, the container used to draw water from the well is always put on the ground after use. By this way, impurities and pathogens are introduced into the wells.

In France for example, the volume of waste water produced is 150l / person / day, ecological damage caused by their release into the wild is now punishable by law, and after, the polluter pays principle, polluters must pay compensation for damage to the environment at the level of the injury. (CROIX ROUGE FRANÇAISE 2009)

Also in South Asia, sanitation coverage for 40% of the poorest households did not increase from 1995 to 2008. (Zhongguo Qingnian Bao,2007) Between 1953 and 1960 MINAMATA in Japan, 111 people died or were severely intoxicated following the absorption of fish and shellfish that contain high levels of organic mercury. Then followed the disease-ITAI-OUCH OUCH ITAI or resulting from contamination by cadmium. Chemical contamination of the water can also be natural. Thus, according to a survey by the British Geological Surveyl in 2001, contamination of groundwater by arsenic in the bedrock of the Brahmaputra basin in Bangladesh threatens the lives of nearly 75 million people. Since the idea of chronic poisoning caused by heavy metals originated among toxicologists and toxicologists (Idem)

Same in Africa South of the Sahara, according to a UNDP report, 63% of the African population has no access to basic sanitation. Furthermore, only 10% of wastewater is treated before their return to the wild. Thus, a two Africans suffering from waterborne disease which 90% are children under 5 years (WASTE, 2006).

According to a study by the United Nations Environment Programme (UNEP) published in March 2011, approximately 51 million people in the Democratic Republic of Congo (DRC), or three-quarters of the population do not have access to the drinking water, even if the country holds more than half of Africa's water supply. Conflict, environmental degradation, urbanization and lack of investment in infrastructure have seriously affected the availability of drinking water.

Many deaths have been reported in Lagos, Port Harcourt and Kaduna in Nigeria due to industrial pollution around some chemical manufacturing plants that have accidentally spilled toxic chemicals in surface water lying near them.

As a result, wastewater is discharged directly or in river beds or in the sea and cause huge health and environmental problems. Their treatment is low due to the dilapidated state of treatment infrastructure. Thus, to support himself, he uses the raw wastewater in irrigation as additional water resources. This is a factor to adverse effects on the health status of the population and not only the environment application area but also in all of entire cities.

To this end, a physicochemical analysis allowed us to determine the organoleptic aspect of poor water quality of some wells, the Batambo neighborhood.

4. PHYSICO-CHEMICAL ANALYSIS OF WELL WATER DISTRICT BATAMBO
For this analysis, ten wells were taken.

4.1. Checks the quality of well water
Given the objective assigned to our work, only a few analyzes deemed important physicochemical parameters were performed in order to have an idea about the quality of well water in the study area. These parameters are: temperature, hydrogen potential, color, conductivity, suspended matter and dissolved oxygen.

4.2. Organic and chemical composition
Liquid wastes include dissolved solids and settleable solids and non-settleable suspended. Organic matter concentration is obtained by analyzing the Biochemical Oxygen Demand (BOD5) and Chemical Oxygen Demand (COD). First, BOD5 represents the amount of oxygen required by microorganisms for five (5) days to break down organic matter in sewage 200C. While the COD is the amount of oxygen required to oxidize the organic material using the dichromate in an acid solution to convert it into carbon dioxide (CO_2) and water (H_2O). (French development Agency,2011)

The value of COD used to test the strength of non-biodegradable waste water is always higher than that of the BDO5 used to test the strength of treated municipal wastewater or not. (14) In general, the types domestic wastewater contained 50% carbohydrate, 40% protein and 10% fat, with a pH of 6.5 to 8.0 (14).

The industries release into the environment chemical pollutants such as heavy metals (cadmium, lead, etc.), nutrients (nitrogen, phosphorus), artificial chemicals (pesticides, hydrocarbons, etc.) and natural chemicals (chloride, sodium, fluorine, arsenic, etc.) for adverse effects on the ecology and human health and in some cases toxic phenomena.

4.3 Health risks
The combined presence or one of these organic chemicals above is likely to result in the individual being exposed to various conditions. The following table lists the different risks that can have adverse effects on human health and the environment.

