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Analysis of Physico-Chemical Parameters and Quality Control of Water in Anjavibe Lake in the Bemagnondrobe Borough Situated in Nosy-Be District

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Abstract The Nosy-Be island has 12 large sacred lakes, the urban commune of Nosy-Be is a set of five (5) arrondissements, my search is done in the 5th Arrondissement named BEMAGNONDROBE. The first objective of this work; Determining the concentrations of physico-chemical, microbiological parameters and the quality control of these parameters in relation to international standards. The second objective, to satisfy the populations of BEMAGNONDRO BE and also the population drinking water safely. The method used for metals is mass spectrometry. The method for pH: pH-meter, temperature: thermometer, turbidity: turbidimeter, Conductivity: conductivity meter. The results of the physical parameters obtained correspond to 95% of the standards of potability, the chemical parameters almost admitted to the standards by WHO and the EU and while the microbiological correspond exactly to 100% for the norms of the international potabilities.

Keywords Water, Physico-chemical, Microbiological and quality control parameters

1. Introduction

Nosy-be is an exceptional island because of its geology and its relief, that is to say in the island of Nosy-Be, there are 12 great sacred lakes.

The island of Nosy-Be is divided into five (5) arrondissements, so the research is carried out for the borough of BEMEGNONDROBE. The number of inhabitants in this district is given by the following table:

ARRONDISSEMENT	Male	Femele	Stranger
BEMAGNONDROBE	11234	12194	200
TOTAL	23628		

Among the 12 sacred lakes we call lake ANJAVIBE, this lake is located in the borough of BEMAGNONDROBE. It is located in the north of the island. The population in this borough uses this lake as drinking water. So this for cella that we draw from my research aims to analyze the physicochemical parameters and the quality control of this lake called ANJAVIBE to make known the situation of this lake is what drinkable or not.

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2. The Characteristics of Lake ANJAVIBE

LAC	Area (ha)	Volume (m^3)	Average Depth (m)	Maximum Depth (m)
ANJAVIBE	34	4500	13	23

The study of these parameters is different from other research,

This study consists of four parts, beginning with the bibliographic synthesis and then the results of measurement for the physico-chemical and microbiological analyzes, followed by the interpretation and the discussion of this result, and ends with the conclusion.

3. Bibliographic Synthesis

Water has the liquid, solid and gaseous structure, the general formula is H_2O.

The chemical operation of water: is the dissociation in H + and in OH- ion, the separation of the two ions is measured with the Potential of Hydrogen.

The chemical composition of the water: consists of dissolved gases of base to oxygen.

The water contains several organic materials: in various concentrations, it also contains the organic materials presented in dissolved forms.

4. Norm of Quality

1 - Recommendation of the WHO
2 - Recommendation of EU
3 - Recommendation of the EM

Recommendation of the WHO

Designation of the parameters		Limit acceptable	units
Parameters microbiological	Microorganism to 22℃	<100	Ufc/ml
	Microorganism to 36℃	<20	Ufc/ml
	Coliformes	0	Ufc/100ml
	Coli	0	Ufc/100ml
	Enterocoques	0	Ufc/100ml
	Spores	0	Ufc/100ml
Parameters of aesthetic	Turbidity	5	NTU
	Temperature	25	℃
	pH	6,5 to 8,5	mg/l
Parameters inorganic	Chlorides	250	-
	Magnesium	50	-
	Sodium	200	-
	Calcium	400	-
	Potassium	<12	-
	Aluminum	0,2	-
	Nitrates	44	-
	Ammonium	<0,5	-

Recommendation of the EU

Designation of parameters		Limit acceptable	units
Parameters organoleptiques	Turbidity	<5	NTU
Parameters physic-chemical	Temperature	25	℃
	pH	6,5 to 9,5	
	Chlorides	250	mg/l
	Magnesium	50	-
	Sodium	200	-
	Potassium	12	-
	Aluminum	2	-
	Toughness	50	°F
Parameters concerning the substances undesirable	Nitrates	50	mg/l
Parameters toxic	Lead	<0,5	mg/l

Recommendation of the EM

Designation of the parameters		Limit acceptable	unitis
Parameters organoleptiques	Turbidity	<5	NTU
Parameters physic-chemical	Temperature	25	℃
	pH	6,5 to 9	
	Chlorides	250	mg/l
	Magnesium	50	-
	Calcium	400	-
	Sodium	150	-
	Potassium	<12	-
	Aluminum	0,2	-
Parameters concerning the substances undesiranle	Nitrates	50	-
	Iron	0,2	-
Parameters concerning substances toxic	Lead	0,05	-
Parameters microbiological	Coliformeses total	0	Ufc/100ml
	Streptococcifecal	0	Ufc/100ml
	Coliforme thermotolerant	<1	Ufc/100ml
	Sulfite-Reducing	<1	Ufc/20ml

Metals: may exist in water form trace.

