

# The Problem of the Final Disposal of Solid Waste in the Jaguaribe Valley Region: A Look at the CGIRS-VJ

José Hamilton Ribeiro Andrade, and Tiago de Régis de Melo Alves

*City Hall of Quixerê-Ceará, Brazil*

**Abstract:** The objective of this work is to evaluate the final solid waste disposal problem and the importance of the Integrated Solid Waste Management Consortium of the Jaguaribe Valley region in the State of Ceará. For this, a review of the literature on the subject and field work in the study area was carried out. The results show that all municipalities in the Jaguaribe Valley region dispose of their solid waste in dumps, which brings serious socioenvironmental problems. One solution to this problem is the CGIRS-VJ implementation.

**Key words:** urban open space, increasing density, levels, morphology

## 1. Introduction

Currently one of the major challenges faced by municipal public managers is the management of solid waste, which, due to the increase in population and commercial practices that encourage consumption, has contributed to the exacerbated increase in the production of waste that is often not deposited in adequate places, leading to social, economic and environmental impacts.

Solid waste is a heterogeneous matter, resulting from the activities of human societies and nature. Its composition varies from community to community, according to the habits and customs of the population, number of inhabitants of the place, economic conditions, educational level, economic activities among others [1].

Most Brazilian municipalities dispose of their solid waste in inadequate places such as dumps and flooded areas. This situation is experienced mainly in those municipalities that present population of up to 20.000

inhabitants, who represent more than 73% of the Brazilian municipalities.

Dumps are open pit deposits that do not have adequate sanitary conditions for the destination of the waste, but it is the cheapest solution found by the municipal management, compared to the landfill that is an engineering work all appropriate to deposit the garbage with total security, but its construction and operation costs are very onerous, making it difficult for municipalities to implement medium and, mainly, small ones [1].

According to Mucelin and Bellini (2008) [2], among the environmental impacts caused by inadequate garbage disposal are the contamination of water bodies, silting, floods, proliferation of vectors transmitting diseases, visual pollution, bad smell and contamination of the environment.

The National Solid Waste Policy (Law No. 12.305, of August 2, 2010) presents as the goal of the national and state solid waste plan the disposal and recovery of the dumps. However, this goal in practice is not being fulfilled, especially in small municipalities that have very limited financial resources. A legal way to achieve this goal, especially by smaller municipalities, is

through the creation of public consortia for the integrated management of solid waste, this can substantially reduce the costs of construction and operation of landfill.

The creation of public consortia is regulated by Law No. 11.107 of April 2005, which regulates general contracting rules and public consortia and provides other measures.

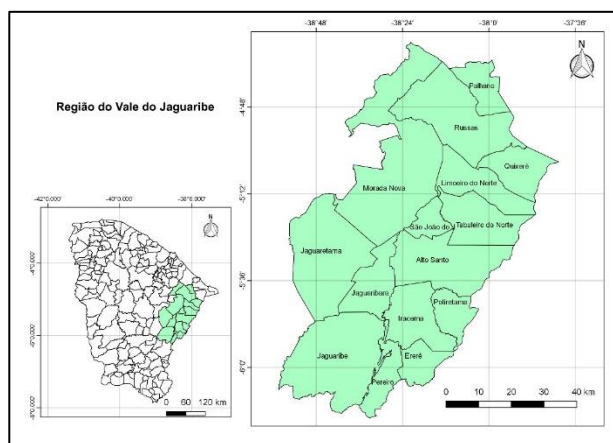
The state of Ceará presents a reality similar to national, presents serious problems in relation to the final disposition of solid waste, most of its municipalities adopt as the main means of disposal of their waste dumps, in the territory of Ceará there are 310 garbage dumps and only eight landfills Restroom. This problem is experienced in all the regions that form this territory.

The region of the Jaguaribe Valley, located in the eastern portion of the State of Ceará is composed of fifteen municipalities that add up to a population with more than 390.000 thousand inhabitants [3].

This region is one of the most important from the economic point of view of Ceará, highlighting in the activities related to irrigated agriculture, aquaculture and currently also in mining.

