Practices and perceptions of riverside families about household and/or commercial waste produced on Tem-Tem, Caciri, *Ilha Grande*, and Juaba Islands: The need for riverine collection and transportation

DOI: 10.53499/sfjeasv1n1-002

Received in: November 1st, 2020
Accepted in: December 30 th, 2020

Maria de Fátima Miranda Lopes de Carvalho
Master's student in Environmental Management and Auditing at Universidad Europea Del Atlántico
Institution: FUNIBER - Iberoamerican University Foundation
Address: Rua Vento Sul, 126 - Campeche, Florianópolis/SC - Brazil
E-mail: mariadefatimacarvalho@yahoo.com.br

Maria de Valdivia Costa Norat
Master in Geophysics from the Federal University of Pará
Institution: Universidade Federal do Pará
Address: Rua Augusto Correa número, 01 Bairro- Guamá, Cidade Belém, Pará Brasil
E-mail: vnorat1@gmail.com / vnorat@ufpa.br

ABSTRACT
The general objective of this paper is to verify how the collection and final disposal of solid domestic and/or commercial waste produced by the riverside population of the *Ilha Grande*, Caciri, Tem-Tem, and *Vila do Juaba*, in the municipality of *Cametá* - PA is done, geographically situated in the extend in the River Tocantins extension. This is bibliographical research, complemented by quantitative and qualitative research with data collected through a questionnaire with closed-ended questions (quantitative approach) and semi-structured survey script (qualitative approach) applied in September 2015 to forty subjects (ten for each location) residing in the four municipalities. The qualitative collection results show that 52,5% of the subjects are woman; 70% work; 62,5% work in autonomous activities; 42,5% has incomplete middle school; 92,5% reside in an unpaved place; 92,5% do not have piped water system; 100% has access to electricity; 97,5% do not have sewage system 62,5% live in a wood build house, and 65% already had the opportunity to witness acts against the preservation of the environment. In this qualitative research, the results of the four questions utilizing a semi-structured script place that a sanitary landfill should be built; selective garbage collection at least once a week; an end to disposable bags and the use of cloth bags; the environment should be protected from solid waste; and the research subjects do not agree with taking returnable waste to a collection point. In final considerations, every offender of the environment should be fined.

Keyword: Collection, Solid Waste Disposal, Municipalities, *Cametá*.

1 INTRODUCTION

Nowadays, the world lives the biggest development moment in history. The human ancestors experienced different degrees of evolution, whether in terms of bodily structure, behavior, or cognitive and intellectual development, but, keeping the proper proportions, their discoveries were an essential part of who we are today, for having contributed fundamentally to man's social, moral, and capacitive evolution.

The industrial revolution was the most effective tool in this development process. The moment which the production had great emphasis was from the industrial revolution in England around 1760 (MARTINS, 2004). The entire society changed from this point on because of the consumer culture that began to take hold, first in the centers and then expanding, allowing ordinary people to enjoy a standard of living they had never experienced before.

The practice of consuming has intensified and this consumption without awareness has become alarming, because today the abundance of consumer goods, a characteristic of capitalist societies, is the target of criticism since consumerism, a characteristic of these societies, has become one of the central problems of modern industrial societies (MMA, 2005).

The result of consumption is disposal, and improper disposal causes major environmental damage, such as pollution of soils, waterways, and air. And in large cities, the situations are worse because of the population densification. Nowadays the urban population growth reaches ever-higher levels every year, 85% of people are in cities (MMA, 2011).

Getting the Law 12.305/2010 off the paper is a priority for every city that wants a decent future for its community. It is an attitude that will have repercussions on the awareness of its inhabitants, but without forgetting that to complete actions like this will require a joint effort in the areas of sanitation and environment, as well as education.

The study discusses the solid's residual produce in the *Ilha Grande*, *Ilha do Caciri*, *Ilha do Tem-Tem* e *Vila do Juaba*. In the geographic constitution of *Cametá*, the territorial area is formed by approximately 100 islands, in the Tocantins River extension and its tributaries (NASCIMENTO; PASSOS; AMANAJÁS, 2014).

The Municipality presents an estimated population of 110.323 inhabitants, of which inhabitants 47.984 lives in the urban area, in the municipality seat and 62,339 inhabit the rural area of the municipality of *Cametá*, distributed in the seven districts: municipality seat *(Cametá), Juaba, Carapajó, São Raimundo dos Furtados, Moiraba, Curuçambaba,* and *Joana Coeli,* as well as the villages of *Areião* and *Vila do Carmo* do Tocantins (IBGE, 2014).

Cametá economy for a long time was linked to the extraction of native forest products, such as rubber, cacao, and *açaí*. Although after the end of the XIX century had a decrease in the local market, when they were considered top of the line were beaten by national competition, specifically it is the rubber crisis that affected the entire Amazon. The economic activities that prevail in the municipality are agriculture and extractivism, around 60% of the total economy belonging to the municipalities of the Lower Tocantins region (ALMEIDA, 2009).

In this context, the paper general objective is to verify in which way the collection and the final disposal of the domestic trash and/or commercial produce by the river population of *Ilha Grande*, Ilha de Caciri, *Ilha do Tem-Tem* e *Vila do Juaba*, belonging to the municipality of *Cametá* – PA, geographic situates in the Tocantins rivers extension. As for the specific objectives, they are a) to explain about solid waste; b) to highlight the legal provisions about the National Policy for Solid Waste, according to Law 12,305 of August 2, 2010; c) to comment on the environmental impacts of incorrectly discarded solid waste and d) to highlight the participation of the public power and the community regarding the problem of production and disposal of solid waste.

About the research justification, it is relevant in the academic and social point of view, because refers to the environmental impact caused by the disposal of solid waste in open-air dumps, a theme chosen to be developed in this study, due to the worrying accumulation of waste, which is produced daily in *Ilha Grande*, *Ilha do Caciri*, *Ilha do Tem-Tem* e *Vila do Juaba*, in the municipality of *Cametá* – PA. This is a research of singular social relevance because it will raise concern for the environment and the health of the population in general, which becomes a socially relevant issue.

With this study, the objective is to answer the following question as a research problem: how are the collection and final disposal of solid waste produced by the riverside population of *Ilha Grande, Ilha de Caciri, Ilha do Tem-Tem e Vila do Juaba*, in the municipality of *Cametá* – PA, geographic situated in the Tocantins rivers extension?

2 THEORETICAL REFERENCE

2.1 SOLID WASTE, GENERATION AND FINAL DISPOSAL.

The issue around solid waste started to receive great notoriety after the United Nations Conference on Environment and Development (UNCED) held in the city of Rio de Janeiro in 1992, better known as ECO-92 or RIO-92. The conference aimed to reaffirm what was agreed upon in Stockholm-72 and sign joint action pacts to improve human and environmental conditions (IPHAN, 2010 apud THOMÉ, 2014).

One of the topics addressed was the sustainable management of solid waste, which, according to Thomé (2014) has become one of the biggest problems of global economic development, as well as the management of liquid and gaseous waste from industrial production and large-scale consumption.

According to the Brazilian Association of Technical Standards (ABNT, NBR 10004, 2004), solid waste is.

> Waste in solid and semi-solid states, resulting from community activities, of industrial, domestic, health services, commercial, agricultural, services, and sweeping origin. Also considered as solid

> waste is the sludge from water treatment systems, those generated in pollution control equipment and installations, as well as certain liquids whose particularities make it unfeasible to discharge them into the public sewage system or body of water or require for these purposes solutions that are technically and economically unfeasible given the best technology available.

Thus, the waste became a problem of concern, because once their final disposal sites proved to be inadequate and problems both in human health and in the environment (soil, water and air pollution) began to be noticeable, it was then attested that the causes went beyond the wrong choice for the site, but also social reasons influenced the issue, such as poverty, failed education, population densification (JACOBI; BESEN, 2011).

