Sigtuna Think Piece 1
Climate Change Education in Africa

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Abstract

Climate change has placed the environment firmly on the international agenda. It is one subject that all nations of the world must relate to and address. Africa is not left out. Though Africa produces less than 10% of total greenhouse gas emissions, the continent was noted as one of the most vulnerable to climate change by the Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report (2007). There is therefore a justifiable call for adaptation and mitigation policies to help Africa cope with the challenges of climate change. This will require the involvement of every sector and individual; and this is where climate change education is seen as critical in empowering citizens and leadership and mobilising positive response to the climate change challenge. This think piece highlights the present uncertainties surrounding climate change science, identifies other critical areas of study and argues for a cross-disciplinary research agenda for Africa that will create opportunities for knowledge sharing within the continent with an emphasis on provision of solutions to the continent's problems, preferably in the context of indigenous knowledge systems. It concludes by emphasising that climate change education should not be viewed in isolation of the critical foundation provided by environmental education. Africa needs to build its climate education strategy and research agenda on the already existing worldwide effort to bring about environmental citizenship in all spheres of society through environmental education. For Africa, this means domesticating environmental education in order that it addresses the present and foreseen environmental challenges that the continent is facing, laying a particular emphasis on adaptation and mitigation of climate change effects.

Sustainable Development Challenges in Africa

In their study of sub-Saharan Africa's prospects for economic and social development in the 21st century, the African Development Bank, African Economic Research Consortium, Global Coalition for Africa, United Nations Economic Commission for Africa and the World Bank concluded that Africa could develop in the 21st century on condition that it addressed the development traps that confined it to underdevelopment, conflict, and untold human suffering for most of the 20th century (The World Bank, 2000). For Africa to break free of these traps, the report of the Commission for Africa[1] (2005) corroborated most of the recommendations made in the World Bank Report (2000). According to the commission, the 'coherent package for Africa' included: improving governance and capacity building; the need for peace and security; investing in people in terms of health and education; going for growth and poverty reduction; and increasing trade and ensuring fair trade. These, combined with significant improvement

in the quality of funding from donors, would meet the challenges. Presently, pursuing the recommendations above is threatened due to new challenges in this century. Some of the challenges include the failing world economy, rising food and energy prices, HIV/AIDS and perhaps the most challenging in the longer term, climate change.

Climate Change in Africa

Africa and climate change vulnerability

The changing climate triggered by the fast-rising average world temperatures due to increased anthropogenic emission of green house gases into the atmosphere is now recognised as the greatest environmental problem facing the Earth. Though Africa produces less than 10% of total greenhouse gas emissions, Africa was noted as one of the most vulnerable continents to climate change by the Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report (2007). An issue paper by the African Union Conference of Ministers (UNECA, 2008) indicated that this vulnerability derives from multiple stresses including: the geographical location of many African countries characterised by an already warmer climate, marginal areas that are more exposed to climatic hazards such as rainfall variability, poor soils and flood plains; the heavy reliance of most African countries' economies on climate-sensitive sectors such as agriculture, fisheries, forestry, other natural resources and tourism; and the inadequate ability of the continent to respond to the direct and indirect effects of climate change because of widespread poverty, poor economic and social infrastructure, conflicts, limited human and institutional capacities, and inadequate technologies and financial resources.

Likely impacts of climate change in Africa

The continent is already being faced by vulnerabilities that could be attributed to climate change. For instance, desertification is now an alarming occurrence in parts of the continent. In the Yobe state of Nigeria, the Sahara is expanding southwards. Villagers have reported losing farms, wells, houses and roads to the desert yearly. Reduced fresh water availability has also been reported. The east African Great Lakes and reservoirs including Lake Victoria and Lake Nakuru could be responding to climate variability with pronounced changes in storage, while parts of Kenya and the Horn of Africa have been heavily affected by recurrent droughts. On the other hand, the frequency of severe floods is increasing, with devastating effects as shown in recent floods in Mozambique and Namibia.

