SOLID WASTE MANAGEMENT IN MINNA TOWN

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I remain very grateful to God for making me able to go through this programme successfully.

DEDICATION

This work is dedicated to Almighty Allah for His Mercies. Also to everyone determined to ensure cleaner and healthier environment for all Nigerians.

ABSTRACT

Waste management has been in practice for long, starting with the initial crude methods to the now advanced and sophisticated methods.

Solid wastes in particular, present problems in many countries when it comes to management.

This study has investigated solid waste management in Minna, with the main objective of determining if the management programmme now is better than it was before.

The study has been mainly on comparative investigation of the former agency responsible for waste management in the area of study known as Niger State Environmental Protection Agency and the present one, Niger State Urban Development Board.

The investigation was carried out theoretically, practically, statistically and with data sourced from NUDB, etc. All that were necessary and available used for the study. The investigation showed that there has been remarkable improvement in waste management since the establishment of Niger State Urban development Board.

CHAPTER ONE

1.1 INTRODUCTION

The environmental problems facing Nigeria today are serious and complex. Therefore, the case of a clear understanding of physical environment land, water and air in which we operate can never be over-emphasized. It is from land, water Air and their resources that human needs are provided. These needs are ever changing and ever on the increase. Usually, the more effectively it can be put at the service of human being.

In Nigeria, particularly in cities, the cumulative negative effect of solid waste growth have certain pattern relationship with the environment and it is necessary to actually study these relationship because, the human being and the environment relate to each other dialectically. As we effect the environment, it in turn affects us too. The effect of one on the other can be Positive or Negative. In light of this, a conscious attempt on ways and manners we manage solid waste on the environment becomes imperative.

1.2 BACKGROUND TO STUDY.

Solid wastes are numerous and occur daily. It seems not much attention is given to heir proper management and as such they generate a lot of environmental problems. With odernization, increasing amount of solid wastes are produced daily.

The world's attention is now focused on solving environmental problem. Solid stes are major pollutants of the environment, therefore they require proper management.

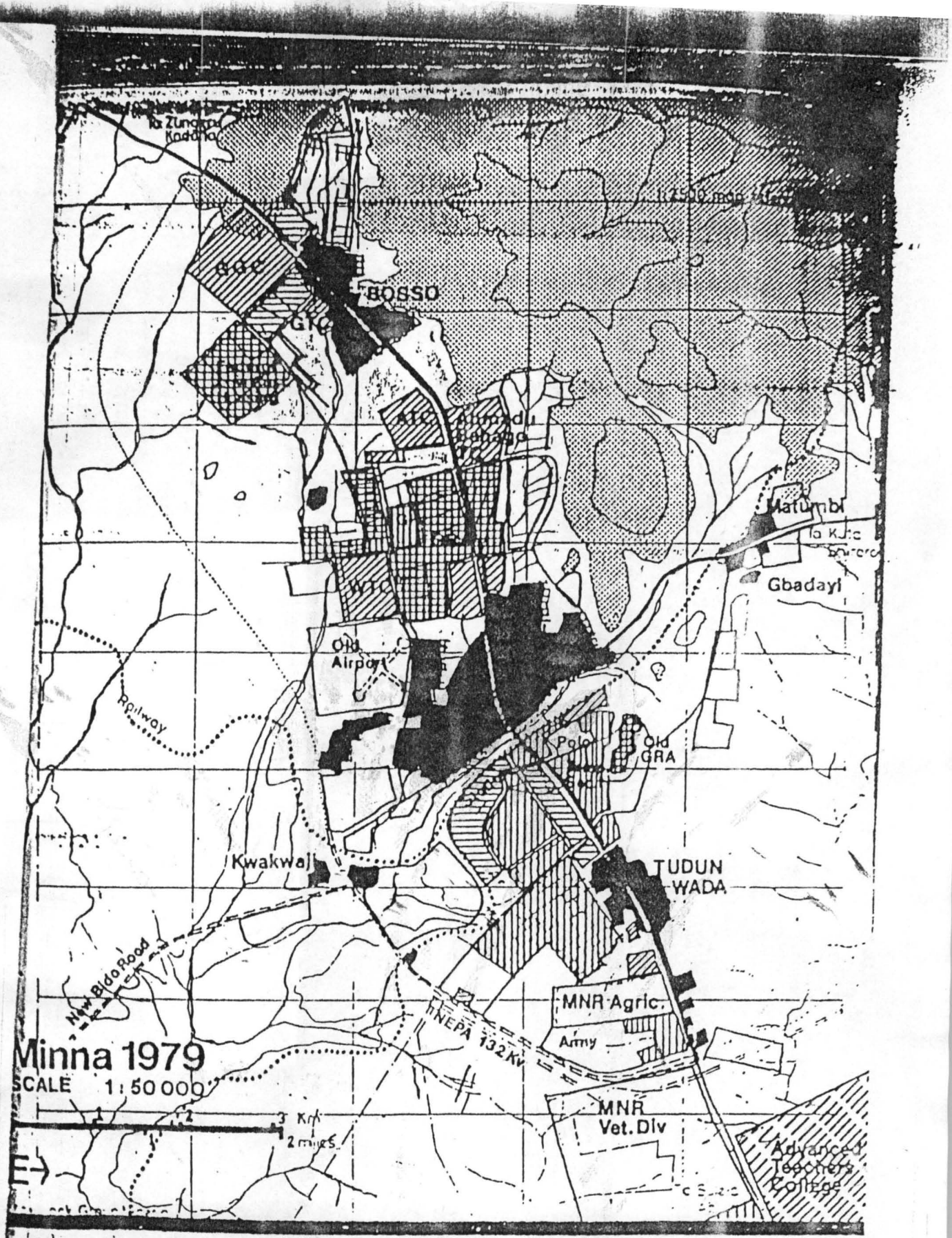
This study is carefully chosen to examine the past and present management cedures for solid wastes in the Minna Metropolis and to proffer better management.

