ISSN 2175-5361 DOI: 10.9789/2175-5361.2013v5n6Esp2p382

INTEGRATIVE REVIEW OF THE LITERATURE

Comparative study of plans for integrated residue management of construction: an analysis documental

Estudo comparativo de planos integrados de gerenciamento de resíduos da construção civil: uma análise documental

Estudio comparativo de los planes integrados de gestión de residuos de construcción civil: un análisis documental

Jorge Henrique e Silva Júnior[1], Elizângela de Jesus Oliveira de Sousa Vieira[2], Maria José Soares Monte[3], Moisés Lopes Carvalho[4], Francílio de Carvalho Oliveira[5], Jancineide Oliveira de Carvalho[6]

ABSTRACT

Objective: The present study is a comparative study of integrated plans in four cities, highlighting the points that are in accordance with Resolution 307/2002 of CONAMA. **Methods**: This is a bibliographic and documentary research as having scientific articles sources Plans and Integrated Solid Waste Management Construction of five Brazilian cities: Curitiba, Cuiaba, Florianopolis, Rio de Janeiro and São Paulo. **Results**: The resolution foresees the Integrated Management of Residues Plan for Construction, as an instrument for implementing the management of construction waste, to be developed by municipalities. Many capital not yet made their plans Integrated Residue Management Construction. **Conclusion**: The Integrated Waste Management Plan Construction is of great importance, because these residues bring many environmental and health problems. **Descriptors**: Waste, Construction, Comprehensive Plan.

RESUMO

Objetivo: o presente trabalho faz um estudo comparativo dos Planos integrados de quatro cidades, destacando os pontos que estão de acordo com a resolução 307/2002 do CONAMA. **Método:** Trata-se de uma pesquisa bibliográfica e documental tendo como fontes artigos científicos e os Planos Integrados de Gerenciamento de Resíduos Sólidos da Construção Civil de cinco cidades brasileiras: Curitiba, Cuiabá, Florianópolis, Rio de Janeiro e São Paulo. **Resultados:** A resolução prevê o Plano Integrado de Gerenciamento de Resíduos da Construção Civil, como instrumento para implementação da gestão dos resíduos da construção civil, que deve ser elaborado pelos municípios. Muitas capitais ainda não elaboraram seus Planos Integrados de Gerenciamento de Resíduos da Construção Civil. **Conclusão:** O Plano Integrado de Gerenciamento dos Resíduos da Construção Civil é de grande importância, pois esses resíduos trazem inúmeros problemas ambientais e de saúde. **Descritores:** Resíduos. Construção Civil. Plano Integrado.

RESUMEN

Objetivo: El presente trabajo hace un estudio comparativo de los Planes Integrados de cuatro ciudades, destacando los puntos que están en conformidad con la Resolución 307/2002 de la CONAMA. **Método:** Se trata de una búsqueda bibliográfica y documental teniendo como fuente artículos científicos y Planes Integrados de Gestión de Residuos Sólidos de la Construcción Civil de cinco ciudades brasileñas: Curitiba, Cuiabá, Florianópolis, Río de Janeiro y São Paulo. **Resultados:** La resolución prevé el Plan Integrado de Gestión de Residuos de la Construcción Civil, como un instrumento para la aplicación de la gestión de residuos de la construcción civil, que debe ser elaborado por los municipios. Muchas capitales aún no elaboraron sus Planes Integrados de Gestión de Residuos de la Construcción Civil. **Conclusión:** El Plan Integrado de Gestión de Residuos de la Construcción Civil es de gran importancia, ya que estos residuos traer muchos problemas ambientales y de salud. **Descriptores**: Residuos. Construcción Civil. Plan Integral.

