

The methods used by the non-governmental organization in solid waste management; are they effective in combating waste in Zanzibar.

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Abstract

The aim of this study is to evaluate the methods (composting, recycling and segregation) used by Non-governmental organizations (NGOs) in solid waste management in Zanzibar, Tanzania. The qualitative methodology was used to analyzed data. Purposive and simple random sampling was applied to select the NGOs, respondents. Both primary and secondary data were used in this study. The questionnaire was established from related literature. An informal interview was also conducted with some members of Zanzibar municipal council office in order to situate and understand which of the methods is more effective and the challenges facing solid waste management in Zanzibar. The descriptive statistics was used as a statistical tool to analyze data. The study found that the methods used by Non-governmental organizations (NGOs) especially recycling has a significant impact on solid waste management in Zanzibar.

Keywords: Composting, non-governmental organizations, recycling, segregation, solid waste management.

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Introduction

Waste management emerges from the beginning of human existence. Thousand years ago in the world, human beings were always involved in some activities to manage waste. Earlier from the 1950s to 1960s, there were efficient waste management strategies due to the adequate resources and lower number of urban population. The initial method used was digging the ground and burying waste. This method was the best for that period since there was not so much waste. Burying waste helped to protect the people against various diseases caused by different animals in waste such as the mouse, rodents, and others Okot-Okumu & Nyenje [1]. Most African countries have been facing challenges in improving their solid waste management system due to the population growth and rapid urbanization Abduroul & Bakari [2]. In Tanzania, solid waste management has been a big concern since the colonial era. In urban areas, solid waste management was recognized as a service provided by the government as a duty to its citizens and payment has to be made for the services Ntakumulenga [3]. However, some of the citizens were unwilling to pay for the services, as a result, the urban authorities faced many challenges including rapid population growth and inadequate of funds and lack of the involvement of the people. There was much increase of waste in the cities where the system of waste management from the collection, transportation, and disposal was despondency [3]. Environmental pollution in the Islands of Zanzibar is a very serious problem because of the rapid growth of the population that leads to the increasing of solid wastes in the environment McIntyre C & McIntyre S [4]. The emerging of solid wastes is an inevitable outcome caused by day to day individual activities whereby its management results in environmental impacts and safeguard of human health [5,6]. Noted that there is the need of analyzing technical and nontechnical aspects of waste management system as a whole because there is a deep relation between them hence; there are linked to each

other in accomplishing waste management goals like the way the methods used in solid waste management (composting, recycling and segregation) are linked with one another. After independence in 1964, the increasing of solid wastes has been seen as the cause of so many diseases and poverty that lead to suffering in the society. Therefore, the combat of all kinds of wastes in Zanzibar has become the crucial aspect of Zanzibar government's macro policies [7]. After independence in 1964, the government immediately passed waste management regulations to regulate the waste management activities. The Vision 2020 and Zanzibar Strategy for Growth and Reduction of Poverty (ZSGRP), National Health Policy (2011), Education Policy (2006), Zanzibar Investment Policy (2004), National Land Use Plan (1995) and many other sectors based policies indicated the significance of waste management for socio-economic and sustainable development in the country. The Zanzibar government, therefore, established the tools and strategies to handle and control the waste management. Both strategies aimed at improving waste management system and reducing negative environmental and health impacts (Zanzibar Environmental Policy, 2013: United Nation Conference on Sustainable Development, 2012).

Taken into consideration the efforts the government put in place to improve solid waste management but yet Zanzibar has been badly littered by wastes due to the absence of national mechanism on waste management which has led to diseases and suffering among the people. Blomstrand [8,9]. In addition, the mixing of different types of waste together with hazardous waste in uncontrolled dumpsites heightens environmental and public health risks (UNCSO, 2012). Moreover, dwellers, tourists as well as some hotels dumped solid wastes around the residential areas or in the sea. There is a high quantity of solid wastes that have been generally left by the municipal council as unmanaged [4]. The collection of wastes and disposal done by the municipality cannot compete with much of the waste

produced in a day [2]. The decayed wastes and odors near the living and public areas result in air pollution and hence posing some human health risks Ally [10]. This problem becoming openly worse every year with low investments and low effort in managing the problem [4].