STATEMENT OF RESEARCH PROBLEM

Developing countries have been characterized by a high rate of urbanization. The has had its advantages and disadvantages hence, problem of solid waste management ng the effect of urbanization.

ve this problem, different approaches have been used by Government, non nental Organization and Community Base Organization yet there are short comings f these approaches.

Minna, solid waste disposal seems to be fairly organized as Government provide grounds, and dustbin in most of the organized settlements. It is in line with this,



SOURCE: Minna, master plan (1979-2000) Max Lock grp ed.

Study Area Map

Fig 1.0

that the state government established the Niger State Urban Development Board. These parastatal is vested with the responsibility of solid waste management in Minna Metropolis.

Despite the Government's large capital investment in these parastatal, indiscriminate dumping is still experienced and clearance of waste from dumps is irregular in some places in Minna. In view of this, it has become necessary to identify the problems associated with achieving a solution.

1.4 AIM OF STUDY

The aim of this study is to conduct research on solid waste management in Minna Metropolis with a view to recommending better system of managing these wastes.

1.5 OBJECTIVES

(i) To identify the sources of solid waste generation, in Minna Metropolis.

(ii) To identify the problems of solid waste generation, collection and disposal in Minna Metropolis (Such as Socio-economic aspect, public health implication, environmental hazards etc.

(iii) To review the existing Framework for Solid waste Management in the study area by recommending new planning proposals to that effects.

1.6 SCOPE AND LIMITATION OF STUDY

The study will focus on the management of solid waste and shall cover only the build up area of the study area (Minna-Metropolis).

1.7 SIGNIFICANCE OF STUDY

The problem posed to the environment by poor solid waste handling has drawn the attention of almost every Nigerian. There fore the need to look into this problem and provide a solution to it is very important.

CHAPTER TWO: STUDY AREA

2.1 LOCATION OF STUDY AREA

The study area covers Minna town only. Minna is a fast growing State capital, in terms of population and size. If attention is not given proper disposal and management of solid wastes, they can cause very serious environmental problems in future as the town further develops.

2.2 HISTORICAL BACKGROUND:

Minna, like some northern Nigerian towns own its origin and expansion to the invention of Railways. As for Minna town, it started as a small settlement of Bosso, a hilly village five kilometers North of the present railway station. The permanent settlement of Railway worker attracted the local people to settle near them.

In 1976, Niger State was created as a separate entity from the North Western State and Minna as the state capital. The creation of the state brought about the establishment and proper setting out of standard roads, Organized Settlements, Banks, Post Office etc. With time there was an influx of people leading to increase in population and the need to control and abate refuse disposals.

Over time the problem of refuse disposal has ever been on the increase. Heaps of refuse are seen raising above the normal ground level and crossing onto the streets. The need for a proper waste management scheme was always on the enphacy.

In 1998, the Niger State Urban and Regional Development Board was established with on added responsibility of, refuse collection and disposals.

Niger State came into being on April 1st 1976 as a result of creation of two states out of the defunct northwestern state by the Federal Government of Nigeria.

2.3 PHYSIOGRAPHY:

The state Capital is Minna, it covers an area of approximately 74,244.7 square meters and is bounded on the North by Sokoto State, from the East by Kaduna State from the South East by the Federal capital territory Abuja, and from the West by Kogi State.

It is located between latitude 30^0 20^0 and 7^0 40^0 East and longitude 8^0 0^0 and 11^0 3^0 North.

2.4 CLIMATE:

The state has a Savannah Climate Characterized by Mari-time air and rainfall which is between April and October. Also there is Savannah air with very little or no rainfall between November and April. During Hamattan dry desert wind blows between November and Mid-February, while night temperature is very low.

