

TITLE PAGE

THE EFFECT OF LAND POLLUTION TO THE ENVIRONMENT: A CASE STUDY
OF GWAGWALADA, FEDERAL CAPITAL TERRITORY - ABUJA.

A PROJECT SUBMITTED TO THE
DEPARTMENT OF GEOGRAPHY
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POSTGRADUATE DIPLOMA (PGD) IN ENVIRONMENTAL MANAGEMENT

BY

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DECLARATION

I hereby declare that except where literature is cited the investigations and research carried out on this study and the results obtained are the pure handwork of the researcher and not reproduction of any previous work. It forms part of the requirements for the award of Post Graduate Diploma in Environmental Management.

..Mu.u.

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CERTIFICATION

This is to certify that this work has been approved by the Department of Geography as having met the requirements in partial fulfilment for the award of Post Graduate Diploma (PGD) in Environmental Management, Federal University of Technology Minna, Niger State.

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DEDICATION

This write up is dedicated to the Almighty "ALLAH" who is my Creator and who in His mercy spared my life throughout the course of my studies till today, bestowed His power on me and guided me in this project write up. However, I also dedicate to my parents Alhaji Ibrahim Shaku and Mallama Fatima (Binta) Ibrahim - who laboured to give me the foundation of education to this level. I also wish to dedicate to my beloved late brother Zakari Ibrahim who encouraged me to join the pursuance of this study and later died while I was in struggle to complete this study. May his gentle soul rest in peace. Amen.

Finally to my children Mustapha Adamu Ibrahim, Abbas Adamu Ibrahim and Suleiman Adamu Ibrahim who also endured my absence during the cause of my study. May Almighty ALLAH continue to spare our life amen.

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ABSTRACT

Land which man depend for various activities is limited in the sense that it can not be created and the population of people who depend on land keeps increasing at an alarming rate thus creating scarcity of land. The activities of man generates - various land pollutants such as solid wastes, industrial influences, etc, which contribute to the degrading of the environment which man depends.

The result of such degradation includes health problems, transportation problem, scarcity of resources, destruction of ecosystem among other problems.

In Federal Capital in general and Gwagwalada in particular, the problem of land pollution is high as the population of the people in area continues to grow in Gwagwalada and the rate of land pollutant generation also increases without adequate method of its control or reduction.

Based on this, the researcher decided to work on the effects of land pollution on the environment in Gwagwalada and make suggestions, recommendations and conclusions on how to improve the situation.

TABLE OF CONTENTS

Title Page		
Declaration		ii
Certification		iii
Dedication	~	iv
Acknowledgement		v
Abstract		vi
Table of contents		vii
List of figures		ix
List of tables		x
CHAPTER ONE		
1.1	Background	1
1.2	Statement of problem	5
1.3	Aims and objectives of the study	5
1.4	Significance of the study	6
1.5	Study area	6
1.5.1	Geographical location	6
1.5.2	Climate condition	7
1.5.3	Population	7
1.5.4	Culture	7
1.5.5	Social amenities	8
1.6	Scope and limitation of the study	~ 9
CHAPTER TWO		
2.1	Preamble	10
2.2	Environment and its aspects 10
2.2.1	Pollution and types	11
2.2.2	Land pollution	12

2.2.3	Land pollutants...	12
- 2.2.4	Population and land pollution	12
2.3	Waste and land pollution	13
2.3.1	Effects of land pollutants to the environment	13
2.4	Land pollution as factor of land scarcity	16
2.5	Problems with control of land pollution	17
2.6	Elimination or reduction of land pollution :.....	18
2.7	Waste and land pollution	19
2.8	Effects of land pollutants to the environment	21
2.9	Land pollution as a factor of land pollution	23
2.10	Problems with control of land pollution	25
2.11	Elimination or reduction of land pollutants	26
CHAPTERTHREE		
3.1	Method of data collection	29
3.1.1	Primary data	29
3.1.2	Secondary data :.....	30
3.2	Coding/tabling	30
3.3	Percentage/model responses	30
3.4	Statistical tools for the analysis	31
CHAPTERFOUR		
4.1	Data analysis	38
CHAPTERFIVE		
5.1	Summary	46
5.2	Conclusion :.....	47
5.3	Recommendations	47
	References	49
	Appendix.....	50

LIST OF TABLES

Table 4.1	The selection of sample	.	32
Table 4.2	The rate of response	:	33
- Table 4.3	Sex of Respondents	.	38
Table 4.4:	Statistical Distribution of Respondents Population Group	..	39
Table 4.5:	Level of Land Pollution	.	39
Table 4.6:	Are People Aware About the Effects of Land Pollution?	.	41
Table 4.7:	What Are the Effects of Land Pollution in the Study Area?	.	41
Table 4.8:	Are Any Land Pollution Control or Reduction Methods Available in the Study Area?	.	42
Table 4.9:	Are You Satisfied with the Present Control or Reduction Method in the Area?		43
Table 4.10:	Are there Legislations on Land Pollution in the Study Area?		45

LIST OF FIGURES

Figure 4.1:	The Common Land Pollutants.....	40
Fig. 4.2:	What Methods do you Recommend for Reduction/Control of Land Pollution?	43
- Fig. 4.3:	Who do you Think can Complement The <i>Government</i> Effort in Control an Reduction of Land Pollution?	44

LIST OF PLATES

- Plate 1: A heap of illegal refuse dump in front of one uncompleted building at Kutunku area around better life Gwagwalada - Abuja. 35
- Plate 2: The illegal refuse dump opposite Paiko Motel along market road Gwagwalada - Abuja 36
- Plate 3: This is one of the illegal refuse deposited opposite Islamic Primary School phase 1 Quarters Gwagwalada - Abuja . 37

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND.

The environment can be defined as the circumstances or conditions that surround an organism or group of organisms. It can also be defined as the complex of social or cultural conditions that affects an individual or community (Cunningham, 1999).

Humans have always inhabited two worlds, One is the natural world of plants, animals, seas, air and water that preceded us by billions of years and of which we are a part. The other is the world of social institutions and artefacts that we create for ourselves using science, technology and political organisation.

Both worlds are essential to our lives, but integrating them successfully causes enduring tension. Where the earlier people had limited ability to alter their surroundings, we now have power to extract and consume resources, produce wastes and modify our world in ways that threaten both our continued existence and that of many organisms of which we share the planet. The future sensation also needs to be sustained by understanding how the world works, what we are doing to it and what can be done to protect and improve it. Both the natural world and the "built" or technological, social and cultural worlds constitute important parts of our environment and this shows that there is interaction between the environment and man.

Environment affects man and man on the other hand affects the environment. The activities of man have altered and have continued to alter the

- natural environment positively and negatively. The environment has been degraded,
- wildlife and even man have been adversely *affected* by the activities of man.

Environment in which man finds himself is continually being threatened by man's problem, which includes flooding, deforestation, earthquake, global warming, and pollution among others. This has resulted in competition of the limited natural resources available by the ever increasing population.

Human population has grown at alarming rate in this century, nearly six billion people now occupying the earth and we are adding about 90 million more each year Sango (1997) and in the next decade, our number will increase by nearly as many people as are now alive in India. This trend has resulted to many problems all over the world and thus calls for effective and efficient management of the scarce resources so that they can sustain our living and the living of future generation.

