

# FUNDAMENTAL STEPS TO SOLID WASTE RECOVERY IN NIGERIA.

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## Abstract

Steps which would be taken towards obtaining income from solid waste is presented. The paper which is anchored on the concept of waste to wealth identified waste sorting as the first fundamental step to waste cycling. The current practices of scavenging, neighbourhood collection, composting, paper recycling etc. are highlighted. Also examined is the adverse effect of waste to the environment in terms of pollution. The paper came to the general conclusion that Nigerians can also alleviate poverty by adopting any of the simple and low-cost techniques of waste conversion presented here. The author recommended among other steps, that government should encourage citizens interest in waste recovery through soft loans, tax incentives and information on waste markets. (*International Journal of Social Science and Public Policy* 2000:3(2) pp 155-163)

## INTRODUCTION

Waste has been defined as any unwanted or unused product in whatever state whether liquid, solid or gaseous from any source whatsoever, discharged into the environment and having a present or future harmful or obnoxious effect (CRS EDIT NO. 4 of 1996). All wastes are thus discarded items considered worthless, defective, useless, harmful and of no further value. It is the idea that waste is of no value that has placed a limit to its use as a resource. It is, perhaps, for this reason that we are more interested in waste disposal which has become a crucial problem in our urban centres. However, waste management which involves the collection, transport, storage, treatment and disposal of solid waste including the after care of the dumpsite is the most preferred current approach. This study is anchored on mostly the treatment of waste before final disposal. Waste to wealth which is also called waste recovery or recycling is part and parcel of the concept of waste management. Waste recycling, in the broadest sense, includes resource recovery and re-use techniques such as repair, re-manufacture, material recovery and conversion to energy. Wealth from waste usually involves waste sorting, scavenging, animal feed production, paper recycling and the production of biogas.

From the foregoing the aim of this paper is to examine the concept of waste to wealth and then see how it can be applied to waste management in Nigeria. A few waste to wealth

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conversion procedures, alongside their associated problems and prospects are analysed. The problem of pollution which is the product of waste is also considered. The overall objective is to draw the attention of experts and the general public to the need for waste management through recycling. This is considered both economically and environmentally essential and expedient. The main objective is to help Nigerians to begin to see waste as wealth and therefore take steps to convert waste to different uses instead of just burning or burying them in landfills. Clearly, waste recovery reduces the volume of waste that is finally disposed and brings in income. It maintains some industries and provides the means of livelihood for a few people.

We shall examine a few waste to wealth strategies as they are legion. What I have here is just a tip of the iceberg and is meant to wet our appetite even though waste may sound generally unpalatable. The following steps or waste recovery procedures are considered fundamental to waste recovery in Nigeria.

### WASTE SORTING AS THE INITIAL STEP

Waste sorting is the first step to waste recovery or recycling. Garbage heaps in Nigeria are a complex aggregation of unsorted inorganic and organic waste plus water. Segregation of the waste into wet and dry waste and further separation into biodegradable and non-biodegradable waste is thus the first step in the recycling of waste. Waste sorting in very simple terminology refers to the separation of waste into the biodegradable and non-biodegradable wastes or its division into reusable or recyclable materials. Sorting, therefore, presupposes the intention to use or recycle. Sorting is usually done at source whether it is at the household, office, club or firm level. For instance, the use of at least three garbage containers for paper products, bottles + plastics and "food leftovers" respectively may suffice. The Friederich Ebert Foundation published in 1995 a pamphlet for waste sorting which can be very useful to those who are interested in waste recovery. The pamphlet shows that waste sorting at source is not difficult neither is it technical. All that is therefore required is the willingness to start the practice. The Ebert Foundation is of the opinion that by the time each and everyone of us decides to start placing 3 containers at conspicuous places in our homes, offices and clubs, in no time the practice will go round. France, Germany, USA and even Egypt in Africa have been involved in waste sorting hence waste recycling and its many benefits have been known to them for a long time. Waste recycling therefore usually begins with waste sorting to discover whether waste items are to be repaired or processed into other forms. Sorting can be done by anybody who cares at minimal cost.

### SCAVENGING

The word scavenging is now used in the literature to refer to the hordes of able-bodied and sane men and women, most especially youths, who visit refuse dumps in our urban centres to pick valuable materials for the purpose of recycling or re-use (Olaore 1997). Uchegbu (1998) has therefore referred to dumpsites as the scavengers paradise. The Oxford Dictionary of current English defines a scavenger as a person who searches for and collects discarded items. The scavenger is a valuable element in the solid waste management system as he aids resource recovery and reduces the volume of waste which is finally disposed. Scavenging is however very different

from neighbourhood collection in that the former concentrates mostly on refuse heaps while the latter goes from house to house buying discarded items like old cloths, bottles, plastic materials etc. Scavenging has been traced to Arizona in United States where it probably started in 1968 with the collection of aluminium for recycling (Osuagwu, 2000). In Egypt, scavenging is a well organized business as whole families called the Zabbalens are involved. (Okpala, 1997). In Guatemala, it is the slum dwellers referred to as the Guajeros that take the lead in Scavenging (Osuagwu, 2000).