2.5 LAND USE:

The state is well served by roads, rail, inland waterways and air transport. The citizens are known for farming and trades like black – smiting. Poultry and other numerous crafts.

2.6 POPULATION:

There are many ethnic groups with different languages in Niger State, which includes, Nupe, Gwari, Hausa / Fulani, and Kambari. Minna has a population size of over

CHAPTER THREE

LITERATURE REVIEW

3.1 ENVIRONMENT AND ENVIRONMENTAL MANAGEMENT.

Man's environment includes all the living things and non-living elements in his surrounding. The major

Components are Physical, Biological and Social. A better understanding of the environment will be obtained by studying each of the global realms, namely: the atmosphere, the hydrosphere, the lithosphere and the biosphere. The lithosphere, which is the solid earth, where wastes are dumped.

Environmental management is not " management of the environment" it is the management of man's activities.

Within tolerable constraints imposed by the environment itself, and with full consideration of economical factors (Beale, 1980). The objective is to meet basic human needs within the potentials and constraints of environmental systems.

Man-made works make impact on the environment and there needs to be a workable and economic system which will ensure that those who contemplate potentially harmful actions assess the likely impact upon the environment. In order to protect the environment it is vitally important that environmental impact assessment are made prior to any action being taken and that it ranks equally with the technical and economic assessments which always precede development (Beale, 1980).

The needed for better environmental management strategies in Nigeria grows with the increasing urgency of the perceived environmental problems, and the progressive nature of the threats to sustainable development that these problems pose (Olokesusi, 1994).

3.2 SOLID WASTES

Solid wastes are unwanted or undesirable products of life, and range from leaves, human and animal feaces to metallic, plastic and chemical by – products of manufacturing industries (Olokesusi, F. 1994). The control of waste is at the heat of the sustainable development debate and is a key area to be addressed. Solid waste are numerous and include: plastics, metallic materials, glass, tins, waterproofs (or polythene), building debris, waste woods, etc.

Nowadays the refuse contains a lot more paper and plastic materials, solids exist in many forms large pieces, fine powders, sheets and so on. The mass of solid's may have difficult properties; it may be abrasive, sticky and may be explosive (Henstock, et al, 1975).

3.3 ENVIRONMENTAL PROBLEMS CAUSED BY SOLID WASTES

The cost of societal dumping of industrial or domestic waste may be very much greater than the actual costs assigned / charged (Henstock, M.E, 1975). Sewage and contamination of land and water may place an additional charge on the local authority ultimately responsible. Solid wastes can cause pollution to air, land and water; water through leaching. About 85% of all U.K. refuse is dumped with no prior treatment other than the utmost removal of undesirable items, e.g. Massive metal from it (Henstock et. Al 975)

Paper, wood, cardboard and textiles will be converted to ash and to oxides of carbon. A more scientific study carried out by the Federal Environmental Protection Agency (FEPA) in 1989, showed that toxic substances like polychlorinated biphenyl's (PCBS), gammalin 20, and heavy metals like lead, iron and copper are washed from dump sites into receiving surfaces ad ground water, therefore constituting great health hazards to plant and animal lives (Olokesusi, F. 994).

Pollution resulting from burning of refuse, poor aesthetics, well and ground water pollution as well as health hazards are some of the environmental problems posed by solid wastes. Since Nigerian's are sensitive to hazardous land fill sites as exemplified by this study and this mode of waste disposal being the most prevalent in the country, there is indeed a need for policy recommendations. Perhaps, solid waste problem is the most pressing environmental problem being faced by urban dwellers, urban managers as well as planners. If the available internal municipal resources are inadequate, such municipal authorities may study the cost and benefits of contracting out waste collection and disposal operations to private sector operators. This might even turn out to be a profit-making venture. Besides, there is need to have competent management team at the municipal level whether or not the job is contracted out (Olokesusi, F. 1994)

Solid waste dumped sites are ugly sights. They produce in most cases, bad, uncomfortable odour. They also block drainage. The dumpsites, especially when unchecked, take up street spaces. Some wastes decompose and leach into streams

underground water, etc. Some that leach into water are poisonous and poison both water and aquatic life. They generate airborne diseases and other health hazards. They have many negative environmental effects.

3.4 CONTROL OF SOLID WASTES DISPOSAL

The economist's see waste as that which is cheaper to throw away than to make further use. This does not mean that waste is valueless; some of it certainly is not. (Henstock et al, 1975). Current methods of refuse disposal vary from simple uncontrolled tipping areas with no land shortage to highly sophisticated incinerators capable of 97% volume reduction. Unless recycling is possible, disposal is merely a question of relocation. Disposal never means total disappearance but only transfer from an inconvenient to a convenient site.