Pollutions: these very dangerous in water it presents in microbe.

Quality standard

The standard of qualities is referred to by the European Union (U.E) recommendation and the World Health Organization (WHO).

5. Analysis Parameters

- Turbidity: it is the transparency of water.
- pH: to know the water is acid, base and neutral, its depends on the variation of this pH.
- Conductivity: allows appreciating the quality of salt dissolved in the water.
- Organic matter: allows estimating the quality of organic matter in water, BOD and COD.
- Salinity: this is the measure of salt concentration in water.
- Alkalimetric title: this is the basic salt content, ie to know the concentration of OH- ion in water.
- Determination of nitrate content: Determination of nitrate concentration in water.
- Total hardness: Determines the calcium and magnesium content in the water.
- Dosages of iron: to know the concentration of iron in water, it is in the form of trace.
- Ammonium: the ammonium ion indicates an existence of pollution in water.
- Sodium: is responsible for the hydro-electrolyte balance.
- Potassium: plays a role as a calcium in human life.
- Calcium and magnesium: concentrations are very high in drinking water.

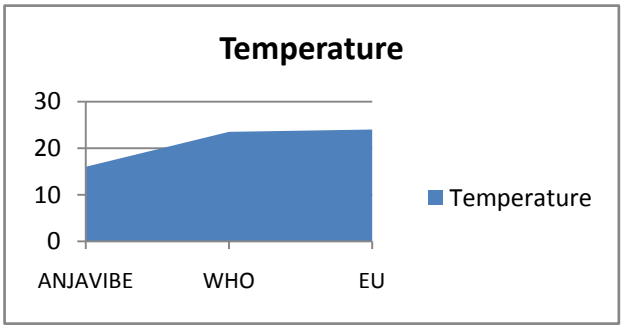
- Aluminum, Lead and Copper: are lord metals, their existences in drinking water do not accept for international standards.
- Determination of chloride: it is a major ion contained in natural water.

6. Results of Measures

I / -Parameters

1- Temperature

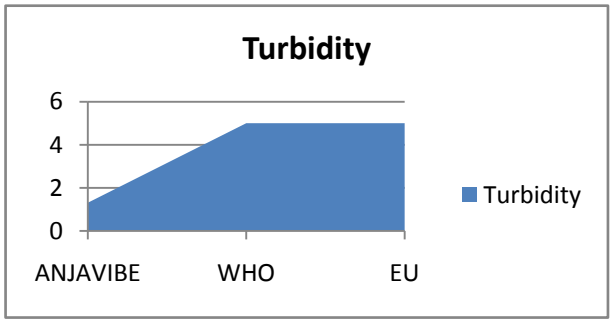
Site	Temperature (°C)
ANJAVIBE	16
WHO	<25
EU	<25



The temperature is in the potability frame, so it is acceptable

2- Turbidity

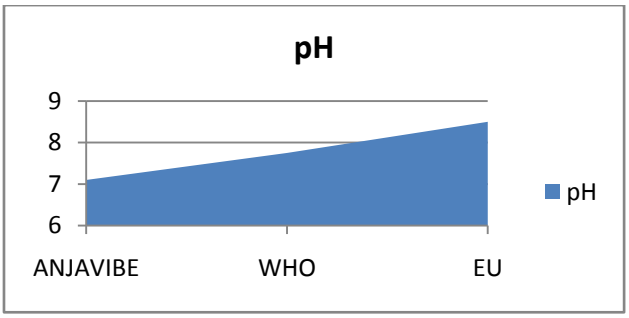
Site	Turbidity (NTU)
ANJAVIBE	1,31
WHO	5
EU	5



The turbidity is equal to 1.31 NTU thus acceptable for the international standard