Many alternatives have been using in the search to decrease the of waste that reaches landfills, among them are recycle, reuse, and reduce. Pimenteira (2000) to verify in the international experiences that a correct waste management, the so-called integrated management reduces waste quantitatively, since integrated management is understood as the involvement of all the players in the process and all the conditions, promoting a harmonious and uniform development among all stakeholders, in order to achieve the proposed objectives and meet the needs of each community.

When commenting on international experiences with solid waste, Germany emerged as the first country to adopt a waste reduction policy. It enacted the Waste Minimization and Disposal Act (1986), from which manufacturers were obliged to accept the return of packaging and take it to a material recovery, regardless of the public waste collection services (KAWAICHI, 2009).

In turn, Oviedo-Ocaña *et* al (2011) illustrate an alternative using in Colombia to reincorporate solid residues in the productive cycle and reduce them at the final disposal sites. It is performed in production plants, called Solid Waste Management Plants (PMRS). These units work with the use of bio-waste and recyclables and have an area for non-reusable waste.

In Brazil, many companies began to adapt to this type of attitude, foreseen in Law 12.305, which provides for solid waste, its management and final disposal. A few establishments began to receive packaging of their products or products that no longer work, and that the consumer wants to get rid of, this is still a practice that is still not widespread.

However, it is worth remembering that it was the junction of several factors and actions that led to the current situation concerning solid waste in the country. According to Jacobi and Besen (2011), the production *per capita* of the residuals in Brazil reaches averages of 359 kg. inhabitant/year. The legal framework around the theme has also grown precisely with the purpose of helping in the decision-making process, given the aggravating situation day by day.

2.2 LEGAL FRAMEWORK

Four major pieces of legislation strengthen the discussions on the solid waste issue. Are those: Federal Law of Basic Sanitation, Federal Law 11.445, of January 5, 2007; National Policy on Climate Change, Law 12.187, of December 29, 2009; the Federal Law of Public Consortia, Law 11.107/2005; and the National Policy on Solid Waste, Law 12.305/2010 (apud GOUVEIA, 2012). The knowledge of these laws is of vital importance for the elaboration of PGIRS, Plans for Integrated Solid Waste Management.

The aspects related to urban cleaning are treated in the Solid Waste Law and the Basic Sanitation Law, in which the solid waste plan must integrate the municipal sanitation plans (JACOBI; BESEN, 2011). According to Law 11.445/2007 (Basic Sanitation), cleaning services and waste management consist of waste collection, transshipment, and transportation, sorting for recycling, treatment, and final disposal (MMA, 2011). The management of solid waste is the competence of the local public power, although it can be exercised by private companies through public concession (IBGE, 2011).

It is worth mentioning that the Basic Sanitation Law also deals with the public services of drinking water supply; collection, treatment, and adequate final disposal of sanitary sewage, among others, and solid waste is one of its guidelines and goals, along with the other laws mentioned above.

Solid waste disposal also encompasses another very worrying issue, that of Greenhouse Gas (GHG) generation, and as to this, the National Policy on Climate Change, Law 12.187/2009, regulated by Decree 7.390/2010 established in its article 4, the reduction of emissions of these gases from anthropic activities, whatever they may be, including solid waste (MMA, 2011).

According to ABRELPE (2014), only in the year 2011, 198 thousand tons of solid waste were produced in the country, which generates an average of 62 million tons in the year. Of this amount, approximately 90% was collected and of this percentage was conducted to sanitary landfills about 58%, 24% in controlled landfills, and 17% in dumps, causing the impact of 75 thousand tons still deposited in inadequate locations.

The risk present in this situation is that these sites (dumpsites and controlled landfills) do not have the necessary structure to drain these gases, especially methane (CH4), which according to the MMA (2012) is emitted in large quantities during the process of landfilling and degradation of solid waste, and reaches 20% of emissions, coming from the decomposition of human waste.

The municipalities and cities can work in cooperation for the collection, transportation, and everything else related to the management of solid waste, as stated in the Federal Law of Public Consortia, Law 11.107/2005. Through this law was regulated the art. 241 of the Federal Constitution (1988), which establishes the general rules for contracting public consortia, such consortia shape the regionalized

provision of public services established by the Federal Law of Basic Sanitation (Law 11.445/2007) and that is encouraged and prioritized by the Law of National Policy on Solid Waste (LAW 12.305, 2010).

The joining or incorporation of several laws to the solid waste management cause was of great value, because it reinforced and solidified the efforts so that truly positive action pacts could be signed, and thus, long-awaited results, promoting the integration in the waste management process.

Finally, there is the National Solid Waste Policy, Law 12.305/2010, a legal instrument that represents a regulatory milestone in the national scenario, because it brought goals, guidelines, and standards for the implementation of integrated solid waste management. The policy confers responsibility on consumers, public authorities, and generators within the management.

What was once optional has now become mandatory, such as, for example, the order of priority in management, which includes generation, reduction, reuse, recycling, treatment, and adequate disposal of solid waste. Law 12.305/2010 also makes the crucial differentiation between waste and rejects, being respectively those that can be reused or recycled, and those not usable again in the production process (MMA, 2012).

The National Policy for Solid Waste (PNRS) created by Law No. 12,305 of 2010 and regulated by Decree No. 7,404 of 2010 has as one of its main instruments the National Plan for Solid Waste. Decree No. 7.404/2010 established and delegated to the Inter-ministerial Committee (IC), composed of 12 Ministries, and coordinated by the Ministry of Environment, the responsibility for coordinating the preparation and implementation of the National Solid Waste Plan. (PNRS, 2010).

Law 12,305 of August 2, 2010, established a deadline of August 2, 2014, for the city halls of Brazilian municipalities and capitals to provide for the closure of the activities of urban dumps and the implementation of sanitary landfills, with the prognosis of adapting to the National Solid Waste Policy.

The new law establishes destinations for various categories of solid waste in both urban and rural areas and also those of hospital, industrial, commercial, services, residential, and agricultural origin (COSTA, 2011). ABNT NBR 10.004 (2004) classifies solid waste into solid waste and semi-solid waste, which result from industrial, domestic, hospital, commercial, agricultural, service, and sweeping activities.

According to ABNT NBR 10.004 (2004), the definition presented in the previous paragraph also includes sludge from water treatment systems, those generated in pollution control equipment and installations, in other words, certain liquids whose characteristics make it unfeasible to discharge them into the public sewage system or bodies of water or require technical and economically unfeasible solutions given the best available technology. Therefore, criteria such as hazard and toxicity are defined.

Hazardousness involves characteristics presented by waste that, due to its physical, chemical, or infectious properties can pose a risk to public health, causing mortality, disease incidence, or increasing their rates and risks to the environment, when the waste is improperly managed. Toxicity is the potential property that the toxic agent has to cause, to a greater or lesser extent, an adverse effect as a result of its interaction with the body (ABNT NBR 10.004, 2004).

According to ABNT NBR 10.004 (2004), the waste that, due to its physical-chemical and infectious properties is classified as risk A is a public health and environmental. Certainly, the most hazardous waste requires more attention from the generator, because the most serious accidents with the greatest environmental impact are caused by this class of waste. They can be conditioned, temporarily stored, incinerated, treated, or disposed of in sanitary landfills suitable to receive hazardous waste.

They present at least one of the following characteristics: inflammability, corrosivity, reactivity, toxicity, and pathogenicity. Examples of residues: paint sludge, paint cans, mineral, and lubricating oils, waste with thinner, sawdust contaminated with oil, grease, or chemical products, contaminated (leather gloves and boots), salt waste from metal heat treatment, rags, lead sludge, sludge from the washing ramp, brake linings, air filters, brake pads, sludge generated in cutting, oil filters, papers, and plastics contaminated with greases and sweepings (THOMÉ, 2014).