Traditionally, reclamation plants have separated solid wastes in the as-received condition. Hand picking has long been relied upon to extract from the flow of refuse certain classes of large saleable items. e.g. newspaper, cardboard, metals, and glass, and much interest has been shown in attempt to automate this process. Domestic waste, the type usually collected in bins or plastic bags, forms a substantial part (60-70%) municipal waste.

DISPOSAL METHODS INCLUDE:

a) Sanitary landfill – whereby the waste is discharged and piled in thin layers at a suitable site, compacted and covered.

b) Composing – a biological process whereby the Organic material is biologically decomposed. Coarse inorganic matter has to be separated and treated Solid, in general, are much more difficult to handle in processing operations than liquids of gasses. Large masses of insoluble solids, like sulphur and coal in pulverized form, are usually stored in enormous heaps out in the open. The solids are removed from the pile when required by tractor shovel and delivered to a conveyor (Henstock et; al 1975)

Most important in the proper consolidation of the waste as it is put down, to prevent air getting in to the base of the tip and support combustion. It is not easy to put out a tip fire once it has gotten underground. On the other hand, if tipped material contains an amount of plasterboard containing gypsum, anaerobic conditions can develop and bacterial

reduction of the sulphate can then produce hydrogen sulphide. Such a problem arose in Pittsburgh a few years ago.

The most important factor in determining the proper handling methods for a solid waste is the actual character of the waste. Methods that define the chemical composition and physical characteristics of a waste are essential to ensuring that such materials are treated or disposed of in a manner that is protective of human health and the environment (Leorenzen, et al, 1986).

3.4 MANAGEMENT OF SOLID WASTES.

The waste products of society are, by definition, that the generator finds more profitable to discard than to utilize; they include agricultural, house hold, human and industrial wastes. The diversity of substances contained in household waste, other wise, known as refuse, garbage or municipal solid waste (MSW) makes it less amenable than the more homogenous residues to most forms of utilization (Henstock, 1983).

Incineration is the ideal alternative to land filling as the disposition of municipal solid waste. Incineration has the advantages of 90% volume reduce to a complete odourless inert product; potential for recovery of valuable heat energy; and existing technology to remove dust and pollution's from the flue gas to meet the most severe environmental requirements. There are four or five options for the final disposition of municipal waste, each with its own drawback and limitations. Three of such options are: land filling, which until recently was the most common method, is beginning to experience problems with a lack of space and environmental concerns, particularly ground water pollution. The cost of land filling will increase rapidly as more emphasis is placed on environmental controls and sitting becomes a greater problem.

ii. Ocean dumping is being phased out by law in most cases because of possible damage to the environment and increasing costs plus energy loss.

iii. Composting is not appropriate for all types of municipal waste material and there are problems with a lack of market for the product, amount of space required and disposition of residues.

Waste disposal, is ostensibly the simplest form of waste management. However, reduced Land availability in Many regions coupled with increasing costs of compliance with environmental regulations are making the disposal option less attractive to utilities.

CHAPTER FOUR

4.0 METHODOLOGY.

4.1 DATA COLLECTION.

From the data gathered in the course of the study, it is obvious that official and non-official dump sites exits. The official dumpsites are the major dumpsites, created and maintained by NUDB regularly.

The management programme does not include recycling. But it is known in waste management that improvement in environmental quality resulting from recycling rather than abandonment of materials makes the case for recycling almost irresistible in many cases. If waste can be recycled, pollution will disappear, since the latter is only material in wrong place at a particular time.

No landfill sites, due to cost; no incinerators. It follows that not all-waste management methods are practiced in the area of study. But it is not necessary that all must be practiced before there can be efficient waste management.

4.2 METHOD OF DATA COLLECTION

In obtaining the necessary information relating to this project work three methods has been adopted namely,

a) Questionnaires
b) Personnel interviews
c) Field inspection
d) Other sources

4.2.1 QUESTIONNAIRES:

The questionnaire was designed and administered to different areas within the study areas. This area were categorized into low density areas e.g the GRA's medium density areas eg Tunga, Bosso and high density population area which include the central business district (CBD) Kateren gwari etc.

A total of thirty (30) questionnaires was administered.

In the questionnaire we try to rank the Past Management of Solid waste in Minna town and the present, efficiency in services, manpower availability and machinaries , A couple of open questions Yes or No and structured questions.

Respondents were given options in most of the questions this method proved very successful to the realization of the research objectives.

4.2.2 PERSONAL INTERVIEWS:-

A part from administering the questionnaire oral/personal interview were also conducted to throw light into the vital aspect of this project. The following are the respondent interviewed personally, Assistant General Manager waste management, Niger State Urban Development Board Minna, Head of Dept waste management, Niger State Urban Development Board and other key staffs under the department. This method enabled me to produce first hand information on the project topic.