The degradation of woodlands, loss of forest quality and deforestation are now common occurrences in most parts of Africa. It is projected that the succulent Karoo biome could be completely displaced or lost altogether under continued climate change (UNEP, 2006). Of course this will be accompanied by species losses not only in the Karoo but in other biomes too. The oceans have not been spared either: coral bleaching and coastal erosion are now a real concern to environmental managers. The projected rise in sea level is now threatening to displace the occupants of Ngomeni. In 2007, strong ocean currents were reported to have destroyed several houses and inhabitants were spending sleepless nights trying to salvage household items or save their lives (UNEP, 2006). Glacial melting is no longer an issue to only worry the

northerners; back here in Kenya, where the United Nations Environment Programme (UNEP) has its headquarters, Mount Kilimanjaro has lost the bulk of its glaciers – over 80% since 1912 (Minarcek, 2003), while the Lewis Glacier on Mount Kenya has retreated by more than 800m between 1893 and 2004 and lost almost 16m water equivalent of its thickness between 1979 and 1996 (UNEP/GRID-Arendal Maps & Graphics Library, 2007). Other severe impacts are loss of agricultural productivity and increased health risks due to expansions of malarial areas.

Climate Change Education

For Africa to mitigate and adapt to these effects that are a threat to the continent's very survival, individuals, institutions, governments and the private sector, in essence everyone on the continent, needs to take responsibility for reducing the causes of these risks, as well as appropriate responses to mitigate and adapt to them. Education is therefore going to play a fundamental role in the fight against climate change in Africa. So far, many studies have been undertaken to understand the science and economics of climate change. Technologies to reduce its causes and those that help to mitigate and adapt to its effects are constantly being researched. New policies are continuously proposed and organisations are conducting relatively successful advocacy on climate change. Despite all these activities being in place, however, there is still not an effective capacity to bring the understanding of the climate change facts to the public in a manner that influences their day-to-day actions and habits.

Another dimension of climate change education is the fact that climate change science is still bleary and most of the climate change science draws logical conclusions from various scenarios. There is still a lot to be understood. For example, is climate change the only responsible cause for the current changes in Africa (i.e. the hazards mentioned above) and the rest of the world? If climate change could really lead to a disastrous future for Africa could this mean that things are already bad now? Can we identify specific contributory factors that are within our control?

So many unanswered questions. Hence, climate change education would have to be born out of a cross-disciplinary research agenda. Without a comprehensive approach, born of a proper understanding of the facts behind climate change, the fight will be lost before it is begun.

Research Agenda

What should be included in a climate change education research agenda?

As mentioned above, a research agenda must be an intrinsic part of climate change education by reason of the fact that climate change itself is a 'phenomenon' that is yet to be fully understood. Other challenges in Africa that could also lead to some of the impact associated with climate change are poor urban planning, ineffective governance systems leading to poor infrastructures and failure of services, including inadequate regulations for disposal of chemical waste, destruction of forests and aquifers, etc. According to the World Bank report (2010), climate and development are inextricably linked. This means that if the effects of climate change are anything to go by, then sustainable development will not only be seriously hampered, but even the already gained achievements will be reversed. For Africa, this will affect water, land and

energy, the key resources for development. Water is a key factor in development for the role it plays in sanitation and subsequently, the health of individuals. Closer observation may reveal that the availability of sufficient clean water is an indication of healthy ecosystems, without which water levels and water quality are reduced. Land in Africa is quite essential in food production. With its vulnerability to hunger, land degradation means reduced food production and diminished potential to increase the quantity of food produced. Energy is important in development as it determines the rates and levels of industrialisation, hence affecting employment and economic status. Poor sources of energy, such as fossil fuels, are now turning out to be problematic in terms of contributing largely to greenhouse gases, which have now been shown to cause global warming.

