Law and Climate Change in Nigeria



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CHAPTER TWO
CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT: SOLUTION SO FAR

BY

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*ABDUL FATAI OLADAPO SAMBO***

ABSTRACT

Scientists project global warming to continue at a rate that is unprecedented in hundreds of thousands or even millions of years of Earth's history. They predict considerably more warming in the 21st century, depending on the level of future greenhouse gas emissions. In 1987, the World Commission on Environment and Development synthesized the need to ensure sustainable development and to provide mechanisms to increase international co-operation to this end. This welcome development resulted in the emanation of the three principles of conservation, namely conservation of option, conservation of quality, and conservation of access. The major begging question is: will recourse to these principles bring about the much-needed balance between the need to exploit the environment and the need to preserve it for the coming generation by using it in a way that will enhance sustainable development? This we intend to examine and answer in this work.

1.0 INTRODUCTION

There is a growing scientific consensus that human activities have been substantially contributing to the increase in the atmospheric concentration of greenhouse gases. The increase has however been enhancing the natural greenhouse effect, which has

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in turn led to increased warming of the earth's surface and atmosphere.[17] The rise in temperature has resulted in the frequency and intensity of extreme weather conditions causing climate change. However, even though climate change is a global phenomenon, the negative impact is unevenly felt depending on the adaptive capacity of the individual nations. African nations like most developing nations are most exposed to climate change because they lack the requisite adaptive wherewithal to cope with it.

It should be noted that climate change is capable of causing numerous damages on the earth, particularly on human life. The most notable of these damages is that the earth would be caused to be hot.[18] On this, predictions have been made by scientists that the hotness of the earth will continue and even get worse.[19] Activities of man and state are not only posing serious threats to the fragile ecosystem but to the existence

17 *According to the Nigerian Climate Reports, Climate change is any long-term change in the statistics of weather over durations ranging from decades to millions of years. It can be manifest in changes to averages, extremes, or other statistical measures, and may occur in a specific region or the Earth as a whole. Climate change refers to a change in climate that is attributable directly or indirectly to human activities, that alters the atmospheric composition of the earth which leads to global warming. Climate change has the potential of affecting all natural and human systems and may be a threat to human development and survival socially, politically and economically.*

18 *The effects of global warming on the environment and human life are numerous and varied. Scenarios studied by the International Panel on Climate Change predict that global warming will continue and get worse much faster than was expected. The IPPC reports attribute many specific natural phenomena to human causes. The expected long range effects of recent climate change may already be observed. Rising sea levels, Glacier Retreat, Arctic Shrinkage and altered patterns of agriculture are cited as direct consequences of human activities.*

19 *Scientists and environmentalists are warning the world that lethal diseases are on the rise throughout the earth. Scientists from many universities and research centers are echoing the reports coming from the Wildlife Conservation Society that the monitoring of world wildlife indicates that deadly diseases are increasing and spreading across the earth, due in large part to climate change. Animals are seen as an indicator of climate change and its effects upon life on this planet as we know it. The diseases they carry and suffer from are often resulting from climate change in these modern times. Many diseases thrive in warmer weather. This enhances the lifespan of pathogens that infect wildlife. Altered rainfall also affects that rate and distribution of bacteria and deadly pathogens. Global wildlife are being infected by deadly diseases in larger numbers than ever before in recorded history. Scientists and environmentalists are sounding the alarm and saying the animals of the world are an "early warning system" of what is yet to come to the human population.*

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of the entire human race, including future generations.[20] Human beings are changing the climate by increasing the global concentrations of green house gases such as carbon dioxide,[21] methane[22] and nitrous oxide.[23]

20 *Saba A.K.,'After Rio-what Next in Environmental Law and Sustainable Development in Nigeria' in Afomo M. and Adewale O. (ed.) (NIALS and British Council, Lagos 1994) See also Ajai W. 'Achieving Environmental Protection Through the Vehicle of Human Rights Some Conceptual Legal and Third World Problems' (1995) U B.L J Vol. 2 p. 1*

21 *Carbon dioxide is the second most abundant greenhouse gas, after water vapor. Carbon dioxide constantly circulates in the environment through a variety of natural processes known as the carbon cycle. It is released into the atmosphere from natural processes such as eruptions of volcanoes; the respiration of animals, which breathe in oxygen and exhale carbon dioxide, and the burning or decay of plants and other organic matter. Carbon dioxide leaves the atmosphere when it is absorbed into water, especially the oceans, and by plants, especially trees. Through a process called photosynthesis, plants use the energy of light to convert carbon dioxide and water into simple sugars, which they use as food. In the process, plants store carbon in new tissue and release oxygen as a by-product. Humans are significantly increasing the amount of carbon dioxide released to the atmosphere through the burning of fossil fuels (such as coal, oil, and natural gas), solid wastes, and wood and wood products to heat buildings, drive vehicles, and generate electricity. At the same time, the number of trees available to absorb carbon dioxide through photosynthesis has been greatly reduced by deforestation, the widespread cutting of trees for lumber or to clear land for agriculture. Human activities are causing carbon dioxide to be released to the atmosphere much faster than Earth's natural processes can remove it. In addition, carbon dioxide can remain in the atmosphere a century or more before nature can dispose of it. Before the Industrial Revolution began in the mid-1700s, there were about 280 molecules of carbon dioxide per million molecules of air (abbreviated as parts per million, or ppm). Concentrations of carbon dioxide have risen since then as industrial production and fossil fuel-based transportation and electricity generation have spread around the world, accelerating in the last 50 years. In 2007 the Intergovernmental Panel on Climate Change (IPCC), a major scientific organization, reported that levels of carbon dioxide had risen to a record high of 379 ppm and are increasing an average of 1.9 ppm per year. To stabilize atmospheric concentrations of carbon dioxide, global emissions would need to be cut significantlyon the order of 70 to 80 percent. If efforts are not made to reduce greenhouse gas emissions, carbon dioxide is projected to reach concentrations more than double or even triple the level prior to the Industrial Revolution by 2100. In a higher-emissions scenario carbon dioxide is projected to reach 970 ppm by 2100, more than tripling preindustrial concentrations. In a lower-emissions scenario, carbon dioxide is projected to reach 540 ppm by 2100, still almost doubling preindustrial concentrations.*