3- The pH

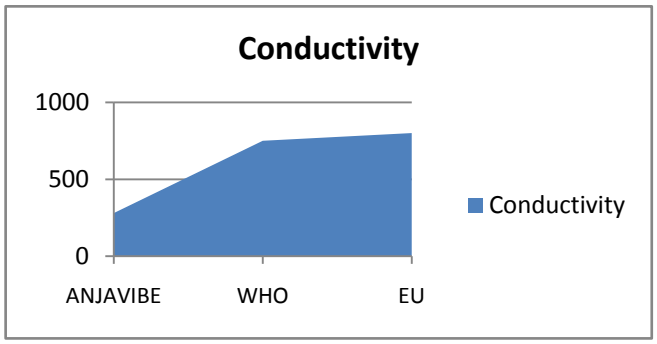
Site	pH
ANJAVIBE	7,1
WHO	6,5 to 8,5
EU	6,5 to 9,5



The pH is equal to 7.1 therefore it is acceptable for the quality standard for potability

4- Conductivity

Site	Conductivity (µS/cm)
ANJAVIBE	280
WHO	180 – 1000
EU	180 – 1000

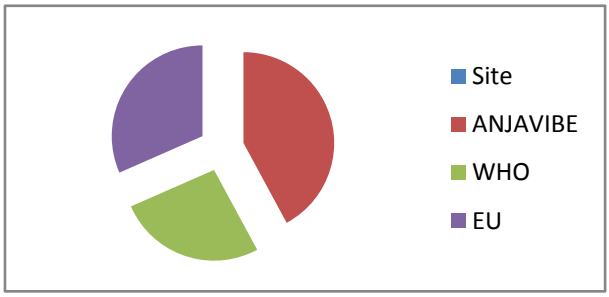


The conductivity is 280µs / cm acceptable for the potability standard

II- chemical parameters

1- Organic materials

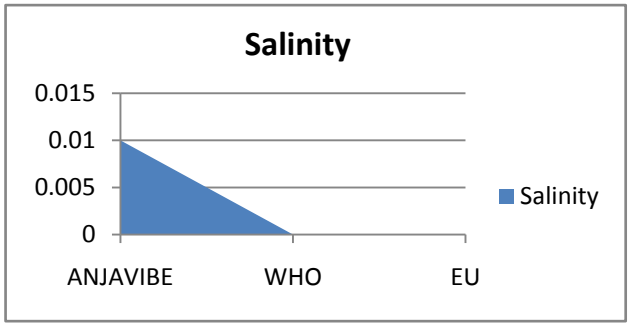
Site	Dissolved Oxygen (mg/l)
ANJAVIBE	2
WHO	1,25
EU	1,5



Oxygen dissolved the value found is greater than 2mg / l therefore outside of potability standard

2- Salinity

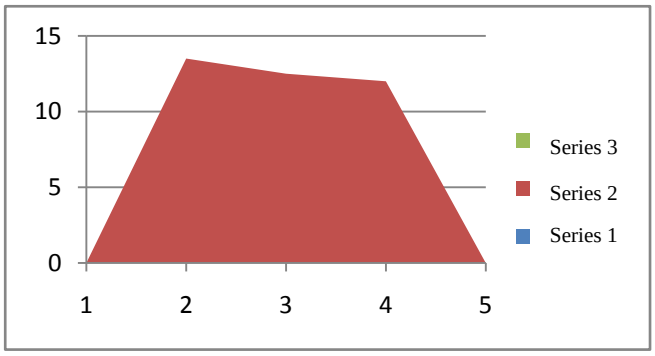
Site	Salinity (mg/l)
ANJAVIBE	0,01
WHO	0
EU	0



Salinity is zero and therefore normal

3- Title Alkalimetry

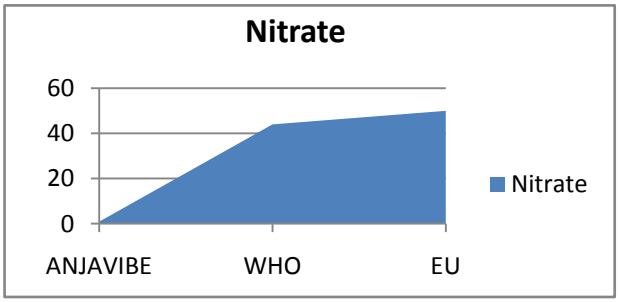
Site	Title complete Alkalimetry (°f)
ANJAVIBE	13,4
WHO	>11
EU	>11



