

**RELATIONSHIP BETWEEN PERCEPTIONS AND ATTITUDE  
OF SECONDARY SCHOOL STUDENTS IN KADUNA  
METROPOLIS TOWARDS ENVIRONMENTAL PROBLEMS**

**BY**

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**BEING**

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## DECLARATION

I hereby declare that this thesis has been written by me and that it is a record of my own research work. To the best of my knowledge, it has not been presented in any previous application for a higher degree. All quotations are indicated by quotation marks and the sources of information are specifically acknowledged by means of references.

.....  
**Badamasi Abdul Gambo**

.....  
**Date**

## **CERTIFICATION**

This thesis entitled “RELATIONSHIP BETWEEN PERCEPTIONS AND ATTITUDE OF SECONDARY SCHOOL STUDENTS IN KADUNA METROPOLIS TOWARDS ENVIRONMENTAL PROBLEMS” by BADAMASI, ABDUL GAMBO meets the regulation governing the award of degree of Master of Education in Science Education of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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## **DEDICATION**

This work is dedicated to my mother; Mrs. Zeenatu Badamasi.

## **OPERATIONAL DEFINATIONS**

This section deals with definition of terms used in this study.

**Attitude** – Predisposition to respond overtly to social and physical objects.

**Biological oxygen demand** – Is the requirement of oxygen for respiration by aquatic organisms.

**Chemical oxygen Demand** – Is the amount of oxygen required to degrade the organic Compounds of waste water.

**Environment** – Is the sum total of all external conditions influencing the growth and development of an organism.

**Environmental Issues** – refers to problems created as a result of human activities such as mining, gas flaring, solid waste disposal, tyre burning, soil degradation etc which deteriorate the environment.

**Perception** – Is the way individual view objects or situations depending on tradition, personal observation and experience and education.

## **ABBREVIATIONS**

APE	-	Assessment of Perception of Environmental Education.
ATE	-	Assessment of Attitudes toward the Environment
CERASE	-	Centre for Environmental Resources and Sustainable Ecosystem
E.E.	-	Environmental Education
FEPA	-	Federal Environmental Protection Agency
IUCN	-	International Union for Conservation of Nature and Natural Resources
KEPA	-	Kaduna State Environmental Protection Agency
SEPA	-	Science Education Programme for Africa
SS 2	-	Second year of Senior Secondary School
UNESCO	-	United Nations Educational, Scientific and Cultural Organisation.
UNEP	-	United Nations Environmental Programme
WAEC	-	West African Examinations Council
WWF	-	World Wildlife Fund
WCED	-	World Commission on Environmental and Development
WRI	-	World Resources Institute



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## **ABSTRACT**

A need for better perception of environmental problems and better attitudes toward the environment among secondary school students in Kaduna metropolis and find out the difference between male and female students' attitudes towards environmental problems.

The instruments used were APEP and ATE questionnaires adapted by the researcher to collect data from 375 senior secondary school students. Reliability coefficients,  $r= 0.74$  and  $0.69$  were obtained for the questionnaires respectively. The data collected were analysed using Pearson-moment correlation coefficient and t-test at 0.05 level of significance.

From the analysis, the following findings were obtained:-

1. There was significant relationship between perception and attitude of students toward environmental problems.
2. There was no significant difference between male and female students in their attitude towards environmental problems.
3. There was no significance difference between the students (male and female) on perception of environmental problems.

Base on the findings of this study, a number of recommendations were made. The highlights are as follows:

1. Primary and post primary students should be encouraged to form environmental clubs such as Youth Environmental Scout.
2. Government under the auspices of Federal Ministry of Education should include environmental education in the curriculum of post primary schools.
3. Government and non-governmental organizations should create public awareness in the form of environmental education.
4. Teaching aids from wastes as in-house production should be encouraged.
5. Curriculum developers should seek for the implementation of the draft curriculum for environmental education for secondary schools.
6. Government should make effort to improve the socio-economic condition of families.

Key Words: Attitude, Perception, environmental problems, students.

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## CHAPTER ONE

### THE PROBLEM

#### 1.1 Background to the Study

Human perceptions of the environment and attitudes toward it evolved from time immemorial as an integral part of human interaction with nature. The recognition that people can damage or deplete the natural resources on which they depend is ancient. Plato in Mcraken (1987) described deforestation and soil erosion as the negative side of power. Some early civilization created reserves to protect wildlife or natural areas. However, the cultural heritage of humanity is one of the many strands in the evolution of perception and attitude. In recent times it has been the acceptance that the lifestyles and traditions of many indigenous people are based on a real understanding of the environment and that other people can learn much from them.

The individual's perception of environment is moulded by tradition(especially as conveyed through parental influence) personal observation and experiences, education and non-formal information from a diversity of sources (Mostafa et al.,1992).

Over the last fifteen years, there has been an increasing awareness on the subject of environmental education at formal and informal levels in Nigeria. This awareness gained momentum

following the conference of 1992, held in Rio-de Janeiro, Brazil. Environmental education is now a subject of worldwide importance. The emphasis is on the knowledge of the effects and solutions of such problems as pollution, solid waste disposal and depletion of natural resources among others. These have been considered to be important for the people as foundation for their perception and effective utilization of the environment (Okebukola et al., 1997).

Though our existence in this universe is much threatened by our activities, which disturb the ecosystem, the quest for correct policy formulation on democratic and environmental rights must assume wider dimensions in Nigeria and other parts of the world. Among these is the consciousness of the global environment which call for unified and concerted effort of environmental enhancement all over the world. It is in this respect that governments, non-governmental organisations and people should work together for a safe and clean environment in this global village so that future generations can inherit a tolerably unblemished environment. Environmental pollution does not only affect the environment, it also has deleterious effect on socio political life. The pentup frustration in the Niger Delta is due largely to unfulfilled economic and political hopes in the midst of economic abundance. This is mainly due to oil exploration and exploitation that have exploded into the fratricidal

conflict the cause of which many of the combatants cannot rationally explain. The blight which oil spillage, gas burning, damage to fisheries, agriculture, inadequate infrastructure in a difficult terrain, lack of opportunities in the midst of economic plenty have inflicted on the psyche of these people can best be imagined. Hence, while abuse of the environment has global implications, the building blocks of these global implications are local. Starting from the uncollected urban and rural wastes, indiscriminate and unplanned construction of houses, refuse burning and unscientific disposal of wastes in landfills to industrial pollution and automobile scraps and other emissions due to the application of technology, the end result is one and the same, which is gradual killing of the world in which we all live to the extent that we may not be able to hand it over to the next generation in a habitable condition (Akinjide,1997).

Environmental Education refers to education from the environment; about the environment, for the environment. This means that education from the environment relates to experience gleaned from the environment; Education about the environment relates to teaching we receive about the working of the environment, its nature, composition and its utility to man, while education for the environment relates to man's commitment to environmental protection and conservation for sustainable development (Inyang

Abia and Umaren, 1994).

The right step in the effective control and management of the environment is in the development of public environment awareness, that is “synthesis of people’s conceptional interpretation and perception of environmental issues “(Okobah, 1999). The major assumption is that such conceptions and the like would affect their behaviours and the quality of their responses and reactions to environmental problems.

According to Piaget (1967), the cognitive aspect of man gradually developed through the dynamic interaction with the environment. According to him, cognitive development of a man begins from the time he or she is able to represent the outside world by thinking through specific sensory impulse, for examples sight, sound, smell and so on. He considered perception to be one of the most important processes of cognition. He stressed that lightwaves stimulate the eye’s retina and messages about the stimulus are carried along the optic nerve and processed by the visual cortex in the brain. But man does not always perceive the same stimulus in the same way.

From Piaget’s view, therefore, it can be inferred that students need to be made aware that perception is a very important process of cognition in every individual but differences occur in the way individuals perceive and interpret information.

Gestaltists, according to Akubor (1997), believed that there is a natural tendency for the incoming sensory stimuli to organize themselves into patterns of Gestalten at the psychological level, before they reach consciousness. Thus, for the visual Gestalt, we have:

Stimulus → Psychological Gestalt → Perception (object seen)

Gestalt agreed that learning can play some role in perception; and many theorists took the position that perceptual organization reflects innate properties of the brain itself. Therefore, perception is being considered as synonymous to the brain and thereby as the reason Piaget considered it as the most valuable of human cognitive reasoning. These theories on perception by the scholars have some implications for the students. The knowledge of the process of perception will help to direct the attitude through application of the principles of the theory. For these reasons, the study will focus on the perception and attitude of senior secondary school students in Kaduna metropolis towards environmental problems.

## **1.2 Statement of Problem**

Recent studies (Mostafa et al., 1992; Okebukola et al., 1997; Arove, 1998; Kola-Olusanya & Arove, 1999) reported on perception, attitude and awareness of Environmental Education (EE) and have indicated the importance of EE in school curricula. Most of them

argued that EE helps students to develop cognitive skills. Lawal and Mohammed (1991) and FEPA (1995) stressed that the development of an environmentally literate Nigerian citizenry calls for the acquisition of cognition and a change in attitude which are achievable through both formal and non-formal education. The international Union for conservation of Nature and Natural resources (IUCN, 1970) referred to this as the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among men. It is important to provide effective EE in order to enhance better perception and attitude towards the environment. Mahre and Badamasi (1997) reported the negative effect of industrial activities on the environment in Kaduna metropolis.

However, population pressure, destruction of vegetation cover, serious floods, huge gullies, mounds of garbage, gas flaring and toxic waste dumping constitute environmental hazards in Kaduna Metropolis. Solid waste heaps dot every part of the metropolis, blocking drainages, motor ways and pedestrian paths, hence making movement along the alleys and pavements difficult and offensive. Individuals use non-biodegradable polythene bags, plastic containers, styrofoam packages and throw them carelessly all over the place. These industrial and municipal wastes end up in the

extensive network of water bodies in the metropolis and drain into river Kaduna, thereby affecting the lives of individuals (Ngene,1997). This study, therefore, sought to find out the way the secondary school student of Kaduna metropolis perceive environmental problems and the relationship between such perception and their attitude towards it.

### **1.3 Objectives**

The objectives of this study were as follows: -

1. To find out the relationship between the ways students perceive environmental problem and their attitudes toward them.
2. To find out the difference between male and female students perception towards the environmental problem.
3. To find out the difference between male and female students attitude towards the environment.

### **1.4 Research Questions**

In order to address the problems of this study, the following research questions were formulated:

1. Is there any relationship between perception and attitude of students' towards environmental problems?
2. Is there any difference between male and female students' attitudes toward environmental problems?
3. Is there gender difference between the students on perception of

environmental problems.

### **1.5 Hypotheses**

From the research questions in 1.4 above, the following hypotheses are formulated for testing:

- HO<sub>1</sub> There is no significant relationship between students' mean scores on perception of environmental problems and their scores on attitude towards them.
- HO<sub>2</sub> There is no significant difference between the mean scores of male and female students on their attitude towards environmental problems.
- HO<sub>3</sub> There is no significant difference between mean scores of students (male and female) on perception of environmental problems.

### **1.5 Significance of the Study**

This study is significant in the sense that it will identify the perception and attitude of secondary school learners towards environmental problems. If students are aware of environmental problems, they will help in disseminating the information to the public, hence the importance of its inclusion in the school curriculum.

