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Environment and climate change needs assessment study for Mukuba University: A document review

Phanuel Chuka Hakwendenda
Head of Department, Environment and Climate Change Mukuba University, Zambia, Itimpi, Kitwe, Zambia

Abstract
The purpose of the *needs assessment study* was to ascertain the responsiveness of the newly introduced Bachelor of Science in Environment and Climate Change (B.Sc. ECC) programme to the demands of Mukuba University and the labor market in Zambia. The study employed a cross sectional design, utilizing desk/document reviews covering local and international contexts, executive speeches from cabinet and statutory instruments. Like-minded stakeholders and institutions with interest in the field of climate change were also consulted. In order to identify existing training available in similar programmes elsewhere, efforts were made to trace as many curricula from other learning institutions in the region. Documents were then searched manually for other information relevant to climate change and the environment. The study found that the B.Sc. ECC programme is one, among many other similar programmes, that responded to the demands of Mukuba University and the labor market in Zambia. The study strongly recommended that the programme should be allowed to proceed to give chance to many prospective students who would want to be trained in this critical area in order to supplement the efforts of other climate change and environmental management experts.

Keywords: climate change, climate change training, environment, environmental management and sustainability

Introduction

Mukuba University in Zambia is a newly established STEM university whose mandate is to promote the growth and development of higher education in the areas of science, technology, engineering and mathematics (STEM). Since the University's establishment under Statutory Instrument 108 of the Higher Education Act, 2013, a number of new departments, among which is the Department of Geography, Environment and Climate Change, have been established. To actualize this goal, the Department of Geography, Environment and Climate Change embarked on the development of new programmes aimed at increasing access to the training of both undergraduate and postgraduate students in a wide range of issues related to geography, climate change and environmental management and sustainability. Therefore, the first programme to be developed by the department and which has since been accredited by Higher Education Authority (HEA), was the Bachelor of Science in Environment and Climate Change (B.Sc. ECC). However, although the programme is already accredited and commenced in August 2021, the HEA, which is the accrediting board of authority in Zambia, requested that a Needs Assessment Study be conducted to ascertain the responsiveness of the B.Sc. ECC programme to the demands of Mukuba University and the labor market in Zambia and hence this study.

It is worth noting that the B.Sc. ECC programme is one of the key components of the education system which requires development of appropriately qualified human resource to take up the opportunities present in the field. Mukuba University has an established School of Mathematical and Natural Sciences and the Department of Geography, Environment and Climate Change. This arrangement requires a curriculum of high standard that is flexible enough to respond to the prevailing job opportunities for students but equally resilient to the variations in staff expertise that are a normal result of lecturer turnover in any growing university. Mukuba University is equally favourably positioned to offer courses in the B.Sc. ECC that are relevant to the needs of the country's growing population and economy in line with "Vision 2030". The Department of Geography, Environment and Climate Change has a responsibility to train B.Sc. ECC students who are expected to work effectively at either local or international level.

Studies have shown that the African continent remains the world's second fastest growing economy after East Asia according to the African Development Bank (AfDB) financial presentation 2017. Buoyed by recent investments in the resource sectors, agriculture, and growing innovations, the prospects of continued growth look good except that the impact of climate change, which has become a development imperative threatens to derail the gains made and limit African countries' pathway to sustainable development (AfDB, 2017). As such, several programmes and initiatives have been established at national and regional levels to deal with the growing threat of climate change impacts. Such programmes and initiatives allow various African stakeholders to collect and share climate information and services that would strengthen national and regional climate information systems.

The Climate Change and Development Africa (CCDA) conference, for example, is designed to strengthen linkages between climate science and development policy by promoting transparent discussions between key stakeholders in the climate and development community with the ultimate goal to mainstream climate information into decision-making and strengthening capacities on climate

sensitive sectors such as agriculture, food security, energy and transport. Such initiatives, among others, are informed by the African Union's Action Plan for Africa and the Action Plan and Adaptation Strategy of AfDB to strengthen the capacity of member countries to address climate change risks, and to deliver sustained development benefits on the continent.

Studies have further shown that over the last 50 years, human activities, particularly the burning of fossil fuels and an increase in industrial activities, have released sufficient quantities of carbon dioxide (CO_2) and other greenhouse gases (GHGs) to trap additional heat in the lower atmosphere and affect the global climate. Literature further reviews that in the last 130 years, the world has warmed by approximately 0.85ºC and each of the last three decades has been successively warmer than any preceding decade since 1850 (IPCC, 2001). In Zambia, climate trends indicate that mean annual temperature has increased by 1.3ºC between 1960 and 2003; an average rate of 0.34ºC per decade. This is approximately twice the increase in the average global temperature during the same period. On the other hand, the mean rainfall over Zambia has decreased by an average rate of 1.9 mm/month; 2.3% per decade since 1960. The future trends in the country are towards higher average temperatures, possible decreases in total rainfall, and an indication of occasional heavy bouts of rainfall (Presidential Speech, 2016).