[1] Graduado em Gestão Ambiental pelo Instituto Federal de Educação, Ciência e Tecnologia do Piauí – IFPI. E-mail: juniorx986@hotmail.com
[2] Graduando do curso de Direito do Centro Universitário UNINOVAFAPI. E-mail: elizangelavieira@uninovafapi.edu.br
[3] Mestre em Biologia pela Universidade Federal da Bahia - UFBA. Docente da Graduação do Centro Universitário UNINOVAFAPI.
[4] Graduando do curso de Enfermagem do Centro Universitário UNINOVAFAPI. Bolsista de Iniciação Científica do CNPq. E-mail: mooysescarvalho@hotmail.com
[5] Mestre em Físico-Química pela Universidade de São Paulo - USP. Docente da Graduação do Centro Universitário UNINOVAFAPI.
[6] Especialização em Fisiologia do exercício pela Universidade Federal de São Paulo – USP. Docente da Graduação do Centro Universitário UNINOVAFAPI.

INTRODUCTION

Municipal waste are a major concern worldwide, because many of these can entail risks to public health and the environment, which imposes the need to adopt new technological guidelines that bring less degradation to the environment. [1] Among the municipal waste highlight the waste originating from construction and demolition waste, as they are produced in large quantities due to the intense transformation of urban buildings and can pose risks if disposed of improperly.

The main problem of civil construction residues is related to its irregular layout, the large volume produced and the environmental impacts to the environment and people's health. [2]

CONAMA by reesolution No. 307 of July 5, 2002 establishes guidelines, criteria and procedures for the management of civil construction residues disciplining the necessary actions in order to minimize environmental impacts and standardizes the creation of an Integrated Management Plan construction waste as a tool for implementing the management of civil construction residues being prepared by the municipalities and the Federal District which shall incorporate the Municipal waste Management Programme of Construction.[3]

In the resolution are still defined the responsibilities of generators, transporters, managing external intere, reuse, recycling, processing, landfill waste, waste disposal areas and classifies waste according to the physico-chemical characteristics. [3]

Considering the problem in question the present study aims to conduct a comparative study of the Integrated Residue Management Plans Construction of five Brazilian capitals, and highlight the points that are in accordance with Resolution 307/2002, providing that they can serve references for the preparation of other plans.

METHODOLOGY

It is a bibliographic and documentary research, exploratory-descriptive, quantitative and qualitative nature. According to scholars, documentary research is very close to the literature, what differentiate them is the nature of the sources, because the literature analyzes the contributions of different authors on a particular theme, paying attention to secondary sources, and the documentary research resorts to materials not yet received analytical treatment, and because it is of primary sources, the researcher requires a more thorough and careful analysis.[4,5]

To achieve the objectives of this research, were developed the following methodological procedures: 1- search of documents (books, scientific articles and legal documents) about the Integrated Waste Management Plans for Construction; 2- reading and analysis of the documents.

Were selected for the study Plans Integrated Waste Management Construction of five Brazilian cities, Curitiba[6], Cuiabá[7], Florianópolis[8], Rio de Janeiro[9] and São Paulo.[10]. The choice of these cities is given by these focus a great development in the field of construction for decades. The plans were analyzed based on Resolution 307/2007 of CONAMA[3].

The aspects evaluated, comparatively, were related to the constant demands on the CONAMA Resolution No. 307/2002, which establishes guidelines, criteria and procedures for the management of construction waste.[3]

RESULTS AND DISCUSSION

Issues required by resolution 307/2002 of CONAMA

The CONAMA Resolution No. 307 of July 5, 2002 establishes guidelines, criteria and procedures for the management of construction waste disciplining the necessary actions in order to minimize environmental impacts.

Resolution 307/2002 defines the responsibilities of generators of carriers, inter and external management, reuse, recycling beneficiation, waste landfill, waste disposal areas, classification of waste according to the physico-chemical characteristics.[3]

Also provides for the Integrated Waste Management Plan of Construction as a tool for implementing the management of construction waste being prepared by the municipalities and the federal district which shall incorporate the Municipal Waste Management Programme of Construction.[3]

Under Resolution 307/2002 Integrated Waste Management Plan Construction should contain the following:[3]

1 - The technical guidelines and procedures for the Municipal Waste Management Programme of Construction and Project Management for Construction Waste, to be produced by large generators, enabling the exercise of the responsibilities of all generators.