The result from this study will indicate the nature of student perception and their attitude toward the environment. This will further strengthen government to complement efforts of a forestation, encourage research into developing and popularizing alternative



energy and energy efficient technologies such as solar, gas cooker, biogas, biomass-stove, etc to reduce pressure on forest resources.

The findings from this study could promote changes toward Patterns of economic development that is environmentally sustainable and socially equitable among the students.

Finally, this study would necessitate the need for teachers to be effectively trained in order to deliver and improve the standard of environmental education in Kaduna State.

### **1.6 Delimitations of the Study**

This study is delimited to the senior secondary school students in Kaduna metropolis. It is also restricted to second year students of the senior secondary school (SS2) only.

25 out of 55 secondary schools in Kaduna Metropolis were used.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

The review of this study will be discussed under the following subheadings:-

- Theoretical framework on perception,
- Meaning of perception,
- The Concept 'Environment'
- Environmental problems,
- Awareness,
- Attitude,
- Strategies to solve environmental problems,
- Related studies and lastly implications.

#### **2.2 Theoretical Framework on Perception**

The current study described two theoretical framework on perception; namely unconscious inference theory, and theory of direct perception.

##### **2.2.1 Unconscious Inference Theory**

Simon et al, (1987) reported that Helmholtz in 1866 tries to explain that an individual's eye serves as a clue to what that individual senses. And other non-sensory information are received

from memory and assumption which are combined with visual sensation from the eye to enable the individual construct the perceived object mentally. Simon et al., (1987) concluded by saying how perception takes place could be equated to the human mind as being a blank state waiting to be inscribed with experiences. Hence, an individual mind perceives meaningfully whenever there is sufficient experiences from the surrounding.

However, Simon et al.,(1987) argued that stimulus information received from the retina is ambiguous and perception result indirectly from inferences. Thus, distorted perceptual awareness may take place and the individual may fail to perceive the whole, but can see the relationship between the object and the environment because of the information from the retina. Vigilante (1967) reported the effect of distorted perception on children as it makes them incapable of dealing with the world of reality. This is further confirmed by the assertion, that in any given classroom, one might find the teacher, textbook and students functioning at different level of thinking, and as such may not understand each other (Inekwe, 1999).

### **2.2.2 Theory of direct Perception**

Clifford (1986) reported the theory of direct perception. This theory tries to explain that abundant stimulus information is

sufficient to provide direct perception. He went on to explain that, the perceiver continuously interact with the environment to produce a rich optical flow of information to the eye. This information allows all that is needed to perceive directly the properties of visual space. On the other side, the recognition and integration of perceived stimulus is a higher mental process taking place in the brain and not in the sensory organ such as the eye. For instance, for an individual to perceive a circle or sphere from the environment, visual awareness takes place in the eye, but conceptual recognition takes place in the brain. The degree of relationship between visual awareness and conceptual recognition may have profound effect on the accuracy of visual perceptual ability of the individual. Consequently, accurate visual perceptual abilities enable the individual to deal with his immediate environment.

The contributions of the two theories of perception towards understanding the principles of perception are substantial. The unconscious theory of Helmholtz as reported by Simon et al (1987) attempts to describe visual perception in terms of sensory and nonsensory inputs, such as memory and ability to associate them and the stimuli from the environment. The Gibson's theory or theory of direct perception as reported by Simon et al (opt cit) seems to stress the dynamic synthesizing forces in perception. In the light of

this, pollution teaching at senior Secondary School level can be structured so as to make individual learner's discovery oriented. When this is achieved, then insight gained may be transferred and other environmental problems will be understood by the learner.

From above discussion, it can be deduced that, every individual has an inbuilt tendency to establish order in an observation. Therefore, perception may be described as a magnet which produces a magnetic field around it, thus something perceived give rise to a field or perception in which various intrinsic forces operate to structure the field. Hence, consciousness and pattern formed by the brain activity correspond structurally with one another. Therefore, teachers determination to enhance the students attitude towards environment should include developing their visual perceptual abilities, particularly considering the central role it plays when teaching any of the subjects aspect of the curriculum.

### **2.3 Perception**

Perception has been described by different authors from different perspectives. For instance, Simon et al (1987) described perception as a complex and indirect process. This is because it involves reviewing, organizing and interpreting message or information by the sensory organs through sense receptors, past

learning experiences, memory and other cognitive processes before awareness of reality can emerge. Similarly, Clifford et al (1986) described perception as the impression one has about the world through the sense organs such as seeing, hearing, taste or smell, feeling. In other words, perception is an experience of the world through the sensory inputs plus the way we process them.

Related and earlier to that above, Melvin (1976) viewed perception as a selective process, which depends on the mechanism of attention. This is to say, perception is the resultant effect of meaningful contact with environment through the sense organs. He said that, meaningful contact occurred as a result of richness of the stimulus from the environment. And our ability to enjoy and understand the nature of the world is a function of our visual perceptual skill.

It is for this reason that, Vigilante (1967) said, it has become an acceptable principle to see geometry as the resultant effect of sense perception and abstract thought. Therefore, Vigilante (1967) opined that perception is among the earliest of the child's learning that leads to concept formation. So environmental education seems to be a strong avenue where science teachers effort of developing students' power of aesthetic and creative thinking can be enhanced. This can be carried out with ease by skillful science teacher at senior

secondary (SS) level whereby environmental education is designed in such a way that students should be able to discover the truth themselves through suggested experiments and experiences.

#### **2.4 The Concept 'Environment'**

Environment is the combination of natural objects (Living and non living), objects made by human beings, the inter-relationships between these and various circumstances, which surround people on Earth (Lawal, 1991).

Most countries of the world are now seriously concerned about problems of environmental pollution, whether it is of water, air, or land. These problems are greatest in the industrially developed countries and in the countries with high population densities, Nigeria is a practical example. Lester (1987) said without population, there would be no pollution and that pollution is the price of progress. Therefore, it is crystals clear that continued progress is dependent on pollution abatement in particular and environmental protection in general.

Wastes generation and environmental degradation have been associated with human settlements since the dawn of history. It has also been observed that amount, size, nature and complexity of wastes generated by man are profoundly influenced by the level of

urbanization and the intensity of socio-economic development of the given settlement.

A solid waste, if allowed to accumulate is a form of environmental pollution. The problems of refuse collection; disposal and environmental sanitation in our cities and urban areas throughout the country have occupied the attention of the three tiers of government in the country, the Federal, State and Local Government Authorities for many years.

Okobah (1999) defined the environment as “the sum total of all external conditions influencing the growth and development of an organism”. These factors could be physical, biological, social and cultural. The environment is a very broad concept and in order to be more specific in policy measures, it is essential to perceive it in terms of its various subsystems with the urban subsystem at the fore.

In many respects, environmental education is now widely acknowledged as a vital environmental awareness raising methodology. Environmental education according to Kola-Olusanya (1998) is a key part of the movement to improve the use and care of the environment and to achieve a shift towards more sustainable societies locally and globally. Although, there have been many attempts to define environmental education for the purpose of this study therefore, environmental education shall be defined as –“an



integral part of the education process. It should be centered on practical problems and be of an interdisciplinary character. It should aim at building up sense values, contribute to public well-being and concern itself with the survival of human species. Its force should reside mainly in the initiative of the learners and their involvement in action and it should be guided by both immediate and future subjects of concern". (UNESCO, 1978).

#### **2.4.1 Environmental Problems**

Keller (1976) opined that the environment is considered abused when an injurious or corrupting element is introduced thereby failing it, reduces the satisfaction and utility derivable from growing and developing within it. The elements that insult the environment are many and varied, but most commonly, though not exclusively they manifest as wastes. Wastes are usually considered in three major categories, namely; gaseous, Liquid and solid. Society sensitivity to these forms of pollutants tends to vary depending on differences in perception, technology and socio-economic development and developmental ideologies and philosophy (Omuta, 1986).

Pollution of Land, water and air started with the first man on earth. Since then pollution has been growing in different dimensions. The greater the concentration of people in one area, the greater the

amount of pollution, and the greater the sophistication of a society the more intricate and poignant its pollution. That is why environmental problems are getting more serious and complex in towns than in villages, and more in densely populated areas than in region of sparse settlements (Inyang, 1978).

An environmental issue is one, which has its roots in the environment and involves a problem surrounding it which there are differing beliefs and values (Ahiakwo, 1998). In Nigeria, such environmental problems are known to come in form of soil erosion, water contamination, deforestation, coastal erosion, accretion of domestic and industrial waste, inadequate management / treatment arrangement for industrial effluents, poor management of solid wastes as well as the disposal of sewage and house hold refuse, air pollution, biodiversity and fisheries loss. Each of these has been having varying impact on the people, the environment and the economic growth of the country.

#### **2.4.2 Land Pollution**

Deserts are usually visualized in terms of shifting sand dunes in very hot and dry lands, but some deserts throughout the world are stormy deserts as they are principally composed of desiccated rock and rock fragments whereas some deserts even occur in lands which

are often cold and dry as for example, the Gobi desert in Mongolia. The phenomenon of desertification is however known to be prevalent in some Local Government Areas of Kebbi, Jigawa, Sokoto, Borno, and Yobe States of Nigeria. Desertification is caused by a complex mix of climate and human effects. The human effects over which we have more control are said to include the rapid growth of both human and animal population, detrimental land use practices (especially deforestation), adverse terms of trade and civil strife. World commission on environment and development (WCED) (1987) reported that the cultivation of cash crops on unsuitable rangelands has forced herders and their cattle into marginal lands thereby aggravating the problem. So also are some other human activities like bush burning and cutting down of trees for firewood collection.

According to World Resources Institute (1994) Nigeria, in the 1980's lost about 80% of its 498,000 hectares of savannah grassland. The effects of this trend on cattle grazing, food crop, farming human survival and environmental quality can only be imagined in the context of the forest loss in other parts of the country, which is also 80%, the fear is that the entire country might eventually turn to desert. This could be further confirmed with one of the center for Arid Zone study (CAZS) 1992 reports quoted by Centre for Environmental Resources and Sustainable Ecosystem (CERASE 1998) in one of its

publications that Nigeria's loss of landmass to the phenomenon of desertification in the recent years is over 350 square kilometers with a linear advancement of desert put at about 3 sqkm per year.

Furthermore, severe cases of desertification have been found to cause mass movement of people into areas that are experiencing less problem of desertification. This in some cases have led to slum-like living conditions with its consequential environmental sanitation problem and its effects on people's quality of life. Other effects of desertification on environmental quality include increased wind erosion and local sand storms, increased run-off and sheet erosion, permanent degradation of the vegetation.

Environmental problems occur in differential proportion across the whole country. Soil erosion for instance, has reached an alarming proportion in Abia, Anambra, Benue, Enugu, Cross-River, Delta, Edo and Lagos States. Reduction of biodiversity in terms of its numerical distribution is prevalent. Nigeria is endowed with at least six different ecological systems, namely, swamp / estuaries, tropical rainforest, southern guinea savannah, northern guinea savannah, sahelian and desert, each with its rich diversity of flora and fauna, except probably in the case of sahelia and desert. In addition, the ecological services which arise from normal functioning of ecosystem are abundant. These include clean air, operational watersheds, biological diversity

and aesthetic component.

These endowments are gradually being degraded or depleted by human activities fuelled by socio-economic consideration and pressure. National, local and individual development activities is reducing the resources to levels where they may be unable to renew themselves.

