Review

Environmental Sustainability in Zambia: Where Are We?

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Article

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Abstract: Global environmental sustainability is a crucial issue, and Zambia, like many other countries, has particular potential and challenges in this regard. Environmental sustainability has been and is today a priority on the global development agenda due to serious issues emerging from extensive interference with human-related activities. Maintaining environmental sustainability is essential for preserving the nation's natural resources, fostering economic growth, and guaranteeing the welfare of its citizens. Even if there are many significant challenges, coordinated initiatives incorporating international cooperation, sustainable practices, and community engagement can open the door to a more sustainable future. While the ongoing discussion about environmental sustainability takes very diverse forms and concentrate on various aspects of the problem, this paper aims to discuss climate change, habitat and biodiversity, land degradation and agricultural constraints in the Zambian context. Using desktop approach, the paper will utilize reports, academic journals and policy documents in an attempt to define a common starting point from which to gain an understanding of the magnitude of the issue.

Keywords:

1.0. Introduction

Environmental sustainability is vital for maintaining the stability of our planet which is the only known planet supporting life. Human activities such as industrialization and deforestation has led to climate change, land degradation, pollution of air, water, and soil, depletion of non-renewable resources, biodiversity loss, and buildup of hazardous, resistant compounds, among other related problems (Arora, 2018). These environmental effects on the ecosystem are creating long term impact which endanger human life. This unique position places a huge concern on humankind to defend and preserve the natural resources through environmental sustainability and education. Therefore, key aspects in fostering environmental sustainability depends on environmental education, which is the cornerstone in facilitating knowledge dissemination, research and education. In practice, environmental education covers formal and informal educational settings that equip diverse individuals with the knowledge, skills, attitudes, and values necessary to understand and address the complex environmental challenges facing our planet (Hungerford & Volk, 1990; UNESCO, 2017).

On the other hand, Environmental sustainability is defined as the ability to maintain the characteristics that the physical environment values (Sutton, 2004). This call for the need to foster responsible interaction with the environment to prolong environmental quality in the quest to focus on addressing current demands without sacrificing the capacity of future generations to address their own needs (Brundtland Commission, 1987).

1.1. Background

Zambia is a landlocked country surrounded by eight neighbouring countries. As such, land is its greatest asset. Large plateaus, luxuriant woods, and a diverse range of rivers and lakes define its topography, with forests making up over 60% of the total land area. These forests are essential for many rural populations' livelihoods in addition to maintaining the natural balance. They supply necessary resources including fuelwood, lumber, and non-timber forest products like medicinal

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herbs, honey, and mushrooms (Phiri, Morgenroth & Xu, 2019; UNEP, 2021). Kalaba et al (2013) add that the numerous national parks and game reserves may be found throughout the nation, which is important for both tourism and conservation. Among the notable parks are the Kafue National Park, which is one of the biggest in Africa, and the South Luangwa National Park, which is well-known for its fauna, which includes lions, elephants, and several bird species.

The country has an abundance of minerals, especially copper, which has long been the mainstay of the country's economy. Among the world's main suppliers of copper and cobalt is the northern Copperbelt region. Significant revenue and employment are created by mining operations, which advance national development. Manganese, gold, and emeralds are among the other minerals that are found in Zambia (Davis et al, 2020).

2.0. Climate Change

Though discussions about climate change almost always center on global warming, which is caused by increased emissions of greenhouse gases (GHGs), it's important to keep in mind that there are economic and social aspects as well. This is evident, for instance, when one looks at energy generation systems and the dramatic and ongoing increase in the world's population. Consequently, concerns that are typically regarded as development issues alone must be taken into account in any comprehensive and potentially effective plan to combat climate change. (UNE-UNDP, 2008).

The amount of data on the consequences and effects of climate change that is currently available has significantly increased in recent years. The Intergovernmental Panel on Climate Change (IPCC) reports and the Stern Report are two of the most significant scientific papers that have been released recently. While numerous initiatives are in place to guarantee the inclusion of a gender perspective in scientific publications, those documents do not address gender issues like inequality or women's capacity as change agents.

The World Meteorological Organization (WMO) and UNEP established the IPCC in 2007 to analyze scientific, technological, and socioeconomic data in order to better understand climate change, its potential implications, and adaptation and mitigation options. The report underlined that there is indisputable evidence of global warming and that the warming seen in the 20th century is a result of human activity. It offers a comprehensive scientific account of the physical effects of climate change. (IPCG, 2007).

A prognostic report on the potential effects of climate change, based on the assumption of various possible emissions scenarios worldwide, was one of several publications on related issues involving impact, adaptation, vulnerability, and mitigation that the IPCC presented in 2007 in addition to its Fourth Assessment Report. The IPCC came to the conclusion that natural systems are being impacted by regional climate changes based on data collected from most oceans and all continents. The IPCC further stated that although modifications to lifestyles and behavioral patterns may be able to reduce emissions of greenhouse gases, emissions of these gases will still rise if current development practices and mitigation measures are followed.

Like many other Sub-Saharan African nations, Zambia is rapidly feeling the negative consequences of climate change. Because 60% of the population depends on rain-fed agriculture for their livelihoods, the country is especially vulnerable. According to recent climate statistics, there has been a noticeable increase in temperatures and variability in rainfall patterns, which has resulted in flooding and extended droughts. These modifications have a variety of effects. The Zambezi River's water levels have been severely damaged by protracted droughts, which is problematic for both hydroelectric power generation and agriculture. Reduced agricultural yields as a result of lower water levels have put food security at risk and led to power shortages since hydroelectric capacity has dropped. Extreme weather conditions, such floods, have also resulted in property destruction, relocation, and a rise in the prevalence of waterborne illnesses (Mwila, 2010).