The TAC 13.4 ° f almost normal for the potability of water

4- Nitrate assays

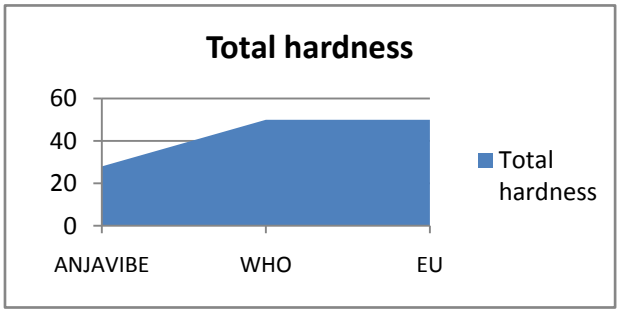
Site	Nitrate (mg/l)
ANJAVIBE	09
WHO	44
EU	50



Normal nitrate is equal 0.9mg / l water is clear

5- The total hardness

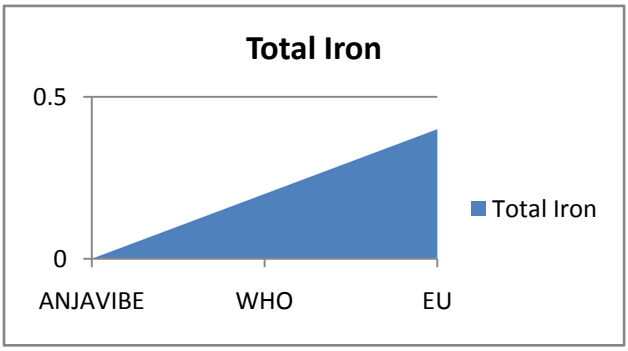
Site	Total hardness (mg/l)
ANJAVIBE	28
WHO	50
EU	50



Hardness 28mg / l water is not so so normal

6- Determination of iron

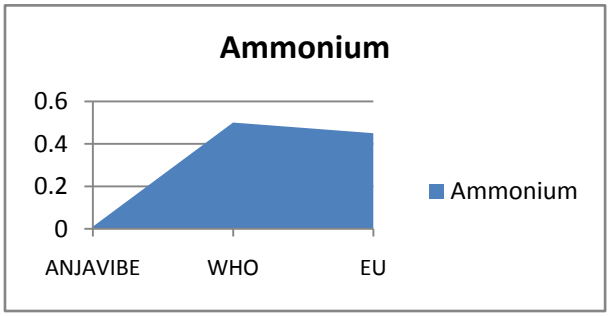
Site	Total Iron (mg/l)
ANJAVIBE	0
WHO	<0,2
EU	<0,5



Iron 0 mg / l therefore no trace for water

7- Ammonium

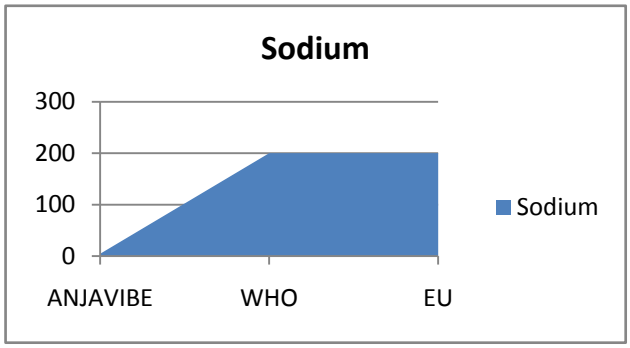
Site	Ammonium (mg/l)
ANJAVIBE	0,01
WHO	0,5
EU	<0,5



