GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

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ABSTRACT

Greenhouse gas emissions have been linked to global warning. The world has entered a period of unprecedented environmental change as evidenced in the rapid growth of natural and man-made changes in the biosphere during the final quarter of 20th century. One of the major causes of this is the effect of green house gas emissions. Although scientific evidence remains inconclusive on the issue of global warming, it is recognized that the potential impact of greenhouse gas emissions on society and ecosystems may prove to be significant. The continued increase in concentration of GHG in the atmosphere is likely to lead to climate change resulting in large changes in ecosystems, leading to possible catastrophic disruptions of livelihoods, economic activity, living conditions, and human health. The United Nations Framework Convention on Climate Change requires the parties to protect the climate system in accordance with their 'common but differentiated responsibilities' and respective capabilities. To address the environmental issue of greenhouse gas emissions properly, one needs to have an open and sound mind.. This study shall bring to bare the reality of this global issue.

KEYWORDS: Greenhouse gas emission, Global warming, Climate change

INTRODUCTION

Greenhouse gas emission refers to the circumstances where both natural and anthropogenic gases are released into the atmosphere where it causes an imbalance in the gas proportions in the atmosphere. This imbalance leads to greenhouse effect, which on the one hand, refers to the condition where the short wavelength of visible light from the sun passes through a transparent medium and are being absorbed, but on the other hand, the longer wavelength of infrared re-radiation from heated objects or simply called earth's radiation are unable to pass through that medium. This trapping of long-wave radiation leads to more heating and a higher resultant temperature (World Bank, 2006; OECD/IEA, 2000 and International Energy Agency, 2005).

According to Vine, Kusher and York (2004), greenhouse gas emission is the leading process that causes the greenhouse effect, which aids in heating the earth's surface and

atmosphere. Dlugochenky (1998) also opined that greenhouse effect is the consequence of certain atmospheric gases such as carbon dioxide, methane, and water vapour being emitted into the atmosphere, and are able to change the energy balance of the planet by absorbing long-wave radiation from the earth. The Intergovernmental Panel on Climate Change (IPCC) (2007) has noted that greenhouse gas emission causes the earth to be naturally blanketed and to be kept at about 33°Celsius and warmer than it would be without these gases in the atmosphere. Over the past centuries, the earth has increased in temperature by 0.5°Celsius and many environmental experts' believe this is because of an increase in the concentration of the major greenhouse gases: carbon dioxide, methane, nitrous oxide, and fluorocarbons. Fears are that emissions of these gases at a rocket rate may result in negative consequences such as frequent and more dynamic floods, droughts, increased prevalence of insect infestation, sea level rise, lower/poor health, and decreasing economic development (Patin, 2002; International Energy Agency (IEA), 2005; Community Development Carbon Fund (CDCF), 2004). Some of these negative consequences have already manifested in Eket Local Government Area due to intense oil and gas exploration and exploitation.

See (2001) believe greenhouse gases make up only 1 per cent of the earth's atmosphere, and they regulate our climate by trapping heat and holding it in a kind of warm air blanket that surrounds the planet. He observed that nitrogen (N_2) and oxygen (O_2) do not absorb infrared radiation but carbon dioxide (CO_2) methane (CH_4) and nitrous oxide (N_2O) do absorb such radiation

Statement of the research problem

The problem of gas flaring has been created by a consortium of international oil companies, which have been in operation in Africa since the 1950s (Africa News Service, 2003). The economic and environmental ramifications of excessive gas flaring in Nigeria's Niger Delta are quite serious because it is a waste of potential energy for domestic and industrial needs; it is also a major source of environmental degradation through the pollution of water, air, soil, plants and animals. Michael (1997) reveals that the build-up of greenhouse gases in the atmosphere have been driven largely by growing consumption of fossil fuels in the industrialized world, together with the wanton destruction of the rain forest in developing nations. As more greenhouse gases are emitted into the thin atmosphere, global temperature also rises and these warmer temperatures lead to global warming, which in turn results in weather extremes including heat waves, frequent droughts and worsening air quality. There are frequent complaints in Eket/Ibeno areas about heat rash and general discomfort, asthma, malaria and dengue fever, foul air, poor agricultural yields, declining fish catch, and upper respiratory tract infections in children and adults. In the area surface streams have become polluted, there are power outages due to frequent thunderstorms and rapid deterioration of physical structures, including zinc roofs. Medical reports also suggest that increasing number of the productive human population suffer from heart attack, a very serious situation that impacts on the production and gross domestic product of the place.

