Journal of Education and Practice
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol.6, No.30, 2015


# Causes of Climate and Environmental Changes: The need for Environmental-Friendly Education Policy in Nigeria

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**Abstract**.

Man cannot naturally be detached from his environment. From time to time, changes in climate and environmental conditions occur as a result of natural and human factors. Obviously, the natural factors are almost beyond human control. But, the human factors are to a very large extent under human control. Thus, this paper tried to discover natural and human factors that cause climate and environmental changes which have negative effects on the existence of man on earth. Such human factors include, air, water and land pollutions, production of greenhouse gases, deforestation, desertification, emission of carbon dioxide, carbon monoxide and other harmful gases. Natural factors include, volcanic eruption, ocean variations, solar variations, Plate Tectonics, Thermohaline circulations, etc. Amazingly, the paper discovered that there is a complete negligence of climate and environmental education in many countries education system, including Nigeria. This is proven by the fact of the absence of climate and environmental education stipulations, in the National policy of education, 2004 edition. It is based on this that the paper advocated for the inclusion of climate and environmental education in Nigeria education policy. There were suggested policy statements made that will enhance climate and environmental education which will enlighten people about the dangers of causing harm to the environment. When this done, there will be a drastic reduction in the negative effects of climate and environmental changes.

**Keywords:** Climate, environmental changes, environmental-friendly education policy, Nigeria.

## Introduction

Human lives are directly linked to the climate. Therefore, there is no gainsaying that human activities are changing the climate. Climate change of course has great impact on the ecosystems. There has been a continuous rise in global temperature in the last 130 years, which has huge consequences on a wide-range of climate related factors. It is evident that carbon dioxide (CO2) and Methane are being dumped in the atmosphere at an alarming rate as a result of the advent of industrial revolution. There are oil spillage and gas flaring all over the environment. Fossil fuels burning and deforestation which produce greenhouse gases are on the increase. This phenomenon is called greenhouse effect. Greenhouse gases act like blanket around the earth, wrapping energy into the atmosphere. This, is the cause of the earth warming. As such our earth's average temperature has risen by 1.4"f over the past century, and is projected to raise another 2 to 11.5"f over the next hundred years. (www.epa.gov/climatechange/basics).

This rise in temperature of the planet can bring about ice caps melting, sea levels rising and other environmental challenges. The buildup of greenhouse gases can change Earth's climate and result in dangerous effects to human health, safety, welfare and to the ecosystems. There are distortions and pollutions in our water supplies, agriculture, weather, seasons, power, transportation system, and so on. However, it is important to state that, some changes in the climate are unavoidable; carbon dioxide can stay in the atmosphere for nearly a century. As such, the earth will continue warming, and the warmer it becomes, the greater the risk for more adverse changes to the climate and the Earth's system. Even though it is difficult to predict or forecast the impact of climate change, yet, what is certain is that the climate we are used to is no longer a reliable guide for what to expect in future.

In view of the adverse effects of certain human activities, that cause earth warming and climate change, it is important that we begin to make choices that will reduce greenhouse gas pollution, and the best way out of this is to get ourselves and the younger generations educated through our education systems and other avenues of public enlightenment. The most current National Policy on education in Nigeria which is the 2004 edition, does not have any provision for the teaching of climate and environmental education. Nigeria is not the only country of the world that has this deficiency in her educational system. Several other countries in Africa have not made provision for this form of education. The western world is not left out. It is in the light of this, that this paper is

billed to discuss the causes of climate and environmental changes and the need for environmental-friendly education policy in Nigeria through the following sub-headings.

1) The concepts of climate, environment, climate and environmental changes;
2) Causes of climate and environmental changes;
3) The need for education policy on climate and environmental education;
4) Problems of teaching climate and environmental education;
5) Suggested policy statements on climate and environmental education;
6) Summary/conclusion;
7) Recommendations.

**The concepts of climate, environment, climate and environmental changes**

Climate is the average weather condition of a place over a long period of time, usually about or even over 30 years. Climate is the average weather usually taken over a 30-years period for a particular region and time(http://www.classzone.com/books/earth_science). It is a large-scale, long-term shift in the planet's weather patterns or average weather condition(http://www.metoffice.gov.uk>Home>public>climate). To ascertain the climatic condition of a place, there is always a systematic observation, recording and processing of the climatic elements such as temperature, rainfall, atmosphere, pressure, humidity, wind, sunshine and clouds. Climate differs from weather in that, weather reflects short-term condition of the atmosphere while climate is the average daily weather for an extended period of time (ocean service .noaa.gov>Home>ocean facts). The climatic elements are normally observed and measured over a period of time by weather instruments. Based on the data collected, maps and charts are prepared. Through these charts and maps, one can easily observe certain changes that may have occurred over a period of time.