Regarding Class II - A Non-Inert Waste, its components are organic materials, paper, glass, and metals, and can be disposed of in landfills or recycled, with the evaluation of the recycling potential of each item. Examples of waste are organic materials from the food industry, sludge from water treatment systems, iron filings, polyurethane, glass fibers, waste from boiler cleaning and sludge from filters, uniforms, rubber boots, polishing shovel, sweepings, polyethylene and packaging, presses, glass (windshield), plasters, cutting discs, grinding wheels and uncontaminated sandpaper (THOMÉ, 2014).

The effluents can also be classified in this standardization. The Class II effluent, among many destinations, can receive biological treatment. Class II Waste - Infertile can be disposed of in landfills or recycled, as it does not undergo any kind of change in its composition over time. Examples of this type of waste are rubble, scrap iron, and steel (THOMÉ, 2014).

The operation specialized in the treatment of hazardous and non-inert effluents develops liquid waste treatment with the mission of transforming it into less toxic and less hazardous waste that can be recycled legally and safely into the environment. In some cases, certain residues can be transformed into products. In parallel work, the operation also specializes in composting non-inert waste to turn it into organic compost and substrate for plants.

As observed the processes of classification of solid waste, according to the standards of ABNT NBR 10.004 of 2004 in line with Law 12.305/2010 are essential mechanisms for treatment in conditions considered close to the appropriate destination of solid waste, whether urban or rural, keeping their particular characteristics (COSTA, 2011).

In Brazil, the large incidence of dumps is a factor of significant concern for the public power and society, given those nations such as Brazil, belonging to an emerging market in full industrial and technological development are lagging in environmental policies for nearly 30 years concerning developed countries (TEIXEIRA, 2007).

2.3 FINAL DESTINATION OF THE SOLID RESIDUES

The truth is that the destination of solid waste is related to the use and occupation of the soil of the Municipalities. This is because Brazil has adopted the principle contained in the Brazilian Convention (1989), according to which, as a general rule, waste must be treated and disposed of where it was generated.

The solid waste treatment system is the set of units, processes, and procedures that change the physical, chemical, or biological characteristics of the waste and lead to the minimization of risks to public health and environmental quality. In turn, the final disposal system of solid waste is the set of units, processes, and procedures aimed at the disposal of waste on the ground, ensuring the protection of public health and the quality of the environment (THOMÉ, 2014).

It can be seen from the definitions above that solid waste must be treated in order to minimize the risks to public health, and only after this process can it be released into the environment, in specific locations, also aiming to minimize the risks to the public health.

It is important to point out that open-air solid waste deposits are inadequate for this purpose and are rejected by the legislation in force since they cause pollution not only of the atmospheric air, but also of the soil, subsoil, water table, and biota, compromising the healthy quality of life.

Another concern is the final destination of the solid's residuals. The volume of waste produced is large if compared to the physical space destined to it in large centers.

The environmental organization is not yet equipped to deal with the difficulties. The current environmental management model, although it considers the possibility of using some form of prevention through licensing, is centered on the concept of command and control, very much in vogue in the 1970s. The estimate tools such as interdiction, are not technically satisfactory, since they provide answers to the destination of the waste that would continue to be produced, nor are the physical, chemical, or biological

characteristics of the waste and lead to the minimization of risks to public health and the quality of the environment.

In your turn, the "solid waste final disposal system is the set of units, processes, and procedures aimed at the disposal of waste on the ground, ensuring the protection of public health and the quality of the environment."

We can extract from the aforementioned definitions that the solid residues must be treated to minimize the risks to public health, and only after this process can they be released into the environment, in specific locations, also aiming at minimizing the risks to public health and the environmental impacts that will affect mankind in some way.

It is important to note that open-air solid waste deposits are inadequate means for this purpose, rejected by the legislation in force, given that they cause pollution not only of the atmospheric air but also of the soil, subsoil, groundwater, and biota, compromising the healthy quality of life. About the final disposal of solid waste, the National Solid Waste Policy, Law 12.305 of August 2, 2010, art. 8, the waste must have as final disposal destination the landfill, incineration, composting, and recycling all from the selective collection, separating the dry waste and organic waste, in the places of generation.

Landfills are places chosen by the government for solid waste disposal, which has vents and drains to release gases. All waste is compacted and deposited in these landfills and then covered with earth: (i) the earth cover must be daily, to avoid vectors, (ii) the soil must be waterproofed, as well as (iii) drainage must be controlled, to avoid pollution of the water table and (iv) there must be a leachate treatment station at the site itself (TONANI, 2011).

Another way of treating solid waste is incineration, in which the waste is destroyed thermally at an average temperature of 850°C, recovering energy and reducing volume. This method is only useful for disposing of combustible waste and is not recommended for glass and metals.

The incineration of organic waste produces a low energy source in relation to its cost, which is why it has been used in large centers in order to reduce the volume of solid waste produced. Given the polluting effects of the incineration method, the legislation that deals with the installation of plants is extremely strict, requiring environmental impact studies and permits from the municipal and state spheres (TONANI, 2011).

Finally, it should be noted that incineration allows the use of energy, but not the recycling of the toxic material released in the process, that is, in solid form (example ashes), liquid form (for example water vapors), and gaseous form (example polluting gases), the only benefit being the reduction in the volume of organic material produced.

Composting is one way to dispose of solid waste, is to transform solid waste into compost, i.e., it is the method of treatment of solid waste by fermentation of organic matter, turning them into fertilizer and fertilizers. The criticism made to this method of disposal of solid waste is not always eliminated all the parasites in the organic residues, parasites that will infect future compounds (TONANI, 2011).

Recycling is the reuse of certain materials, through reprocessing and recovery of waste for further use in the home or industry. It is a method of recovering and transforming the energy contained in solid waste so that it can be used again, including as raw material, even if in another state (solid, liquid, and gaseous) than the one originally found. It also represents a way to minimize the amount of waste disposed of in landfills, increasing their useful life, and reducing the environmental resources extracted by man (TONANI, 2011).

The selective collection is a system that consists of separately collecting the portion of waste considered suitable for recycling, separating dry waste from organic waste in the places of generation, such as homes and offices. In addition, it enables recycling and reduces the volume of waste thrown into landfills.

It is important to emphasize that the preparation of a municipal plan for integrated management of solid waste is a condition for the Federal District and the municipalities to have access to resources of the Union, or controlled by it and intended for undertakings and services related to urban cleaning and management of solid waste, or to benefit from incentives or financing from federal credit or development entities, because the concern with the issue of solid waste is great, so the global discussions are also expressive (TONANI, 2011).

In a similar situation, the discussions in Brazilian society around environmental issues led a group of researchers to formulate a research program called what Brazilians think of ecology. This program aimed, according to Crespo and Leitão (1983, p. 59)

> [...] To situate the environmental issue within the culture and experience of Brazilians, both common citizens and opinion-making groups, by collecting data on two aspects: on the one hand, concepts, information, currents of ideas, main arguments, and dominant trends in the professional and academic debate on ecology and the environment. The values, perceptions, interests, behavior, and willingness to change habits of the population in the face of the emergence of an unprecedented environmental crisis are worrying.

To this end, a quantitative survey of public opinion was carried out in one stage, and, in another, qualitative research through in-depth interviews with opinion makers. Some results from these surveys are used to support this TCC. In the qualitative research, the researchers tried to identify who the environmentalists are, and found that there is an apparently common interest among different groups of

environmentalists, government technicians, scientists, representatives of social movements (blacks, women, unionists), businessmen and politicians.

To contribute to the protection of the environment, environmental education became law on April 27, 1999, by Law No. 9.795, the Environmental Education Law, it is stated in art. 2, that environmental education is an essential and permanent component of national education, and should be present, in an articulated manner, at all levels and modalities of the educational process, formally and non-formally, given its relevance, because without working on environmental education from an early age in schools nothing will change regarding the disposal of solid waste and care for the environment so as not to impact it.

