

TACKLING CLIMATE CHANGE AS A FUNDAMENTAL TOOL FOR FIGHTING ENVIRONMENTAL DEGRADATION IN THE 21ST CENTURY

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Abstract

The magnitude and timing of climate change characterized as global warming is increasing leading to large scale irreversible effects at the local, continental and global scales. Large reduction in ice sheets in Greenland, accelerated global warming due to carbon cycle feedbacks in the terrestrial biosphere is increasing including physical changes in sea level, rise in local temperature and changes in rainfall patterns. Wild fires, changing pattern of agriculture and species dying off are other impacts of climate change among others examined. Climate change has the potential to reverse the millennium development Goals. Tackling climate change is fundamental to development and the environmental sustainability agenda in the 21st century

Introduction

Climate change has described as the greatest threat facing humanity. For one thing, the physical processes that underlie global climate systems are complex and not fully understood. A reason given for such changes is an intensification of the greenhouse effect, natural phenomena vital for life on earth. When energy from the sun reaches the earth, about 70 percent is absorbed, heating air, land and sea. If it were not for this mechanism, the average surface temperature would be about minus 18 degrees Celsius. Eventually, the absorbed heat is released back into space as infrared radiation, thus preventing the earth from over heating. But when pollutants change the composition of the atmosphere, less heat escapes, this can causes earth's temperature to rise.

Gases that contribute to the greenhouse effect include carbon dioxide, nitrous oxide and methane as well as water vapour. The atmospheric concentration of greenhouse gases has increased markedly over the past 250 years, since the start of the industrial revolution and the increased use of fossil fuels, such as coal, oil and flaring of gases as in the developing countries like Nigeria. Another greenhouse enhancing factor seems to be the rising population of farm animals, whose digestive processes produce methane and nitrous oxide (Vladimir, 2006).

Researches in recent times point to human induced warming which has under gone substantial fluctuations in the past. They point to the ice ages, when the earth was earth was < supposedly much cooler than it is now; and in support of natural warming, they cite evidence that old regions, such as Greenland, at one time supported vegetation that prefers warm areas. Of course, -scientists concede that the further back they go, the more their certainty about climate diminishes. What may have caused temperatures to vary significantly are possibly sunspots and solar flares which correlate with fluctuation in solar energy output (Khadka, 2004). In the light of the above, the question that readily comes to mind is, if the earth's temperature is rising, no matter what the causes, how will it affect us and the environment? It is based on this that one assert that the earth's life-sustaining environment is being assaulted by pollution, deforestation, urbanization and the extinction of species, to name just a few. What is more, if human activity is causing global warming, we may have only years, not centuries, to make the needed changes. At the very least, making such changes would mean promptly addressing the root causes of the earth's problems-climate change which is the result of human greed, self interest, ignorance, inept government and apathy.

Causes of Climate Changes

Changes in the state of the climate can occur externally from variation in the sun's output and internally from changes in the concentrations of atmospheric gases, mountain building, volcanic activity and changes in surface or atmospheric albedo (Pidwirny, 2006).

According to Pidwirny (2006), variations in the earth's orbital characteristics, atmospheric carbon dioxide variation, volcanic eruptions and variation in solar output are factors responsible for climate change. The Milankovitch theory suggests that normal cyclical variation in three of the earth's orbital characteristics is probably responsible for some climatic change. The first cyclical variation, known as eccentricity control the shape of the earth the sun. The second cyclical variation results from the fact that as the earth rotates on its axis it results in the precession of the equinoxes and thirdly, cyclical variation related to the changes in the obliquity of the earth's axis of rotation over a 41,000 year period. When the tilt is small, there is less climatic variation between the summer and winter season in the middle and high latitudes while periods of a large tilt result in greater seasonal

climate variation in the middle and high latitudes (Keeling and Whorf, 2006).

Studies of long-term climate change have discovered a connection between the concentration of carbon dioxide in the atmosphere and mean global temperature. Carbon dioxide is one of the most important gases responsible for the greenhouse effect. Thus, atmospheric gases like carbon dioxide, water vapour and methane are able to alter energy balance on the earth by being able to absorb long wave radiation emitted from the earth's surface (Keeling and Whorf, 2006).

Over the past three centuries, the concentration of carbon dioxide has been increasing the earth's atmosphere because of human activities arising from the burning of fossil fuels, conversion of natural prairie to farmland and deforestation have caused the release of carbon dioxide into the atmosphere (Pidwirny, 2006). Also, explosive volcanic eruptions have been shown to have a short-term cooling effect on the atmosphere if they eject large quantities sulfur dioxide into the stratosphere (post, 2007). For example, Mount Pinatubo ejected about 20 million tons of sulphur dioxide into the stratosphere and researchers believe that the Pinatubo eruption was primarily responsible for the 0.8 degree Celsius drop in global average air temperature in 1992 (NASA, 1992). Also, measurements made by satellites equipped with radiometers in the 1980s and 1990s suggested that the sun's energy output showed a decrease of 0.1 percent in the total output of solar energy reaching the earth. If this trend continues, it could influence global climate thus, any change in its output will result changes in the reception of insolation and generation of heat energy which drives the climate system resulting above all in global warming.

