

ideologies. Educating the next generation of scholars and citizens to both understand knowledge content about the complex climate system and to be ‘emancipated’ from the philosophy of climate change denial and to begin to think about how and what we can do about climate change . Folke (2006) required carefully rethinking paradigms and ways in which curricula and knowledge about climate change are currently framed. Such effort by these authors is necessary so that we can create a cohort of flexible, interactive thinkers and doers. These knowledge content domains and curricula will not only require knowledge and skills usually vested in local contexts and provided by established ‘centres of learning’, for instance a school or university, but will also require broader approaches that are mindful, informed, and open to the needs of society and the wider environmental context in which decision-making occurs.

Several authors are calling for a different approach to education and capacity-building (O’Brien et al, 2013). Integration for climate change learning thus entails integrating across ‘traditional’ school and university disciplinary silos (e.g. biology, physics, economics and law) and developing an educational space that allows for co-engagement of both world and personal views in relation to the world in which we live. Recently, calls have been made both internationally and locally for transforming the current framing of ‘climate change’ knowledge. The complex environmental and social challenges of the 21st century cannot be addressed with the approaches of the past, and several authors are calling for a different approach to education and capacity-building (O’Brien *et al.*, 2013).

Ikehi et al (2014) worked extensively on the need to integrate climate change into the curriculum of secondary schools especially into agricultural science. Curriculum is a deliberately and systematically planned attempt to change the behavior of young and inexperienced to enable them gain the insight that helps them solve problems for a better society. Curriculum is also an instrument through which schools seek to translate the hopes of the society into concrete reality. Curriculum if well served, helps youths to build and develop their cognitive and psychomotor abilities. The choice for constraining the study to secondary school is due to the fact that it is at that level that children begin to develop the desires for the environment and choice of career. So well

structured curriculum will help to develop their knowledge, skills and attitudes.

There already exists much climate change related topics that also reflects in agricultural science such as soil conservation, the ecosystem, weathering etc. Habit formation takes time to stick and once it does, it's difficult to erase, when climate change education is philosophically and psychologically inculcated into our youth who are the future of tomorrow, they'll grow to naturally love nature and conserve it without much campaigns and orientations as we now have. Thus conserving revenue that is used for this campaigns and orientations year- in, year-out. It is well established that climate change poses a serious threat to agricultural production, particularly on rain-fed agriculture. For instance, climate change results in stunted growth and low yield of food crops, late fruiting of tree crops, easy spread of pests and diseases on crops and livestock. Thus it impinges directly on food security. Responsive institutions and problem-focused knowledge generation are key elements for effectively addressing challenges emerging from climate change. It therefore implies that climate change and its variables like causes, effects and mitigation could be integrated into the secondary school agricultural science curriculum to equip learners with the necessary skills for adaptation.

The term curriculum refers to the lessons and academic content taught in schools or in a specific course or program. In dictionaries, curriculum is often defined as the course offered by a school, but it is rarely used in such a general sense in schools. Depending on how broadly educators define or employ the term, curriculum typically refers to the knowledge and skills students are expected to learn, which includes the learning standards or learning objectives they are expected to meet (The Glossary of Education Reforms, 2015.).

2.2 The participatory and inclusive approach to climate change

In almost all cases, a participatory and inclusive approach is fundamental, that is, where the 'teacher' acts as a facilitator and co-generator of knowledge and not as a 'font of wisdom', imparting only content knowledge to passive learners. Internationally, recognition of the need for education as a central component of sustainable development has been acknowledged (O'Brien *et al.*, 2013). Key elements include being able to learn in order to know, to do and to be able to transform self and

society (Combes, 2006).

Renewed commitments to enhanced training and the development of curricula for sustainability were also recently made an outcome of *Shaping the Future We Want* (UNESCO, 2014). Alongside, the recognition of sustainable development, there has also been a growing acknowledgement that systems that sustain our planet, including complex socio-ecological systems, should include arrangement of ‘knowledge’, including those informed from an African perspective – such as local and indigenous knowledge.