Africa is at this point struggling to develop; and to avoid the destructive development path of the Western countries that are the main cause of climate change, it is important that Africa chooses a sustainable development path, amid the threat of climate change. To do this, the key resources for development: water, land and energy (which unfortunately are the most vulnerable to climate change as well as to mis-governance) need to be researched and well understood to enable their sustainable utilisation, and how they are considered in educational programmes. Therefore the research agenda for climate change education in Africa should focus on answering the following questions:

Governance:

- What is the role of government in positioning African nations to mitigate and adapt to climate change, and what education is needed for governments?
- How much are current structures and systems contributing to present vulnerabilities and likely impacts of climate change in Africa, and what are the implications of this for education programmes?
- What is the meaning and function of equity in understanding and dealing with climate change on a global or international environmental governance level, and how should such issues be integrated into education programmes?

Water:

- What are the factors that affect water quality (both negative and positive) and how are these to be brought into education programmes?
- How can the positive factors be introduced/boosted while minimising/eliminating the negative factors, and what kind of education is needed to strengthen positive outcomes?
- How can the quality of water be constantly monitored in using simple indicators to ensure that adjustments are constantly made to maintain its quality, and can education make these monitoring processes more widely applied and used?

Land:

- What land-use activities are essential for the livelihood of citizens and for sustainable development in general, and how can education strengthen these land-use activities?

- What land types are required for these activities and where are these located, and how can education be oriented to helping people to correctly locate appropriate activities on different land types?

Energy:

- What sources of energy are available to Africa and how can education share this knowledge with people?
- What quantities of energy are required to boost and sustain Africa's sustainable development, and how can education best help citizens to use energy more sustainably?
- Among the available sources, what are their costs of production and impacts, and under a cost-benefit scrutiny, which are the most viable and how can this knowledge be shared through education?

In addition, ecosystems and related implications for education have to be well understood as they determine the quantities and qualities of the above resources. Any effect on ecosystem resilience through direct human activities or through climate change effects will have a ripple effect on the key resources for development. The educational research agenda should therefore look at the following questions:

- What role do ecosystems play in determining the quality and quantity of water?
- How do human activities on ecosystems affect the overall climate?
- How does energy production and utilisation affect the health or resilience of ecosystems?
- Does the health of ecosystems affect land that is proximate?
- To maintain a high health status for ecosystems, which human activities should be encouraged, which should be encouraged and what indicators should be used to monitor their health? This should be answered especially in the context of water (quality and quantity), land-health status and energy (production and consumption).

Underpinning all of these ecosystem-related research questions is the associated question of how education can strengthen knowledge and learning about these issues in order to broaden public uptake and participation in solutions and alternative practices.

Another argument that should be considered at this stage is: why should Africa mainstream climate change in its education curriculum when it does not significantly contribute to climate change itself? Due to its low levels of industrialization, Africa produces less than 10% of the total greenhouse gas emissions in the world. It would therefore be prudent to focus Africa's agenda on building capacity that can chart a development path that is climate friendly, and equally address the other challenges that Africa faces including environmental degradation, corruption and poor governance. Thus, the research agenda should focus on creating opportunities for knowledge sharing within the continent with an emphasis on provision of solutions to the continent's problems.

One of the critical starting points is through research into indigenous knowledge. This knowledge is usually integrated in the culture of a people and thus is readily usable. Gorjestani

(2000) describes indigenous knowledge as a significant resource that could contribute to the increased efficiency, effectiveness and sustainability of the development process. This is because it is defined as the basis for community-level decision-making in areas pertaining to food security, human and animal health, education, natural resource management and other vital economic and social activities. Communities in Africa have an abundance of indigenous knowledge depending on their geographic location and history. Universities should explore this knowledge with the aim of tapping into it in order to meet climate change challenges.

