



Review Article

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# The Problem and the Environmental Impact of Solid Waste in the Paramajó River, Abaetetuba-Pará, Brazil



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## Abstract

The present project addresses the problem that solid waste has been causing in the Paramajó River in the municipality of Abaetetuba-Pa, for the riverside population and viable proposals for the Rio Paramajó community mitigate environmental impacts through actions that promote awareness of the local community. The procedures used in the referred project focused on field research through an on-site investigation of the current conditions of the local riverside people in relation to how the community disposes of the waste produced. The trash produced does not have a proper destination, in addition to domestic activities which are sources of water pollution on the banks of the river as they throw various objects. Until recently, there was no information about the damage that could be caused by the trash present in the river could cause damage to the population. However, due to the increase in the local population, there was an increase in the amount of trash produced and thrown into the river. Over time, this trash accumulates, causing contamination of the river and interfering in the quality of residents life's.

**Keywords:** Pollutants, Riverside, Amazonia

## Introduction

When the issue of river pollution is addressed, several elements are related to this phenomenon. The most basic point of understanding river pollution is understood as the dumping of various organic or inorganic materials, which directly affect the quality of life of everyone involved in the relationship of dependence with the river. As a concrete fact, we have the direct discharge of untreated sewage in rivers, which has some consequences among them: the proliferation of microorganisms in rivers, which causes the spread of various diseases [1]. It is interesting to emphasize

that since 1988 the Laboratory of Analytical and Environmental Chemistry, of the Federal University of Pará has carried out several chemical analyzes on the water quality of rivers in the Amazon in order to detect possible contamination, and forward them to the competent bodies for diagnosis. of the problem<sup>1</sup>. The results presented by the Chemistry laboratory in recent years have shown worrying results. In the analysis of the results there is the presence of contamination due to microorganisms, this due to the indiscriminate discharge of sewage in the rivers, a great presence

<sup>1</sup>Journal of the Federal University of Pará. Year XXX N° 130. April and May 2016. Available at: <http://www.jornalbeiradorio.ufpa.br/novo/index.php/2010/107-edicao-79/985-laboratorio-analisa-rivers-da-amazonia>. Accessed on: September 10th. 2019.

of traces of metals was also found, among them Cadmium, which was found in high quantities in the Pará River; due to the presence of the large companies present in Barcarena (3.86 micrograms per liter), the maximum allowed by Conama in Resolution 357/05<sup>2</sup>, is one microgram per liter. Through the daily empirical observation of fishermen, many plastic bags are checked in the workout nets, such as bottles, disposable diapers and other waste that have become common in river beds. The amount of garbage is higher than that of fish. This fact is related to the consumption of contaminated water, despite the existence of guidance work by community health agents on the consumption of this water from the Paramajó River. The relevance of the work is in the fact that Abaetetuba is a very extensive municipality with several rivers threatened by pollution present in its beds, from that it is necessary to make a survey of data on the disposal of garbage on the banks of the Paramajó River. So we have the following goals

### The Abaetetuba Islands in the Context of River Pollution

The daily observation of those who live on the islands of Abaetetuba is that there is a significant increase in the presence of solid waste in rivers, this presence indicates a concern with the consequences of socio-environmental impacts on the lives of riverside dwellers and aquatic ecosystems. Reports from the local population on the Abaetetuba islands is that there is a significant increase in the presence of solid waste in rivers, which can generate socio-environmental impacts on the lives of riverside dwellers and aquatic ecosystems.

