217 - SOLID WASTE GENERATED IN THE UNIVERSITIES' ENVIRONMENT: A PROBLEM TO BE FACED

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1 INTRODUCTION

One of the biggest problems faced by an administration, whether public or private, is the problem of waste generated by various activities. One can not imagine a way of life that does not generate solid waste. Due to increased human population, concentration in urban centers, shape and rhythm of the occupation of these spaces and way of life based on strong production and consumption of goods, the problems caused by these residues tend to become visible, degrading the environment and interferes with quality of life.

CONAMA Resolution No. 005/1993 defines waste as "waste in solid and semi-solid resulting from the activities from industrial, domestic, hospital, commercial, agricultural, and street sweeping services. Included in this definition from the sludge treatment systems water, waste generated in equipment and facilities for pollution control, and certain liquids whose characteristics make it infeasible its launch in public sewers or water bodies, or to require that technical solution and economically viable given the best available technology "(BRAZIL, 1993). In this setting, it is here to highlight the existence of the definition of the Brazilian Association of Technical Standards - NBR 10004 (ABNT, 2004) and contained in Agenda 21 (UNCED, 1997, p.273), among others. Anyway, in all settings, the residues are byproducts of human activity with particular characteristics, usually defined by the process that generated them.

The understanding of solid waste is being gradually changed and, currently, the residue in the classified and separately, the sale value, making it economically significant. Corroborating this argument has been one of the principles of State Law No. 12.300/06, which established the State Policy on Solid Waste in Sao Paulo, the recognition of solid waste reusable and recyclable as well as an economic generator of jobs and income (CETESB, 2006).

There are several ways to classify solid waste. Knowledge of classification is important for, among other things, determine the best technology for treatment, recovery or disposal of waste. Knowing the composition and characteristics of solid waste information and provides allowances for the correct evaluation of the economic potential of this, and yet, one can say that it is of fundamental importance for planning and evaluation of the efficiency of collection and disposal. It should be noted that the economic component is one that most influences the quantity and quality of municipal solid waste.

According to Dias (2003), the solid waste generated in the university encompasses the urban solid waste, industrial and health care. These wastes are generated in the administrative sectors of education (classrooms and laboratories), to support academic activities, resulting in a multitude of waste to be collected and disposed properly. It is common in these environments the disposal of carcasses of computers, appliances and laboratory, as well as batteries and fluorescent lamps. It can also be generated waste classified as Class I (hazardous) from laboratories in chemistry, biology and physics. The author points out that the generation of diagnosis and classification of waste generated in universities are important to guide the segregation, collection, treatment and disposal of them. The diagnosis is made through a technical study called for determining the physical or gravimetric study of solid waste. The results show the lifestyle of a community. These are also the basis for the development of programs for waste management and determining the type definition to be adopted.

Teixeira and Zanin (1999) stated that for a program to recycle waste to be developed efficiently, it is necessary to make a good separation of materials, since this action promotes the recovery of that. Studies report that the benefits gained from recycling are higher when the waste to be collected are clean and available in large quantities, as occurs in places that concentrate large numbers of people. Moreover, the separation of recyclable materials is an essential action for the success of any recycling program.

The generation of waste depends on cultural factors, levels and patterns of consumption, income and standard of living, climatic factors and characteristics of gender and age groups (IPT/CEMPRE, 2000, CAMPOS, 2001). From the qualitative point of view, the factors that most influence the production and composition of household waste (MANDELLI, 1997; CAMPOS, 2001) are level of family income, industrialization of food habits of the population and seasonal factors.

Currently, solid waste is one of the major environmental problems experienced by humans, mainly because it does not end when the "garbage" is to collect and persisted until the final destination receives. Most of the waste, including those with economic value (or recyclable secondary raw materials) is deposited in places not always appropriate and can endanger human health and the environment. When handled improperly provide food and shelter for many animal vectors of diseases, especially rodents and insects. Moreover, the decomposition of waste and leachate can lead to contamination of soil and groundwater.

Minimizing the generation of waste at source is considered one of the main actions that should be part of the proposed solutions. Should be based on the principle of preservation, seeking ways to avoid the generation of large quantities of waste. Saves raw materials and conservation of natural resources, reducing costs of production, treatment and final disposal.