Table 1: Table of different risks of contamination

Types of hazards		Enes pathogenic agents
infectious	Bacterial Second	Vibrio cholerea Salmonella typhi Shigella Leptospira legionellosis
	viral	Ent erovirus Adenovirus Rotavirus Hepatitis A Virus
	parasitic	Historitica Entamoeba, and Giardia lamblia Balantidium coli. Bilharzia Intestinal parasites (roundworms, pinworms, hookworm ...)
	Fungal	Mycoses (pool)
Chemicals	Min 'meeting	Normally pr ESENT but harmful in excess: calcium, sodium ... Abnormal presence: mercury, arsenic, chromium, Lead ...
physical	organic	
	thermal	Pheating of the water
	radioactive	center near nuclear

Source: *"The health and environmental risks of wastewater discharge in Ngoa-Ekellé neighborhood in Yaounde." FEUDJEU DEFO Paul Ines 2011. [9bis]*

Wastewaters have impacts on human health but also its living environments.

4.4 On the environment

To appreciate the magnitude of the problem and its consequences on the lives of the population, it is significant to watch, sewage flowing in the streets, garbage everywhere present, habitat types, clogged gutters waste, excreta in public places, the state of the roads, and environmental management infrastructure.

This lack of processing infrastructure management has significant impacts on the quality of the natural environment (contamination of groundwater, degradation of ecosystems) (WASTE, 2006). These impacts can beings observed on several types of waters.

✓ **Surface water**

When wastewater is discharged directly into the natural environment, we notice the excessive presence of phosphates; in particular, promote eutrophisation, which can ultimately lead to death of fish and other aquatic organisms that live there. (Ateukeng, 2011)

✓ **Groundwater**

The quality of the ground water can be degraded by sewage, if the sealing of the wastewater treatment plant or lagoon is defective or when the individual sewerage system is dysfunctional.

4.5 On the human health

Sanitation is strongly related to public health because of the many diseases observed in humans living in an unhealthy environment. In Batambo area, proximity to populations with sewage can cause diseases faecal-oral transmission. Wastewater conveys a large number of micro-organisms (viruses, bacteria, protozoa, helminths etc.). These more or less pathogens that pose a real danger to health. (Mouchili Mfome, 2008) If this untreated wastewater directly discharged into water courses, lagoon or spread on the floor, they can cause contamination of crops, surface water and groundwater. These are also the discomforts associated with traditional latrines that favor the proliferation of mosquitoes, cockroaches and bad odors in the living environment of the people. The first category of diseases related to water quality (cholera, typhoid, hepatitis, polio) results from the contamination of water by human waste, chemicals or animal and can be avoided by simple treatment of water. The second category is derived from aquatic organisms such as worms that spend part of their life in water and another as parasites.

The most known diseases identified at Batambo are typhoid, and schistosomiasis. Next come the diseases due to water-related vectors such as malaria, trypanosomiasis, yellow fever, filariasis and dengue fever, which are most prevalent in the world. Finally, we can note serious social consequences (modesty rate of access to the small school) and economic (rising care costs, loss of the number of actual working days). (Mouchili Mfome, 2008)

5 DISCUSSIONS

These analyzes are performed simultaneously in different circumstances, because the first was made directly after the rain while the second was conducted without any rain; but all analyzes gave almost similar results we try to demonstrate. The water quality depends on the nature of its environment. The middle of the geological and hydraulic training can have influence on the water. In our study area, we worked in a sandy and clayey formation because the area is swampy. Groundwater is a victim of runoff threats and sometimes infiltration of various elements: The distance between latrines and wells is not respected; deposits of household garbage, wastewater discharges by the nearby factory houses affect well water. That's the reason for the contamination of wells Batambo area waters.

Before any discussion we have referred to European standards of raw water and drinking water recognized by the Central African state to assess the quality of the analyzed well water. The waters are classified into three grades: A1, A2, A3, and a class off class (HC)

Poor water quality; disturbed fish life; use for cooling water for navigation, water for irrigation. Water of very poor quality; cannot be used for the processing of drinking water. At the end of our analysis, we assessed the results based on campaigns carried out by the graph below:

The temperature is not in itself a water potability parameter as it depends on the nature of the water which is to be analyzed. Well water and drilling elevated temperatures compared to that of the water surface; because they constitute what is called "groundwater". The temperature values are slightly higher than that fixed by the standards discussed as well water, these values are acceptable.

