WATER QUALITY BUNDLE

ALTERATION OF WATER QUALITY CAUSED BY POLLUTING PRODUCTS

RESEARCH TEAM

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ABSTRACT

For Madagascar, the water treated by JIRAMA (Water and Electricity Company) is one of the main sources of drinking water for the population. For the water to be clean for consumption, according to the coordinator of the JIRAMA water project, the pH at the factory outlet must be around 8 and arrive at consumer level around 7.5 8 depending on the path traveled by the treated water. This drinking water is physically and chemically treated according to international standards. Unfortunately, only 54.4% of the capital's population benefits from it. It is for this reason that we are undertaking this research with the aim of answering the following questions: is the water consumed by the rest of the population of the capital, especially the disadvantaged, drinkable? If not, what are the causes and consequences?

Thus, we assume that the water taken at the source or throughout the IKOPA river, the main watercourse with its many tributaries used by JIRAMA and the rest of the population of the capital can only be of good quality (neutral or basic pH) and suitable for consumption. Otherwise the water company will not use it. So to verify this hypothesis, as a Globe student we will carry out sampling and pH tests in different areas of the IKOPA river which run through almost the entire capital (see the map of Antananarivo the capital). After the tests, - almost all the water samples have an acid pH(Fig1-2), even those intended for JIRAMA filtration. But the water company rectifies them by efficient physical-chemical tests

INTRODUCTION

Water, a precious resource essential to life, has played and still plays a fundamental role in the development of societies.

Water is drawn, treated, transported, distributed and then used. After use, this water is more or less contaminated. This polluted water returns to nature via the sewers, possibly after passing through a treatment plant, via a drain, or directly into a watercourse. Water goes through a whole journey, which we call the water cycle. It is very important that enough water is still pure, after being used, or that it becomes so again, so that it can be used again later. Because water is not inexhaustible!

Currently, the environmental problem has an international dimension. The aspects and sources of this problem are very diverse. In developing countries like Madagascar, resource degradation is mainly due to population growth and poverty. Antananarivo today exceeds one million inhabitants. The population is growing at a high rate and the density is increasing dramatically. During the last twenty years, the human density in the faritany of Antananarivo has increased from 27 to 50 inhabitants per km². This increase in population causes a multitude of problems for the environment.

Our research work is devoted to the environment sector and more specifically to water analysis. Water is one of the most widespread elements on earth: 70% of the globe is covered in water and it is essential for all life. At the same time the waters are excessively affected by pollution, which can entail a real danger for the ecosystem. There are several types of water pollution (physical, chemical, organic and microbiological) which can have different origins. For this, it is very important to control the water quality.

METHODS USED DURING THE RESEARCH

1. Surveys of the national water and electricity distribution company and the Ministry of Water (Water Component service)

2. pH sampling

a) Delineation of representative water withdrawal zones in the capital of Madagascar using the geographical map

b) Establishment of the sampling schedule according to our availability

c) Descent to the field to take water samples using labeled tubes showing the name of the sampling area, the date and time of sampling

d) Analysis of the ph of the samples at the laboratory of our school by adding the pH value on the labels

3. Processing of the results of the pH analysis of the water sampled

a) Establishment of the table and graphs representative of the pH values of all the sampling areas

b) Analysis of pH values obtained in the field and interpretation in relation to the hypothesis put forward

4. Issuance of a conclusion taking into account field observations and interpretations of the pH values obtained

5. Establishment of a community and student awareness timetable

MATERIALS

As we are Globe students we use materials from the hydrology protocol (www.globe.gov) such as

*pH paper which allows us to evaluate the pH value of each water sample in a given area

*water sampling tube

*Data collection sheet that allows us to record pH values in all sampling areas.

But we also use other materials such as

*Red cabbage solution which is a colored indicator studied in class that we will want to test in comparison with pH paper by developing our scientific curiosity

*Recycled plastic bag as latex gloves

*Geographic map of Antananarivo Madagascar for the delimitation of water withdrawal areas

METHODS USED DURING THE RESEARCH

1. **Surveys of the national water and electricity distribution company and the Ministry of Water (Water Component service)**
2. **PH sampling**
    a) Delineation of representative areas of water withdrawals in the capital of Madagascar using the geographical map
    b) Establishment of the sampling schedule according to our availability
    c) Descent to the field to take water samples using labeled tubes showing the name of the sampling area, the date and time of sampling
    d) Analysis of the pH of the samples in the laboratory of our school by adding the pH value on the labels
3. **Processing of pH analysis results of sampled waters**
    a) Establishment of the table and graphs representative of the pH values of all the sampling areas
    b) Analysis of pH values obtained in the field and interpretation in relation to the hypothesis put forward
4. **Issuance of a conclusion taking into account field observations and interpretations of the pH values obtained**
5. **Implementation of a community and student awareness timetable**