### **2.4.3 Water Pollution**

Water is an important part of our earthly environ, covering about three quarters (3/4) of the earth's surface and occurring on land, underground and in space. It is often referred to as the 'liquid of life' because it constitutes up to ninety (90%) percent of the body cell, serves as medium for the dissolution and transportation of body nutrients and other essential molecules. Without its availability to human (through drinking) within a maximum of fourteen days, the body becomes dehydrated and life is endangered. Similarly, it is essential to terrestrial plant life and marine / aquatic flora and fauna.

In the life of human communities and economic activities, water is useful for sanitation, navigation and transportation, agriculture and fishery, and power generation wherein a quarter (1/4) of all the world's electricity that is about 2.2 million megawatts is hydro-electricity (Adara, 1998). The distribution of essential liquid of life is

however, unequal across the world, which explains the scarcity in space and time. Thus, we have arid to rainforests, swamps to deserts; its cyclic availability is also represented by the “Water cycle”. It behooves on all of us to take care of this priceless commodity whenever and wherever available to ensure human survival. As a way, one need to understand the nature of the commodity and factors which cause a change in its quality.

The problem and issue of water pollution arises with the tendentious presence of extraneous elements and substances in a body of water. These are referred to as pollutants. Since, it is usually difficult to find pure water in nature (pH of natural water is normally between 6.5 to 8.5) the quality of water found in a human community mirrors the quality of life of such society. It indicates the types of pollutants generated and dumped into the environmental water sources; it also usually furnishes the type of aquatic flora and fauna to expect in such situations. It is therefore useful to get familiar with possible sources of water pollution and the effects of such pollution on the biosphere.

One notorious source of water pollution in Nigeria is sewage and waste dumping in both urban and rural areas. Another is situation resulting from erosion run-offs. Others include:

- Leachates of fertilizer and pesticides from farm lands.

- Oil spillages through accidents in oil rigs, grounding of tankers, routine cleaning of tanks of tankers, from bunkering boats.
- Industrial effluent from tanneries, paint and textile factories, and mining sites.

A variety of pollutants are released through these sources, they can be conveniently classified as either biological or elemental chemicals. Those grouped under biological pollutants are usually contained in untreated sewage wastes. They include tape worm ( *Taenia spp* ), ascaris species, liver fluke, salmonella typhii, coliform bacteria, filariasis, all of which are disease-causing organisms.

The elemental chemicals (pollutants) are mostly derived from industrial, agricultural and oil exploitation activities. They include. Mercury, leads, chlorine, nitrates, phosphates, magnesium, oxides of nitrogen, sulphur and carbon, and hydrocarbon slicks. A unique and strange pollutant of the nation's inland fresh waterways is the plant called water hyacinth (*Eichbornia crassipes*). It grows rapidly and chokes up the waterway thereby obstructing navigation and fishery activities. While its spread over water bodies usually obstructs oxygen dissolution into such water, the discharge of sewage and chemical pollutants further enhances water hyacinth growth and multiplies its effects.

Another important source of water quality change is the group

of human activities (e.g. Nuclear power generation, agriculture and brewing) that discharge hot effluent and coolant water into streams and other water sources causing thermal pollution. This causes the temperature of water to rise; the increase of which has been reported to have a negative relationship with oxygen dissolution, sensitivity of aquatic organisms towards toxic substances, parasites and diseases, and a positive correlation with the photosynthesis carried on by algae and other large aquatic plants, and the metabolic rates of aquatic organisms generally (Adara, 1998).

The effects of water pollutants transcend national boundaries, most especially as they are usually carried in streams, rivers and oceans and even by air, away from source. The pollutants affect both terrestrial and aquatic life forms. These effects range from bleaching of man-made structures, disease – causing, poisoning to death of plants and animals. (*See appendix A*)

However, it is clear that we can not take the quality of water for granted. It may look clear and harmless and yet may be dangerous due to several micro-organisms it contains. For instance 80% of diseases in the world are due to unsafe water and poor sanitation; over 4 million children below the age of 5 die annually in the developing countries of the southern hemisphere due directly to water pollution (Adara, 1998).



#### 2.4.4 **AIR Pollution**

Air pollution is the presence of harmful gases, liquids, or solids in the atmosphere. Air pollution, known as smoke pollution for many years, resulted from coal combustion (Hodges), 2001). Smog has been a problem in coal-burning areas for several centuries. Smog finally decreased when coal combustion was replaced by oil and gas combustion. Air pollution is caused by a number of different types of pollutants. The first type, particulate matter, consists of solid and liquid aerosols suspended in the atmosphere. These arise from the burning of coal and from industrial processes. Atmospheric particles can scatter and absorb sunlight, which reduces visibility. Particles also reduce visibility by attenuating the light from objects and illuminating the air causing the contrast between the objects and their backgrounds to reduce. Not only does it effect visibility, but it hastens the erosion of building materials and the corrosion of metals, interferes with the human respiratory system, and brings toxic materials into the body. “The small particles cause chronic bronchitis, bronchial asthma, emphysema and lung cancer” (Hodges, 2001).

The second type is sulfur oxide, which comes from the burning of coal and industrial processes. Damage to building materials, vegetation, and to the human respiratory system are caused by the

acidic nature of oxides. "Small quantities of sulfur oxides can increase illness and mortality" (Opt cit). Another type of pollutant is carbon monoxide. Carbon monoxide is a colourless, odourless, tasteless gas against which humans have no protection. Carbon monoxide comes from the exhaust of gasoline-powered vehicles and secondarily from industrial processes. Haemoglobin, which is in the blood, combines with carbon monoxide and carries less oxygen to body tissues causing health and heart effects. Some health problems come from the exhaust fumes leaking into the interior of automobile. "Several hundred Americans die from CO poisoning each year. Sodium oxide levels below .25ppm have been associated with increased morbidity in New York as measured by hospital admissions. In all cases in which adverse health effects have been noted, the elderly patients have been affected severely" (opt cit). Also, in Nigeria studies had shown that lead effect the brain. Children, who have one thing or the other to do by the road-side e.g. those who hawk, are less brilliant than those who are not. "Police and students who are exposed to the inhalation of lead are more aggressive than those who are not" (Olakunle, 1997). The forth type is hydrocarbons, which are chemical compounds containing only carbon and hydrogen. Hydrocarbons also arise from gasoline-powered vehicles and from industrial processes.

Hydrocarbons are an important part of the production of photochemical smog (opt cit). Also, nitrogen oxide is another type that comes from high-temperature combustion, such as that occurring in motor vehicle engines, electric power plants and other fuel usage. Nitrogen oxide contributes to acidity in precipitation and production of photochemical smog. Nitrogen oxide is also dangerous because it causes serious illness and possibly death even if the exposure to NO<sub>2</sub> is short.

Noise pollution is a recently recognized form of pollution. This seems to be a characteristic of communities in our cities. Children exposed to long period of high amplifier music for example may suffer from permanent loss of hearing (Inyang, 1978). Overcrowding and the presence of many industries make the cities a noisy environment. Noise in the residential area is caused by personal radios, radiograms, stereophonic sets and television sets. Many people in the city have exhibitionist tendencies and they tune their sets loud, thereby making a deafening noise. Record vendors, bar attendants and medicine peddlers advertise their presence by using amplifiers. The problem of noise pollution in the cities may soon get out of hand if the present trend continues.

#### 2.4.5 **Poverty:**

Damage to the environment has three potential costs to present and future human welfare. Human health may be harmed. Economic productivity may be reduced and the pleasure or satisfaction obtained from an unspoiled environment often referred to as its “amenity value”, may be lost. Human welfare and their economic productivity as key elements of standard of living and are therefore germane to poverty reduction. They are also crucial “input” in economic progress and development of a nation. It is therefore widely acknowledged that poverty, a deplorable state of human welfare, is closely linked to environmental dimensions. Infact the linkages are both ways. Poverty affects the environment and the environment affect poverty.

Poverty, a state of deprivation, is often associated with short time horizons that tend to lead individuals to “ Mine” resources at a more rapid rate than may be socially and economically desirable. Poor families often have to meet short term needs, prompting them to excessively work natural resources through for example cutting trees for firewood, and failure to replace soil nutrients. They use crop residues and animal dung for fuel thus depriving field of organic material needed to prevent soil degradation. The short-term horizon is also a disincentive to invest in land resources that yield returns

only after a number of years. The quest for survival by the core poor and the poor is obviously more paramount than the need for soil conservation, air pollution control, proper sanitation, etc.

Poverty is closely linked to rural / urban migration - an invariably the increasing demand over a given state of environment in the urban settings. This and the general high fertility rate often noticeable in less developed economy also brings forth the mutual reinforcing nexus of poverty, population growth and environment.

Poverty effects on environment – a number of characteristics of poor households contribute to high fertility. Minimal education and limited income earning possibilities of poorer parents are less likely to have access to markets or mechanism that provide old age security and thus rely on having sufficient children to assure that some survive to adulthood to provide this. Children in poorer households also can provide labour that has an economic value to the household, at the same time that limited access to education and health reduces the cost of raising them.

Degradation of land worked by poor persons reduces the productivity and economic advantage of working the land. Degradation of tree, range and drinking water resources increases the time needed for fuel wood gathering, livestock pasturing, and water fetching tasks that children can do which increases the

children's value to parents. These links between environmental damage and poverty are potentially strongest in areas where female fertility is already high.

Environment effects on poverty – environmental damage can hurt the health, productivity, aesthetic and recreational life of the people. The poor suffers disproportionately, particularly from health and productivity impacts. It is the poor who suffer from water contamination and lack of sanitation. For most part, it is the poorest; 1.7 billion people in the world who suffer from unsanitary conditions and the poorest; 1 billion who have no access to pipe – borne water. The 2 million infants who die each year from such conditions are almost all from poor families

(Okunmadewa, 1997). It is mainly the very poor who cook from open stoves using fuel wood, dung and other biomass fuels. An estimated half billion women and children suffer severe health threats from such condition, lack of affordable alternative energy sources is the cause ( Opt cit).

Finally, it is mainly the very poor farmers who suffer depletion of their soils, not because they are producing too much but because they lack the financial resources and technical knowledge to invest in soil conservation and fertilization. Similarly, it is the poorest farmers denied legal tenure to land or access to extension and credit services,

who due to a large family size and declining incomes, are forced to reduce fallow period and to move on to marginally productive land and hillsides.

#### 2.4.6 **Economy**

The earth's "sources" are limited and so absorptive capacity of its "sink". Whether these limitations will place bounds on the growth of human activity will depend on the scope for substitution, technical progress and structural change, policies, market forces and institutional arrangement often serve as regulators of the situation.

There are three patterns of how rising economic activity can cause environmental problems and can, with the right policies and institutions help address them. Firstly, some problems decline as income increases. This is because increasing income provides the resources for public services such as sanitation and rural electricity. When individuals no longer have to worry about day to day survival, they can devote resources to profitable investments in conservation. This is a positive synergy between economic growth and environmental quality.

Secondly, some problems initially worsen but then improve as income rise. Most forms of air and water pollution fit into this category, as do some types of deforestation and encroachment on natural habitats. This is devoted to dealing with environmental

problems. Finally, some indicators of environmental stress worsen as income increase. Emission of carbon and of nitrogen oxides and municipal wastes are current examples. In this case abatement is relatively expensive and the cost associated with the emissions and wastes are not yet perceived high, often because they are borne by someone else. Unless there are regulations or charges; such emissions and wastes will continue to increase.