2.3 Climate Change and its Relationship to Global Warming

In 2007 the Intergovernmental Panel on Climate Change (IPCC) Working Group I AR4 (Fourth Assessment Report) clearly declared that the contribution of human activities to recent global warming is certainly more than 90 per cent (IPCC, 2007). Akimasa et al. (2011) considered this view as widely accepted by global scientific and political communities, which means that we have entered into an important stage of the global warming issue: the age of action. However, various questions will arise on entering this decision making stage, and there may be increased levels of skepticism. It is therefore necessary to reconsider what the global warming issue means for our future and evaluate the available courses of action. The Earth’s climate system is determined by radiative energy and material balances. With regard to energy, Earth’s climate can be considered an open system; however, it is a closed system as far as most materials are concerned. Energy is measured by temperature, while a typical example of material is water (precipitation), which is a reason why traditional climate classification is based on temperature and precipitation. Temperature in the Earth’s climate system is determined by the balance between incoming and outgoing energy. If the former is larger, the temperature will increase, although its distribution in the system is determined by processes within the system. In reality, the Earth’s climate consists of many interacting subsystems that influence the distribution of energy. Precipitation also results from interactions between many processes in the climate system. At the same time, it should be noted that the Earth’s climate is dynamic rather than static. The Earth has experienced many dramatic climate changes, including

several ice ages.

Following the Industrial Revolution, human beings have become a component in the Earth's climate system. Through modification of the environment, we possess the power to reduce environmental constraints around us. By changing land cover and land use, we have increased our food supply. Furthermore, car use has amplified our ability to move. Emission of global warming gases associated with these human activities has resulted in changes in the minor constituent concentration in the atmosphere; this disturbs the earth's radiative energy balance, resulting in a warmer climate. Also, perturbation induced by humankind does not only affect the radiation energy balance, but happens in many other fields as well. Thus it is concluded that the environment around us consists of interaction between various subsystems. To summarize these interactions, Komiyama and Takeuchi (2006) introduce three subsystems – the global (natural), social and human – and the various problems around us (the Earth's environmental issues) that result from the imbalance between these subsystems sub systems, but these three represent the three dimensions in a frame of thinking towards a sustainable society when each issue is considered.

The three societies, i.e. the low-carbon society, the resource-circulating society and the nature-friendly society, should be realized simultaneously. But even when action is taken to attain a low-carbon society, attention must be paid to these three interactions. For example, the global warming issue is caused by the imbalance between the global (natural) and social systems. Greenhouse gases emitted by human activity have changed the concentration of the atmosphere, which perturbs the radiation balance in the Earth's climate system. Here it should be noted that the present climate is not the most ideal climate. The environment has evolved by adapting to climatic conditions. In other words, our society, natural resources and ecosystem services are under these climatic conditions – thus it is easy to understand that changes in the present climatic conditions will impact on our society. One result of the imbalance between the social and human systems is material circulation. Through production and consumption, we have produced many artifacts' that have changed natural resources into waste. This waste production cannot continue indefinitely without consequences, and therefore a circulation of materials (recycling) is necessary. Examples of the imbalance between

the global (natural) and human systems are natural hazards such as earthquakes, tsunamis, typhoons and hurricanes.

2.4 Politics and the Science of Global Climate Change

At present it is vital for politics to listen to the voice of science, but there remains a significant gap between the two fields. Politicians need all necessary knowledge, but policy usually requests more than science can provide. This provokes questions about the suitability of science for political decision-making, but it is clear that science is crucial. The present issues could not be addressed without scientific and technological knowledge. However, convincing politicians of scientific suggestions remains difficult because science relates the conclusions that follow logically from data and established theories. In contrast, politics has to pay attention to different aspects of human beings, such as desire, lust and economic values. The value system and mental situation of each individual must also be considered (Akimasa et al. 2011)

When issues emerge, scientists believe that we should attempt to gain a full understanding of each aspect and how it might interact with what is already known. While this is true, there are many problems that require action before complete understanding can be gained. Global warming is just such a problem. When we take action before complete understanding, analysis of the criteria for action should be undertaken. It is easy to say that the present generation should take action on behalf of future generations, but full consideration of why and how we should act is imperative. “Freedom, equality and fraternity” is a slogan from the French Revolution. However, these values cannot always be completely achieved simultaneously.

Mankind is surrounded by many difficulties, and the conquest of nature has always been considered a victory. We now realize that human activity exerts a strong influence over our environment. Therefore, to adapt to the problems caused by global warming, we will have to introduce limits to our freedom. An example of this can be seen in the arms reduction negotiations. To limit nuclear weapons, each country has to limit its freedom to increase its military power. To combat the problems caused by global warming, each society has to limit the freedom of maximizing its own economic interest. People may insist upon their rights to pursue their own interests, but

in some cases these may have to be forfeited. In brief, global warming creates a constraint to global politics and economics. The actions induced by Akimasa et al. (2011) that these issues need international diplomacy. The Nuclear Non-Proliferation Treaty has been created for reduction of nuclear weapons. For global warming, long-lasting international diplomacy is being procured through the activities of the UNFCCC Conference of Parties (COP)/Meeting of Parties (MOP), which has resulted in negotiation about future action following the Kyoto Protocol. Social concern about global warming has now shifted from the scientific question of whether or not human activity contributes to climate change to real action such as adaptation and mitigation. However, on entering the stage of concrete action, we have to consider various aspects of society. In particular, there are distinct differences in position between developed and developing countries. We have to admit that developing countries have a right to develop, and the concept of “co-benefit” must be presented so that policies will be acceptable to nations at different levels of development.

