

Biology education as a tool for combating global climate change

Isah Bala

Department of Biological sciences, Nigeria Police Academy, Wudil, Kano, Nigeria

*Email: isahbala@yahoo.com

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Abstract

Global climate change is a climate change that is caused globally by the release of fuels in the atmosphere. Fuels (gases) such as carbon dioxide, sulphur dioxide and lead compounds etc are into continuous release to atmosphere as a result of human activities, such human activities include modernisation and industrialization which continuously reduces the number of green houses gas (GHG) emissions to the atmosphere and this consequently bring about the global climate change. As a result of its effect, numerous programs, seminars and awareness campaigns were carried out aimed at bringing about awareness to public on the causes effect and control of this global climate change. The use of biology education can equally be used as a tool for combating global climate change where human activities like poor agricultural practice, deforestation, industrialization etc. would be discussed as causes for the release of gases to the atmosphere. The effects like Carbon dioxide and green house effects, ozone depletion effect and acid rain effects would equally be discussed as possible consequences for global climate change. Then use of afforestation programme, good agricultural practices, use of predators like bats and lizards and plant conservation through botanic gardening would serve as solution to global climate change.

Keywords: Global, Climate, Biology Education

INTRODUCTION

Global climate change is climatic change that is caused by the release of fuels (Gases) into the atmosphere. Nature has made balance in the amount of gases occurring naturally occupying the atmosphere. The activities of human has thwarted the balance where certain number of gases (carbon) occupy more space than space given to it by nature.

Carbon dioxide is normally present in the lower atmosphere, (I.E the troposphere), in very small amount, about 0.03% by volume. Its importance lies in its contribution to the planetary green house effect. Carbon dioxide is transparent to in coming short wave radiation from the sun, but absorbs strongly the long wave radiation which the earth re-radiates into the space. It therefore traps the out going radiation, warming the lower atmosphere, which in turn radiates energy back to the surface of the earth. Ultimately of course, any given package of in coming energy will eventually be dissipated and lost to space, but the atmosphere surface exchanges induced by the present of carbon dioxide (and other near surface green house gases) are sufficient to raise planetary surface temperatures some 32 0c above those that would otherwise occur.

It is important to realize that without the basic green house effect, which has varied little for millions of years, living system as we know them would not exist. The contemporary concern lies with the clear evidence that carbon dioxide levels (and those of other green house gases notably carbon mono oxide methane and chlorofluorocarbons) are rising at a rate unprecedented in recent earth history and their increased presence may lead to an increasingly warmer surface environment (global climate change). This may in turn lead to an increased evaporation and a greater atmospheric water vapour content. Since water vapour also act as a powerful long wave observer, this may further increase surface temperature. A resulting rise in surface temperature would cause changes in the distribution pattern and intensity of the

major planetary weather system which would profoundly affect human activities and the distribution of organisms.

Some human activities leading to global climate change

Until the last ten thousand years or so, living system evolved in response to changes in the a biotic environment, unaffected by human activities. Since the development of agriculture and technology, an increasing human impact on the environment has occurred. In the last two centuries, especially wide spread industrialization has led to potentially damaging environmental pollution. Taylor, et al. (2004).

Below are some human activities that contribute to global climate change.

Global deforestation

Forest are the natural climax of many part of the world covering, until recent years, a one third of the land surface. It has been estimated that, many hectores of forest are disappearing annually by removal of good timber species in appropriate management and in attension to conservation needs.

Furthermore, increase of human population size leads to higher need for larger areas of land for cultivation to supply food. In addition, fuel wood gathering also lead to further deforestation. Changing land use may make the situation worse, such as clearance of large areas for the growth of cash crops. Lost of forest is serious for many reasons like desertification, erosion, leaching, extinction of wild life and loss of traditionally harvested products e.g. timber, fruits, honey and herbs, that one time supplied local people with their needs, but more importantly deforestation increases global carbon dioxide, which may have a long term effects on the global climate.