Literature Review

Global Warming Theory

According to Ekpoh (2002) and Edouard and Martin (2006), the science behind global warming is often portrayed as enormously complex, but some of it is quite simple. It begins with a ray of light, shot through space from the staggering inferno of our sun. That sunbeam delivers energy to earth, giving us light and warmth and life. As some of this energy radiates back toward space as heat, a portion is absorbed by a delicate balance of heat-trapping (or "greenhouse") gases in the atmosphere that create an insulating layer. Without the temperature control of this greenhouse effect, the Earth's average surface temperature would be 0°F (-18°C), a temperature so low that the Earth would be frozen and would not sustain human life as we know it. A delicate balance of heat-trapping (or "greenhouse") gases in the atmosphere naturally insulates Earth. When the sun shines on the Earth, some of that heat is absorbed, keeping Earth warm enough to support life. The problem is that over the last century, humans have been releasing more and more carbon dioxide and other heat-trapping gases into the atmosphere when we burn fuels and cut down forests. These additional gases have upset the natural balance of our atmosphere, trapping more heat than is healthy for the Earth. The result is human-caused global warming, which brings serious threats from increased flooding to the spread of disease to the disruption of agriculture in many parts of the World.

Based on these facts, it is a general consensus that stopping global warming is urgent - we have just a few years to turn around the growth of greenhouse gas emissions in order to avoid the worst effects. The good news is that we can achieve these emissions reductions with effective national policies and international treaties. We must insist that businesses and governments join individuals around the world to greatly increase energy efficiency, widely adopt renewable energy, and commit to stopping climate change. Success is possible, but we need the help and involvement of all in the process. To achieve this, Ndukwe (2000) posited the fact that there are certain basic principles that underpin the context of environment law. Anijah-Obi (2001) cited one of these principles as "The precautionary principle" which she said the protection of the environment should be the first concern, in the absence of firm scientific evidence as to the effect of a particular substance or activity. That is to say, that there is no need for conclusive scientific proof before preventive action is taken, especially where there are threats of serious or irreversible damage to the environment.

According to Harte (2006), no human challenge is so potentially uniting as the climate crisis. Our human drive to invent and build has led to extraordinary advances and great technological promise. It's also had grave, unintended consequences. And unless we face the climate crisis with ingenuity, resolve, and a sense of urgency, much of the world as we know it will begin to unravel before our eyes. The warning signs are plain to see. The 10 warmest years on record have all occurred since 1990. Mountain glaciers are fading on every continent and the sea ice is melting. The seas have begun a slow but menacing rise. They also maintained that the most abundant of the greenhouse gases is water vapor. In addition, there are other powerful greenhouse gases like carbon dioxide (CO_2), methane, and nitrous oxide. Each of these is a natural part of the never-ending cycle of life, death, and decomposition on Earth. But since the onset of the Industrial Revolution humans have been pumping out more and more of these and other greenhouse gases. Scientists are clear: human activities are contributing to global warming by adding large amounts of heat-trapping gases to the atmosphere. Our fossil fuel use is the main source of these gases. Every time we drive a car, use electricity from coal-fired power plants, or heat our homes with oil or natural gas, we release carbon dioxide and other heat-trapping gases

into the air. The second most important addition of greenhouse gases to the atmosphere is related to deforestation, mainly in the tropics, as well as other land-use changes. They pointed out that the concentration of CO_2 in the atmosphere is now 380 parts-per-million (ppm), 100 ppm higher than at the beginning of the Industrial Revolution. But we can look back even further. By drilling into the deepest glacial ice we can measure CO_2 deep into time. This ice library shows more carbon dioxide in the atmosphere than at any time in last 650,000 years.