3 TREATMENT AND FINAL DISPOSAL OF SOLID DOMESTIC AND/OR COMMERCIAL WASTE FROM RIVERSIDE COMMUNITIES OF CAMETÁ – PA

This section presents the research with a quantitative and qualitative approach applied to forty subjects who live on the islands Grande, Caciri, Tem-Tem, and Vila do Juaba, municipalities of Cametá - PA, in September/2015.

3.1 SURVEY METHODOLOGY

This research is classified as bibliographic research, complemented by quantitative and qualitative research with data collected through a questionnaire with closed questions to people from the communities of Ilha Grande, Ilha do Caciri, Ilha do Tem-Tem, and Vila do Juaba, islands located on the banks of the Tocantins River and that are part of the territorial constitution of the municipality of Cametá, in the state of Pará.

The data collected regarding the quantitative research in the aforementioned communities were collected through a questionnaire with ten closed questions (data collection instrument). Ten people participated in each community, who answered the questionnaire to get to know the socioeconomic profile of the forty participants.

The qualitative research was applied to the same people of the quantitative research, aiming to know about the collection and disposal of solid domestic and commercial waste in the communities mentioned. The municipal manager responsible for waste collection answered both the questions contained in the questionnaire (quantitative research) and the semi-structured script, both with ten questions (data collection instrument).

The exclusion criteria adopted were people under the age of eighteen and also people who do not reside in the localities in which the research was set Both qualitative and quantitative research was applied in September 2015.

The data are treated in this study utilizing a chart (quantitative research) and a chart (qualitative research), containing the quantities and percentages of each answer, and analyzed by discursive texts arranged below the chart referring to each community. The qualitative research is analyzed employing discourse text.

3.2 PRESENTATION OF ILHAS GRANDE, CACIRI, TEM-TEM E JUABA

The farthest source of the Tocantins River is located on the border between the municipalities of Ouro Verde de Goiás - GO and Petrolina de Goiás - GO, close to the border of both with the municipality of Anápolis - GO. From this point on, the river appears under the name of Padre Souza River in the municipality of Pirenópolis - GO.

The highest recorded flow on the Tocantins River was on March 3, 1980, reaching approximately 70,000 cubic meters per second near Tucuruí, located on the left bank of the Tocantins River, in a territory formerly inhabited by the Caamutás and other Tupinambá tribes. Soon after the foundation of the city of Belém, the Portuguese colonizers were drawn to the riches of the Tocantins River region. Although the fights between Portuguese, French, and Dutchmen, engaged in the conquest of the Amazon Trough, the Portuguese, using the cross and the sword, settled on the left bank of the Tocantins River for the first time (NASCIMENTO; PASSOS; AMANAJÁS, 2014).

With the hydroelectric construction in Tucuruí, could be seen, for example, a decrease in the variety and quantity of fish and a change in the floodplain level, which directly influences agricultural productivity, thus affecting the inhabitants of the floodplain. Owners of means of production, commerce, and services present on the waterfront and contribute greatly to the exchange value of the municipality. Owners of means of production are the owners of the industries and commercials business (NASCIMENTO; PASSOS; AMANAJÁS, 2014).

The propose as the management systems existing in the region is an important alternative for increasing the income of the populations that obtain their survival and source of income from fishing, açaí, and shrimp extraction because they generate certain economic stability in the instability generated by activities that are seasonal, taking into account that these depend on environmental factors to determine the daily production.

3.3 RESSULTS AND DISCUSSIONS ABOUT THE QUANTITATIVE RESEARCH

The following are the quantitative data referring to the research applied at Ilha Grande, Caciri Island, Tem-Tem Island, and Juaba Village, according to the methodology, explain in subitem 2.2. Quantitative research aims to obtain the socioeconomic profile of the forty research participants.

Chart 1 is the gender of the research subjects. It can be seen from the graph that in the Ilha Grande predominantly women (6 = 60% and 4 males = 40%). In do Caciri Island there was a tie regarding the gender of the participants (5 males = 50% e 5 females = 50%). In Na Tem-Tem Island also had a tie referring to the participant's gender (5 males = 50% e 5 females = 50%). The Juaba Village present a tie in this request (5 males = 50% e 5 females = 50%).

Chart 1: Gender?

Gender?	***Ilha Grande***	**Caciri Island**	**Tem-Tem Island**	**Juaba Village**
Male	40% (6)	50% (5)	50% (5)	50% (5)
Female	60% (4)	50% (5)	50% (5)	50% (5)
Total	100% (10)	100% (10)	100% (10)	100% (10)

Source: Field Research (2015)

Among the four communities, the same quantity, and the same percentage regarding the sex of the research subjects predominated, which shows the growth of the female population in Brazil, according to data contained in the newsletters of the Brazilian Institute of Geography. Where the female population is not greater than the male population it is equal to the latter.

Chart 2, the question asked is whether the research subject works. The answer, in Ilha Grande 90% (9) work and 10% (1) did not work. Referring to the subjects in the Caciri Island 70% (7) work and 30% (3) did not work. Tem-Tem Island 60% (6) work and 40% (4) did not work. In the Juaba Community, 60% answered that they work (6) and 40% (4) answered that they do not work.

Chart 2: Do you work?

Do you work?	***Ilha Grande***	**Caciri Island**	**Tem-Tem Island**	**Juaba Village**
Yes	90% (9)	70% (7)	60% (6)	60% (6)
No	10% (1)	30% (3)	40% (4)	40% (4)
Total	100% (10)	100% (10)	100% (10)	100% (10)

Source: Field Research (2015)

In the question do you work, the answer yes also predominated, which affirms that most of the research subjects residing in the four-research locus community’s work.

Chart 3, the questioning has done was to supplement questioning 2 and consist in which branch of activity the research subject works. answers obtained in the questionnaires answered by the subjects of

the study in Ilha Grande indicate that 90 (9) work as autonomous and 10% (1) is retired. The subjects from Caciri Island noted that 70% (7) are autonomous and 30% (3) are retired. Of the subjects from Trem-Trem Island, 60% (6) are autonomous and 40% (4) are retired. The subjects from Juava Village about the branch of activity in which they work, 30% (3) are autonomous, 30% (3) are civil servants, and 40% are retired.

Chart 3: Branch of activity in which you work?

In What Activity Do You Work?	*Ilha Grande*	Caciri Island	Tem-Tem Island	Juaba Village
Autonomous	90% (9)	70% (7)	60% (6)	30% (3)
Retire	10% (1)	30% (3)	40% (4)	40% (4)
Civil Servants	-	-	-	30% (3)
Did not answer	-	-	-	-
Total	100% (10)	100% (10)	100% (10)	100% (10)

Source: Field Research (2015)

As for questionnaire number 4 in the quantitative survey, the objective was to verify the schooling or academic background of the survey subjects. In Ilha Grande 50% (5) have an incomplete elementary school, 20% (2) have a complete elementary school, and 30% (3) have complete high school. In the community of Caciri Island that participated in the research 60% (6) subjects have complete high school education, 20% (2) subjects have an incomplete elementary school, 10% (1) subjects have a complete elementary school, and 10% (1) have incomplete high school. Regarding the subjects on Tem-Tem Island, 80% (8) have incomplete elementary school education and 20% (2) have complete high school education. Regarding schooling in the Vila do Juaba, 30% (3) have complete high school, 30% (3) have complete high school, 20% (2) have incomplete elementary school, 10% have complete elementary school, and 10% (1) have incomplete high school.

Chart 4: Education/Training?