2.5 Reduce the Causes of Climate Change

According to International Energy Agency (2004), scientific understanding of climate change is now sufficiently clear to justify nations taking prompt action. It is vital that all nations identify cost-effective steps that they can take now, to contribute to substantial and long-term reduction in net global greenhouse gas emissions. Action taken now to reduce significantly the build-up of greenhouse gases in the atmosphere will lessen the magnitude and rate of climate change. As the United Nations Framework Convention on Climate Change (UNFCCC) recognizes, a lack of full scientific certainty about some aspects of climate change is not a reason for delaying an immediate response that will, at a reasonable cost, prevent dangerous anthropogenic interference with the climate system. As nations and economies develop over the next 25 years, world primary energy demand is estimated to increase by almost 60%. Fossil fuels, which are responsible for the majority of carbon dioxide emissions produced by human activities, provide valuable resources for many nations and are projected to provide 85% of this demand (IEA, 2004). Minimizing the amount of this carbon dioxide reaching the atmosphere presents a huge challenge. There are many potentially

cost-effective technological options that could contribute to stabilizing greenhouse gas concentrations. These are at various stages of research and development. However barriers to their broad deployment still need to be overcome. Carbon dioxide can remain in the atmosphere for many decades. Even with possible lowered emission rates we will be experiencing the impacts of climate change throughout the 21st century and beyond. Failure to implement significant reductions in net greenhouse gas emissions now will make the job much harder in the future.

2.0 Materials and Method

A descriptive theory was used, using the theory to describe the dimensions and interrelations of the phenomenon of climate change. In this work, specific questions are raised, and answers given accordingly to gain more insight and clarity to the study; such as , what is climate change? What is the sustainable approach for lasting solution to climate change in Nigeria? What are the issues that validate the existence of climate change in Nigeria? What economic sectors that are much affected by the impacts of climate changes in Nigeria? What are the policies and reactions of the Nigerian governments and policymakers towards climate change adaptation? Some of the answers to these questions will come by way of suggestions or recommendations?

2.0 Issues that Validates Existence of Climate Change in Nigeria

2.1 Resource Crisis and Conflicts

Climate change leads to the continuing explosion in global demand for essential resources such as food, water and oil. This is coming just as the planet's ability to deliver many of these materials is weakening. Pockets of evidence abound in Nigeria where there is intermittent struggle over grazing land and water bodies between the Fulani cattle herders and many farming communities, for instance, the mutumbiu and mambila highlands in Taraba State, and the Fufore community in Adamawa State, among others (Ozor, 2009). These crises have always led to several deaths of farmers and pastoralists within and outside the region. Streams and rivers have also dried up in some communities due to climate change, forcing affected communities to go in search of water in neighboring communities with its attendant man hour losses, and propensity

to trigger conflicts and hardships on the people. The situation could worsen for more millions of people as climate change alters the variability and quantity of available water. At the same time, the demand for water is increasing due to the country's growing population and its mounting aspirations. This situation triggers distributional conflicts and poses major challenges to water management systems in Nigeria.

4.2 Increasing Unemployment

As Imhonopi and Urim (2011) observed, the diminishing of resources, drying up of streams, lakes and rivers, the pollution and environmental degradation of arable farmlands, many agricultural and fishing communities will disappear, with the potential of ballooning the unemployment market as many Nigerians at the grassroots lose their jobs. These individuals and families may now be forced to depend on government grants, child support grants, and others, for their survival, due to the decline in the fishing and farming industries. When government support fails to come through or is not adequate, the situation can predispose victims to hunger, sicknesses, resource over-exploitation and other social vices such as conflicts and militancy and these may further threaten Nigeria's political stability if the situation is not arrested.

