

UNIVERSITY OF JOS

**CONCEALED IN THE SCRIPTURES AND REVEALED IN GEOLOGY: THE
PURPOSE OF GOD FOR MAN.**

INAUGURAL LECTURE

DELIVERED AT THE UNIVERSITY OF JOS

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BY

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INTRODUCTION

The Chairman, Professor Hayward Babale Mafuyai, Vice-chancellor of the University of Jos, the Deputy Vice Chancellors (Academic and Administration), The Registrar, Chairperson, Lectures and Award of Prizes Committee, Ministers of the Gospel, Deans and Directors, Heads of Department and Units, Professors, Staff and Students of the University, Invited Guests, Gentlemen of the Press, Ladies, Gentlemen and children from the Calvary Science Group of Schools.

In the beginning, **God** created the heavens and **The Earth**. By the **SPOKEN WORD**, **He** made everything available in the earth for the welfare of man and gave the **geologists** the mandate to subdue the earth.

“So God created man in His own image; in the image of God He created him; male and female He created them. Then God blessed them, and God said to them, Be fruitful and multiply; fill the earth and subdue it(Genesis 1²⁸).

Referring to **Geology** and **Mining**, the relevant scripture says:

“Surely there is a mine for silver, And a place where gold is refined. Iron is taken from the earth, And copper is smelted from ore. Man puts an end to darkness and searches every recess for ore in the darkness and the shadow of death. He breaks open a shaft away from people; In places forgotten by feet They hang far away from men; They swing to and fro. As for the earth, from it comes bread, but underneath it is turned up as by fire; Its stones are the source of sapphires, And it contains gold dust That part no bird knows, nor has the falcon’s eye seen it. The proud lions have not trodden it, nor has the fierce lion passed over it. He puts his hand on the flint; He overturns the mountains at the roots. He cuts out channels in the rocks, and his eye sees every precious thing. He dams up the streams from trickling; What is hidden he brings forth to light.(Job 28¹⁻¹¹).

In this lecture we will be looking at the never failing provision of **God** to man, the talent of the **geologists, miners**, and the attitude of man towards the

natural resources endowment as it relates to **Environment**. Then we will examine the relevant and related scriptures about to be fulfilled and man's attitude. Case studies will be drawn from Nigeria and other parts of the world as the need arises and recommendations will be made.

Geology is widely referred to in the **Holy Scriptures** for example the Bible tells us: "Now a river went out of Eden to water the garden, and from there it parted and became four riverheads. The name of the first is Pishon; it is the one which skirts the whole land of Havilah, where there is gold. And the gold of that land is good. Bdellium and the onyx stone are there (Genesis 2¹⁰⁻¹²).

Deut. 8⁹ says "a land in which you will eat bread without scarcity, in which you will lack nothing; a land whose stones are iron and out of whose hills you can dig copper". Much of this had been told us during the first inaugural lecture from the Department of geology and Mining (Ogezi, 2008). Greater emphasis will be laid on the biblical truths concerning geology and mining, as the lecture progresses. As man exploits the natural resources of the earth, there is a defiance in the sustainable management of the environment. The earth is abused, the expertise of the geologist ignored, and the mandate given by the creator of heaven and earth disbelieved, leading to a possible catastrophe. The creator has made abundant provision for man and what was left to the handling of man was efficient resources management.

This lecture is divided into three sections, namely: The practice of geology, The defiance and the catastrophe.

SECTION ONE

THE PRACTICE OF GEOLOGY

THE GEOLOGIST

The Geologist is a scientist that studies and researches on the evolution of the earth and its inhabitants from the formation of the earth to the present day. He seeks to find out how and when rocks were formed, as well as what is going on within and on the surface of the earth. They carry on the exploring traditions of the past, journeying to all corners of the earth and deep oceans, searching for natural resources

The Stone Age man was very much aware of his environment; he knew the rocks to use in making tools, and the ones on which to grow food. He was probably the first geologist. Although not very precise, it is believed that modern geology began as a scientific discipline when Greek “natural philosophers” and students of “natural” history observed details of the nature of the earth and drew conclusions based on their observations. Ogezi, in 2008, during the University of Jos inaugural Lecture, series 37 observed that God Himself was the first miner, substantiating his point based on God’s application of clay in forming man (Genesis 2⁷). Subsequently, the study of geology advanced to detailed description and differentiation of materials that form the earth, namely rocks, minerals and fossils.

Geology is a very wide discipline and it directly or indirectly affects all aspects of life and living on earth. Some geologists are mineralogists, who are concerned with the study of crystal form, chemical composition, physical properties, and occurrence of minerals; others are petrologists, whose main concern is the study of the texture, mineral composition and origin of rocks.



Fig.1 Sandstone Beds In The Middle Benue Trough (Source: Report of 300-level geology field trip, 2011)



Fig.2 Ammonites Found AT ANINGE (Source: Report of 300 level students' geology field trip, 2011)

The paleontologists apply biological principles in their studies. The branches of geology include physical geology, mineralogy, petrology, structural geology, Stratigraphy and palaeontology. Other divisions include geophysics, geochemistry, geochronology, seismology, volcanology, economic geology, engineering geology, hydrogeology, geochemistry, medical and environmental geology. The study of geology has been made easier in recent years due to technological advancement, leading to the introduction of the global positioning system (GPS), the geographic information system (GIS), the remote sensing technology, and others. Satellite and GIS can be used to monitor the movement of large dust clouds moving across oceans, carrying toxic metals and pathogenic microbes that may kill corals and cause asthma (Centeno 2011). Nigeria Sat – 1 has been used widely in the practice of geology (Ologun et al. 2007).

This lecture lays greater emphasis on medical and environmental geology and draws man's attention to flooding, earth quakes, volcanic eruption, desertification, greenhouse effect, air and water pollution, oil spills and the devastating effects of mining. **Particular attention is laid on the fact that God's provision has not failed but in tapping the abundant natural resources of the earth, man seems to be offending man.** Mineral resources development particularly in Nigeria is done unsustainably.

Medical Geology covers pollution as well as an investigation of the broader relationships between the natural geologic environment and the health of, or occurrence of disease in humans, animals and plants living in that environment. In 2011, scientists who gathered from all over the world in Bari, Italy at a 4th Medical geology conference concluded the conference with the resolution that medical geology was an emerging discipline that will offer the

medical community new opportunities to address a range of health problems. Studies on the application of clays for healing were widely discussed (Cesar et.al, 2011). This aspect of the geology reminds bible students that Jesus Christ may well have been the first Medical Geologist. The scripture says:

“When He had said these things, He spat on the ground and made clay with the saliva; and He anointed the eye of the blind man with the clay. And He said to him, go wash in the pool of Siloam (which is translated, Sent). So he went and washed, and came back seeing (John9⁶⁻⁷)”.

An application of clay on the eye of the blind man resulted in a healing miracle. At that conference this lecturer delivered a paper in which she presented the impact of geology and mining on the Jos Plateau (Adiuku-Brown, 2011). The health impact of lead- zinc mining in Zamfara state, Nigeria, was also presented by the United States Geological Agency (USGS), at that conference.

Environmental geology is the study of the relationship between man and his geologic habitat. This includes the effects of both mass movement and tectonic movements on structures and the effect of subtle variations in the composition of earth materials; the location and exploitation of natural resources, as well as the disposal of wastes, on the present and future generations. This aspect of geology is aimed at making the best advice available to man especially where geologic factors have proved critical. Environmental geology uses the principles of geology, hydrogeology/engineering geology, geophysics, and associated sciences and disciplines, to determine how the resources of an area may be developed for the maximum benefit of man. Environmental geology is therefore linked with the study of factors that affect the atmosphere, the hydrosphere, the lithosphere and the biosphere, having the wellbeing of man

as a priority. By way of emphasis, ***environmental issues are about life and survival of our planet as well as survival in our planet for all generations.***

To make this discussion relevant to those of us on the planet earth today and to put what is discussed into perspective, the earth realms and the sustainability of life in the earth are briefly discussed,.

THE ORIGIN AND SUSTAINABILITY OF LIFE ON THE EARTH

“It is He who sits above the circle of the earth, And its inhabitants are like grasshoppers, who stretches out the heavens like a curtain, and spreads them out like a tent to dwell in” (Isiah 40²³).

The earth is one of the lesser planets, which came into existence when the universe, created from a core of neutrons exploded some ten to fifteen thousand million years ago. It derives nearly all its energy from the sun and is a member of the solar system (the sun, nine planets, a belt of asteroids, meteorites and several comets), and one of the fortunate planets of the solar system. Its rate of rotation makes day and night, balancing the temperatures.

The earth ecosystem maintains a temperature range between 15°C to 35°C on the average, and a relative constant salinity of the seawater at about 3.4%. A salt content higher than 6% would terminate all life in the seas. The oxygen content is 21% and a protective layer of ozone exists at the stratosphere (a layer in which temperature increases gradually). Its density and position with relation to the sun enables it to hold an atmosphere which further moderates temperature and filters harmful rays from the sun. The atmosphere and hydrosphere make life possible on the earth.

“The Lord by wisdom founded the earth; By understanding He established the heavens; By His knowledge the depths were broken up, and clouds drop down the dew” (Proverbs 3, ¹⁹⁻²⁰).

Human activities have however continued to negatively modify the earth’s natural endowments, with possible negative consequences on man.

ENVIRONMENTAL SIGNIFICANCE OF THE EARTH’S REALMS

The large outer circles in figure 3 represent the three great inorganic realms; each one overlaps the other two in a small area suggesting that some of the substance of each realm is held within the other two.