Though born with the focus turned to the industrial waste reduction technology has expanded, reaching different sectors that generate waste. Thus, according to Risso (1993) cited by Campos (2001), have been implemented programs to minimize waste considered non-hazardous, in shops and public and, in the municipalities for household waste. Examples are various campaigns to recycle waste on public and private schools and recycling of household waste when the waste collection obtained satisfactory results, with the effective participation of the community.

The success of selective collection is directly linked to investments made to increase awareness and understanding of the population. Typically, the greater voluntary participation in selective collection programs, the lower the cost of administration (IPT/CEMPRE, 2000).

According to Dias (2003), a way of assessing people's participation in selective collection programs is to observe the amount of waste that comes separately. Thus, by weighing each component has the proportion of which was duly separated. The selective collection, in fact, can mobilize the entire community. However, if not done any preparation, resulting in the awakening and maturing of the population, will be a high risk of sinking and loss of goals, with wear to the municipal administration, and allowing you to create a negative image for the collection.

When discussing the costs of waste collection are not counting the costs related to problems caused by inadequate waste destination, for example, costs the public health system and environmental degradation, among others. Studies suggest that governments can have more active role in this, helping people develop lifestyles based on the reduction of material consumption and enhancing public policies. To achieve success in this area, it is necessary to an overview of the problem that involves and strategies must be developed starting from the source of generation of waste.

Polls indicate a large disinformation and confusion for consumers. As SMA (1998, p.52), "most consumers are aware of environmental issues through the media, but does not understand how routine consumption activities may contribute to their specific problems."

According to Ruffino (2001), "environmental education is a process in which they worked commitment and knowledge that can lead the individual to rethink their relationship with the environment, to ensure changes in attitudes towards the improvement of quality of life society in which it operates, and reverse situations that might compromise the survival of animal and plant species and, consequently, the maintenance of life on the planet. "Environmental education suggests that during the review process and seeking solutions to a problem, to develop a multidisciplinary work, involving actors from different disciplines, providing a holistic view on the subject. As a challenge to be adopted by teachers, businesses, public institutions and other sectors of society, proposing the development of teamwork. Channels more amenable to the use of this process are the schools. Educational institutions that make up professional and ethical entrepreneurs appear in a prominent stock and development of programs aimed at waste minimization, and training of multipliers. In this context, there is need to implement projects to raise awareness in relation to the problem of solid waste, aimed to involve the school community, to form individuals sensitized to environmental issues and aware of their responsibilities to society and the environment .

As Dias (2003), higher education institutions, as well as being responsible for the production and transmission of knowledge, training of qualified professionals, scientific and cultural incentives should also be participants of problems that present themselves to society. Thus, the implementation of a program to minimize solid waste, coupled to a program management and environmental education, can do with that knowledge and experience to serve as examples to other sectors of society, as for small communities and condominium residences.

According to Dias (2003), in educational institutions should adopt environmentally responsible behaviors with attitudes towards sustainable development, because these units are trained professionals who can raise public and private administrators of the need for solid waste management to improve the quality of life and the environment. These institutions can not take position inconsistent with the issue of waste generated by their community.

There is need for coordinated actions and educational character, in order to achieve the social function of the institution in training professionals who are citizens to contribute to building a more just and egalitarian (LOPES, AND COSTA NASCIMENTO, 2005, Dias and GÜNTHER, 2005). Through environmental education we can get the community to raise awareness of its responsibility for the waste produced, making this reduces generation and develop a new vision for the same. Thus, there is a need for an environmental education at all levels of schooling and in all spheres of society. Should be developed in a continuous and ongoing, involving the conscious of the academic community.

To Veja, Benítez and Barreto (2006), education and motivation are the most important aspects in a program for managing solid waste and therefore it is essential to the effective participation of teachers and specialists, as they can motivate and convince students to participate in the program. Critical reflection promoted by education on environmental issues fulfills its goal if the result is added to the daily life of society, changing habits and behavior. Education aims to train citizens to respond to the challenges of environmental crisis, with an ethical stance in relation to society and nature. With the spread of the concept of sustainable development is recognized now that a healthy economy is not maintained without a healthy environment too (CAMPOS, 2001).