2 - Registration of public or private areas suitable for receiving, sorting and temporary storage of small volumes, in accordance with the post of municipal urban area, allowing their subsequent disposal of waste from small generators, areas of improvement.

3 - The establishment of licensing processes for areas of improvement for the final disposal of waste.

4 - The prohibition of disposal of construction waste, such as paints, solvents, oils and other contaminated or those coming from demolitions, renovations and repairs of radiology clinics and industrial facilities and other (for the final disposal of such waste exists a specific legislation).

5 - The incentive to reintegrate reusable or recyclable waste in the production cycle.

6 - The definition of criteria for the registration of carriers.

7- The actions of guidance of super supervisory and control of involved agents.

8- Educational activities to reduce waste generation and enable their segregation.

Comparative analysis of the plans of integrated solid waste management of construction in five brazilian cities according to resolution 307/2002.

Table 1 contains the municipal laws that create Plans Integrated Waste Management Construction of the cities of Curitiba, Cuiaba, Florianopolis, Rio de Janeiro and São Paulo. Also contained aspects required by Resolution CONAMA No. 307/2002, included in these plans.[3]

Table 1: Points covered in the Integrated Waste Management Construction Plans of the cities studied.

CAPITAIS	Municipal Legislation Related to the RCC Management.	Contemplated aspects.
Curitiba	Municipal Law N°. 11,682 of April 6, 2006 [3].	2, 3, 4, 5, 6, 7, 8
Cuiabá	Municipal Law No. 4,949 of January 5, 2007.	1, 2, 3, 4, 5, 6, 7, 8
Florianópolis	Project of Law No. 14,502 / 2011	---
Rio de Janeiro	Decree No. 27,078 of September 27, 2006.	1, 2, 3, 4, 5, 6, 7, 8
São Paulo	Lei Municipal N° 14.803 de 26 de junho de 2008.	1, 2, 3, 4, 5, 6, 7, 8

Source: Direct Research, 2012.

Plan of integrated solid waste management of construction in Curitiba:

The Integrated Waste Management Plan for the Construction of the City of Curitiba includes almost all the recommendations of Resolution No. 307 of CONAMA, however does not specify details of the areas for disposal as well as the licensing of

these areas and neither mentions existence of the project management of construction waste from large generators.[3,6]

The waste classification adopted in Curitiba plan is according to CONAMA resolution:

Class A - reusable or recyclable as aggregates (construction waste, demolition, remodeling, such as bricks, tiles, blocks, mosaics, wireless media, etc..) Wastes;

Class B - recyclable for other purposes (plastics, paper, cardboard, metals, glass, wood and other) wastes;

Class C - Waste for which no viable economic technologies or applications that allow their recycling / recovery (products from the plaster) were developed;

Class D - Hazardous Waste arising from construction processes (paints, solvents, oils and other contaminated waste produced in renovations and repairs of radiology clinics and industrial facilities).[3,6]

The plan also states that the small generator construction waste must have a Class A waste segregated from Class C, on the sidewalk in front of his property. The collection and fate of these materials, limited to the total amount of 500L (five hundred liters) equivalent to 0.5 m^3 (half cubic meter) shall be performed by the competent department of the Municipal Environment - SMMA. Small generators must send the waste to the Class D Special collection of toxic waste in the municipality.

The small generator construction waste residues might direct Classes A and C segregated from each other, limited to the total amount of 2,500 l (two thousand five hundred liters) equivalent to 2.5 m^3 (two and a half cubic meters) in the receive locations transhipment or as may be designated by the municipality.[6]

The plan provides for annual educational campaigns designed to promote the importance of using waste construction for preservation and restoration of the environment.

With regard to large generators the plan does not address the requirement of the project management construction waste which is regulated by Resolution No. 307 of CONAMA.[6]

Plan of integrated solid waste management of construction in the city of Cuiabá:

The Integrated Waste Management Plan for the Construction of the City of Cuiabá includes all the recommendations of Resolution No. 307/2002 of CONAMA, is more complete compared to Cuiabá.

