

Solid Waste management in the riverside Community vila do Itapuru - Municipio de Beruru – AM

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Abstract— With economic development and population growth, the amount of waste generated by humanity has dramatically increased. Many Brazilian municipalities face problems related to the issue of waste, especially when it comes to small municipalities that are difficult to access such as the municipality of Beruri. This work aimed to propose a solid waste management plan in the community located in the municipality of Beruri village of Itapuru. The work was carried out in 4 stages with the use of tools such as questionnaires, lectures and recycling workshops at the Osvaldo Nazaré Veríssimo school. After data collection and analysis, it was concluded that the inhabitants of the village have little knowledge regarding the treatment of solid waste. As a mitigating measure he proposed application of environmental education in school and association, elaboration of a waste management plan, creation of recycling cooperative and with posts.

Keywords— Waste; Recycling; Collection.

I. INTRODUCTION

The problem related to solid waste due to population increase and the process of uncontrolled urbanization, has been discussed in recent decades in relation to impacts on the environment and public health. With economic development new consumer profiles arise, and consumerism has been treated as an aggravating factor for increasing waste production that often does not have an adequate final disposal (RODRIGUES, 2015).

The national solid waste policy dealt with in law 12,305/10 provides for the reduction of waste, with a proposal the practice of habits and sustainable consumption and a set of instruments to promote increased recycling and reuse of solid waste. However, the concern about solid waste issues has been highlighted since the 1970s, observing the disorderly growth of waste, there was a need for a meeting where economic development was discussed and has met environmental education aimed at issues about the generation of solid waste. Selective collection and fundamental importance in the environmental context of the population, so that the collection has a good result is for residents to seek involvement together with recycling programs and environmental education to improve the population's life and a pleasant environment (BELTRAME and LHAMBY2013)

For Holzer (2012) recycling is an important way of reusing waste, avoiding incorrect disposal, thus seeking to involve programs and campaigns focused on the environment, development and sustainability, in order to bring knowledge to the society on the importance of recycling and selective collection. Scholars of the theme such as Tavares and Tavares (2014) conceptualize solid waste as 'all material that cannot be reused for consumption and are despised or abandoned in streets causing problems for the environment.

Thus, the village community of Itapuru falls into this problem because there is no adequate management of its waste, and the same burned daily causing damage to the environment mainly with the emission of greenhouse gases. The forest people and the main character when referring to the Amazonian scenario, these families survive from fishing and agriculture because there is no other means of work because it is an area far from large cities as well as the lack of opportunities also and precarious to lack of knowledge. The school is fundamental for the riverside population where they approach disciplines and activities focused on environmental education, the dimension of education and the construction of school that is motivation for riverside people to change their qualities of life (SANTOS and TREIN 2010)

For Munhoz (2004), the most effective ways to bring environmental education to the community is through the teacher's direct action in the classroom and in activities such as reading, schoolwork, research and debates. Only in this way can students understand the problems that affect the community where they live, and thus seek to improve their attitudes about the environment. This environment which carry out their activities on environmental conservation and respect for nature transforming them into citizens aware and committed to the preservation of the environment.

Thus, this project is justified by the importance of raising awareness and raising awareness among community residents to reduce the waste generated; gaining knowledge about the importance of preserving the environment and encouraging the community through recycling.

Thus, a Solid Waste Management Plan (PGRS) was proposed in the village community of Itapuru municipality of Beruri/AM, where it took knowledge about the importance of correct disposal seeking to raise awareness and raise awareness among the local population regarding the treatment of waste generated in the community. Also, actions were carried out such as lectures at the school and craft workshop focused on the theme in

question and later a questionnaire was applied to verify the level of knowledge of residents regarding the environment and environmental impacts related to solid waste.

II. MATERIAL AND METHODS

The present work will be development in the period of full of Amazonian rivers, comprising the months of June and July of this year. The space chosen was the Community of Vila do Itacuru located in the municipality of Beruri on the banks of the Purus River, distant straight from Manaus 173 km. The aforementioned community is home to 750 inhabitants who organize themselves in three villages being Vila Araújo, Vila Itapuru which is located more in the center and last Vila Miranda. The logistics of arrival in the village of Itapuru, with departure from Manaus takes about 24 hours in the river modal (regional boat).

