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Full Length Research Paper

Engineering Approach Measures to Solid Waste Disposal Management as an Integral Part of Environment Menace in Omu-Aran, Irepodun Local Government Area, Kwara State

Dr. Engr Gana A. J.[1*] and Dr. Engr. Ojediran J.O[2].

[1]Coren Redg, MNSE, MNICE, Istructe (Lond) U. K, ICE (Lond)U.K.
Civil Engineering Department, College of science and Engineering, Landmark University, Omu-Aran, Kwara State.
[2]COREN Regd, MNSE, MINIAE, MASABE
Agricultural & Biosystems Engineering Department, College of Science and Engineering, Landmark University, Omu-Aran, Kwara State
Corresponding author's Emails: phildebo123@gmail.com, doctorgana@yahoo.com

Abstract

This paper discussed on solid waste disposal management in Omu-Aran Town in Kwara State. It has critically examined physical settings of the town in terms of climate in general, which include the Rivers, Vegetation, Economy, Agriculture, Commerce, industries, Transportation, infrastructure, Health institutions that includes state, local and private owned in the town, which are the sources of solid wastes occurrences. The waste storage methods, frequently of wastes collection and wastes disposal methods. Research findings shows that solid wastes collection and disposal should be on daily basis in the highly commercialized towns and cities, while in the less commercialized towns and cities, solid wastes collection and disposal can be carried out on weekly basis. The wastes disposal methods such as open dumps, which pose great hazard to human, animal, and plant lives are commonly practiced in Omu- Aran, while less hazardous methods such as disposal through incineration and sanitary land fill are less employed. This paper highlights the Engineering Approach measures for solving solid waste Environmental menace problems in the town. This method is seen to be the appropriate, considering the Technological advancement in treating Environmental Hazards in different parts of the society.

Keyword: Engineering measures, solid wastes, management, and disposal**.**

INTRODUCTION

Solid waste or refuse is one of many types of waste that must of necessity be generated as a result of daily activities in any inhabited area. The continued generated of these waste calls for constant removal and effective management. This will prevent environment pollution and its accompanying health hazard usually caused by these wastes in dumping site and in its neighboring environments.

Waste management is a serious environmental problem that has been the subject of several studies, conference, strategic meeting and debates. It's importance lies in its visibility and clear intrusion into the daily lives of people, as well as the numerous secondary effect of its neglect. This accounts for the global and national attempts to improve the management of waste.

The issue of solid waste management especially in the residential areas could not be handled with levity for some important reasons. In the first place, the residential areas constitute the highest in comparison with others (Afon, 2003). Secondly, it is also the most troublesome to management since it consists of diverse range of material (glass metal, paper, food, nylon, etc) totally mixed

together with relatively small amounts of each (Matther and chairman, 1995). Thirdly, it is the most obnoxious because it accumulates easily near communities where it may pose grave health hazards as well as becoming insulting or offensive to sight and smell (Adeibu, 1993). Fourthly, the urban residential environment is not only the home of man, but also the engines of economic growth and centre for employment and opportunities. They are also areas of enormous political, social economic and found. Therefore, any problem that threatens the well being of man in the urban areas threatens all other spheres of life. Hence, residential districts of cities and towns should be considered as very imperative. In essence, the means of evolving a sustainable urban solid waste management should be developed at as cost.

Sources and constituents pf solid wastes

Solid waste is a complex mixture of both organic and inorganic materials. Solid waste composition varies widely and depends to a great extent on local life –style waste constituents as a function of population activities (table 1).

General classification of solid wastes

Solid waste can be classified into municipal wastes, Industrial waste and hazardous wastes. Municipal wastes are waste are wastes generated from residences or activities from commercial and institution settings, which includes food wastes, rubbish, etc. Those wastes arising form industrial activities includes rubbish, ashes, demolition and construction wastes are referred to as industrial wastes. Hazardous wastes are those wastes that posed substantial danger immediately or over a period of time to human, animal or plant life. This types of wastes are flammable, has corrosive reaction or toxic. They include radioactive substances.

The incineration institute of America classified solid wastes into six groups. The table 2 below shows these classifications with their moisture contents and heat values.

The objective of this Research: - *The main objectives of this research are as follows:*

(1) To provide an opportunity for the improvement and promotion for the efficient solid wastes management of Omu-Aran town.
(2) To provide base line information of the solid wastes generation rate of the town, this can serve as a basis for further study.

METHODOLOGY

Adopted Methodology for this Research are:

(i) Review and evaluation of all relevant documents on solid wastes management systems of Omu-Aran Town.
(ii) Carried out field visits to various places of current wastes disposal, and as well as determining the intensity of the problems.
(iii) Interviews with different Residents and officers of the town.
(iv) Profile of the study area Omu-Aran own.