Poor agricultural practice

Agriculture involves cultivation of crops plants and rearing of animals for the use of man. The plant cultivation process is attached to sequence of cultural practice that are very important for good hervest yielding to be obtained, such practices include land clearing, cultivation practices, fertilizer application, pesticides application, harvesting etc. some of these practice are not done properly by farmers. For example, pesticides are chemicals substances that are applied to control pest. Pesticide is an all embracing word for herbicides (which kill plants) insecticides (which kill insects) fungicides etc. these pesticides has ecological characteristics which include toxicity, persistence and specificity. These ecological characteristics should be taken into consideration by all farmers applying pesticides.

Over application of pesticides and fertilizers result into the evapouration of some of these chemicals into the atmosphere. And that contribute in global climate problem.

Over grazing

Over grazing reduces the sparse vegetation cover of an area by livestock. Grassland that are over grazed frequently lose the plant cover that holds the top soil. Plants are eaten to the roots and subsequently they die. Death of these plants expose the soil to problems like erosion, leaching and more so, increases global carbon dioxide which may have been used by these plants. This may have a long term effect on global climate.

Industrialisation

Industries are known as places where modern productions are made. But on other hand, they are known as sources of air pollution. Important atmospheric pollutants from industries include gases such as chlorofluro carbons, sulphur dioxide, hydrocarbon etc. these gases produced by industries may be transported long distance in the air, causing adverse effect in environments far removed from the source of emission. These gases equally accumulate in the atmosphere increasing levels of natural gases, such as carbon dioxide and hence contribute to global climate change.

Effects of gases release into the atmosphere

The release of gases into the atmosphere from the above discussed sources may have the following effects:

Carbon dioxide and green house effect

The release of carbon in complex organic forms from fossils fuel by burning and in complex in organic forms from rocks in cement formation leads to increase in the amount of carbon in the atmosphere. Activities of deforestation,

industrialization and over grazing leads to the reduction of the number of plants needing such carbon for photosynthesis. These excess carbon dioxide production has no where to go but to occupy the upper atmosphere. This may in turn leads to increase evaporation and hence accumulation of a greater atmosphere water vapour also act as a powerful long wave absorber, this may further increase surface temperatures. A resulting rise in surface temperature would cause changes in the distribution pattern and intensity of the major planetary weather systems which would profoundly affect human activities and the distribution of organisms.

Ozone depletion effect

The atmosphere provides a thermal blanket and radiation shield to the earth. In the upper atmosphere 15 – 50 km above the earth, oxygen and ozone absorbs much of the incoming short wave radiation which is mostly very harmful to living organisms, in particular, in damaging their genetic materials. Although ultraviolet radiation of certain wave length has a beneficial effect in the production of vitamin D, over exposure to strong sunlight is known to increase the risk of skin concern. Furthermore, radiation absorption by ozone high in the atmosphere warms these higher levels and treats a deep temperature inversion layer (where the highest temperature are at greatest altitude). This effectively limit the movement of air in the atmosphere by convection. Any change or weakening of this inversion layer would profoundly alter global weather patterns and hence earth surface climates (Taylor, 2004).

Ozone is produced high in the atmosphere by the action of sunlight on oxygen molecules. Chlorofluorocarbons are a group of chemicals, including carbon tetrachloride and chloroform which are commonly used as solvents, aerosol, propellants and refrigerator coolants. They are not readily broken down in the atmosphere and may contribute to increased green house warming. Eventually they diffuse into the stratosphere. High in the atmosphere, they are broken down by sunlight, releasing fluorine and chlorine. These react with ozone and break it down into oxygen faster than it can be reformed from oxygen into ozone. Chlorofluorocarbon pollution thus shifts the oxygen ozone equilibrium.

In 1987, a seasonal but complete, depletion of ozone layer occurred, above Antarctica for the first time, and in the 1990's, ozone thinning over the arctic has been regularly, observed (Taylor et al., 2004). Scientists are not certain why this is happening. A possible explanation may be that increased cooling of the stratosphere is taking place due to the enhanced green house effect which is trapping more radiated heat near earth's surface. This may in turn mean the arctic stratosphere is more frequently cold enough to enable formation of stratosphere ice colds. Rapid ozone depletion then takes place. A worrying outcome may be that in spite of world wide efforts to reduce emissions of chlorofluorocarbons, the stratospheric ozone layer may not, as previously predicted, recover quickly in the next century. Recovery may also depend on controlling the enhanced green house effect.