Land in its most widely use, refers to the solid portion of the earth surface but it may also apply to a nation, a people or a political division of the earth surface. People often refer to ground, soil or earth as land and speak about land as something on which they can walk, build a house and grow crops: however, from a legal point of view, land may be regarded as any portion of the earth surface over which ownership right can be exercised. These rights do not only relate to just surface of earth area but also things such as trees, rivers and object of value that are located either above or beneath the earth surface, Baba (2003). Furthermore, Igbozurike (1976) defined land as the totality of something fundamental to our existence and our way of life because it is not a source of wealth both material and spiritual but also depicts the character and quality of man and woman who inhabit it and whom it saves. On the other hand, Mustapha (1981) quotes "Barlowe" saying

"the term land means different things to different people depending upon the context in which it is used, the circumstances under which it is considered, land could be a space, nature, factor of production, situation, property and capital. Land is fixed in quantity and is indestructible and land as space includes the surface of the earth including mountain, valley and plain which provide physical support for man and his work.

Abdulmumuni (1991) stated that, land is significant not only because the value and use of most land depend largely by its location and accessibility but also because of the strategic importance of the locational factor in modern economic affairs and the world politics.

The total earth's land area is about 144.8 million sq km or about 29% of the surface of the globe. This land falls into categories in terms of use and these are crop land which make up of 11%, range and pasture 26%, forest 30% and others 33%. Most of the land that falls into the residual "other" category is naturally tundra, marsh, scrub forest, bare rock and ice or snow. About one-third of this land is so barren that it lacks plant cover altogether. While desert and other unproductive lands are generally unsuitable for intensive human use, they play an important role in biogeochemical cycles and a refuge for biological diversity, Cunningham (1979).

Presently, only about four percent (4%) of the world's land surface is formally protected in parks, wildlife refuges and nature preserves, Berger (1997).

Although this land could feed a vast large human population, sustained agriculture and other human activities could result in serious environmental and social problems such as land pollution, erosion, desertification, etc. Rapidly growing

human population and expanding forestry and agriculture have brought about extensive land use changes throughout the world.

Many countries already have serious water problems or shortages due to pollution from man's activities such as dumping of refuse indiscriminately, industrial activities such as oil exploration and refining. Supplies of these fuels are diminishing at an alarming rate and problems associated with their acquisition and use include air and water pollution, mining damage, shipping accidents and political insecurity.

Pollution can be defined as any impairment that renders the environment - (land, air and water) incapable of being put to its usual role. According to Cunningham (1979), it is difficult to give a simple, comprehensive definition of pollution. The word "pollution" comes from Latin pollutus, which means made foul, unclean or dirty. Land does not increase in size yet the population keeps increasing at an increasing rate. This has brought about scarcity in the land availability for man's use.

Land pollution has contributed immensely to a great extent to land conflicts between and among communities, leading to war, hunger, famine and starvation. The issue of land pollution has assumed a wider dimension due to man's activities through farming; indiscriminate wastes disposal, deforestation, industrial discharge and burning. The land pollutants such as solid waste get to the rivers and seas every year. Man generates vast amount of unwanted stuff every year and places to put these wastes are becoming more and more scarce as their contents are becoming increasingly unpleasant and dangerous.

The rich countries and nations send it to their impoverished neighbours. Cunningham (1997).

Land pollution had led to death of plants and animals, loss of available land for man's use resulting in huge economic losses. A lot of the scarce resources had also been channelled into the control and prevention of land pollution but only a little achievement has been recorded in that area.

1.2 STATEMENT OF PROBLEM.

Since the population of Nigeria has continued to grow at an alarming rate resulting in increase in the generation of land pollutants such as solid wastes, industrial influents, etc. the problem of land pollution with its effects has been on the increase resulting to degraded environment.

The health effects of land pollution and other environmental ills of modern society has become a greater threat than infectious diseases for many of the people in industrialised cities. The natural habitats have been lost and more are facing extinction due to loss of lives arising from land pollution. Diseases such as typhoid fever, cholera, lung problems, malaria, etc. have been attributed to land pollutants in nation including the study area Gwagwalada. Also water scarcity, loss of aquatic lives, deaths of people and conflicts between or among people due to the effects of land pollutants always occur in the study area.

1.3 AIMS AND OBJECTIVES OF THE STUDY

The broad aim of this study is to determine the effects of land pollution on the environment in Gwagwalada, FCT, Abuja.

The above aim will be achieved through the following objectives.

- i. To identify the various land pollutants in the study area.
- ii. To investigate the extent of land pollution in the study area.

- iii. To investigate the efforts already made to reduce the generation of land pollutants in the study area and make recommendations on how to minimise the effects of land pollution on the environment in the study area.

1.4 SIGNIFICANCE OF THE STUDY.

The majority of people in Gwagwalada live in slums and a lot of land pollutants are generated by the people. It is therefore of great importance to study the effects of land pollutants on the environment in the study area. Through the data or information gathered, bottlenecks of land pollution in the area shall be identified and meaningful suggestion or recommendation that will enhance sanity and healthier environment on the study area shall be made for use by environmentalists, health workers and the public in general.

1.5 STUDY AREA.

1.5.1 Geographical Location.

The Gwagwalada Area Council map lies at the centre of the ceramic picturesque of Federal Capital Territory. Kwali stretches from its southern border overshooting into north. Bwari, Abuja Municipal and Kuje Area Council took turns in the border relay on its eastern ventricle. Gwagwalada Area Council was created on the 1st of October 1984.

It is located on a gentle sloppy area which lies between latitude 8°-9°W and longitude 7° N and covers a total land area of about 950 square km.

The Gwagwalada has a land of abundant agricultural potentials. It is irrigated by the three principal rivers of F.C.T. namely; Usuma, Gurara and Iku.

The vegetation combines the best features of the southern tropical rain forest and guinea savannah of the north. Gwagwalada shares in the climatic endowments - that make the middle belt the food basket of Nigeria today.

1.5.2 Climatic Condition.

The area is about 760m above sea level with average monthly temperature of 27°C-30°C in most month of the year. It has an annual rainfall of 1000-1500mm and the rainy season begins in the early part of May and continues till November.

The month of August and September usually has the greatest amount of rainfall. It is moderately cold during the harmattan period, which starts from late November ending in early part of February. The area experiences the hot period in the month of January to early part of April.

1.5.3 Population.

When the Gwagwalada Area Council was created in 1984 its official population figure was 150,000 people and it has since become obsolete. The final relocation of government from Lagos to Abuja in 1991 brought about a massive influx of people into the Area Council. The teeming population of the Area Council has grown astronomically and can be estimated at one million people. This comprises the original settlers: namely Gwari, Koro, Bassa, Gede and Hausa/Fulani as well as the immigrant population of other Nigerians and expatriates.

1.5.4 Culture.

The area has many ethnic groups, which include Gwari, Koro, Bassa, and Hausa/Fulani as mentioned earlier as the indigenes and due to the movement of Federal Capital to Abuja, other ethnic groups are also found on the area. Due to this, the culture in the study area varies depending on the ethnic group.

However, a leader known as Aguma was made a second class chief to oversee Gwagwalada town and he is the leader of other traditional rulers in the study area.

1.5.5 Social Amenities.

Gwagwalada, besides its industrial potentialities has assumed a pride of place as the Athens of Abuja. As a centre of learning, it houses all the major higher learning institutions in the F.C.T. These include, the University of Abuja, the School of Nursing and College of Education, located at Zuba.

It has over 40 primary and seven secondary schools including the school for the Gifted and the reputable Christ the Kings College (C.K.C.). Private individuals own some nursery/primary/secondary and Islamic schools. The Gwagwalada also

- houses the Abuja Specialist Hospital, a centre of medical excellence recognised nationwide and some other comprehensive health centres, many maternity centres, private hospitals, clinics and basic health centres.

The pipe borne water, boreholes and electricity are available and federal roads linking the study area to Niger State and Kwali Area Council. Other roads linking Gwagwalada and other villages also exist. There is a major market in Gwagwalada town, which holds every five days.

