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PILOT PROJECT OF WASTE MANAGEMENT IN ZAMBIA: THE SUCCESSFUL REALITY OF KOINONIA, LUSAKA*

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Abstract

The quantity of wastes globally is increasing, not only in the industrialized states but also in the developing countries. According to the report UNEP 2010, this is attributable to a demographic growth, new urbanization and a general improvement of lifestyle.
Zambia can be considered an example of this situation, because is characterized by a significant economic and social development, but at the same time by strong economic inequalities. Referring to the waste management, the Zambian legislation is updated and conformed to the international guidelines for health and environment protection. However, the municipal solid waste management still appears fragmented, characterized by several critical issues and the capital, Lusaka, it is symbolic. The waste disposal is not performed as provided by the national law but according to costumes and habits deeply embedded in the population. In fact, the wastes are usually abandoned and accumulated on city streets, the methods of disposal are reduced exclusively to silting and uncontrolled incineration, even thought a dumpsite is placed in the district of Kafue and a more recent one in the district of Lusaka.
In this paper are presented the first results of a work conducted in collaboration with non-profit NGO Amani, for a project of international cooperation, facing the introduction of waste separation and recycling in the Koinonia community in Lusaka. The study has, as main objective, the creation of a municipal waste management model that was effective, lasting and exportable to other African countries. The analysis of the territory and community habits, along with the involvement of the local population, have led to the success of the project, currently under implementation and realization, for the differentiation of product classes of waste generated in the community with a view to recovery and recycling.

Keywords: Lusaka, municipal waste, recycling, waste management, waste disposal

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1. Introduction

The amount of waste is rising around the world, especially in developing countries, due to the simultaneous occurrence of several factors including the continuous increase of the population, changes in lifestyle and increasing urbanization. (Guerrero et al. 2013) The UN-habitat study of 2010, *"Solid waste management in the world's cities"* (Anand, 2010) shows how these countries not have real plans for the waste management and how so precarious and worrying conditions in terms of impact on health and environment persist. Moreover, the issue of public health becomes clear and worrying during the rainy season, when outbreaks of various diseases, such as cholera and dysentery, are generated in the majority of the most densely populated areas. These diseases then spread and propagate because of the poor sanitary conditions (Wilson et al., 2012). This year, in Zambia, about 1179 cases of cholera, with 31 confirmed deaths (8 were children) have been recorded (Unicef Zambia, 2016).

However, there is a wide legislation on environmental issues in Zambia. National environmental policies formulated by the Ministry of the Environment consider theoretically the effective management of waste as part of the environmental protection strategy and pollution control and especially the protection of public health. National environmental policies, by the Ministry of the Environment, consider, in principle, an effective management of waste as part of the environmental protection strategy and pollution control and especially the protection of public health (Anand, 2010). In specific, the waste management is regulated by the Parliament Act, 2004, thank to which have been instituted the Waste Management Unit at Lusaka City Council. In addition, there is the Environmental Management Act (GRZ, 2011) e l'Health Act (GRZ, 1978) which treats these issue. This is a high-quality and updated legislation. It defines a separate waste management, in order to recycle materials according to the different product categories, and landfill disposal of mixed waste. Moreover, it considers sanctions for irregular practices of waste disposal.

As reported in the Environmental Audit on Waste Management del 2007, in Lusaka the administration has contracted out garbage collection to private companies, which confer on the city dumpsite. (Chifungula, 2010) This landfill, located to the west to Chunga, does not operate disposal of waste according to appropriate safety standards for operators inside. Furthermore, all around the city are created irregular collection sites and uncontrolled incineration of waste, despite the laws. These happens because is not possible pay collection services by the majority of the population belonging to the lower classes.