22 *Methane is emitted into the atmosphere during the mining of coal and the production and transport of natural gas and oil. Methane also comes from rotting organic matter in landfills, rice paddies, and wetlands, as well as from certain animals, especially cows, as a byproduct of digestion. Live plants also emit small amounts of methane. Scientists are increasingly concerned about the release of methane and carbon dioxide from melting permafrost, areas of frozen ground in the tundra (Arctic plains) of Alaska, Siberia, and other subpolar regions. Temperatures in the top layer of permafrost have increased, leading to a decrease in the area of seasonally frozen ground. Methane released from these areas as they melt would contribute to further warming and further melting, in what scientists call a feedback process. Since the beginning of the Industrial Revolution, the amount of methane in the atmosphere has more than doubled. Methane traps nearly 30 times more heat than the same amount of carbon dioxide. Compared to carbon dioxide, methane appears in lower concentrations in*

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Global warming is one of the greatest environmental, social and economic threats facing the planet.[22] The warming of the climate system is unequivocal, as is now evident from observation of increase in global average air and ocean temperatures, widespread melting of snow and ice, and rising sea level.[23] While the world's climate has always varied naturally, the vast majority of scientists now believe that rising concentrations of green house gases in the earth's atmosphere resulting from economic and demographic growth over the last two centuries since the industrial revolution, are overriding this natural variability and leading to irreversible climate change in the global climatic system that supports the planet's basic life support's functions.[24]

the atmosphere and remains in the atmosphere for a shorter time. In total, methane contributes about a third as much as carbon dioxide to global warming.

23 *Nitrous oxide is a potent greenhouse gas that is released primarily by ploughing farm soils and burning fossil fuels. Nitrous oxide traps about 300 times more heat than does the same amount of carbon dioxide. The concentration of nitrous oxide in the atmosphere has increased 18 percent over preindustrial levels. Nitrous oxide contributes about a tenth as much as carbon dioxide to global warming.*

24 *Ijaiya H, 'Global Warming: India's Participation in Asia-Pacific Partnership on Clean Development and Climate', unpublished.*

25 *Ijaiya, ibid.*

26 *Earth has warmed and cooled many times since its formation about 4.6 billion years ago. Global climate changes were due to many factors, including massive volcanic eruptions, which increased carbon dioxide in the atmosphere; changes in the intensity of energy emitted by the Sun; and variations in Earth's position relative to the Sun, both in its orbit and in the inclination of its spin axis. Variations in Earth's position, known as Milankovitch cycles, combine to produce cyclical changes in the global climate. These cycles are believed to be responsible for the repeated advance and retreat of glaciers and ice sheets during the Pleistocene Epoch (1.8 million to 11,500 years before present), when Earth went through fairly regular cycles of colder "glacial" periods (also known as ice ages) and warmer "interglacial" periods. Glacial periods occurred at roughly 100,000-year intervals. An interglacial period began about 10,000 years ago, when the last ice age came to an end. Prior to that ice age, an interglacial period occurred about 125,000 years ago. During interglacial periods, greenhouse gases such as carbon dioxide and methane naturally increase in the atmosphere from increased plant and animal life. But since 1750 greenhouse gases have increased dramatically to levels not seen in hundreds of thousands of years, due to the rapid growth of the human population combined with developments in technology and agriculture. Human activities now are a powerful factor influencing Earth's dynamic climate. The ice of the Polar Regions furnishes clues to the makeup of Earth's ancient atmosphere. Ice cores that scientists have bored from the ice sheets of Greenland and Antarctica provide natural records of both temperature and atmospheric greenhouse gases going back hundreds of thousands of years. Layers in these ice cores created by seasonal snowfall patterns allow scientists to determine the age of the ice in each core. By measuring tiny air bubbles trapped in the ice and properties of the ice itself, scientists can estimate the temperature and amount of greenhouse gases in Earth's past atmosphere at the time each layer formed. Based on this data, scientists know that greenhouse gases have now risen to levels higher than at any time in the last 650,000 years. Greenhouse gases are rising and*

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This paper therefore looks against the background of the causes of global warming, its effects and ways of militating against its adverse effects on the ecosystem and entire human race.

2.0 CAUSES AND EFFECTS OF CLIMATE CHANGE

Scientists have determined that a number of human activities are contributing to global warming by adding excessive amount of green house gasses to the atmosphere. Green house gasses such as carbon dioxide accumulate in the atmosphere and trap heat that normally would exit into outer space.[27]

While many greenhouse gases occur naturally and are needed to create the greenhouse effect that keeps the Earth warm enough to support life, human use of fossil fuels is the main excess of green house gasses. By driving cars, using electricity from coal-fired power plants, or heating our homes with oil or natural gas, we release carbon dioxide and other heat-trapping gases into the atmosphere. Deforestation is

temperatures are following. Before the late 1800s, the average surface temperature of Earth was almost 15°C (59°F). Over the past 100 years, the average surface temperature has risen by about 0.7 Celsius degrees (1.3 Fahrenheit degrees), with most of the increase occurring since the 1970s. Scientists have linked even this amount of warming to numerous changes taking place around the world, including melting mountain glaciers and polar ice, rising sea level, more intense and longer droughts, more intense storms, more frequent heat waves, and changes in the life cycles of many plants and animals. Warming has been most dramatic in the Arctic, where temperatures have risen almost twice as much as the global average.