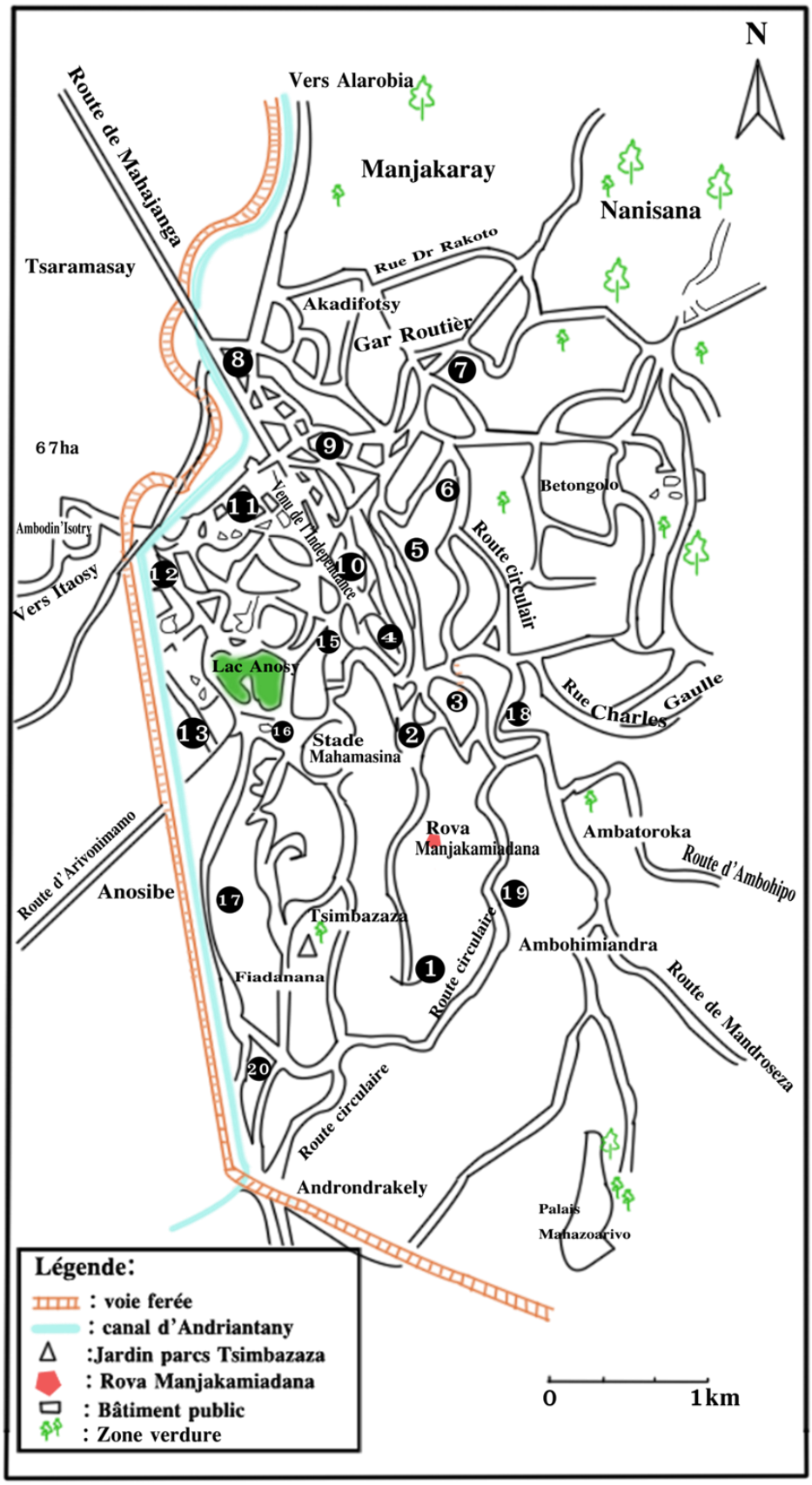
MAPS OF WATER SAMPLING AREA

LEGEND

lake Anosy

Chanel Andriatany

River Ikopa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Androndrakely
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Manazoarivo
Légende:
: voie ferée
: canal d'Andriantany
:Jardin parcs Tsimbazaza
: Rova Manjakamiadana
: Bâtiment public
: Zone verdure
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1km

railway track queen's palace public building green area

pH SAMPLING OF THE IKOPA RIVER AND ITS DIFFERENT TRIBUTARIES

All as in the Ikopa River, the tributaries without exception display a pH value below 7, which indicates the nature of ACID pH

