

Analysis of the physicochemical parameters of the water quality of stream Urumutum in the city of Tabatinga - AM

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Abstract — Water is an essential resource for the maintenance of life that everyone and it is up to all human beings to preserve our water resources. This work aimed to evaluate the physical chemical parameters of the water of the Urumutum stream, which is located on the INCRA road, in the rural area of the municipality of Tabatinga-AM. For the analysis of water quality, two collections were carried out, in a period of one month. The parameters analyzed were: ammoniacal nitrogen, electrical conductivity, biochemical oxygen demand (BOD), chemical oxygen demand (COD), dissolved iron, nitrite, nitrate, Ph, temperature and turbidity. The results obtained in the laboratory analyzes were compared with the water quality standards established by CONAMA 357/2005, in which some parameters outside the established standards were observed. Being them, the electrical conductivity, BOD, COD, temperature and dissolved oxygen, showing high degradation of the water course generated by the accumulation of residential waste that consequently alters the water quality of the stream. Based on the study, it was possible to conclude that the water quality of the Urumutum stream is in a critical state due to anthropic actions. Public policies must be taken immediately in view of the fact that the lack of sanitation, added to the abandonment of public power, can generally cause serious problems in the health of residents, leading to an increase in diseases caused by contamination of the stream water.

Keywords— Physical-chemical analysis, degradation, water quality.

I. INTRODUCTION

Water is an essential natural resource for the survival and development of life on the planet. We can use it for various activities of extreme importance, such as supplying houses and industries, irrigation, transportation. It is estimated that 97.5% of the water available on the planet is salty and is not suitable for any type of supply or irrigation. The fresh water available on the planet corresponds to 2.5%, most of which is difficult to access [1].

Water quality standards vary for each type of use. Therefore, potability standards are different from bathing standards, which, in turn, are not the same as those agreed for irrigation water or for industrial use. Resolution 357/2005 was created by the National Council for the Environment (CONAMA), which reconciles the classification of water bodies and the environmental

guidelines for their classification. establish the conditions and standards for the discharge of effluents.

The municipality of Tabatinga is located west of the interior of the state of Amazonas on the left bank of the Solimões River, with a population of 67,182 inhabitants [2]. Population growth in recent years has been one of the major problems in the municipality. Due to large irregular occupations and the lack of basic sanitation. Streams such as Urumutum have been significantly affected by the anthropic occupation of its banks.

Water quality is related to natural phenomena and anthropic actions, due to the irregular use and occupation of its banks. Anthropic actions are one of the main causes of the imbalance and alteration of water quality, through the generation of domestic effluents, industrially or in a dispersed form, contributing to the materialization of organic and inorganic compounds in water courses and changing their quality [3].

In this context, it is necessary to verify the current situation of the waters of the Urumutum stream, which frequently receives discharges of domestic effluents and solid waste. Thus, the present study aimed to analyze the water quality of the Urumutum stream on the effects of the occupation of its banks, analyzing the physical and chemical aspects of the stream water.

II. METHODOLOGY

The Urumutum stream is located on the INCRA road, in the rural area of Tabatinga-AM, with coordinates 4 ° 12'16.8" S and 69 ° 55'15.3" W. This area was selected for study due to irregular occupation on the banks the stream and measure the impacts generated in the stream water by the anthropic action generated in recent years.

Water samples were collected randomly at 15 m from the margin. The samples were collected at 20 cm from the stream surface in a polyethylene container. After collection, the samples were stored in thermal containers with ice to preserve their characteristics and transported to the laboratory of COSAMA, agency Tabatinga - AM. The analyzed parameters were; Ammoniacal nitrogen, Electrical conductivity, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Dissolved Iron, Nitrite, Nitrate, Ph, Temperature and Turbidity.

On-site analyzes of the following parameters were carried out; Hydrogenionic potential (pH) through the Phmetro brand HACH; Temperature (° C) with the help of Phmetro brand HACH.

In order to obtain the parameters of Chemical Oxygen Demand (COD) and Biochemical Oxygen Demand (BOD), it was necessary to send the samples to the laboratory, LUPA An Análise bromatológicas Ltda, located at Avenida Joaquim Nabuco – Downtown of Manaus - AM.

III. RESULT AND DISCUSSION

The characterization of the water quality allows to measure the impacts generated by anthropic actions in the water courses, enabling its adequate management and, additionally, its recovery. The monitoring of water resources is very important, since it is through contamination that harmful agents or pathogens are introduced that alter the characteristics of the watercourse. One way to measure or analyze water quality is through indexes, called Water Quality Indexes (AQI) [4].