The intuitive explanation of the observed pattern is that when income is low, the economy does not affect the environment much. As income rises, environmental damage will increase and because is still relatively low, the demand for a cleaner environment will not increase much. However, at a certain stage when income is sufficiently high for the demand for environment improvements to catch up, and further income growth will be accompanied by improvements in the environment. In essence, unless income is sufficiently high and abatement is relatively less expensive, regulations and policies have to be employed to keep environmental damage in check.

## **2.5 Awareness**

In recent time, multitudes of debilitating environmental problems such as pollution of the air by gaseous elements emitted from 150,000 in Nigeria industries (Obassa, 1997). Others are



depletion of Ozone layer, deforestation, flooding, erosion, dumping of toxic wastes and other man-made and natural disasters which still stare one in the face. Perhaps, the need for a decisive action on these problems would not have arisen if our activities in the quest for knowledge, power and development had been very well planned. Considering classroom teaching as one of the channels for environmental awareness, teachers must equally be ready to adopt a more conscious approach (Lawal 1998). This could be in form of formal and more conscious integration of the concepts of environmental education into the relevant areas of the school subjects especially in physics, chemistry, Biology, Geography, Government, Economics, History, Agricultural science, Mathematics, English language and even religious studies. This, when students are consciously provided with opportunities to learn more about environmental problems, they are capable of becoming more conscious of the consequences of any of their actions or those of others on environment and its conservation and protection as a useful natural resources.

By so doing, the delight of being a caretaker of one's environment can touch them most strongly. They can thus become satisfied that they have acquired part of the ability to awaken in others, they are urge to be friends and caretakers of their

environmental resources such as water, land and air. More also, a great deal of effort has been invested by the Nigerian Educational Research and Development Council (NERDC) to infuse environmental education concepts into many other subjects in the Junior and Senior Secondary school curricula (Okebukola et al, 1997).

Furthermore, since the foundation of strong environmental action rests on what happens in homes, communities, voluntary organizations as well as schools, the conscious teaching of population growth, pollution, solar system, structure of the earth, ecosystem etc as an EE component in the classroom situation will make the students more sensitive to their environment. They will also be better able to recognize pollution and others as an environmental problem. All these are with the belief that a sustained educational measure would normally have lasting attitudinal effects on the learner.

### **2.5.1 Importance of Environmental Education and Awareness**

Mankind is under threat in the global drive for progress at the expense of the earth's resources. The earth must be saved from further degradation. The human dimension of settlement is a key element in population policies as are their environmental and developmental concerns. Mountains, forests, rivers, and valleys are perfect masterpieces created by the wisdom of nature's harmony. Buildings, cities, bridges and roads-works of man in his never ending

quest to adapt his environment to his own needs. Typical manifestation of nature and human will is cement. A magic dust produced by man that then becomes moldable rock, a vital factor for man's progress.

Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature. In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it. Therefore, we must begin from somewhere. Today, humanity knows that beautiful earth is fragile. Governments strive to create wealth, without endangering the delicate balance of the earth's resources. A change of attitude is indispensable and must start now from somewhere. From an awareness and commitment of each one of us. All people. All companies, because miracles will not happen, the enormous work involved must also begin with environmental education.

Secondly, man needs energy to fuel the processes that create light, heat, shelter, transportation and goods. The basis of our modern civilization yet as the world population grows, so does the demand for improved quality of life. Energy consumption increases daily and with it; the threat to clean air, pure water and fertile soil.

These natural resources are not inexhaustible. It is not too late. Man's creative ingenuity can solve the problems he has caused, even though, industries are essential for production, but the activities of industries often result in harmful emission into the atmosphere and environment. Industrial development should be encouraged to minimize adverse impacts by adopting means, which prevent environmental degradation and destruction of ecological system. Subsequently introduction of the emission measurement concepts to the power plant operation should be encouraged as well as undertaking the implementation of environmental impact monitoring equipment project at bigger power station.

Furthermore, factories can be made cleaner by installing effective dust filter and dust monitoring systems in the plants. The pollutants emitted by motor vehicles are one of the major threats to the quality of our air but the introduction of cleaner burning fuels can significantly reduce this threat. Nevertheless, clean energy concern us all, therefore everything the oil industries do should be informed by a concern for the environment.

For example: -

- Promoting the development of decentralized combined heat and power generation,
- Advising industry on energy efficiency and process

optimization

- Developing energy-efficient and environment friendly gas appliances;
- Reinstalling or even improving the landscape after pipe laying;
- Noise abatement;
- Combating visual pollution;
- And promoting the use of natural gas as an automotive fuel.

All these precautions are inevitable because our air supply is fragile and protecting its quality is essential if the human race wishes to retain planet earth as its home. However, through its close links with the soil and nature, agriculture should play an important part in the protection and improvement of the quality of environment that is; by soil quality monitoring system. This system measures the soil elements, irrigation levels, ground water and surface water quality. The improvement of natural resources, their protection and their best rational use can only be achieved using top quality food and agricultural products. By this means an efficient and competitive agricultural industry will be developed working in harmony with nature.

Finally, much of the environmental destruction that has occurred to fresh water system has been the result of a lack of public

awareness and education. Preventive measures will prove less costly than rehabilitation, if we constantly remember that the earth is ours and that we should be able to do with it what we want while being conscious of the fact that we do not own it, we are only holding it in trust.

Okobah (1999) stressed that there is an inevitable interplay of environmental education and awareness on man's survival, for man mastering and organizing his environment is a matter of enlightened self-interest, the better he is able to look after his environment, the higher the quality of life he enjoys and the longer his life-span on the planet.

## 2.6 **The Concept 'Attitude'**

Social scientists view attitude, as the posture of the mind rather than the body, even within the social science perspective, there is no definite definition of attitude as it has been used in different applications. The researcher will take a few of such definitions especially relevant to this study.

Stuart (1977) outlines some definitions but concluded that the following was more comprehensive. "An attitude is a mental or neutral state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all

objects and situations with which it is related”.

Stuart (1977) further explained this meaning under the following points.

- Readiness for response –This means an attitude is not a behaviour, not something that a person does but it is rather a preparation for a behaviour, a predisposition to respond in a certain way.
- Attitude object - This is what exactly the said attitude is meant to respond to, it includes things, people, places, ideas or situations.
- Motivation force - This shows that attitude is not just passive results of past experience but rather impels behaviour and guides its form and manner.
- Relatively enduring – This shows that once an attitude has been formed, it is difficult to get rid of. Researchers have shown that even the actual cause of the attitude formation changes, it takes time before the attitude is also changed.
- Evaluation attitude – Is now generally seen as a disposition to respond in a favourable or unfavourable manner to a given object or situation.

With reference to these aspects, Stuart (opt cit) then gave his own simple definition of attitude as ‘a learned predisposition to respond to a consistently favourable or unfavourable manner with

respect to a given object.

Percy (1966) describes attitude as the disposition of man to view things in certain ways and to act accordingly. This view is also shared by Nunnally (1964) as he describes attitude as predisposition to react positively or negatively in some degree towards a class of objects, ideas, situations or people. Johnson and Matros (1975) also describes attitude as a combination of feelings and beliefs which results in a predisposition to respond favourably or unfavourably toward particular person, groups, ideas, events or objects.

Burns (1982) view attitude with a generalist approach as he says that most definitions of attitude contain three essential ingredients as follows:

- A belief, which may or may not be valid,
- An emotional or evaluative connotation around that belief,
- A consequent likelihood of responding (or behaving) in a particular way.

Kerlinger (1986) also view attitude as “an organized predisposition to think, feel, perceive, and believe toward a referent or cognitive object”. He further stressed that, it is an enduring structure of beliefs that predisposes the individual to behave selectively towards attitude referents.



Branca (1974) said “ most attitudes are built without much thinking, thus, attitudes are mostly emotional rather than rational and that attitudes that are shared with many people are called social attitude but that which are distinctly one’s own attitudes are called personal attitudes. Kalat (1992) in his own opinion state that “ attitude is a hypothetical construction, which is something that can not be directly observed. It is a relatively stable system of organization of behaviour displayed by a person towards a particular object or act of object:. According to Sherif and Sherif (1969).

*“Attitudes are inferred from characteristic consistence and selective modes of behaviour directed toward or against relevant objects, persons, and events. However, not all modes of behaviour indicate an attitude. They are formed or learned in relation to identifiable referents, whether these factors are person, objects, groups, values, institution, social issues or ideologies”.*

Supporting Sherif and Sherif. Monaghan (1977) opined that attitudes as a person’s feeling, thinking, or manner for responding towards a particular activity, object, person or idea, once attitudes are formed by one’s past experiences and one’s set of values. Attitudes once formed largely govern behaviours.

### 2.6.1 **Attitude change**

The development of attitude is an integral part of socialization. It is inherent in the process by which a biological being (child) matures into an acceptable member of the society. The home, school, neighbourhood, culture and the mass media play very important roles in this process. That is why when attitudes are formed they are not very easy to changed. It is however important to note that despite the fact that attitude formation takes time and attitude is not easily changed, the process of attitude change is very complex. Johnson and Matros

(1975) summarize it in the following:

*“Attempts in changing our attitudes happen many times a day, your friend may try to influence your attitude toward drugs and teachers try to influence students attitude toward himself. Each of us tries to change another’s attitude and each of us is influenced by another who is trying to change our attitude”.*

The above quotation specifically shows how people’s attitudes are being influenced by people around. This study is however more specific to the influence of the environment. It is actually concerned with the way and manner perception of students in Kaduna Metropolis affects and changes their attitude towards environmental problems.

Stuart (opt cit) stressed that it takes different forces and pressures to change attitudes since attitudes themselves serve different functions. He outlined the following categories of attitude changes, which go hand in hand with the functions such attitudes serves.

i. Understanding - Oriental attitudes – attitudes are most like to change in situations, which have become ambiguous for the attitude holder because of new information or a changed environment. For example, a student who hold a very negative attitude toward Biology may have to change his attitude when he is told of the importance of the subject to the general life of an individual. This is because the latter information has changed his understanding of the subject.

ii. Need-Oriented attitudes – These attitudes are most likely to change only if the holder's goal or needs have changed or if the person's needs are no longer being satisfied by the attitude in question. For instance, if the student's negative attitude toward Biology was because he intended to be a curator and suddenly changed his goal to becoming a medical doctor; where he was told Biology is compulsory, he might have to change his attitude towards the subject.

iii. Ego defence-Oriented attitudes – if one's attitude makes one vulnerable or unsecured there is the tendency that one might change in the interest of one's security or health. Still on the subject of Biology, if the student's negative attitude towards the subject makes his close friends downgrade or isolate him from them, he might have change his behaviour to develop positive attitude to the subject in order to go along with his friends.

iv. Value-Oriented attitudes – The negative attitude of a student may have to change if he does not like the subject but if he so much values the current scientific and technological breakthrough, which would not have been possible without Biology. For him to sustain that value, he has to have a positive attitude towards the subject.

However, the subject of attitude is core on issues concerning proper use and management of the environment especially in developing countries like Nigeria. It is the attitude of the citizenry that determines how well or how badly environmental resources are managed. Since many of these countries are ill equipped with sophisticated machinery to take care of the harmful effects of environmental abuse, the safest pathway is to avoid damage to the environment through environmental education. The major thrust of environmental education in urban, and suburban settlements in Kaduna Metropolis is to shape the attitude of the students in a

direction that will promote sustainable development.