Non-governmental organizations (NGOs) in Zanzibar recognized the incapability of the government to meet the needs and so, therefore, NGOs have come on board to the enhancement of governmental and private efforts in managing solid waste in Zanzibar. NGO's are different methods that include composting, recycling and segregation. This study seeks to evaluate the methods used in solid waste management to see which is the most effective in reducing solid waste in Zanzibar. The literature is reviewed by looking at the following themes; the empirical evidence and what the following terms are: solid waste, solid waste management, recycling, composting and segregation.

A study by Hellman and Karlsson [11]. Indicated that waste segregation and composting are the most effective way of decreasing waste in the environment. Furthermore, Kaushal et al. [12], in the study of Municipal Solid Waste Management in India and suggested that composting and segregation are very important in solid waste management. Singh and Dey [13] conducted a study in different municipalities in Manipur, India and discovered that NGO's can best reduce solid waste by creating the awareness of the people on the effect of littering their surroundings. Additionally, Coker et al. [14] looked at solid waste management practices at a private institution of higher learning in Nigeria. Their study agreed that the separation of waste materials into groups such as nylon, bottles, organic materials and plastics after collection and to be sold to the secondary markets and some organic waste materials from food wastes and animal houses wastes to be utilized for organic fertilizer and bioenergy production can improve the solid waste management systems and contributes to the economy increase in wealth.

Again, Regassa et al. [15] examined challenges and opportunities in Municipal Solid Waste Management in Addis Ababa Ethiopia. The study revealed that absence of waste reduction promotion including recycling, lack of separation of waste, cost recovery, composting, energy option practices, community involvement and public awareness were some of the challenges mitigating waste management in Ethiopia. Kaseva and Mbuligwe [16] after their studies stated that it is necessary to encourage waste composting and recycling activities.

Solid Waste

Solid waste is any sludge, refuse, and garbage which resulted from control facility of air pollution, water source treatment plant or waste action plant and other unwanted materials such as solid, liquid or gaseous materials which are resulted from commercial, industrial, mining, community activities and agricultural operations (Wisconsin Department of Natural Resources). Usually, the management of solid waste includes financing, operation, construction and facilities planning for the collection activity, transportation, recycling method up to their final waste disposition [17].

Solid Waste Management

European Union's [18] defines solid waste management as includes all process of managing solid waste from its collection to the final destination of waste disposal. In order to be managed accurately, there are the needs for solid waste management to be guided and monitored through its waste regulations with its legal frameworks. Victor and Agamuthu [19] stated that solid waste management involves all the systems of managing solid wastes from its collection, storage, processing, and transportation to their final disposal. Also, solid waste management definition has been suggested to include the controlling of solid waste activities [20].

Composting in Waste Management

Composting is the process of using microorganisms to lower the waste organic content. Composting is the low cost of low technology that approaches in the reduction of waste, Composting is defined as a method of waste disposal whereby there is the naturally decomposes of organic waste under oxygen-rich conditions. Composting helps in the reduction of greenhouse gas emission. For organic waste treatment, composting is an appropriate method [5,21].

Segregation in Waste Management

Segregation is the process of separating waste into biodegradable waste and Non-biodegradable waste. Biodegradable waste includes organic waste such as; papers, leaves from trees, kitchen waste, fruits, vegetables among others while non-biodegradable waste includes plastics, paper, glass, metal, paints, chemicals, bulbs, spray, and others.

Recycling in Waste Management

Recycling is the process of turning already used materials (waste) into new usable products. This helps to reduce the use of raw material that would have been used in the manufacturing of products. It helps in controlling water pollution, air pollution, and land pollution. Recycling is the effective, efficient and best method in the solid waste management system. It is an adaptable tool for minimizing the quantity of household that bury the dumpsites and providing raw materials for the industries [22].