27 *Scientists project global warming to continue at a rate that is unprecedented in hundreds of thousands or even millions of years of Earth's history. They predict considerably more warming in the 21st century, depending on the level of future greenhouse gas emissions. For a scenario (possible situation) assuming higher emissionsin which emissions continue to increase significantly during the centuryscientists project further warming of 2.4 to 6.4 Celsius degrees (4.3 to 11.5 Fahrenheit degrees) by the year 2100. For a scenario assuming lower emissionsin which emissions grow slowly, peak around the year 2050, and then fallscientists project further warming of 1.1 to 2.9 Celsius degrees (1.9 to 5.2 Fahrenheit degrees) by the year 2100. Melting polar ice and glaciers, as well as warming of the oceans, expands ocean volume and raises sea level, which will eventually flood some coastal regions and even entire islands. Patterns of rainfall are expected to change, with higher latitudes (closer to the poles) projected to receive more rainfall, and subtropical areas (such as the Mediterranean and southern Africa) projected to receive considerably less. Changes in temperature and precipitation patterns may damage food crops, disrupting food production in some parts of the world. Plant and animal species will shift their ranges toward the poles or to higher elevations seeking cooler temperatures and species that cannot do so may become extinct. Increasing levels of carbon dioxide In the atmosphere also leads to increased ocean acidity, damaging ocean ecosystems.*

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another significant source of greenhouse gases, because fewer trees mean less carbon dioxide conversion to oxygen."[28]

During the 150 years of the industrial age, the atmospheric concentration of carbon dioxide has increased by 31 percent. Over the same period, the level of atmospheric methane has risen by 151 percent, mostly from agricultural activities such as raising cattle and growing rice."[29]

As the concentration of greenhouse gases grows, more heat is trapped in the atmosphere and less escapes back into space."[30] This increase in trapped heat changes the climate and alters weather patterns, which may hasten species extinction, influence the length of seasons, cause coastal flooding, and lead to more frequent and severe storms."[31]

Global warming has emerged as a real problem. Due to global warming, we've experienced an increase of the average temperature worldwide and more smog in the air. Flowers are blooming earlier in the year than usual and our climate is changing across the entire world. Humans contribute to an increase of green house gases in the air and as a result have a warming effect of our earth."[32]

As the temperature rises, so does the body count. One of the things people do not readily think about when dwelling on global warming is how it is affecting their health right now. This is not an event that is coming in the future but one that has been underway for a century and is now well into its manifestation of effects on this planet.

28 *Global warming has emerged as a real problem. Due to global warming, we've experienced an increase of the average temperature worldwide and more smog in the air. Flowers are blooming earlier in the year than usual and our climate is changing across the entire world. Humans contribute to an increase of green house gases in the air and as a result have a warming effect of our earth. A number of scientists warned us for years about the consequences of global warming. Many studies have been done and several facts are proven to support this, but they still don't know how many degrees and how fast the temperatures will rise and if it is permanent or not. One thing is sure, global warming causes several negative health effects. The change in our climate can affect us in many ways.*

29 *< http://www.climatehotmap.org> accessed on the 5th March, 2010.*

30 *Ibid.*

31 *Ibid.*

32 *'Report on the Stern Commission on Climate Change' cited in Donohoe M., 'Global Warming: A Public Health Crisis Demanding Immediate Action', World Affairs, Summers 2007, Vol. 11, N0 2, pp. 44-58.*

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One of the ways in which global warming has an effect is by harming the health of humans and exacerbating existing conditions."

Global warming is a precursor for extreme and abnormal weather, and it causes numerous hurricanes and tsunamis that would not exist otherwise. In this regard it has helped kill millions. Though the link is tenuous more direct global warming related phenomenon such as the appearance of hurricanes in areas that had never before seen them is an indication that it causes extreme weather events."

Another thing is that our warm climate is an ideal setting for disease to flourish and spread. Warm weather is ideal for infectious diseases and allows them to spread like wildfire while cold often has a lethal effect on them." It has been historically verified that the increase in temperature has shown a linear increase in the spread of infectious diseases. By depleting our ozone layer global warming allows many more ultraviolet

33 *These are some of the significant and potential health effects which can result as a direct effect of global warming: Heart diseases- People who are suffering heart diseases, asthma or any other lung diseases and older people will get more problems because their cardiovascular systems need to work harder to keep their body cool which is necessary for efficient breathing. Health effects caused by heat waves. As the earth warms up, there have been several long periods of extreme high temperatures in countries which are not used to hot weather for a long time. We saw this in 2003 when 35,000 people died during the heat wave in Europe. A study done by the Hadley Center for Climate Prediction and Research in the United Kingdom showed by using computer models how green house gases increased heat waves. Heatstroke and hyperthermia are the most common health effects caused by these heat waves and can be fatal if not immediately treated. Health effects caused by high concentration of ozone- Air pollution is the main factor that causes ozone depletion. Ozone gases protect us against ultraviolet rays of the sun. The ozone layer is necessary for protecting us and efforts need to be done worldwide for maintaining this layer. The problem is ozone pollution which causes a high concentration in the air of ground level and is harmful for our health. This pollution is caused when sunlight combines with some gases in the air which are responsible for air pollution.*

34 *'Executive Summary (PHP) Abrupt Climate Change: Inevitable Surprises': United States National Academy of Sciences (June 2002) Retrieved 01/05/2008.*