4.2.3 FIELD INSPECTION:-

This was carried out to enable the researcher have a visual inspection and assessment of solid waste management within the area of study. In this way the researcher is able to ascertain level of waste dumps in the different areas within the study area and consistency of clearing by the management in charge.

The researcher took a detail field inspection of Minna central areas, Tunga Kpakungu, Bosso, e.t.c

4.2.4 OTHER SOURCES

Other sources of acquiring information needed were through past research work, textbooks, seminar papers and journals on waste management.

Though most of the information used for this dissertation are acquired through field inspection and interviews.

4.3 METHOD OF DATA ANALYSIS

For the purpose of further clarity and simple understanding of the data collected tables, percentage (%) were used.

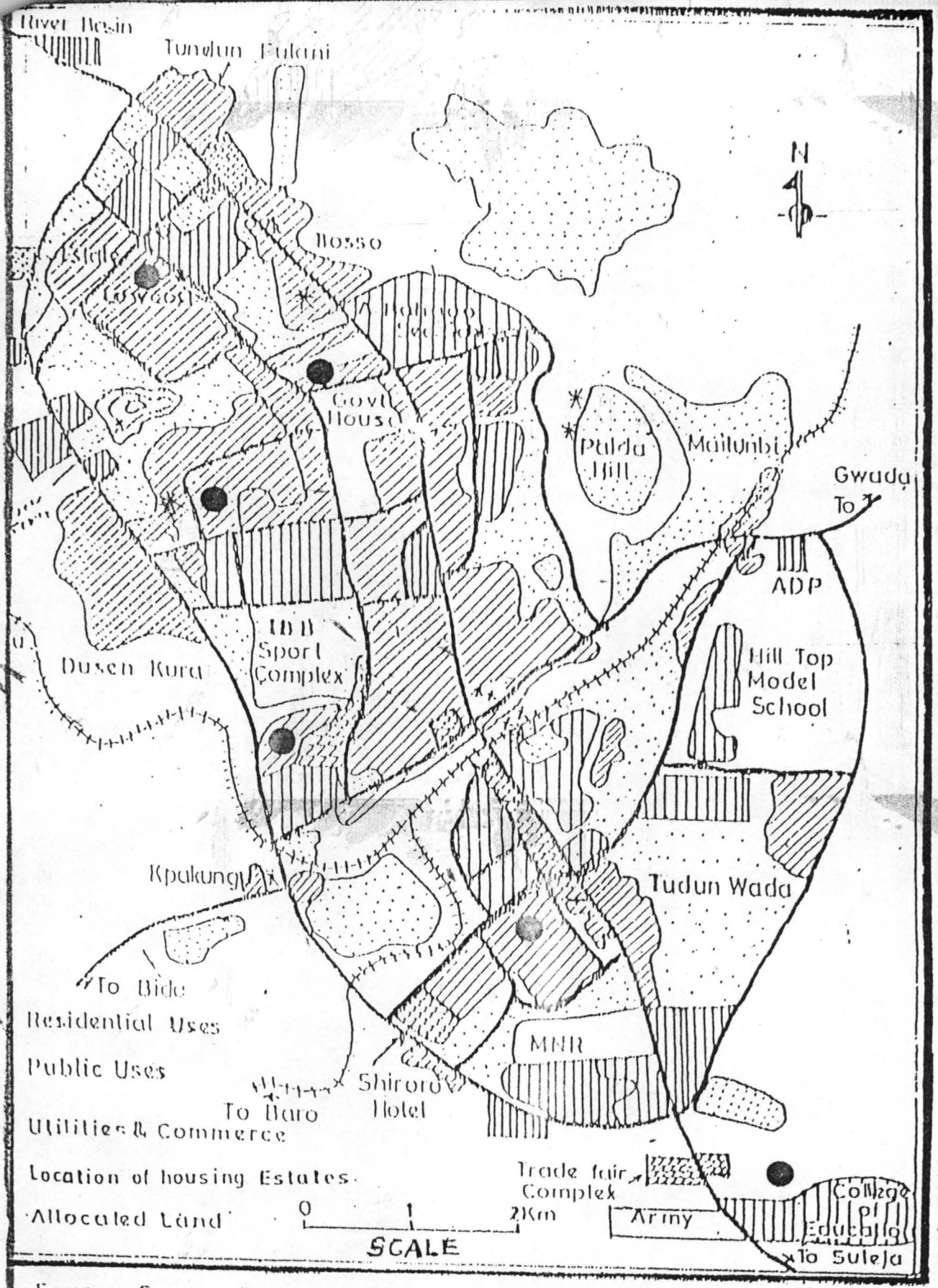
4.4 LIMITATION/PROBLEMS ENCOUNTERED

In the cause of undertaking this project, the researcher has some constraints which affects the information received and the successful completion of this project.