In this situation, an informal economy of wastes has been established in which the different actors, mainly groups of poor citizens, collect and sell wastes to be recycled for their own gain to ensure their subsistence (Simpson and Gupt, 2010). To confirm this, the PDFs below in Fig. 1 shows how the regular collection system covers about 45% of the population and the amount of waste handled illegally are significant (Anand, 2010). Illegal actors also take care of the disposal of a large amount of waste (94,297 tons / year), even higher than the ones disposed in landfill (77,300 tons / year). Another interesting fact is the low quantity of recycled material, approximately 16,000 tons/year, compared to the amounts that would be potentially recyclable. The recyclable waste is not completely processed within the country but about 30% is transported to South Africa or Zimbabwe.

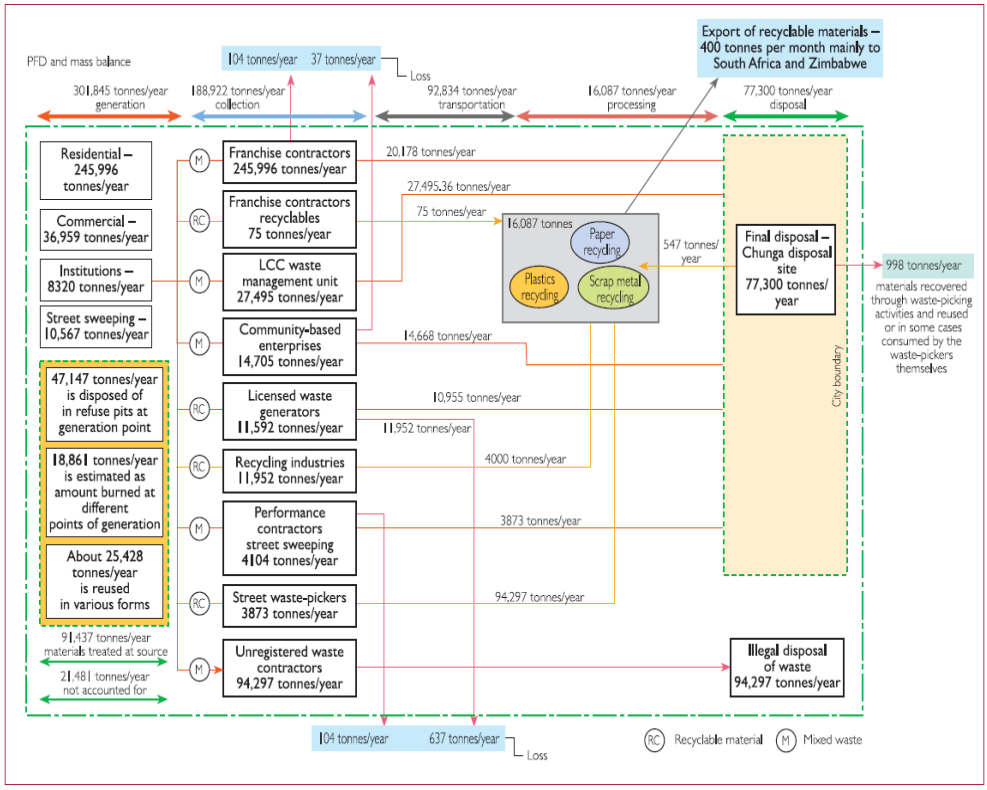

Fig. 1. PDF representing the situation of waste disposal in Zambia (Anand, 2010)

In dumpsite waste separation officers work in very poor health and hygiene conditions, which often stand side by side with members of the population, searching useful materials. These habits characterize all the inhabitants even those of the suburbs of Lusaka, as are the members of the Koinonia community, the place where the project reported in this memory started. In fact, the project moves just by the need to involve and educate people on the subject of wastes and to create a differentiated waste management system in partnership with the community, which could also be versatile and adaptable to other realities in Zambia and in the developing countries in general.