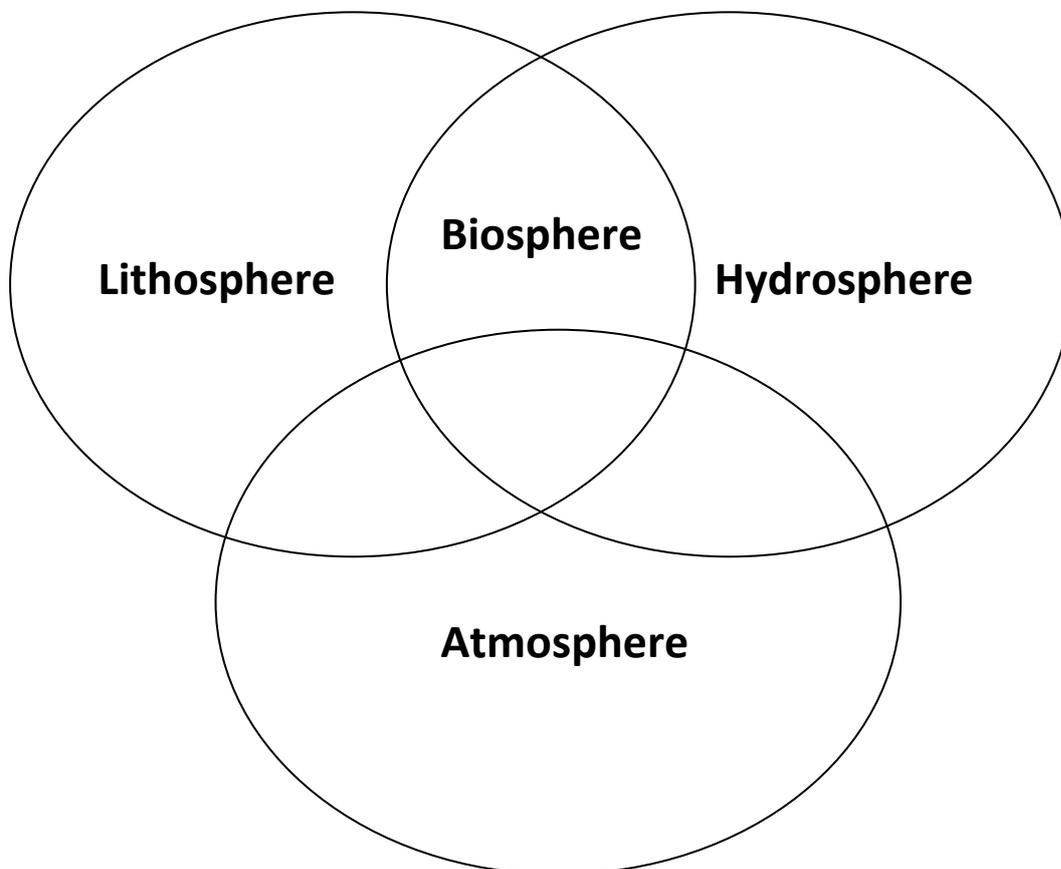


Fig. 3 The Earth’s Outer Realms

The earth’s atmosphere consists of a mixture of various gases surrounding the earth to a height of many kilometres. It is held to the earth by gravitational attraction; this envelop of air is densest at sea level and thins rapidly upward.

Although almost 99% lies within 29km of the earth's surface, the upper limit of the atmosphere can be drawn approximately at a height of 10,000km, a distance approaching the diameter of the earth itself. The remaining 0.970% of the air is mostly argon (0.934%). Carbon dioxide although constituting only about 0.033%, is a gas of great importance in atmospheric processes because of its ability to absorb heat therefore allowing the lower atmosphere to be warmed by heat radiation coming from the sun and from the earth's surface. Carbon dioxide is also an effective emitter of radiation and acts to cool the upper atmosphere. The remaining gases of the homosphere are neon, helium, krypton, xenon, hydrogen, methane, and nitrous oxide. These total about 0.003% by volume. All of the component gases are perfectly diffused among one another, so as to give the pure dry air a definite set of physical properties, just as if it were a single gas.

Green plants, in the process of photosynthesis utilize carbon dioxide from the atmosphere converting it with water into carbohydrate. A pronounced rise in the carbon dioxide content of the atmosphere has been noted to be the result of man's combustion of large quantities of hydrocarbon fuels such as coal and petroleum products.

The lowermost atmospheric layer, the troposphere, is of most direct importance to man and other life forms. Practically all phenomena of weather and climate that materially affect the biosphere take place within the troposphere. In addition to pure dry air the troposphere contains water vapour, a colourless, odourless, gaseous form of water which mixes perfectly with other gases of the air. The concentration of water vapour in the air is called the humidity and is of primary importance as an environmental factor. Water vapour can condense into cloud and fog. If condensation is excessive,

rain, snow, hail, or sleet, collectively termed precipitation, may result. There is, in addition, a most important function performed by water vapour. Like carbon dioxide, it is capable of absorbing heat, which penetrates the atmosphere in the form of radiant energy from the sun and earth. Water vapour gives the troposphere the quality of an insulating blanket, which prevents the rapid escape of heat from the earth's surface.

Dust particles enter the troposphere from dry desert plains, lake beds or beaches, as well as from explosive volcanoes. Forest and bush fires are yet important sources of dust particles. Dust in the troposphere contributes to the occurrence of twilight and the red colours of sun rise and sunset. Certain types of dust particles serve as nuclei, or centres around which water vapour condense to produce cloud particles. The atmosphere is the source layer of heat and condensed fresh water entering the ocean.

The evolution of the primeval atmosphere into the present one, which consists essentially of nitrogen and oxygen, is pictured as beginning with the photochemical dissociation of water vapour by solar radiation, thereby producing free oxygen. Other photochemical reactions led to the production of more complex organic compounds, ultimately leading to self-reproduction systems – living matter.

ATMOSPHERIC POLLUTION

Air is an environmental resource. It is a fundamental necessity for almost all forms of terrestrial life. It is also an economic resource. It is essential to a number of vital economic processes, including agricultural production, forestry production, industrial production, fuel combustion, heating, cooling and so on. Likewise, poor air quality affects a number of these processes. Poor air quality can be described as the presence in the outdoor or indoor atmosphere of one or more gaseous or particulate contaminants in quantities, characteristics, and of duration such as to be injurious to human, plant or animal life or to

property. Poor air quality can reduce human production potential as well as agricultural productivity. This implies that poor air quality can lead to poverty and death.



Fig. 4 Air Pollution From A Cement Factory In Nigeria.

Some air pollutants such as SO_2 can undergo atmospheric oxidation and hydrolysis to form acidic deposition, otherwise called the “acid rain”. Acidic precipitation can lead to loss of aquatic resources, including fish and other components of freshwater biota. This impact will be even more severe on natural lakes, ponds, rivers and streams. Acidic deposition can hasten the corrosion and tarnishing of metals, soiling of surface stone, brick and concrete, and discoloration and peeling of paint. In addition, many historic buildings/structures and relics can be damaged by exposure to atmospheric pollutants. Poor sensitisation, poverty and unbelief are some of the factors that lead to the release of air pollutants to the environment.

HYDROSPHERE is a generalized word for the total free water of the earth (whether as gas, liquid, or solid). It is largely represented by the world ocean. The most active portion of the ocean is its uppermost layer. At great ocean depths water moves extremely slowly and maintains a uniformly low temperature. Sea water is a solution of salts - a brine whose ingredients have maintained approximately fixed proportions over a considerable span of geologic time. Besides their importance in the chemical environment of marine life, these salts constitute a vast reservoir of mineral matter from which certain constituents may be extracted by man for his use. Chlorine constitutes 55% by weight of all the dissolved matter and sodium 31%. Other important elements in the ocean include bromine, carbon, strontium, silicon, and fluorine. At least half of the known elements can be found in sea water. Sea water also holds in solution small amounts of all the gasses of the atmosphere, principally, **oxygen and carbon dioxide.**

HYDROSPHERIC POLLUTION

The composition of surface and underground water is controlled by the environment through which the water passes, which are in turn influenced by climate, source of material from which the water is found and relief of the basin of the water course. The concentration of elements in water is controlled by such factors as the hydrogen ion concentration, the ionic potential, ionic size and charge, the electrode potential, and ionic concentration.

Surface water is polluted from sources which include sewage, sewage sludge, oil spillage, urban runoff, chemicals, agricultural runoff, accidental spills of chemicals, radioactive materials, runoff from industrial sites, leaks from surface storage tanks, or pipelines, sediments from a variety of sources.

Groundwater is polluted by solid waste disposed into water bodies such as mill tailings and metals, sanitary land fill method of waste disposal, where waste is buried in the zone of aeration and is subject to reaction with percolating rainwater infiltrating the ground surface. Leachate rich in a wide variety of ions is carried to the water table and is able to follow the flow paths of ground water. Others include oil seepage and trace elements from ores, mine spoils and mill tailings.



Fig. 5 An Abandoned Mine Pond Contaminated With Iron Oxide In Sabongida Kanar, On The Jos Plateau.



Fig. 6 Women Sourcing for income by Packing Sand for Sale from a Highly Polluted Tributary of Delimi River.

THE LITHOSPHERE

The lithosphere, made up of the crust and part of mantle; a shell of brittle rocks, has the capability of moving bodily over the asthenosphere and is broken into large fragments called lithospheric plates. Whereas the asthenosphere is the soft layer beneath the lithosphere and is semi plastic, the mesosphere is the zone of stronger rock beneath the asthenosphere. The continents move along with the lithosphere which forms the stable platform for the biosphere.