It is, therefore, from this considered background, that it is important that students must have access to the best available training, through this programme, regarding the design and implementation of policies for the reduction of social, economic, environmental and public health burden resulting from climate change in order to prepare them and to respond adequately to its devastating impacts.

Rationale and purpose

The B.Sc. ECC programme has been referred to as one of the most important learning programmes in tackling the emerging issues of the 21st century and hence a defining challenge for the current generation of students. It is a well-known fact that the Earth's climate is influenced by nearly all human activities and as the Earth's climate changes, it will have widespread devastating effects on human societies and the world at large. Therefore, the purpose of this needs assessment study is to ascertain the relevance and responsiveness of the B.Sc. ECC programme to the needs of Mukuba University and its wider community and to determine whether the programme reflects the broader aspirations of the nation in reducing the impact of climate change. The B.Sc. ECC programme aims to increase the understanding of global climate change by approaching it from an interdisciplinary perspective. Through this programme, students will learn about our world and human interactions within it and about the emerging environmental issues of global warming and climate change. Students will also have an opportunity to see how a complex issue like global climate change is being approached from different disciplinary perspectives.

Methodology

The study employed a cross sectional design, utilizing desk/document reviews covering local and international contexts, executive speeches from both the President and cabinet ministers, and statutory instruments. Like-minded stakeholders and institutions with interest in the field of climate change were also consulted. In order to identify existing training available in similar programmes elsewhere, efforts were made to trace as many curricula from other learning institutions in the region. Key words such as 'climate change' 'climate change training,' 'climate change mitigation,' and 'environmental management and sustainability' were used to search the documents and findings recorded. Documents were then searched manually for other information relevant to climate change and the environment. Therefore, a qualitative approach was used and the following procedures and techniques were used to gather relevant information for this study: desk review of the literature covering international and local contexts, executive speeches from the President and his Cabinet ministers, government statutory instruments, and stakeholder consultation/engagement with like-minded organizations.

Key Findings

Desk review findings

After a thorough review of existing literature, both locally and internationally, on the need for climate change programmes in higher institutions of learning, the following were the key findings of this needs assessment study:

International context

Studies have shown that climate change is still widely recognized as one of the major challenges facing humankind as highlighted in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2007). Therefore, efforts are being put together, at international level, to respond to the challenges of climate change. These include, inter alia, development of global treaties such as the United Nations Framework Convention on Climate Change (UNFCCC) whose main objective is to stabilize greenhouse gas concentrations in the atmosphere to a level that would prevent dangerous human induced interference with the climate system.

In order to implement the provisions of the convention, Parties are encouraged to formulate and implement measures to mitigate climate change by addressing anthropogenic emissions of GHGs and facilitate adaptation to its impacts. This is to ensure that climate change does not compound the economic and social challenges already faced by the world and developing countries in particular and hence the reason why the programme was developed. Since Zambia is one of the signatories to the UNFCCC treaty, it is important that this programme is developed to supplement the efforts of the treaty in mitigating the impact of climate change.

Studies have also shown that despite the effort at the regional and national levels, many African countries continue to lack access to consistent climate and weather information to properly inform decisions on the management of climate-related risks. Many more other countries are still confronted with gaps in available climate information and low capacity to collect, analyze, and use robust and reliable climate information to inform decision-making and to mainstream climate change adaptation and risk measures into national development plans and policies. The density and coverage of existing African climate data observations network have generally been described in many literatures as poor and sparse (Washington *et al*. 2006;

Parker *et al*. 2011). This clearly shows that there is a need for this programme.

The state of existing facilities for collection, recording and analysis of climate in most African countries is deplorable and continue to deteriorate over the years. Due to lack of investment and the brain drain, meeting of demand, the level of technical expertise able to support climate monitoring network, climate data processing, and the current level of activity are generally low (Nyambane & Ozor 2018) [8]. As a result of these problems, government institutions, developmental practitioners and service providers engaged in climate sensitive sectors of the economy are rarely oriented to plan or manage climate risks. With climate change increasing the frequency and intensity of disasters such as floods and droughts, it is becoming more urgent to support vulnerable countries and communities to have access to relevant climate information through such programmes. Climate information is also needed to characterize climate risks, to inform decision-making for the effective management of climate risks and to mitigate further impact of climate change in the country.