The Federal Radio Corporation of Nigeria has its transmitting centre at Gwagwalada. Also, Nitel, MTN and Globalcom can be accessed in Gwagwalada town. Banks such as Co-operative Banks, Bank of the North, All State Trust Bank, First Bank, United Bank for Africa and Community Bank, Peoples Bank are found in the study area.

1.6 SCOPE AND LIMITATION OF THE STUDY.

For a thorough and effective investigation on the research topic, the study covers Gwagwalada and both primary and secondary data was used.

The limitations include lack of finance, duration of project, time and attitude of the respondents.

CHAPTER TWO

LITERATURE REVIEW

- 2.1 PREAMBLE

The environment which comprises of the atmosphere (air), hydrosphere (H₂O) and the biosphere (the living) has been altered greatly by man and this has resulted to the depletion and degradation of the various aspects of the environment. Man through his activities has helped to accelerate the degree of depletion and degradation resulting in environmental problems such as pollution, erosion, drought, and desertification among others.

The study area, which used to be quite natural before the creation of the Federal Capital Territory has suffered from the activities of man. The population is ever increasing, resulting in heaps of solid waste, water pollution and over cultivation of land. The researcher in carrying out this study wishes to identify the land pollutant, investigate the extent of land pollution in the area, find out the efforts being made to reduce the generation of land pollutant and make necessary recommendations on how to minimise the effect of land pollution on the environment in the study area.

- 2.2 ENVIRONMENT AND ITS ASPECTS.

The environment, which is defined as the complex of social or cultural condition, that affects an individual or community Cunningham (1979) is made up of many components. These include the atmosphere, biosphere, hydrosphere and lithosphere. The components are inter-related and interdependent. Man can not exist without any of the components. The water can be found in the air and soil.

Particles of soil are found suspended in both water and air showing the interdependency of the environmental aspects.

2.2.1 The atmosphere is a very essential component of the environment as without an atmosphere, the earth would have no air, wind, cloud, rain or weather. Without atmosphere there would be no blanket of air to reduce the intensity of the sun's heat during the day or to hold the earth's heat during the night. There would be enormous extremes of temperature during any 24 hours period.

At night, the temperature might drop as low as 300°F and the day the temperature might rise as high as 350°F Machellian M (1975). Man depends on air (oxygen) for breathing while he expels carbon-dioxide which plants and crops require for manufacturing of their food. Without air, man, animals and plants will definitely cease to exist. The rains from the atmosphere provide water for drinking, bathing, cooking and replenish the rivers and oceans through the hydrological cycle. Aquatic animals, man, animals and plants need water for some physiological processes without which life ceases.

The atmosphere has been degraded by man's activities such as release of dust, deforestation, smoking and burning of fossil fuel resulting in depletion of the ozone layer leading to global warming.

The atmosphere is of different levels naming the troposphere with average temperature of about 59°F at the earth surface. The depth varies from 6-10 miles Machellian (1975). This is followed by stratosphere with the depth of between 10-20 miles. The chemosphere extends to about 50 miles above the sea level and the ionosphere to an altitude of 250 miles. This later is followed by the mesosphere, which is the last zone before the space.

2.2.2 The hydrosphere region has to do with water. Water is life as every living organism depends on water for existence. Water is found in air as well as on and under the earth surface. But more than three-fourth of all the earth surface is ocean which is not mostly available for man's use. The earth's water supply originates in the ocean and a vast quantity of this water evaporates into the air and most of it comes back into the ocean carrying with it much of the earth's soil.

The water beneath the surface also forms part of the hydrosphere. Water is lost through runoff, evaporation and a portion of the rainfall soaks into the ground. This is called ground water and is of utmost important to living things. The water has been made impure both on land and in oceans through the activities of men thereby making the available water for man's use to be scarce. This has led to the saying that "water, water everywhere no any drop to drink".

2.2.3 The lithosphere is referred to the solid earth. This layer is not uniform from the surface to the centre of the earth. It is thought to consist of three layers namely the crust, mantle and core. The crust consists of the surface layer of the soil and rocky material. It is in this layer that soil, water, oil, gas, coal and our common minerals are found.

This layer unfortunately has been degraded through weathering, erosion and man's activities such as pollution, deforestation, etc. Below the crust is the mantle which is about 1800 miles thick and extends from the crust to the central core. The core has a diameter of about 4320 miles and its temperature ranges between from 2000 and 6500°F.

2.2.4 The biosphere consists of all living things and their habitats and this also has been adversely affected by man's activities. Pollution has led to loss of lives of

aquatic animals, plants, crops, and even man. Pollution has led to loss of land which were useful to man.

Generally, pollution had and is still having adverse effects on the atmosphere, _ biosphere, lithosphere and hydrosphere making these aspects and its component which man depends on for existence scarce and unavailable.

2.3 POLLUTION AND TYPES

As earlier defined, pollution is any impairment that renders the environment and its aspects incapable of being put to its usual roles. Rapid growth of cities has had a harmful effects on surrounding ecosystems. Poor management of municipal wastes - sewages, septage and refuse - is Nigeria's major urban environmental problem and improving wastes management is more of a policy and management problem than a technical one. -

Industrial water is another major environmental problem. Textile plants, breweries, slaughter houses, sugar refineries, pulp and paper plants and petroleum industries discharges raw, untreated and often toxic liquid effluents into open gutters, streams, drains, channels and lagoons. This renders most surfaces and underground water around urban area unsafe for human, agricultural or recreational use. All the environment (air, land and water) is affected by smoke, gases and dust _ from motor vehicles and factories causing serious health hazards.

2.3.1 Types of Pollution

Based on the aspects of the environment, pollution could be classified as land pollution, water pollution and air pollution.

(i) Land Pollution: In its most widely accepted use, the term land refers to the solid portion of the earth surface. People often render to ground soil or earth as land

and speak of land as something on which they can walk, build houses and grow crops. Land is fixed in quantity and is indestructible and land as space include the surface of the earth including mountains, valleys and plains which provide physical support for man and his works. Land is of great importance to mankind and due to increase in population, there has been a serious competition for land that is available for man's use as all productive activities take place on land. Most of these activities result in the impairment of land thereby rendering it unfit for use.

Land pollution is defined as the impairment of land which renders it and its aspects incapable of being put to its usual roles. Man's activities such as deforestation, farming, etc. result in flooding which renders land unfit for use. Dumping of refuse, oil exploration, human excreta, etc. form part of land pollution.

- In cities where population are much, the problem of land pollution is common.

Igbozuriike (1976) defined land as the totality of something fundamental to our existence and our way of life because it is not only a source of wealth both material and spiritual but also depicts the character and quantity of man and woman who inhabit it and whom it serves. Also Abdulmumuni (1991) states that land is significant not only because the value and use of most land largely determined by its location and accessibility also because of the strategic importance of the locational factor in modern economic affairs and the world politics. As important as the land is, it is fixed in quantity and is indestructible and yet the demand for it keeps increasing. Most activities of man renders even the limited quantity that is available for man's use unavailable. Land pollution has led to outbreak of diseases, blockage of canals, rendering of roads impassable, dead crops and plants, etc.

(II) **Water Pollution:** Any physical, biological or chemical change in water quantity that adversely affects living organisms or makes water unsuitable for desired uses can be considered as water pollution (Cunningham, 1997).

There are natural source of water contamination such as poison springs, oil seeps and sedimentation from erosion but the primary sources of water pollution is human caused. The most serious water pollutants in terms of human health world wide are pathogenic organisms, resulting in diseases such as typhoid, cholera, bacterial and amoebic dysentery, polio, infectious hepatitis and schistosomiasis. Malaria, yellow fever and filariasis are transmitted by insects that have aquatic larvae. Also human activities such as wastes and sewage disposal into rivers, streams and oceans led to water pollution. Other toxic inorganic material are carried by run off into the lakes or rivers or even percolate into ground water aquifers.