In Nigeria, Scavenging is not well organized as most scavengers conjure the picture of destitutes at first sight with their torn clothes, shoes or slippers, base-ball caps or raffia hats and the scruffy scavenger's bag hung over the shoulder. Osuagwu (2000) recently analysed the economic benefits of scavenging and the solid waste market at Abia State and She observed that scavengers earn just about N679.80K per week. Olaore (1997) has attributed the upsurge in scavenging to (SAP) Structural Adjustment Programme and its attendant impoverishment of masses in Nigeria which reduced them to waste pickers. However, one cannot deny the economic and environmental importance of scavenging today in Nigeria. An appropriate pricing of recovered items and proper outfits to protect against harm may be of help to the scavenger in this country. This is because the combing of refuse heaps exposes the scavenger to toxic and dangerous substances, diseases, reproductive abnormalities, body weakness, Stomach upset, cough and injuries (Olaore 1997; Oyediran 1997).

#### NEIGHBOURHOOD COLLECTION

In a country where the potentials of solid waste as a resource is yet to be recognized and where all wastes end up at the dumpsite, only very few lowly placed individuals have found the courage to go from street - to - street and from house - to - house to collect discarded items like empty bottles, cans, rubber shoes, slippers, scraps iron-beds and cloths. Neighbourhood collection is a process of resource recovery which involves the interception of discarded items before they reach the dumpsite. A neighbourhood collector is, therefore, someone who moves from door-to-door to buy discarded items. So, what the scavenger picks freely in the refuse heaps, the neighbourhood collector buys or picks from the home refuse bin. The neighbourhood collector buys discarded items with either cash or trade-by-barter in which items like used cloths or plastics are exchanged for flasks, coolers, spoons, new plastic buckets and basins. The job of the neighbourhood collector is very tasking, tedious and hazardous. Apart from trekking round whole neighbourhoods and towns, he faces the problem of harassment by the police, fellow waste pickers and members of the public who often molest him for pilfering.

#### COMPOSTING

Composting is an old and very popular method of waste conversion which is used for treating agricultural, municipal and industrial wastes. It was practised in this country in some primary and secondary schools before the civil war (1967-1970). Nowadays, only very few urban farmers do composting. Composting simply involves the biodegradation of the organic constituent of waste through aerobic microbial activity which results in the formation of humus-like matter called

compost (Uchegbu, 1998)

The compost manure is very good in agricultural farms especially in home gardens. The compost can be used in stabilising eroded soils. The conversion of refuse to stable humus-like substance (Peat humus) is achieved by micro-organisms. Composting can be achieved through mechanical and non-mechanical methods. Uchegbu (1998) has analysed in depth the different stages/methods of composting and a list of compostable materials. Composting has the advantage of being environmentally friendly and very economical as it provides useful fertilizer input into the agricultural system. In addition, it can easily be practised in backyards and it does not require imported technology. Its advantage is that it has high commercial value as compost markets have been established by compost farmers. However, it has the problem of having an offensive odour and it is tedious to work.

### ANIMAL FEED SUPPLEMENTS FROM WASTE

The feeding of animals such as goats, sheep and pigs with cassava peeling or food remnant is very commonly practised in Nigerian rural communities. This practice can be improved upon to breed more of these animals. Professor A. D. Ologhobo, a professor of animal science at the University of Ibadan, recently called attention to what he called the dramatic upsurge in man-animal competition for food items such as cereals, pulse and oil seeds pointing out the fact that the unhealthy contest can be reduced or eliminated by developing novel feeds which can be fed exclusively to livestock. He went on to show how the exclusive animal feed can be produced from animal waste such as excreta, feathers, hair, rumen contents, blood and other by-products of animal slaughter industry (Ologhobo 1997).

In addition, Crop residues, cereal bran, saw dust, cocoa pods, coconut husks, melon shells, food left-overs, can be converted into nutritionally valuable feeds. Even municipal waste or urban waste can be utilised for this purpose. In the area of converting urban waste to animal feeds, Cuba remains our best example. In Cuba, urban waste is collected daily, loaded into trucks processed in factories where they are mixed and sterilized by autoclaving (Ologhobo, 1997). Autoclaving is necessary to remove bacteria and other harmful pathogens. Sugar cane molasses are later added to sweeten and make the feed palatable for the feeding of pigs, poultry, ducks and geese, (Ologhobo, 1997). Nigerians can copy the Cuban example and generate a lot of income from converting waste to animal feeds.