Literature also points to the fact that climatic variability and change are posing significant challenges to societies and only the timely communication of climate information would help prevent the economic setbacks and humanitarian disasters that can result from climate extremes and long-term climate change (UNECA, 2011) [9]. We all know that climate information plays a crucial role in national development planning, for managing development opportunities and risks and for mitigation and adaptation. The efficient application of climate services requires the integration of climate information into the policies of various sectors. Climate services may include, among others, the dissemination of climate information to the public or a specific user. Strong partnerships among providers and stakeholders, including government agencies, for the purpose of interpreting and applying climate information for decision-making, sustainable development, and improving climate information products such as predictions and outlooks, are necessary (Nyambane & Ozor 2018) [8].

Whilst deeper analyses of the likely impacts of climate change has been carried out at the global and continental levels, there is an expressed need and recommendations made for the acquisition of more detailed climate data to inform decision-making and for improved modelling accuracy at the regional, national and local levels.

Local context

At the local level, literature reviews that Zambia is also vulnerable to the adverse impacts of climate change as a result of its geographical location, the multiple socio-economic stresses it is subjected to, and its low adaptive capacity. According to the study on the economic impacts of climate change conducted in 2011 by government, a gross domestic product (GDP) loss of about US5 billion over a 10 to 20-year period was estimated. The study estimated that loss of agricultural productivity and its associated effects on poverty levels, the potential impact of an energy crisis related to power generation, and the loss of natural environments which provide critical services to urban, peri-urban, and rural communities are major contributors to GDP loss.

Studies have also shown that there has been an increase in the frequency of extreme events such as floods and droughts over the past four decades. Further literature points to the fact that the rainy season is becoming shorter and more intense while a trend towards an increase in temperature in both the cooler and warmer seasons was also observed. The predicted future trends in the country are towards higher average temperature resulting in increased rainfall intensity and variability.

Furthermore, the proportion of total rainfall that falls in heavy events is projected to increase annually but mainly in December, January and February. The mean annual temperature is projected to increase by a further 1.2 to 3.4°C by the 2060s, with the projected rate of warming expected to be a little more rapid in the southern and western regions of Zambia than in the northern and eastern regions.

As a response to the international calls for concerted efforts to tackle effects of climate change, Zambia has established a long-term institutional arrangement for the coordination of climate change activities and programmes. The coordinating structure includes: the Council of Ministers, the Steering Committee of Permanent Secretaries and the Technical Committee on Climate Change. Further the country has established a dedicated Department of Climate Change and Natural Resources in the Ministry of Lands and Natural Resources. The country has also embarked on the development and implementation of dedicated climate change-related policies and strategies which include the National Policy on Climate Change (NPCC), the National Determined Contribution (NDC), and is in the process of developing the National Adaptation Plan (NAP). Various sector policies and programmes have mainstreamed climate change.

Conscious of the serious risk of the fundamental disruption that climate change poses to the already challenging attainment of national development goals, the Vision 2030, the government is treating climate change as a developmental challenge and taking all necessary actions to minimize the potential for further damage. The National Policy on Climate Change (NPCC) was developed to support and facilitate a coordinated response to climate change issues in the country. The policy will also contribute to the achievement of the overall objective of the UNFCCC which is "stabilization of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."

A number of global policies and plans have emerged from conferences and publications. Notable among these are the Rio Earth Summit (RES), World Summit for Sustainable Development (WSSD), the World Summit on Education Forum (WSEF), the United Nations Decade for Sustainable Development (UNDSD) and the Sustainable Development Goals (SDGs). These have influenced the design and implementation of climate change projects that focus on learning.

The UNFCCC (Article 6) and the Kyoto Protocol (Article 10) both encourage governments to educate, empower and engage all stakeholders and major groups on climate change policies. Locally, the Zambian revised curriculum framework, 2013 recognizes Education for Sustainable Development (ESD), Environmental Education (EE) and Climate Change (CC) as some of the key cross cutting issues that must be taught from Early Childhood Education (ECE), primary and secondary schools. The higher education institutions are also offering climate change

related courses. Other sector-related training institutions such as those in the Ministry of Agriculture have mainstreamed climate change in their training programmes.

Executive speeches

A number of speeches, both from the President and his Cabinet Ministers, point to the fact that Zambia is committed to combating climate change impacts. For example, in a speech delivered at the World Economic Forum on Africa (WEFA) meeting in Durban, South Africa on May 4th 2017, His Excellency Dr. Edgar Chagwa Lungu, President of the Republic of Zambia said that climate change threatened to derail the country's economy, and disruptions to the rainy season had already dampened its outlook. He further said, in terms of economic growth, the country encountered the devastating effects of climate change.