One of the great challenges facing the state of Ceará, especially the Jaguaribe Valley region, is the integrated management of solid waste. This discourse has been worked on for more than a decade, some municipalities in the region in question, together with the support of the government of Ceará, have formed an inter-municipal solid waste consortium known as the Solid Waste Integrated Consortium - Vale do Jaguaribe (CGIRS-VJ), with the main objective of providing sustainable solutions to the associated municipalities about the final disposal of solid wastes in the municipalities.

In view of this, this study presents the Jaguaribe Valley region as a study area (Fig. 1), and proposes to show the solid waste problem faced by the municipalities of the region with regard to the final disposal and the importance of the Integrated



**Fig. 1** Location of the study area. Source: authors of the paper.

Management Solid Waste - Jaguaribe Valley (CGIRS-VJ) to solve this problem.

## 2. Goals

### 2.1 General Objective

Evaluate the problems of the final disposal of solid waste in the Jaguaribe Valley region and the importance of the creation of the Jaguaribe Valley Solid Waste Integrated Consortium (CGIRS-VJ).

### 2.2 Specific Objectives

- Show how the final disposal of solid waste in the Jaguaribe Valley is carried out;
- Identify the main socio-environmental problems arising from the final disposal of solid waste;
- Understand the importance of the Integrated Solid Waste Management Consortium - Vale do Jaguaribe.

## 3. Methodology

The scientific research to reach its objectives must be structured in methodologies that suit its object of study in order to find answers to the problematic in research. For that, this work was constituted in three stages, being these: Bibliographic review, field stage and cabinet stage.

The bibliographical review stage consisted of the survey of the main theorists who discuss the solid

waste issue, as well as the socio-environmental problems resulting from the final disposition of solid wastes. To this end, several sources of research were consulted as a journal of the Coordination for Improvement of Higher Education Personnel (CAPES), the virtual libraries of the environmental agencies of Ceará, such as the State Superintendence of the Environment (SEMACE), Ceará (SEMA) and Secretariat of the Cities of Ceará, among other sources.

In the second stage, some visits were made to the municipalities involved in the consortium of solid waste (Palhano, Quixeré, Russas, Morada Nova, Alto Santo, Potiretama) in order to know and record the difficulties faced by them. Visits were made to the secretariats and directories responsible for the solid waste management of the municipalities that make up the consortium, in addition to visiting some dumps. In this step the following tools were used: camera and field book for recording.

In the case study, the data collected in the field were analyzed and later, these were systematized and organized in the Geographic Information System (GIS).

#### 4. Analyses and Result

The municipalities that make up the Jaguaribe Valley region present the main disposal methods for their solid wastes (Table 1). These spaces are located in environments with serious environmental fragilities that can bring problems of contamination of the soil, water resources, air and degradation of fauna and flora.

According to Mota (2012) [4], solid waste, when thrown on open ground (dumps) besides the unpleasant aesthetic aspect, causes bad odors. These spaces favor the proliferation of micro and macro vectors that cause diseases. In addition, garbage dumps present the presence of scavengers, generating a social and public health problem, as it is an unhealthy activity, with serious risk of contracting diseases.

Many of the dumps found in the investigated municipalities are located near the entrance of cities, as

well as small water bodies such as ponds and streams, bringing visual impacts and bad smell to the residents, as well as being spaces conducive to the proliferation of diseases and sources of pollution. soil and water bodies (Fig. 3). It is worth noting that in many municipalities of the Jaguaribe Valley, besides the disposal of solid waste to be made in the open air, it is also carried out the burning of these wastes bringing serious problems of air pollution (Fig. 4).

Another problem found in the municipalities of the Jaguaribe Valley is the presence of recyclable material collectors (Fig. 5) who work daily in these spaces, to guarantee or complement the income for their survival, even with all the unsanitary working conditions presented in these spaces.

**Table 1** Location of final disposal of solid waste in the Jaguaribe Valley region.

Counties	Final Disposal Location of Solid Waste
Alto Santo	Lixão
Ererê	Lixão
Iracema	Lixão
Jaguaretama	Lixão
Jaguaribara	Lixão
Jaguaribe	Lixão
Limoeiro do Norte	Lixão
Morada Nova	Lixão
Palhano	Lixão
Pereiro	Lixão
Potiretama	Lixão
Quixeré	Lixão
Russas	Lixão
São João do Jaguaribe	Lixão
Tabuleiro do Norte	Lixão



**Fig. 3** Final disposal of solid waste in the municipality of Palhano.



**Fig. 4** Burning of solid waste in the municipality of Limoeiro do Norte.



**Fig. 5** Recyclable waste pickers in the Limoeiro do Norte dump.

With the accomplishment of the field works it was possible to identify several socioenvironmental problems resulting from the final disposition of solid waste in the municipalities of the Jaguaribe Valley region, these being:

- Ground contamination;
- Air pollution from fires;
- Deforestation of native vegetation;
- Degradation of water resources;
- Visual impacts on landscapes;
- Devaluation of the areas surrounding the dumps;
- Presence of waste pickers in the areas of the dumps; and

- Presence of domestic animals in the areas of the dumps.