Ammonium 0.01mg / l therefore no pollution water

8- Sodium

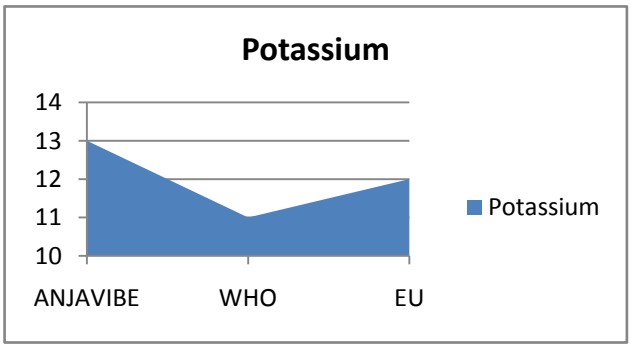
Site	Sodium (mg/l)
ANJAVIBE	4,5
WHO	200
EU	200



Sodium 4.5mg / l very low so the water lacks a lot of sodium

9- Potassium

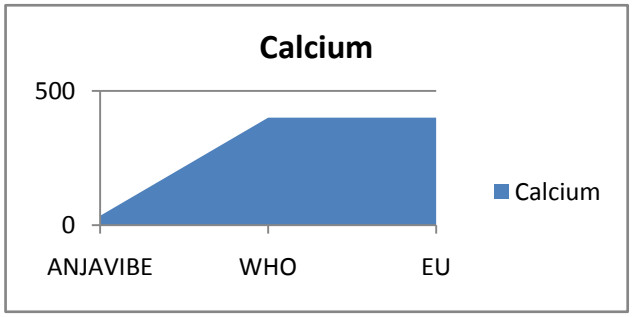
Site	Potassium (mg/l)
ANJAVIBE	13
WHO	<12
EU	12



Potassium 13mg / l higher normal value

10- Calcium

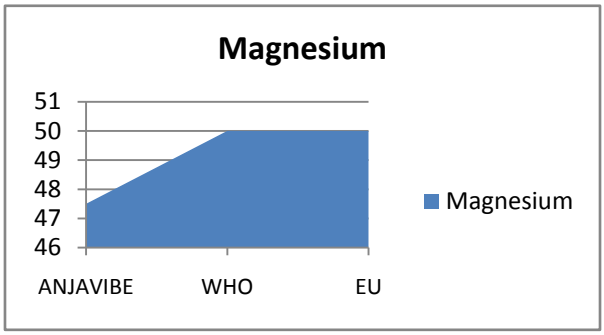
Site	Calcium (mg/l)
ANJAVIBE	35
WHO	400
EU	400



Calcium 35mg / l, the standard is 400mg / l so the water low in calcium

11- Magnesium

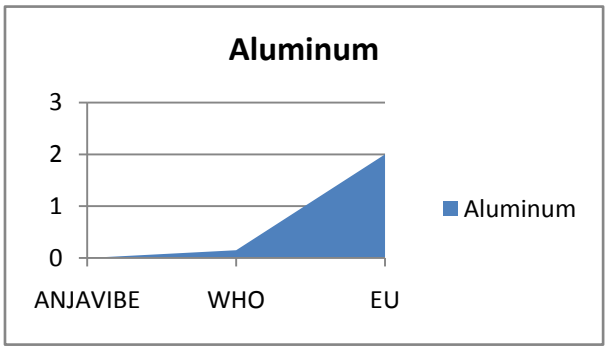
Site	Magnesium (mg/l)
ANJAVIBE	47,5
WHO	50
EU	50



Magnesium is 47.5mg / l value is normal for drinking water

12- Aluminum

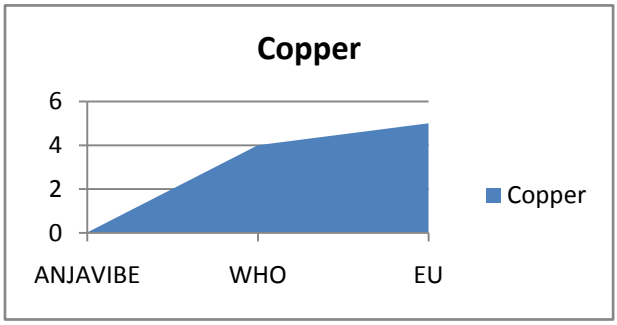
Site	Aluminum (mg/l)
ANJAVIBE	0
WHO	<0,2
EU	2