Note * ***Filtered water*** represents water treated by JIRAMA.
* ***Unfiltered water*** represents water used directly by local residents
* ***Red cabbage*** is a biological indicator prepared and studied in class that we students want to test during this research project

	Unfiltered water			Filtered water		
	Ph paper	**Red cabbage (4ml)**	**Natural**	**Ph Paper**	**Red cabbage(4ml)**	**Natural**
Mandroseza	5	2,5	Acid	5,5	2	Acid
Marais Masay	5	3	Acid	5,5	3,5	Acid
Ikopa	5,5	2,5	Acid	6	3	Acid
Tanjombato	4	4	Acid	5,5	5	Acid
Andriatany	4,5	2	Acid	5	2,5	Acid
Ambodirano	3,5	1,5	Acid	6	1	Acid
Tsimbazaza	5	2,5	Acid	5,4	1,5	Acid
Lac Anosy	4	3,5	Acid	4,5	1,5	Acid

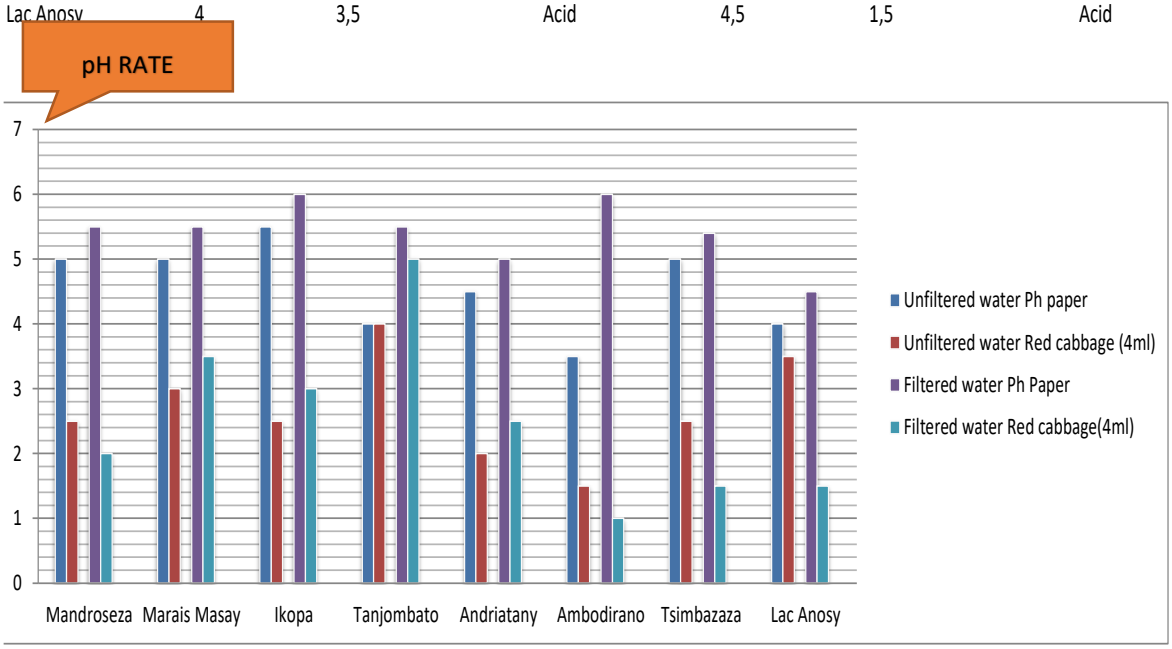

Fig. 1 -2 Table and graph showing the pH variation of the Ikopa River and its tributaries

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Fig. 3-4: Water sampling (Ikopa – Tanjombato