2 FINAL CONSIDERATIONS

The current historical moment points to a reflection of contemporary societies and their impacts on health and the environment. The effects of environmental pollution are far more complex and diffuse than one might initially assessed, their aftermath and widespread, may also be chronic and cumulative, becoming more complex action to clean up.

You can minimize the amount of solid waste generated through environmental education programs and restore the portion recycled through collection.

Therefore, it needs to be investigated what they know, think and how people behave in relation to the phenomenon of "solid waste", which is a routine in the lives of citizens. This concern is due to the fact that each citizen is responsible for the waste it generates every day. And given this fact, it is extremely important that people are aware of the most critical points of the problem.

Without the conscious participation of every individual, are not going to change the form of behavior, or promote the reduction of the amount of waste generated. Clarification of citizens is necessary, that they may become allies in the transformation of cities in sustainable scenarios. For the definition of strategies, it is necessary to build a comprehensive knowledge of local realities of each social group and the factors involved in the urban context, that may be to the public for the necessary planning and implementation of environmental programs.

REFERENCES:

ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS. ABNT. **NBR 10004 – Resíduos sólidos: classificação**. Rio de Janeiro (RJ): ABNT, 2004.

BRASIL. Conselho Nacional do Meio Ambiente. CONAMA. **Resolução nº 05, de 05 de agosto de 1993**. Dispõe sobre o plano de gerenciamento, tratamento e disposição final de resíduos sólidos de serviços de saúde, portos, aeroportos, terminais rodoviários e ferroviários. Disponível em: http://www.mma.gov.br/conama.

CAMPOS, A.C.A. **Resíduos sólidos urbanos: educação ambiental e análise de comportamento de estudantes de escolas de Feira de Santana – BA.** Dissertação (Mestrado em Engenharia). Universidade Federal do Rio Grande do Sul, Porto Alegre, 2001.

CETESB – COMPANHIA DE TECNOLOGIA DE SANEAMENTO AMBIENTAL. **Lei Estadual nº 12.300 de 16 de março de 2006.** Disponível em: www.cetesb.sp.gov.br/Solo/residuos/texto_revisado.pdf. Acesso em: março de 2009.

CONAMA – CONSELHO NACIONAL DO MEIO AMBIENTE. **Resolução nº 275, de 25 de abril de 2001.** Disponível em: www.mma.gov.br/port/conama/res/res01/res27501.html. Acesso em: março de 2009.

CONFERÊNCIA DA ORGANIZAÇÃO DAS NAÇÕES UNIDAS SOBRE MEIO AMBIENTE E DESENVOLVIMENTO. CNUMAD. **Agenda 21.** São Paulo (SP): Secretaria de estado do Meio Ambiente, 1997.

DIAS, S.M.F.; GÜNTHER, W.R. Comunicação ambiental no gerenciamento de resíduos sólidos urbanos. In: Congresso Brasileiro de Engenharia Sanitária e Ambiental, 23, 2005, Campo Grande. Resumos... Campo Grande (MS): ABES,

2005. 1 CD-ROM.

DIAS, S.S.F. **Avaliação de programa de educação ambiental voltados para o gerenciamento dos resíduos sólidos urbanos.** 2003. Tese (Doutorado em Saúde Pública) – Faculdade de Saúde Pública, Universidade de São Paulo, São Paulo (SP), 2003.

IPT/CEMPRE – INSTITUTO DE PESQUISAS TECNOLÓGICAS / COMPROMISSO EMPRESARIAL COM A RECICLAGEM. **Lixo municipal: manual de gerenciamento integrado.** 2ed. São Paulo (SP): IPT/CEMPRE, 2000.

LOPES, R.L.; COSTA, L.P.; NASCIMENTO, R.U.L. Programa de coleta seletiva em grandes instituições de ensino: os resíduos sólidos analisados e valorizados sob a ótica da gestão ambiental. In: Congresso Brasileiro de Engenharia Sanitária e Ambiental, 23, 2005, Campo Grande. **Resumos..**. Campo Grande (MS): ABES, 2005. 1 CD-ROM.