35 *Ten deadly contagious diseases seen on the rise in world wildlife that can infect humans are: Avian Flu - which is spreading to diverse bird flocks worldwide as the weather patterns change bird flight paths, Cholera - warmer weather enhances the life and spread of this pathogen as outbreaks are erupting outside of 3rd world nations, presently; Ebola - is now definitely seen to be influenced by changes in rainfall patterns in the jungle areas of Africa. It kills monkees, gorilla, chimpanzees and people; Intestinal Parasites (whip-worm, tapeworm, hook worm and more) - now are seen in more and more animals in the wild and domesticated dogs and cats. Warmer temperatures and increased rainfall helps these parasites breed and thrive. Check with your vet, if you are a dog or cat owner, because heart-worm medicines NOW have options for other parasite prevention; Plague - is being seen in animals worldwide at alarming numbers. This deadly disease loves warm temperatures and so do the fleas that spread this infection; Red Tides - kill animals and people through the brevetoxins and saxitoxons; Tuberculosis - this is rising worldwide*

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rays to get through unabated. This causes an increase in the instances of skin cancer around the world.

The Intergovernmental Panel on Climate Change (IPCC) has said human climate change "is likely to have wide-ranging and mostly adverse impacts on human health, with significant loss of life. "[36] The signs of this are everywhere but people do not have the factual data to support what they are seeing so they let it pass. That is how this problem got started in the first place. We have to stop passing the buck sometime and take responsibility for this global crisis before it gets even worse

For many years global warming was portrayed in the media as an issue with two sides, with some scientists arguing that global warming is occurring and others arguing that it is not. However, this portrayal was an oversimplification of the scientific debate. [37] Skeptics of global warming, including some scientists, pointed to lingering scientific uncertainties to question whether global warming is actually occurring. [38] However, there is now undeniable evidence that global temperature is increasing, based on direct temperature measurements and observations of other impacts such as melting glaciers and polar ice, rising sea level, and changes in the lifecycles of plants and animals[39].

As the scientific evidence on rising global temperature became indisputable, skeptics focused their argument on whether human activities are in fact the cause of global warming. They argued that the observed warming could be caused by natural processes such as changes in the energy emitted by the Sun.[40] However, the Sun's influence has been found to have contributed only slightly to observed warming, particularly since the mid-20th century. In fact, there is overwhelming evidence that greenhouse gas emissions from human activities are the main cause of the warming.[41]

In 1988 the United Nations Environment Program (UNEP) and the World Meteorological Organization (WMO) established the Intergovernmental Panel on Climate Change (IPCC). The panel comprises thousands of the top climate scientists

36 *Mastrandrea M. and Schneider S.H., 'Global Warming', Microsoft Student 2008 [DVD]. (Microsoft Corporation, Redmond WA 2007).*
37 *Ibid.*
38 *Ibid.*
39 *Ibid.*
40 *Ibid.*
41 *Ibid.*

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from around the world and releases a report every six years describing the state of scientific knowledge on global warming. The IPCC's Fourth Assessment Report, released in 2007, offered the strongest scientific consensus to date on global warming". The panel concluded that it is "very likely" (more than 90 percent probability) that human activities are responsible for most of the warming since the mid-20th century; that it is "extremely unlikely" (less than 5 percent probability) that the warming is due to natural variability, and that it is "very likely" the warming is not due to natural causes alone." This level of certainty is extremely high, given the complexity of the climate system and of the influence of human activities on the climate."

There are many potentially damaging health effects associated with global warming apart from all the other problems it may bring.

OUR WATER SUPPLIES

As flooding becomes more frequent the quality of our drinking water will decrease while the chances of untreated sewage entering the water source will increase. This could lead to a whole host of diseases spreading or resurfacing. Typhoid which is practically unheard of in western countries these days could surface again.

ILLNESS

Illnesses such as heat stroke may become more common with only a slight increase in the overall temperature. Sickness, vomiting and diarrhea will no doubt follow temperature increases.

LACK OF FOOD

Starvation, famine and poverty with their associated illnesses and diseases will probably happen more. This could happen as crops fail due to drought. As global warming may increase rainfall at times some crops could be flooded and ruined

42 *'Summary for Policy Makers: Climate Change 2007: The Physical Science Basis Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change'.*

43 *Ibid.*

44 *'Report on the Stern Commission on Climate Change', ibid.*

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whilst others will become dry and barren. Some farm lands will become useless

THE AIR THAT YOU BREATH

Air quality is already bad in many large cities and is set to decline further. If air quality declines there will be more asthma and breathing difficulties.

LACK OF HABITABLE SPACE

As water levels rise significantly some countries, or parts of them, will be put under water either temporarily or permanently. This will result in more overcrowding of the habitable land that is left dry. This will obviously be detrimental to health and encourage the spread of disease.

3.0 CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT

Global Warming or Climate Change measures increases in the average temperature of Earth's atmosphere, oceans, and landmasses. Scientists believe Earth is currently facing a period of rapid warming brought on by rising levels of heat-trapping gases, known as greenhouse gases, in the atmosphere.[45]

Greenhouse gases retain the radiant energy (heat) provided to Earth by the Sun in a process known as the greenhouse effect. Greenhouse gases occur naturally, and without them the planet would be too cold to sustain life as we know it. Since the beginning of the Industrial Revolution in the mid -1700s, however, human activities have added more and more of these gases into the atmosphere.