Environment in the view of Ajayi(1998) is the total surrounding of an organism in a given area including the physical and non-physical surroundings. Kwan, Lam and Ofoefuna (2011) see environments as the conditions of an organism's surroundings. Onuoha (2012) defined an environment as a set of conditions and forces which surround and have direct influence on the organization/organism. The Oxford Advanced Learners Dictionary defines environment as the conditions that affect the behaviour of somebody or something and/or the physical conditions that somebody or something exists in…the natural world in which animals and plants live. It therefore implies that environment is made up of all the physical visible and microscopic matters that affect the existence of organisms positively or negatively and an organism does not exist in isolation. It must co-exist with other matters.

There are five divisions of the sphere of an environment according to Ajayi(1988). These are:

1) The atmosphere; made up of the troposphere and stratosphere. The atmosphere consists of 78% nitrogen, 21% oxygen and 0.003% carbon dioxide and water vapour as the most valuable component. This sphere is seen as very important because it aids biotic activities.
2) The stratosphere; which also is known as the ozone layer absorbs ultra-violet radiation. So, when such radiation is prevented by the ozone layer from reaching the earth's surface in high intensity, many organisms (plants and animals) are relieved.
3) The Hydrosphere; this is the world of water existing in form of water, lakes and oceans.
4) The Biosphere; is the part of environment which is known as the active part of the earth where plants and animals inhabit. It is made up of Aquatic and terrestrial bicycles. The aquatic bicycles contain fresh and salt water, while the terrestrial bicycle is zone where certain life forms can exist outside water.
5) The lithosphere; is the solid part of the environment which contains rocks, sediments and soil minerals.

Supporting this view (www. the guardian.com/environment/2015jan/29/British.belief.) while describing internal mechanism argued that scientists generally define the five components of earth's climate system to include – atmosphere, hydrosphere, cry sphere, lithosphere (restricted to the surface soils, rocks and sediments) and biosphere. Natural changes in the climate system (internal forcing) result in internal climate variation e.g. include the typical distribution of species and changes as ocean currents.

**Climate and Environmental changes**

Climate change refers to a long change in the average weather pattern over a specific region/and a significant period of time. It is also seen as a change in the statistical distribution of weather patterns when that change lasts for an extended period of time (i.e. decades to millions of years). The most general definition of climate change is a change in the statistical properties of the climate system when considered over long period of time (en.m.wikipedia.org/w). As such, fluctuations over periods shorter than few decades, such as El Nino do not represent climate change. The term sometimes is used to refer to climate change caused by human activity as opposed to change in climate that may have resulted as part of Earth's natural processes (en.m.wikipedia.org/w). In this sense especially in the context of environmental policy the term climate change has become synonymous with ''anthropogenic global warming'' (en.m.wikipedia.org/w).

Some scientific journals are of the opinion that'' global warming refers to surface temperature increases while climate change includes global warming and everything else that increasing greenhouse gas levels will affect'' climate change is also seen as a change in global or regional climate patterns, in particular, a change apparently from the mid to late 20$^{th}$ century onwards and attributed largely to the increased level of atmospheric carbon dioxide (CO2) (www.epa.gov/climatechange/basics).

Environmental changes have to do with changes caused by the variation in the occurrences of some climatic factors; rainfall, temperature, light wind: biotic factors; predators, parasites, soil micro-organism, pest and diseases: and edaphic factors; soil pH, soil texture, soil structure etc. when environmental changes occur as a result of the actions of man and other natural phenomena, lives and properties are adversely affected.

**Causes and Effect of Climate and Environmental Changes**

In a broad sense, climate and environmental changes is the after mat of so many human activities and some natural occurrences. Some natural causes of climate change are referred to as ''climate forcing'' or ''forcing mechanisms''. Changes in the state of this system can occur externally (from extraterrestrial systems) or internally (from ocean, atmosphere and land systems), through any one of the described components. For example, an external change may involve a variation in the Sun's output which would externally vary the amount of solar radiation received by the Earth's atmosphere and surface. Internal variations in the Earth's climate system may be caused by changes in the concentrations of atmospheric gases, mountain building, volcanic activity, and changes in the surface or atmospheric albedo ( www.cheron .com )

However, some climatologists are of the opinion that only a limited number of factors are primarily responsible for most of the past episodes of climate change on the Earth. These factors include;

- Variations in the Earth's orbital characteristics
- Atmospheric carbon dioxide variations.
- Volcanic eruptions.
- Variation in solar output.
- Plate Tectonics
- Thermohaline Circulation.