RESULTS AND DISCUSSIONS

PHYSICAL SETTINGS OF OMU- ARAN TOWN

(i) Location

The town is situated some kilometers South of Ilorin, Capital of Kwara state and 16km North- East of Otun Ekiti, in Ekiti State. It is located on Latitude 8.9 0N and Longitude 50.61oE. The town shares boundaries with Ilofa and Odo-Owa in the East, Ipetu-Igbomina and Arandun in the South, Oke-Onigbin in the West, Oko and Isanlu-Isin in the North and North- West respectively.

This location confers advantages of centrality in the midst of other Igbomina, Ekiti and Moba towns. The town thus appears to have been favoured by nature to be at the heartland of an ancient confederacy, which thrived through the ages, particularly in the 18th century.

Omu-Aran, as with most parts of Igbomina Land, is on the highland beautifully nested in a girdle of hills. It is located on a section of Elliu Hill and is actually the highest point above sea level in Kwara State.

(ii) Climate

The climate is tropical maritime with a long wet season. The weather is moderate, subjected to modest variation of hot and cool as the season changes. Rain is typically heavy and the season lasts for about eight months in a year. It lies within the zone that envoys the highest rainfall in Kwara State.

Rivers

Five major rivers drain the town. These rivers are Oisa, Omipupa, Areja, Omikuru and Rooro, Flowing fro various directions and providing not only potable and irrigation water but also aquatic splendor and a mass of fertilizing matter deposited on the banks, particularly during the rainy season floods.

Table 1: Sources and constituents solid wastes

Population activities	Major constituent of solid waste	Class of solid waste
Rural domestic	Wood, food, remnants, sewage	Composting
Urban domestic and commercial	Food packaging, textile, paper materials, wood materials, leather, mental cans glass, rubbers, and plastic	Non - composting
Urban automobile	Ferrous metals, glass, rubbers, and plastics	Composting
Agriculture	Crops, wood residue, logging food waste, saw dust	Composting
Chemical petrochemical	Packaging paper, wood materials, textile	Composting
Allied industries	Plastic, metals, rubber, glass	Non -Composting

Table 2: Classification of solid wastes

Type	Group	Content	Moisture Content (%)	Heat value (KJ/kg)
0	Trash	Waste paper, cardboard and wood	10	8,500
1	Rubbish	Paper, wood scraps, floor sorcepts, and foliages	25	6,500
2	Refuse	An even mixture of rubbish and garbage	50	4,300
3	Garbage	Animal and vegetables	70	2,500
4	Pathological wastes	Animal and human remains	85	1,000
5	Special wastes	Industrial gaseous and semi- liquid	90	9,500

Source: Ashworht 1991

Vegetation

The town is blessed with a large expanse of rich soil and greenery of the guinea Savanna. From it grow such food crops as yam, maize, guinea corn, cocoyam, cassava, rice, locust bean, shea butter, etc and such cash crops as cocoa, kola nut and palm.

Economy of Omu- Aran

Omu- Aran has grown from a rural economy to a thriving commercial centre of importance, not only to its indigenes and inhabitants, but also to network of far and near towns and villages. From a state of absolute dependence on agriculture and traditional services alone, in the past, the economic activities, including manufacturing, the professions, civil service, trading, transportation, lumbering, artisanship, and agriculture among others. In consequence, economy today is bigger, more sophisticated and more prosperous.

Both agricultural, which remains the fulcrum of the town's economy, and these other economic activities are further discussed in greater detail as follows: -

Agricultural, Commerce and Industries

Farming this main stay of the town's economy is still practiced mainly at the subsistence level. It is done on full time basis mostly by the aged and on part time basis by public servants and enterprising professionals and artisans.

Commercial farming is limited to cocoa plantations, oil palm plantations and large scale yam, maize and cassava cultivation. Particularly for the purpose of cocoa farming, indigenes of the town are spread across the forest belt of the country, concentrating around Ile-Ife, Ore, Aisegba and Owena in South West Nigeria.

Crop farming is also complementary by poultry and livestock farming by indigenes of the town.

Industrial Activities

There are also many of small and medium scale industries operating and contributing to the economy of the town.