2. Experimental

2.1. Case study

The community of Koinonia, located in Lusaka province, in Chilanga district, at about 15 km from the center of the capital, is a community of life, founded in 1982 by Father Kizito, supported by the NGO Amani since 2000 with whom collaborated in the realization of some projects. The total area owned by the community covers an area of 100 acres, equivalent to 40.5 hectares, of which 8 hectares are the living quarters of the community and the remaining 32.5 correspond to the agricultural area, which is cultivated in most of part with corn, and includes the horticultural areas and some cultivation of moringa. The village consists of ten residential houses, the Mthunzi center for street children, a medical clinic, a school, a library, a theatre, a poultry and a piggery. There is also a joiner, a computer lab, a

football pitch and a structure, recently completed, which should be used as a school of agriculture. The overall prospective is to create social entrepreneurship activities that could make, in the long terms, the community and the project sustainable and independent.

The resident people are one hundred and fifty, but there are variations during the week, until to have two hundred people, in public holydays. The resident population is itself divided into 10 households with 10 people each, plus 50/60 boys housed permanently at the Mthunzi center. The increase of people is due to the presence of the boys studying in other cities (borders) and children of the neighboring communities that participate weekly to community activities of Koinonia (home based). The community is self-managed throughout its administration. They elect every four years a president that coordinates the management of the community and chairs the weekly meeting of the Executive Committee, composed of five members (president, secretary, treasurer and two counselors). The support of ONG Amani for Africa is not only economical for the financing and maintenance of the facilities and activities, but also managerial and coordinative thanks to the presence of a reference person for many months a year, which works alongside the community.

The community of Koinonia, though on small-scale, represents a symbolic example of the general state of waste management in Zambia.

2.2. Waste management

In Koinonia, the population adopted the same method for the waste disposal, by silting and uncontrolled incineration, with consequences often harmful to the quality of air, soil and groundwater, resource from the entire community. Waste management included the use of storage pits, not far from the homes, where all members of the community collected wastes indiscriminately. Furthermore, the waste was abandoned all around the village, including horticultural areas (Fig. 2).

Fig. 2. Photographs emblematic of the situation in Koinonia. The first is a storage pit and the second are wastes abandoned

The necessity of a practical and applicable solution in a short time was the basis of the project. Daily habits of families were observed in order to identify the types of waste produced within the community and consider the potential for recycling of the materials according to the most appropriate collection plan. At the same time, some community members were involved to enable them to know and understand the dangers and the damage of these habits. The risks arising from the uncontrolled burning of waste for both health and the environment were then outlined. Moreover, there was a search for local companies operating in the recycling industry and a survey about which waste categories were

recyclable and therefore exploitable by the community. There were evaluated the modes of transports and the distances to be covered to reach the above-mentioned companies. Finally the managers of the landfill were contacted in order to obtain information about the types of waste transferable on to the site, the mode of transport and the costs of disposing.

It was clear from the researches that:

- the perception of environmental and health risks to the community is negligible;
- the knowledge on waste, their characteristics and economic value is limited;
- wastes derive from the normal daily activities of the community, from the kitchen to work activities related to the use of machinery for cultivation, up to personal hygiene. The wastes are constituted by biodegradable organic material, paper material, packaging, plastic materials, glass containers, clothing and footwear, aluminum tins, chemical products for the hygiene and the coating, inert ceramic materials and waste resulting from the management of the green areas and allotments;
- the recycling of materials is carried out by private companies and the plastic material was a result the more profitable to recycle;
- the disposal of general waste should be made to the Kafue landfill, according to the authorities. This landfill is at south of the city, far away from the community so prohibitive for the cost of transport. However, it is possible to apply for permission to use of the landfill Chunga, far few kilometers from Koinonia and therefore more advantageous;
- the Chunga dumpsite is for urban waste, ensure the collection of waste if the quantities are sufficient to justify the use of special transport, and requires the payment of 140 Kwacha, for an individual waste dumping.