Also, it was developed of environmental education with students of the public network, in a municipality in the interior of the state of Amazonas, from June to July 2019. The space chosen was the Community of Vila do Itapuru, considered a Sustainable Development Reserve (RDS), located in the municipality of Beruri on the banks of the Purus River, distant straight from Manaus 173 Km (Figure 1).



Fig.1: Beruri location map in the Amazon

Technical visits were made for the application of questionnaires and photographic records in order to trace the profile of the community. Thus, one can identify the means that could be degraded by incorrect disposal of waste. In addition, it was attended by the department of the environment of the Municipality of Beruri during the process of collecting, transporting and treating the respective waste.

The activities were carried out in June and July 2019, being divided some stages, the first through lectures related to the preservation of the environment, correct treatment of solid waste, through recycling. A second stage, occurred through lectures, recycling workshops for recycling with waste brought from their homes and turn

them into new products, thus avoiding incorrect disposal, such as burning these waste.

Finally in the third stage, it was an artistic workshop, in which students will apply all the acquired knowledge about recycling and sustainable practices during the project, in the construction of toys, utensils and fantasies. At the end of the workshop, the products generated will be presented to the community and other participants through an exhibition.

III. RESULTS AND DISCUSSIONS

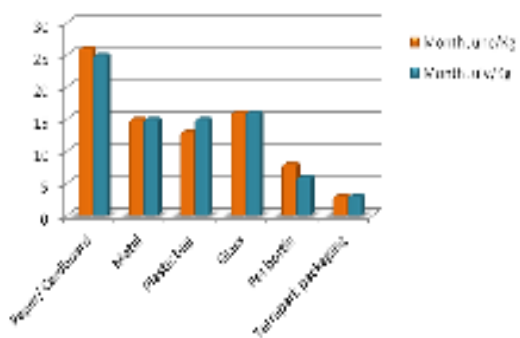
It was found that the population of Villa do Itapuru did not have a system of correct disposal of waste generated in the community, thus bringing serious risks to

the health of community members, impacts on the environment and social. It was also observed that the locality does not have waste collection services generated, which demands concern about the quality of life of its residents, given this situation the amount of waste that is burned daily motivated the elaboration of this project aimed at managing local solid waste.

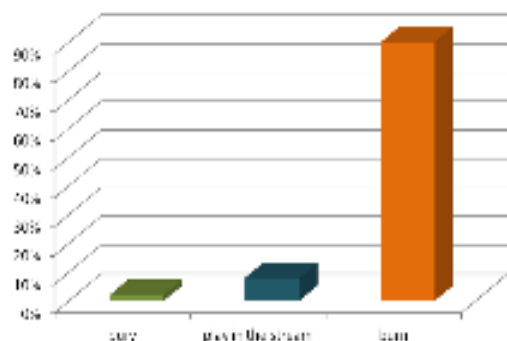
Through the survey conducted during the months of June and July it was possible to evaluate the amount and type of waste generated in each residence (Table 1). It was found that residents of the village of Itapuru produce around 1 kg of waste daily, which the final destination is burning.

Table 1- Sampling of the quantity of solid waste.

Material gerado	Mês Junho	Mês Julho
Papel Papelão	26 kg	25,3 kg
Metal	15 kg	15 kg
Sacolas Plásticas	13 kg	15 kg
Vidro	16 kg	16,7 kg
Garrafa Pet	8 kg	6 kg
Embalagem Tetrapark	3 kg	3,7 kg



a)



b)

Fig.2: a) quantitative waste in the community of Itapuru; (b) behaviour in relation to waste disposal.

According to Table 1 the amount of paper and cardboard generated in June in the community is 26 kg,

tetrapark packaging 3 kg and metal 15 kg, these values are close to those found by Rodrigues (2016), in his study on solid waste management communities amazon riverines, where the amount of paper waste reached 25kg per month, tetrapark packaging 2 kg and metal 14 kg.

Figure 2 shows that Community members do not have many alternatives to the final destination of waste, and that 90% of them adopt non-recommended measures, such as burning. Unlike Lima (2017), which found where only 8% and 3% of the population of Princess Isabel (PE) and Quixaba (PE), respectively. Meanwhile, Souza (...) in his analysis in the community of Our Lady of the Rosary in Parintins-AM showed that 80% were destined for burning, 10% used for fertilizer and 10% for other purposes.



a)



b)

Fig.4: a) residues are burned daily by the community population; b) waste is burned daily by the community population.