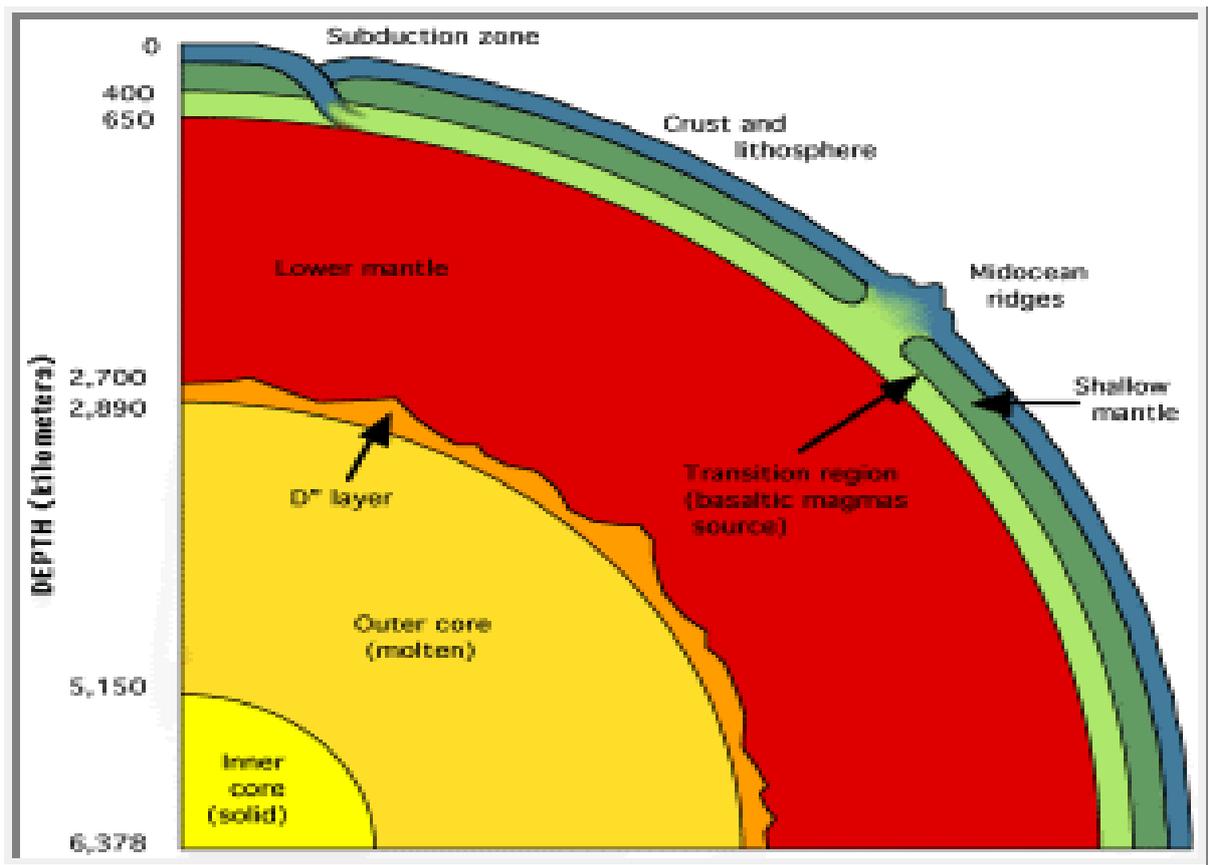


Fig. 7 The Internal Structure Of The Earth.

Earthquakes and volcanic eruption show that, although the earth feels solid and immovable beneath our feet, it is not at rest. The crust has always been capable of slow movements. Earthquakes may displace a part of the crust by a meter or so in a few minutes and repeated displacements over a period may result in the shifting of parts of the crust for lateral distances of hundreds of kilometers. About five hundred thousand earthquakes occur in the world every year, among them 100,000 of these can be felt and on the average, only 18 are strong earthquakes and those causing serious damage are three to five on the average, every year in the world. In 1556, in central china, a region where most people lived in caves carved from soft rock, a deadly earthquake occurred, causing the collapse of the caves, killing 830,000 people. The bible says:

“And you will hear of wars and rumors of wars. See that you are not troubled; for all these things must come to pass but the end is not yet. For nation will rise against nation, and kingdom against kingdom. And there will be famines and pestilences, and earthquakes in various places” (Mathew24⁶⁻⁷).

Earthquakes could be tectonic, caused by crustal motion, volcanic, due to the eruption of volcanoes or depressive, which accompanies the collapse of the roofs of caverns.

THE BIOSPHERE otherwise known as the life layer being the sum total of all organic life living on or in the surface of the earth draws its substance from the inorganic environment. The initial development of living matter was dependent on the pre - existence of organic molecules such as amino acids. However, the moment cells – the smallest unit of life was established, photosynthesis became possible. Photosynthesis enabled the organisms to utilize carbon dioxide with the help of solar radiation, in the synthesis of more complex compounds. Photosynthesis was also responsible for the gradual release of oxygen into the atmosphere. Having established photosynthesis, a vastly greater supply of energy was available for metabolic activities, by organisms.

The combined evidence of geochemistry, palaeontology and stratigraphy indicate that photosynthesis by green plants was probably established well ahead of the availability of atmospheric oxygen. By the end of the Precambrian, organic evolution had produced the metazoan and probably by that time the atmosphere and hydrosphere were not notably different geochemically, from the present state. The total mass of matter held in the biosphere is but a small fraction of that in the other three realms of the earth.

The earth has been the only habitat of living things for at least the last one billion (10^9) years.

The lands of the earth comprise the habitat of the human species and all other terrestrial forms of life. Soil is an accumulation of loose weathered material which covers much of the land surface of the earth and is essentially a mixture in varying proportions of organic matter called humus, and inorganic (mineral) materials derived by weathering from rocks. Soil is one of the greatest natural resources made available to man and is a component of the lithosphere.

EARTH PROCESSES AND FUNCTIONS

The earth is a dynamic body of mineral capable of undergoing several processes. These processes are internal and external, natural, and man-induced. From its origin and through the years, endogenic force from the interior of the earth moves the crust and under its action, folds and faults come to being, earthquake and volcanic eruption occur.

The face of the earth has been changing its configuration continuously through the geologic ages. Constructive earth processes produce the global framework of continents, ocean basins, furnish the soil and seawater with essential ions for metabolic activities, and produce intrusive and extrusive rocks which give rise to characteristic relief features or landforms.

Most volcanic rocks in time produce highly fertile soils such as can be seen in Bokkos and similar locations on the Plateau, where good yield of Irish potato is recorded. Volcanoes are also a natural resource in terms of recreation and tourism, examples of which are found in Hawaii Volcanoes National Park. Similar recreational facilities can be developed out of the Pidong crater lake region on the Jos Plateau. Igneous activity is the primary source of practically

all of the world's inorganic resources, and igneous rock itself, is a source of structural materials such as building stone and rock aggregates used in concrete foundation layers for highways and buildings.

Other crustal activities include weathering, erosion, and deposition of sediments. These activities result from movements and chemical activities of the air, water, ice *and* living organisms. They take place on the surface of the crust or very near it. The energy for these processes is supplied by the heat radiated from the sun and by the force of gravity. These exogenic/ surficial geological processes have been of direct and indirect practical importance to man.

Petroleum and coal are fossil fuels formed from these earth's processes and are among Nigerias most valuable resources. Petroleum, the mainstay of Nigeria's economy took millions of years to accumulate; it's exploitation is done unsustainably because man cares little about the provider of petroleum but is in a great haste about its exploitation. Resource control is about man's inhumanity to man.

Many elements such as tin (Sn), copper (Cu), zinc (Zn), lead (Pb), cobalt (Co), mercury (Hg), silver (Ag), platinum (Pt), antimony (Sb), germanium (Ge), and gold (Au), which are so essential to our needs and civilization are among some of the rarest elements in the earth's crust but are sourced for and made available through mineral exploration, mining and mineral processing.

The scripture puts it that:

“Surely there is a mine for silver, And a place where gold is refined. Iron is taken from the earth, And copper is smelted from ore. (Job28¹⁻²).

The naturally occurring material dug out from the ground, from which a mineral or minerals of economic value can be extracted, is called an ore. An ore is a mineral resource - a naturally available asset, produced by nature. Mineral Resources can be stock resources meaning that it is fixed in quantity and therefore non-renewable. Some resources are consumed by use e.g. fossil fuels and phosphate used in fertilizer, metals can be recovered and recycled. It is common sight to notice trailers on Nigeria's highways conveying scrap metals from mechanic workshops to factories where the metals are recycled and re-used in foundries and other related industries.

Rich mineral resources provide the material base for national economic development. Groundwater is also a mineral resource. Every page of human history is affected by mineral resources. According to Ogezi (2008), over 500 mineral deposits representing over 34 mineral types are known in Nigeria with more to be discovered with intensive mineral exploration. There is no state in Nigeria without a mineral resource but much of the solid mineral exploitation is done illegally, a practice that poses great danger to the health and wellbeing of residents of the mining locality. The death of about 400 children in Zamfara State in 2010, due to illegal lead- zinc mining, is a case in point.

Ores are mined for economic and technological purposes. Many of man's activities in industry and agriculture depend on the exploitation of economic mineral deposits. Mining activities create new pathways for the dispersion of trace elements, some of which are pollutants and man is affected in the process.

Having realized that human activity could cause dramatic and irreversible damage to the earth, 20 million Americans gathered to celebrate the earth-Day in 1970, (Zimmerman, 2002), an occasion, which was used to protest corporate and governmental abuse of the environment. In 1972, the United Nations summoned a conference on the human environment in Stockholm, Sweden. It was a United Nation's first major conference on international environmental issues and marked a turning point in the development of international environmental politics. The need for a common outlook for common principles to inspire and guide the peoples of the world in the preservation of and enhancement of the human environment was considered. At the end of the conference, seven proclamations were made and twenty six principles were stated and the principles were made binding to all nations including Nigeria. Nigeria as a country has like other nations assumed international obligations under Conventions and Treaties for the purpose of environmental protection. Thereafter earth summit has been held twice in Rio De Janeiro, 1992 and 2012 (Rio+20), and South Africa, 2002. The federal Ministry of Environment coordinates issues related to the environment, in Nigeria.

SECTION TWO

THE DEFIANCE: NIGERIA'S CASE SCENARIO.

It is generally agreed that without the committed participation of the private sector at the highest level of management, environmental problems cannot be effectively solved at the national, regional and indeed global levels. It is also noted, regrettably, that a combination of some limiting factors, have singled out the African continent as one in which the global private sector has least confidence. This is possibly because the African private sector is under the control of the global private sector. Nigeria is part of the African continent and the global community has participated very actively in creating hazardous environment through mining activities in the country.



Fig. 8 Abandoned Mined – Out Barren Land in Sabongida Kanar.



FIG. 9 Mechanised Mining in Jos, Using Dragline.