Schooling?	Ilha Grande	Caciri Island	Tem-Tem Island	Juaba Village
Analphabet (a)	-	-	-	-
Primary Incomplete	50% (5)	20% (2)	80% (8)	20% (2)
Elementary School Complete	20% (2)	10% (1)	10% (1)	10% (1)
High School Complete	30% (3)	-	-	30% (3)
High School Incomplete	-	10% (1)	-	10% (1)
College Incomplete	-	60% (6)	10% (1)	-
Higher Education Complete	-	-	-	30% (3)
Total	100% (10)	100% (10)	100% (10)	100% (10)

Source: Field Research (2015)

Chart 5 brings in your information register about the paving of the place where the research subjects of the four islands live. As shown in the chart, 100% (10) of the subjects from Ilha Grande indicated that they live on unpaved roads. In Caciri Island, 100% (10) of the subjects' participants in 100% (10) of the subjects participating in the research pointed out that they do not live on asphalt. In Tem-Tem Island, 100% (10) of the subjects participating in the research pointed out that they do not live on asphalt. The subjects from the Juaba Village answered through the questionnaire, that 70% (7) do not live in an asphalted place, and 30% (3) answered that they live in an asphalted place.

Chart 5: Do you resides on paved roads?

Resides on paved roads?	Ilha Grande	Caciri Island	Tem-Tem Island	Juaba Village
Yes	-	-	-	30% (1)
No	100% (10)	100% (10)	100% (10)	70% (9)
Total	100% (10)	100% (10)	100% (10)	100% (10)

Source: Field Research (2015)

Chart 6, following the object in analyses, is if the research subject resident in the four communities has piped water. The answers noted in the questionnaire reveal that in Ilha Grande 80% (8) do not have piped water and 20% (2) have piped water. As for the research subjects residing on Caciri Island, 100% (10) do not have piped water. In Tem-Tem Island, 100% of answers for questionary do not have piped water. In Juaba Village, 90% (9) of the research subjects do not have piped water and 10% (1) has piped water.

Chart 6: Do you have piped water?

You Have Piped Water	Ilha Grande	Caciri Island	Tem-Tem Island	Juaba Village
Yes	20% (2)	-	-	10% (1)
No	80% (8)	100% (10)	100% (10)	90% (9)
Total	100% (10)	100% (10)	100% (10	100% (10)

Source: Field Research (2015)

It is predominant among the research subjects in the four locations that there is no piped water, an average of 90%. Probably, this condition is since they live in riverside communities, where sanitation services have not been implemented.

The question in Chart 7 is whether there is electricity in the homes of the research subjects. In summary, in the homes of 100% of the research subjects located on Ilha Grande, Ilha do Caciri, Ilha do Tem-Tem and Vila do Juaba there is electricity.

Chart 7: Do you have electricity in your home?

Electricity?	Ilha Grande	Caciri Island	Tem-Tem Island	Juaba Village

Yes	100% (10)	100% (10)	100% (10)	100% (10)
No	-	-	-	-
Total	100% (10)	100% (10)	100% (10	100% (10)

Source: Field Research (2015)

This is an achievement for the people in the riverside communities, who can now enjoy electricity, which brings the possibility of light bulbs illuminating the locality and the houses, and also the possibility for these families to acquire electrical appliances and electronics, such as, for example, television, refrigerator, and computer, among others.

Chart 8 shows the data regarding the question of whether the research subjects of the four locations have a sewage system at home. It is observed from the records in the chart that 100% (10) of the subjects on Ilha Grande do not have a sewage system at home; on Caciri Island 100% (10) do not have a sewage system in their homes. The subjects on Tem-Tem Island state, in 100% (10) do not have a sewage system at home. Regarding the subjects from the Vila do Juaba, 90% (9) stated that they do not have a sewage system in the house where they live with their families and 10% (1) have a sewage system at home.

Chart 8: Do you have a sewage system at home?

Sewage System?	Ilha Grande	Caciri Island	Tem-Tem Island	Juaba Village
Yes	-	-	-	10% (1)
No	100%	100% (10)	100% (10)	90% (9)
Total	100% (10)	100% (10)	100% (10)	100% (10)

Source: Field Research (2015)

Note that even the discrete percentage of households in the Vila do Juaba with a sewage system, this community shows that the research subject which has sewage system there is in advances to research subject from Ilha Grande, Caciri Island, Tem-Tem Island, and the other subjects on Juaba Village, that still do not have a sewage system at home, yet this service is a basic need that ratifies the dignity of every family. The ideal would be that families without a sewage system could have this basic resource at their disposal.

Thus, the analysis that begins (Chart 9) is about the type of material that the homes of the forty research subjects in the four locations where the data was collected were built. 60% (6) among the subjects from Ilha Grande highlight that they live in a wooden house, 30% (3) live in a house built of other materials, and 10% (1) live in a house built of mixed material, in other words, masonry, and wood. The subjects from Caciri Island, 100% (10) pointed out that they live in a wooden house. As for the subjects on Tem-Tem Island, 70% (7) live in a wooden house, 20% (2) live in houses made of other materials, and 10% (1) live in a house built of masonry and wood. Regarding the research subjects in the Vila do Juaba,

70% (7) live in houses built of masonry and wood, 20% (2) indicated that they live in wooden houses, and 10% (1) live in masonry houses.

Chart 9: What material your house is built of?

What material your house is built of?	Ilha Grande	Caciri Island	Tem-Tem Island	Juaba Village
Masonry and wood	10% (1)	-	10% (1)	70% (7)
Masonry	-	-	-	10% (1)
Wood	60% (6)	100% (10)	70% (7)	20% (2)
Other materials	30% (3)	-	20% (2)	-
Total	100% (10)	100% (10)	100% (10	100% (10)

Source: Field Research (2015).

In chart 9 register predominate among the residents of the Ilha Grande, Caciri Island Tem-Tem Island, and Juaba Village those who live in a house build by hardwood. In the second position are those residents in houses who build Masonry and wood.

In what concerns chart 10, we present the analysis regarding the question have you ever witnessed, in the place where you live, any act against the preservation of the environment. The answers obtain by questionary affirm that, in Ilha Grande, 90% (9) have ever witnessed an act against environmental preservation and 10% (1) have not witnessed any action against environmental preservation. 100% (10) of the research subjects on Caciri Island answered yes, that is, they had already witnessed acts against environmental preservation. On Tem-Tem Island 60% (6) said yes, they had witnessed acts against environmental preservation where they live, and 40% (4) said they had not witnessed any acts against environmental preservation where they live. On Juaba Island, 90% (9) have still witnessed an act against environmental preservation and 10% (1) have already witnessed an act against environmental preservation.

Chart 10: Have you ever witnessed, where you live, any act against the preservation of the environment?

Have you ever witnessed, where you live, any act against the preservation of the environment?	Ilha Grande	Caciri Island	Tem-Tem Island	Juaba Village
Yes	90% (9)	100% (10)	60% (6)	10% (1)
No	10% (1)	-	40% (4)	90% (9)
Total	100% (10)	100% (10)	100% (10	100% (10)

Source: Field Research (2015).

The quantitative research presented the socio-economic profile of the research subjects with data collected on Ilha Grande, Ilha do Caciri, Ilha do Tem-Tem, and Vila do Juaba, in the municipality of Cametá, on the banks of the Tocantins River.

In summary, the overall result of the quantitative research, that is, considering the four communities reveals the following findings in percentages:

1) regarding sex, 52.5% of the research subjects are women and 47.5% are men.

2) regarding the work situation, 70% work and 30% do not work.

3) regarding the field of activity in which they work, 62.5% are self-employed, 7.5% are public employees and 30% are retired.

4) regarding education: 42.5% have incomplete elementary school; 17.5% have incomplete high school; 15% have complete high school12;5% have complete elementary school; 7.5% have complete high school and 5% have incomplete high school

5) regarding the pavement of the place where they live: 92.5% live in an unpaved place and 7.5% live in a paved place.

6) regarding the piped water system at home: 92.5% have no piped water system at home and 7.5% have a piped water system at home.

7) regarding the electric power at home: 100% have access to electricity at home.

8) as to sewage system at home: 97.5% have no sewage system at home, while 2.5% are provided with sewage system at home.

9) as to the type of material with which the house they live in is built: 62.5% have lived in a house built of wood; 22.5% live in a house built of mixed material (masonry and wood); 12.5% of the research subjects live in a house built of other types of materials and 2.5% live in a house built of masonry.