For example, levels of carbon dioxide, a powerful greenhouse gas, have risen by 35 percent since 1750, largely from the burning of fossil fuels such as coal, oil, and

45 *Greenhouse gases are rising, and temperatures are following. Before the late 1800s, the average surface temperature of Earth was almost 15°C (59°F). Over the past 100 years, the average surface temperature has risen by about 0.7 Celsius degrees (1.3 Fahrenheit degrees), with most of the increase occurring since the 1970s. Scientists have linked even this amount of warming to numerous changes taking place around the world, including melting mountain glaciers and polar ice, rising sea level, more intense and longer droughts, more intense storms, more frequent heat waves, and changes in the life cycles of many plants and animals. Warming has been most dramatic in the Arctic, where temperatures have risen almost twice as much as the global average.*

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natural gas. [46] With more greenhouse gases in the mix, the atmosphere acts like a thickening blanket and traps more heat. But since 1750 greenhouse gases have increased dramatically to levels not seen in hundreds of thousands of years, [47] due to the rapid growth of the human population combined with developments in technology and agriculture. Human activities now are a powerful factor influencing Earth's dynamic climate. [48]

46 *Mastrandrea and Schneider, op cit.*

47 *Ibid*

48 *While the behaviour of the climate system and the processes that cause global warming are well understood and grounded in basic scientific principles, scientists are still working to understand certain details of the climate system and its response to increasing greenhouse gases. Scientific uncertainty is inevitable with a system as complex as Earth's climate. However, advancements in measuring, analyzing, and modelling techniques have helped clarify many uncertainties in recent years. For example, there had been uncertainty regarding why the warming trend stopped for three decades in the middle of the 20th century. Records even showed some cooling before the climb resumed in the 1970s. The lack of warming at mid-century is now attributed largely to the sulfate aerosols in air pollution, which have a cooling effect because they reflect some incoming sunlight back to space. Continued warming has now overcome this effect, in part because pollution control efforts have made the air cleaner. Satellite measurements of atmospheric temperature, which became available around 1980, originally were thought to measure much less warming in the lower region of the atmosphere than surface thermometers. This led to some doubt about the accuracy of the warming detected at the surface. Eventually, other researchers reanalyzed the satellite data using more advanced techniques and concluded that the satellites were detecting warming quite similar to surface measurements. While there is still some uncertainty, scientists examining the satellite data now agree that the record is consistent with a warming world. For many years global warming was portrayed in the media as an issue with two sides, with some scientists arguing that global warming is occurring and others arguing that it is not. However, this portrayal was an oversimplification of the scientific debate. Skeptics of global warming, including some scientists, pointed to lingering scientific uncertainties to question whether global warming is actually occurring. However, there is now undeniable evidence that global temperatures are increasing, based on direct temperature measurements and observations of other impacts such as melting glaciers and polar ice, rising sea level, and changes in the lifecycles of plants and animals. As the scientific evidence on rising global temperature became indisputable, skeptics focused their argument on whether human activities are in fact the cause of global warming. They argued that the observed warming could be caused by natural processes such as changes in the energy emitted by the Sun. However, the Sun's influence has been found to have contributed only slightly to observed warming, particularly since the mid-20th century. In fact, there is overwhelming evidence that greenhouse gas emissions from human activities are the main cause of the warming.*

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Scientists project global warming to continue at a rate that is unprecedented in hundreds of thousands or even millions of years of Earth's history.[49] They predict considerably more warming in the 21st century, depending on the level of future greenhouse gas emissions. For a scenario (possible situation) assuming higher emissions in which emissions continue to increase significantly during the century, scientists project further warming of 2.4 to 6.4 Celsius degrees (4.3 to 11.5 Fahrenheit degrees) by the year 2100. For a scenario assuming lower emissions in which emissions grow slowly, peak around the year 2050.[50] In short the more the increase in the emission of green house gasses into the atmosphere, the more the increase in the negative effect man continues to experience.

In 1988 the United Nations Environment Program (UNEP) and the World Meteorological Organization (WMO) established the Intergovernmental Panel on Climate Change (IPCC). The panel comprises thousands of the top climate scientists from around the world and releases a report every six years describing the state of scientific knowledge on global warming. The IPCC's Fourth Assessment Report, released in 2007, offered the strongest scientific consensus to date on global warming.[51] The panel concluded that it is "very likely" (more than 90 percent probability) that human activities are responsible for most of the warming since the mid-20th century; that it is "extremely unlikely" (less than 5 percent probability) that the warming is due to natural variability; and that it is "very likely" the warming is not due to natural causes alone.[52] This level of certainty is extremely high, given the complexity of the climate system and of the influence of human activities on the climate.

49 *Mastrandra and Schneider, op. cit.*

50 *Ibid.*

51 *In its 2007 report the IPCC projected temperature increases for several different scenarios, depending on the magnitude of future greenhouse gas emissions. For a "moderate" scenarioin which emissions grow slowly, peak around the year 2050, and then fallthe IPCC report projected further warming of 1.1 to 2.9 Celsius degrees (1.9 to 5.2 Fahrenheit degrees) by the year 2100. For a "high-emissions" scenarioin which emissions continue to increase significantly and finally level off at the end of the centurythe IPCC report projected further warming of 2.4 to 6.4 Celsius degrees (4.3 to 11.5 Fahrenheit degrees) by the year 2100. The IPCC cautioned that even if greenhouse gas concentrations in the atmosphere ceased growing, the climate would continue to warm for an extended period as a result of past emissions, and with more dramatic effects than were observed during the 20th century. If greenhouse gas emissions continue to increase, scientists project severe climate changes.*

52 *Ibid.*

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If we look at society from a historical perspective, we realize that protection and Preservation of the environment has been integral to the culture and religious ethos of most human communities. Nature has been venerated by ancient Hindus, Greeks, Native Americans and other religions around the world. They worship all forms of nature, believing that it emanated from the spirit of God Hinduism declared in its dictum that "the Earth is our mother and we are all her children."[53] The ancient Greek worshiped Gaea or the Earth Goddess. Islamic law regards man as having inherited "all the resources of life and nature" and having certain religious duties to God in using them.[54] In the Judeo-Christian tradition, God gave the earth to his people and their offspring as an everlasting possession, to be cared for and passed on to each generation.[55]

We may not fully appreciate why in recent times so much is being said and done both at the national and international levels with regards to the environment unless and until we understood the concepts of the environment.[56] Climate change is as a result of human hunger for maximum utilization of the available resources since the evolution of industrialization and if not checked, it will continue to hinder sustainable development.