The problem most pronounced are that of time factor which was due to the wide courage of the research.

Secondly, the unavailability of adequate finance to attend to the typing and administering of the questionnaires at the different location in the study area.

Thirdly the un-co-operation attitude of some the respondents in giving necessary information also hindered the progress of the research.



Source : Survey Department Minna With Modification

K = official dump sites

Figure 5.1

SOURCE NUDB

CHAPTER FIVE

5.0. DISCUSSION OF RESULTS

The number of official dumpsites could be increased to make them closer to the people and discourage indiscriminate dumping of wastes. They should be evenly spread and easily accessible.

The unofficial dumpsites can be reduced in number of providing more refuse-bins at strategic places and closer to the people.

The Saturday market official dumpsite is not really well located. It is very close to the market: in fact the dumpsite is even part of the Saturday market site. Perhaps lack of space, and the need to locate such in a place that will allow for easy evacuation prompted the allowing of that as official dumpsite.

Lacks of land fill sites, incinerators, and non-treatment of wastes before final disposal make the management process short of ideal.

The statistical data and analysis show remarkable improvement in solid waste management. More people scored the present management higher marks over ten. Average mark for past management is 4.1 over ten while average mark for the present management is 6.7 over ten. When further analysed, it was found that twenty-four people out of the thirty interviewed scored present management above five over ten, representing eighty percent. While only four out of the thirty people scored past management above five representing about thirteen percent (13.3%).

On the other hand, twenty-six people out of the thirty interviewed scored past management five and below representing twenty percent (20%). And all data source from NUDB compared with what was before showed that the present management is much more efficient and better than before.

5.1 LOCATIONS OF MAIN DUMPSITES.

The study sought to identify the locations of main or official dumpsites, and to map them. Dump sites are collection center for refuse from houses or house-holds, stores and other small establishments such as restaurants, bars, etc. They are usually in open, easily accessible locations, in the course of the study, the main dump sites were identified and indicated on the

accompanying map (fig.5.1). The map shows clearly their locations. Data got from NUDB shows the frequency of clearance of these to be every six days.

The study identified some other large-size dump sites but which are not designated official dump sites. The official dump sites are clearly located away from residential areas; but most unofficial dump sites are within or very close to residential area. The unofficial dump sites are poorly taken care of, people often put fire on them causing smoke and air pollution in the area.

5.2. METHODS OF DISPOSAL AND FINAL DISPOSAL LOCATIONS

The study examined disposal methods and final disposal locations. Data sourced from NUDB shows that public cleaning is a daily affair with two main groups of cleaners at works each day. See table (a) and (b). One group cleans along the major roads, while the other cleans along the street corners or inner roads.

Public cleansing starts with simple and effective collection of refuse and street-sweeping service backed up by good sanitary landfill. Leaving aside for the moment difference in composition and quantities of waste. The cardinal fact of life in urban waste management is that only a part of the problem can be tackled by direct house-to-house collection. This system, using side and rear-end loading vehicles and tippers is posible only in city center and in the middle and upper income suburbs where good access d western housing standards allow their efficient use.

For the rest, the only solution is the communal co tion system, with centrally placed skips and bulk container vehicle. The communal points be served by teams of collection labourer using wheeled trolleys to move refuse from sehold or illicit dumps to the communal or official dump points.

The sources of data for this aspect of the study ger State Urban Development Board. Through observations and personal interviews the Assistant Development Manager (AGM) waste Management, of NUDB, dispos aste is by use of tricycles, dustbins, vehicles, e.t.c from small, scattered dump sites, st premises to the official or major dump sites. Then tippers and other disposal vehicle ar transport wastes from the main sites to the final disposal indicated on map.

The final disposal sites are three large borrow pits l ollows: 1) Behind the handicapped. 2) Along Bida road, after the toll

5.3 DETERMINATION OF FREQUENCY AND EFFICIENCY OF CLEARANCE.

This was carried out through personal interviews, observations and data obtained from Niger State Urban Development Board. The study covered the periods before the establishment of NUDB and since its establishment. Both primary and secondary data were used for the study. It was established that NUDB currently in charge of waste management in Minna and environs dispose off refuse more often that before. Prior to the establishment of NUDB, that is the period of Niger State Environmental Protection Agency (NISEPA), refuse dumps were cleared only on sanitation days. But now with NUDB in place, the streets and small dump sites are cleared on daily basis, Monday to Saturday, by the staff, using tricycles, baskets, etc. The Staffs also collect refuse from refuse bins placed by NUDB on premises such as hotels, filling station, restaurants etc. The collection done daily and the people concerned pay five hundred Naira monthly per dustbin.

The wastes collected are carried to the major or official dump sites which are located at safer and more convenient places. The official dump sites are cleared on the average of every six days. They are then taken to the final disposal sites.