Effects of Climate Change

The effects of climate change on the environment and human life are numerous, varied and taking scientists by surprise. Thus, climate change characterized as global warming is leading to large-scale irreversible effects at continental and global scales. The likelihood, magnitude and timing are seen to be increasing at a faster rate..

The probability of warming having unforeseen consequences increases with the magnitude and duration of climate change. Additionally, the United States National Academy of Science has stated greenhouse warming and other human alterations of the earth's system may increase the possibility of large, abrupt and unwelcome regional or global climatic events (Kluger, 2007). Most of the consequences of global warming would result from physical changes, sea level rise, higher temperatures and changes in rainfall patterns but, synergistic effects causing the release of methane hydrates, ocean forests and species dying off create many unforeseen impacts such as a decrease in the amount of oxygen in the earth's atmosphere. Sea level is generally expected to rise to 18-59cm by the end of the 21st century (Hoyos, 2006).

Increasing temperature is likely to lead to increasing precipitation but the effects on storms are less clear (Cubasch and Meehi, 2001). Global warming is responsible in part for some trends in natural disasters such as extreme weather. According to Kerry (2005), hurricane power dissipation is highly correlated with temperature, reflecting global warming. Precipitation hitting the United States from hurricanes has increased by 7 percent over the twentieth century (Kluger, 2007). Hoyos (2006), has linked the increasing trend in the number of hurricanes in recent times directly to the trend in sea surface temperatures. The hurricanes we see today are indeed a direct result of climate change and that the wind and warmer water condition that fuel storms when they form in the Caribbean are, increasingly due to greenhouse gases (Holland, 2006).

Also, over the course of the 20th century, evaporation rates have reduced worldwide (Peterson, et al, 2002). This is through by many to be explained by global warming. As the climate grows warmer and the causes of global dimming are reduced, evaporation will increase due to warmer oceans. Because the world is a closed system, this will cause heavier rainfall, with more erosion, this erosion, in turn, can in vulnerable tropical areas lead to desertification. On the other hand, in other areas, increased rainfall leads to growth of forests in dry desert areas. Increased evaporation could result in more extreme weather as global warming progresses.

Climate change has had more impact on the people than expected. Catastrophic losses in materials, human and vegetal resources doubled and are expected to double roughly every 10 years because of increase in construction costs, increases in the number of structures and changes in their characteristics (PieJke, 2008). In terms of hurricane damage, according to Pielke (2008), the decade 1996-2005 has the second most damaging effect among the past 11 decades, with only the decade 1926-1935 surpassing its in costs. The most damaging single storm was the 1926 Miami hurricane with \$157 billion of normalized damage

Climate change has led to glacier retreat and disappearance. Glacier retreat declined and

reversed in many cases from 1950 to 1980 when slight global cooling occurred (Pelto, 2005). Since 1980, glacier retreat has become increasingly rapid and ubiquitous and has threatened the existence of many of the glaciers of the world (Vladimir, 2006). Excluding the ice caps and ice sheets of the Arctic and Antarctic, the total surface area of glaciers worldwide has decreased by 50 percent since the end of the 19th century (Pezza, 2006) The loss of glaciers not only directly causes landslides, flash floods, and glacier lake overflow but also increases annual variation in water flows in rivers (Simmonds, 2006). According to a UN climate report, the Himalayan glaciers that are the sources of Asia's biggest rivers such as the Ganges, Indus, Mekong and Yangtze could disappear by 2035 as temperature rises. Thus, the people of India, China, Pakistan, Bangladesh, Nepal and Myanmar could experience floods followed by droughts in coming decades (Adam, 2005).

Also, the role of the oceans in global warming is a complex one. The oceans serve as a sink for carbon dioxide, taking up much that would otherwise remain in the atmosphere, but increased levels of carbon dioxide have led to ocean acidification (Bindoff, 2007). Furthermore, as the temperature of the oceans increases, they become less able to absorb excess carbon dioxide. Global warming is projected to have a number of effects on the oceans as rising sea levels due to thermal expansion and melting of glaciers and ice sheets including the warming of the ocean surface leading to increased temperature stratification.

There have been predictions also and some evidences, that global warming might cause loss. Of carbon from terrestrial ecosystems, leading to an increase of atmospheric carbon dioxide levels. Several climate models according to Cox and Betts (2000), indicate that global warming through the 21st century could be accelerated by the response of the terrestrial carbon cycle to such warming. Climate change has affected many mid latitude regions such as Mediterranean Europe which experienced decreased rainfall and increased risk of drought, which in turn would allow forest fires to occur on a large scale and more regularly. This releases more stored carbon into the atmosphere than the carbon cycle can naturally re-absorb, as well as retuning the overall forest area on the planet (Suzuki, 2006).