53 *Atharva seda (Bhumi sukta)*

54 *See 'Islamic principle for the conservation of the Natural Environment', 13-14 (JUCN and Saudi Arabia, 1983).*

55 *Genesis 1:1-31, 17:7-8.*

56 *Defining the terms environment presents important preliminary difficulties. None of the major treaties, declarations, codes of conduct and guidelines attempts to define the term. No doubt this is because it is difficult both to identify and to restrict the scope of such an ambiguous term, which could be used to encompass anything from the whole biosphere to the habitat of the smallest creature or organism. Dictionaries definitions range from something that environs, to the whole complex of climatic and biotic factors that act upon an organism or ecological community or, simply, surroundings; surrounding objects, region or circumstances. The Declaration of the United Nations Stockholm Conference on the Human Environment (UNCHE) 1972 merely refers obliquely to man's environment which gives him physical sustenance and affords him the opportunity for intellectual, spirituals, morals and social growth adding that both aspects of man's environment, the natural and the man-made, are essential for his well-being and enjoyment of basic human rights.*

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In 1987, the World Commission on Environment and Development synthesized the need to ensure sustainable development[57] and to provide mechanisms to increase international co-operation to this end. It defined sustainable development as development that meet the needs of the present[58] without compromising the ability of future generations to meet their own needs[59] and United Nations Environmental Programme has since added that it requires the maintenance, rational use and enhancement of the natural resources base that underpins ecological resilience[60] and

57 *The concept of sustainable development contains two basic components or principles. First among these is the precautionary principle. Whereby the state must anticipate, prevent and attack the cause of environmental degradation. The Rio Declaration on Environment and Development 1992 affirms the principle by stating that where ever there are threats of serious or irreversible damage; lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation. Most cases of the 1990's deal with the definition of the principle. In 1996, the Supreme Court of India Stated that environmental measures, adopted by the state government and statutory authorities, must anticipate, prevent and attack the causes of environmental degradation. Following the definition provided in the Rio Declaration, the Court stated that where there are threats of serious and irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. The second component of the doctrine of sustainable development is the principle of polluter pays. The principle states that the polluter not only has an obligation to make good the loss but shall bear the cost of rehabilitating the environment to its original state. In operation, this principle is usually visible alongside the precautionary principle.*

58 *In an endeavour to find solutions to the complex problems of securing sustainable development in a wide spectrum of environmental issues, a United Nations Conference on Environment and Development was convened in 1992. Its preparatory commission attempted to identify both the problems and the solutions in relation to virtually every aspect of the environment on which developmental progress adversely impacts, to identify and evaluate, inter alia, the role being played by international law in this process, and to strengthen and develop it further. It was originally planned to conclude several new conventions relating to key issues on which currently no global convention exists such as climate change, bio- diversity, and land-based sources of pollution and to promulgate an Earth Charter. UNCED also aimed to improve co-ordination between the many organisations whose roles and programme conflict or overlap in areas where sustainable development is required. But even before the conference opened, the range and complexity of the economic and social problems involved in achieving these goals proved virtually insurmountable.*

59 *WCED, 'Our Common Future p. ', 43; see also pp. 43-65.*

60 *It was perceived at the time of the Stockholm Conference that progress on environmental protection was inextricably linked, especially for developing states, with progress in economic development. The United Nation Conference on Human Environment Declaration recognized this need and provided for it in several of its principles. Problems soon emerged, however, because of the political and economic implications of restricting industrial, agricultural, fisheries, and other developmental activities in order to protect the environment from pollution or to conserve resources, and though they continue to arise for all states they do so in an increasingly acute form for developing countries whose incomes are everywhere declining. In the 1980s, however, strategies were promulgated which,*

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economic growth and implies progress towards international equity.[61]

However, there is a need to harmonize man's need to survival and develop himself with the ecosystem. This correct and vital perception of the true relationship between man and ecosystem has given birth to the school which remains the bedrock of environmental protection. That is, School of Sustainable Development.[62] The theory of sustainable development postulates that the only way you can ensure that the future generation is not compromised is by ensuring the protection of the environment. See for example, principle 4 of the Rio Declaration which states that environmental protection shall form an inseparable part of the developmental process which cannot be dealt with separately.[63]

It follows that goals of economic and social development now have to be defined in all states in terms of sustainability.[64] The role of law in achieving sustainable development has been little discussed but is crucial in regulating use of resources and the biosphere. New concepts are emerging such as the inherent rights or interest of future generations, of equitable utilization, and the precautionary principle.[65] The problem of achieving sustainable development is however, easier to identify than to resolve and is essentially one of negotiating balanced solutions taking account of both developmental and environmental factors in the particular context of the problem in issue.[66]

A Native American proverb states that "*we do not inherit the planet from our ancestors but borrow it from our children*", this is the next significant component of sustainable development-the principle of intergenerational equity. The principle envisages that each generation should be required to conserve the diversity of the

though primarily aimed at environmental protection, did take account of the need for development whilst recognising that the environment could not in all cases sustain unlimited development. The International Union for Nature's World Conservation Strategy adopted in 1980 was premised on sustainable utilization of species and ecosystems. The World Charter for Nature adopted by the General Assembly in 1982 aimed, inter alia, at optimal sustainable productivity of all resources coupled with conservation and protection.