Categories of Greenhouse Gases

Wittwer (1998) asserts that the only recognized greenhouse gases are water vapour, carbon dioxide, methane, Nitrons oxide, Ozone and other man-made greenhouse gases which include hydrofluorocarbons (HFCs), perflorocarbon (PFCs) sulfur hexafluoride (SF6) and chlorofluorocarbons (CFCs). According to the United States Environmental Protection Agency (USEPA, 2004), the following are recognized as greenhouse gases according to their major sources

1. Water vapour - Natural
2. Carbon dioxide - Natural/Anthropogenic
3. Methane - Natural
4. Ozone - Natural
5. Nitrous oxide - Natural
6. Sulfur-hexafluoride - Anthropogenic
7. Perfluorocabon - Anthropogenic
8. Hydrofluorocarbon - Anthropogenic
9. Chlorofluorocarbon - Anthropogenic
10. Sulfur Dioxide - Natural
11. Carbon monoxide - Anthropogenic

According to Smith (1993), since about 1750, human activity has increased the concentration of carbon dioxide, methane and some other greenhouse gases. Natural sources of carbon dioxide are 20 times greater than its anthropogenic sources, but over periods longer than a few years, natural sources have closely balanced natural sinks such as weathering of continental rocks and photosynthesis of carbon compounds of plants and marine plankton (Raven, 1993). The author further advanced that as a result of the balance, the atmospheric concentration of carbon dioxide in the past remained between 260 and 280 ppm for the 10,000 years between the end of the last glacial maximum and the start of the industrial era.

Thomas (2004) and Thomas and Zelikoff (1999) have revealed some of the main sources of greenhouse gases due to human activity to include: burning of fossil fuels and deforestation which leads to higher carbon dioxide concentrations. That is land use change for instance

(mainly deforestation in the tropics) accounts for up to one third of total anthropogenic CO_2 emissions. Livestock enteric fermentation and manure management, paddy rice farming, wet land changes, pipeline losses, and covered vented landfill emissions leading to higher atmospheric methane concentrations. Many of the newer-styled, fully vented septic systems that enhance and target fermentation process are also sources of atmospheric methane. Use of chlorofluorocarbons (CFC_S) in refrigeration system, and use of CFC_S and other halons in fire suppression systems and manufacturing processes is a contributing factor.

Kim (2008), in his emission of greenhouse gases report, outlined the principal greenhouse gases that enter the atmosphere because of human activities to include: Carbon dioxide: which enters the atmosphere as a result of burning of fossil fuel, solid waste, trees, and wood products, and also as a result of other chemical reactions. Nitrous oxide: Is also emitted during the combustion of fossil fuels and solid waste. Halocarbons (i.e. CFC, HCFCs otherwise known as High Global warning potential gases (High GWP-gases) are emitted as a result of industrial processes. Vine, Kushler and York (2004) and World Bank (2006) also outlined sources of the greenhouse gases, which is in consonance with that of Kim (2008). They included the source of ozone, carbon monoxide, and sulfur dioxide, as follows:

i. Ozone – are emitted into the atmosphere as a result of photochemical reactions involving oxygen (O_2).

ii. Carbon monoxide: Emitted due to plant emission and also from man-made releases during transport and industrial processes.

iii. Sulfur dioxide: Are emitted into the atmosphere as a result of volcanic eruptions and also from the burning of coal and biomass.

Although many people associate public exposures to air pollution primarily with urban outdoor settings, but it is a known fact that indoor environments can also be contaminated, both from pollution penetrating from outside and from indoor sources. Perhaps less generally understood by the indoor air community, however, is that the largest exposures to health-damaging indoor pollution probably occur in the developing world, not in the households, schools, and offices of developed countries where most research and control efforts have focused to date. As a result, much of the health impacts from air pollution worldwide seem to occur among the poorest and most vulnerable populations, largely women and young children who are most exposed to the indoor pollution sources in poor countries. These high individual and population exposures are the result of a set of factors:

• About half the world's households use unprocessed solid fuels for cooking, ranging roughly from near zero in developed countries to more than 80% in China, India, and Sub-Saharan Africa (Holdren, et al., 2000).

• In simple small-scale devices, such as household cook stoves, solid fuels have rather large emission rates of a number of important health-damaging airborne pollutants including respirable particulates, CO, dozens of toxic hydrocarbons, and, depending on combustion and fuel characteristics, nitrogen and sulfur oxides.

• A large, although uncertain, fraction of such stoves are not vented, i.e. do not have flues or hoods to take the pollutants out of the living area.

• Even when vented to the outdoors, unprocessed solid fuels produce enough pollution to significantly affect local neighborhood pollution levels, with implications for total exposures (Smith et al., 2000). As cook stoves are essentially used everyday at times

when people are present, their exposure effectiveness (or intake fraction) is high, i.e. the percentage of their emissions that reach people's breathing zones, is much higher than for outdoor sources (Smith, 2002a).