5.4 EVALUATION OF MANAGEMENT EFFECTIVENESS.

The study also examined the principal issues in proper management of solid wastes. The four main aspects of any solid waste management system are:

. Storage at or near the point of generation

. Collection of waste.

Street cleaning.

Disposal of waste.

It is important to emphasize, again and again, that solid waste management is much more than refuse collection and disposal. The most important factor in determining the proper handling methods for a solid waste is the actual character of the waste. Methods that define the chemical composition and physical characteristics of a waste are essential to ensuring that such materials are treated or disposed off in a manner that is protective of human health and environment.

is now a daily affairs with the exception of Sundays. Disposal of waste is now frequent. It is no longer on sanitation days only.

Evaluation of present management programme shows remarkable improvement over the past. Solid wastes are now managed as properly as possible within the limits of NUDB financial capability. But incinerators and land fill sites are still not made use of, and only the medical waste is treated before final disposal

5.5. DATA ANALYSIS

Scientific studies often demand use of statistical analysis. The study gathered such data through personal interview question administered randomly but to people believed to be aware of what waste management entails. After briefing each of them, they were asked the question: is waste management in Minna and environs better now than before? They were asked to score past present management over ten.

From statistical data gathered; responses to interview question gave the following average mark: 4.1 over ten for past management programme and 6.7 over ten for present management programme.

Further analysis showed that twenty-four people out the thirty interviewed scored present management above six over ten, representing (80%) while only four out of the thirty people scored past management over six, representing about thirteen percent (13.3%).

Table 5.1 Comparison of facilities Source: NUDB,2003.

	FACILITY	BEFORE	NOW
1.	Incinerators	None	None
2.	Land fill sites	None	None
3.	Vehicle	4 Tippers	11 tipper
4.	Manpower	50 cleaners	116 cleaners
5.	Dump sites	Less	More
6.	Clearance	Less often	More often
7.	Treatment of waste	Same	Same
8.	Final disposal method	Same	Same
9.	Organisation	Less	Better
10	Wheel barrows	Less	More
11.	Tricycles	None	Available

TABLE 5.2a **WEEKLY CLEANING TIME TABLE**

a). Cleaning along major roads

1. Monday - From Mobil to Chanchaga
2. Tuesday - From Mobil Tudun Fulani
3. Wednesday - From Mobil to Maitumbi
4. Thursday - From Mobil to old post office/ Govt. House.
5. Friday - Kpakungu down to Secretariat
6. Saturday - Refuse dumping sites for clearance.

Source: NUDB

Table 4.2b. Cleaning of Street Corner (Inner roads)

1. Monday - Moi filling station, Bay clinic road, New Tunga Primary School, Tunga Secondary school, low cost, then opposite Elf dumping site.
2. Tuesday - Kpakungu, Barikin Sale, Fly over, Broadcasting road opposite unity block industry.
3. Wednesday - Ciromawa Estate, ERC road, to IDI praying ground and paida hill, back of hospital.

4. Thursday - Limawa Dumping site, Old airport road, behind shiroro cinema, 123 quarters.

5. Friday - Moi-filling station, Bay Clinic road, New Tunga primary school, Tunga secondary school, Tunga low cost, opposite Elf dumping site.

6. Saturday - Kpakungu, Barikin Sale, Fly over, Boardcasting road

CHAPTER SIX

6.0 FINDINGS, CONCLUSION AND RECOMMENDATIONS.

6.1. SUMMARY OF FINDINGS.

The study has shown that most of the unofficial dumpsites constitute eyesores and produce bad odours. There is no use of incinerators, but two are proposed for the year 2,000 budget, which were never delivered. No land fills sites because of cost of establishment, which runs into millions of Niara. No treatment of wastes before final disposal except medical wastes (needles and syringes, treated with petrol, then burnt and buried in the ground).

Analysis of statistical data confirms improvement in management. Private sector participation has just recently been initiated. Penalties for general offence of unauthorized dumping and for specific offence of abandoning motor vehicles are not enforced.

6.2. CONCLUSION.

For decades, solid waste has been regarded more as a nuisance and private problem rather than as a major public problem requiring critical solution.

The most important factor in determining the proper handling methods for a solid waste is the actual character of the waste. Method that define the chemical composition and physical characteristics of a waste are essential to ensuring that such materials are treated or disposed of in a manner that is protective of human health and the environment.

With the establishment of NUDB, waste management programme in the area of study is now much better and more efficient, but there is still room for improvement.

6.3. RECOMMENDATIONS

Perhaps, solid waste problem is the most pressing environmental problems being faced by Urban dwellers, Urban managers as well as urban planners. The removal and disposal of solid waste generally impose costs on individuals and the local community.

My recommendations are as follows:

1. There is the need for the concerned governments in Nigeria, to recognize solid waste management as a major problem and allocated appropriate and adequate resources to efficiently and effectively solve the problem.