Mining operations are carried out by heavy earthmoving equipments which include draglines, scrapers, dump trucks and dozers. These are used to remove the overburden while the wash is extracted through gravel pumps to Sluice Boxes or by the use of jigs. Most of the dumps littering minefields are from dragline operations (Fig 9).

The disturbances associated with mining can be categorized as holes/excavation, ponds and dams, dumps and tailings, gullies, pits, and radioactive waste

Holes are excavations from which minerals have been extracted, are abandoned and left open and dry. Ponds/dams are excavations that are filled with water or dams where water is impounded along natural streams.



FIG. 10 An Abandoned Mine Pond In Jos.

Dumps are mounds of over-burden, which was removed in order to reach the mineral bearing layer of the soil. When mineral-bearing soil is processed and mineral is removed from it, the rest of the waste mineral is called tailings. These could further be classified into:

- i. Primary tailings – which are as a result of initial field concentration and
- ii. Secondary tailings – which are obtained in tin sheds/dressing Mills and consist of minerals such as Ilmenite, zircon, monazite and others.



FIG. 11 A Heap of Radioactive Mill Tailings In Jos

Gullies are small natural streams whose natural course had been disturbed by mining operations giving rise to gully erosion. Loto operations also leave behind pits and dumps which leave behind vast areas of devastated land.

Some of the minerals listed under secondary tailings are radioactive. A lot of these mineral tailings have been removed and dumped elsewhere around private mills and in some mine ponds. A 3D model of Beta radiation dose rate profile for Jos Plateau and environs (Adiuku-Brown and Ogezi, 2001) is shown in figure 12.

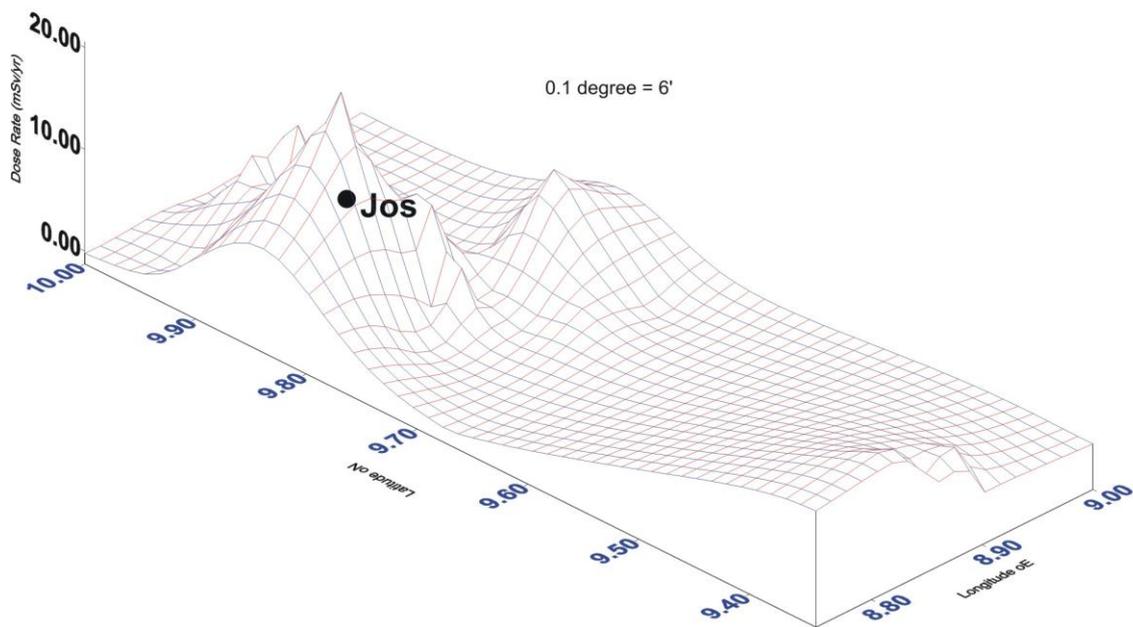


FIG 12 A 3D model of beta radiation dose rate profile for Jos and its environ
Scale 1cm = 10 km

Ninety-one of all known elements occur naturally in the crust. All surface rocks are subject to weathering and in time become soils from which plants can extract minerals that are passed to herbivores. Similarly gases are released into the atmosphere by volcanism, dissolved by rainfall and are absorbed by plants and animals through the consumption of water.



Fig.13 One of The Pathways Through Which Pollutants Get To Man: Irrigation Farming

Studies by Adiuku- Brown and Ogezi (2003 and 1985), revealed heavy metal pollution of ponds and soils on the Jos Plateau and Zurak as a result of mining. Adiuku- Brown et al (2006 and 2004) also showed high concentration of toxic trace elements in soils in the Ririwai mining area.

In the course of mineral processing, the ore mined is upgraded into a usable product by physical removal of the gangue material. The main operations involved in mineral processing are crushing, separation, concentration, smelting and refining. In the course of these activities, different elements are concentrated at different parts of the geo-cycle.

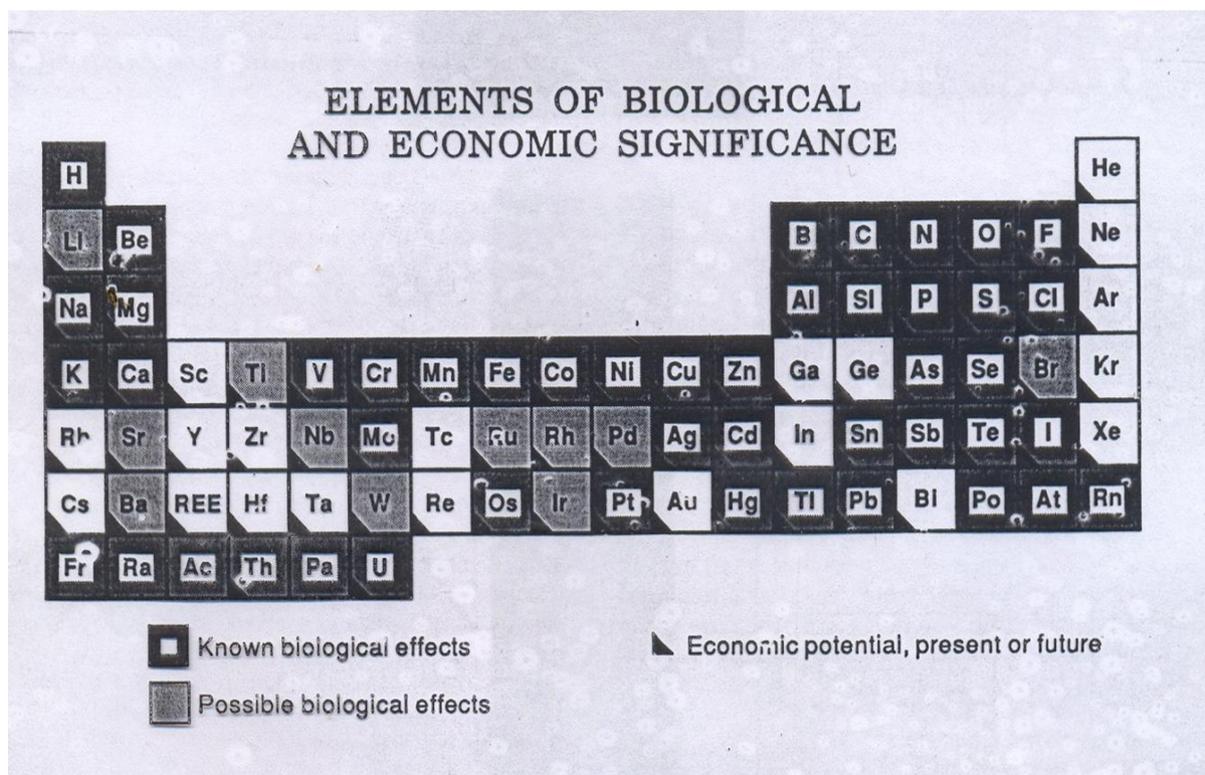


Fig. 14 The Periodic Classification of Elements with Biological and Economic Impact.

Some environmental pollutants are heavy metals/ trace elements (metals with a density greater than 5g/cm^3). Most heavy metals bond strongly to sulfur and the resonance in this bond gives it an unusual strength and stability. Cysteine, a sulfur containing amino-acid, for example, provides bonding sites for heavy metals in protein molecules, such as enzymes, denaturing the enzymes and inhibiting its activities. Other trace elements are radioactive. Uranium mineralization, mining, and processing, expose man to ionizing radiation which produces genetic effects and cancer. Cassiterite mined in Jos is associated with monazite and zircon as accessory minerals. The processing of cassiterite has led to enhanced radioactivity around heaps of mill tailings in Jos (Adiuku-Brown & Ogezi, 2000). Till date no attention is paid to the health effects of

such exposures. Appropriate attention could prevent possible future health disaster. The analysis of soil samples in Jos and environment (Adiuku-Brown et al, 2011) revealed high concentration of uranium and thorium (Fig. 15).