Method

In evaluating the effectiveness of the methods used by of non-governmental organizations (NGOs) in reducing solid waste in Zanzibar, the qualitative method was used in the collecting and analyzing data. The descriptive statistics were used in analyzing primary data. Purposive and simple random sampling was applied in the study for selecting the respondents, the study area Zanzibar (Unguja Island) and non-governmental organizations (NGOs). The data were collected using questionnaires. There was a total of four hundred (400) respondents in the study from eight environmental NGOs; fifty (50) members from each selected NGO. These group of people was chosen because they are perceived to have much information and understanding on solid waste management. The entire numbers of environmental NGOs in the chosen area of study were twenty (20). The selected eight (8) NGOs were chosen by considering their distance, time and transport as the NGOs are separate in different areas and cities as some

of them are in rural area. The NGOs selected in the study areas represent other NGOs as they are involved in similar activities and experience the same issues. The study applied close-ended questionnaire to gather the information from targeted respondents. The questionnaire was established from related literature reviews, studies, and the research question. In the close-ended questionnaire, the respondents will specifically respond their answers by putting a tick. The closed-ended questionnaire is easier to manage because each point is followed by alternative answers and is efficient to use in terms of duration. An ethical agreement was requested from NGOs' management and respondents and then questionnaires were distributed to be filled. Likewise, there are some data that the researcher obtained during a visit from Zanzibar Municipal Council office at data collection period that was used as a secondary data in this research as well. The IBM SPSS software was used in data collation and analyses. The descriptive statistics was used to analyze data for this study. Data was presented by using tables with some emphasis on the percentage then the results were qualitatively analyzed.

The study assumes the following hypotheses:

H0: The methods (composting, recycling and segregation) used by NGOs have a significant impact in reducing solid waste management in Zanzibar.

H1: The methods (composting, recycling and segregation) used by NGOs have no significant impact in reducing solid waste management in Zanzibar.

Results

Out of the four hundred (400) questionnaires distributed, three hundred and fifty-two (352) usable questionnaires were retrieved from respondents and analysed. Considering the hypotheses of the study, the result shows that the majority of respondents agreed that the methods (composting, recycling and segregation) used by NGOs have a significant impact in reducing solid waste in the environment and hence reducing the health risk posed by this waste. Composting of solid waste is realized to have impact on solid waste management as agreed by 78.4% of the respondents, segregation of solid waste recognized to have impacted on solid waste management by 69.9% and recycling of solid waste is agreed by the majority of the respondents about 91.0% to be effective on solid waste management as presented in Tables 1-4. The result proves that the three methods thus composting, recycling and separation are effective methods in reducing the amount of solid waste in the environment and hence lead to a sustainable environment. Also, from the result, we can infer that recycling is favoured to be the most effective method for reducing waste in the environment. The null hypothesis of this study was rejected. As a whole, all the methods used by NGOs compliment with one another in reducing solid waste in the environment which leads to a sustainable environment.

Discussion

The results presented above provide an insight into the nature of activities used by NGO's and their impacts on reducing solid waste in Zanzibar. It is evident in the results obtained from this

Table 1. The enrolment of Zanzibar municipality workers according to their gender and positions.

No.	Position	Male	Female	Total
1	Drivers	24	-	24
2	Containers cleaners	10	46	56
3	Roads cleaners	11	13	24
4	Gardeners	6	6	12
5	Secretaries	-	27	27
6	Waste collectors	8	12	20
7	Accountants	1	1	2
8	Supervisors	6	2	8
9	Track repairs	-	3	3
10	Total			176

Source: Zanzibar municipal council district authority.

Table 2. Ages and percentage of the respondents working in the non-governmental organizations (NGOs).