**Variation in the Earth's orbital characteristics.**

The Milankovitch theory opines that normal cyclical variations in three of the Earth's orbital characteristics is likely responsible for the past climatic change. By implication the theory assumes that over time these three cyclic events vary the amount of solar radiation that is received on the Earth's surface (www.cheron.com).

The first cyclical variation is known as eccentricity. This controls the shape of the Earth's orbit around the Sun. The Earth's orbit in a very gradual manner changes from being elliptical to be almost circular and the back to elliptical in a period of about 100,000 years (www.cheron.com). As the eccentricity of the orbit increases, the variation in solar energy received at the top of the atmosphere between the Earth's closest (perihelion) and farthest (aphelion) approach to the Sun increases as well. Currently, the Earth is passing a period of low eccentricity. The difference in the Earth's distance from the Sun between perihelion and aphelion (which is only about 3%)

**Volcanic Eruption-** During volcanism, materials from the earth's core and mantle are brought to the surface as a result of the heat and pressure generated within. Volcanic eruptions and geysers release particles into the earth's atmosphere which affect the climate. The most dangerous of these gases is the carbon dioxide gas which reacts with water vapour commonly found in the stratosphere to form a dense optically bright haze layer that reduces the atmosphere transmission of some of the sun's incoming reception. Climatologists for a long time have noticed that there is a link between very explosive volcanic eruptions and short term climate change. For instance, a year after the Tambora volcanic eruption in 1815, there came very cold years. As such there has been very cold weather in regions across the planet (http://www.physicalgeography.net/fundamentals/7y.html).

**Solar output variations-** There are many variations in solar activity that have been observed through the sun and beryllium isotopes. The sun provides the earth with heat energy, an integral part of our climate. Numerical climate models predict that if there is a change in solar output of only 1% per century, the earth's average temperature will be altered by between 0.5 to 1.0 Celsius. In fact, solar radiation has caused a phenomenon known as global warming http://www.physicalgeography.net/fundamentals/7y.html).

**PlateTectonics**- Planet earth has a landmass made up of plate tectonics that shift, rub against one another and even drift apart. This causes the repositioning of continents, wear and tear of mountains, large –scale carbon storage and increased glaciations.

**Thermohaline Circulation- The** relationship between the atmosphere and the ocean equally results in climate changes. Thermohaline circulation is the redistribution of heat via slow and deep oceanic currents.

Climate and environmental changes also is as a result of human activities. Thus, Barade (2009) stated that our planet is unique to support life. However, within the limitations of our understanding of the terms evolution and progress, human beings contributed a number of disastrous climate change triggers. Some of them are increased carbon dioxide emission, increase in greenhouse gas levels, and increase in land, water and air pollution levels. He is therefore of the view that the high level of industrial pollution and a number of human induced processes have resulted in climate change and environmental hazards.

Kwan,Lam and Ofoefuna (2011) are of the opinion that pollution is the process by which substances are added to the environment or the addition of materials to the environment that damages or defiles it, making it undesirable or unfit for life. These materials according to them are called pollutants. They further explained that as human populations increase and as society becomes more industrialized and urbanized, the problem of pollution has become more serious. Obviously many of theproducts of modern technology which find their ways into the air and water are toxic and harmful to life of organisms and the entire ecosystem. Below areoutlines of environmental pollutants caused by human activities.

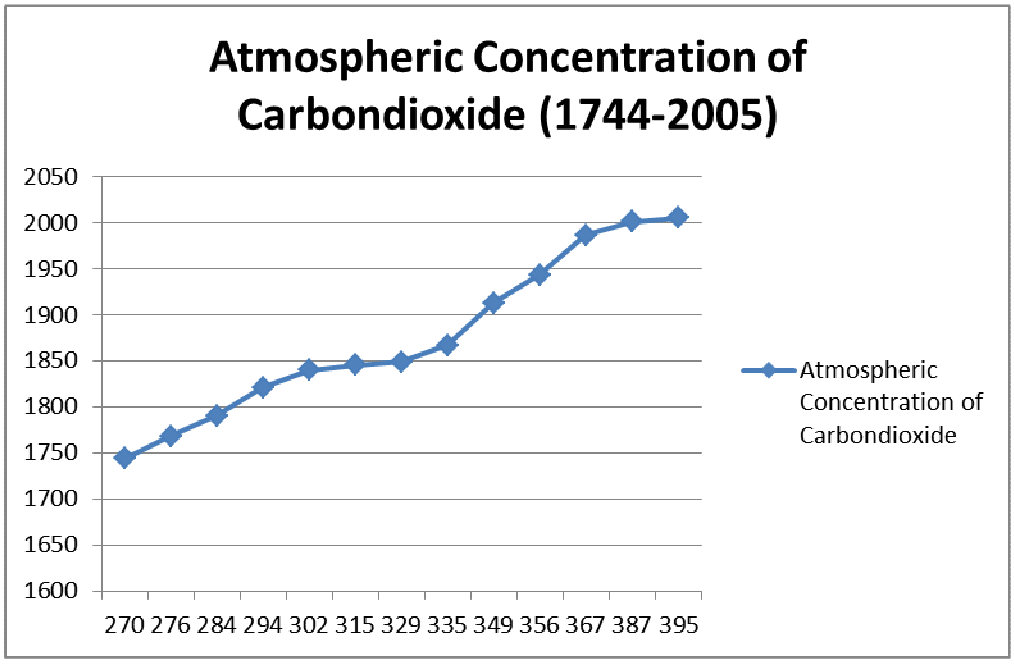
**Airpollutants**- air pollution occurs as a result of incomplete burning of fuels such as coal, oil, petrol and wood. Apart from human activities, the gaseous pollutants emitted into the air can also be by natural occurrences such as biological decay, forest fires or volcanic eruptions as mentioned earlier. These harmful gaseous pollutants include; sulfur dioxide, nitrogen oxides, carbon dioxide, carbon monoxide and lead.