• The individual peak and mean exposures experienced in such settings are large by comparison with WHO guidelines and national standards.

• Because so many households are involved, the resulting global indoor population exposure is high, probably substantially exceeding total global outdoor exposures for several important pollutants, including respirable particulates (Smith, 1993).

Greenhouse Gas Emissions/Climate Change and People's Perception

Anderson (2010) notes that climate change is a key causative factor of increased hazards that are leading to disasters, in fact, the average number of disasters caused by natural hazards has increased in the last 20 years from 200 a year to more than 400 today and this is predicted to increase by as much as 320 percent in the next 20 years. Disaster risk reduction in the education sector aims to plan for educational continuity and to strengthen education systems and learning for disaster reduction and prevention, which are also critical components of climate change adaptation. Educators have long traditions of educating for social change and can use their expertise on knowledge, skills, and attitude and behavior change to help reduce greenhouse gas emissions. In addition to education's integral role in behavior change, schools have a role to play in mitigation in terms of becoming carbon neutral and reducing their own ecological footprint. Education is also a critical component of adaptive capacity: the way that people are educated and the content of education provide the knowledge and skills needed for making informed decisions about how to adapt individual lives and livelihoods as well as ecological, social or economic systems in a changing environment (Anderson, 2010).

Kurup (2004) maintains that global warming is accelerated by human activities like industrialization, deforestation, farming and increased energy consumption through transportation and use of air conditioners. There are several national and international reports emphasizing the importance of education and community based actions to reduce the impacts of environmental problems. Citizens need to be scientifically literate about the greenhouse gases effect and global warming in order to participate in decision-making and to take appropriate actions in their own lives for a sustainable, green and clear environment. Collectively these decisions and actions have similar impact and significance as those taken by industry to reduce carbon emission by adapting clean and alternative sources of energy. A scientifically literate public would improve the quality of public decision making and actions. Greater familiarity with the nature and findings of science will also help the individual to question pseudo-scientific information. The most important question, therefore, is what kind of education in science would help people make the social and personal judgments and actions regarding social and environmental issues. In this context, it is very important that students the future citizens should

be scientifically literate and be committed to acting in ways that reduce greenhouse gas emissions thereby global warming.

According to Pugliese and Ray (2009), Gallup conducted the first comprehensive survey of global opinions between 2007 and 2008 on climate change, asking respondents in 128 countries about their awareness of the issue and the extent to which they perceive climate change as a threat to themselves and their families. Overall, Gallup's data reveal a majority (61 percent) of the world's adult population knows at least something about global warming. Forty-one percent are aware of the issue and perceive it as a serious threat. Gallup's survey, which is representative of both urban and rural areas, reveals that the general Chinese perception of climate change as a relatively low threat is pervasive across demographic and geographic groups. Awareness is higher among urban Chinese (77 percent) than rural Chinese (52 percent). But even within urban and rural areas, education has an independent, additional effect on awareness. As education levels increase, so does basic awareness of climate change.

For the survey, a total of 206,193 interviews was conducted across 128 countries in 2007 and 2008. A nationally representative sample of the civilian, non-institutionalized, adult population aged 15 and older was interviewed in each country, either in person or by telephone. The coverage area is the entire country including rural areas; exceptions include areas where the safety of interviewing staff is threatened and scarcely populated islands in some countries. Interviews are stratified by population size and or geography and clustering is achieved through one or more stages of sampling. Country-level data are weighted to the 2008 World Bank population estimates (aged 15 and older) to derive the regional and worldwide summary figures in this article.

Conclusion

Greenhouse gas emissions are significant to the human knowledge and policy making towards minimizing the hazards (health) on the people living in oil producing areas. The study reveals that because of the significant concentration of carbon dioxide in the atmosphere, a lot of people suffered heart attack in the area. In view of the above, there is no masquerading the fact that increase in human activities have increased the magnitude of atmospheric concentration of greenhouse gases. Increased or raised levels of greenhouse gases therefore have serious effects on human health in the study area.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. As a way of curbing increased gas flaring, government should as a matter of policy encourage gas re-injection strategy by all oil companies.
2. The government should work in concert with multinational companies in the area to encourage periodic medical checks and subsidized bills on gas related sicknesses for the people of the area.
3. There is the need to examine the effect of greenhouse gas emissions on the water resources, soil and agricultural productivity and socio-economic life of the people with regards to their various occupations.

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