

Implication of Climatic Change on Sustainable Environmental and Natural Resource Management in Africa: Individual and Collective Responsibility

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ABSTRACT

The impact of climate change is quite evident: Increasing aridity, disruption of livelihood in term of food and drinking water supply, risking the collapse of marine eco-systems, food insecurity, Arctic melting, loss of glaciers, Amazon and Siberian fires, droughts and floods. Several studies analyzing the content of scientific articles on climate show that almost all articles that take a position on the causes of global warming support the scientific consensus that global warming is due to human activity. This is explained first of all by the use of fossil fuels, and secondly by the balance of emissions from changes in land use. The ocean has absorbed about 30% of human made carbon dioxide emissions which has led to acidification of the waters. Global warming relies mainly on the greenhouse gas emissions, which are currently increasing. There is need to redesign our curricula and demand that ecology be at the Centre for the curriculum today at all educational levels; young people need to be taught about the urgency, severity and scientific basis of the climate crisis. Unless we make a paradigm shift in our curriculum design and development and also change our lifestyle, we risk suffering the worst impact of climatic change aforementioned. The paper is a review of both theoretical and empirical studies on impact of climate change in Africa. It brings to the limelight the global views of this impact in Africa. The paper contributes to new knowledge by suggesting the need for the African nations to collectively take responsibility to address the impact of climate change by recommending a Pan African Ecological Curriculum.

Key words

Impact of climate change, Pan African Curriculum, African Nations, Collective Responsibility

Introduction

Climate change is a global phenomenon and has been identified as a leading human and environmental crisis of the 21st century and is rooted in the human interference with mother nature mostly for economic purposes (Singh & Shishodia,2007). Francis (2015) explains that marine life in rivers, lakes, seas, and oceans, which feed a great part of the world's population, is affected by uncontrolled fishing, leading to a drastic depletion of certain species and the livelihood of the poor. The adverse impact of climate change is experienced in developing countries and specifically in Africa evidenced by; increased aridity, disruption of livelihood in term of shortage of drinking water supply, risk of the collapse of marine ecosystems, food insecurity, loss of glaciers, droughts and floods among others (Religious of Assumption Newsletter 2020, Sing &Shishodaia 2007, Awojobi, & Tetteh, 2017, Ireghenu, Uzonwanne, & Nwogwugwu, 2014, Francis 2015).

The paper reviews both theoretical and empirical studies with the main objective of bringing to the limelight the impact of climate change in Africa and what African nations ought to do in order to address the challenges of the climate change. The paper specifically appeals to the African nations to collectively address the adverse effect of climate change and improve the livelihood of the poor people in the continent without heavily relying on the foreign aid. This paper adds to new knowledge by suggesting the need for the African nations to make a paradigm shift from their individual curriculum to a Pan African ecological curriculum where all the young people in Africa at all educational levels will be taught about the urgency, severity and integration of scientific and traditional methods to address the impact of climate change. The paper is keen on showing that through participatory spirit and wisdom from the African scholars, the African nations have the potential to mitigate some effects of climate change in the continent.

The paper is divided into five sections. The first section reviews global literature on the impact of climate change in Africa, the second focuses on the environmental education. The third section proposes and discusses a Pan African Ecological education, the proposed content, benefits and the sustainable model. The fourth and last section provides the summary and conclusion.

Global Literature on the Impact of Climatic Change in Africa

The UNEP Report of 2012 points out that the problem of understanding climate change (or global warming) is one of the major challenges confronting African people, their governments and the African Union. Africa suffers significant threats from climate change yet it is the lightest polluter and responsible for a negligible amount of total global greenhouse gas emissions (UNDP,2018-2020, Tadesse 2010; Besada & Sewankambo, 2009). It is predicted that the temperature in Africa continent will rise by 2 to 6°C over the next 100 years and in terms of economy, the Sub-Saharan Africa will lose a total of US\$26 million by 2060 due to climate change (Gemedra, & Sima, 2015). Predicted changes to rainfall regimes indicate that southern African will become drier, and eastern and western Africa will become wetter, with more intense rain and increased risk of floods.

Some projections indicate that 250 million Africans could face water shortages by 2020 if nothing is done – and done quickly (UNDP,2018). Further still, some economists predicted that in order to achieve “climate resilient” Millennium Development Goals over the whole continent, Africa will require US\$100 billion a year in the 2010-2020 period with approximately US\$82 billion required for standard development assistance, and an additional US\$11-21 billion for adaptation. A scenario analysis undertaken by the Food and Agriculture Organization (FAO) indicates that by 2080, Gross Domestic Product from agriculture could decline in Africa from 2 to 9%. FAO stresses that changes in agricultural practices will be required to respond to these impacts including changes to crop species, new irrigation techniques, the use of different fertilizer inputs, seasonal changes and sowing dates. It is clear that all the projections are inconsistent and unreliable

On a different note, Singh & Shishodia (2007) opine that it is not possible to eliminate land degradation altogether but it can be minimized. They assert that Prevention is far often more cost effective than rehabilitation of degraded lands. They point out that that once land has been excessively degraded, restoration cost is higher and effectiveness is low. They stress that not only is a 100 percent abatement of land degradation technically difficult but economically not viable. They ascertain that what is needed is an integration policy for management of natural resources to ensure that they address the adverse impact of climate change.