Some families are still not careful to treat the garbage, and end up dumping the bags with garbage on the rivers, the garbage is

floating in tributaries. For Quigg (1976):

Of all the environmental ills, water contamination has the most disastrous consequences. Each year, 10 million deaths are directly attributed to water-borne intestinal diseases. One third of humanity lives in a continuous state of disease or weakness as a result of impurity in the waters, the other third is threatened by the release of chemicals into the Waters. (Quigg, 1976, p. 25). Before the industrial revolution, basically the only solid waste was composed of food scraps. With the advent of the industrial revolution, more and more materials are being produced and discarded. Currently the term used for such materials is Urban Solid Waste (USW)<sup>3</sup> to designate any material discarded by society. This disposal started to be expanded by the industrialization process, causing contamination of the environment and risks to human health in urban areas [2]. In this scenario of production of discarded materials 95% of all discarded mass can be recycled. Specifically, solid rivers are found in the rivers resulting from the production, use or transformation of consumer goods. In the last years, the reuse of discarded solid materials is transformed and generates economic value [3]. The presence of solid materials in rivers has direct impacts on the balance of aquatic ecosystems, in addition to transmitting numerous diseases to those who live in the vicinity of streams, rivers and streams contaminated by anthropic [1]. Pollution of rivers is also caused by solid waste, mainly domestic, which is discarded in rivers. Over time, garbage accumulates, causing the river to silt up. When heavy rains occur, the flow of the river decreases and causes flooding on the banks, causing floods and serious damage to people who live nearby (Figure 1).



**Figure 1:** Location of the Paramajó River (Arrow) of Abaetetuba-Pa.

Source: Google maps

<https://www.google.com.br/maps/@-1.6977496,-48.9160882,10963m/data=!3m1!1e3>. Accessed on: 17 de sep. 2019

<sup>2</sup>It provides for the classification of bodies of water and environmental guidelines for their classification, as well as establishing the conditions and standards for the discharge of effluents, and other measures.

<sup>3</sup>The so-called Urban Solid Waste (USW), according to the NBR.10.004 standard of the Brazilian Association of Technical Standards - ABNT), commonly referred to as urban waste, are the result of domestic and commercial activity in urban centers. The composition varies from population to population, depending on the socioeconomic situation and the conditions and life habits of each one.

## Place of Study

The municipality of Abaetetuba is located at the confluence of the Tocantins River with the Pará River. According to the 2010 Demographic Census, 141,100 people live in the municipality, of which around 40% are located in rural areas. Much of its territory is made up of river islands. The socio-cultural composition of the municipality and the islands of Abaetetuba is diverse, as in most of the Brazilian Amazonia. The residences are usually located on the banks of the rivers, and areas have been significantly altered by intense human actions. The houses, suspended and protected

from tidal movements, are generally made of wood and covered with clay tiles or palm leaves, regionally called “straws”. Some houses have a small thatch covered with straw, which serves for loading and unloading goods and people, characterizing the typical scenario of the estuary residences [4] (Figure 2). According to the residents, the riverside communities of the river on the bank of which they are established, a peculiar characteristic and many lowland communities in the Amazon estuary. Economic activities are based on agriculture and the extraction of forest products, complemented by fishing, mainly shrimp, in addition to small livestock (chickens, ducks and pigs) for domestic consumption.



**Figure 2:** Delimitations of the Paramajó River.

Source: Google maps.

<https://www.google.com.br/maps/@-1.6977496,-48.9160882,10963m/data=!3m1!1e3>. Accessed on: 17 de sep. 2019

## The Research Methodology

The nature of the research was qualitative and quantitative with a descriptive character carried out “in loco”. The data collections consisted of the application of semi-structured questionnaires, by Means of the Informed Consent Form - MICF (APPENDIX) with direct questions. Such issues reflected the day-to-day life of the population living on the banks of the Paramajó River; taking into account aspects related to daily life and the perception of solid urban waste. The application of the questionnaire took place from June to July 2019 in the locality of Rio Paramajó, island of Abaetetuba-Pa, this period is related to the great concern to observe the problem with a long time. The study population was concentrated on families residing on the banks of the river. In addition, the description and characterization of the types of garbage dumped in the river was carried out on the spot. A sample of 10 families<sup>4</sup> in the 15 to 50 age group was used, which corresponds to 3.21% of the universe of families residing on the