MANDELLI, S.M.C. **Variáveis que interferem no comportamento da população urbana no manejo de resíduos sólidos domésticos no âmbito das residências**. 1997. Tese (Doutorado em Educação – Área de Metodologia do Ensino) – Universidade Federal de São Carlos. São Carlos (SP).

RUFINO, P.H.P. **Proposta de educação ambiental como instrumento de apoio à implantação e manutenção de um posto de orientação e recebimento de recicláveis secos em uma Escola Estadual de Ensino Fundamental.** São Carlos. 71p. Dissertação (Mestrado) – Escola de Engenharia de São Carlos, Universidade de São Paulo, 2001.

SMA – SECRATARIA DO MEIO AMBIENTE. **Consumo sustentável.** São Paulo (SP): Secretaria do Meio Ambiente do estado de São Paulo, 1998, 128p.

TEIXEIRA, B.A.N.; ZANIN, M. Reciclagem e reutilização de embalagens. In: PROSAB. **Metodologias e técnicas de minimização, reciclagem e reutilização de resíduos sólidos urbanos**. Rio de Janeiro (RJ): ABES, 1999.

VEJA, C.A.; BENÍTEZ, S.O.; BARRETO, E.R. M**exican educational institutions and waste management programmer: a University case study.** Disponível em: <http://www.sciencedirect.com>

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SOLID WASTE GENERATED IN THE UNIVERSITIES' ENVIRONMENT: A PROBLEM TO BE FACED

ABSTRACT

Solid waste is one of the major environmental problems experienced by humans, mainly because it does not end when the "garbage" is to collect and persisted until the final destination receives. The solid waste generated in the university encompasses the urban solid waste, industrial and health care. Are generated in the administrative sectors of education (classrooms and laboratories), to support academic activities, resulting in a multitude of waste to be collected and disposed properly. It is common in these environments the disposal of carcasses of computers, appliances and laboratory, as well as batteries and fluorescent lamps. It can also be generated waste classified as Class I (hazardous) from laboratories in chemistry, biology and physics. Minimizing the generation of waste at source is considered one of the main actions that should be part of the proposed solutions. Should be based on the principle of preservation, seeking ways to avoid the generation of large quantities of waste. The effects of environmental pollution are far more complex and diffuse than one might assess at first, its aftermath and widespread, may also be chronic and cumulative, becoming more complex action to clean up. Without the conscious participation of every individual, are not going to change the form of behavior, or promote the reduction of the amount of waste generated. Clarification of individuals is necessary, to become allies in the transformation. For the definition of strategies, it is necessary to build a comprehensive knowledge of local reality of each group and the factors involved in the urban context.

KEY WORDS: solid waste, universities, environmental

LES DECHETS SOLIDES GENERES DANS LE MILIEU UNIVERSITAIRE: UN PROBLEME A RESOUDRE

RÉSUMÉ

Les déchets solides est un des principaux problèmes environnementaux rencontrés par les êtres humains, principalement parce qu'il ne se termine pas lorsque la "poubelle" est de collecter et ont persisté jusqu'à la destination finale reçoit. Les déchets solides produits dans l'université englobe les déchets solides urbains, industriels et de soins de santé. Ces déchets sont générées dans les secteurs administratifs de l'éducation (salles de classe et laboratoires), pour appuyer les activités académiques, résultant en une multitude de déchets qui seront collectés et éliminés correctement. Il est commun dans ces environnements de l'élimination des carcasses d'ordinateurs, d'appareils et de laboratoire, ainsi que les piles et lampes fluorescentes. Il peut également être généré des déchets classés dans la classe I (dangereux) à partir de laboratoires en chimie, biologie et physique. Minimiser la production de déchets à la source est considérée comme l'une des principales actions qui devraient faire partie des solutions proposées. Devrait être fondée sur le principe de la préservation, la recherche de moyens pour éviter la production de grandes quantités de déchets. Les effets de la pollution de l'environnement sont beaucoup plus complexes et plus diffus que l'on peut apprécier au début, ses suites et généralisée, mai aussi être chronique et cumulatifs, devenant ainsi une action plus complexe à nettoyer. Sans la participation consciente de chaque individu, ne vont pas changer la forme de comportement, ou de promouvoir la réduction de la quantité de déchets générés. Clarification des citoyens est nécessaire, qu'ils mai devenir des alliés dans la transformation des villes en scénarios durable. Pour la définition des stratégies, il est nécessaire de construire une connaissance exhaustive des réalités locales de chaque groupe social et les facteurs qui interviennent dans le contexte urbain, que mai soit adressée au public pour la planification nécessaire et mise en œuvre de programmes environnementaux.