Man through his activities such as mining, processing, using and discarding of materials cause water pollution. Other industrial processes such as leather tanning, metal smelting and plating, petroleum distillation and organic chemical synthesis release acids and bases which help in water pollution.

Use of organic chemicals such as pesticides, plastics pharmaceuticals pigments and other products that we use in everyday life are important but many of these chemicals are highly toxic.

"The two most important sources of toxic organic chemicals in water are improper disposal of industrial and household wastes and run off of pesticides from farm fields, forests, roadsides, golf courses and other places where they are used in large quantity" (Cunningham, 1997).

(iii) Air Pollution: Air pollution is generally the most easily widespread and obvious kind of environmental damage causative agent. Air is very important to man and animals as they depend on it for survival.

Also, plants make use of the air for food manufacturing. The air is contaminated to some degree through smoke, haze, dust, odours, corrosive gases, noise and toxic compounds that are present nearly everywhere even in the most remote pristine wilderness. Man through his activities has released directly or indirectly some pollutants into the air in harmful form.

In cities and towns where population is very high, the air has been polluted through smokes from exhaust pipes of vehicles, soil erosion, strip mining, rock crushing and building construction. Other discharges from industrial activities release gases such as carbon monoxide, sulphur dioxide, nitric oxide and other volatile organic compounds from part of the air pollutants.

Air pollution has led to health hazards, accidents, reduced visibility, pains in the eyes, acid rains, etc.

2.4 LAND POLLUTION

Land is a vast storehouse of resources that man is tapping at an increasing rate. From land, all metals, fuels and building stones are extracted for man uses. Machelhiar (1975) few of these resources can be used in their natural state as most of them require refining or chemical changes to make them useful. These processes of refining or chemical changes result in some waste products which are usually dumped on land. Some of these are toxic and result in land pollution. Yet land is limited supply and man through his activities continues to render some portions of land unavailable for use.

Land pollution is defined as any impairment that renders the land incapable of being put to its usual role. The waste that are disposed indiscriminately in our towns and cities, the oil spillage that renders land incapable of supporting plants and crops, industrial discharges from mining, refining and processing industries, leftover foods from our homes, etc. are all land pollutants. Also, man through his activities like agriculture crop residues, animal's manure and the blood in the slaughter houses that constitute the single largest source of non-point pollutants.

Land being one of the most important resource needed by man and is limited in supply, anything that affects it should be taken very serious. As the population is increasing, the demand on land for man's use also increases and most activities may render some portions of land unavailable for man's use. This poses a great danger to man. Land pollution is one of the ways man renders the land unavailable for his use.

2.5 LAND POLLUTANTS

Anything that renders the land unfit of its usual role is a land pollutant. Land does not increase in size yet the population keeps increasing at an increasing rate. This has brought about scarcity of land available for man's use. Land pollutants has contributed immensely to a great extent to scarcity of land thereby causing conflict between and among communities, lead to wars, hunger, famine and starvation.

The issues of land pollution has assume a wider dimension due to man's activities through the indiscriminate waste disposal, deforestation, over cultivation, industrial discharges, etc.

Land pollutants such as solid waste gets to the rivers and seas every year. The problem is that we generate vast amount of unwanted stuff every year and places to put these wastes are becoming more and more scarce as their content are

becoming increasingly unpleasant and dangerous, the rich communities and nations send it to their impoverished neighbours (Cunningham, 1999).

Land pollutants are common site in both villages, towns and cities. The more the population of an area, the worst the amount of land pollutants. This goes to show that man through his activities generate majority of the land pollutants. Waste as a land pollutant, is every one's business in nearly everything we do.

According to the environmental protection agency, the United States produces eleven billion tones of solid waste each year. Consisting of agricultural wastes, industrial wastes and municipal wastes. Agricultural wastes that are pollutants include crop residues and animal manures. Human excreta, leftover, food, domestic garbage, construction refuse, pesticides, herbicides, fertilisers, fuel, spray paint cans, plastic, etc. are all land pollutants.

2.6 POPULATION AND LAND POLLUTION.

Population is defined as the number of people living in a particular geographical area. Land becomes populated only when it is rendered incapable of being used for its usual role. It is a common knowledge that the more the population, the higher the pressure on land since it can not be increased. As the population increases, more people are engaged in production processes of mining, production and processing. All these processes result in wastes accumulation, which constitute land pollutants. The problem is that we generate vast amount of unwanted stuff every year and places to put them are becoming more and more scarce as their contents are becoming increasingly unpleasant and dangerous.

Rapid growth of cities have a harmful effect on surrounding eco-systems. Poor management of municipal wastes sewage, septage and refuse is Nigeria's

major urban environmental problem. In the cities, industrial waste is another major environmental concern. "Textile plants, breweries, slaughter houses, sugar refineries pulp and paper plants and petroleum industries discharges raw untreated and often toxic effluents into open gutters, streams, drains, channels, lagoons and open land" World Bank (1995). This has rendered most land, surface and underground waters around urban areas unsafe for human, agricultural or recreational use.

As the population grows, the infrastructures such as water supply, sewages, - sanitation, urban roads, electricity, drainage, waste disposal are generally in contrast, rural areas are "safer" from land pollution although it is not possible for a place to be totally free of land pollution. In villages, industries are not cited, "mountains" of refuse are not visible and the volume of man's activities that generate land pollutants are low compared to the town and cities.

Generally, the effects of land pollution are more in towns and cities than in the rural areas since a greater number and quantity of land pollutants are generated in the towns and cities.

2.7 WASTE AND LAND POLLUTION.

Wastes could be solid, toxic and hazardous. These contribute a lot in land pollution. Solid waste which could be industrial or municipal when disposed improperly constitute land pollutants. As the population of an area increases, more wastes are produced and deposited on the land. Some of these wastes are washed into the rivers, streams and sea where they have adverse effect on aquatic lives. These waste include organic materials such as yard and garden wastes, food wastes, - and sewage sludge from treatment plants, junked cars', worn out furniture and other consumer productions of all types.

Newspapers, magazines, advertisements and office refuse made paper one of our major refuse wastes. In spite of recent progress of recycling, many metals, glasses and plastic tool and beverage containers used every year in Nigeria end up in the trash.

Wood, concrete, bricks and glasses from construction and demolition sites, dust and rubbles from landscaping and road building; all of this varied and voluminous waste has to arrive at a final resting place-dumps.

However, man in his quest for knowledge has come up with ways of managing these wastes but little or no achievement has been recorded, no achievement has been recorded. In most developing countries, the method of waste disposal is by open dump; while in most developed countries, open dump is forbidden but the problem has been illegal dumping. A trip to our towns and cities show trash accumulation along roadsides and in vacant, weedy lots in the poorer sections of the cities. Other wastes like oil and solvents are poured into the sewers or allowed to soak into the ground every year in Nigeria. No one knows the volume of solvents and other chemicals disposed of by similar methods.

Increasingly, these toxic chemicals are showing up in the ground water supplies on which many people and animal depend on for drinking, agriculture and other purposes in Nigeria.

The problem of illegal dumping in our towns and cities is likely to become worse as acceptable sites for wastes disposal become more scarce and costs for legal dumping escalate. A change in our attitudes and behaviours and the need for laws becomes very important.