Age	Frequency	Percent	Valid Percent	Cumulative Percent
20-30 years	123	34.9	34.9	34.9
31-40 years	116	33	33	67.9
41-50 years	58	16.5	16.5	84.4
51 and above	55	15.6	15.6	100
Total	352	100	100	

Source: Survey data

Table 3. Gender and percentage of the respondents working in the NGOs

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Male	219	62.2	62.2	62.2
Female	133	37.8	37.8	100
Total	352	100	100	

Source: Survey data

Table 4. Methods used by NGOs and their impact in reducing solid waste by percentages.

NGOs Involvement Methods	Agree %	Disagree %	No idea %	Total %
Composting	78.4	16.5	5.1	100
Recycling	91	5.6	3.4	100
Segregation	69.9	23	7.1	100

Source: Survey data

study that about 78.9%, 69.9% and 91% of the respondents agreed composting, segregation and recycling be effective strategies in improving solid waste management in Zanzibar. All the three methods are important in the solid waste reduction in Zanzibar. The complement one another. However, recycling is seen by many to be the best method for reducing solid waste in Zanzibar. This is because NGOs are paying for goods that can be reused for that matter most people in Zanzibar are involved in collecting waste materials that can be converted into new finished goods. This has improved the sanitation conditions and hence fewer diseases. This goes in line with what has been stated earlier by Momoh & Kaseva [16,22] but centrally to [11-15]. We can, therefore, state that, the Non-governmental organization should increase their recycling activities by paying more for reused materials to reduce waste and that can benefit the people economically. Some other methods were realized as effective ways through personal interviews with respondents. These methods are awareness creation and this supports what is suggested by Singh & Dey [13]. NGO's need

to do more in terms of educating the people on the effective waste management practices such as composting, recycling and segregation. NGO's must frequently remind the people through social media and other channels to clean their surroundings and give training to people in waste recycling, waste segregation and waste composting. More waste collection containers must be kept at vantage points where people can dump their waste in which is an effective method used in developed countries such as Germany, USA, Australia, and others. NGOs must give education on waste management practice to women as they are considered as homemakers. This, in the long run, would help improve solid waste management in Zanzibar which would lead to a sustainable environment [23].

Conclusion

The purpose of this study is to evaluate the various methods used by NGOs in solid waste management in Zanzibar and to be precise the Ungula Island. The results show that the methods (composting, recycling and segregation) used by NGO's in reducing solid waste are effective in dealing with the environmental problems in Zanzibar. However, recycling is seen by many to be the most effective method in reducing waste than the other method more is required to improve the condition of waste management in this Island. NGOs must involve women in their quest to help improve the environmental situation since they are the house makers in the various households in Zanzibar. The general masses should be educated on the strategies used by NGO's in fighting waste. This study would enable stakeholders, governments, the sanitation to know the most appropriate methods for reducing solid waste management in Zanzibar and other parts of the world.

Recommendation

- The government should enact direct policy concerning solid waste management and arrange the National Waste Management Plan as it is an essential foundation for the development of a sustainable waste management service.
 - There is the need for Zanzibar Municipality to adopt 3R options (reuse, reduce and recycling) or composting strategies for effective solid waste management.
 - The community should be encouraged to engage in segregation of waste materials at the source for the purpose of recycling, this will help to minimize the quantity of waste to be disposed of.
 - The effective collaboration among government agencies in charge of waste management, NGOs, the individual households and other stakeholders is very important in the solid waste management.
 - Awareness creation and provision to the community concerning waste management, its effects and benefits are very important in the improvement of waste collection and management in general and this is the way to the sustainable environment.
 - The government should undertake phased programs that can ensure and motivate community participation such as to plan for regular meetings with the local resident for well-being associations.
- NGOs should improve and develop recycling process, segregation and composting method as the main methods that they engaged in so that they can be formally performed and bring huge benefit to people, environment and in the solid waste management.
 - There is the need for government and NGOs to develop technology from developed nation but should be developed according to the local conditions. This will help to improve the adoption of other methods of solid waste management such as the adoption of life circle approach, waste hierarchy, sanitary landfilling technology, waste to energy and other appropriate solid waste management methods.
 - The government should ensure the enforcement of the laws and take serious action against those who undermine waste management activities.

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