### EXCRETA AS A RESOURCE

The mention of excreta may nauseate many people yet John Pickford s (1995) established the fact that human or animal excreta contains nutrients like those in artificial fertiliser and even better than chemicals in many ways. He attributed the success of Chinese agriculture to increasing soil fertility by spreading their own excreta on their farms. A few other illustrations will help us better (Table 1):

Poultry waste is today being sold as fertilizer by, especially, poultry farmers. People can earn money acting as middlemen between poultry farmers and poultry waste users. It does not require any conversion. All you need is a big bag to carry your poultry waste. In Calabar, the capital of

Cross River State, almost all vegetable gardens which grow water-leaf rely majorly on poultry waste. Infact, people book for orders before they are ready. Seriously, a little cottage fertilizer industry can be set up to utilize poultry waste and produce fertilizer from it on a commercial scale.

TABLE 1. NUTRIENT VALUE OF VARIOUS ORGANIC WASTES

WASTE	Nutrients in Kg when applied at 1ton per ha				
	N	P	K	Ca	Mg
Refuse	13.50	8.0	14.69	6.23	2.86
Poultry	21.80	11.2	6.0	6.2	2.4
Piggery	19.00	8.4	15.51	5.2	5.2
Cattle	13.33	3.31	22.4	10.0	5.51
House	14.40	2.80	4.31	8.6	2.51

SOURCE: Sridhar, 1996 (Quoted by Uchegbu 1998).

Table 1 Shows the chemical composition of various organic waste including excrement from animals such as Poultry birds, Pigs and Cattle. Most of the animal excrements are very high in Nitrogen and Potassium, two elements that are organic components of the fertilizer industry in Nigeria.

Akinsoyinu and Ologhobo (1989) established the potential of human excreta processed into activated sewage sludge as feed ingredients for ruminants. At the experimental stage, cow dung has been used to breed maggots which was fed to hens and the hens were found to do better than those which relied on poultry feeds (Prof. Ologhobo, Personal Comm.). Further research and the application of appropriate technology can change the history of the poultry industry in this direction. Furthermore, compositing can be used to treat human excreta and turn it into useful fertiliser. Apart from compositing, excreta can be centrally collected, as in UCH Ibadan, given treatment before being used as fertiliser. The primary treatment begins with bar screens and different chambers e.g. the sedimentation tank/stage, stabilisation stage, chlorination stage (See Boon 1975, Downing 1966, Uchegbu 1998). Raw sewage can also be discharged into fish ponds as feeds. Even Irrigation with sewage waste water after treatment has been practised in several countries like India and Mexico. Such sewage waters are usually diluted before use. This however is not possible without first separating the solids from the liquid and then dealing with them separately.

Mention must also be made of the value of human urine which has been used medically by some Africans and Asians. And human urine, when diluted, can provide useful nutrients for plants. The ammonia in urine was used in 19<sup>th</sup> century Europe for house cleaning, fanning leather and dyeing of clothes (Pickford, 1995). In Northern Nigeria, Indigo plants are still fermented in vats

of urine to produce the iridescent blue that is a feature of local cloth (BBC, 1994). Also, the pharmaceutical value of urine was discovered long ago by the Chinese. For instance, Robson (1991) reported that Shanghai Bureau of Environmental Sanitation collects 2000 tons of urine a day from public latrines and sells them to pharmaceutical and biochemical laboratories whose products are best used as blood coagulant in surgery and are presently exported to Europe, Japan and United States.

### **PAPER RECYCLING**

Every piece of waste paper in the environment is a valuable resource to the paper recycling industry. Yet from Lagos to Calabar and from Maiduguri to Sokoto, millions of naira worth of used paper are either burnt or just allowed to rot away daily or at best used in wrapping "akara" or "groundnuts". Yet we can reap thousands of naira by making these waste papers available to those who need them. These days we even have waste paper buyers who move from office to office and from one institution to the other looking for waste papers. Infact the sophisticated ones (i.e waste paper buyers) have opened up business offices for the sole aim of buying used papers. The used papers are usually recycled into toilet papers, notebooks, news-prints, writing pads etc. The white papers are usually preferred to the coloured ones. The processing of used paper into toilet roll, for instance, is a small inexpensive industry which has prospered a lot of people. All that is needed is the converting machine which comes in different modes and shades. The raw material, pieces of papers etc. are ubiquitous!