All the activities of man generate wastes and most of these renders the land unfit for use. Shall we continue to generate these wastes and pollute the land which has become more scarce from year to year due to population increase? Sometimes drastic and helpful need to be done to reduce or eliminate these wastes go as to save our land from being polluted. Other wastes such as hazardous and toxic wastes also pollute the land. These are injurious to both human health and environmental quality. According to the Environmental Protection Agency, industries in U.S.A. generate about 265 million metric tones of officially classified hazardous wastes each year. In addition, considerably more toxic and hazardous - wastes materials is - generated by industries or processes not regulated by E.P.A. These wastes shockingly are released into the air, water and land in the United States each year, Cunningham (1997).

2.8 EFFECTS OF LAND POLLUTANTS TO THE ENVIRONMENT.

Environment as known can be defined as the circumstance or condition that surround an organism or group of the organisms. It is also defined as the complex of social or cultural conditions that affect an individual or community Cunningham (1999).

Man inhabit the natural and the built up world, all constitute important parts of our environment and this shows that there is interaction between the environment and man. The environment affects man and also man affects the environment through natural environment to degraded environment. Most of these activities by man produce land pollutants such as fertiliser, chemicals, pesticides, herbicides, fuels, garbage, household refuse, agricultural refuse, animal dung, etc.

These pollutants among others have had and are having adverse *effects* on our environment. These includes

- (i) **Loss of Wide Life:** Due to the *effects* of land pollutants, some wild life habitats have been altered and in some cases destructed. This has resulted in loss of such wildlife. Even aquatic animals e.g. fish are lost due to the effect of land pollution. Pesticides and other chemicals that are harmful could be washed into the river where fishes inhabit and the result is always death of fishes. Oil spillage is another form of land pollution that has led to loss of a greater number of flora and fauna lives.
- (ii) **Health Problems:** Due to land pollution, there have been cases of sickness and diseases. Diseases such as typhoid, cholera, bacterial and amoebic dysentery, polio, etc. are caused by land pollution. Our dumps that are common in our towns and cities serve as abode for disease, and carrying insects such as mosquitoes leading to outbreak of diseases like malaria, yellow fever and filariasis. Most of such diseases have led to the death of many people especially in tropical Africa.
- (iii) **Transportation Problems:** Some land pollutants constitutes obstacles on our roads. A trip to our towns and cities show "mountains" of refuse almost everywhere with some impeding the free flow of *traffic*. Such refuse cause blockage of the roads and drainage system where they exist thereby causing flooding each time the rain falls. Flooding has led to loss of lives and properties in Nigeria especially in urban areas. The offensive odours always ooze out of such heaps making the people living around them and people passing by uncomfortable.

- (iv) Scarcity of Resources: Land pollution has led to the scarcity of natural resources such as land, water, and air. Land being a very important factor of production has always been depended on by man for his activities. Pollution renders such land unfit for use and with the population ever increasing, land became scarce for man's use. Such land are made not available for agricultural processing and other industrial uses. This results in conflicts between and among the competing forces that depend and control land.
- (v) Destruction of Ecosystem: The ecosystem has been depleted and some cases completely destroyed due to land pollution, plants and animals are affected adversely each time and anywhere land is polluted. A case of oil spillage leads to destruction of the plants and animals in the area. Man depends on these plants and animals for foods, income, social studies and political power. When the land can no longer serve these purposes, there will be crisis, hunger and starvation in the area.

2.9 LAND POLLUTION AS A FACTOR OF LAND SCARCITY.

"Land is the totality of something fundamental to our existence and our way of life because it is not only a source of wealth both material and spiritual but also despite the character and quality of man and woman who inhabit it and who it serves" Igbozurike (1976). People often refer to ground, soil or earth as land and speak of land as something they can walk, build a house and grow crops; however, from a legal point view, land may be regarded as any portion of the earth surface over which ownership right can be exercised. It is estimated that the earth's total

land area is about 144.8 million sq km which is only about 29% of the surface of the globe.

This land falls into four categories in terms of use which include crop land 11%, range and pasture 26%, forest 30% and others 33%. Most of the land falls into the residual "other" category is naturally marshy, scrub forest, bare rocks, ice or snow and trunks which are not available for man's use.

The deserts and other unproductive lands are generally unsuitable for intensive human use. Also only about 4% of the world's land surface is formally protected in parks, wild life refuges and nature preserves Berger (1997).

Although, this land sustains a vast human population, sustained man's activities could result in serious social and environmental problems such as land pollution. The world's population is increasing at an alarming rate. Land is of great importance to mankind and due to increase in population there has been a serious competition for the land that is available for man's use, as all productive activities take place on land.

Land pollution which has been defined as any impairment on land which renders it unfit to serve the purpose it would ordinarily have served. A large portion of the available land have been rendered useless unless as they can no longer support plant and animal lives. _

Oil spillage, exploration and exploitation have rendered a lot of land useless leaving the teeming population in such areas landless and hunger, starvation, famine and conflicts often result in such areas. Land can not be created by man as the volume of land is fixed and since the population of man keeps increasing, the demand for land also will keep increasing and since land pollution increases as the

population increases, due to man's activities, a situation has resulted where land is in short supply; so land pollution is a contributing factor to land scarcity.

2.10 PROBLEMS WITH CONTROL OF LAND POLLUTION.

Since the source of land pollution could be natural or man made, it is very difficult to control land pollution instantly. The natural sources such as poison springs, oil seeps, sedimentation, nutrient decomposition by bacteria among others can hardly be controlled since man has little or no control over nature. They can only be predicted and control measures adopted to reduce the level of land pollution.

Other sources of land pollution which are natural but non point include spring snow melt, high concentration of gasoline leads, oil and rubber residues of city streets. The irregularity of these events, as well as their multiple sources and scattered location makes them much more difficult to monitor, regulate and treat than the point sources Saigo (1979). The activities of man which affects land thereby causing land pollution are on the increase since the population keeps increasing and the quantity of land available for man's use is not increasing. The movement of people from rural to urban areas has contributed greatly to the increase in the rate of land pollution in such urban areas as land that were available for use have turned to dumpsites which originally they wouldn't have been use for.

A lot of industries especially the oil companies which are involved in petroleum exploitation, exploration and refining are springing up mostly in some areas due to increase demand on their products. As the population grows the demand to products such as petrol, kerosene, etc. increases. In many case, vandalisation, pipe leakage are leading to various quantities of petroleum products being pumped into the land which renders such area unfit for use (pollution). The

level of awareness of the causes of land pollution has been a great problem in the control of land pollution in many areas. Lack of adequate legislation on the control of land pollution is another problem. Where some legislations exist, enforcement has not been effective either due to lack of political will or lack of appropriate organ charged with the implementation of the land pollution control policy. Land pollution could be a cross boundary and in such case co-operation is needed between or among the countries. This becomes more difficult especially if the policies of these countries on pollution differs.

2.11 ELIMINATION OR REDUCTION OF LAND POLLUTANTS.

Since the natural sources of land pollution and activities of man continues on land, land pollutants can not be eliminated but these could be reduced.

The reduction of the level of land pollutants could be achieved through improved technology. The companies that generate these pollutant could improve on their production technologies which will result in reduction in the level of land pollutants. Oil companies should always maintain their pipes and operation to reduce the incidence of oil leakage and pipe vandalisations.

Proper dumping of hazardous wastes will also go a long way in the reduction of the level of land pollutants. This could be done using open dumps and ocean dump which are however not the best method. Other methods of disposing wastes which cause land pollution include use of landfills. In such land fills, solid wastes disposal is regulated and controlled.

Historically, landfills have been a convenient and relatively inexpensive waste disposal option in most places, but this situation is changing rapidly.

Rising land prices and shipping cost as well as increasingly demanding land fills construction and maintenance requirements are making this a more expensive disposal method. Cunningham (1977).