Man's effort at sustainable development in infrastructures such as roads, airport, runways, lines and pipelines sewers, water mains, etc., have been threatened by climate change. They may require increased maintenance and renewal as they become subjected to greater temperature variation which have led to high levels of subsidence, resulting in buckling roads, sunken foundations and severely runways (Weber, 2007).

In the field of agriculture, it was hoped that a positive effect of global warming would be increased agricultural yields, because of the role of carbon dioxide in photosynthesis, especially in preventing photorespiration, which is responsible for significant destruction of several crops. In Iceland, rising temperatures have made possible the widespread sowing of barely which was untenable twenty years ago (Brown, 2005). Local benefits may be felt in some regions, but recent evidences shows that global yields will be negatively affected. Rising atmospheric temperatures, longer droughts and side-effects of both, such as higher levels of ground-level ozone gas according to Vidal (2005), are likely to bring about a substantial reduction in crop yields in the coming decades.

Effects of Climate Change: the Africa Experience

Everyone in the world is affected by climate change, but we are not all affected equally. It is the billions of the world's poor who will suffer the most. With increasing climate fluctuations, the poorest countries of Africa suffer most because of their geographical location, low income and their heavy reliance on climate sensitive sectors such as agriculture (Okonjo-Iweala, 2008). Climate change has the potential to reverse much of the hard earned progress made towards achieving the Millennium Development Goals including the goals of eradicating, combating communicable diseases and achieving environmental sustainability (Okonjo-Iweala, 2008).

The geography of Africa makes it more vulnerable to climate change. About 70 percent of the population rely on rain-fed agriculture for their livelihood. Tanzania's official report on climate change suggests that the areas that usually get two rainfalls in a year will probably get more and those with only one rainy season will get far less. The net result is expected to be 33 percent less maize-the country's staple crop-will be grown (Vidal, 2005).

Climate change may be one of the causes of the Darfur conflict. The combination of decades of drought, desertification and overpopulation are among the causes of the conflict. Because, the Arab Baggara nomads searching for water have to take their livestock further south, to land mainly occupied by farming peoples (Benjo, 2007). The scale of historical climate change as recorded in Northern Darfur, is almost unprecedented. The reduction in rainfall has turned millions of hectares of already marginal semi-desert grazing land into desert. The impact of climate change is considered to be directly related

to the conflict in the region as desertification has added significantly to the stress on the livelihoods of pastoralist societies forcing them to move south to find pasture (UNEP, 2007).

In West Africa, according to Campbell (2007), flood affected 80,000 people in 14 countries, while in Lesotho, high temperatures and drought destroyed crops. In Sudan, torrential rainfall as a result of climate change left 150,000 people homeless. In Nigeria, cases of flood disaster as a result of climate change have been reported in many parts of the country. In Darazo Local Government Area of Bauchi State, flood submerged over 250 houses and rendered many families homeless and destroyed many farmlands and crops. The hope of farmers in the area has been dashed. Also, flood from Duku River in Gombe State, has over run many houses and the inhabitants of the area were rendered homeless.

Rising temperature may also foster the spread of diseases by enabling mosquitoes, ticks and other disease carrying organisms including fungi to spread further a field. It can therefore, be ascertained that the dangers posed by climate are nearly as dire as those posed by nuclear weapons. The effect may be less dramatic in the short run, but over next three to four decades, climate change could cause irremediable harm to the habitats upon which human societies depend for survival.

Recommendation

The combined effect of global warming may have particularly harsh effects on people and countries without the resources to mitigate those effects. This may slow economic development and poverty reduction and make it harder to achieve the millennium Development Goals (Richards, 2007). It is on this premise that this paper recommends.

- ❖ The scaling of work on climate change by the international community, while at the same time ensuring increased energy access in poor countries.
- ❖ Reducing greenhouse gas emission and speeding the transition to a low carbon economy.
- ❖ Helping developing countries adapt to climate change risks
- ❖ There is the need for renewable energy; including solar, wind, geothermal, biomass and hydro up to 10 MW in developing countries. This will lead support for socially and environmentally responsible hydropower.
 - ❖ With the help of the Global Environmental facility and other donor agencies projects to commercialize a new generation of less expensive clean energy technologies can be initiated in developing countries to check global warming.
 - ❖ The World Bank should identify cost effective growth paths for major emerging economies in order to reconcile rapid growth and rising energy consumption aimed at climate change mitigation.
 - ❖ With collective effort, with all partners in the international community cooperating to improve financing, share knowledge better and adopt advanced technologies faster, we can rise to this double challenge—fighting environmental degradation and fighting climate change for the poor of the world in the 21st century.

Conclusion

Climate change has continued to pose a threat to human existence, hence in a recent report of the UN sponsored Intergovernmental Panel on Climate (IPCC), global warming is "unequivocal" or a fact and very likely mankind is largely to blame. Global warming presents the greatest test we humans have yet faced. If we are to meet that challenge of combating rising sea levels, glacier retreat, flooding, arctic shrinkage and altered pattern of agriculture among others successfully, we must move quickly and decisively. Yet with no iota of doubt, our planet appears to be in peril, but its continued existence as a home for mankind is not far-fetched.

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