10) regarding the opportunity to witness acts against the preservation of the environment in the place where they live: 65% have already had such an opportunity while 35% have not had the questioned opportunity yet.

3.4 RESULTS AND DISCUSSION OF THE QUALITATIVE RESEARCH

In this qualitative research four questions were applied to forty subjects who reside on the islands mentioned in the quantitative research. RS stands for research subject, ranging from 1 to 10, the number of participating subjects.

Table 1: Semi-structured Interview Script at Ilha Grande

1. What needs to be done where you live to improve the disposal of non-recyclable solid waste?
R.S1: Several sanitary landfills are needed to serve the entire municipality of Cametá, each pole being responsible for receiving the waste from several communities adjacent to it, with selective collection transported by the city's boats for this purpose. This would be the best option for the non-recyclable solid waste produced at the domestic and commercial levels.
R.S2: Selective collection once a week would be required.
R.S3: To have garbage collection at least once a week.
R.S4: It would be if the garbage collection extended from Cametá to Juaba or if a sanitary landfill were built in the region.

R.S5: To burn the garbage in a place adapted for this.
R.S6: Transport the garbage to Juaba and from Juaba to Cametá.
R.S7: Collect the garbage on each island and take it to Cametá for final destination.
R.S8: It is necessary that the municipality does at least one garbage collection a week to improve the quality of life of the riverside dwellers and reduce the environmental impacts.
R.S9: The construction of a sanitary landfill would be ideal.
R.S10: Raise awareness of the population for selective collection and burning of garbage in an appropriate place to not cause more problems of environmental impact.
2. Do you agree with the end of the disposable plastic bags used as packaging by supermarkets, similar establishments, and pharmacies, having to carry their cloth bags that can be used over and over again?
R.S1: I do not agree, because these bags have their usefulness, getting rid of them will be a big problem, because when it comes to hospitals the contamination is big and the cloth bags run a great risk of contamination.
R.S2: Yes, I agree, because these bags serve as garbage when disposed of in the wrong way in the environment. I would take the cloth bags for shopping.
R.S3: Yes, I agree, because with the end of plastic bags, in general, it would decrease the amount of garbage. I do not really like the idea of cloth bags, but with time I would get used to them since I would have no alternative.
R.S4: Yes, it would not solve 100%, but it would help. I would take a cloth bag; I would take it without problem.
R.S5: Yes, I am in favor. I would also carry the cloth bags when I go shopping.
R.S6: Yes, I think it would reduce the amount of garbage.
R.S7: Yes, but just taking the plastic bags out of circulation would be insufficient to reduce the impact.
R.S8: Yes, at least it would reduce the amount of accumulated garbage.
R.S9: Yes, but it is not the solution.
R.S10: No, it would cause a big problem in hospitals. The cloth bags would accumulate a lot of contamination.
3. Do you agree or disagree that the environment should be protected from domestic and/or commercial solid waste? What is your suggestion to decrease the environmental impacts?
R.S1: Yes, the suggestion would be the construction of a sanitary landfill.
R.S2: Yes, the government must do its duty and worry about the environment.
R.S3: Yes, the suggestion is that the city should collect it from the houses.
R.S4: Yes, to reduce environmental impacts, the construction of a sanitary landfill is indispensable.
R.S5: Yes, each village should have garbage burning by the municipality.
R.S6: Yes, the government could provide transportation to take the garbage to Cametá.
R.S7: Yes, the suggestion is that the governors be more conscious.
R.S8: Yes, it is necessary that the rulers do their duty.
R.S9: Yes, I agree. My collection is door to door.
R.S10: Yes, the suggestion is selective collection and recycling.
4. Would you take the waste such as batteries, bottles, glass, cans, and others that can be returned to the consumer to the collection point (if there is one)? Or would it be better if a collector came to your door? How often would you like the collector to come to your house?
R.S1: No. The suggestion is to collect the waste at your door more than once a week.
R.S2: No. It would be better for us if we had waste pickers from house to house twice a week.
R.S3: No. Door to door collection once a week.
R.S4: No. The collector should come to my house twice a week.
R.S5: No. For the waste produced at home and in commerce, the waste collector should come weekly.
R.S6: No, the ideal was that the waste picker collected the waste at home and at the business.
R.S7: No, the waste pickers should collect twice a week.
R.S8: No. It would be better if the waste picker came to collect once a week.
R.S9: No. They should pick it up at my door.
R.S10: No. The collection should be at my door, weekly.

Source: Field Research (2015).

Table 2: Semi-structured Interview Script on Caciri Island

1. What needs to be done where you live in order to improve the disposal of non-recyclable solid waste?
R.S1: A sanitary landfill is needed to serve the islands of the municipality of Cametá.
R.S2: Stop to think and create a way to improve garbage collection since on the islands there is no option.
R.S3: Create an alternative to improve the pollution that is experienced in the community.
R.S4: To collect the garbage by boat.
R.S5: Burn the garbage in an appropriate place. This service should be done by the municipality.
R.S6: Selective garbage collection once a week and more commitment from the municipality.
R.S7: Garbage collection in the city hall's boat.
R.S8: To burn the garbage.
R.S9: Basic sanitation and selective garbage collection by the municipality.
R.S10: The municipality should do garbage collection from house to house so that this garbage does not end up in the river.
2. Do you agree with the end of the disposable plastic bags used as packaging by supermarkets, similar establishments, and pharmacies, having to carry their bags made of fabric that can be used countless times?
R.S1: Yes, I agree. I would take the cloth bag, but I do not think that will solve it.
R.S2: Yes, totally, I will take the bag if I need it. It will reduce the amount of garbage in the environment.
R.S3: I do not agree. Everyone needs to be aware of how to dispose of it correctly.
R.S4: Yes, I agree, I can take the cloth bag. It would be less trash in the river.
R.S5: Yes, if I need to, I take the cloth bag. It is a less environmental impact.
R.S6: Yes, when I need to take the cloth bag, it is reusable. With this, it will reduce disposable bags.
R.S7: Yes, I agree. The cloth bag reduces the amount of plastic bags.
R.S8: Yes, I agree. It is for the good of the planet.
R.S9: Yes, I agree. The end of plastic bags decreases the pollution on Earth.
R.S10: Yes, I agree. If it is better for the environment, I take the cloth bag.
3. Do you agree or disagree that the environment should be protected from household and/or commercial solid waste? What is your suggestion to decrease the environmental impacts?
R.S1: Yes, I agree. The selective collection reduces the environmental impact more because there is the possibility to recycle.
R.S2: Yes, I totally agree with the end of disposables. Everyone should embrace the cause.
R.S3: Yes, I agree, we could have garbage collection in all locations to avoid environmental pollution.
R.S4: Yes, I agree. We have to become aware that pollution is harmful to everyone's health.
R.S5: Yes, I agree. Maybe if the municipality separated and burned the garbage, it would reduce pollution.
R.S6: Yes, I agree. I believe that what could be done is a proper collection, selection, and recycling.
R.S7: Yes, for sure. The municipality should put a boat to collect the garbage.
R.S8: Yes, of course. Separate and burn the garbage.
R.S9: Yes, I agree. There should be collective river garbage collection at the door of the houses.
R.S10: Yes, I agree. The solution is to recycle the garbage.
4. Would you take the waste such as batteries, bottles, glass, cans, and others that can be returned to the consumer to the gas station (if available)? Or would it be better if a waste picker came to your door? How often would you like the collector to come to your house?
R.S1: No, the collection by the municipality should be at my door twice a week.
R.S2: No, it would be better to have the collection at least once a week at my house.
R.S3: No, it would be better if it were collected at my door twice a week.
R.S4: No, the collector would have to come to my house to pick it up.
R.S5: No, it would be better if the collector came to my house 2 or 3 times a week.
R.S6: No, better the waste picker comes to my house once a week.
R.S7: No, the municipality would have to send for the picker at home once a week or every two weeks.
R.S8: No, the collection should be at my house, twice a week.
R.S9: No, collection needs to be at my house once a week.
R.S10: No, the collector must go home.