61 *UNEP Governing Council Decision 15/2 of May 1989, Annex II, GAOR, 44th Session Suppl. No. 25 (A/44/25).*

62 *See the Rio Declaration of 1992.*

63 *Ibid.*

64 *See Handl, I YIEL (1991), 24-28.*

65 *See Munro and Lammers, Environmental Protection and Sustainable Development (Dordrecht, 1986)*

66 *Ibid.*

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natural and cultural resource base, so that it does not unduly restrict the options available to future generations in solving their problems and satisfying their own values, and should also be entitled to diversity comparable to that enjoyed by previous generations. This principle is called "conservation of options".

Secondly, each generation should be required to maintain the quality of the planet so that it is passed on in no worse condition than that in which it was received, and should also be entitled to planetary quality comparable to that enjoyed by previous generations. This is the principle of "conservation of Quality." Thirdly, each generation should provide its members with equitable rights of access to the legacy of past generations and should conserve this for access for future generations. This is the principle of "conservation of access".[67]

4.0 SOLUTION SO FAR

International cooperation is required for the successful reduction of greenhouse gases. The first international conference addressing the issue was held in 1992 in Rio de Janeiro, Brazil.[68] At the United Nations Conference on Environment and Development, informally known as the Earth Summit, 150 countries pledged to confront the problem of greenhouse gases by signing the United Nations Framework Convention on Climate Change (UNFCCC).[69] To date, more than 180 nations have ratified the UNFCCC, which commits nations to stabilizing greenhouse gas concentrations in the atmosphere at a level that would avoid dangerous human interference with the climate.[70] This is to be done so that ecosystems can adapt naturally to global warming, food production is not threatened, and economic development can proceed in a sustainable manner.[71]

67 *Weiss E.B., 'In fairness to Future Generation: International Law, Common Patrimony, And Intergenerational Equity (United Nations University, 1989).*

68 *Jolly S. and Bajaj V., 'Clean Development Mechanism, International Legal Systems Response to Global Warming', Conference Papers, Thirty-Sixth Annual Conference of the Indian Society of International Law, 24-25 March 2007, pp. 234-244.*

69 *Hulme M., A Change in the Weather? - Coming to terms with Climate Change, Global Environmental issues (John Wiley and Sons, Ltd, West Sussex, England 2004) p. 21.*

70 *The ultimate objective of the Convention expressed in Article 2 states: to stabilize green house gasses concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with climate system.*

71 *Ibid.*

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The nations at the Earth Summit agreed to meet again to translate these good intentions into a binding treaty for emissions reductions."[72] In 1997 in Japan, 160 nations drafted an agreement known as the Kyôto Protocol, an amendment to the UNFCCC[73]. This treaty set mandatory targets for the reduction of greenhouse gas emissions."[74] Industrialized nations that ratify the treaty are required to cut their emissions by an average of 5 percent below 1990 levels."[75] This reduction is to be achieved no later than 2012,"[76] and commitments to start achieving the targets are to begin in 2008"[77]. Developing nations are not required to commit to mandatory reductions in emissions. Under the Kyôto rules, industrialized nations are expected to take the first steps because they are responsible for most emissions to date and have more resources to devote to emissions-reduction efforts."[78]

72 *The Earth Summit of 1992 at Rio marked an important launching point in addressing the effect of global warming on the environment. The Summit identified high anthropogenic emissions as the main reason behind climate change. But it was rather a general approach and never specified emission target or binding mechanisms and instruments of climate policy.*

73 *Under the resulting Kyoto Protocol, industrialize countries listed in Annexure B of the Protocol agreed to reduce their emission in the 2008-2012 period by 5.2 percent compared to 1990 level.*

74 *By arresting and reversing the upward trend in green house gas emission that started in these countries 150 years ago, the protocol promises to move the international community one step closer to achieving the Convention's ultimate objective of preventing dangerous anthropogenic (man-made) interference with the climate system. The developed countries commit themselves to reducing their collective emissions of six key green house gases by at least 5%. This group target will be achieved through cuts of 8% by Switzerland, most central and East European Sates, and the European Union will meet its target by distributing rates among its member states.*

75 *The United Nations and some individual nation's scientific advisory bodies have also issued reports favouring the Kyoto Protocol. In December 3, 2005 an international day of action was planned to coincide with the meeting of the parties in Montreal. The planned demonstrations were endorsed by the Assembly of Movement of the World Social Forum. A group of major Canadian corporations also called for urgent action regarding climate change, and have suggested that Kyoto Now! Which aims to use student interest to support pressure towards reducing emissions as targeted by the Kyoto Protocol compliance? <http://en.wikipedia.org/wiki/kyotoprtocol>*

76 *According to the UNFCC Secretariat, over the last century, atmospheric concentration of carbon dioxide increased from a pre- industrial value of 278 parts to 379 parts per million in 2005, and the average global temperature rose by 0.74oc; See UNFCCC, 'Climate Change: Impacts, Vulnerabilities And Adaptation In Developing Countries', p.8, <http://unfccc.int/resource/docs/publications/impacts.pdf> accessed on 26 April, 2010.*

77 *Patil S.L., 'Normative framework of Law Relating to Global Warming', The Indian Society of International Law, 5th International Conference on International Environmental Law, December, 2007, New Delhi, India.*

78 *Kaur A., 'Threat of Global warming: Concern and Challenges', Indian Society of International Law, 5th International Conference on International Environmental Law 8-9 December 2007, New Delhi, India.*

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The protocol could not go into effect unless industrialized nations accounting for 55 percent of 1990 greenhouse gas emissions ratified it. That requirement was met in November 2004 when Russia approved the treaty, and it went into force in February 2005. By the end of 2006, 166 nations had signed and ratified the treaty. [79] Notable exceptions included the United States and Australia.