In another statement by His Excellency Dr. Edgar Chagwa Lungu, on the occasion of the AfDB group annual meetings in Lusaka, Zambia, on Tuesday, May 24th, 2016, the President reiterated that energy shortages and climate variability and change had become a major threat to sustainable development in Africa and that growth on the continent had already been reduced. He therefore expected that such meetings would generate resolutions that would help Africa shape its post 2016 development agenda and address the numerous ramifications of energy deficits and climate change impacts confronting the continent.

In another address by His Excellency Dr. Edgar Chagwa Lungu, on the progress made in the application of the national values and principles delivered to the 4th session of the 20th National Assembly on Friday, 6th March 2020, the President further reiterated that climate change could impede the sustainable development agenda. He said that the devastating effects of climate change could cause an economic and social shutdown. He, therefore, assured the nation that government would continue to mitigate against the effects of climate change by supporting research in agriculture in order to develop more climate resilient seed varieties and promote the use of conservation farming practices especially in the drought prone areas.

Government statutory instruments

A number of statutory instruments in Zambia also point to the need to establish institutions that can help militate against and minimize the impact of climate change. For example, the Zambian government has developed the National Policy on Climate Change to provide a framework for coordinated response to climate change issues. The policy gives guidance on how the Zambian economy can grow in a sustainable manner and thereby fostering a smooth implementation of the Revised Sixth National Development Plan (R-SNDP) and its successor plans including the achievement of the Vision 2030 agenda. The overall objective of the policy is to provide a framework for coordinating climate change programmes in the country in order to ensure climate resilient and low carbon development pathways for sustainable development towards the attainment of Zambia's Vision 2030.

The Sustainable Development Goal (SDG) 4--on education, and SDG 13--on climate change, highlight the importance of the role of education in climate change responses. Of particular relevance are Target 4.7, which states that by 2030 all learners should acquire knowledge and skills needed to promote sustainable development and Target 13.3 which states that by 2030 there should be improved education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

Climate change seems to be well addressed in the draft SNDP although there are large variations in the level of integration of climate change issues between different sectors. The energy chapter includes several programmes for both adaptation and mitigation, including programmes for the development of renewable energy. However, these are very small compared to the budget allocation for major hydro-power expansion which may actually increase the vulnerability of the energy sector to climate change. Further information on how to replace the high dependence on biomass as an energy source would be useful, in particular given that this is a major driver of deforestation and hence the need for this programme.

Other international agreements that highlight the important role of education in addressing climate change and sustainable development include:

- Article 12 of the Paris Agreement which stresses that "Parties shall cooperate in taking measures …to enhance climate change education, training, public awareness, public participation and public access to information.."
- The Lima Ministerial Declaration on Education and Awareness-raising which stresses the importance of including climate change in school curricula and development plans.
- Article 6 of the UN Framework Convention on Climate Change which focuses on education, training, public awareness and access to information related to climate change.

Stakeholder consultation

The following stakeholders were consulted and they all alluded to the fact that there is dire need for this B.Sc. Environment and Climate Change program:

Table 1

S/N	Name	Institution	Qualification
1.	Prof. Stephen Syampungani	Copperbelt University, School of Natural Resources	B.Sc. Forestry; M.Sc. Environmental Engineering; PhD Forest Ecology
2.	Mr. Edson Nkonde	Zambia Meteorological Department, Climate Division, Lusaka	Director
3.	Dr. Adamson Mukhalipi	Mopani Copper Mining Plc.	B.A.Ed. Geography; Dip. Project Management; H/Dip. Health Management; PhD Management

Conclusion and Recommendations

Using a critical review and analysis of available climate information and needs locally and internationally, this study has found that the B.Sc. Environment and Climate Change programme is one, among other similar programmes, that responded to the needs of Mukuba University and the wider community in Zambia. Furthermore, a perusal through various presidential and ministerial speeches and government statutory instruments reveals that the B.Sc. ECC programme also reflects the current climate change issues and development priorities and agenda of the country. It is particularly clear from all the executive speeches cited that the development of this B.Sc. ECC programme is a step in the right direction and a positive and timely response to the government's clarion call for various institutions of learning in Zambia to come up with proposals on how to combat the current impact of climate change in the country and we believe this is one such way of responding to this call.

In view of the foregoing, the author strongly recommended that the B.Sc. Environment and Climate Change programme should be allowed to proceed to give chance and latitude to many prospective students who would want to be trained in this critical area so that they could supplement the efforts of other climate change and environmental management experts in characterizing climate risks, in informing decision-making and in order to mitigate further impact of climate change in the country.

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2. **Mr. Emmanuel Kapongolo:** Head of Department-Biology, Mukuba university, Zambia

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