banks of the Paramajó River. The interview consisted of a total of 10 questions, with 5 objective questions and 5 subjective questions. The objective questions allowed all respondents to answer the same questions because they were standardized, received a quantitative treatment, using descriptive statistics. Subjective questions were used in order to identify from the interviewees’ spontaneous expressiveness the real knowledge for each question addressed. According to the information obtained, the answers were grouped into categories by analyzing the descriptions about the questioning and then quantified. The analysis of the obtained data was made using the Software Windows Excel 2007. After collecting information in the Paramajó River, a final meeting was held with the population at the São Pedro Community shack to raise awareness about the disposal of waste in river waters and in particular the Paramajó River. At the end, each question was read so that there would be a community discussion in order for the community itself to respond through a response that represented the community.

<sup>4</sup>The current number of families on the Paramajó River today is 302. Of which:

-508 are male;

-499 are female;

-186 children.



APPENDIX

Free and Clarified Consent

I, \_\_\_\_\_, declare to be aware of my participation in the work of Benezade Barreto da Trindade, entitled "THE GARBAGE IN THE MARGINS RIO PARAMAJÓ, ABAETETUBA-PA".

Therefore, I authorize you to link my responses present in the questionnaire I have answered, without however mentioning my name. I authorize solely for the purpose of research and dissemination of scientific knowledge without any burdens and restrictions. For the same purposes, the assignment of the right of attachment is also authorized, for the same purposes, without receiving any type of remuneration.

Results and Discussion

Regarding the interviewees' perception of what they think of garbage, 70% highlighted that: *It is everything that is worthless and thrown away, useless, old and worthless things* (Figure 3). Given this answer, it is clear that the community has no notion of reusing or recycling solid urban waste. According to the Ministry of the Environment, people consider everything that is thrown away and no longer useful as garbage. Garbage is not an indiscriminate mass of materials. It is composed of several types of waste, which need different handling. Thus, it can be classified in several ways. However, greater guidance is needed on how waste can be managed and differentiated, thus making it easier to handle.

Regarding garbage originating from homes, 100% of respondents answered: household garbage. Household waste is formed by solid residues from residential activities containing a large amount of organic matter, plastic, cans, glass, papers, etc. [5]. This shows that the riverside population is aware of household waste, but there is no adequate place for the final disposal of this waste. When asked about garbage collection 100% answered that there is no garbage collection in the rivers of the community, mainly selective collection. Some participants also pointed out that although there is no selective collection of solid urban waste in rivers, there are buyers of solid waste, such as: Bottles, metals (copper, aluminum, lead and iron), in addition to aluminum cans (Figure 4).



Figure 3: Household waste being disposed of.  
Source: Authors



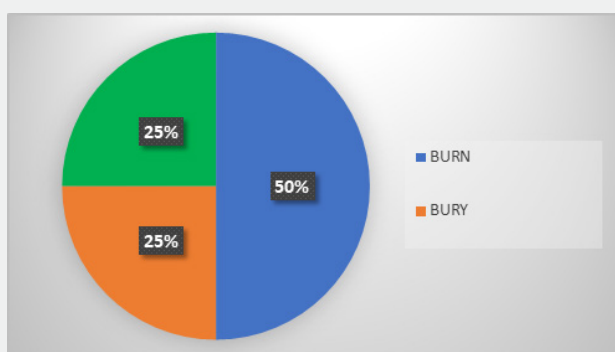
Figure 4: Garbage collected (cans, pans, batteries and iron) by Mr. Miguel Gonçalves, as a means of survival and family income.  
Source: Authors