Source: Field Research (2014).

Table 2: Semi-structured Interview Script on Tem-Tem Island

1. What needs to be done where you live in order to improve the disposal of non-recyclable solid waste?
R.S1: A sanitary landfill is needed to serve the municipalities of Cametá.
R.S2: To burn or have a sanitary landfill, as stated in the law of 2010.
R.S3: Garbage collection in our locality would be ideal.
R.S4: The municipality should provide the collection in the communities and then give the final destination.
R.S5: The municipality should regularize garbage collection in the localities so that people do not throw garbage in the river.
R.S6: The municipality has to provide sanitary landfills so that the river does not become a garbage dump.
R.S7: They have to have a sanitary landfill, because that is what the law determining the landfill is for.
R.S8: A sanitary landfill or something else that will truly solve the garbage issue.
R.S9: First of all, there should be garbage collection in the region.
R.S10: It is up to the population to do their part, not throwing garbage in incorrect places and to have the sanitary landfill.
2. Do you agree with the end of disposable plastic bags used as packaging by supermarkets, similar establishments, and pharmacies, having to carry their bags made of fabric that can be used countless times as volume?
R.S1: Yes, because it will help in health issues and in environmental preservation issues.
R.S2: I agree. Disposable packaging tends to clutter up the environment even more. R.S3: Yes.
R.S3: Yes. These packages cause serious problems in the environment and last for decades.
R.S4: I agree, it is better for each person to carry their own bag to put their shopping in it.
R.S5: Better to take the cloth bag because this practice is able to help the environment.
R.S6: Yes, it is better for the planet. Everyone should have several bags and use them for shopping.
R.S7: I agree. I will be one of the people to take the cloth bag when I go shopping.
R.S8: Yes, I agree. I can carry the cloth bag on shopping days.
R.S9: Yes, I agree. The idea of the cloth bag is a good one and I would take it.
R.S10: I agree, the cloth bag should be washed and used several times, then replaced with another one.
3. Do you agree or disagree that the environment should be protected from household and/or commercial solid waste? What is your suggestion to decrease the environmental impacts?
R.S1: Yes, I agree. Educational campaigns in series, if not solved apply irreversible fines.
R.S2: Yes, it needs to be protected from garbage. Anything that causes less environmental damage. Once a week.
R.S3: Yes. The municipality should check the correct way and put it into practice.
R.S4: Of course. Everyone should worry about the environment.
R.S5: It must be protected. The population needs to be aware and do their part.
R.S6: Yes, something must be done. I do not know, but the city can pay for those who know how to solve it.
R.S7: Yes, it is necessary. Many people do not care about this and punish the environment by doing wrong things.
R.S8: Very much so. There are people who do it on purpose to get the city's attention.
R.S9: It is much better if they come to my house twice a week.
R.S10: I agree, but the population should be made aware.
4. Would you take the waste such as batteries, bottles, glass, cans, and others that can be returned to the consumer to the waste collection point (if there is one)? Or would it be better if a waste picker came to your door? How often would you like the waste picker to come to your house?
R.S1: I would not take it to the trading post, but I would make the selective collection so that they would come to pick it up at home.
R.S2: I would not, because the city is obligated to do the collection at home. Once a week would already help.
R.S3: No, the city should do the collection at home or at the store.
R.S4: The right thing is for the collector to come to our house once a week.
R.S5: It would be better to have the collection at my house once a week.
R.S6: It is up to the city or other interested parties to pick up the garbage at our house.
R.S7: I would take it, once a week would be ideal.
R.S8: No, the collectors have to come to my house.
R.S9: The city hall should send to pick up the selective garbage at my house.
R.S10: That's not possible, the garbage should be picked up at home. I can separate it properly, but take it away no.

Source: Field Research (2014).

Table 4: Semi-structured Survey Script in the Vila do Juaba.

SEMI-STRUCTURED SCRIPT
1. What needs to be done where you live in order to improve the disposal of non-recyclable solid waste?
R.S1: A sanitary landfill is needed to serve the municipalities of Cametá
R.S2: To build a sanitary landfill.
R.S3: Burn the garbage.
R.S4: It needs to be burned by the municipality.
R.S5: Make everyone aware and the city build a place to dispose of the garbage.
R.S6: Build a sanitary landfill.
R.S7: Sanitary landfill, selective collection, and recycling.
R.S8: Build sanitary landfill and selective collection.
R.S9: Selective collection.
R.S10: Selective collection.
2. Do you agree with the end of disposable plastic bags used as packaging by supermarkets, similar establishments, and pharmacies, having to carry their bags made of fabric that can be used over and over again?
R.S1: I do not agree. The population should be prepared to know how to use the plastic bags.
R.S2: No. Everyone needs to be committed to the environment.
R.S3: Yes, it will help clean up the environment if everyone uses cloth bags.
R.S4: Yes, people need to educate themselves and use cloth bags.
R.S5: Yes, the end of disposable bags will reduce the accumulation of garbage.
R.S6: Yes, it is already a good start to eliminate debris in the environment. Using cloth bags is the solution.
R.S7: I agree, and I would take the bag, because it would reduce garbage in the environment.
R.S8: Yes, I would take the cloth bag and the environment would thank me.
R.S9: Yes, I would take my cloth bag. It is the beginning of respecting the environment.
R.S10: Yes, I can take the cloth bag and charge others to use the bag, because it can be used many times.
3. Do you agree or disagree that the environment should be protected from domestic and/or commercial solid waste? What is your suggestion to decrease the environmental impacts?
R.S1: Yes, I agree. There should be enforcement and fines for wrongful disposal of garbage.
R.S2: Yes, I agree. The solution would be to fine the offenders who try to harm the environment.
R.S3: Yes, the great solution is to make the population aware.
R.S4: Yes, making everyone aware.
R.S5: Yes, to reduce environmental impacts, I bet on the city government to invest in this area.
R.S6: Yes, what can solve it is the sanitary landfill.
R.S7: Yes, to reduce the impacts, everyone needs to be aware of how bad it is to throw garbage in rivers.
R.S8: Yes, to solve the issue of garbage disposal that exists today.
R.S9: Yes, the city hall should fine those who throw garbage in the river or in inadequate places.
R.S10: Yes, fining those who pollute is the ideal solution.
4. Would you take the waste such as batteries, bottles, glass, cans, and others that can be returned to the consumer to the waste collection point (if there is one)? Or would it be better if a collector came to your door? How often would you like the waste picker to come to your house?
R.S1: No. Twice a week.
R.S2: No. The garbage collection should be weekly.
R.S3: No. The city should have a pickup at my door once a week.
R.S4: No. The people who work in the city that collect the garbage should collect it from my house.
R.S5: I do not agree that the garbage collector should come to my house three times a week.
R.S6: No. The city has to make a commitment to pick it up at my door.
R.S7: Yes, I can take it. Two pickups a week.
R.S8: I would take it to the exchange if there were one. As for garbage collection at least once a week.
R.S9: I cannot take it to the exchange point, the right thing is that someone comes to pick it up at home twice a week.
R.S10: No. We from the community need the collection to be done twice a week.

Source: Field Research (2014).

According to what is foreseen in the methodology, this qualitative research will be analyzed globally, that is, the results referring to the four municipalities Ilha Grande, Caciri, Tem-Tem, and Vila Juaba will be presented in analysis with the answers to the questions made to the forty research participants in the semi-structured research script, who answered four questions referring to solid waste.

Referring to the questioning first what needs to be done on-site to have an improvement in the path of non-recyclable solid waste. The answers given by the subjects of the four islands are remarkably similar and consist of the construction of a sanitary landfill, selective collection at least once a week to reduce the environmental impact, that the collection of garbage should be done on each island, create alternatives to reduce environmental pollution, make the inhabitants of the island's universe of the research aware of the correct disposal of garbage and recycle what can be recycled.