These include:

- ❖ Roofing Sheet Industries, exemplified by Ajide Olaiya Roofing Sheet Industry located at the formal site of the town's aerodrome.
- ❖ Food Processing Industries, involving the production, packaging and marketing of Ogeieda (coarsely ground maize formula for making Omu-Aran's variety of hot pap)
- ❖ Bakeries, producing bread for the consumption of the people of the community and its environs.
- ❖ Feed mill/Poultry Farm, established by the State government. Production was halted for some time, but it is presently being resuscitated.
- ❖ Block Making Industries, Molding blocks on commercial basis. Some of the known names include Toye Block Industry, Olaiya Block Industry, etc.
- ❖ Furniture Making Industries, producing household and office furniture. The known names include Abusi Edumare Furniture Works and Ike- Oluwa Furniture Works.
- ❖ Recreation, Omu-Aran is well served by hostels of good quality, including Omoniyepe Hotel, Mucenty Hotel, P-County Hotel, Alakaka Hotel.
- ❖ Artisanship, Skilled artisans and tradesmen now also thrive in the town. They are made up of fashion designers, hair dressers, automobile mechanics, cobblers etc.
- ❖ Saw Milling has lately sprung up in the town, striving to meet the lumber requirement of Omu-Aran and environs.

Transportation

There is also a thriving road transport sub- sector in the town, contributing in no small way to the welfare of the people and to the well being of the economy.

Travelers would get a vehicle from the town any time of the day to far and near places, including Oro-Ago, Isanlu-Isin, Aran-Orin, Odo-Owa, Oko-ola, Oro, Ajase-Ipo, Ilorin, Ibadan and Lagos, among others. However, the sector also still requires revamping and more investment to give more quality and bring it up to date. This can be done by introducing taxis and increasing the number of buses plying the township roads.

Infrastructure

Omu- Aran is well connected to the outside world by a network of roads; it is served by access routes to Ado Ekiti in Ekiti State, Egbe/ Kabba/ Lokoja in Kogi state and Oro- Ago , Isanlu- Isin and Ilorin, in the Kwara State. The Omu- Aran Lokoja route has recently become the favorite of people traveling to Abuja. Internally too, there is a fair network of graded roads connecting different parts of the town to one another. The upkeep of the roads has been borne by the combined efforts of the community, the Local Government Authority and the State Government. Water supply in the town is one of the best in Kwara State through the public water system. As a matter of fact, many neighboring towns and villages are being supplied with water from the town's waterworks.

Omu- Aran has also been blessed with public power supply since 1978 when the National Electric Power Authority (NEPA) connected the town to the National grid. The 132KVA distribution station at Omu- Aran supplies electricity to the Igbomina and Ekiti lands in Kwara State. And also parts of Kogi and EKiti States. The electricity supply is one of the most stable in the whole federation.

The postal system is well developed, with the strong presence of the Nigeria Postal Service (NIPOST) in the town.

In the area of banking, Omu-Aran presently uses the Union Bank, Omu-Aran Community Bank and Nigeria Agricultural and Rural Development Bank. There are strong indications that the more banks will open their branches in Omu-Aran as some are under construction.

Presently, Omu- Aran envoys all the three major mobile (GSM) network services in Nigeria (MTN, GLO and Celtel). Telephone in and around the town is receptive.

Health institutions

The Health institutions in the town is classify into the following groups: -

(a) State: -

(i) General Hospital Omu-Aran

(b) Local Government: -

(i) Aran Primary Health Center Omu-Aran
(ii) Ifaja Primary Health Center Omu-Aran
(iii) Ihaye Primary Health Center Omu-Aran
(iv) Orolodo Primary Health Center Omu-Aran

(c) Private Health: -

(i) Ajisafe Hospital Omu-Aran
(ii) Adeyemo Hospital Omu-Aran
(iii) Olaolu Clinic & Maternity Omu-Aran
(iv) Asore Clinic & Maternity Omu-Aran
(v) Victory Clinic & Maternity Omu-Aran
(vi) E.C.W.A Hospital Omu-Aran
(vii) E.C.W.A Hospital Oke-gbala, OMu-Aran

Educational Institutions

The post primary and post Secondary institutions located in the town are as follows: -

(i) Landmark University

(ii) Landmark Secondary School
(iii) Government Secondary School
(iv) Omu-Aran High School
(v) Ogbo Grammar School
(vi) Ofe-Aran Commercial Secondary School
(vii) Aperan Comprehensive College
(viii) Federal Government Girls College
(ix) Adeoti Secondary School
(x) Victory Model College
(xi) Obi International College

Sources and types of solid wastes in Omu- Aran

The observation made shows that there are different sources and types of waste. The main sources are grouped as following: -

i. Residential
ii. Commercial
iii. Construction and Demolition
iv. Municipal

The types of solid wastes produced in the residential area consists of mainly organic, while commercial solid wastes are predominantly inorganic, which consists of materials such as food waste (garbage), paper of all types, card board, plastics of all types, textiles, rubber, leather, wood and yard wastes.