In an attempt to ascertain the habits that the community has in relation to garbage, respondents were asked to exemplify the destination they gave to “garbage”, 80% answered that they do not throw garbage in the river. During the interview, it was observed that the interviewees are aware of the destination of the “garbage”, but they do not know where to dispose of the garbage due to the lack of structure. Information from IBGE (2011) indicates that one in three households in the country separates biodegradable waste from that which is not. However, the institution indicates that only 40% of this waste is collected selectively when it reaches the street. Brazil has about 4 thousand dumps and only 30% to 40% of the garbage collected is deposited in regulated landfills<sup>5</sup>. Among recycled products, aluminum has a representative role, 90% of which are recycled. According to the IBGE<sup>6</sup>, this is due to the high market value of scrap, in addition to the large number of aluminum cans consumed in the country, which contribute to this high number. Regarding the destination of the “garbage”, most of the interviewees burn their garbage (Graph 1). The burning

of “garbage” (Figure 5) is quite recurrent and a practice that is seen by the community as the most appropriate. However, when burning occurs another type of air pollution, the air becomes contaminated and depending on the chemical elements present in the garbage, they can be extremely harmful to human health. The habit of burning garbage in the backyards of homes, especially plastic, releases highly toxic smoke containing chemicals known as dioxins and furans<sup>7</sup> that have considerable carcinogenic potential. In addition to smoke, the burning residue is also toxic, as it contains the same substances, definitely contaminating the soil. In this context, the burning of “garbage” is a very serious environmental problem that occurs in the whole of Brazil, including in the metropolitan regions where there is selective collection. On the question of who throws garbage in Rio, the interviewees answered that passengers who travel inside the boats throw garbage in the river causing pollution. In addition, some families residing on the banks of the Paramajó River also throw garbage in the river.



**Figure 5:** Burning non-organic waste (paper, pet bottle, plastic bags, diapers, absorbents, etc.).  
Source: Authors.



**Graph 1:** Destination given to garbage by residents.  
Source: Authors

<sup>5</sup>Pensamento verde. Available in: <http://www.pensamentoverde.com.br/reciclagem/dados-sobre-a-reciclagem-no-brasil/>. Accessed on: 20 de sep. 2019.

<sup>6</sup> IBGE - The Brazilian Institute of Geography and Statistics - IBGE is the main provider of data and information in the country, which meets the needs of the most diverse segments of civil society, as well as federal, state and municipal government agencies.

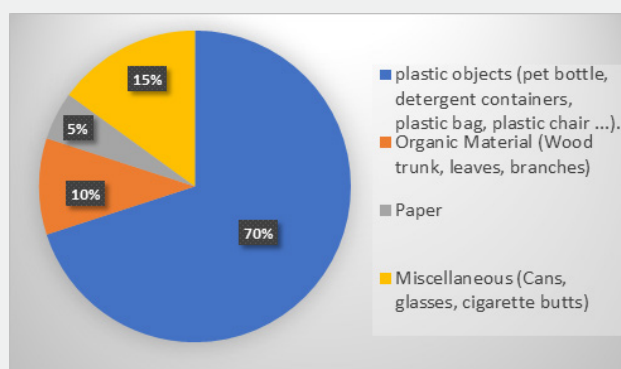
<sup>7</sup>Molecules similar to dioxins and differentiate themselves because they have less oxygen. Available at: <http://comer1767.wixsite.com/spolucoesambientais/informaes-ambientais>.

Through the work it was possible to verify that the origin of the garbage in the rivers happens by the disposal of the residues on the banks of the river by the riverside community and by passengers of the boats that travel by the river. Families should be careful when planning the construction of corrals, pig pens, chicken coops and septic tanks in the vicinity of the riverbed. Another polluting factor that can be avoided by families is the practice of non-deforestation around the river and its surrounding regions. It is worth mentioning that some initiatives are already being carried out by the vessel owners, such as the internal garbage collection on the vessels (figure 6). This simple change of habit helps to keep rivers free of garbage. On the question what types of garbage do you usually have in your home? The community replied: can, paper, cigarette butt, dead animals, chicken feathers, etc. The production of household waste is a worrying reality, especially in those locations where there is no home collection. The quantities produced of household waste increase every day, as does its diversity. According to the interviewees, this waste contains