Regarding the second question, do you agree with the end of the bags used as packaging by supermarkets, similar establishments, and pharmacies, having to carry their bags made of fabric and that can be used countless times. There was a predominance of subjects who agree with the end of plastic bags, as many allege that plastic bags become garbage when incorrectly discarded in the environment; there are subjects who bet that it would decrease the amount of waste and environmental impact on the environment; there are some who agree, although they believe it's not the solution; there are those who agree because the bags can be reused until they are replaced permanently; but there are also those who do not agree with the end of the disposable bags, because they claim the usefulness of the bag for carrying objects to be used in hospitals, claiming that these bags can be thrown away in the trash, and the cloth bags can be dangerous and cause contamination. The truth is that most of the survey subjects agree with the end of the disposable bag and say they would take the cloth bag for shopping.

Regarding the third question, do you agree or disagree that the environment should be protected from domestic and/or commercial solid waste, and what is your suggestion to reduce environmental impacts? It can be observed from the answers that all participants agree that the environment should be protected from the incorrect disposal of solid waste since this is harmful to everyone's health. Some think that the city hall should put a boat to collect the garbage, there are suggestions for selective collection; application of a fine; awareness on the part of the population; investment by the city hall in garbage collection; and door to door collection.

In as much as the fourth questioning of the semi-structured research script was concerned, when asked if the research subject would take batteries, bottles, glass, cans, and other waste that, once recycled, might be returned to the consumer, there was a predominance of subjects who would not take returnable

waste to the exchange post. As a suggestion as to the frequency of time that the collector should spend, once or twice a week, door to door, predominated.

4 FINALS CONSIDERATIONS

The solid waste generated domestically and/or commercially on the islands Grande, Caciri, Tem-Tem, and Vila do Juaba represent a considerable source of the problem given the poor conditions for collection and final disposal that should be more effective, however, the very extension of the municipality of Cametá, the lack of financial resources and logistical resources in the municipalities in question corroborate so that the environmental impacts become imminent, since part of this material is thrown into the Tocantins River, as can be identified, and due to the precarious collection system that does not meet the needs of the population of the communities where the research was set.

One of the biggest jobs that should be done in the municipalities regarding solid waste is education, so a subject on environmental education should be part of the whole curriculum of elementary school to be part of the children's lives who, as adults, would become conscious adults and aware of other people so that there is no pollution of my environment.

Another issue regarding the selective collection of garbage in the municipalities is the investment in public policies that add quality of life to people and also the quality and care for the environment, but regardless of the existence of public policies, the residents should leave behind old habits such as, for example, throwing garbage in the riverbed and do at home or in their shops the selective collection of the garbage they produce daily.

In the medium and long term, according to what can be deduced from data collection on the islands Grande, Caciri, Tem-Tem, and Vila do Juaba, it will not be in the short or medium-term that a sanitary landfill will be built in Cametá, but while this construction does not happen it is up to everyone to do their part.

As far as the general objective of this study is concerned, to verify how the collection and final disposal of domestic and/or commercial garbage produced by the riverside population of Ilha Grande, Ilha de Caciri, Ilha do Tem-Tem, and Vila do Juaba, belonging to the municipality of Cametá - PA is done, it is possible to consider that this objective was reached.

Regarding the answer to the research question (problem), defined in the introduction, that is, how are the collection and final disposal of solid waste produced by the riverside population of Ilha Grande, Ilha de Caciri, Ilha do Tem-Tem and Vila do Juaba, belonging to the municipality of Cametá - PA, geographically located in the extension of the Tocantins River? In response, the manager responsible for

the area of garbage collection of the City Hall of Cametá replied that the collection of garbage in the localities where the research was done is still not done as it should be weekly and selectively, and what is worse is that it goes to an open-air dump in the city of Cametá.

REFERENCES

ALMEIDA, M. W. B. **Floresta que sangra.** Journal of History of the National Library**,** YEAR 4 - N°. 44, may of 2009.

BRASIL. Brazilian Association of Technical Standards. **NBR 10.004, 2004**.

_____. **Federal Constitution of the Republic.** Brasília: Federal Senate, 1988.

_____. Law nº. 11.445 of January 5th, 2007. **Establishes national guidelines for basic sanitation; amends Laws 6.766, dated December 19th, 1979, 8.036, dated May 11th, 1990, 8.666, dated June 21st, 1993, 8.987, dated February 13th, 1995; revokes Law 6.528, dated May 11th, 1978; and makes other provisions.** Access in: August 25th of 2015.

_____. Law nº. 12.305 of August 2nd of 2010. **National Policy for Solid Waste.** Available at: <http://www.planalto.gov.br/ccivil_03/_Ato2007-2010/2010/Lei/L12305.htm >. Access in: August 25th of 2015.

COSTA, F. A. **Elaboration of Policies for Solid Waste**. São Paulo, 2011.

CRESPO, S; LEITÃO, P. **What Brazilians think of ecology**. Rio de Janeiro: MAST/CNPO: CETEM/CNPO. State Agency: ISER, 1993.

GIL, A.C. **How to write a research project.** São Paulo: Saraiva, 2010.

IBGE - Institute for Economic, Social and Environmental Development of Pará, 2014. Available at: http://cidades.ibge.gov.br/painel/historico.php?lang=&codmun=150210&search=para|cameta|infografic os:-historico.IPEA - Instituto de Pesquisa Econômica Aplicada..pdf. Access in: August 25th of 2015.

JACOBI, P. R.; BESEN, G. R. **Solid waste management: sustainability challenges.** Advanced Studies 25 (71), 2011.

GOUVEIA, N. **Solid waste:** socioenvironmental impacts and perspective of sustainable management with social inclusion. Ciência & Saúde Coletiva, 17(6):1503-1510, 2012.

KAWAICHI. V. M. **An analysis of the countries' environmental public policies and the adoption of Payment for Environmental Services in Brazil.** São Paulo Uniersity. Piracicaba, 2009.

MARTINS, C. H. B. **A sociedade de risco:** visões sobre a iminência da crise ambiental global na teoria social contemporânea. Ensaios FEE, Porto Alegre, v. 25, n. 1, p. 233-248, April. 2004

MINISTRY OF THE ENVIRONMENT. **Clean development mechanism applied to solid waste. Integrated management of solid waste.** National Sanitation Secretariat - SNSA and Water Resources Secretariat – SRHU/MMA. Brasília, 2005.

MINISTRY OF THE ENVIRONMENT. **Guide for the elaboration of solid waste plans**. Secretariat of Water Resources and Urban Environment. Brasília: SRHU/MMA, 2011.

MINISTRY OF THE ENVIRONMENT. **Solid Waste Management Plans: Orientation Manual. Supporting the implementation of the national solid waste policy: from national to local.** Brasília, 2012.

NASCIMENTO, T. O; PASSOS, L. B; AMANAJÁS, P. H. **Analysis of the dynamics of the productive structure in the municipality of Cametá**. 2014. Available at: http://www.eumed.net/cursecon/ecolat/br/14/economia-cameta.hmtl. Access in: August 27th of 2015.

OVIEDO-OCAÑA *et* al. **Prioritized interventions in solid waste management plants by applying structural analysis.** 2011.

NATIONAL SOLID WASTE PLAN. Brasília, 2011. Solid waste - classification ABNT NBR 10004. Available at: <http://www.conhecer.org.br/download/RESIDUOS/leitura%20anexa%206.pdf>. Access in: August 25th of 2015.

RESOLUÇÃO CONAMA 237/97. **Provides on environmental licensing: competence of the Union, states and municipalities, list of activities subject to licensing, environmental studies, environmental impact study and environmental impact report.**

TEIXEIRA, M. V. **Natural resources, labor, and the environment.** Rio de Janeiro, 2007.

THOMÉ, R. **Manual of environmental law.** Editor \juspodivm. 4ª edição, 2014.