MOTS CLÉS: déchets solides, les universités, l'environnement

LOS RESIDUOS SÓLIDOS GENERADOS EN EL ENTORNO UNIVERSITARIO: UN PROBLEMA A SER ENFRENTADO

RESUMEN

De residuos sólidos es uno de los principales problemas ambientales de los seres humanos, sobre todo porque no termina cuando la "basura" es recoger y persistió hasta el destino final recibe. Los residuos sólidos generados en la Universidad comprende los residuos sólidos urbanos, industriales y de cuidado de la salud. Estos residuos se generan en los sectores administrativos de la educación (aulas y laboratorios), para apoyar las actividades académicas, resultando en una gran cantidad

de residuos que deben recogerse y eliminarse correctamente. Lámparas Es común en estos ambientes de la eliminación de los cadáveres de las computadoras, electrodomésticos y de laboratorio, así como de pilas y fluorescentes. También se pueden generar residuos clasificados como clase I (peligrosos) de los laboratorios de química, biología y física. Minimizar la generación de residuos en la fuente es considerada una de las principales acciones que deberían formar parte de las soluciones propuestas. Debe basarse en el principio de conservación, buscando la manera de evitar la generación de grandes cantidades de residuos. Los efectos de la contaminación del medio ambiente son mucho más complejo y difuso que se podría evaluar en primer lugar, sus consecuencias y extendido, también puede ser crónica y acumulativa, cada vez más compleja la acción de limpiar. Sin la participación consciente de cada individuo, no van a cambiar la forma de comportamiento, o promover la reducción de la cantidad de residuos generados. Aclaración de los ciudadanos es necesario, que se conviertan en aliados en la transformación de las ciudades en los escenarios sostenibles. Para la definición de estrategias, es necesario construir un amplio conocimiento de las realidades locales de cada grupo social y los factores que intervienen en el contexto urbano, que puede ser para el público para la planificación y ejecución de programas ambientales.

PALABRAS CLAVE: residuos sólidos, las universidades, el medio ambiente

RESÍDUOS SÓLIDOS GERADOS EM AMBIENTES UNIVERSITÁRIOS: UM PROBLEMA A SER ENFRENTADO

RESUMO

Resíduos sólidos são um dos principais problemas ambientais vividos pelo ser humano, principalmente porque ele não se encerra quando o “lixeiro” passa para recolher, persistindo até o destino final. O resíduo sólido gerado em ambientes universitários engloba os resíduos sólidos urbano, industriais e de serviços de saúde. São gerados nos setores administrativos, de ensino (salas de aula e laboratórios), de apoio às atividades acadêmicas, resultando em uma infinidade de resíduos a serem coletados e dispostos adequadamente. É comum nestes ambientes o descarte de carcaças de microcomputadores, aparelhos eletrodomésticos e laboratoriais, assim como pilhas, baterias e lâmpadas fluorescentes. Também pode ser gerado resíduo classificado como classe I (perigosos), proveniente de laboratórios de química, biologia e física. A minimização da geração de resíduos na fonte é tida como uma das principais ações que devem integrar parte das propostas de solução. Deve ser baseada no princípio da preservação, buscando-se formas de evitar a geração de grandes quantidades de resíduos. Os efeitos da poluição ambiental são muito mais complexos e difusos do que se poderia avaliar de início, suas conseqüências, além de disseminadas, podem ser também cumulativas e crônicas, tornando mais complexa a ação de despoluir. Sem a participação consciente de cada um dos indivíduos, não se conseguirá mudar a forma de comportamento, nem promover a redução da quantidade de resíduos gerados. O esclarecimento dos indivíduos se faz necessário, para que se tornem aliados no processo de transformação. Para a definição de estratégias, é necessário construir um conhecimento abrangente da realidade local de cada grupo e dos fatores que interferem no contexto urbano.

PALAVRAS-CHAVE: resíduos sólidos, universidade, meio ambiente.

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