PH influence on the most chemical and biological mechanisms in the water, for example carbon dioxide is present in the water in various forms in equilibrium. Thus, pH-meter, the dominant form is the bicarbonate ion; carbon dioxide is only found at acidic pH (companion report of well water in the 5é and 8é district, "water team Hydro Lavoisier Laboratory Science" 2007). These values correspond to the nature of the

deep shallow aquifer that feeds the water of traditional wells. According to the standards, the pH value is between 6.5- 9 for drinking water, our tables give us an alternative value of 5.72 - 6.81 it shows that almost all of the examined wells of acidic water .

As we mentioned earlier, the color of water depends on the material contained in this water, and then it is well water that are not even protected, our results demonstrate that three quarter (¾) analyzed wells have the color that does not meet the standards set at 15mg / l of Platinum in reference to the scale Platinum / Cobalt.

Well n° 2 has a water stain that far exceeds the values of European standards. This is due to discharges of wastewater from the factory, as well as the household rubbish dumps. The lack of roads in this area causes a large-scale pollution of well water. The conductivity measurement for assessing quickly but about the overall mineral water and to monitor progress.

The guideline value of the mineralization is set to a value less than 600μs / cm. The results of our analysis show that the wells in the vicinity of the plant contain many minerals that we see during our two companions. During these three well companions (P2, P3, and P4) have extremely high values, indicating the presence in the wells of considerable mineralization. These minerals are not highlighted because all physicochemical parameters characterizing pollution have not been carried out.

Comment: all the wells studied, turbidity has much higher standards; as shown on the above curves. This high turbidity could be explained by the fact that water wells analyzed in our study, are used by lots of people for lack of hydrants in the countered. High turbidity is often a sign of pollution. This setting prevents the propagation of light, the intensity decreases and it causes eutrophisation phenomena in certain cases.

Regarding the dissolution of oxygen, there is no ambiguity because the results obtained in our analyzes show that the standards are met. This standard is 3 mg / l O2.

As for total suspended solids (TSS), following the state are the wells and from the nature of the use of water in these wells, MY far exceed the standards (0 mg / l); because most of these wells are not covered or sometimes covered by old sheets.

As a partial conclusion, the study that has been conducted basically involves the illegal occupation of industries (SAVEX) from the ground and planning gaps in the major part of the city of Bangui, particularly in study area were causing the degradation of not only the human living environment, but also water from traditional wells in the Batambo neighborhood. This motif abundantly justifies the proliferation of traditional wells as the main mode of household food, depending on the network of water whose access is limited and conditioned. Unfortunately, the quality of this widely used resource problem for the local population because of the implications for public health that it induces.

Merely the degree of pollution which these wells have can be classified in class A2; Average quality water that requires normal physical treatment, chemical treatment and disinfection;

6. CONCLUSION AND RECOMMENDATIONS

Through this study we showed that the city of Bangui in general and especially Batambo district faces several environmental problems. At this stage, we can affirm the hypothesis that SAVEX would be partly the cause of the pollution of water wells nearby. A soil and geological study of the area and is located Batambo Savex the plant would also be necessary to determine if the soil quality is also a source of pollution of wells in the area.

To improve the water quality and saving of the dangers linked to pollution of the water, a few suggestions are necessary: Users must reduce the use of this well water. The plant must be sealed rejection network of these effluents. NGOs working in the field of water must conduct a development wells and regular disinfection of the wells. The government facilitated access to water SODECA. Prohibit anarchic settlements factories in the city center. Build roads that meet international standards while taking into account the quality of the rocks on the ground. Increase the budget allocated for mayor of the city while avoiding the financial mismanagement which is a blockage in the management of the urban structure responsible to clean up the city. (Arnaud, 1998) All this implies a rational management of well-trained human resources and dynamic.

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