The inorganic fraction consists such as glass, crockery, metals of different types and dirt. Institutional sources of solid wastes, which include offices, educational institutions, others, produce similar types of wastes to commercial and residential sources. Wastes are also produced during construction buildings, individual residences and other structures. The composition of these includes dirt, stones, concrete, plaster, lumber (Timber) etc. Demolished wastes buildings, broken out street side walks bridges, and other structures that are similar to construction wastes most of the construction and demolished wastes are recycled by selling it to users in which it is used as a sub- grade or final cover for access road to residences and commercial centers.

Other community wastes resulting from the operation and maintenance of municipal service include there organic solid wastes such as bones, horn, dung, tail and intestine, street, sweeping, roadsides litters and wastes form municipal litter containers, landscape and tree trimming, dead animals and a banded vehicles.

Collection System

The general modes of collection system are communal contains and door-to-door system. Communal waste collection is done by using waste containers placed randomly within over crowed residential and commercial arrears. The household commercial and institutional waste generating sources are required to deliver their waste to communal collection points located by road sides and vacant plots in their vicinity.

Dumpling

The disposal site that is currently operating is open filed located at a distance from the town. This is an agricultural area where no extra preparation is done to make it disposal site. Solid waste of every kind is dumped in the open field haphazardly, and the waste that is mostly organic attracts dogs and brides around the site. Generally, no proper method or sanitary land filling is applied for the disposal of solid wastes collected from residential areas, hotels, restaurants, institutions, etc are halved for open-air disposal at the site.

De-merit and limitations of the solid waste disposal methods in Omu-Aran

i. The lack of an effective organizational strategy especially by the administrators of the town.
ii. Non-availability of sufficient statistical analytical data on solid waste management.
iii. Environmental computability – The open dumping as practice in Omu-Aran have attended problems of atmospheric pollution, especially where the damping is done of complex mixtures which could include certain industrial organic solid waste
iv. Non-profit oriented schemes – usually, solid waste management venture is not regarded as a profit making scheme, although clean and sane living environment is the primary objective for all. The non-profit nature of the scheme and its management is the reason for non-involvement of the majority of the business organization in Omu-Aran town.

CONCLUSION

Omu-Aran like many other towns in Kwara State has many sanitary problems, of which the major one is solid waste. It is very common to see piles of wastes on the streets, river banks besides individual houses, available open areas, and market areas. In all these areas where wastes are illegally thrown, it is observed that flies and rodents breed and also dogs, goats and shop scatter the wastes. The wastes are polluting the rivers in and around the town during the rainy season, taking along with runoff. Population explosion and the associated anthropogenic activities generate huge amounts of different wastes that adversely affect the physical environment of the town.

Lack of proper city planning which contain the regular waste management system is found to be one of the conditions which enhances environmental degradation in

the town. This is specially noticed in the crowded areas where residents lack space to dispose their waste, since the majority of the houses in the town are regarded as slum. The poor housing condition of the town is characterized by lack of toilets and kitchen facilities, and proper sanitation. A good waste management scheme for Omu-Aran town with well designed engineering schemes and application is the appropriate method for solving environmental menace for the town.

REFERENCES

Basak NN (2006). Environmental Engineering, published by Tata Mcgraw-Hill publishing company New Delhi, India. Pp. 155-163.

Gana AJ, Osueke OC (2012). Integrated Water resources and waste management, water, sanitation, flood and storm, water management, World journal of applied science and Technology, published by faculty of science, Univeristy of Uyo Nigeria, vol 4, No.2, (pp. 308-309)

Garg SK (2004). Sewage disposal and Air Pollution Engineering, Khanna publishers, Delhi, India. Pp. 543-546.

Guidelines for Municipal waste management Health cities series No 6 WHO

Irepodun Local Government Office (July, 2013). Geograhpy of Omu-Aran Town

Rao CS (2008). Environmental pollution control Engineering. New Age International Publishers New Delhi, India. Pp.372-386.

Solid waste problems, collection and disposal programs in Jimma Town, (Jimma Institute of Health Science (Bulletin), JHS Vol. 3, No 1, 1993.

Weiner RF, Matthews R (2003). Environmental Engineering Published by Elsevier, New Delhi, India. Pp. 251-263.

APPENDIX

PICTURES SHOWING VARIOUS SOLID WASTES DISPOSAL SITES AND MODERN TECTHNOLOGICAL COLLECTING AND DISPOSAL SYSTEMS IN OMU-ARAN TOWN

Figure 1: Dumping of Solid Wastes Materials within the Township of Omu-Aran

Figure 2: Packing & Loading of Solid Wastes materials to dumping sites by the Local government Officials during working hours

Figure 3: Dumping of Solid Wastes Materials outside Omu-Aran Township

Figure 4: Dumping of Solid Wastes materials within the Township of Omu-Aran

Figure 5: Packing & Loading of Solid Wastes materials to dumping sites by the Local government Officials during working hours

Figure 6: Dumping of Solid Wastes materials within the Township of Omu-Aran