With the burning of waste can occur a number of problems both to the environment and the health of the population and air pollution. In addition to harming the soil with the burning of these wastes can cause fires of large proportions destroying the forest and nearby residences, the smoke harms the health of residents mainly those who have breathing problems. To Santiago et. al.,

(2012) waste generated by riverside communities is usually burned for lack of adequate place for final destination.

Table 2: students' knowledge of solid waste recycling before action.

Issues	Yes (%)	No (%)	Did not answer (%)
1. Have you heard of recycling	60	40	----
2. You know what the importance of recycling	70	30	----
3. Knows the difference between solid waste and tailings.	90	5	5

The results in Table 2 show the level of knowledge of community students in relation to garbage recycling and sustainability. It was observed that 60% of the students showed familiarity with waste recycling, while 40% answered that they never heard about the topic. In addition, when asked about the importance of recycling waste, 70% of respondents answered yes, while 30% did not know (Table 2).

Collaborative questionnaires were elaborated to understand the dynamics with which solid waste is discarded. With the information obtained by the questionnaires, it will be possible to obtain information that helps in the implementation a system of collection of solid waste. For this, on-site visits were made that allowed us to observe the generation of waste per captas in the city. In addition, the questionnaire allowed us to observe how solid waste is discarded, a state of decomposition of them and above all, the environment in which the population of the neighborhoods live. Furthermore, if asked if they knew the difference between waste and tailings (Table 2), 90% of the students answered yes, and only 5% answered no, and 5% answered. The results are similar to the 95% found in Souza (2012).

Finishing the on-site research, we observed the need to raise awareness among students of the Osvaldo Nazaré Veríssimo School. Thus, during the months of June and July 2019, actions were carried out through lectures on solid waste management and environment for students of the three shifts. In addition, awareness, play and gymkhanas were incorporated, where the target audience were teachers, students and other people in the community. The students of the osvaldo Nazaré Veríssimo school understood one of the main problems and the issue of waste, and through this work realized that most students had no knowledge about what is referring to the collection, treatment and final destination of waste.



a)



b)

Fig.5: a) Public network classrooms, where awareness about the environment was carried out; b) Public network classrooms, where awareness of the environment was carried out.

After the awareness activity, each of the students performed an illustration based on the topics addressed during the activity as a way of fixing the topics addressed (Figure 5). After the activity, the students participated in a task force for collecting household waste: plastic, packaging, cardboard, cans and pet's bottles, as a way to awaken environmental awareness and the practice of selective collection. With the end of the task force, the collected objects were selected to perform a recycling workshop for the transformation of waste into toys, utensils and costumes. The process was addressed in a playful and objective way, and thus, it was possible to massify the concepts of sustainable practices presented throughout the workshop (Figure 6).



a)



b)

Fig.6 - a) Couple winner of the recycling contest; b) exhibition of the manufacture of briquettes, utensils and fantasies through recycling.

Mitigating measures

During the work, some aspects and impacts on the environment were found in the study area. Due to the treatment and incorrect disposal of solid waste, the soil is contaminated by infiltration. However, soil contamination is not the only consequence, as groundwater and surface contamination is also occurring around the community. Also, due to the effect of burning waste, the smoke generated by this can harm the health of the population, especially children and the elderly.

As a contribution to the community, some mitigating measures such as: insertion of the discipline of environmental education in schools and associations are suggested; implementation of selective collection programs; preparation of a selective collection and

recycling program; implementation of composting plant for organic waste.

IV. FINAL CONSIDERATIONS

This work showed that, through actions in school and in the community, it was observed that knowledge about the consequences of incorrect disposal of waste can reduce the amount generated today and thus improve the quality of life of the community. The questionnaires applied showed that 90% of residential and commercial waste is burned, 8% discard in rivers and streams, and only 2% discard in areas far from their homes. Among the mitigating measures, it is possible to promote the awareness of community residents, through lectures and courses related to waste separation, propose a way of correct disposal and raise awareness of the decrease in consumption. Furthermore, by diagnosing the environmental impacts caused by waste in the community, preventive actions can be avoided through preventive actions.

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