The impact of climate change has weakened Africa’s capacity to grow and develop and has posed a great threat to the continent’s agricultural production, food security, health, water and energy and infrastructure as evidenced by the elongated and heightened droughts in

the Eastern Africa, exceptional floods in the Western Africa; reduction of rainforests in equatorial Africa; and a rise in ocean acidity across Africa's southern coast coupled with extremely altered weather patterns leading to food shortages due to crop failures and loss of livestock that has endangered rural and pastoralist populations ((Tadess,2010, Awojobi & Tetteh, 2017, UNEP,2012; Besada & Sewankambo, 2009). Francis (2015) points out that tropical forests that possess the ecosystems of enormously complex bio diversity are senselessly burnt down or leveled for the purposes of cultivation to the detriment of countless species and the poor people are most affected. A majority of African people are poor and live on the front lines of pollution, disaster, and degradation of resources and land (Besada & Sewankambo, 2009).

Vulnerability of the continent to adverse impact of climate change has compelled UNEP to call upon decision makers in Africa, to help reduce negative consequences. UNDP (2018) opines that the time is now for the African nations to support bold, innovative approaches to foster low-carbon climate-resilient development across sub-Saharan Africa and the rest of the continent. This means that African nations need to become active participants in finding solutions to the impact of climate change. To address these climatic challenges, the UN Environmental Programs in collaboration with other stakeholders, is promoting capacity development for future professionals through environmental education. Francis (2015) affirms that ecological education can lead to new habits and lifestyles that can promote a new relationship with the environment and all creation and with God.

Environmental Education

Education plays a major role in alleviating environmental problems and promoting sustainability. The relationship between education and sustainable development was first officially recognized at an international level at the 1972 Stockholm Conference on Human Environment (Kawa,1991). Proper and relevant environmental education should provide appropriate knowledge and skills needed to address the adverse effects of climate change and simultaneously improve a country's economy and people's way of life. In the same vein, Wahyuni (2016) points out that education provides answers or solutions to the world's pressing conditions and problems such as those related to climate change, politics, and socio-economic as well as other issues related to poverty and sustainable development. In order for the education to yield the aforementioned outcomes, it must be well designed with relevant content and pedagogy.

Otewa *et al* (2007) in their studies on *Environment and sustainable Development: A Guide for Higher Education in Kenya Volume II* observe that since the teaching of environmental concepts were integrated in various core subjects in Kenya's school curriculum, environmental deterioration continues to amount. These scholars assert that learners have failed to comprehend the meaning of environment. This implies that the content of environmental education is probably shallow and therefore ineffective in making the students to act responsibly towards the environment. The learners may not be aware of how their individual and collective lifestyles could be impacting on environmental degradation and in the long run to climate change. Caduto (1989) similarly elaborates that ecological education includes spiritual values and the spiritual aspects of children's lives. It helps children to assimilate the symbols that are necessary for developing an ecology of mind that will enable them to understand the earth in all of its aspects, to solve problems, and to adapt their behavior so as to create a means of living in an ecologically balanced, sustainable way. Religious of Assumption Winter Newsletter (2020) summarizes that young people need to be taught about the urgency, severity and scientific basis of the climate crisis.

Francis (2015) asserts that effective education is critical for creating awareness, enhancing values, changing people's attitudes and improving skills consistent with environmental sustainability. This means that is not enough to merely integrate environmental concepts in various core subjects as is done in the schools in Kenyan and perhaps in many educational systems in African Nations. Francis further explains that environmental education in its broad sense can achieve ecological equilibrium and is capable of producing "ecological citizens." He enumerates that environmental education needs educators capable of developing an ethics of ecology, and helping people, through effective pedagogy, to grow in solidarity, responsibility and compassionate care of the environment. He asserts that it is only by cultivating sound virtues that people will be able to make a selfless ecological commitment.