Most recently, use incinerators where thousand of tons of wastes are burnt per day. However, there has been a lot of argument on the environment effects of the use of such incinerators. It has been reported that ash for incinerators contain high level of dioxins, furans, leads and cadmicin.

The most effective means of land pollutants reduction include recycling reuse and reduction. This is the reprocessing of discarded materials into new useful products. This turns old materials (land pollutants) into entirely new products.

Kitchen wastes becomes a valuable soil amendment, steel cans becomes new automobiles and construction materials. This helps to cut down the volumes of waste drastically and reduce pressing on disposal systems. It also lowers the demand for raw materials. It reduces energy consumption, air pollution and reduction of litter in our streets.

Reuse: Even better than recycling or composting is cleaning and reusing materials in their present form, thus saving the cost and energy of remaking them into something else. Autoparts are regularly sold from junkyards. In some areas. Stained glass, windows, brass fittings, fine wood work and bricks salvaged from the old houses bring high prices.

Some commodities sort and reuse a variety of materials received in their dumps. Also the land pollutants can be reduced by producing less of such pollutants. This can be achieved by changing the manufacturing processes, finding uses for waste products and listening to employee's suggestions.

Laws and ordinances can be passed requiring that fast food restaurants package food in paper or other biodegradable wrapping which will both reduce litter and protect the atmosphere.

Legislations that regulate the generation of land pollutants should be formulated and implemented. The rural areas could be provided with social amenities and means of livelihood to reduce the movement of people to urban areas. This will reduce the pressure on land, reduce the level of the generation of land pollutant in urban areas and make some places or areas better places of living.

CHAPTER THREE

METHODOLOGY

This chapter highlights the methods of data collection and various processes employed in conducting the research. This research is a survey type designed to investigate the effects of land pollution by obtaining the opinions of various groups which includes farmers, environmentalists, builders, transporters and health workers to:

- i. Identify various forms of land pollution in the study area.
- ii. Investigate the extent of land pollution in the study area.
- iii. Investigate the effort already made to reduce the generation of land pollutants in the study area and make recommendations on how to minimise the effects of land pollution on the environment of the study area.

The research relied mainly on primary and secondary data and the questionnaire was structured in a way that will ensure relevance of data collected.

3.1 METHODS OF DATA COLLECTION.

Data collection is one of the crucial pillars in the research findings and the researcher collected data using primary and secondary sources for the purposes of finding out the effects of land pollution using Gwagwalada as a case study.

3.1.1 Primary Data.

Due to the fact that primary source of data collection gives a first hand and better information, the researcher relied on it in the course of data collection for the study. The various primary data that were used was obtained from the use of questionnaire and observation methods.

.. 3.1.2 Secondary Data.

The researcher consulted textbooks, magazines, and newspapers, delivered papers, lecture notes and journals for the purpose of data collection. This enabled the researcher to acquire some data to investigate some areas that require more studies.

3.2 CODING/TABLING.

All related data were first coded and later assembled to help in categorising them under appropriate heading and sections. This is also to help facilitate the editing of the information collected and reduce survey errors.

The data from the questionnaires were separately tabulated to present a summary of all the responses to each major research question to aid the testing. In doing this, the data were first tallied to produce useful relationships and the results of interviews and observations were considered in drawing conclusions.

3.3 PERCENTAGE/MODEL RESPONSES.

The responses to questions were analysed on simple percentage basis.

A percentage of each of alternate response was calculated against the total response for each major research questions.

This helps the researcher determine the model response to each question by each of the population group of the respondents in order to make a comprehensive analysis and select the alternative with highest percentage

The frequency of response to a particular question expressed as a percentage formed the basis of a majority view. Primary data were analysed and inferences drawn were compared with those of secondary data for correlation or lack of it.

3.4 STATISTICAL TOOLS FOR THE ANALYSIS.

The data gathered from the various questions were grouped and the tally method, which was the simplest and most straight forward, was applied. The statistical data were presented using tabular method, pie charts and bar charts for easy compensation and taking decision, the highest percentages and values were used for generalisation.

CHAPTER FOUR

PRESENTATION AND DISCUSSION OF RESULTS

The problem of land pollution in Gwagwalada is great and in order to solve it, the researcher decided to carryout a study in it with the aims and objectives of determining the effects of land pollution, identify various land pollutants, the extent of land pollution, methods of land pollution reduction and control and make suggestions and recommendations on how to minimise the effects of land pollution in the environment in Gwagwalada.

The data collected in the process of this research are analysed and interpreted in this chapter for easy understanding.

Table 4.1 The Selection of Sample.

Population group	Number	o/o expression
Farmers	30	37.5
Environmentalists	20	25
Health workers	14	17.5
Transporters	12	15
Builders	4	5
Total	80	100

Source: Compiled by the author (2004).

Simple random sampling method was used in selection of sample based on proximity, access to information and representativeness. From the table above, it could be seen that 30 out of 80 people selected are farmers representing 37.5%, environmentalists constituted 25% numbering 20 out of 80, health workers were 14 representing 17.5%, transporters were 12 representing 15% and builders were 4 which represents 5%.

Table 4.2 The Rate of Response.

Population group	Number in sample	No. of respondents	o/o expression
Farmers	30	28	93.3
Environmentalists	20	17	85
Health workers	14	13	92.9
Transporters	12	11	92.7
Builders	4	3	75
Total	80	72	90

Source: Compiled by the author (2004).

From the table, out of 80 questionnaires administered, 72 were returned representing 90% of the total questionnaires. Out of 30 administered to farmers, 28 representing 93.3 were returned, 17 out of 20 administered to environmentalists representing 85% were returned, 13 out of the 14 administered to health workers representing 92.2%, 11 out of 12 administered to transporters making 92.7% were returned and 3 out of 4 administered to builders representing 75% were returned.

This shows that farmers responded most and the least were builders. This could be as a result of interest that the farmers have on the topic under study as their livelihood is mostly affected by land pollution, only eight questionnaires were returned. This response rate is high enough to be used for analysis.

PLATE 1

A heap of illegal refuse dump in front of one uncompleted building at Kutunku Area, Behind Better Life Gwagwalada- Abuja

PLATE 2

The Illegal refuse dump opposite Paiko Motel along market road
Gwagwalada ~Ahuja

PLATE 3

This is also one of the illegal refuse deposited opposite Islamic Primary School
Phase I quarter, Gwapala · A·uja

4.1 DATA ANALYSIS.

The questionnaires made up of 80 copies were used in collecting data for this study and 75 copies were filled and returned for analysis representing 75.93%. However, three of the seventy five questionnaires returned were disregarded for data analysis because they were not properly filled. In analysing the data collected, the statistical techniques employed are the histogram, bar chart, pie chart and percentage method where various population groups were separately tabulated for effective and easy understanding. The analysis is made up of two (2) parts, first is the inference testing in which the questionnaires were analysed under their related inferences. The second comprised of analysis of other additional data which helped to explain the outcome of the inference testing.

Table 4.3 Sex of Respondents.

Sex	No. of Respondents	Percentage expression
Male	61	84.7
Female	11	15.3
Total	72	100

Out of the seventy two questionnaires used for the purpose of data analysis 61 were from male representing 84.7% while 11 were from female which represents 15.3% of the total questionnaires accepted for analysis. From the table 4.1 above, there is an empirical evidence that the majority of respondents who eventually returned their questionnaires were male representing 84.7% of the total population.

Table 4.4: Statistical Distribution of Respondents Population Group.