The Plan Cuiabá follows the recommendation of Resolution No. 307/2002 of CONAMA incorporating:[3,7]

I - Municipal Waste Management Program of Construction, in the case of small generators;

II - the Projects of Waste Management of Construction, in the case of generators not included in Item I.

Still comparing with that of Curitiba stand out as important measures:

1 - The requirement Projects with Waste Management of large generators; 2 - The establishment of a network of delivery points for Small Volumes of Waste Construction and Bulky Waste limited to 1 m3 (cubic meter) per flush, located in the catchment of waste; 3 - Dial Collection Service for Small Volumes, telephone access to small private transporters construction waste and bulky waste; 4 - a network of Areas Receiving Large Volumes (Transshipment Areas and Triage Areas, Recycling and Waste Landfill Construction) focused on the receiving construction waste and bulky waste.

The Plan also provides educational and penalties for violators.

Plan integrated solid waste management of construction in the city of Florianópolis

The city of Florianópolis still does not have an Integrated Waste Management Plan Construction. The solid waste management is carried out in accordance with a Plan for Solid Waste Management - SWMP prepared by the Company's Capital Improvement - CONCAP - management of municipal solid waste, based on Decree No. 3372 which aims to promote the sustainability of operations management of solid waste and preserve the environment and quality of life, contributing to solutions to social, economic and environmental aspects involved in the issue.[3,8]

Although the city of Florianópolis not yet have an integrated management plan for construction waste produced on the basis of Resolution 307/2002 of CONAMA, the problem is addressed in the Plan for Solid Waste Management in the city, where some important aspects are contemplated, second newsletter of the Municipal Chamber of Florianopolis on March 12, 2012 (7). There is also a project for the Law No. 14.502/2011, which "Provides for municipal waste management policy construction in Florianópolis."[3,8]

It is noteworthy that the Plan for Solid Waste Management - SWMP presents a strong point issue of selective collection of all solid waste, especially the final disposal of Class II waste - B / aggregates that include construction waste in a landfill specific named inert landfill located on the banks of the Santa Catarina State Road 401, Km 17, located on a private plot of 90,000.[2,8]

Integrated waste management plan for the construction of the Rio de Janeiro

Integrated Waste Management Plan for the Construction of the Rio de Janeiro City includes all the recommendations of Resolution No. 307 of CONAMA, being similar to Cuiabá.[3,9]

The Integrated Waste Management Plan for the Civil Construction of the city of Rio de Janeiro follows the recommendation of Resolution No. 307 of CONAMA incorporating:[3,9]

I - Municipal Waste Management Program of Civil Construction, in the case of small generators;

II - the Projects of Waste Management of Civil Construction, in the case of generators not included in Item I.

Stand out as important important measures in the plan:1 - The requirement Projects with Management of Residues of large generators;2 - The establishment of a network of delivery points (ECOPOINTS) Low Volume Waste of Civil Construction and household dry recyclable wastes limited to 1 m3 (cubic meter) per flush;3 - Dial Collection Service for Small Volumes, telephone access to small private transporters construction waste and bulky waste;4 - a network of Areas Receiving Large Volumes (Transshipment Areas and Screening Areas, Recycling and Waste Landfill of Civil Construction) focused on the receipt of construction waste.[9]

Those responsible for Waste Management Projects of Civil Construction shall, where appropriate, point out the procedures to be taken for proper disposal of wastes, such as health and home services, from outpatient clinics and cafeterias, subject to the specific Brazilian standards .

The issuance of Occupancy Permit or acceptance of works by the competent municipal agency, of the ventures of large generators of waste from construction, should be subject to the presentation of services documents Note Waste Transport (NTR) or other documents of hiring announced in the Project for Management of Residues of Civil Construction, comprovadores the correct sorting, transport and disposal of waste generated.