From the foregoing, it is apparent that attitudes of contemporary urban, sub-urban and rural citizenry towards the environment are negative. Therefore, one would like to identify the degree of attitudes and their sources, as attitude is a very strong phenomenon or trait, which is difficult to change if formed in a person.

### **2.6.2 Some Theories of Attitude Change**

Attitude takes time before it is formed. Once it is formed, it also takes and in-fact is more difficult to be changed, since this study is on students attitude towards the environment as caused by their perception of the environment, it suggest that the perception must have affected their attitude by changing it. It may also be deduced that the attitude change is likely to be negative.

Many theories have been postulated on attitude. They are mainly aimed at defining the conditions under which attitude will change and the way in which the change will occur. No single theory can provide answers to such conditions and ways the changes takes places. However, the nature of this study will only allow for discussion on a few of such theories. The following are the three main categories of the theories as categorized by Stuart

( opt cit ). One theory will be discussed under each category.

1. Consistency theories
2. Dissonance theories
3. Perceptible approaches

### **Consistency theories**

A lot of theories have been postulated under this theory. These theories are concerned with the people's beliefs and ideas. They are concerned with the principle that people try to maintain consistency among their beliefs, attitude and behaviour. These theories state that attitude change results when individuals receive new information, which is inconsistency in their previous viewpoints, or when existing inconsistency in their beliefs and attitude are pointed out to them.

Affective-cognitive consistency theories are types that were proposed by Rosenberg and Abelson as explained by Stuart (opt cit). This approach is an emphasis on consistency in relation to cognitive and affective elements. The authors of the theory suggested that attitudes are influenced not only by the tendency toward balance between affective and cognitive elements (beliefs and attitudes) as postulated by the originator of the theory, but that attitudes are also influenced by hedonic tendency to maximize one's gain and minimize one's cost. In line with his hedonic tendency they postulated that whenever any unbalance between cognitive and

affective components of attitude arises, the easiest way of restoring the balance would be tried first and used most frequently. They also said that whenever the two elements are not consistent, a homeostatic process would operate to bring them back to equilibrium. They made several experiments, which showed that a change in either of the components could produce a change in the other.

### **Dissonance theories**

This is also called cognitive dissonance theory. It is also a type of consistence theory but it is given a separate class because it has some unique aspects. The theory deals with the relationship between cognitive elements. These elements are the knowledge, information, attitude or belief a person holds about himself or his surroundings. It postulates that two elements can either be consonant with each other (Consistent) or dissonant (irrelevant).

A dissonant relationship is that the opposite of one element would follow from the other element; that is x and y are dissonant, if non y follows from x. what 'follows from' a cognitive element is determined by the person's expectations. Dissonance can therefore be a result of logical inconsistency of a person's past experience concerning what things go together.

The basic principle of dissonant theory according to Stuart (opt cit) are: -

- i. Dissonance, being psychologically uncomfortable, will motivate the person to try to reduce the dissonance and achieve consonance (and) to avoid situations and information, which would likely increase the dissonance.
- ii. The magnitude of the dissonance (or consonance) increases as the importance or value of the element increases.
- iii. The strength of the pressure to reduce dissonance is a function of the magnitude of the dissonance.

As exemplified by Stuart, (opt cit) 'I believe I smoke' is consonant with the belief that 'I know I enjoy smoking' but dissonant with 'I believe smoking is bad for my health'. If the elements are all important to him he may reduce the dissonance by either of the following:-

- a. Changing the belief about his behaviour by giving up smoking or reduce the rate he smokes.
- b. He may change his belief about the environment by deciding that 'smoking is not harmful' or that 'only too much smoking is harmful'.
- c. He may also add some belief to the other elements such as 'I am not the only one that smokes; most of my friends do; 'evidence



linking smoking to cancer are not conclusive' and ' the risk in smoking is not more than that in driving a car'.

d. He might also decide to reduce the importance of one of the elements by convincing himself, for example; that 'it does not matter whether smoking is dangerous to health as long as I enjoy it. After all, I prefer dying young to when I am old.

### **Perceptible approaches**

Perceptible approaches to attitude change view the process of attitude change as a change in the perception of the attitude object, rather than a change in beliefs or opinions about it. Sheriff and Houland (in Stuart, 1977) presented the concept of three attitude latitudes which are acceptable, rejection and non-commitment. They presented their aspect of attitude change within the principle of assimilation and contrast.

The principle of assimilation states that social stimuli, such as persuasive messages, which are within a person's latitude of acceptance will be assimilated. This means they will be seen as closer to the person's attitude than they actually are; they will be unfavourably evaluated and will produce some change in the person's attitudes on the direction advocated by the message. The principle of contrast states that when social stimuli are within a person's latitude of rejection, contrast will result. This means they will be seen as

farther from the person's own attitude than they actually are; they will be favourably evaluated and will produce either no attitude change or in some cases attitude change opposite to the direction advocated.

Travers in Giggins (1985) gave some points that can help attitude change. They are summarized as follows:-

- i. People must consider the source, from which the change in the attitude is coming,
- ii. The credibility of the source of change is equally important, the competence of the source and the trustworthiness of the source are important in the determining whether the message will or will not change the attitude.
- iii. Attractiveness of the change. If the source of the change is singular to the receiver of the message, attitude may change.
- iv. The more powerful the source of the change in attitude, the more likely the change in attitude.

## **2.7 Strategies to solve Environmental Problems**

The first in the effective control and management of the environment is in the development of public environment awareness which Choker (in Okobah, 1999) defined as "synthesis of people's conceptual interpretation and perception of environmental issues". A major thesis or assumption is that such conceptions and the like

would affect their behaviour and the quality of responses and reactions to environmental problems. Its utility would shape desirable environmental management practices and effective control.

It was the intention of the Nigerian Educational system to fuse into school's curricula. The National Council on Education (NCE) approved in 1990, the introduction of EE components in the primary and secondary school curricula starting with the citizenship education curriculum. Environmental Education components have since then been introduced either as "infused" or "integrated" within the content of appropriate school subject such as Integrated science, Social studies, Introductory technology, home-economics, agricultural science and business studies, which are often referred to as the 'carrier' or 'host' subjects ( Adeniyi, 1999) .

The science Teachers Association of Nigeria (STAN) through its environmental education project is vigorously pursuing a regimen of training for environmental educators for the school system as well as the development of EE materials for general reading. In secondary schools, the environmental awareness campaign is further consolidated by encouraging students to form environmental conservation clubs.

At the non formal level, public enlightenment programmes in the media (especially television, radio, and newspapers) and the bi-

monthly and monthly environmental sanitation exercises, have continued to stimulate awareness in the effective management of the environment. These initiatives and the activities of the Federal environmental protection Agency (FEPA); now Ministry of Environment is promoting environmental literacy. Also, the daily routine sweeping and periodical compound cleaning by students both at home and in school are efforts to sensitize them positively towards the environment.

## **2.8 Review of Related Studies**

The researcher is of the view that environmental perception and attitude towards the environment are closely related or linked. It is difficult to talk of one and completely neglect the other. The following are some of the studies carried out and related to students' perception and attitude towards the environment.

Okebukola (1995) cited by Okebukola et al (1997) carried out a study on perception of Nigerians from different walk of life and varying socio-economic backgrounds of environmental issues in both urban and rural areas of Lagos, Rivers and Kaduna States. He found out that high illiteracy and high poverty profile attributed to the high level of ignorance of global environmental problems among people, although he saw perception as viewed differently by different people.

He concluded that people are only aware of environmental problems that they can see and feel immediately and whose effects are drastic enough to jolt them such as the smell, the ugly sight of garbage on our streets, flooding of our streets and houses. The central focus of the study is related to the topic of this work, although in a different settings. His study cut across different profession while this work restricted itself to students.

In another study on environmental knowledge among High School Students in Nigeria, Mansaray and Ajiboye (1997) found that, this still remains generally poor and it was attributed to the problems of the existence teachers, a gap between many of the expectations of environmental education and what each is able and willing to do within his or her teaching practice. The authors related the set back in awareness among the students to teacher inconsistency in their lesson and inability to make rapid on line decisions. As teachers specialize only on their subject areas, they find it difficult or less interested in impacting knowledge in areas they are not familiar with. The study was in a different setting, although related to this work in its framework. He was specific on impacting the knowledge.

Kola-Olusanya and Ahoje (1999) studied the content knowledge of Environmental education (EE). Teachers on environmental science concepts in both private and public school system in Lagos State.

They found out a low content knowledge of environmental concepts on the part of the teachers. The finding disagreed with Borden and Schettino (1979) that says knowledge is not a better predictor of environmental action, on the strength of the finding of Crandall and Loucks (1983) which found out that no amount of awareness could replace knowledge. For any teacher to be a good EE teacher, in-dept knowledge of various environmental concepts other than mere awareness of much publicized issues is required. These studies are related to this work as they were environmental issues but different with this study as they were on concepts. They were also on particular categories of teachers.

Onyegebu (1999) also conducted a study on the level of understanding schistosomiasis among second year secondary school biology students in endemic and non-endemic areas of Anambra State. He found a significant higher understanding of schistosomiasis among students from endemic areas than their counterparts from the non-endemic areas. The investigation revealed that the content of communicable diseases in the biology core-curriculum has been de-emphasized, made more academic and that the delivery system in the secondary school is inadequate. The study is quite similar with this work, although was in a different setting. His study was restricted to an aspect while this work cut across different aspects.

Ayogu and Nworgu (1999) studied the influence of Gender and school location on students' Achievement in Physics in Enugu State. They found out that males were superior to females while urban students proved superior to their rural counterparts. The superior performance by the urban students was as a result of the comparative advantages they enjoy in having more qualified and experienced physics teachers as well as the opportunities available for private tuition and extra-moral classes. Their study is also similar to this work, but it is specifically using Gender and location as determinant of students' achievement.

Rosemblum (1973) reported that boys and girls are equal competence in mathematics and spatial reasoning. In another study, Anastasic (1982) noted that boys do not have advantage over girls of the same age in mental attributes such as intelligence. Also, in united States, investigation have shown that Mathematical ability for boys and girls is built out of a combination of verbal, numerical and spatial factors, but have suggested that the components of this ability are different between the sexes, the verbal factor being for girls (Tarsten Husen, (1967). Their studies are quite related to the current study since the researches centred on gender that also tested some variables.

Mayer (1997) also wrote on Global science literacy. He said that Earth system education provide a rationale for an international pre-college science curriculum and a global definition of science literacy. That children of all nations experience weather; and while each child's habitat is unique, many observe flowing stream and rock materials as parts of their daily environment, and they often appreciate the beauty of sunsets, the power of storms, the sparkle of snow crystals in winter, the tranquility of a mountain scene, or the colours of deciduous trees on a bright autumn day. He stressed that a science curriculum organized around the students natural environment provides a common subject for study in all cultures. This was not a research study, but a write-up which is related to the topic of this work.

Showers and Shringley (1995) studied the effects of knowledge and persuasion on High School Students' attitudes toward Nuclear Power plants in rural schools in Pennsylvania and Ohio (U.S.A.). They reported links between subjects knowledge about nuclear power plant and attitudes toward them. Crater (1972); Nealey and Rankin (1987) disclosed statistical correlation between knowledge of and attitudes toward nuclear power plants. Solomon (1989) on the other hand identified knowledge as our important ingredient of High – School students' discussion of Nuclear Power. They summarized the



relationship between nuclear knowledge and attitude by asserting that attitudes are based on beliefs that have a source in factual knowledge. Their study differed from this work as it was conducted in another country, although related to this work on students' attitudes.