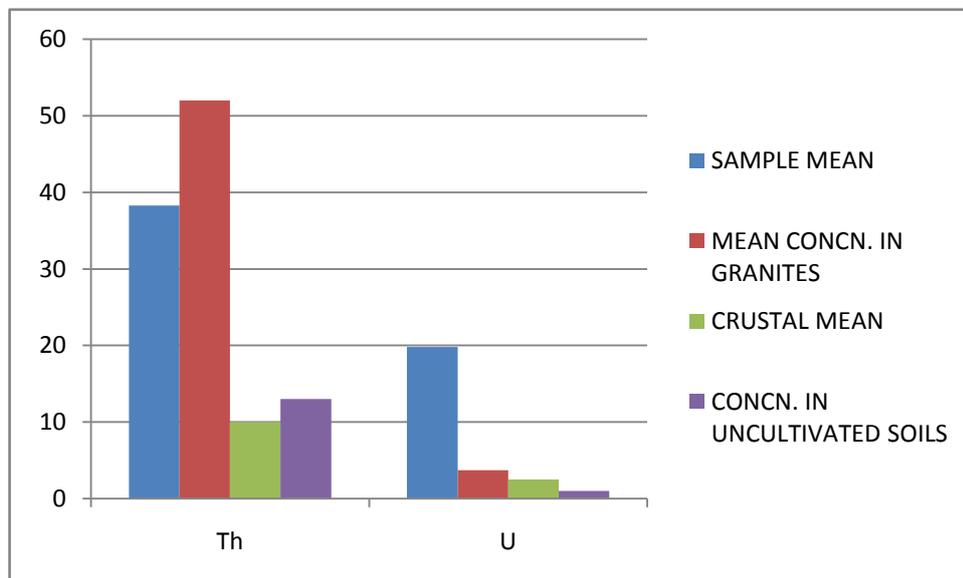


FIG. 15 High Uranium and Thorium Concentration in Soils in Jos and Environs

Cadmium and Lead in high concentrations have been detected in the abandoned mine ponds in Zurak; a source of water for domestic and agricultural purposes (Adiuku-Brown & Ogezi, 1991). Associated with mining and mineral processing are diseases such as pneumoconiosis, common in coal mining districts, asbestosis, associated with the mining and manufacturing of asbestos, and silicosis, caused by dust from quarries, cement companies, road construction and others. (Strahler and Strahler, 1973).

THE GEOLOGY OF NIGERIA AND ASSOCIATED MINERAL RESOURCES

The surface area of Nigeria is about 923,768 square kilometers and is covered in nearly equal proportions by crystalline rocks and Sedimentary Series (Ogezi, 2002). The crystalline rocks are further divided into three main groups namely:

The Basement Complex, The Younger Granites and Tertiary - Recent Volcanic rocks. Nigeria lies within the mobile belt that separates the West African and Congo Cratons.

The Basement Complex outcrops are distributed in three areas viz: A triangular area in South-western Nigeria where the rocks continue westwards into the neighbouring Benin Republic, a roughly circular area in North-central Nigeria and a rectangular area broken up into three zones by sedimentary rocks on the eastern border of Nigeria with Cameroon Republic. It is made up of a polycyclic migmatite – gneiss – quartzite complex, schist belts composed of metasedimentary and meta volcanic rocks, charnokitic gabbroic and dioritic rocks, as well as Older granites.

Three petrological units characterize the migmatite-gneiss complex. A grey foliated biotite acid/or biotite hornblende quartz feldspathic gneiss of tonalitic to granodioritic composition which is now known as the grey gneiss or early gneiss (Rahaman 1981). Mafic to ultramafic component, where it is present, often outcrops as discontinuous boudinaged lenses or concordant sheet of amphibolites with minor amount of biotite-rich ultramafite. Felsic component is a varied group of rocks consisting essentially of pegmatite, aplite, quartz-oligoclase veins, fine-grained granite gneiss, porphyritic granites etc.

The three components may or may not be present together on a single outcrop. Different types of migmatite gneisses e.g. banded gneisses, agmatites, nebulites etc result from the varying different relationship between these components.

The Schist belts occupy generally N-S trending synformal troughs infolded into the migmatite-gneiss complex and which are best developed in the Western part of the country. Seventeen main belts have so far been identified,

according to Turner, 1983. The Schist Belts define the structural grain of the Basement. They are largely sediment – dominated and the most important lithologies are pelites, semipelites and quartzite. In some belts chemical sediments are now present as marbles and banded iron formations (BIF). Mafic to Ultramafic rocks are present as amphibolites and ultramafities. Minor felsic to intermediate meta -volcanic rocks and greywackes have also been described. The Schist belts are the best-studied group of rocks in Nigeria mineralized.

The Older Granites are the most obvious manifestation of the Pan-African orogeny and constitute about 40-50% of the Basement Complex outcrop. They vary in composition from tonalite through granodiorites to granite and syenite. Granodioritic composition is the most common. Texturally they vary from strongly foliated gneiss varieties to undeformed rocks. Rahaman (1988) described the following petrographic types: migmatitic granite gneiss, early pegmatites, aplites and vein quartz, undeformed pegmatities to mica granites and quartz vein.

Pegmatites associated with the Older Granites show an appreciable degree of mineralisation. Jacobson and Webb (1946) discussed the occurrence and distribution of mineralized pegmatities in Central Nigeria but these rocks are now found in all parts of the country, intruding the basement complex. Recent work (Garba, 2002) indicates that pegmatites located parallel to the basement trend may be important as loci of gold, tantalite and gemstone mineralization; otherwise the Older Granites are not mineralized; although the thermal effects are believed to play a role in the remobilisation of mineralizing fluids.

Falconer (1911) introduced the term 'Younger Granites to distinguish these high – level anorogenic volcanic and hypabyssal rocks centred around Jos

Plateau from the plutonic basement granites. They are characterized by arcuate to circular intrusions and represent one of the classical areas of occurrences of ring-complexes in the world. For this reason and for the cassiterite, columbite, wolframite etc mineralization, these rocks have been the best studied rocks in Nigeria. The Nigerian occurrences form the southern extension of similar ring complexes in Air, Niger Republic. The dominant rock types are granites and rhyolites, which underlie over 90% of the area. Intermediate and mafic rocks occur in many complexes but occupy less than 1% of the area.

The most extensive outcrop of Tertiary – Recent activity are on the Biu and Longuda Plateaux of North eastern Nigeria and of Jos Plateau. Scattered occurrences exist within the Benue Trough. The dominant rock type is basalt with alkaline affinities (Grant et al, 1972). The more recent activity is probably related to the event along the Cameroon volcanic zone.

The sedimentary rocks are distributed over eleven sedimentary basins: The lower Benue basin, Gongola basin, the Middle Benue Basin, the Upper Benue, The Yola Basin, The Anambra Basin, The Bida Basin, The Sokoto Basin and The Niger Delta Basin. The Sokoto and Chad Basins are part of the Illumedden and Taodeni Basins respectively, which are outside Nigeria with histories dating back to the Palaeozoic. Most of the remaining sedimentary basins appear to have been initiated in the Cretaceous and are related to the Gulf of Guinea. Tectonically they are classified into two broad groups namely:

- a) Marginal Sag Basins: The Niger Delta and Benin Basins belong to this group

- b) Intra Continental Basins: They show complete cycle development, characterized by marine facies and continental sediment. Some basins show retreated cycles.

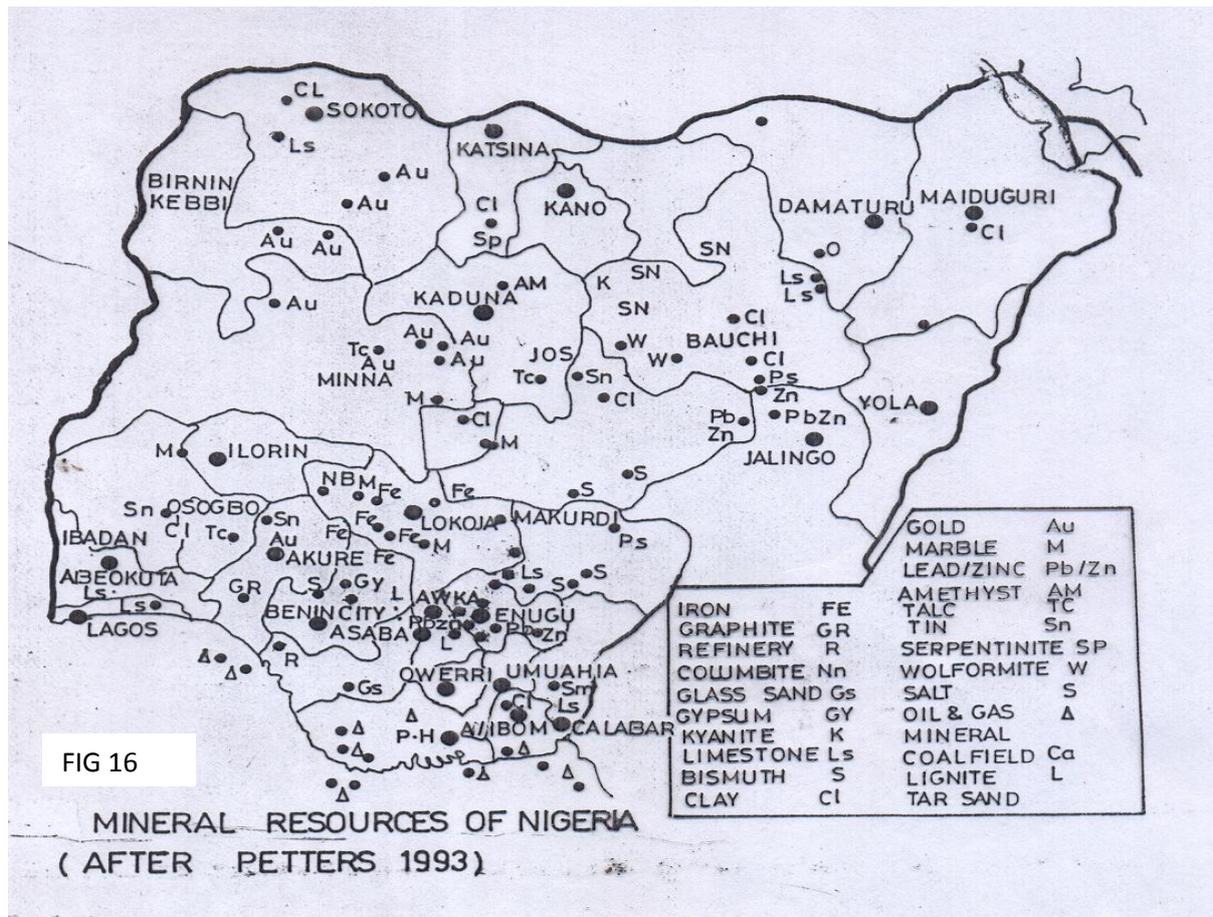
Within the sedimentary basins are found a large variety of industrial minerals such as limestone, clays, gypsum, barite, salt and energy raw materials like coal, oil petroleum and bitumen. Sediment-hosted non-ferrous base metals such as lead and zinc also occur in veins.