3. Results and discussion

The project starts from the assumption that the success itself arises from the awareness that all actors share the choices and make it their own, so that the project is a shared thought and an imposition of a few (Edema et al., 2012). Knowing the importance of community involvement, it has been planned activities practical and training. For example, have been organized meetings to propose a new plan for the waste management and therefore encourage the sharing in the community, as well as meeting between technical knowledge and the local intrinsic knowledge to optimize the recovery plan. The separation of wastes has been explained to the boys of Mthunzi center by simple and funny games.

The new collection plan for the community is based on the vision of a holistic management system that minimizes waste production, taking advantage of the circularity that is established between the animal world, nature and the human being in order to create an organization that promotes the symbiosis of the three environmental compartments. Organic waste from the kitchen activities have been identified as a source for feeding pigs, whose waste is regularly collected and used for fertilization of vegetable crops. In addition, significant amounts of green waste from the pruning and maintenance of the gardens, with non-edible organic waste for pigs, have been defined as secondary raw materials, useful for the production of compost. This compost is useful for nourish the crops of vegetables that complete then the circle for managing the biodegradable organic waste, inside the community. The non-degradable waste management is instead planned and organized on the basis of public and private facilities in the area. The collection plan is designed in two successive steps in order to make gradual the transition to a differentiated waste management:

- Step 1: Collection of organic waste, compost, plastic bottles, mixed waste;

- Step 2: Collection of organic waste, compost, plastic bottles, paper, glass, ferrous materials, aggregates, plastics.

Depending on the type of waste, it has been necessary to think solutions for a simple collection system that would meet the demands of families and the approval of people. For this reason, the collection is organized in a mixed system: Proximity and door to door.

Specifically, bio-waste and plastic bottles are collected through a door by door collection system, unlike relating to mixed waste and the production of compost for which were individuated special collection points. Regard to mixed waste, has been set up four collection points, each with a container of 0.25 m^3, located at strategic positions for the community, representative for the same user base of 40 people. By means of a collection system provided every two day, the four containers are emptied into a main container in a collection center located in the square in front of the poultry (only fenced area). Once filled, it will be transported by the trailer available and disposed of at the landfill site.

About the door by door collection, the community has established a specialized team consisting of three persons involved in the control of the correct differentiation and the withdrawal of waste. Each household has been provided with a specific container for biodegradable organic waste, and a container for the collection of plastic bottles (Fig. 3).

Fig. 3. Containers for the of plastic and organic waste at a community family

Organic waste, for reasons of climate and high perishability, they are transported daily from the piggery of the community, after the differentiation of non- edible organic waste which are destined to production of compost. The plastic bottles are transferred weekly to the single container of a ton at the collection center, as well as for the mixed waste (Fig. 4).

The introduction of this system began with the application of a " year zero ", some days in which were closed all the storage pits, collected all the waste left on the ground, with the final abandonment of the practice of ' incineration. It has also been called a trial period of one year, with monitoring and optimization of the first phase, trying to organize the second phase with additional information.

Fig. 4. Images of the station of collection. To the right, the bags for the collection of plastic bottles; left, the bags of mixed waste and a working collection team operator

4. Conclusions

The situation of the Koinonia community reflects the general reality of Zambia. The condition was very precarious and dangerous and in need of an intervention. Population health and the environment were at risk because of the negative habits and the limited knowledge of the population.

The project has radically changed the habits of the community, so a period of adjustment has been necessary to get used to the new management. Nevertheless, the project has achieved almost immediately the approval and commitment of the whole community. In the first period, the team has been instructed in the proper work. The monitoring has found several errors or doubts in the separation of waste, especially among compost and organic pet. In this way, these errors were correct and the collection was efficiently improved. This described is the preliminary intervention planned and initiated at the community of Koinonia for a trial period of one calendar year starting from October 2015.

It is evident that sometimes the engineers must leave behind the numbers, because in the world there are places where the response to the working of a project derives from the people involved rather than charts and tables built on databases that are difficult to find.

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