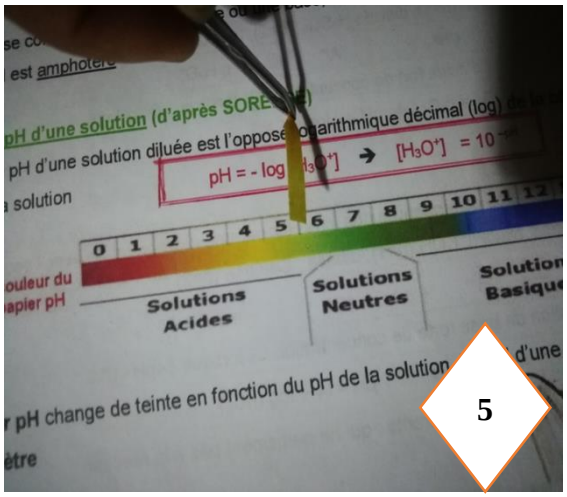

Fig. 4 pH analysis using pH paper

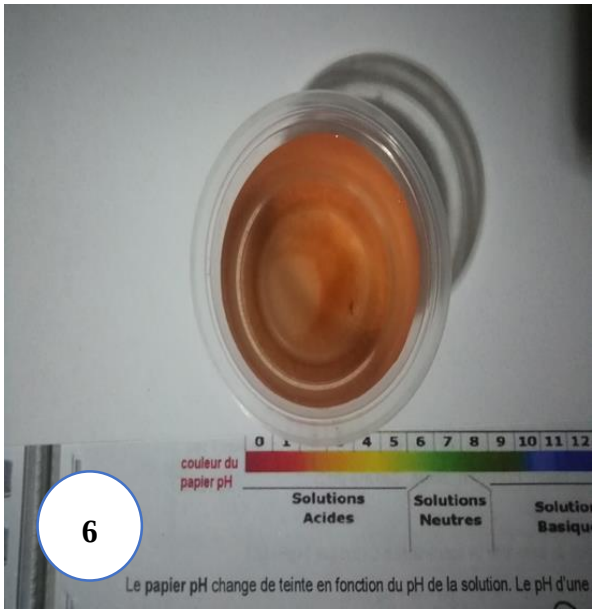

Fig.6: pH analysis using red cabbage solution

Fig.7 : local residents who use polluted water to laundry washing

Fig.8: tributary of the river soiled with excrement

DISCUSSION

After the analysis of the results of the waters sampled in the different areas, the interpretations of this analysis we can see that;

* the nature of the pH is not what is assumed in the hypothesis (neutral or basic) to be suitable for consumption. However, the results may already be significant because we tried to cover the areas of the capital during the sampling.

*the choice of the 2 qualities of water (unfiltered and filtered) is also a strategy that allows us to make a comparison with that distributed by the national water and electricity company

* the use of the red cabbage solution prepared in class is a real discovery and an evidence on the nature of the waters analyzed, however as a scientist the quantification of the pH value always requires the use of pH paper

*use of a pH meter will be highly desirable for high accuracy of the pH value

FINDINGS

We can conclude that all water sources in the capital drinkability of Madagascar are acidic in nature, however JIRAMA will ensure its through efficient physical-chemical treatment, but those that are used directly by local residents or the rest of the population will not having no access to drinking water are very acidic caused by a wide variety of polluting substances and all the more dangerous (excrement, toxic industrial waste, household waste,) which requires immediate, continuous and lasting handling to save human lives, in the name of science we have already done our part by carrying out this project and then by raising awareness among students, the community living along these rivers and collaborating with the community.

We could also have carried out an analysis of polluting substances using nitrate and phosphate kits from around the world when we note the main causes of water pollution or carry out bacteriological analyses, but this is not the objective of the research. and it is very expensive. We will be able to do this soon in another scientific research project and in collaboration with NGOs or departments of the Ministries concerned (health, water environment, University, etc.). Water sampling for physical or chemical testing can be done by several methods, depending on the precision required and the characteristics of the contaminant. Many contamination events are highly time-limited. For this reason, “grab” samples are often insufficient to fully quantify contaminant levels.

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Date: 10 MARS 2023

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Relationship to Minor: Guardian Date: 10/03/2023

Signature of Minor:

Name and Location of Event: I V F F

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OPTIONAL BADGES

*Be a collaborator because it ‘is very important to take part in a world observation than work all alone in a limited region. Science evolves every day, doing science with several observations and sharing it is so enriching and allows to verify so many things

*Be a data scientist because this is our main global mission, it makes it possible to explain scientifically all the events and to prevent those which could affect the proper functioning of our unique system

*Making action because it is also very important to take part in creations which make it possible to solve social problem. Indeed, science always has a solution to propose for the social problem by means of the discovery

DATA GLOBE

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