As mentioned earlier, solid mineral commodities occurring in about 450 locations nationwide have been identified and they are at various stages of exploration and exploitation. These minerals are distributed in almost all the states of the federation. The mineral commodities can be divided into 6 major groups namely: metallic minerals, precious minerals, gemstone, specialty metals, mineral fuels and industrial minerals (Ogezi, 2008).

- (a) Metallic Minerals: This group includes minerals such as
 - i) Cassiterite (tin ore)
 - ii) Lead/Zinc Ores, currently being mined in Zurak.
 - iii) Iron Ores such as that mined in Itape
 - iv) Bauxite (aluminium),
 - v) Nickel,
 - vi) Chromium.
- (b) Precious Minerals: Gold and Silver
- (c) Gemstones: Aquamarine, Emerald, Ruby, Amethyst, beryl, Sapphire, Tourmaline, Garnet and Zircon.
- (d) Specialty Metals: Tantalite, Columbite, Lithium, beryllium

- (e) Mineral Fuels: Coal, Lignite, Bitumen (tar sands, Uranium, Thorium
- (f) Industrial Minerals: This group can be further subdivided into
 - i) Chemical subgroup, which includes salt, sodium carbonate, phosphate, nitrates, sulphur and trona.
 - ii) Metallurgical and refractory subgroup: metallic ores, fluorspar graphite, marble, limestone, dolomite, refractory clays, kyanite, and others.
 - iii) Abrasives subgroup: corundum, quartz sand, diatomite and monazite
 - iv) Other industrial and manufacturing subgroup include asbestos, mica, talc, monazite, barites and gypsum.
 - v) Dimension stone.

In agreement with Ogezi, 2008, there is the need for mineral exploration to be intensified, reserves ascertained, mining, mineral processing and smelting carried out using conventional and sustainable techniques. Much of Nigeria's mineral resources are carted away illegally following illegal and artisanal mining.



In the Niger Delta region, petroleum exploration and exploitation is carried out in total disregard of the basic principles of sustainable environmental management. The once-fertile agricultural lands have been degraded by heavy hydrocarbon pollution of surface and subsurface waters, leading to the destruction of the fishes and other economic marine organisms. The natives are dispossessed of their lands and are often forcibly displaced and/or ejected from their ancestral lands. They experience total impoverishment and marginalization. These situations have turned the once easy to exploit, docile and friendly people of the Niger –Delta region into a restive group, fighting fiercely for survival and the preservation of their fundamental and basic rights. The amnesty program introduced by government in recent times needs concerted efforts by all Nigerians, to be effective.



Figure 17 A Typical Niger Delta Lifestyle; The couple is Sourcing for Fuel wood for domestic energy in Ibeno, Akwa Ibom State.

In a land flowing with milk and honey (the black gold/petroleum), kerosene is costly and scarce. Deforestation accompanies kerosene scarcity, and the resultant impact is desertification. This is an aberration of God's original concept.

As for the earth, from it comes bread, but underneath it is turned up as by fire; its stones are the source of sapphires, And it contains gold dust (Job 28⁵⁻⁶).

If kerosene were sold at fifty naira per litre in Nigeria, domestic gas made available at affordable price, relevant cooking tools made available, affordable, and acceptable, tree felling would have reduced and desert encroachment minimized.



Figure 18 A Truck Loaded With Charcoal, Heading for a Market In North Central Nigeria.

In Nigeria, associated gas sales is still very limited as about 68% of the gas is flared. Apart from being a huge loss to the nation, the flaring of such a high volume of gas represents an irreplaceable national asset that should be conserved for future socio-economic growth. Besides, gas flaring is associated with climate change and related global warming, deforestation, desertification, acid rain as well as flooding, with the attendant impacts on health, agriculture and other physical infrastructure, to follow. This is not what God intended it to be. The bible says:

“While the earth remains, Seedtime and harvest, cold and heat, Winter and summer, And day and night shall not cease” (Genesis8²²).



Fig. 19 Gas Flaring At Ibeno, Akwa Ibom State, Nigeria.



Figure 20 Desert Encroachments in Parts of North Central Nigeria

He did not create man to lord it over another man, destroy the environment, and render another man permanently impoverished. A man is to remember that every other man was created a small God and has a nature of the all mighty God in him. Man is to appeal to that nature of God in a fellow man, however impoverished; otherwise we will continue to have the chaos that is prevalent in the world presently.

SECTION THREE

THE CATASTROPHE

It is not just disastrous, but equally catastrophic, for man to disbelieve the Bible.

1. "Beloved, I now write to you this second epistle (in both of which I stir up your pure minds by way of reminder)

2. That you may be mindful of the words which were spoken before by the holy prophets, and of the commandment of us the apostles of the Lord and savior

3. Knowing this first: that scoffers will come in the last days, walking according to their own lusts;

4. 'and saying, where is the promise of his coming,? For since the fathers fell asleep, all things continue as they were from the beginning of creation'

5. for this they willingly forget; that by the word of God the heavens were of old and the earth standing out of water and in the water.

6. By which the world that then existed perished, being flooded with water

7. But the heavens and the earth which are now preserved by the same word are reserved for fire until the Day of Judgment and perdition of ungodly men.

8. But, beloved do not forget this one thing, that with the Lord, one day is as a thousand years and a thousand years as one day.

9. The Lord is not slack concerning His promise, as some count slackness, but is longsuffering towards us, not willing that any should perish but that all should come to repentance.

10. But the day of the Lord will come as a thief in the night, in which the heavens will pass away with a great noise, and the elements will melt with fervent heat; both the earth and the works that are in it will be burned up.

11. Therefore since all these things will be dissolved, what manner of persons ought you to be in holy conduct and godliness.

12. Looking for and hasting the coming of the day of God, because of which the heavens will be dissolved, being on fire and the elements will melt with fervent heat?

13. Nevertheless we, according to his promise look for new heavens and a new earth in which righteousness dwells.

14. Therefore, beloved, looking forward to these things, be diligent to be found by him in peace, without spots and blameless;

15. and consider that the longsuffering our Lord is salvation -as also our beloved brother Paul according to the wisdom given to him, has written to you.”(2nd Peter 3¹⁻¹⁵)

There has been large scale flooding in various countries of the world including Japan, United States of America, New-Zealand, Haiti and others, between 2011 till date. The 2012 floods in Nigeria began in early July and has killed 137 people and displaced 120,000 as of ninth of September 2012. In spite of the warnings and sensitization by the mass media concerning the widespread flooding that was to ravage Nigeria, several Nigerians narrowly escaped the direct impact of the flood.

It is so easy to blame the people of Noah’s day each time the Holy Scripture is read but so also are all the people building on flood plains, along drainage channels or developing housing estates on land reclaimed from the ocean. Man unfortunately disbelieves a lot of life giving, poverty alleviating and pains relieving instructions. Studies in geology reveal that there has been several episodes of flooding on the earth, one of which took place in the days of Noah.

“Now the flood was on the earth forty days. The waters increased and lifted up the ark, and it rose high above the earth. The waters prevailed and greatly increased on the earth, and the ark moved about on the surface of the waters. And the waters prevailed exceedingly on the earth, and all the high hills under the whole heaven were covered. The waters prevailed fifteen cubits upwards, and the mountains were covered. And all flesh died that

moved on the earth: birds, and cattle, and beasts and every creeping thing that creeps on the earth, and every man” (Genesis 7¹⁷⁻²¹).

Geology reveals that limestone, one of the widely distributed mineral resources worldwide, are known to be mostly formed in ancient seas (Qicheng and Jingyuan). One wonders if they were formed resulting from the flood in Noah’s days or could there have been a flood prior to that of Noah’s time? The scripture specifically talks about the earth standing out of water and in the water and the world perishing through flooding.

According to geology, seas give rise to mountains and lands of the past are also changed into seas. It is recorded that about 30 million years ago, a strong crustal movement took place which caused the rapid rising of the Himalayas. The fact that “seas changed into fields” was mentioned in ancient Chinese classics over a thousand years ago (Qicheng and Jingyuan, 1985). Fossil records show that the wide area where the Himalayas stands today was a turbulent sea pertaining to the ancient Mediterranean sea about 30m.y. ago.

There are disasters that man can avert but natural disasters remain as predicted in the Word of God. It is on record (This Day newspaper, 31st October 2012), that the disaster experienced in the US on account of the Super Storm, Sandy surpassed previous experiences. According to New York governor, they have not seen something like that in a generation. The cost of clearing is put at about 30- 40 billion dollars. New York subway was to remain shut for a while. More than 40 people died, and about 8million people had to go without electricity for a couple of days. Concerning floods, there is the promise of God in the scriptures that the entire human race will no longer be destroyed by flood. Just as the case is presently, some will die on account of flooding but certainly not the entire human race, at a go.

“Thus I establish my covenant with you: Never again shall all flesh be cut off by the waters of the flood; never again shall there be a flood to destroy the earth” (Genesis9¹¹).

As stated in the scriptures in 2nd Peter 3¹⁰⁻¹¹, the earth is reserved for fire and the elements will melt with fervent heat; the earth and the works in it will be burned up and dissolved, being on fire.

Geologic observations make us understand that strong earthquake causes great loss of lives and property and if accompanied by tsunamis, the destruction is increased due to flooding. Volcanic eruption also begins with sounds like thunder under the ground and the earth shakes. The hot gases, ashes and stones, are launched high into the air from the crater, the volcano is covered with a great volume of fiery clouds ranging to several kilometers; red hot lava pours out from the crater and spills downhill. Mixed with gases and water vapor, ashes fall on the ground, forming hot debris flow which is powerful enough to destroy and bury buildings on the ground. In 79 A.D. debris from the explosion of Vesuvius volcano of Italy buried two busy cities – Pompeii and Herculaneum. This seems like the fire the bible is talking about. We better believe it so we can prepare for the rapture.