In 1998 the United Statesthe world's single largest contributor to greenhouse gas emissionsbecame a signatory to the Kyôto Protocol. [80] However, in 2001 U.S president George W. Bush withdrew support for the treaty. He claimed that the treaty's goals for reducing carbon dioxide emissions would be too costly and would harm the U.S. economy. He also claimed the treaty put an unfair burden on industrialized nations. [81] Opposition to the treaty in the United States was spurred by the oil industry, the coal industry, and other enterprises that manufacture or depend on fossil fuels[82]. These opponents claimed that the economic costs to carry out the Kyôto Protocol could be as much as $300 billion, due mainly to higher energy prices. [83] Proponents of the Kyôto Protocol[84] believed the costs would prove more modest$88 billion or lessmuch of which would be recovered as Americans switched to more efficient appliances, vehicles, and industrial processes.[85]

The Kyôto Protocol, which expires in 2012, is only a first step in addressing greenhouse gas emissions. [86] To stabilize or reduce emissions in the 21st century, much stronger and broader action is required. In part this is because the Kyôto

79 *By acceding to the Kyoto Protocol on 26th August 2002, India has sent a good signal by taking the lead in the region and showing that multilateral approach to solve the problem of global warming is better than unilateral approach.*

80 *Mastrandra and Schneider, op. cit.*

81 *Ibid.*

82 *Ibid.*

83 *Some environmental economists have been critical of the Kyoto protocol. Many see the costs of the Kyoto Protocol as outweighing the benefits, some believing the standards which the protocol sets to be too optimistic, others seeing a highly inequitable and inefficient agreement which would do little to curb green house gas emissions. Some economists such as Gwyn Prins and Steve Rayner think that an entirely different approach needs to be followed than the approach suggested by the Kyoto Protocol.*

84 *The Protocol encourages governments to cooperate with one another, improve energy efficiency, reform the energy and transportation sectors, promote renewable forms of energy, phase out inappropriate fiscal measures and market imperfections, limit methane emissions from waste management and energy systems, and protect forests and other carbon sinks.*

85 *Advocates of the Kyoto Protocol state that reducing these emissions is important, as carbon dioxide is causing the earth's atmosphere to heat up. Most prominent among the advocates of Kyoto Protocol have been the European Union and Many environmentalist organizations.*

86 *Mastrandra and Schneider, op. cit.*

provisions did not take into account the rapid industrialization of countries such as China and India, which are among the developing nations exempted from the protocol's mandatory emissions reductions. [87] However, developing nations are projected to produce half the world's greenhouse gases by 2035. [88] Leaders of these nations argue that emissions controls are a costly hindrance to economic development. [89] In the past, prosperity and pollution have tended to go together, as industrialization has always been a necessary component of an economy's development. [90] Whether or not an economy can grow without increasing greenhouse gas emissions at the same time is a question that will be critical as nations such as China and India continue on the path of industrialization. [91]

Sustainable developments require that environmental criteria must be incorporated into the planning and implementation of any public policy. It also allows the values of environment and development to be reconciled by calling for the integration of environmental and developmental concerns at all levels of decision making.

5.0 CONCLUSION

Climate of the world has changed and is still changing due to man's disruption to the natural balance of water, land and forest. Mischief on the land and sea is inflicted by man's unwary interference with the natural laws and unwise human activities which include natural and non human inducement for climate change.

In the past, there had been a broad balance between people and her environment. But industrialization has upset this basis of human society. People in cities often lost all connection with nature. Many of them are scarcely aware of the origin of products.

87 *Ibid.*

88 *Ibid.*

89 *Ibid.*

90 *In particular, an international emission trading regime is established allowing industrialized countries to buy and sell emissions credits amongst themselves. They will also be able to acquire emission reduction units by financing certain kinds of projects in other developed countries through a mechanism known as Joint implementation. In addition, a Clean Development Mechanism for promoting sustainable development enables industrialized countries to finance emissions reduction projects in developing countries and receive credit for doing so.*

91 *Some public policy experts who are skeptical of global warming see Kyoto Protocol as a scheme to either slow the growth of the world's industrial democracies or to transfer wealth to the third world in what they claim is a global socialism initiative. Others argue that the Kyoto Protocol does not go far enough to curb green house emissions.*

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including food, on which they depended.

Climate change has been shown to be any shift in the natural balance of the atmospheric condition of the earth surface either to increase or decrease its temperature. Much as the latter has not been given attention as having much adverse effect on man and its environment, the former has remained a concept of serious concern to the whole world for about three decades back. The UN and governments of many nations have undertaken various efforts to combat the menace of global warming resulting from climate change by setting targets for the reduction of greenhouse gases by particularly the developed nations.

The environment is a sector that cuts across all other sector of the economy. It is as sensitive as we should not allow it to be endangered let alone it being destroyed. Scientists have indicated that about 50 percent of communicable diseases are tied to the environment. Thus to be able to protect the environment, all hands must be on desk.

Sustainable development requires a global partnership, and as such require the strong helping the weak, not only nationally but also internationally. It requires structural changes in the economic, social and political order of the world more so in the industrialized states. The industrialized countries that directly have primary responsibility to environmental degradation must bear the costs of adjustment.

The development cannot be meaningful when the environment is not considered as an important factor. The impact of development has to be measured not only in terms of its influence and impact on the present generation, but also on the future generation. This is the gist of sustainable development.

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