Population group	No. of Respondents	Percentage expression
Farmers	31	43.1
Environmentalists	19	26.4
Builders	12	16.7
Health workers	10	13.8
Total	72	100

Table 4.2 shows the percentage of the various population groups namely farmers, environmentalists, builders and health workers. 31 questionnaires were administered to farmers which represents the highest percentage of 43.1%, 19 questionnaires representing 26.4% were administered to environmentalists, 12 questionnaires translating to 16.7% were administered to builders and 10 questionnaires representing 13.8% were administered to health workers.

Table 4.5: Level of Land Pollution.

Levels	No. of Respondents	Percentage expression
High	45	62.5
Moderate	20	27.8
Low	7	9.7
Total	72	100

From table 4.3 above, 45 out of 72 respondents representing 62.5% agreed that the level of land pollution is high in the study area, 20 out of the 72 respondents representing 27.8% felt the level of land pollution is moderate in the study area and only 7 respondents out of 72 representing 9.7% agreed that land pollution is low in the study area. From this, it could be seen that majority of the respondents are of the opinion that the level of land pollution is high in the study

area while a majority believe that the level of land pollution is low in the study area. This also shows that people are aware that land pollution is common in the study area as all the respondents agreed that there are some levels of land pollution in the study area.

Figure 4.1: The Common Land Pollutants.



The histogram in fig. 4.1 shows that solid wastes contribute the greatest land pollutants in the study area. 50 out of the 72 respondents agreed that solid wastes are the greatest land pollutant in the study area while only 15 respondents attributed land pollution to hydrocarbons. 5 out of the respondents believed that other pollutants other than solid wastes and hydrocarbons are the causes of land pollutants in the study area. Solid wastes could have been the greatest land pollutants in the area due to population of people and inappropriate disposal of such wastes in the study area.

Table 4.6: Are People Aware About the Effects of Land Pollution?

Response	No. of Respondents	Percentage	Expression
Yes	61	81.9	
No	11	18%	
Total	72	100	

Table 4.4 above shows that 61 out of 72 respondents are aware about the effects of land pollution representing the 81.9% in the study area and 11 out of the 72 respondents representing 18.1% are not aware of the effects of land pollution. The level of awareness is quite high and could be as a result of various campaigns carried out on environmental issues by the local government council and schools in the study area.

Table 4.7: What Are the Effects of Land Pollution in the Study Area?

Response	No. of Respondents	Percentage	Expression
Loss of wild life	9	12.5	
Health problems	23	31.9	
– Transport problems	15	20.8	
Scarcity of resources	12	16.7	
Destruction of ecosystem	13	18.1	
Total	72	100	

Out of the 72 respondents, 9 representing 21.5% believed the effects of land pollution to be loss of wild life, 23 representing 31.9% are of the opinion that land pollution cause health problems, 15 respondents meaning 20.8% of the total respondents said land pollution causes transports problems, 12 respondents representing 16.7 believed scarcity of resource is being caused by land pollution

while 13 respondents translated to 18.11 are of the opinion that land pollution destroys the ecosystem.

This shows that majority believed that land pollution causes health problems, transport problems, destroys the ecosystem, cause scarcity of the resources and lead to loss of wildlife in a descending order.

Table 4.8: Are Any Land Pollution Control or Reduction Methods Available in the Study Area?

Response	No. of Respondents	Percentage Expression
Yes	32	44.4
No	40	55.6
Total	72	100

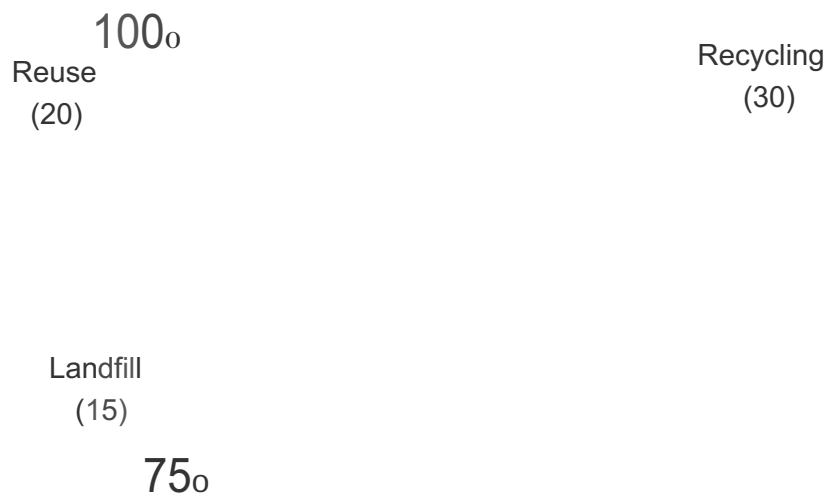
It could be observed from table 4.6 that out of 72 respondents, 32 believed that there are some control and reduction method of land pollution in the study area. This translates to 44.4% which is a minority compared to 40% respondents who said there are no method to prevent or control land pollution in the study area. This could be as a result of the amount of land pollutants the respondents find on the streets and roads in the study area. This therefore calls for more effort from governments and individuals in the area of control and reduction of land pollutants in the study area.

Table 4.9: Are You Satisfied with the Present Control or Reduction Method in the Area?

Response	No. of Respondents	Percentage Expression
Yes	11	15.3
No	61	84.7
Total	72	100

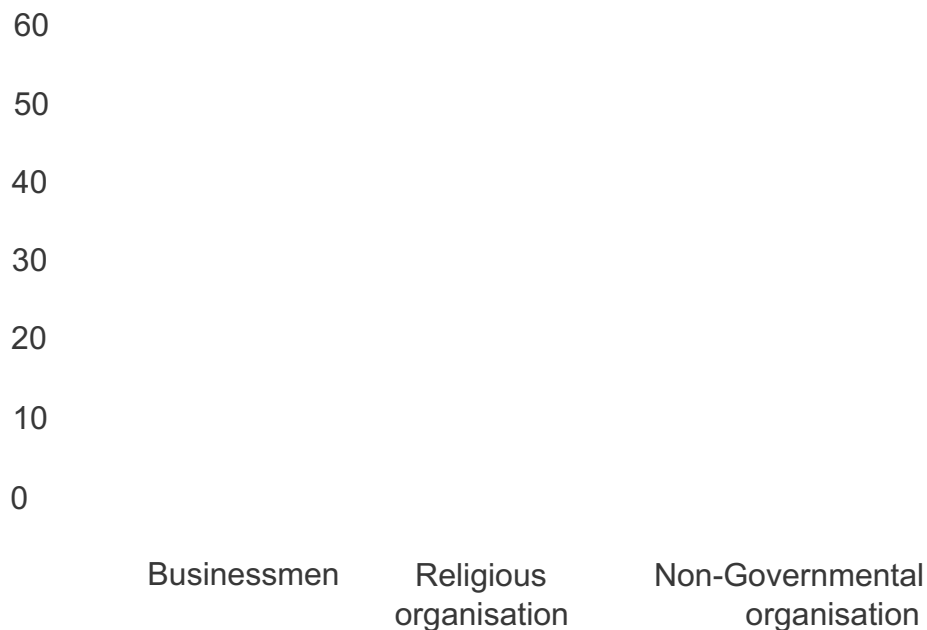
Majority of the respondents i.e. 61 out of 72 are of the opinion that the reduction and control methods presently being used in the study area are not - satisfactory. This represents 84.7% of the respondents. It is only 11 out of 72 respondents translating to 15.3% that are satisfied with the present control/reduction methods in use in the study area. This calls to improvement or change of methods being used for reduction/control of land pollution in the study area.

Fig. 4.2: What Methods do you Recommend for Reduction/Control of Land Pollution?



The pie chart above shows that more respondents believe that the best control reduction method is recycling, 30 out of the 72 representing agreed to that translating to 150°, this is followed by reuse as 20 respondent out of the 72 agreed to that, translating to 100°. The 15 respondents supported the use of landfill being 75° and only seven respondents representing 35° believed that burning the best method for land pollution reduction and control.