4.3 Pauperization of Many Nigerians

Climate change has been predicted to deepen poverty both directly and indirectly in developing countries (World Bank, 2010). According to the report, the direct impacts include: the loss of life, livelihoods, assets, infrastructure, and others from climate extreme events. According to a report on the poverty impacts of climate change, it affirmed that the poorest (countries and people) are most at risk and identified a range of poverty-related climate change impacts to include: reduction in crop yield, food insecurity, unemployment, income and economic stagnation, huge displacement of people from coastal and densely populated areas, exposure of millions of people to new health risks, especially from vector-based diseases like malaria and schistosomiasis, as well as water-borne diseases like cholera and dysentery, malnutrition, and susceptibility to desertification, declining soil fertility, and dependency on subsistence agriculture (Nagel et al. 2008).

4.4 Health Crisis

Climate change is known to trigger health challenges within locals. According to Imhonopi and Urim (2011), there are reported incidences of an explosion of climate-related health crisis in many Nigerian communities today. They observed that the aspects of health that will be exacerbated by climate change include: increased cases of cataracts (eye disease) in the northern parts of Nigeria due to low cloud cover and greater intensity of solar radiation; increased cases of malaria and typhoid due to increased rainfall and temperature in certain parts of the country; and increased cases of water-borne diseases such as cholera and dysentery due to urban flooding, and improper disposal of wastes. Gas flaring harms local health through emissions that have been linked to cancers, asthma, chronic bronchitis, blood disorders, and other diseases.

5.0 Nigeria's National Policies on climate change adaptation and mitigation

According National Adaptation Strategy and Plan Action on Climate Change for Nigeria NASPA-CCN (2011), the Government of Nigeria acknowledges the importance of developing a national response to climate change, and is taking steps to build a governance structure to manage the issue. In addition, development of a National Climate Change Policy for Nigeria, and of a Nationally Appropriate Mitigation Action (NAMA) programme document, is on-going. NASPA-CCN has been developed for the country. Its vision and objectives and goals are encapsulated below :

- (i) Envisions a Nigeria in which climate change adaptation is an integrated component of sustainable development, reducing the vulnerability and enhancing the resilience and adaptive capacity of all economic sectors and of all people – particularly women, children, and resource-poor men – to the adverse impacts of climate change, while also capturing the opportunities that arise as a result of climate change.
- (ii) Take action to adapt to climate change by reducing vulnerability to climate change impacts and increasing the resilience and sustainable well being of all Nigerians;
- (iii) Reduce or minimize risks by improving adaptive capacity,

- (iv) Leveraging new opportunities, and facilitating collaboration inside Nigeria and with the global community.

5.1 How will the National Government achieve that?

To reduce the impacts of climate change through adaptation measures that can be undertaken by the Federal, State and Local Governments, civil society, private sector, communities and individuals, including measures that will:

1. Improve awareness and preparedness for climate change impacts
2. Mobilize communities for climate change adaptation actions
3. Reduce the impacts of climate change on key sectors and vulnerable communities
4. Integrate climate change adaptation into national, sectoral, State and Local Government planning and into the plans of universities, research and educational organizations, civil society organizations, the private sector and the media.

The NASPA-CCN Response and action plan also covers policies, programmes and measures on Agriculture (crops and live stocks), Forestations (aforestation and deforestation), fresh water resources, coastal water resources and fisheries.

5.2 Solutions for Climate Change in Nigeria

In Nigeria, available records show that the greatest concentrations of CO₂ which mainly cause global warming are due to the burning of fossil fuels, gas flaring and deforestation (Imhonopi and Urim, 2011). This shows that anthropogenic activities are mainly responsible for climate change. It also means then that measures to mitigate the effects/impacts of climate change will involve mainly legislative and technological approaches. Unfortunately, Nigeria lacks the technological capabilities to deal with this issue. Even when the bills are passed into law there are often implementation problems due to unnecessary bureaucracy and other challenges facing the Nigerian state. It is therefore most appropriate to deal with the matter psychologically and philosophically by incorporating climate change studies into the minds of our youths, as they grow and become industrialist shall have regard for environmental conservation, and adapt to the realities of climate change.

5.3 Conclusion

Legislation, litigation, global and national campaigns are not sufficient to proffer a lasting solution to the issue of climate change structured curriculum of climate change education into the fresh minds of our teens and youths through the formal education system may give a more lasting solution. Climate change is no more an illusion called up by the roguish imagination of the political class or civil society gladiators. Climate change is here in Nigeria as the recent rise in flooding, environmental degradation and pollution and climate change health-induced crises all attest to the need to tackle this insidious enemy boldly.

5.4 Recommendation

Considering the policies of the federal government, it is clear that it is aligning itself with global climate change strategies of many Nation, which is good. But to give a more lasting solution to climate change mitigation and adaptation it is good that government re-consider numerous debates on the need to incorporate climate change studies into agricultural science curriculum for Nigerian secondary schools.

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