Today in the world, dormant faults are suddenly becoming active. In 2011, 5.8 magnitude earthquake hit Washington D.C. and the impact was felt in New York. Shaking was felt at the White House, the north central parts of the Pentagon, White House and Capitol were evacuated. 4.2 magnitude shock was felt in Virginia. Earthquake of such magnitude has not happened in Washington D.C. in a century. The last time earthquake took place in New York was in 1884. God in his wisdom has allowed the man he created a great deal of time to believe the bible. Table 1 shows the magnitude and number of earthquakes in

the world for a period of ten years, table 2 shows the death toll, while table 3 indicates volcanic eruption and the eruption start date, in various countries.

“And you will hear of wars and rumors of wars. See that you are not troubled; for all these things must come to pass but the end is not yet. For nation will rise against nation, and kingdom against kingdom. And there will be famines and pestilences, and earthquakes in various places” (Mathew 24⁶⁻⁷).

Wars in Africa are man-made disasters very closely related to mineralization and mining. Geologists know and appreciate better, the natural resources of any people and the sentimental, economic and political attachment of the people to the resources. They also know the adverse effects of the exploitation of such resources on the people. Government can prevent ethnic, tribal, regional and international clashes that lead to the loss of revenue and lives by seeking the advice of geologist in matters of boundary adjustment, resource exploration, exploitation and revenue allocation.

Table 1 The Magnitude and Number of Earthquakes for a Period of Twelve years.

Magnitude ranging between	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
8-9.9	1	1	0	1	2	1	2	4	0	1	1	1
7-7.9	14	15	13	14	14	10	9	14	12	16	21	19
6-6.9	146	121	127	140	141	140	142	178	168	144	151	182
5-5.9	1344	1224	1201	1203	1515	1693	1712	2074	1768	1896	1963	2200
Total	1505	1361	1341	1358	1672	1844	1865	2270	1948	2057	2136	2401

From Wikipedia, the Free Encyclopedia

Table 2. The Date, Death toll and Location of the Earthquakes.

Rank	Magnitude	Death toll	Location	Date
1	9.0	15,828	Tohoku, Japan	March 11
2	7.9	0	Honshu, Japan	March 11
3	7.7	0	Honshu, Japan	March 11
4	7.6	0	Kermadec Islands, New Zealand	July 6
5	7.4	0	Kermadec Islands, New Zealand	October 21
6	7.3	0	Honshu, Japan	March 6
7	7.3	0	Ndoi island, Fiji	September 15
8	7.2	2	Pakistan	January 18
9	7.2	0	Aleutian Islands, Alaska, United States	June 23
10	7.2	604	Van, Turkey	October 23
11	7.1	0	Araucania Region, Chile	January 2
12	7.1	4	Honshu, Japan	April 7
13	7.1	0	Port ville, Vanuatu	August 20
14	7.1	0	Lae, Papua new guinea	December 14
15	7.0	0	Santiago del Estro, Argentina	January 1
16	7.0	0	Loyalty islands	January 13
17	7.0	0	Honshu, Japan	July 10
18	7.0	0	Port ville, Vanuatu	August 20
19	7.0	0	Isangel, Vanuatu	September 3

From Wikipedia, the Free Encyclopedia

Table 3 Volcanic Eruption in Various Countries and Eruption start Date

Volcano	Country	Eruption start date
Grimsvotn	Iceland	2011
Katla	Iceland	2011
Puyehue	Chile	2011
Planchon-peteroa	Chile	2011
Turrialba	Costa Rica	2011
Telica	Nicaragua	2011
Cleveland	United States	2011
Klichevskoi	Russia	2011
Bezymianny	Russia	2011
Aso	Japan	2011
Kirishima	Japan	2011
Karangetang-[api siau]	Indonesia	2011
Lokon-empung	Indonesia	2011
Soputan	Indonesia	2011
Merapi	Indonesia	2011
Marapi	Indonesia	2011
Aoba	Vanuatu	2011
Rabaul	Papua New Guinea	2011
Tofua	Tonga	2011
Nabro	Eritrea	2011

San Cristobal	Nicaragua	2010 Dec 15
Tengger caldera	Indonesia	2011
Tungurahua	Ecuador	2010 Nov 26
Kizimen	Russia	2010 Nov 22
Bulusan	Philippines	2010 Nov 11
Krakatau	Indonesia	2010 Nov 11
Barren island	Philippines	2010 Nov 6
Etna	Italy	2010 Aug 25
Manama	Papua New Guinea	2010 Aug 10
Ulawun	Papua New Guinea	2010 May 26
Concepcion	Nicaragua	2009 Dec 11
Villarrica	Chile	2009 Nov 22
Poas	Costa Rica	2009 Nov
Huila, Nevado Dell	Colombia	2008 Oct 26
Tinakula	Solomon Island	2008 Sep 19
Reventador	Ecuador	2008 Jul 27
Ambry	Vanuatu	2008 May 23
Ibu	Indonesia	2008 Apr 5
Soufriere hills	United kingdom	2005 Apr 15
Popocatepetl	Mexico	2005 Jan 9
Suwanose-Jima	Japan	2004 Oct 23
Nyiragongo	DR Congo	2002 May 17
Fuego	Guatemala	2002 Jan 4

Karymsky	Russia	2001 Nov 15
Bagana	Papua new Guinea	2000 Sep 16
Shivelush	Russia	1999 Aug 15
Colima	Mexico	1997 Nov 22
Erebus	East Antarctica	1972 Dec
Seremu	Indonesia	1967 Aug 31
Erta ale	Ethiopia	1967
Sakura-jima	Japan	1955 Oct 13
Sangay	Ecuador	1934 Aug 8
Dukono	Indonesia	1933 Aug 13
Santa Maria	Guatemala	1922 June 22
Yasur	Vanuatu	1977

From Wikipedia, the Free Encyclopedia

In spite of the earthquake and volcanic eruption records above, the end of the world has only come upon those that died while the survivors may have described their experiences as tribulation.

“For then there will be great tribulation, such as has not been since the beginning of the world until this time, no, nor ever shall be”(Mathew24²¹).

Tribulation is already widespread worldwide and can assume any dimension and style. It ranges from death in abandoned mine ponds, through road mishaps resulting from the ill maintained roads in places like Nigeria, to kidnappings and armed robbery, ritual murder and bombings.

“Whoever sheds man’s blood, By man his blood shall be shed; For in the image of God He made man (Genesis 9⁶).

Divorce, rape, petrol scarcity, high cost of kerosene and a whole lot of man’s inhumanity to man are part and parcel of end -time tribulations. This is not the original plan of God because the bible says;

“As for you be fruitful and multiply; Bring forth abundantly in the earth And multiply in it” (Genesis 9⁷).

Some researches on earthquakes are being carried out by the Nigerian Geological Survey Agency (NGSA), in the Ministry of Mines and Steel Development (MMSD), and the Federal Ministry of Science and Technology. Professor U. A. Lar of the Department of Geology and Mining also led a multi disciplinary research team in 2007 and completed an Unpublished Report on the geological mapping of volcanoes in Nigeria. Under his supervision related researches are also ongoing by Ph.D. students in the Department. These researches should be encouraged and funds released. They help confirm the scriptures and offer some assistance in natural disaster monitoring and prediction. Disaster monitoring and public enlightenment reduce the impact of natural disasters. As a matter of fact there are volcanoes in Nigeria as was mentioned under the section on the Geology of Nigeria. If the volcanoes decide to become active, research can reveal it, but no man can stop it.

Nigeria lies in a relatively “stable” mobile belt sandwiched between the West African and Congo cratons on the African continent. It has not experienced a major earthquake or volcanic eruption in recent times but has however experienced several earth tremors in locations covering all geopolitical zones. (Ugodulunwa and Ogezi, 1986; Elueze, 2003; and Ologun & Onwusulu, 2005). Ajakaiye, in 1989 and Ogezi, in 2008, have warned that Nigeria should not be

complacent concerning the possible occurrence of earthquakes. These suggestions are worthy of note given the experience of an earthquake in the United States of America (USA), in 2011; as mentioned earlier, the fault had been inactive since a century.

CONCLUSION AND RECOMMENDATIONS

Technological advancement notwithstanding, natural disaster can be monitored and predicted and the impact controlled but it cannot be stopped. Pollutants and other man made hazards have a link with the geology of any environment. Although the geologist has a primary duty of searching for the raw materials that the world demands, they also store information that is very essential for environmental protection. The environmental geologist is particularly saddled with the responsibility of studying the relationship between man and his habitat. He should be consulted in all matters pertaining to environmental protection.

The engineering geologists and geophysicists are to be consulted in the design and construction of roads, houses and dams. His geologic information will help check poor construction practices and assist in the selection of sites for dams.

The bible says:

He dams up the streams from trickling; what is hidden he brings forth to light (Job 28¹¹).

Such a multidisciplinary approach in engineering practice will help curb incidences of the collapse of tunnels, road failures, the collapse of buildings and dams. The contributions of geologists serve as cost and life saving

measures in the long run, preventing losses that accompany horrible incidences such as the collapse of dams. Finally the scripture says:

“Assuredly I say to you, not one stone shall be left here upon another that shall not be thrown down” (Mathew 24^{2b}).

Also:

“Immediately after the tribulation of those days, and the moon will not give its light: the stars will fall from heaven, and the powers of heaven will be shaken. Then the sign of the son of man shall appear in heaven and then all the tribes of the earth will mourn, and they will see the son of man coming on the clouds of heaven with power and great glory” (Mathew 24²⁹⁻³⁰).

The bible admonishes:

“So you also, when you see all these things, Know that it is near, at the door” (Mathew24³³).

As predicted in the scriptures, the activities of the geologists are made manifest in the world. Through their activities mineral resources are made available for the benefit of man. In the same manner the second coming of Jesus will certainly be preceded by catastrophic geologic events as predicted in the scriptures.