Fig. 4.3: Who do you Think can Complement The Government Effort in Control an Reduction of Land Pollution?



The bar chart shows that 38 of the respondents agreed that businessmen could complement the effort of government in reduction and control of land pollution in the study area. Also 13 out of the 72 respondents believed that religious organisations have a role to play in land pollution reduction and control while 31 out of the 72 respondents are of the opinion that other non-governmental organisations could support the effort of the government in the reduction and control of land pollution.

This means that the people are aware that only government can not completely control land pollution in the study area.

Table 4.10: Are there Legislations on Land Pollution in the Study Area?

	Response	No. of Respondents	Percentage Expression
–	Yes	33	45.8
	No	39	54.2
	Total	72	100

A greater number of the respondents that is 39 out of 72 believed that there are no legislation on land pollution in the area while 33 respondents out of 72 agreed that there are legislations on land pollution in the area. This could be as a result of 'non-enforcement' of the existing legislation on land pollution or that people are not aware of such legislations. This means that there is need for various enforcement of such legislation or creation of awareness on such legislation. However, on further investigation it was discovered that very few legislations on land pollution exist in the study area meaning more laws to be formulate and enforced.

From various analysis, it is observed that the level of land pollution in Gwagwalada is high, the people are aware of its effect and the existing reduction and control methods of land pollution. However, the people in the study area believed that only government can not handle land pollution reduction and control and suggested that the best method is recycling. Also, it was observed that solid wastes contributes the greatest land pollutant and that legislations on land pollutants are few and are not effectively enforced.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY.

The observation from this study are summarised in this section of the work. It looked into the problem statement which include health problems and other environmental ills due to land pollution in Gwagwalada.

The aim of the study is to determine the effects of land pollution on the environment, which was achieved through some objectives which include identification of various kind of pollutants, investigating the extent of land pollution and efforts made to reduce the generation of land pollutants. Also, recommendations were made on how to minimise the effects of land pollution on the environment in Gwagwalada.

The study was carried out using statistical methods. Data were collected using primary and secondary sources.

A sample was collected randomly for the purpose of questionnaires administration for data collected. The data collected were coded presented in tabular form, pie chart, histogram and bar chart for analysis and interpretations.

The study shows that the level of land pollution in Gwagwalada is high, the people are aware of its effects and the existing reduction and control methods to land pollution. the people in the study area also believed that only government can not control or reduce land pollution and suggested that the best method of land pollution control or reduction is through recycling. The study also showed that solid wastes contributed the greatest percentage of land pollutant are few and are not effectively enforced.

5.2 CONCLUSION.

Despite the effort made by the government to reduce on control land pollution, the effect seem to be on the increase in the Gwagwalada area since the level of land pollution is high in the area.

The main challenge facing the government and the people therefore is to involve innovative approaches on finding ways of reducing or controlling land pollution. Also, there seems to be lack of awareness on the legislations on land pollution.

The effects of land pollution in the study area includes loss of wildlife, health problem, transportation problems, scarcity of resources and loss of ecology system. These problems can only be solved if other non governmental organisations, commercial effort and wealthy businessmen join hand with government to take actions to reduce and control the effect of land pollution.

5.3 RECOMMENDATIONS.

Based on the analysis made and on the basis of the study, the following recommendations are advanced:

1. There should be awareness campaign on causes and effects of land pollution. This could be carried out in schools, religious houses, market places and other places of public gatherings or through the mass media.
2. There is need to stop the use of burning as control/reduction method on land pollution. The use of recycling, reuse and landfills should be encouraged.

3. Enough funds should be made available to agencies charged with control of land pollution so as to collect and dump refuse, purchase working materials and general staff welfare in a proper manner.
4. There is the need to embrace the spirit of cleanliness by the people. Sanitation exercises should not necessarily be on sanitation days alone but always.
5. Non-governmental organisations, community' effort and religious bodies should be encouraged to participate in reduction and control of land pollution.
6. Recycling plants should be established at various locations to aid in reducing wastes on the streets and roads.
7. More legislation should be made on land pollution and both the existing and new legislation should be enforced vigorously.
8. Some of these wastes should be converted into compost/manure and used for farming.
9. Finally, the greatest challenge for Nigerian on environmental issues today is that of environmental education. This study however, tried to reveal most of the ugly trends in the attitude of the public in Gwagwalada amid growing environmental awareness. Moreover, the populace are predominantly literate. It is therefore recommended that new environmental education strategies be vigorously embarked upon by the state ministry of environment with a new emphasis on environmental stewardship and not just the hitherto superficial approach.

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APPENDIX

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Minna.

Dear Sir/Madam,

QUESTIONNAIRE ON THE EFFECT OF LAND POLLUTION

The researcher is a student of the above named University. To qualify for the award of a Post Graduate Diploma in Environmental Management, one of the conditions is to have conducted a research study.

The researcher is undertaking a research study on the effect of land pollutions in Gwagwalada, Gwagwalada Area Council, FCT- Abuja.

The information required are strictly for academic purposes and shall be treated with utmost confidence.

Your cooperation is highly solicited.

Thanks for your cooperation.

Yours faithfully,

Ibrahim Adamu Shaku

PGD/GEO/2003/2004/295

INTRODUCTION

Please tick [~] in the boxes provided for relevant questions. Additional comments are welcome and should be made in the space provided.

1. Sex: Male ☐ Female ☐
2. How long have you lived in Gwagwalada?
Under 5yrs ☐ 5-10 yrs ☐ Above 10yrs ☐
3. Population group or interest group.
Farmers ☐ Environmentalist ☐ Builder ☐ Health work ☐
Other (please specify) _____ .
4. Was there much land pollution in Gwagwalada at the first time you came to settle? Yes ☐ No ☐
5. If the answer to question 4 above is yes, has it been on increase?
Yes ☐ No ☐
6. What is the level of land pollution now in Gwagwalada?
High ☐ Moderate ☐ Low ☐ Others (specify) _____ ..
7. Are people aware of the effects of land pollution in the study area?
Yes ☐ No ☐
8. If (7) above is yes, what is the level of awareness of the effect of land pollution in the study area?
High ☐ Moderate ☐ Low ☐ Other (specify) _____ .
9. What are the common land pollutants in the area?
Solid waste ☐ Hydrocarbons ☐ Others (specify) _____ ..
10. Are you satisfied with the present control or reduction method in the study area?
Yes ☐ No ☐ Other(specify) _____ .
11. Are there any control or reduction methods available in the area?
Yes ☐ No ☐
12. Does land pollution cause health hazards?
Yes ☐ No ☐
13. What are the waste management methods available in the study area?
Burning of wastes ☐ Reuse ☐ Recycling ☐ Reduction ☐
Other (specify) _____ .

14. What do you think is the major effect of land pollutions in the study area?
Loss of wildlife [] Health problem [] Transportation problem []
15. Are you comfortable with the present status of land pollution in the area?
Yes [] No []
16. Can the government only handle the problems of land pollution in the study area?
Yes [] No []
17. If the answer to question 16 above is No who do you think should help the government?
Businessmen [] Religious organisation [] Non-governmental organisation []
Other (specify) ..
18. Are there any legislation on land pollution in the study area?
Yes [] No [] Other (specify) ..
19. If the answer to question 18 above is "yes", are the laws effectively implemented?
Yes [] No [] Other (specify) ..
20. If the answer to question 19 above is No, what method do you recommend?
Reduction [] Burning [] Landfill [] Reuse [] Recycling []
21. Give any useful comment that could help resolve the research question