The Plan also provides educational and penalties for violators.[9]

The integrated management of residues plan for the construction of São Paulo

The Integrated Management of Residues Plan for the Construction of the Rio São Paulo City includes all the recommendations of Resolution No. 307 of CONAMA, similar to the plans of Cuiabá and Rio de Janeiro.

The Integrated Management of Residues Plan for of Civil Construction of São Paulo follows all recommendations of Resolution No. 307 of CONAMA incorporating:

I - Municipal Waste Management Program of Construction, in the case of small generators;

II - the Projects of Waste Management of Construction, in the case of generators not included in Item I.

Stand out as important measures in the plan: 1 - The requirement Projects with Management of Residues of large generators; 2 - The establishment of a network of points of delivery for small volumes of construction waste; 3 - Dial Collection Service for Small Volumes, telephone access to small private transporters construction waste and bulky waste; 4 – A network of Areas Receiving Large Volumes (Transshipment Areas and Screening Areas, Recycling and Waste Landfill of Civil Construction) focused on the receipt of construction waste.[10]

The plan highlights the legislation for generating large volumes: the generating large volumes of construction waste, whose projects require the dispatch of permit approval and execution of new construction, the reform or reconstruction, demolition, walls and breadwinners earthwork, pursuant to Law No. 11228, of June 25, 1992, shall develop and implement projects Waste Management of Construction, in accordance with the guidelines of Resolution No. 307/2002 of CONAMA and municipal laws no 13,430, 13,478 and 13,885, establishing the specific procedures of the work for the environmentally sound management and disposal of waste.[3,10]

The plan also provides detailed definitions of some aspects required by resolution 307/2002, included in the plan:

Delivery Points for small volumes: public facilities for the receipt of construction waste and bulky waste limited to 1 m^3 (cubic meter) per flush, generated and delivered by residents, and may be collected and delivered by directly employed by small carriers generators, such that equipment without causing damage to public health and the environment, should be used for screening of waste received, later differentiated collection and removal for proper disposal and shall meet the specifications of the Brazilian standard NBR 15112 of ABNT - Brazilian Association Technical Standards.[3,11]

Transshipment Areas and Screening (ATT) of construction waste and bulky waste: are authorized establishments Urban Cleaning System in São Paulo for the receipt of construction waste and bulky waste generated and collected by private agents, whose areas without causing damage to public health and the environment, should be used to separate waste received, processed and subsequently eventual removal for proper disposal and shall meet the specifications of the Brazilian standard ABNT NBR 15.112.[3,11]

Waste Landfill Construction: authorized areas of Urban Cleaning System in São Paulo where technical waste disposal construction of mineral origin, designated as Class A by specific federal legislation will be employed, seeking reservation of materials so secreted that enables its future use or, disposal of these materials, with a view to future use of the area by employing engineering principles to confine them to the smallest possible volume without causing damage to public health

and the environment and must meet specifications Brazilian standard ABNT NBR 15.113. [3,11]

Small landfills with waste civil construction: licensed areas, having area less than 10,000 m2 (ten thousand square meters) and volume of less than 10,000 m3 (ten thousand cubic meters) with activities described in Waste Management Projects provision of Civil Construction, prepared for the purpose of regularization with defined topographical urban function, where techniques of waste disposal construction of mineral origin, designated as Class A by specific federal legislation will be employed and must meet the specifications of the Brazilian standard ABNT NBR 15.113.[3,11]

CONCLUSION

The Integrated Waste Management Plan of Civil Construction is a requirement of CONAMA Resolution No. 307 of July 5, 2002, that guides municipalities in developing and implementing plans of municipal waste management construction. It is of great importance because these residues bring many environmental and health problems. However, many municipalities have not yet made their plans for integrated management of construction waste and therefore these municipalities should develop their plans so they can more effectively manage the waste generated and thus prevent such waste will pollute the environment and cause problems health of the population.

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Received on: 09/04/2013
Required for review: no
Approved on: 25/10/2013
Published on: 27/12/2013