To determine the quality of the stream water, the results obtained from laboratory analyzes were used and compared with the parameters established by CONAMA resolution 357/2005, which provides for the classification

of water bodies and environmental guidelines for freshwater class II, shown in the Table 1.

Table 1 – Conama357 Standards

<i>Parameters</i>	<i>Conama 357</i>
<i>Ammoniacal Nitrogen</i>	2,0 mg/l
<i>Electric conductivity</i>	10 - 100 µS/cm
<i>DBO</i>	≤ 5,0 mg/l
<i>COD</i>	
<i>Dissolved Iron</i>	≤ 0,3 mg/l
<i>Nitrite</i>	≤ 1,0 mg/l
<i>Nitrate</i>	≤ 10 mg/l
<i>Ph</i>	6,0 - 9,0
<i>Temperature</i>	20 - 25 °C
<i>Turbidity</i>	≤ 100 NTU
<i>OD</i>	≥ 6 mg/l

In the study carried out by [6], the water quality parameters of the stream do Gigante from city of Manaus-AM were evaluated, where the results of the water quality parameters resulted in values much higher than those allowed by CONAMA 357/2005, resulting in in the total contamination of the stream in that study area, due to the large release of domestic sewage and the large accumulation of waste on the banks of the stream.

The Urumutum stream, although it obtained results outside the standards stipulated by the CONAMA resolution 357/2005, compared to the study of [6] is not in a state of total contamination, but it is at great risk if we do not take corrective measures and monitor the course d ' Water.

After the comparative analysis of the laboratory results of the water samples, the parameters Electrical conductivity, Biochemical oxygen demand (BOD), Chemical oxygen demand (COD), Dissolved oxygen (OD) and Temperature, do not meet the water quality standards for CONAMA resolution 357/2005, for class II fresh water. The results obtained are shown in Table 2.

Table 2 – Lab results

<i>Parameters</i>	<i>Results</i>
<i>Ammoniacal Nitrogen</i>	0,23 mg/l
<i>Electric conductivity</i>	-85,6 µS/cm
<i>DBO</i>	11,3 mg/l
<i>COD</i>	21,8 mg/l
<i>Dissolved Iron</i>	0,29 mg/l
<i>Nitrite</i>	0,12 mg/l
<i>Nitrate</i>	0,08 mg/l
<i>Ph</i>	6,4
<i>Temperature</i>	27,6 °C
<i>Turbidity</i>	6,57 NTU
<i>OD</i>	4,21 mg/l

Ammoniacal nitrogen results from the decomposition of organic matter present in the watercourse. Following the determination of Conama 357/2005 for freshwater class II, it indicates the corresponding value of 2.0 mg / l, therefore, the result indicates that the parameter is within the standards defined by Conama 357/2005.

According to [7], when the dissolved oxygen parameter is high, it means that the aquatic environment is in favorable conditions, as it reveals a higher consumption of O₂ by microorganisms in the decomposition process of organic matter. The result found was 4.21 ml / L, therefore, dissolved Oxygen is not within the standards published by Conama Resolution 357/2005.

The result of turbidity indicates that the presence of particulate matter in suspension or clay particulate is at low levels. Therefore, turbidity is at a satisfactory level according to the rules of Conama Resolution 357/2005.

The black waters of the Amazon are slightly acidic and have little electrical conductivity due to the poverty of dissolved ions [8]. In the results obtained in this study, an extremely low level of conductivity was observed, resulting in negative and unusual values, remaining outside the standards established by Conama Resolution 357/2005.

Of the parameters analyzed, what draws the most attention is the high value of Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand, in the case of BOD the result is 11.3 mg / l, a value greater than 5.0 mg / l stipulating CONAMA 357 resolution for Class II waters. The high levels of BOD indicate large amounts of organic matter present; from domestic sewage or organic matter from solid waste discharged into the water [9].

The COD indicates the amount needed for the oxidation of organic matter. second [10] to assess the biodegradability of an effluent, we correlate the BOD and COD values: The closer the BOD value is to the COD, it means that the effluent is more biodegradable. In this context, the result of the water samples from the Urumutum stream shows that the COD is higher than the BOD value, presenting a low self-cleaning power in the watercourse, which characterizes the eutrophication potential of the stream.

IV. CONCLUSION

Water is an essential resource for the maintenance of everyone's life and it is up to all human beings to preserve our water resources. In the study it was possible to conclude that the Urumutum stream is in a critical state due to anthropic actions.

One of the main problems is the accumulation of residential waste that is dumped in the stream by the residents who live in the surroundings.

Public policies must be taken immediately, considering that the lack of sanitation, associated with the abandonment of public power, can generate serious health problems for residents, leading to an increase in diseases caused by contamination of the igarapé waters.

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