Le fay (2006) supports the idea of ecological education by explaining that *If we are to make the shift to an ecological worldview, then the principles of ecology must become the principles of education. That is, the education system must be radically redesigned using ecological principles at every level: curriculum, pedagogy, philosophy, organization, management and architecture, and in its relationships with the wider community and environment. It is not enough to teach ecology as a 'subject' in a still fragmented and industrially orientated 'curriculum'; education systems must embody ecological principles in their total design.*

The views of the scholars on environmental education clearly calls for a paradigm shift in the way environment education is delivered in general and particularly in Africa. Although UNDP is working to help African countries address the challenges of climate change through various projects, and remains the largest service provider in the UN system globally on climate change adaptation and mitigation, African nations need to take both individual and collective responsibility to understand the impact of climatic change and speedily address the climatic crisis in the continent. Relying solely on foreign and international policies with their inconsistent statistics and projections aforementioned will not help the African nations to address the adverse effects of climate change in the continent.

Anesu (2013) observes that Africa's voice in international climate change negotiations has been very limited and the continent has struggled to influence global policies to tackle its particular challenges without much success. limited financial resources have always been made available to the continent. This clearly shows that excessive reliability on the EU-funded research projects in finding solutions of the impact of climate in Africa will not help the continent to grow and develop. There is need for the African nations themselves to actively participate and be part of the solutions. The nations to affirm themselves and devise viable and affordable means to curb the impact. One of these means is drawing wisdom from the research findings from the African scholars such as the one from Egeru (2012) on *the Role of Indigenous Knowledge in Climate Change, Adaptation in the Teso Sub Region, Eastern Uganda*.

The study of Egeru (2012) examined the role of indigenous knowledge in climatic change adaptation in Uganda with specific focus on the Teso -Sub-Region. Data was collected using semi structured questionnaires, individual interviews, focused group discussions and observations of the cultural practices. The findings revealed that the Iteso people have been very good custodian of their immediate environment. The study further shows that the Iteso have acquired detailed knowledge about the functioning of their immediate environment and have been vital in responding to environmental challenges including droughts, diseases and pest infestations. Citing the Iteso as an example, Eguru explains that many traditional societies have built up knowledge over a long period about their environment and have developed strategies to recognize and cope with these changes. Unfortunately, wide applications of traditional knowledge systems in mitigation and adaptation to climate change have long been neglected in developing and implementing climate change policy. Consequently, he recommends incorporating indigenous knowledge into climate change policies and is quite optimistic that this will lead to the effective adaptation strategies that are cost effective,

participatory and sustainable. Eguru emphasizes that traditional and indigenous people have valuable lessons to offer about successful and unsuccessful adaptations to climate change. He concludes that it is important for education institutions, including primary schools, secondary schools and universities to work with communities to validate and strengthen community practices.

The study of Eguru (2012) is in line with that of Tosam (2019) which argues that it is time for African governments to start appraising and encourage the re-institution of traditional conservationist values and practices to help extenuate the adverse effects of climate change in Africa and promote sustainable development on the continent. Just like Eguru (2012), Tosam is emphatic that there is an urgent need to seek indigenous solutions to environmental crisis in Africa without compromising the much-needed development in the continent. In the same vein, Le fay (2006) ascertains that we must learn to create educational communities that model ecological communities, to devise educational structures and processes that are patterned on ecological principles earlier mentioned, that mirror the web of life.

These scholars provide insights on the kind of environmental education needed in Africa and by Africans. This will mean collective participation and solidarity among African nations to explore and come up with a common and comprehensive environmental education that will equip learners at all levels with appropriate knowledge and skills to address environmental challenges for the common good of the African continent. Unless this is done, African nations risk leaving a desolate continent for the future generations.

To come up with a common environmental curriculum will require a paradigm shift in the way African nations perceive themselves. Positive self-image will enable them to grow and develop together valuing each other's nation. This collaboration will open their eyes to realize their potentials and abilities to change the environmental face of the continent. Ahunna Eziakonwa Assistant Administrator and Director Regional Bureau of Africa UNDP is optimistic that when African Nations enhance partnership, they can tap Africa's vast resources and human talents to transform the continent and ensure a brighter future for generations to come. For them to significantly transform the continent this paper suggests that they enliven and embrace the slogan of the former US president Barak Obama of 'Yes, We Can.' They need to believe that together they can find indelible solutions to the impact of climate change in Africa. Just the way the slogan worked for Obama, and saw him rise to becoming the first black

president of the coveted United States of America, it can also work for them as the leaders of the African nations in finding solutions to the environmental crisis.

There is power in working together and in self-affirmation. In Kiswahili we have a saying that *umoja ni nguvu* (unity is power). America is the most powerful nation on earth because of the unity of the states (United States of America). African nations need to borrow good practices. What is required is collective good will of the nation so that they cease act as isolated and dim stars that shine separately. The lack of unity of the African nations has led to the detriment of these nations making them to remain at the periphery in international decision making. It is time for the nations to collectively break away from the mundane of “*twaomba usaidizi*” (we ask for aid) through their various social media whenever they are hit by environmental challenges. This paper proposes a new thinking in regard to the collaboration of the African nations in addressing the impact of climate. It proposes a common curriculum- a **Pan African Environmental Curriculum (PAEC)** at all levels of learning from primary to tertiary levels. The paper expounds on the content, methodology and the envisioned benefits for African nations in the continent.