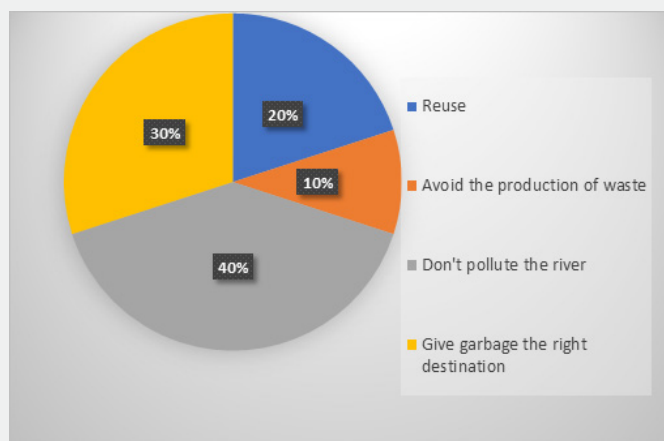
organic and inorganic compounds. Organic waste consists of food scraps, coffee and animal feces. Inorganics, plastic, metal, glass, among others [6] were observed. In this context, the production of household waste in the community, without collection, is interfering with the quality of life of the local population. It is worth mentioning that the problem of garbage is cumulative, that is, added to the garbage brought by the boats and the tides, the amount tends to increase the environmental impacts caused by the inadequate decomposition of domestic garbage (Graph 2). Regarding the question, do you reuse some of this debris? Respondents responded that they use cans and glass. When asked how they teach their children to use garbage or to dispose of it, 40% of parents teach their children not to throw the river (Graph 3). When asked whether the city of Abaetetuba, through the Department of the Environment, gave lectures on the issue of garbage in the rivers? All respondents (100%) answered that no, the city does not carry out any Environmental Education program with the community or in the boats that sail on the Paramajó River.



**Figure 6:** Garbage collected and stored on the vessel.  
Source: Authors.



**Graph 2:** Types of garbage in the Paramajó River.  
Source: Authors



**Graph 2:** Orientation from parents to children to the destination of waste.  
Source: Authors

The waste that is produced cannot go anywhere. The space must be prepared to avoid soil contamination and problems for the environment. City halls are responsible for regular garbage collection and collection. Keeping the city and rivers clean to eliminate possible outbreaks of disease and, at the same time, preserving the environment and the quality of life of the population are some of the duties of the city through its secretariats [7]. In relation to the Environmental Education proposed in this work, it is to make families and boat owners aware of not throwing garbage in the Paramajó River. In addition, we taught how to pack household waste and raise awareness about the problem of plastics in the ecosystem. When working on the proposed theme, the need for effective means of raising awareness that rivers are sources of life for many riverside dwellers who remove their food for their survival, through fishing and other activities, becomes evident. However, pollution in the rivers has been worsening due to domestic pollutants, which are mostly taken by the residents themselves when they shop at the Abaetetuba - Pa fair and by vessels that sail daily throw garbage in the river and its tributaries [8-19].

### Conclusion

Residents on the banks of the Paramajó River have a negative influence on the local environmental quality. It is possible to observe points of inadequate waste disposal in some houses along the river, which characterizes a habitual behavior, which is directly related to the absence of garbage collection. The population needs to be aware of its contribution to reducing the generation of solid waste and minimizing negative impacts. During the interview about the destination given to the garbage, it was informed that the garbage burns. This can increase damage to the environment. Thus, the constant practice of Environmental Education in the community is important. So, the position of the community can be explained, above all, by the fact that the municipality does not

adopt a SWMP (Solid Waste Management Plan) with sustainable methods of final destination of the waste generated in the city. In this sense, Public Policy actions are necessary to invest in garbage collection and also in the awareness of the riverside population about not throwing garbage in the river, in order to provide and guarantee a healthy environment in the environment in which they live.

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