- Sulfur dioxide and nitrogen oxides- these occur as a result of the burning of fossil such as coal, oil and natural gases. Sulfur dioxide at a very high concentration has damaging effects on both plants and animal lives. In the case of plants, it penetrates the leaves through the stomata (tiny opening in the cells of the leaves) and kills the plants. In the case of humans, sulfur dioxide causes irritation and damaging of the sensitive lining of the eyes, air passages and lungs. When this occurs for long time in an environment, it causes respiratory diseases. Furthermore, it is also important to state that, when sulfur dioxide and nitrogen oxide react with oxygen and rain water, they form sulfuric acid and nitric acid respectively. Rain water containing these acids are called acid rain. The presence of acid rains in lakes and rivers causes the death of fish and other creatures in so many countries of the world today.

  Kwan et al (2011) also opined that sulfur dioxide is the main component of killer smog; which is a mixture of smoke and fog. Normally when smoke is emitted during burning, it is blown by the wind, and it goes to mix with the cool air. This mixture is prevented from escaping by a layer of warm air which acts like a cover above it. The mixture of the cool air and the pollutant remains stagnant air until it forms high concentration to produce lethal results. This causes respiratory problems. The occurrence this smog in London in 1952 led to the death of about 400 hundred people. Consequently, the Clean Air Act of 1960 in England was passed (Kwan et al, 2011).

- Lead –it is possible to find the presence of lead in the food we eat, the water we drink and the air we breathe in. A long time accumulation of lead in the body system could lead to high concentration of lead which may result to cramps, loss of control of hands and feet, and sometimes coma and death. Air in cities has higher presence of lead than the air in rural areas.
- Carbon monoxide- the exhaust of motor vehicles, generators, air crafts, motorcycles and other forms of engines that emit such gases are the sources of carbon monoxide. When carbon monoxide is breathed in, it combines with hemoglobin in the red blood cells to form ''carboxyhaemoglobin'' which reduces the capacity of the blood to transport oxygen round the body. The may be very harmful when it occurs in high concentration and could be attributed to most deaths that occur when people confine themselves to areas where carbon monoxide is emitted without cross ventilation.
- Carbon dioxide- this factor though primarily caused by human activities through the burning of organic compounds which results to the releasing of carbon dioxide into the air, yet has some natural implications. As such, carbon dioxide is the most important gases that cause ''Greenhouse effects''. This occurs when the sun rays hit the earth surface, but when they are reflected back into space, they are trapped in the atmosphere. The sun rays cannot escape from the earth's atmosphere, and the earth heats up. Or put in another way, certain atmospheric gases like carbon dioxide, water vapour, and methane have the ability to change the energy balance of the earth by being able to absorb '' long wave radiation'' emitted from the earth's surface. The result of this may be global warming. The possible effect is that the world temperature may rise; Icebergs may melt, leading to an increase in quantity of water in the oceans. Below is an illustration of atmospheric Concentration of Carbon Dioxide (1744-2005).




Source- Pidwirny (2006). ''Causes of Climate Change'', Fundamentals of Physical Geography, 2nd Edition. http:/www.physicalgeography.net/fundamentals/7y.html

Figure 1.1 shows a graph illustrating the rise in atmospheric carbon dioxide from 1744 to 2005. Note that the carbon dioxide's concentration in the atmosphere has been exponential during the period under review. An exploration into the immediate future would suggest continued increases.