The content of the Envisioned Pan African Environmental Curriculum and Benefits

This curriculum will be holistic and will borrow and integrate indigenous and scientific knowledge and skills in finding solutions to environmental crisis in Africa and beyond. It will be designed to cover in details the causes, effect and appropriate, practical and sustainable solutions to the impact of climate change. Topics that will be covered include but not limited to: impact of individuals family, friends, schools, governments and developed nations and society at large on climate change. Issues of poverty, corruption and financial management will also be covered in details and at different levels. Moral and ethical values and the link to the impact of climate change will included. Some of the ecological principles outlined by Le fay (2006) will also be part of the content; philosophy, organization, management and architecture. The curriculum will be practical and compulsory at all levels and will inculcate values in the citizens and continuously raise their awareness of how their individual and collective lifestyles contribute to the impact of climate change. Francis (2015) affirms that it is by cultivating sound virtues that people will be able to make a selfless ecological commitment that will benefit the entire society.

Teaching methods

To achieve the desired outcomes, the educators will employ different pedagogies such as field trips, research, reflection papers, demonstrations, community engagements including case studies of environment heroes and heroines from different nations to inspire people of different cadres to participate in activities that will improve the environment and consequently reduce the impact of climate change. For example, in Kenya, the case of the late Wangari Maathai an environmentalist and a Nobel laureate will serve as a perfect example of the case study Her environmental and work, largely contributed to a greater consciousness of the crisis in Kenya of climate change; and the specific challenges facing Africa (Awori, 2006). Children will be taught through stories, riddles, songs and poems and nature walk on the causes and effect of climate change. Through nature walk, they can visit different places where the environment has been cared for and where people have polluted it. Learning in this way will make them individually grow up respecting the environment. They will learn good practices of planting trees to avoid soil erosion, not to throw away materials that harm the environment, the culture of recycling and many other values that will slowly but conspicuously transform the continent. The code of the curriculum across the continent will start with PAEC then the first letter of each nation for example for the case of Kenya, it will be PAEC(K). The countries that share the initial letters can use other abbreviation for identification. For example, the case of Tanzania it can be PAEC(TZ) followed by the level of the learner.

The Envisioned Benefits of the Pan African Environmental Curriculum to the African nations

This curriculum will benefit the African Nations in many ways:

- Ecological virtues will be inculcated in all the learners translating to all citizens of each nation taking responsibility to care for the environment.
- The nations will significantly contribute to solutions to the impact of climate change in the continent.
- The collective African voice will be heard in global policy formation and implementation in regard to matters concerning climate change and adaptability.
- The Nations will reduce the syndrome of over dependence on the foreign aids that for years have failed to significantly solve African problems.
- They will generate, document and avail realistic data in matters of impact of climate in the continent of Africa for future plans.
- The nations will be able to develop customized and relevant tools to monitor and evaluate the impact of climate variability.

- They will have collective decisions in coming up with budgetary allocations for the sustainability of the curriculum.
- The nations will improve their self-image and esteem to the global world because they will no longer be at the receiving end.
- The level of corruption will reduce because each nation will be made to account for the funds allocated.
- The unity of African nations will be enhanced
- The African nations will be proud of them identify
- Other nations will learn good practices from them
- The general lifestyles of all the people of Africa will improve

The Model of sustainability of the PAEC Curriculum

The paper proposes the adoption of the Savings and Credit Co-Operative Society (SACCOS) Economic Model. This is a model with many success stories in many countries worldwide. It is a transparent model that will help the nations to enhance their collaboration and remain accountable in implementing the curriculum and purchasing the required resources. The SACCO S created will specifically be for addressing the impact of climate change and adaptability. The nations will come up with modalities and logistics for evaluating the effectiveness.

Summary and Conclusions

The paper has shown that there are inconsistent projections about the impact of climate change in Africa and that most of the projections are from international and western perspectives. The paper has brought to the limelight that the African voices are largely missing in the decision making and in projecting the impact of climate change in Africa. The paper has elaborated on the importance of environmental education in addressing the impact of climate change. The paper has used the case study of Eguru to explain the need to integrate the indigenous and scientific knowledge in solving the climatic challenges. The paper has generated new knowledge by passionately suggesting the need for designing and implementing a Pan African Environmental Curriculum through collective participation by the African in order to understand the impact of climatic change and get solutions without heavily depending on the foreign aids. Lastly the paper has outlined the benefits of the envisioned curriculum and suggested the content, pedagogies and sustainable model

(SACCOS). In conclusion, the paper has shown that collective effort is mandatory if the African nations have to have a voice in the decision making in matters of climate change and development of the entire continent.

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