Aluminum 0mg / l this water no aluminum

13- Copper

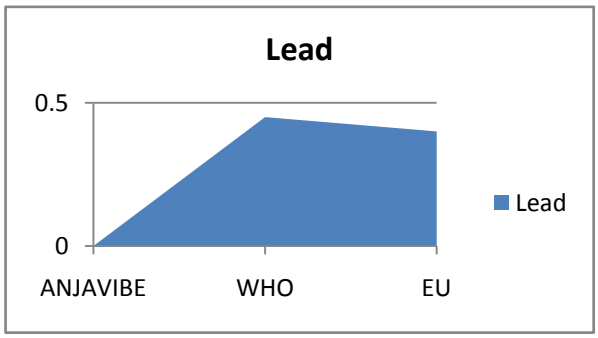
Site	Copper (mg/l)
ANJAVIBE	0,02
WHO	<5
EU	5



The copper value is 0.2mg / l in trace form

14 - Lead

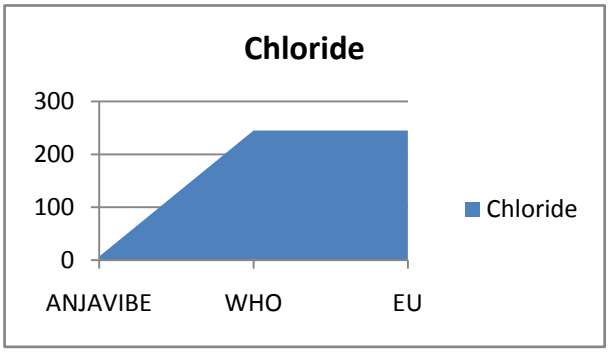
Site	Lead (mg/l)
ANJAVIBE	0
WHO	<0,5
EU	<0,5



Lead 0mg / l water no danger

15- Determination of chloride

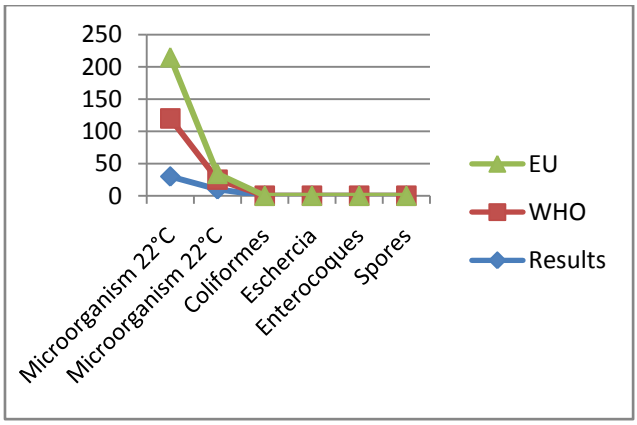
Site	Chloride (mg/l)
ANJAVIBE	7,1
WHO	<250
EU	<250



Chlorides 7.1mg / l very low concentration found by international standards

7. Bacteriological Analyzes

ANJAVIBE	Results	Units	WHO	EU
Microorganisms at 22°C	30	Ufc/ml	<100	<100
Microorganisms at 36°C	10	Ufc/ml	<20	<10
Coliforms	0	Ufc/100ml	0	0
Coli	0	Ufc/100ml	0	0
Enterocoques Spores	0	Ufc/100ml	0	0
Ordering	C			



8. Quality Control

In quality control, values on physical parameters, chemical parameters and bacteriological parameters are compared with international standards in order to conclude the potability of water.

Physical parameters

The temperature 16°C, turbidity 1.31 NTU, pH 7.1 and conductivity 280 µs/cm [1, 4] are admissible to international standards.

The organic matter such as dissolved oxygen is equal to 2 mg / l, this value is outside for the standard by WHO and EU because the required value is <2mg / l. [5]

Chemical parameters

In general, the results obtained are admissible to the values required by the potability of the water, despite some inadequacies of concentrations such as calcium is 34.5 mg / l, [5-8].

Required value is 400mg / l and the chloride is 7.1 mg / l, the required value is 250mg / l. [9]

Bacteriological analysis

The water of the lake called ANJAVIBE that we will study is not microbial [3].

9. Conclusions

The physical parameters of ANJAVIBE lake exactly meet the WHO and EU standards, chemical parameters meet almost 90% of the requirements for water potability and 100% allowable for microbiological conditions.

Therefore the water of Lake ANJAVIBE used by the population of the 5th Arrondissement named BEMAMGNOBE in the District of Nosy-be is drinkable.

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