2. Participation of private sector in waste disposal should be encouraged. If well bandled it could become a source of revenue for the government.
3. There should be more education of the people on environmental issues to create more awareness.
4. There should be more refuse bins and regular collection of them.
5. House to house collection of refuse should be intensified, to avoid or reduce indiscriminate dumpsites and un-cleared heaps of wastes.
6. Waste should be moved enmass on daily basis.
7. Government should build and maintain sanitary land fill sites, well located away from residential areas.
8. Incineration should be introduced as it reduces the mass and size of waste for fi disposal.

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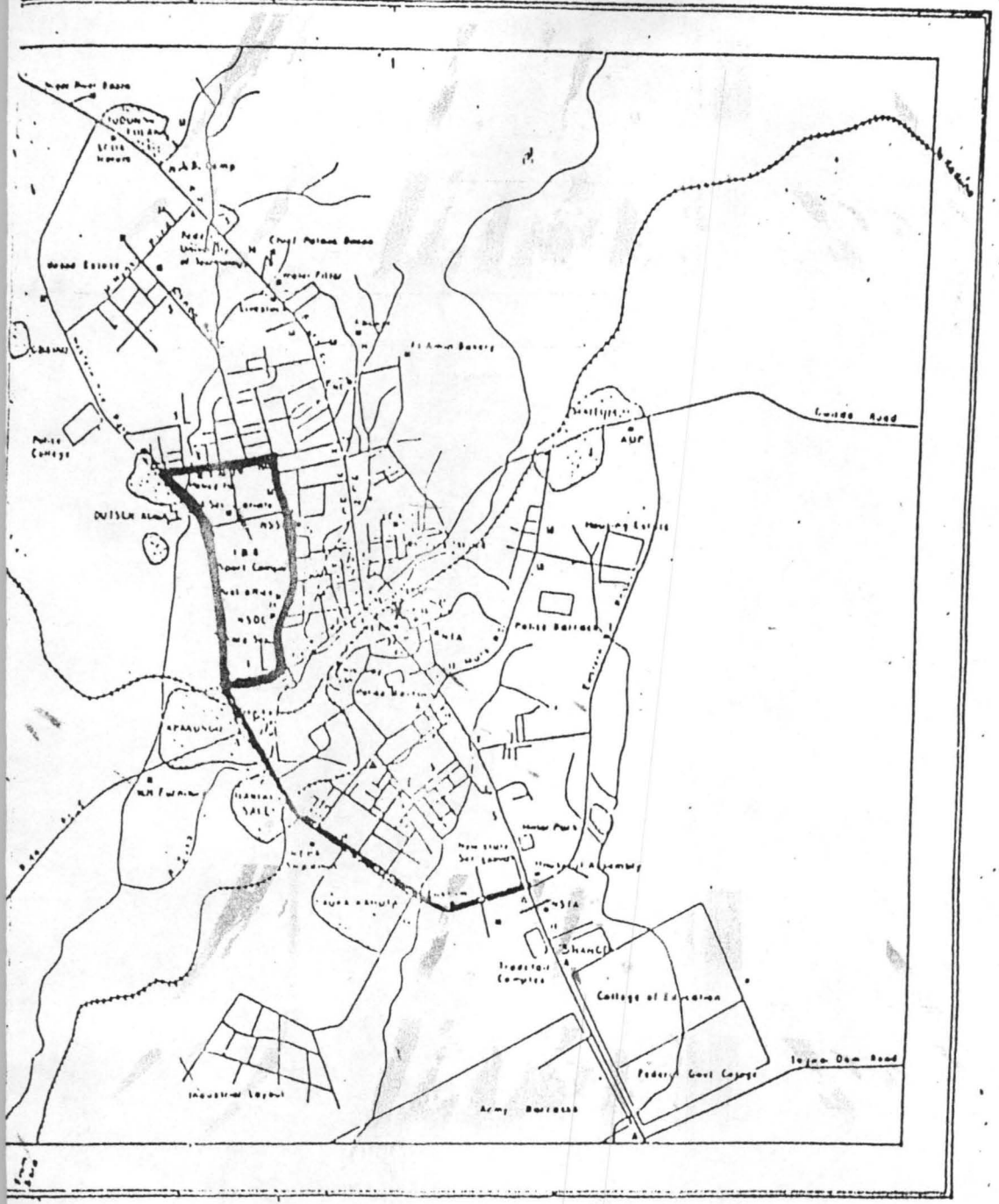
MINNA STREET GUIDE MAP



Scale 1:50000

Metres 1000 0 1 2 Kilometres

KEY

Mosque	Court	
Petrol Station	Police Station	
Bank	Market	
Secondary School	Clinic	
Primary School	Hotel	