Indigenous knowledge about environmental adaptation should be integrated into environmental education in Africa, another readily available tool for closing the knowledge gaps existing among the African people. Environmental education is a worldwide effort aimed at teaching the functioning of the natural environment and how this environment is affected by humans. The goal is to influence humans to ensure sustainable ecosystem function, as defined in Belgrade in 1975:

> The goal of environmental education is to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones. (UNESCO, 1975)

Developing a responsive environmental education curriculum

Africa needs to build on the already existing worldwide effort to bring about environmental citizenship in all spheres of society through environmental education. For Africa, this means domesticating environmental education in order that it addresses the present and foreseen environmental challenges that the continent is facing, laying a particular emphasis on adaptation and mitigation of climate change effects.

Borrowing from some of the key characteristics of environmental education as described by Meredith *et al.* (2000), Africa should be able to develop a curriculum that addresses its challenges. Below is an explanation of some of the environmental education characteristics given as they will relate to the creation of an environmental education curriculum for Africa that embraces climate change.

- *Environmental education relates to an environmental topic or issue.* Africa currently faces many challenges that should be included in the curriculum, as discussed above. These include high levels of deforestation associated with biodiversity loss and loss of livelihoods, water scarcity, disease, soil degradation, population growth and challenges associated with unplanned urbanisation.
- *Environmental education is a lifelong learning process.* If Africa is to overcome its challenges including risks it faces from climate change, the education should focus on individual Africans embracing environmentally healthy habits in their entire lives. This would guarantee that actions at all levels are influenced by informed decisions based on factual environmental information and ethics. Those who benefit from environmental education

should apply it through their entire careers, ensuring that environmental consciousness is at the core of each action taken.

- *Environmental education is interdisciplinary and draws upon many fields of study and learning.* One remarkable aspect of environmental education is that it widely encompasses virtually all disciplines, since environmental degradation affects all spheres of life. Therefore the curriculum should not only draw from all disciplines to enrich it, but also target all individuals in all available disciplines on the continent.
- *Environmental education is relevant to the needs, interests, and motivations of the learner.* The need for proper nutrition, clean water, clean air and a clean environment is fundamental to all human beings. Therefore the prospect of bettering their lives is at the centre of Africans' interests. A well-designed curriculum addressing these issues will motivate Africans to take individual lifelong actions that would guarantee reduced risks emanating from environmental factors, whether natural or anthropogenic.
- *Environmental education is based on accurate and factual information and inspires critical thinking and decision-making.* Africa's academics in the higher education and research institutions should play a key role in designing the curriculum. Their role is to ensure that information presented is soundly researched and factual, and is about or directly relates to the African situation. The design of the curriculum and its delivery should also be done in a way that inspires the recipients of the education to think outside the box and create African solutions in view of the challenges and resources available on the continent.

Conclusions

Climate change should not be addressed in an isolated fashion in education. For Africa, sustainable development seems to be the most pressing challenge. This is made more complicated by the climate change effects that are threatening to reverse even the little development progress that has been made. Factors affecting the key resources required for development in Africa: water, land, energy and of course good governance, should be studied and solutions to mitigate the negative ones sought – preferably in the context of indigenous knowledge systems that exist in the continent. Climate change education in Africa should seek to ensure that individuals, governments, the private sector, communities and indeed all stakeholders understand the essential principles of Earth's climate system and the impacts of climate change, and are able to make informed and responsible decisions with regard to actions that may affect climate. This way a climate change education and research agenda for Africa would pave the way to good governance, improving the living conditions on the African continent (both of humans and the natural environment) using inherited wisdom, value systems and indigenous knowledge in combination with modern science and technologies.

Notes on the Contributor

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Endnote

1 The Commission for Africa was established in 2004 by the British Prime Minister Tony Blair. It consisted of 17 members, nine of whom were from Africa and were all working in their individual and personal capacities with the task of defining the challenges facing Africa, and providing clear recommendations on how to support the changes needed to reduce poverty.

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