Palmer (1997) researched on students' Application of the concept of interdependence to the issue of preservation of species. He reported that the greater majority of the students believed that trees and vertebrate animals should be saved, but it was not necessary to save invertebrate animals and other types of living things (Fungi and bacteria). Stanisstreet et al (1993) noted similar trends amongst students in their study. The higher value which students place on vertebrates especially mammals and birds, has strong with other research which indicates that when students think about animals they think mainly of mammals, whereas the invertebrates as a group are very poorly understood. He then concluded that the misunderstanding about diversity may also affect the development of students' attitudes and values about ecological issues. These studies are related to this work as they were on students perception and attitudes but different with this work as they were done outside the country.

## 2.9 Implications of Literature Reviewed for the Study

In the literature reviewed many articles indicated that perception is vital in environmental education for the development of a truly global or international definition of science literacy. Also established is that EE is used as the organizational focus that provide science among other curricular subject with a crucial role in helping student achieve a global understanding and perspective.

The literature reviewed helps to relate, related researches to the formation of attitudes in the classroom environment. As many teachers believe that if they present objective information about the environment, - pollution, evolution, or recycling students will form more positive attitudes toward scientific approaches to issues involving these subjects.

The literature revealed that Environmental Education is representative of a broad range of issues that now face our society, which have a scientific understanding component. The implication of this is that teachers should carefully plan the affective component of the curriculum as the cognitive or psychomotor ones, so that the student will have greater perception and improved attitudes that will go a long way in improving the quality of our environment.

Also, from the literature reviewed there is little or no evidence of studies into relationship between perception and the attitude of

students towards environmental problems in Kaduna metropolis. This study is therefore expected to fill the perceived vacuum and it is hoped that other studies would probe the subject in greater depth and from other dimensions.

## **CHAPTER THREE**

### **Methodology**

#### **3.1 Introduction**

In this chapter the type of design and methodology that were used in this study are described. The population, sample and sampling procedures, instruments used as well as the statistical tools employed in data analysis are also described.

#### **3.2 Research Design**

This research was a correlation study in which perception and attitude scores were correlated. It also deals with the relationship between variables in a natural rather than artificial setting.

#### **3.3 Population of the Study**

The population of this study is all senior secondary school students in Kaduna metropolis. The Metropolis comprises Kaduna and its environs. In Kaduna Metropolis, at the time of the study, 55 secondary schools had attained senior secondary level. Out of these, 24 were State Government owned, while 31 were Private secondary schools. The target population for this study was the senior secondary class two (SS2) students in all the secondary schools with a population of 13,631.

Table 3.1 Schools, type and students population in SS2

S/No	School	Type of School	Population
1.	Dalet Girls Secondary School, Kawo	Girls	472
2.	Govt. Secondary School, Kawo	Boys	420
3.	Govt. College Kaduna	Boys	445
4.	Govt Secondary School, U/Sarki	Mixed	650
5.	Rimi College, Kaduna	Boys	436
6.	Govt. Girls Sec. Sch Ind/Way, Kaduna	Girls	347
7.	Govt. Girls Sec. Sch. U/Mu'azau	Girls	300
8.	Govt. Girls Sec. School Barnawa	Girls	560
9.	Govt. Secondary School , Kakuri	Boys	595
10.	Queen Amina College, Kakuri	Girls	158
11.	Govt. Secondary School, S/Tasha	Mixed	650
12.	Govt. Girls Secondary School, Doka	Girls	270
13.	Govt. Sec. Sch. Kargi Road T/Wada	Boys	200
14.	Sardauna Memorial College Kaduna	Boys	550
15.	Federal Govt. College, Malali	Mixed	485
16.	Govt. Girls Secondary School Kawo	Girls	172
17.	Command Secondary School Kaduna	Mixed	337
18.	Capital School, Kaduna	Mixed	336
19.	Govt. Technical College, Malali	Mixed	285
20.	Govt. Girls Sec. Sch. T/Balewa Way, Kad	Girls	271
21.	Govt. Girls Sec. Sch. (M/Gwarzo) T/Wada	Girls	621
22.	Govt. Secondary School Nasarawa	Boys	350
23.	Commad Day Secondary School, Kaduna	Mixed	337
24.	Airforce Secondary School, Kaduna	Mixed	225
25.	Zamani College, Malali	Mixed	85
26.	Uncle Bado Mem. School, Kaduna	Mixed	53
27.	Labayi International School, U/Rimi	Mixed	130
28.	Jinie College, Barnawa	Mixed	250
29.	Gaskiya Skill Int. School, Barnawa	Mixed	230
30.	Betty Queen Secondary School, Doka	Mixed	130
31.	Model Int. School, K/Mashi	Mixed	150
32.	Heyik Secondary School, Kakuri	Mixed	120
33.	Piety Secondary School, Kakuri	Mixed	91
34.	Immaculate Int. School Express Road	Mixed	230
35.	Faith College, Rigasa	Mixed	95
36.	Anny Secondary School, Express Road	Mixed	71
37.	Baptist High School S/Tasha	Mixed	88
38.	Supreme Int. School, Express Road	Mixed	275
39.	Essence Internationa School, Kaduna	Mixed	101
40.	Christ Ambassador College S/Tasha	Mixed	310
41.	Danbo Int. Sch., Challawa – Kaduna	Mixed	83
42.	Clara Secondary School Rafin-Guza	Mixed	71
43.	Challawa Secondary School, Barnawa	Mixed	70
44.	Quency International School, Narayi	Mixed	206
45.	Dabo Secondary Sch. Television, Kaduna	Mixed	60
46.	Hawad International School, Barnawa	Mixed	100
47.	Our Lady of Fatima College, S/Tasha	Girls	75
48.	Comp. College, Railway Station, Kaduna	Mixed	154
49.	Trinity Int. College, Rail way Station	Mixed	63
50.	Hope Secondary School, Asikolaiye Kad	Mixed	81
51.	Prince College, Sardauna Crescent, Kad.	Mixed	69
52.	Abubakar Mahmud Gumi Sec.Sch T/Wada	Mixed	300
53.	J.M.A. Premier Sec. School	Mixed	165
54.	Jupavi Secondary School, Kaduna.	Mixed	70
55.	ECWA Secondary School, Narayi	Mixed	55
	TOTAL		13,631

Table 3.2 Summary of School Type

School type	Number
Boys	7
Girls	10
Mixed	38

The decision to delimit the study to schools in Kaduna metropolis was based on the evidence that schools in the metropolis have students from most parts of Nigeria because of cosmopolitan nature of the city (W.A.E.C. 2002).

### 3.4 Sample and Sampling Procedure

Simple random sampling was used to select 3 schools from Boys school, 5 schools from the Girls school and 17 schools from the mixed schools making a total of 25 schools selected.

Considering the population in the Table 3.1, the researcher stratified the sample from the population owing to the fact that the number of subjects of interest is very large. Thus, a total of 375 students constituted the subject of the study so as to have a high scope of generalization. The stratified random sampling spread across all disciplines of senior secondary school students and comprised 188 male students and 187 female students.

Table 3.3 List of schools, and sample size

S/No	School	Boys	Girls	Mixed		Sample
				Boy	Girls	
1.	Government College Kaduna	28				28
2.	Rimi College, Kaduna	27				27
3.	Govt. Girls Sec. Sch. T/Balewa Way, Kad		17			17
4.	Capital School, Kaduna			10	11	21
5.	Command Day Secondary School			12	9	21
6.	Abubakar Mahmud Gumi Secondary School			10	9	19
7.	Hejik Secondary School			4	4	8
8.	Essence International School			3	3	6
9.	Comprehensive College Railway station			4	6	10
10.	Prince College Sardauna Crescent			2	2	4
11.	J.M.A. Premier Secondary School			4	6	10
12.	Government Girls Secondary School, Ind. way		22			22
13.	Federal Government College Malali			12	10	22
14.	Government Girls Secondary School, Barnawa		35			35
15.	Government Technical College, Malali			12	6	18
16.	Government Secondary School Kawo	27				27
17.	Our Lady of Fatima Sabo Tasha		5			5
18.	Zamani College, Malali			3	2	5
19.	Gaskiya Skill Int. School, Barnawa			7	8	15
20.	Supreme Int. School Express Road			9	8	17
21.	Anny Secondary School Express Road			2	3	5
22.	Clara Secondary School, R/Guza			3	2	5
23.	Dabo Secondary School			2	2	4
24.	Quency International School, Narayi			7	6	13
25.	Government Girls Secondary School, Kawo		11			11
	TOTAL	82	90	106	97	375

### 3.5 Instrument for Collecting Data

The instrument used to generate data from the respondents was the questionnaire adapted from Kuan-jen Yang and Chien Y.U (1994) focused on the perception of environmental education and attitudes toward the environment held by students which is quite related to the present study.

The questionnaire was made up of three sections; I, II, III. Section I was aimed at eliciting personal information about the respondents. Each question was followed by options requiring the respondent to tick the applicable. Section II assessment on perception of environmental problems (APEP) was aimed at finding out the students' perception of environmental problems. Options were also given for the respondents to tick. Section III (ATE) was also aimed at finding out the students' attitude towards environment.

Section II and III were designed according to likert - type of ratings. Respondents were requested to tick the applicable options. In all, the questionnaire was made up of 36 items (See Appendix B).

### **3.6 Validity of the Instrument**

A panel of experts comprising three senior lecturers in Science Education Section, A.B.U., Zaria, four lecturers in the Department of Environmental Studies, Kaduna Polytechnic, one biology lecturer from Biological Science Department, A.B.U., Zaria, two professionals on Environment from Savannah Conservation and Kaduna State Environmental Protection Agency helped to validate the instrument. They were requested to check for clarity of language and also the suitability of the items. They made useful and constructive suggestions which led to the elimination of some questions that were



found either to be ambiguous or not to have direct bearing with the variables. Out of the initial 42 items contained in the instrument, 36 were finally selected for use after the elimination of others based on the suggestions from the panel of experts that examined the items of the questionnaire. They all agreed that the items were suitable after revision, thus giving the instrument the desired face or content validity.

### **3.7 Pilot Testing**

A pilot test was conducted using twenty students chosen randomly from five schools in Kaduna metropolis. These were made up of at least 4 students each from Dalet Girls Secondary School, Kawo (Girls only), Government Secondary School, U/Sarki (Mixed), Sardauna Memorial College (Boys only), Government Girls Secondary School, T/Wada (Girls only) and Christ Ambassador College S/Tasha. The schools used for the pilot testing were not included in the sample of the main study. The data were then analyzed in order to ascertain the suitability of the instrument. The result of the pilot study was used to compute the reliability coefficient of the instrument using split half method, stepped up using the Spearman - Brown formula:

APEP

$$\begin{aligned}r_{nn} &= \frac{2r}{1+r} \\ &= \frac{2 \times 0.59}{1 \times 0.59} \\ &= \frac{1.18}{1.59}\end{aligned}$$

$$r_{nn} = 0.74$$

ATE

$$\begin{aligned}r_{nn} &= \frac{2r}{1+r} = \frac{2 \times 0.53}{1 + 0.53} \\ &= \frac{1.06}{1.53} = 0.69\end{aligned}$$

$$r_{nn} = 0.69$$

The reliability coefficient of 0.74 and 0.69 were obtained respectively. These were considered high enough to justify the assumption that the instruments are reliable.