### **THE PRODUCTION OF ENERGY FROM WASTE**

Energy in the form of cooking gas can and has been extracted especially from human excreta. The gas, called biogas, is usually extracted by using a biogas plant. Most of the Chinese biogas plants are built by households and the local communities using local materials. One can thus obtain models of biogas plants from China. So far, the only input to biogas plant is human excreta mixed with either pig s excreta or cow dung. The gas from such biogas plants has provided energy for cooking, lighting, powering of machines and vehicles (Pickford 1995). The practical experience of the Chinese can be an interesting area of focus for us in Nigeria. The biogas plant is not a sophisticated or high technology in fact it is classified as intermediate technology.

### **POLLUTION CONSIDERATIONS**

Wastes pollute all sections of the environment ranging from air, land to surface and ground water. Most pollutants are usually waste products from households, industries and agricultural operations. Our atmospheric air is polluted majorly through biomass burning, industrial emissions, vehicular emissions and gas flaring from the petroleum-oil industry. Our land surfaces are polluted by solid waste which produces soils laden with heavy metals such as mercury and lead. Our water bodies are polluted by sewage, buried waste, oil spills, pesticides, DDT, Gammalin 20. By far, it is waste from industries that has produced smog, smoke, odour and the much talked about "green house effect" in especially the industrialised countries of Europe and North America. Atmospheric pollution by industries has, however, also reached an alarming proportion in the third world so much so that acid rain and deposition have been reported in the oil-rich Delta region of Nigeria. Perhaps one thing that has destroyed the aesthetic beauty of our urban centres and has made us to

look like filthy people is the mounting refuse heaps surrounded by urine and human excreta. In addition, lack of sewers (water closets) has made human excreta almost ubiquitous in our urban centres and villages. Water pollution on its own is serious in that potable water is today lacking in most of our cities and this has resulted in the indiscriminate mining of our ground water. The situation is made worse by the fact that almost every stream is a toilet in this country! Noise pollution, is the one not taken seriously at all in this country. Noise emanates from vehicle horns, music record sellers, midnight parties and ceremonies and private electricity generating plants.

The overall contribution of wastes generally to environmental pollution should be better evaluated in terms of the health hazards it poses to people, such health hazards like cholera, malaria, typhoid, diarrhoea, plague, dysentery, meningitis, influenza and such other air/water borne diseases are aided and spread by the pollution of the environment.

It is for the sole reason of solving the problem of waste and the attendant pollution of the environment that Government initiated the monthly environmental sanitation programme in 1984 and yet the problem has not abated. Pollution, however, became high on government's legislative agenda when the country began to be invaded from outside by toxic beef, toxic canned fish, toxic mosquito coil and 3,000 tons of toxic waste from Italy which was dumped at Koko Port in Delta State in 1988. The formation of the Federal Environmental Protection Agency (FEPA) that same year and the promulgation of harmful (toxic) wastes criminal provision decree No. 42 of 1988 all go to confirm how serious the Federal Government of Nigeria took the issue. Since 1988, several Decrees and Acts have been enacted to safeguard our environment from pollution. For example, Government has now made it mandatory to carry out Environmental Impact Assessment before embarking on any major project via EIA decree No. 86 of 1992.

Perhaps the greatest thing that has been done to reduce the problem of pollution in Nigeria is the establishment of the Federal Ministry of Environment whose mandate is contained in section 20 of the constitution of the Federal Republic of Nigeria (1999). As a matter of fact, the driving Philosophy of the Ministry is the Polluter Pays Principle (PPP) in which the polluter is now expected to bear the cost of preventing and controlling pollution. Now, this may apply to manufacturing industries and oil companies but not to individuals. Some people even argue that the so-call pollution fine is low for most oil companies and manufacturing industries who still find it more economical to pay the fine than to obey the law. In other words, the application of legal instrument is not enough to guarantee a healthy environment in Nigeria (Oyeshola, 1995).

## CONCLUSION

Here it has been possible to examine only a few waste conversion procedures which are practicable given the nature of our environment, technology, and economy. The journey of a thousand miles, always, begins with the first step. People should not see waste only as a problem but also as a resource which can alleviate poverty. Nigerians by adopting any of the above simple, low-cost techniques of waste conversion techniques, can make money from waste.

Millions of naira can therefore be made from waste through recycling. At present recycling is not appealing to many Nigerians. That is why information on this subject should be made available

to the larger public. This way many Nigerians, it is hoped, will in the foreseeable future embrace the business of waste recycling. Without doubt Solid waste recovery is one way of ensuring a healthy environment and sustained individual economic well-being. In conclusion it must be pointed out that whatever disadvantages there are in any of the conversion methods mentioned here is not enough to sacrifice the advantage of obtaining wealth from waste. In addition to all these, Government should encourage waste conversion industries through soft loans, tax incentives, waste markets information etc.

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