Chlorofluorocarbons (CFC3) - These are non-toxic, unreactive chemicals. They are used as aerosol propellants, as cooling agents in refrigerators and air conditioners, and in foam packaging. Chlorofluorocarbon is released into the atmosphere from aerosols and other sources break down the Ozone layer of the atmosphere. The Ozone is a gas that forms a layer over the Earth and it absorbs much of the ultraviolet rays from sunlight. So when the Ozone is broken down, more ultraviolet light reaches the Earth. This increases the risk of skin cancer (Kwan, Lam, Ofoefuna, 2011).

Dust- these are smooth, fine dry particles of matter. So much dust is released into the atmosphere due to human activities like, construction, sweeping, mining, cement industrial sites and other sites. Industrial processes produce a lot of toxic materials. For instance, asbestos dust is believed to be the major cause of lung cancer in industrial worker who inhale them for long period of time. Natural phenomenon such as volcanic eruption, burning of garbage, chimney fumes, also causes the release of dust into the atmosphere.

Fumes – these are gaseous products or anything which contains airborne solid particles that are smaller than dust fumes are normally generated by incineration plants and industrial plants and can remain in the atmosphere even far from the place where it was released from. These fumes cause severe irritation of the respiratory system in human beings.

Pollen grains- these are usually released by flowers. These pollen grains are very small in size and as such can travel a very long distances. When they are inhaled, they can trigger allergic reactions in humans.

**Water pollutants-** Rivers, streams and lakes are polluted by waste materials dumped into them by humans. These affect communities that live in such areas. The following are the various ways water can be polluted;

- Sewage- when untreated sewage is discharged into rivers and lakes, they cause the breathing of bacteria. Bacteria grow and multiply using up the oxygen in the water, thereby causing fishes and other organisms in the water to die. These bacteria can also continue to break down the organic wastes, thereby releasing foul-smelling gases like hydrogen sulfide and ammonia. Untreated sewage also causes diseases like cholera and typhoid which sometimes get into wells, bore-wholes and sources of drinking water, which may result to epidemics.
- Fertilizers- these are chemicals used by farmers to increase yields of crops. The fertilizers contain nitrates and phosphates which are useful nutrients for the growth of algae and plants. However the over use of chemical fertilizers may cause water pollution in the sense that fertilizers that are not absorbed by crops may be washed away by rainwater into nearby rivers and lakes. These are harmful to water organisms.
- Inorganic wastes- these include industrial wastes such as poisonous metals like, mercury, arsenicand cadmium. These can be disposed of into rivers, streams and lakes. This can be illustrated by what happened in Minamata, a coastal town in Japan in 1972. A plastic factory had discharged waste water containing high concentration of mercury. About 40 people who eat the contaminated fish and shellfish died of mercury poisoning. About 70 people were crippled; blinded or paralyzed( kwan, Lam and Ofoefuna,2011).
- Pesticides – these are substances used to kill pests that destroy crops in farms. They include insecticides and herbicides. Insecticides are specifically used to kill insects. When applied to farms, they can be carried by rain water into rivers, streams and lakes. When they are in high concentration they may poison fish or animals that drink the water or feed on the contaminated fish. Again, insecticides DDT (Dichloro-diphenyltrichloroethane) are insoluble, and as such are stored in the fatty tissues of animals that consume them, and as such may result to serious health hazards. Also herbicides are substances used to kill weeds. Agriculturists are of the view that herbicides like ‘’2, 4, 5-T, contain an impurity called dioxin, which is harmful to human beings.

**Noise pollution-**this is a type of pollution whereby excessively loud and unpleasant sounds of more than 80 decibels are produced. The world, especially African nations have become very noisy. There are heavy machineries, construction sites, mining activities that produce noise.Electrical gargets that produce noisy sounds like microphones, radios, megaphones, televisions, etc. are indiscriminately used in homes, cities, market places, streets, churches, mosques, hotels, club houses etc. Drivers of cars and Lorries blow horns of their vehicles at random. All these causes noise pollution which cause harm to humans. Prolonged exposure to noise can result in severe loss of hearing. Noise pollution in any environment can also cause emotional stress, irritability, lack of sleep or insomnia, high blood pressure psychological disturbances and low work productivity.

**Soil pollution-**theseare the buildup of chemical substances and other waste materials fromfactories in the soil. The presence of these substances makes the soil to lose its fertility and lead to the leaching of nutrients into water, and death of plants, crops or even animals.Other causes of soil pollution include;

1) Inorganic nutrients like nitrates and phosphorous from the use of fertilizers;
2) Toxic chemicals from the indiscriminate use of pesticides;
3) Oil spill from oil pipes;
4) Heavy metals such as chromium, cadmium and copper from smelting industries;
5) Liquid sewage wastes;
6) Solid wastes such as rubbish, domestic refuse, paper, plastic and glass, and
7) Deforestation(Kwan, Lam and Ofoefuna, 2011).