The pilot study was also conducted to ascertain the efficiency of the instrument, APEP and ATE. It was also intended to find out how the subjects would react to the questionnaire; in terms of whether the items were clear enough and easily understood or not and whether there was need to include more items in certain areas or not. It was also intended to determine the difficulty level and the clarity of the language used to phrase the items. The respondents used in the pilot test were similar in terms of age and exposure to the envisaged environmental problems. Amendments made on the instrument after the pilot testing were mainly on ranking, and demographic data of the respondents.

### **3.7 Procedure for data collection**

The researcher personally visited the schools. The principals of the schools were first consulted in order to obtain permission to involve their schools in the study. The researcher administered the questionnaires to the respondents through face to face contact in their respective schools. This provided the researcher an opportunity to administer the instrument to the subjects in their respective schools as well to ensure that a high percentage return of the questionnaires was achieved.

The researcher created rapport to encourage the subjects to respond directly to all the items of the questionnaire. The responses of each of the subjects were carefully recorded and used as the data that was later analysed for purposes of obtaining results that would help in answering the research questions posed. A total of 375 students were used while 24 respondents did not return their questionnaires making 351 respondents as the final subjects.

### **3.8 Techniques for data Analysis**

The responses to each item in the questionnaire was scored based on the designed five-point likert scale of strongly agree to strongly disagree. The mean scores, standard deviations, percentages and levels of agreement among the respondents were calculated for each item in the questionnaire.

The data collected were used to test the hypotheses in section 1.5 of chapter one. The hypotheses are restated below with description of the statistics used in analyzing them.

H<sub>01</sub>: There is no significant relationship between students' mean scores on perception of environmental problems and their scores on attitude toward them.

The Pearson's product moment correlation coefficient (ppmr) statistics were used to test hypothesis 1 above at 0.05 level of significance. Ppmr was used because the study is on relationship. The t-test of independent samples was used to test hypothesis 2 & 3, restated below, at 0.05 level of significance. The t-test is meant to find significant difference between two samples. The t-test formula presented in the Appendix (See Appendix D).

H<sub>02</sub>: There is no significant difference between male and female students' scores in their attitudes towards environmental problems.

H<sub>03</sub>: there is no significant difference between mean scores of students (male and female) on perception of environmental problems.

## **CHAPTER FOUR**

### **DATA ANALYSIS, RESULTS AND DISCUSSION**

#### **4.1 Introduction:**

In this chapter, the data collected for this study are analysed. The chapter is structured into two sections: presentation of data and discussion of results. The data were analysed using the statistical package for social sciences (SPSS) in the data analysis unit of Institute for Agricultural Research, Ahmadu Bello University, Samaru, Zaria. This was done with a view to testing the null hypothesis of the study and hence attempting to find answers to the research questions. The results of the data analysis are presented in the tables below.

#### **4.2 Presentation of the Results:**

Data were collected based on the requirement of the three hypotheses and the three research questions. The probability level of 5% was used for rejecting or not rejecting a proposed hypothesis. The results are presented below, stating the null hypothesis.

H<sub>01</sub>: There is no significant relationship between students' mean scores on perception of environmental problems and their scores on attitude towards them.

In order to determine the nature of students of environmental

problems and their attitude towards them, the mean perception scores and attitude scores were interpreted using Harrison (1980) guide, in table 4.1 below.

**Table 4.1 Mean Scores of Respondents on Perception and Attitude.**

Variables T	N	$\bar{x}$	SD	SE	Expected Score %	Decision
Perception	351	37.6	0.56	0. 05	≥40	not perceived
Attitude	351	35.1	0.36	0.04	≥40	negative attitude

Result in table 4.1. Shows that the mean perception scores and the attitude scores of the students were below 40 which is the minimum scores for perceptions and attitude as suggested by Harrison, (1980). However, considering the possible limitation of the design and procedure of the study, it has been consider that the mean perception score of the students on environmental problems to be approximately equal to 40.0 because of the closeness of 37.6 to 40.0. Base of the above submission, it is concluded that the environmental problems were perceived by all the students.

To test the hypothesis, students scores in perception and attitude were correlated using ppmr statistics.

The result is presented in Table 4.2:

Table 4.2 Correlation Between Perception and Attitude

Variables	N	$\bar{x}$	SD	df	r-cal	r-crit	p	Decision
Attitude	351	3.5026	0.3587	349	0.4366	0.195	0.000	hypothesis rejected
Perception	351	3.7578	0.5610					

\* significant at  $p < 0.05$

The result in the table 4.2 shows that the coefficient of correlation between perception test scores and the scores of the attitude test was 0.437 while critical value of r was 0.195 at  $p < 0.05$  significance level. This means that the calculated value of r is greater than r critical, which means that the null hypothesis is rejected. This means that there is statistically significant relationship between perception and attitude of students towards environmental problems at 0.05 level of significance ( $r = 0.437$ ,  $df = 349$ ,  $p < 0.05$ )

**HO<sub>2</sub>** : There is no significant difference between the mean scores of male and female students on their attitude towards environmental problems.

The mean scores of male and female students were compared using t-test statistics. The result is presented in Table 4.3 below

Table 4.3: t – test comparison of Male and Female Students’ Attitude mean scores.

Variables	N	$\bar{x}$	S D	SE	df	t-cal	t-crit	p	Decision
Male	184	3.4996	0.342	0.021	347	0.70	1.960	0.486	hypothesis not rejected
Female	167	3.5288	0.414	0.047					

From the above results, female students had a higher mean score compared to the male students. The obtained t-value of 0.70 is less than the critical value of 1.96 at 0.05 level of significance and 347 degree of freedom. This result shows that the difference in the mean scores of the male and female students was not statistically significant (  $t = 0.70$ ,  $df = 347$ ,  $p < 0.50$ ). Therefore, the null hypothesis is not rejected. It means, therefore, that there is no statistically significant difference between the male and female students attitude towards environmental problems.

HO<sub>3</sub> : There is no significant difference between mean scores of male and female students on perception of environmental problems.

The means scores of the students were compared using t-test statistics. The result is presented in table 4.4 below:



Table 4.4: t-test comparison of male and female students perception mean scores.

Variables	N	$\bar{x}$	SD	SE	df	t-cal	t-crit	p	Decision
Male	184	3.743	0.57	0.035	347	1.01	1.96	0.315	hypothesis not rejected
Female	167	3.816	0.528	0.06					

The result in the table 4.4 shows that male students had a lesser score compare to the female students. The obtained t-value of 1.01 is less than critical value of 1.96 at 0.05 level of significance and 347 degree of freedom. The result reveals that the difference in the mean scores were not statistically significant (  $t = 0.436$ ,  $df = 347$  at  $p < 0.05$ ). Therefore, the null hypothesis is not rejected. It means that there no statistically significant difference between the male and female students on perception of environmental problems.

#### 4.3 Discussion of Results:

The findings from the analysis of the data are discussed below:-

**Research question 1:** Is there any relationship between perception and attitude of students towards environmental problems ?

Results presented in Table 4.1 show that the calculated r of

0.437 is greater than the critical value of 0.195 resulting in the rejection of the hypothesis. The interpretation is that, there is significant relation between perception and attitude of students based on environmental problems. This could be taken to mean that environmental consciousness amongst students enhance positive attitude towards the environment.

The finding of this study gives credence to the work of Showers and Shringley (1995) that assessed the effects of knowledge and persuasion on high school students' attitudes toward nuclear power plants in Pennsylvania and Ohio (U.S.A). The study found that there are links between subject's knowledge about nuclear power plant and attitudes toward them. The present result is also in support of the finding of Palmer (1997) who reported that misunderstanding about biodiversity may also affect the development of students' attitudes. This means that there is positive relationship between perception and attitude. However, the present finding is in agreement with the report of Mayer (1997) who wrote on global science literacy. He concluded that a science curriculum organized around the students' natural environment provides a common subject for study in all cultures.

**Research question 2:** Is there any difference between male and female students attitude towards environmental problems? 74

The results obtained (Table 4.3) showed that the calculated  $t$  – value of 0.70 is less than the critical value of 1.96. Thus, the hypothesis was not rejected. This indicated that there is no significant difference in the attitude of male and female students toward environmental problems. The reasons for this could be that both male and female students were exposed to the same environment, confronted with same environmental issues and no gender bias exists.

Compared with previous results of related studies, the present result agrees with the findings of Okebukola et al. (1997) who indicated that people respond to environmental problems whose effects are drastic enough to jolt them. This study also conforms to the work of Roseblum (1973) who reported that boys and girls have equal competence in Mathematics and spatial reasoning.

**Research Question 3:** Is there gender difference between the students (Male and Female) on perception of environmental problems?

The result presented in table 4.4 shows that the calculated  $t$ -value of 1.01 is less than the critical value of 1.96. Thus, the

hypothesis was not rejected. This means that, there is no significance difference in the perception of male from female students on environmental problems. The reason could be that both male and female students were confronted with the same environmental issues. Therefore, no gender bias exists.

This result is in consonance with the findings of Simon et al. (1987) who stressed the dynamic synthesizing forces in perception. They further deduced that, every individual has an in-built tendency to establish order in an observation. Therefore, this study conforms to the work of Anastasic (1982) who reported that boys do not have advantage over girls of the same age in mental attributes such as intelligence. However, no result of any study done in Nigerian was available to compare with the present findings.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter contains the summary of the study. The conclusion from the findings and implication of the findings as well as the recommendations arising from the conclusion are discussed.

#### **5.2 Summary of the Study**

This study had four aims. First was to determine whether there is relationship between perception and attitude of senior secondary school students towards environmental problems. The second was to find out the differences between male and female attitudes toward environmental problems. The third objective was to study the differences that exist between male and female on perception of environmental problems.

The population of the study comprised all the senior secondary school students in Kaduna metropolis. Three hundred and fifty one (351) students randomly selected were the subjects. These students were selected from 25 schools randomly picked from schools in the metropolis. The research instrument used were assessment on perception of environmental problems (APEP) and assessment of attitude towards the environment (ATE) questionnaires adapted by

the researcher (See Appendix B ).

### 5.3 **Summary of findings**

Based on the results of analysis of data collected, the summary of the findings from the results are as follows:-

From the results it is discovered that the respondents perceived the environmental problems which could change the attitude of students towards environmental problems.

- (1) There was significant relationship between perception and attitude of students' towards environmental problems.
- (2) There was statistically no significant difference between male and female students in their attitude towards environmental problems.
- (3) There was no significant difference between male and female students on perception of environmental problems.

### 5.4 **Conclusions**

The following conclusions were made based on the findings of the present study.

1. The students were fairly aware of environmental problems.
2. The perception of senior secondary school students is positive related to their attitude towards environmental problems.

3. The students attitude towards environment were negative though, no statistically significant difference in the attitude of male and female students toward environmental problems.

### **5.5 Implication of the Findings for Science Education**

One of the problems that led to the decision to conduct this study was the poor environmental conditions observed and being experienced in Kaduna metropolis. Many factors have been attributed to the prevalent poor environmental conditions, one of which is the distorted perception of children (Vigilante, 1967) which may necessitate dissonance attitude (Stuart, 1977).