Faced with the technical-financial difficulties faced by the municipalities of the Jaguaribe Valley and the worsening of the problem of dumps, one of the solutions found by these was the organization of an Integrated Solid Waste Management Consortium. Where this mechanism of technical/economic cooperation was carried out by the municipalities of the Jaguaribe Valley headed by the government of Ceará. Among the fifteen municipalities that form the region of the Jaguaribe Valley, thirteen are consociated (Table 2). For geographic and non-economic feasibility reasons, the other four municipalities that are not associated study the feasibility of creating another consortium.

The Solid Waste Integrated Management Consortium (Jaguaribe Valley) has as its main goals the construction of a shared sanitary landfill (where works are already underway) and the construction of recycling centers in the municipalities, as well as the construction of transshipment. It is worth noting that the consortium is formalized in 2008, but only after the establishment of the National Policy on Solid Waste, through Law no. 12.305, dated August 2, 2010 [5], that municipal articulations have become more effective.

The CGIRS-VJ can bring great advances to the region, especially with the adequate disposal of solid waste, as well as the social benefit it can provide,

**Table 2** Municipalities consortium and non-consortium in the CGIRS – VJ.

Consortiated Municipalities in	Non-consortium municipalities
CGIRS – VJ	in CGIRS-VJ
Alto Santo	Jaguaribama
Ererê	Jaguaribara
Iracema	Jaguaribe
Itaíçaba	Pereiro
Jaguaruana	
Limoeiro do Norte	
Morada Nova	
Palhano	
Potiretama	
Quixeré	
Russas	
São João do Jaguaribe	
Tabuleiro do Norte	

especially for recyclable waste pickers who are very important entities in this process of cultural change of the inhabitants of the region. Valley of the Jaguaribe.

## 5. Conclusion

With the accomplishment of the work it was possible to detect that all municipalities in the Jaguaribe Valley region adopt irregular practices regarding the final disposition of their solid waste, causing serious social, economic and environmental problems.

participate in an integrated solid waste management consortium whose objectives include the construction of a sanitary landfill, in order to have a correct and legal disposition of the waste produced in the consortium area. As a way to minimize this situation, most of the municipalities of the Jaguaribe Valley

## References

- [1] BRASIL. Fundação Nacional de Saúde. *Manual de Saneamento* (3 ed. rev.), Brasília: Fundação Nacional de Saúde, 2006.
- [2] C. A. Mucelin and M. Belleni, Lixo e impactos ambientais perceptíveis no ecossistema urbano, *Sociedade & Natureza* 20 (2008) (1) 111-124.
- [3] Instituto De Pesquisa E Estratégia Econômica Do Ceará (IPECE), Perfil Básico das regiões econômicas de planejamento: Vale do Jaguaribe, 2017, Acesso em: 04/04/2019, available online at: [http://www2.ipece.ce.gov.br/estatistica/perfil\\_regional/2017/PR\\_Vale\\_do\\_Jaguaribe\\_2017.pdf](http://www2.ipece.ce.gov.br/estatistica/perfil_regional/2017/PR_Vale_do_Jaguaribe_2017.pdf).
- [4] S. Mota, *Introdução à Engenharia Ambiental* (5th ed.), Rio de Janeiro: Abes, 2012.
- [5] BRASIL, Lei N. 12.305, de 2 de agosto de 2010, Institui a Política Nacional de Resíduos Sólidos; altera a Lei no 9.605, de 12 de fevereiro de 1998; e dá outras providências, acesso em: 05/04/2019, available online at: [http://www.planalto.gov.br/ccivil\\_03/\\_ato2007-2010/2010/lei/112305.htm](http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/lei/112305.htm).