Deforestation- This is the act of cutting down trees and shrubs indiscriminately. Trees may be cut down for the purposesclearing lands for building houses, industries and factories, for growing crops, for grazing cattle, sheep, horsesetc. Deforestation could lead to soil erosion, flooding, and desertification.

Soil erosion- this is a situation whereby the soil is directly exposed to the forces of rainfall due to the cutting down of protective trees in forests. When this happens, topsoil which is the most fertile layer gets washed away during heavy rain especially on the steep slopes. This affects agricultural production.

Flooding- when rainwater is not retained due to the removal of trees both in forests and habitable places, the water levels in rivers rise rapidly thereby making water to flow inland, causing floods to occur.

Desertification- when the protective trees are cut down, sunlight directly falls on the soil, thus making water to evaporate rapidly from the soil making it to dry up and harden. With the topsoil eroded, plants life cannot be supported and other organisms that depend on plants and weeds for food are equally destroyed. The land thus remains barren. Desertification results in the loss of habitats, extinction of many species of organisms and animals, loss of many species of medicinal plants like ''Madagascar periwinkle'' used in cancer treatment, distortion in the balance between oxygen and carbon dioxide and climate change.

Indeed countries all over the world are presently experiencing some severe climate changes due to so many environmental pollution, resulting both from natural factors as well as human activities. In Niger Delta of Nigeria for instance, there are environmental issues resulting from the activities of the petroleum industry. The delta covers 20,000 km2 within west lands of 70,000km2 formed by sediment deposition, where 20 million people and40 different ethnic groups live. This ''floodplain'' makes up 7.5% of the total land mass of Nigeria. The delta region of Nigeria is well endowed with abundant flora and fauna, arable terrain that can sustain a wide variety of crops, lumber or agricultural trees, and many species of freshwater fish than any ecosystem in West Africa. It is currently feared that the region can experience a loss of 40% of its inhabitable terrain in the next thirty years as a result of extensive dam construction in the region. The carelessness of the oil industry within the region is also a serious factor. Thus NNPC in 1983 report to the Federal Government of Nigeria stated '' we witnessed the slow poisoning of the waters of the country and the destruction of vegetation and agricultural land by oil spills which occur during petroleum operations. But since the inception of the oil industry in Nigeria, more that twenty-five years ago. There has been no concern and effective effort on the part of the government, let alone the oil operators, to control environmental problems associated with the industry'' Spills in polluted areas most times spread out over a wide areas, destroying crops and aquaculture through contamination

**The need for education policy on climate and environmental education.**

Environment as in natural environment is the sum total of what is around something or someone. It includes living things and natural forces (simple.wikipedia.org/wiki/Environment). The environment of living things gives them the opportunities for growth and development, including the possibilities of danger and destruction. Creatures or living things do not just live or exist in environment; rather, they constantly interact with their environment. These interactions consists of those between plants, animals, soil, water, temperature, light, and other living and non-living things. These creatures manifest certain changes as they respond to the changes in their environment. The important things that we value in our environment are referred to as natural resources.

Environmental education implies organized efforts to teach school children as well as the public how natural environment function, and how particularly how human beings can manage environment and ecosystems to live sustainably. It is a multi-disciplinary field integrating disciplines like biology, chemistry, physics, ecology, Earth's surface studies, mathematics and geography (enwkipedia.org/wiki/Environment…).Environmental education often times implies education about having a sustainable environment taught within the school system from primary to port-secondary levels of education. However it sometimes includes all the efforts to educate the public about being environmental friendly through print media, radio, websites, campaigns, adverts etc.

Environmental Education can also be seen as the teaching of individuals and communities, in transitioning to a society that is knowledgeable of the environment and its associated problems and ways of solving them. the United Nations Educational Scientific and Cultural Organization (UNESCO) (2004) states that environmental education is very vital in imparting an inherent respect for nature amongst society and enhancing public environmental awareness. UNESCO also emphases the role of environmental education in safeguarding future global developments of societal quality of life through the protection of the environment, eradication of inequality and insurance of sustainable development (enwikipedia,org/wiki/Environment…).

Environmental education focuses on engaging with citizens of all demographics to;

1) To think critically, ethically and creatively when evaluating environmental issues;
2) Make educated judgments about those environmental issues;
3) Develop skills and commitment to act independently and collectively to sustain and enhance the environment, and
4) To enhance their appreciation of environment, resulting in positive environmental behaviour (Bamberg and Moeser, 2007; Wals et al, 2014).

Historically, the root of environmental education can be traced back as early as the 18th century when Jean-Jacques Rousseau stressed the importance of going back to nature and the need for an education that focuses on the environment. Several years later, Louis Agassiz a Swiss –born naturalist, echoed Rousseau's philosophy as he encouraged students in his book Emile to ''study nature not books'' (enwikipedia,org/wiki/Environment…). Thus, these two influential scholars and naturalists laid the foundation for concrete environmental education.