“Therefore, beloved, looking forward to these things, be diligent to be found by him in peace, without spots and blameless; and consider that the longsuffering our Lord is salvation-as also our beloved brother Paul according to the wisdom given to him, has written to you.”(2nd Peter3¹⁴⁻¹⁵)

Geologists should be encouraged to continue their assignment of researching into endogenic and exogenic earth's activities that lead to natural disasters for the purpose of reducing the impact of such disasters on the human colony. Presently the level of education and awareness of the hazards caused by

geology related process are very low in Nigeria. It is therefore equally recommended that environmental education should be introduced at the Universal Basic Education level and in drawing up the curriculum geologists should be invited to make contributions. In the face of ignorance, there can hardly be any pre-disaster contingency planning to cope with all possible natural hazards.

ACKNOWLEDGEMENT

I would like to thank the Vice Chancellor of the University of Jos for granting me the opportunity to present myself to the University of Jos community and the public in general. I guess I am one of the lecturers whose name is known but hardly seen.

I also wish to register my appreciation to Prof A.E. Ogezi for being instrumental to my conversion from technologist to lecturer cadre and my registration for a higher degree in geology, which happened not to be in the main stream of my basic university education. When I joined the University of Jos it was a thing inconceivable for a biochemist to be grafted into geology. Things have now changed since there are such multidisciplinary aspects of geology as environmental and medical geology. I happened to have played a pioneering role trying to discuss the relevance of geology to the environment and medicine. In my perception, it was so clear that geology was as related to **Health as it is to Wealth**, but for the geologist, it was all about measuring strike and dip, studying metamorphic facies, geosynclines and anticlines or nothing. Secondly a First Bank loan he and Mr. Bulus Dareng assisted me to secure in 1986 has helped me to make innumerable contributions to the growth and development of education in Nigeria, and encourage youth development in my immediate community - the Rock Haven/ Utan community, Plateau State, Nigeria.

To the head of the Department, Prof U. A. Lar, I wish to say thank you for allowing God to use you from the period of my promotion to senior lecturer till date. It was not uncommon to see some geologist drop tears each time my promotion was announced. Whether tears of joy or sadness I still have not

been able to find out but of a truth, I once saw tear drops and a handkerchief brought out to wipe the tears, after announcing my promotion.

I sincerely acknowledge and appreciate the contributions of all my teachers. Teachers are wonderful and great people. My pastors and prayer partners have been equally very supportive and wonderful.

I wish to appreciate my husband for permitting me to come this far in my academic pursuit, **actually today is our 35th Wedding Anniversary.**

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MEERY CHRISTMAS IN ADVANCE AND GOD BLESS YOU ALL

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THE CITATION OF PROFESSOR MAYEN EKAETE ADIUKU-BROWN

PROFESSOR OF ENVIRONMENTAL GEOLOGY

Professor Mayen Ekaete Adiuku-Brown, was born on the 5th of May, 1952 in Uruk Ata Ikot Isemin, Utu Etim Ekpo Local Government area of Akwa Ibom State, Nigeria; to evangelist Douglas Okpongete and evangelist (Mrs.) Jane Douglas Okpongete.

She had her early education at Uruk and Ikono group school where she obtained her first School Leaving Certificate in 1963. After he primary school, she obtained admission into Awomama Education Project, Orlu (the Grammar School section), in 1965. As a result of interruption caused by the Nigerian civil war, she returned to the then Cross River State and repeated form three at the Holy Family College, Oku – Abak, in 1968 and completed her secondary school education in 1970, at the Nigerian Christian Secondary School, Ukpom- Abak.

Due to her diligence, she obtained her London G.C.E ‘A’ Level in 1973 after two years of intensive drilling at the College of Science and Technology, Port Harcourt, Rivers State, Nigeria. She obtained her B.Sc. Hons. in Biochemistry (1976), and M. Sc Analytical chemistry (1982), from Ahmadu Bello University, Zaria. Burning with the desire to develop herself further, she registered for Post Graduate Diploma in Education and graduated with a distinction in 1983 from the University of Jos.

She rounded up her formal education at the famous University of Jos in 2004 where she obtained, through rigorous study and research, Doctorate in Environmental Geology.

One would have thought Professor (Mrs.) Adiuku- Brown had been satisfied with her educational attainment. That was not the case. Rather she enrolled and pursued M.Sc. in Curriculum Planning and Development, from the University of Jos, which she has just completed. This is an evidence of her humility, objectivity and unassuming nature.

In addition to her academic qualifications, she has received numerous national and international awards such as “Woman of Merit Gold Award 2003 by People State & Resource (PSR) Magazine; The Woman of the Year, 2005 By American Biographical Institute (ABI); and a Certificate for Successfully Climbing Mount Sinai on the 17th January, 2001.

Professor Mayen Adiuku-Brown’s formal academic career has benefitted so many educational institutions. During her National Youth Service Corps (NYSC) year, she served as a teacher in Ujom grammar school, Asaba, in the old Bendel State now capital of the present Delta State, taught in Mbaise Girls’ High School between 1977 and 1980; did relieve duty at St Louis College in 1982, and taught in GSS Buji, in 1982. She later proceeded to the University of Jos as a Technologist 1 on 3rd February 1983, converted to Lecturer II on 1st October 1986, where she has served till date.

Through sheer hard work and doggedness, she rose through the rank and files of the University of Jos. With hard work, diligence and fervent prayers, she attained the epitome of her academic career in 2007 – **A PROFESSOR OF ENVIRONMENTAL GEOLOGY**. Throughout her service year at the University of

Jos, she has served in many capacities in the Faculty of Natural Sciences and outside the University of Jos.

Our distinguished lecturer is an active member of Professional and academic societies as the Science Association of Nigeria (SAN), Science Teachers Association of Nigeria, (STAN), Nigeria Mining & Geosciences Society (NMGS), The National Association of Women Academics (NAWACS), Nigerian Society for Environmental Health, (NSEH), League of Researchers in Nigeria, Global Alliance for Disaster Reduction (GADR). The Council of Nigerian Mining Engineers, and Geoscientists (COMEG). Reg. No. 000691.

She has supervised several students' Research Projects at both first and higher degree levels, some of which were award winning. The award winning projects supervised are

- 1 NMGS Mobil Award for the best B.Sc. Project in Geology in Nigerian Universities 1997. Ibeneme N. A. (1997) The Geology of Part of The Buji Complex.
2. NMGS Mobil Award For The best B.Sc. Project in Geology in Nigerian Universities 1999. Nghargbu K. (1999). The Geology of the Area West of Awe. Middle Benue Trough Nigeria.

Mr. Chairman sir, distinguished academic, ladies and gentlemen, our distinguished lecturer has attended several international and local conference such as the Global Geochemical Baselines Work in Eastern and Southern Africa in Dodoma, Tanzania, between July 27th and 29th in 2004, an International

Conference on Energy Environment and Disasters: Bridging the Gaps for Global Sustainable Development (INCEED, 2005), in Charlotte, North Carolina, USA July 24th – 30th, 2005, International Conference on Infrastructure, Development and the Environment, in Abuja, Nigeria, 2006; 23rd Colloquium of African Geology in South Africa, 2011, 4th International Conference of Medical Geology, Bari, Italy (Geo-Med 2011), 34th International Geological Congress in Brisbane, Queensland, Australia, and several local conferences.

She has carried out research in several areas as Kinetic Study of the Mechanism of Action of Alpha–Chymotrypsin, Studies on the Determination of Essential Minerals in Some Tropical Plant Materials, Chemistry Students' Attitude Towards Physics, Nigeria. The Effects of Cassiterite Mining and Associated By-Products on the Environment: A Study of Some Trace Elements in the Jos Plateau and Zurak Mining Districts, North-Central Nigeria. Students' Misconceptions in environmentally related topics in Junior secondary schools in Plateau State, Current research activities include Studies on the Environmental Geology of Jos and Environs as well as Environmental Education Curriculum Research and Development.

Ladies and gentlemen, Professor Mayen Ekaete Adiuku-Brown is axiomatically by every standard, a patriotic Nigerian, highly interested in community service and has made enviable achievements in that area. She is the President and founder of Youth Alive in Christ, a nongovernmental Organization (NGO) established since 2005; an initiative she believes will help rescue the Nigerian youth from hopelessness. With her family she hosted and facilitated the Planting of Emmanuel Anglican Church, Rock Haven, Jos in 1997. As an icon of Science and an educationist par excellence, she has established the Calvary Science Group of Schools(Nursery, Primary, and Secondary Schools), which are

competing favourably with the best schools in Nigeria; for the purpose of boosting science education in Nigeria.

Professor Adiuku-Brown is happily married to Sir Engineer Obioma Chukunyere Adiuku-Brown, one of the most sincerely loved husbands in the world, since 1977. The marriage is blessed with four blood children, Engineer Chinedu Adiuku-Brown(a network engineer), Dr Uzodimma Adiuku-Brown, Pharm. Nwamaka Anukam and Engineer Obioha Adiuku-Brown; a son-in-law, Canon Kingsley Anukam, three Daughters-in-law, Mrs. Florence Chizoba Adiuku-Brown, Dr. (Mrs.) Adamma Chikodili Adiuku-Brown and Mrs. Grace Hassana Adiuku-Brown. Professor (Mrs.) Adiuku-Brown is a grandmother of seven, namely Nmesoma, Uzochukukama, Tobechuku, Emmanuella, Adaeze, Louisa, and Chimdumebi. Her wards are too numerous to mention.

The Chairman and Vice Chancellor, distinguished academics, Ladies and gentlemen, it is indeed my privilege to invite Professor Mayen Ekaete Adiuku-Brown, a diligent, courageous and accomplished academic, a multi disciplinary researcher, a scientist of great repute, a lecturer par excellence, an educationist, a motivator and mentor, an administrator with great foresight, a role model to women folk, a great daughter of the Okpongete's, Chief Mkpouto Annang of Annang land, a Nigerian par excellence, and above all else, a Christian Woman in words and deeds, to deliver her lecture titled CONCEALED IN THE SCRIPTURES AND REVEALED IN GEOLOGY: THE PURPOSE OF GOD FOR MAN.



THE ADIUKU BROWNS AS AT 10TH NOVEMBER, 2012

IN GOD WE TRUST.