The results of the present study have shown that senior secondary school students' fairly perceived the prevalent environmental problems. However, their attitudes towards the environment were negative.

The result raises doubt as to whether the students actually perceived the environmental problems in relation to industrial growth and technological advancement since there are few that attributed environmental deterioration to both, it means that the students could not link environmental problems with industrial growth and technological advancement. This implies that greater public

awareness is needed.

The results also raise questions about the adequacy of the topics infused in the various subjects of senior secondary school curriculum. What this result shows is that students have no sufficient knowledge of environmental education.

Present findings also indicate that students did not agree that emphasis should be placed on teaching students about nature at the expense of science and technology. This implies that teaching aids created from scratch, left-overs and wastes need to be used in schools so that students could develop oriental attitude.

On the issue of relationship between perception and attitude scores of students toward environmental problems under study, results indicated that there is significant relationship between the two scores. The implication is that if the environmental problems were well perceived by students, there is high probability of perceived knowledge and a significant attitudinal change towards the environment. Also when adequate stimulus information is provided, students are most likely to perceive more, then in-sight gained are transferred and equally change attitude towards the environment. Thus, the aim of teaching and learning environmental education would be attained by enhancing the much needed industrial development and technological advancement.



## 5.6 **Recommendations**

1. To further strengthen the positive attitude of students towards environmental problems, institutions of learning both primary and postprimary should be encouraged to form environmental clubs such as Youth Environmental Scout; thereby the youth will be more exposed to environmental situations and learn what could be done to solve the problem.
2. Government under the auspices of Federal Ministry of Education should include environmental education in the curriculum of postprimary schools, as the students still remain a big army that can be used in turning the poor environmental situations around and so prevent environmental destruction of our society in the nearest future. This suggestion was made based on the finding in this study that environmental conservation is mainly the responsibility of government.
3. Based on the finding in this study that people's ignorance is the major cause of environmental deterioration, government and non – governmental organizations should create public awareness in the form of environmental education to promote understanding of essential linkages between the environment and development.

4. Government should also make effort to improve the socio-economic condition of families since this could have a significant effect on the attitude of students and of the citizenry at large.

5. It is also recommended that teaching aids from wall charts, maps, and wastes as in-house production should be encouraged. This suggestion was made based on the finding that more emphasis should not be placed on teaching students nature at the expense of science and technology. This is needed for the development of attitudinal change.

6. Based on non-availability of environmental education curriculum for senior secondary schools, curriculum developers are also advised to seek for the implementation of the draft curriculum. This is needed at the initial stage of learning for the development of concrete thinking and cognitive skills of environmental education that are essential for further learning of environmental problems. Moreover, teachers should also develop in students both cognitive and affective domains to enable them think for themselves. This could take the form of ability to perceive and understand the environmental problems around them. Thus, environmental education can be done practically through perception skills.

### **5.7 Limitations of the Study**

1. This study was limited, due to time and financial constraints, to senior secondary school students in Kaduna metropolis thus limiting in some sense, the scope of the generalization of the results.
2. Interview procedure should have been included to complement data collected from questionnaire. Again due to time and financial constraint, this was not done. It is recognized as limitation

### **5.8 Suggestions for further studies**

Since research studies are continuous, the researcher would suggest that this study be replicated using a sample with entire state and or nation for wider coverage.

There is again the need to study socio- economic factors in relation to environmental problems.

There is also the need to conduct similar studies on students' perception and attitude towards environmental problems with a view to revealing the full nature of the difference between gender and school type.

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## Appendix A

### Pollutants, sources and effects

S/NO	POLLUTANTS	SOURCES	EFFECTS
1.	Salmonella typhii	untreated sewage and water	Typhoid fever in humans
2.	Faecal Coliform Bacteria	untreated sewage, wastes, storm run-offs	Cholera, dysentery, gastroenteritis, hepatitis, ear-infections.
3.	Taenia solium	Untreated sewage, human wastes	Anaemia, loss of weight, excessive hunger.
4.	Mercury	paper palping and plant industries.	mercury poisoning resulting in damage to the nervous system (Including eye defects).
5.	Phosphates	Detergents, fertilizers, pesticides.	Eutrophication and increased turbidity, development of anaerobic condition or foul shoreline due to hydrogen sulphide release.
6.	Nitrates	sewage, fertilizers and run-offs.	Depletion of dissolved oxygen, and reduced PH.
7.	Oxides of sulphur and Nitrogen.	gas flaring, vehicular and plant emissions	Acid rains, which significantly lower PH and kill intolerant aquatic flora and fauna.
8.	Hydrocarbons (slicks)	Oil spillage from oil rigs, tanker etc.	Forms a film oil on the water surface. The oil destroys the waterproof coating of the feather of seabirds and swarming flocks, making them become water logged, drown or die of cold. It also prevents dissolution of oxygen.
9.	Silt and clay particles	Erosion from farm land, wastes	Turbidity-causes a reduction in the amount light transmitted, clog fish gills-often killing them, and increases water temperature which leads to a reduction of oxygen level, replacement of water leading to death of aquatic life forms.

Source – Adara, 1998.

**APPENDIX B**  
**STUDENT QUESTIONNAIRE**  
**PART 1**

**BACKGROUND INFORMATION**

**DIRECTIONS:** Please read each item carefully and select your position on each statement by circling and / or indicating your response.

1. Sex  
 (1) Male                      (2) Female
  
2. Arm / Stream  
 (1) SS1                      (2) SS2                      (3) SS3
  
3. Your major area:  
 (1) Arts                      (2) Science                      (3) Technical                      (4) Commercial
  
4. Location  
 (1) Urban                      (2) Sub-urban
  
5. Age in years  
 (1) 15 – 17                      (2) 18 – 20                      (3) 21 and above

**PART II**

**ASSESSMENT ON PERCEPTIONS OF ENVIRONMENTAL EDUCATION**

**DIRECTION:** For the following 1 – 11 items, please read each item carefully and select the response which best expresses your belief about each statement by circling the number.

( 1 strongly disagree, 2 Disagree, 3 Neutral, 4 Agree, 5 Strongly agree)

- |    |   |   |
|----|---|---|
| 1. | Environmental concerns need to be reinforced in secondary school education in Kaduna.   | 1 |
|    | 2 3 4 5   |   |
| 2. | There is a desire need for curriculum development in the secondary education institutions to ensure that environmental education is taken into consideration. | 1 |
|    | 2 3 4 5   |   |
| 3. | The responsibility of environmental education is to promote environmental awareness.  | 1 |
|    | 2 3 4 5   |   |
| 4. | The major responsibility of environmental education is to promote environmental social action.  | 1 |
|    | 2 3 4 5   |   |

- |     |   |   |
|-----|---|---|
| 5.  | I believe that environmental education can be effectively taught in secondary schools in Kaduna.<br>2 3 4 5   | 1 |
| 6.  | Since the curriculum of schools is overcrowded now, the infusion of environmental education into all existing disciplines should be strongly encouraged.<br>2 3 4 5 | 1 |
| 7.  | Prospective student should be required to take one or more courses pertaining to environmental concerns<br>2 3 4 5  | 1 |
| 8.  | Prospective student should be required to take one or more courses pertaining to competence of environmental education instruction.<br>2 3 4 5                      | 1 |
| 9.  | I would like to take environmental education as one of the subjects which I will sit for in the final examination.<br>2 3 4 5                                       | 1 |
| 10. | I believe that I have sufficient ability to take environmental education as one of the subject which I will sit for in the final examination<br>2 3 4 5             | 1 |
| 11. | I believe that I have extensive ability to integrate a broad range of environmental issues into my every day activities.<br>2 3 4 5                                 | 1 |

### **PART III**

#### **ASSESSMENT OF ATTITUTDES TOWARD THE ENVIRONMENT**

**DIRECTION:** Please read each item carefully and select the response which best expresses your belief about each statement  
(1 Strongly disagree, 2. disagree, 3. Neutral, 4. Agree, 5.Strongly agree)

- |    |   |   |
|----|---|---|
| 1. | living things are interrelated and interdependent with one another and with their surroundings.<br>2 3 4 5        | 1 |
| 2. | The balance of nature is very delicate and easily upset.<br>2 3 4 5   | 1 |
| 3. | Industrialization and economic development endanger the existence of wildlife communities and species.<br>2 3 4 5 | 1 |
| 4. | I feel frustrated and worry that the quality of the environment has been deteriorated.                            | 1 |

- 2 3 4 5
5. I would be willing to make personal sacrifices to slow down environment deterioration, even though the immediate results may not be significant. 1  
2 3 4 5
  6. Most of the concerns about environmental problems have been over exaggerated. 1  
2 3 4 5
  7. Plants and animals exist primarily for the purpose of use by the humans 1  
2 3 4 5
  8. The rate of adaptation in organisms keeps pace with the rate of change in the environment. 1  
2 3 4 5
  9. Humans need not adapt to the natural environment because they have rights and are able to rebuild the environments to suit their needs. 1  
2 3 4 5
  10. Environmental conservation is mainly the government's responsibility, so I really need not worry about it and need not to do much about it. 1  
2 3 4 5
  11. Natural resource problems are not affecting me personally. 1  
2 3 4 5
  12. A strict national land-use restriction should be enforced to prevent housing and industry from using much of the best agricultural land. 1  
2 3 4 5
  13. Courses focusing on the conservation of natural resources should be taught in secondary schools. 1  
2 3 4 5
  14. People of the world need to control population growth to maintain balance with the ecosystem. 1  
2 3 4 5
  15. Information about stabilizing the population and about birth control should be taught in secondary school. 1  
2 3 4 5
  16. More than 70% of the earth's surface is ocean, so the oceans is the appropriate place to dump waste to solve the waste disposal problem. 1  
2 3 4 5

- |     |   |   |
|-----|---|---|
| 17. | Pollution and environmental damage are too high a price to pay for increasing living standards.<br>2 3 4 5  | 1 |
| 18. | The price of products should include the cost of preventing and maintaining environmental concerns even if the products will cost much more.<br>2 3 4 5 | 1 |
| 19. | People's ignorance is the major cause of environmental deterioration.<br>2 3 4 5  | 1 |
| 20. | People's indifference is the major cause of environmental deterioration.<br>2 3 4 5   | 1 |
| 21. | The standards of pollution control should not be so strict as to discourage industrial growth and development.<br>1 2 3 4 5                             |   |
| 22. | Information about population and pollution control should be provided in secondary schools.<br>2 3 4 5  | 1 |
| 23. | Industrial development and technological advancement should be blamed for our environmental problems.<br>2 3 4 5  | 1 |
| 24. | Students should be taught how to use our industrial and technological advances wisely.<br>2 3 4 5   | 1 |
| 25. | More emphasis should be placed on teaching students about nature than on teaching them about science and technology.<br>2 3 4 5                         | 1 |

**APPENDIX D**

$$t = \frac{X_1 - X_2}{\sqrt{\frac{(n_1 - 1) S_1^2 + (n_2 - 1) S_2^2}{n_1 + n_2 - 2}}} \left( = \frac{1}{n_1} + \frac{1}{n_2} \right)$$

Where:

- $X_1$  = means scores of the first group
- $X_2$  = means scores of the second group
- $n_1$  = number of subject in the first group
- $n_2$  = number of subject in the second group
- $S_1^2$  = variance of the scores of the first group
- $S_2^2$  = variance of the scores of the second group