Environmental education has long struggled for legitimacy alongside more traditional disciplines within the liberal arts and sciences. But environmental literacy studies in the late 1990s revealed that school children lacked basic knowledge about the natural environment. This convinced the US Congress to take action, and in 1990 Congress passed the National Environmental Education Act, forcing the US Environmental Protection Agency (EPA) to strengthen and expand environmental education nationwide through education and teacher training and the administration of grants to exemplary programs (www.gobartimes.org>Home>Green School).

The most current National Policy on Education, which is the 2004 edition as mentioned earlier, has no provision for climate and environmental education even though there are provisions for the study of certain other science subjects. Environmental friendly education policy is therefore very vital to be introduced into our education system. This will have very broad positive effects on our children, our nation and the entire globe. It is equally important to point out that our future as a nation depends on a well-educated society that is a wise steward of the environment that sustains it. It is only through environmental education that citizens will be made to know the link between economic, political and socio-cultural developments with environmental care and keeping. Of a truth, when the environment is unhealthy and inhabitable, no meaningful development of any sort can take place.

Orr (2010: 2) while supporting the need for the teaching of environmental education in today's schools asserted; '' All education is environmental education. By what is included or excluded we teach students that they are Part of or apart from the natural world. To teach economics ,eg without reference to the law of thermodynamics or those of ecology is to teach a fundamentally important Ecological lesson that physics and ecology has nothing to do With the economy. That just happens to be dead wrong. The Same is true throughout all of the curriculum''

Orr (2010) further opined that schools have the obligation in teaching our students about the world they live in , to accurately render their relationship to it. If the study of environment is neglected in our curriculum, it implies that students are taught to be apart from the natural world they live in, and this is a lie.

Environmental education could increase students' engagement in sciences. Obviously, science subjects pose a lot of difficulty to students in Nigerian schools. This could be attributed to the abstract methods adopted by teachers in teaching them. Students have little or no chances of seeing the real practical nature of what they are being taught. This makes most of them see science subjects as subjects that can only be offered by super brains amongst them. This is not good enough for a country like Nigeria that wants to meet up with other nations of the world that are already scientifically and technologically advanced.

Similarly, studies consistently reveal that the U.S public suffers from a tremendous environmental gap that appears to be increasing. For instance, two-third of the public fails even a basic environmental quiz and a whopping 88 percent of the public fail a basic energy quiz. These same studies found out that 45 million

Americans think that the ocean is a source of fresh water and 13 million believe that hydropower in America is top energy source( www.population.org/why is EE Important?). This level of ignorance about out natural environment is also prevalent in many other countries of the world, even in Africa due to the non-practical nature of curriculum and education system.

As such, the integration of environmental education could improve students' achievement in sciences, for the fact that environmental education connects classroom learning to the real world. It is in line with this that the Science Fair Administrators noted that 40 percent of all Science Fair Projects relate directly to the environment. In the same vain, The Corporation for National Service reports that more than 50 percent of the Service-Learning programmes focuses on environment (www.population.org/why is EE Important).

Furthermore, environmental education improves students' performance in core subjects. Again studies have also shown that when environmental education is integrated into the core curriculum or used as an integrating theme across the curriculum, it has a measurable positive impact not only on students' achievement in science, but also in social studies. The same studies also show that schools that taught the core subjects using the environmental education as an integrating context also demonstrated reduced discipline and classroom management problems, increased engagement and enthusiasm for learning and greater students' pride and ownership in accomplishment.

More importantly, environmental education enhances critical thinking and basic life skills. Confirming this, the National Science Board of the National Science Foundation in the year 2000 stated the importance of environmental education to students in acquiring knowledge and gaining skills such as problem solving, consensus building, information management, communication, and critical and creative thinking. Environmental issues offer excellent vehicles for developing and exercising many of these skills using a system approach(www.populationeducation.org/).

Likewise, the 2005 report to Congress submitted by the National Environmental Education Advisory Council on the Status of environmental education in the US finds that ''environmental education with its emphasis on critical thinking, interdisciplinary teaching and learner achievement is also helping to meet educational reform goals''. Indeed, environmental education provides critical tools for a 21st century workforce. As such, majority of Americans are of the opinion that the issue of environment will become at least one of the dominant issues and challenges of the 21st century in view of the growing need for a healthier globe. The National Committee for Environmental Research and Education, confirmed this in 2003 report, noting that ''in coming decades, the public will more frequently be called upon to understand complex environmental issues, assess risk, evaluate proposed environmental plans…''(www.populationeducation.org/ why is EE Important.).