Acid rain effect

Acid rain is neither a simple nor a single phenomenon. The acid gases sulphur dioxides (SO_2) and oxides of nitrogen (NO_2) are produced by burning fossil fuels. In complete combustion of these fuels also releases hydrocarbons. These may have effects as dry gases or they may be washed out of the atmosphere to produce acid precipitation in rain and snow. The most industrialised areas of the world, such as the eastern USA, western Europe, north east china and Japan have all experienced rainfall with a PH well below 4.0 (Taylor et al. (2004).

Acid rain fall (PH <5) often caused major changes in ecosystem and damage to buildings. This often happens in countries bordering those which are major sources of pollutants. Norway and Sweden for example receive acid rain as a result of air pollutants emitted by UK. And industrial centers of Europe which are transported by prevailing high level winds.

Acid rain leaches magnesium and calcium from soils and from damage leaves. Eventually aluminium, manganese and heavy metals such as iron and cadmium, come into solution and may reach toxic concentrations, causing damage to tree roots and leads to the breaking down of mycorrhizas. This decreases the capacity of the tree to take up water and nutrients and hence can kill plant. Any reduction in the number of plants contribute in altering basic green house effect and equally contribute to global climate change.

Control of global climate change.

The devastating ongoing global climate change can be cut down through the following ways.

Afforestation programme

Forest are the natural climate vegetation that are often on uplands and on water sheds. An intact forest canopy softens the impact of intense tropic rain fall in many ways. It releases large amount of water to the atmosphere in evaporation

and transpiration and channels water gently through the vegetation to the soil. The vegetation that makes up a forest when allowed to live contribute in green house gas emission that help in slowing down global climate change. More so, afforestation reduces global carbondioxide which help in combating global climate change.

Good agricultural practices

Practices of fertilizer and pesticide application should be done correctly in order to avoid over application that may lead to either water pollution and air pollution. Both pesticide and fertilizer are sold with application guidelines. The guidelines should be strictly followed. When application are made correctly there may be no air pollution. And that would definitely reduce the amount gases accumulation in the atmosphere by evaporation. And by that global climate change is slowed down a bit.

Bats, Birds and Lizards can fight climate change

Birds, bats, and lizards may play an important role in earth climate by protecting plants from insects that forage the foliage. A new study suggest that preserving these animals could be a low tech way to fight climate change. The presence, abundance and diversity of birds, bats and lizards,(the top predators in the insect would), has impact on the growth of plants. (Daniel, 2009). Because these animals feed on both plant eating and insect eating bugs in equal number, it was believed that they wouldn't have a net effect an plant growth. When the animals gobble up the plant eating insects, the population of these harmful insects decreases. But when the animals feed on insect eating insects, there are fewer predators to eat the herbivores. Plants are last organisms needed on earth. Because if you don't have plants you don't have organisms that are recapturing carbon and hence global climate change continue.

Plant conservation through botanic gardening

Plants are best conserved in situ (i.e. Where they occur naturally) In situ conservation can achieve maintenance of large number of individuals for minimum management and cost. Species protected in their natural habitat can continue to evolve along side their pollinator's, symbions, competitors and predators. This will ensure that they retain their fitness and adaptiveness. The more the plant live the less the global climate change.

CONCLUSION

Education is described as the total process of human learning by which knowledge is imparted, faculties trained and skills developed (Farent, 1998) and biology deals with the study of life.

Biology is one of the science subjects that national policy on education stipulates its teaching in primary as part of health science, in Junior secondary as part of integrated science, in senior secondary as Biology, in higher institutions as Biology etc.

Because of the above reason many students gained admission into faculty of education of most higher institution as biology teachers. When the detailed of what is presented in this paper is given to such students, definitely the knowledge of the cause, effect and control of global climate change would disseminate to all our schools and when put to practice, hopely by 2020, global climate change would be a history.

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