Another reason why the teaching of climate and environmental education is needed as a part of curriculum is that tomorrow's leaders need to be equipped for tomorrow's challenges and the children must adequately be prepared for the future they will inherit. The obvious fact is that today's children are disconnected from nature. In cities and civilized worlds, children are restricted and grown indoors. They do not have the privileges to explore the natural world. Rather, they are exposed to violence and wars through firms, cartoons and other television programmes.The restriction and indoor upbringing of children have resulted to some anomalies like; children obesity, diminished use of senses, disconnection from the use of senses, disconnection from things that are real. The questions then are, if children are disconnected from nature, how can they learn about, understand, value and cherish nature? How will the next generation care about the earth and become worthy stewards of its resources? Indeed the right answer to these questions is the immediate integration of the climate and environmental education to the curriculum.

**Problems of teaching climate and Environmental Education.**

The teaching of climate and environmental education has not received the degree of attention due it in many countries of the world. There are no concrete policy statements made in favour of the teaching of environmental education in many countries education policies. This has led to the failure of environmental education to meet up with the challenges of environmental degradation.

In line with this, Saylan (2011) is of the view that ''Environmental education has failed because it is not keeping pace with environmental degradation''. This implies that environmental education has failed to provoke actions against human activities that contribute to environmental degradations. Human beings are minute by minute destroying the environment, and environmental education is not offering commensurate condemnation of these actions through making environmental education a part of public education.

Lack of funding has prevented the proper functioning of environmental education in many countries of the world. Environmental educators particularly complain of minimal support for the development and publication of environmental education resource texts. Supporting this, Burch(1994) points to the lack of ‘’pedagogically sound environmental educational materials …’’. Many countries budget so much money for agriculture and science education but budget very little or even nothing at all for environmental education.

Another factor is the fact that teachers feel inconvenienced when asked to take students for outdoor lessons. Students themselves are already used to indoor lessons.

**Suggested policy statements on climate and environmental education.**

Government should make these educational policy statements and state them in the National Policy on Education to enhance climate and environmental education in Nigeria;

1) The curriculum at primary, secondary and tertiary levels of education must include climate and environmental education as a compulsory subject.
2) Teachers and educators should from time to time embark on seminars and workshops on climate and environmental changes.
3) Teachers should study and create sun safety awareness. This should be classroom and school wide activities that will raise children’s awareness of stratospheric ozone depletion, ultraviolet radiation and simple sun safety practices.
4) There should be school sun safety programmes. This should be a collaborative effort of schools, communities, teachers, parents, health professionals, environmental groups, meteorologists, educational organizations and others. It is believed that with everyone’s help, sun protection can go beyond classrooms to the entire communities.
5) There should be a study of past climate conditions which is known as pale climatology.
6) Students should study courses on global observations which will include; knowledge of geostationary operational satellites which is the monitoring of the western hemisphere and the pacific ocean from geostationary orbit 35,800 kilometers (22,300 miles) above the equator; polar-orbiting operational environmental satellites which entails scanning every six hours from altitude of about 850 kilometers (529 miles); Air plat-forms which is to do with investigating hazardous weather for the prediction of hurricanes, tornadoes and winter storms; surface and submarine plat-forms which is about the exploration of the ocean surface and its depths.
7) Students should be taught how to be environmentally friendly; both natural and human causes of climate and environmental changes.
8) Students should be taught environmental sustainability, which has to do with sustainable development and its impact on environmental interaction and climate change.
9) Students should also be taught Earth Science which its major concern will be on the lessons on the production of carbon dioxide by human activities, re-cycling and their impact on climate.
10) The policy should state that all levels of education should design subjects and courses that will expose students to climate and environmentally friendly education.

**Summary**

Climate and environmental factors have immense effect on the existence of human as well as other low creatures. This paper has so far discovered that changes from time to time occur in climatic and environmental conditions partly as a result of natural forces and partly as a result of human activities. Whichever is the case, it is believed that human beings have very vital roles to play in making the environment very conducive and habitable.

From all indications human beings to a large extent lack the awareness of the need to be environmentally friendly. They destroy natural environments through actions like deforestation, pollutions, desertification, production of greenhouse gases etc. This paper is of the opinion that our education system can play immense roles in creating the needed awareness about environmental friendliness. It therefore suggests that policy statements in favour of environmental education be included in the national policy on education, which presently lacks such. Such policy statements should specifically state the teaching of subjects and courses on climate and

environmental education. This will enable the young school children and even the adult folk to understand better what it means to be environmentally-friendly.

This paper however, also pointed out the possible problems that could be encountered in the teaching of climate and environmental education. such problems include; poor finance, feeling of discomfort by teachers to engage students in outdoor education,etc.

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