The government of Zambia has recognized these difficulties and launched a number of programs to lessen the effects of and prepare for climate change. Adopted in 2016, the National Climate Change Policy seeks to encourage sustainable resource management and include climate resilience into development plans. In addition, Zambia has committed to lowering greenhouse gas

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emissions and boosting adaptation capacity by signing international accords like the Paris Agreement.

Nevertheless, there are a number of challenges in the way of these policies' execution. The nation's ability to successfully respond to climate change is hampered by a lack of technical experience, inadequate infrastructure, and limited financial resources. Zambia urgently needs foreign funding and assistance to strengthen its efforts to tackle climate change (National Climate Change Policy, 2016).

3.0. Biodiversity and Habitat

De Long (1996) defines biodiversity as an attribute of a place that precisely refers to the variety that exists both naturally and artificially within and among living creatures, assemblages of living organisms, biotic communities, and biotic processes. Genetic diversity, the identity and quantity of distinct species, species assemblages, biotic communities, and biotic processes, as well as the quantity (such as abundance, biomass, cover, rate, and structure) of each, can all be used to quantify biodiversity. Any geographic scale, from microsites and habitat patches to the entire biosphere, can be used for observation and measurement.

However, a plant, animal, or other living thing's natural home or environment is referred to as its habitat. It offers the local species space, food, water, shelter, and a means of survival. Both biotic and abiotic elements make up habitats. While abiotic factors are nonliving, biotic factors are living things (Australian Museum, 2018).

An estimated 12, 505 biological species are found in Zambia. The national budget or collaborating partners support various government agencies and statutory entities, entrusting them with the responsibility of managing these biological resources. The various organizations have the potential to provide income equal to 24% of the GDP. But because the central government releases a restricted amount of funding to these organizations, the legislative and regulatory framework does not provide an atmosphere that is favorable for the implementation of planned operations. Furthermore, there are difficulties in mobilizing resources and coordinating efforts due to the distribution of biodiversity institutions throughout eleven ministries.

In order to support sector operations and release budgeted funds to ensure the successful execution of biodiversity activities, it is necessary to realign the use of some of the cash obtained by ring fencing biodiversity related revenue. In addition, the government should include other interested parties in the mobilization of resources and the execution of the National Biodiversity Strategic Action Plan II (NBSAP-2) such as academia, research institutes, the commercial sector, and civil society.

Many causes, including but not limited to economic, policy and regulatory, social, environmental, and cultural, as well as political, are blamed for Zambia's declining biodiversity and loss of habitat.

One of the economic factors is the expansion of agriculture to meet the demand for agricultural produce brought on by population growth. More land and forests are being cleared by farmers for agricultural purposes as a result of the growth of both small- and large-scale agriculture.

Mining is another economic engine. Mining firms' discharge of effluents has had detrimental effects on surface and ground water sources, including the Kafue River and the Mushishima stream. It is difficult to monitor the effects of mining operations because of Zambia Environmental Management Agency's (ZEMA) limited geographic reach. The loss of biodiversity in Zambia and other mineral-rich nations in the region is probably going to get worse due to the rising demand for metals in Asian markets. Since mining began in 2005, around 350,000 hectares (ha) of Protected Forest Areas (PFAs) in the North-Western Province have been converted to mining concessions. As more mines open, this situation is expected to worsen (Matakala et al., 2015).

Policy and Regulatory drivers affecting biodiversity loss bordering on policy changes/incentives as well as institutional challenges that pose threats to biodiversity conservation may include the following. Lack of institutional structures by government or traditional leadership that can empower protected areas to generate sufficient revenues potentially contributes to biodiversity loss. While

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there are existing laws aimed at conserving biodiversity, enforcement has been weak. For instance, there have been reported cases of people sneaking in the night to fish and sell their catch in the morning (Times of Zambia, 2014).

It is anticipated that Zambia's recent forest degazettion will increase pressure on the country's forest resources and accelerate the degrading process. In the last ten years, the Copperbelt, Southern, and Eastern Provinces have degazetted six to twelve forest reserves totaling about 280 000 hectares (Mwitwa et al., 2012). Local Forest No. 27 was the most recent area to be degazetted. Environmental pressure organizations strongly opposed this action, claiming it will cause deforestation and interfere with Lusaka's freshwater supply (DW, 2017).

The following are some examples of the social, environmental, and cultural factors that contribute to habitat loss and biodiversity in Zambia: The encroachment of human settlements and the pursuit of agricultural land into Game Management Areas (GMAs) and national parks has resulted in the destruction of animal habitats and the reduction of wildlife populations in Zambia. All GMAs are currently experiencing encroachment, with areas like Bilili Springs and Mukungule experiencing the highest levels of encroachment, primarily for settlement purposes (Lindsey et al., 2013). Mumbwa has also seen an increase in encroachment as a result of agricultural activities, which has caused a 25% degradation in GMAs (UNDP/GEF, 2014).

Additionally, there is no fair benefit-sharing system in place, which goes against the Nagoya Protocol and suggests that the money received from concession sales and hunting license is not enough to support operations

Local politics influence changes in biodiversity. The awarding of concessions and the cancellation of tenders without the Zambia Public Procurement Authority's prior authorization have been done in a transparent manner (Zambia Daily Mail, 2015). In addition, there are questions and harsh choices surrounding the announcement of some regulations (Lusaka Times, 2015), such as the hunting moratoria that were imposed in 2002 and 2013 as a result of alleged corruption in the process of awarding GMAs to operators through tenders (Lindsey et al., 2013).

4.0. Land Degradation and Agricultural Constraints

Africa is expected to have the fastest population growth rates in the world, with 1.8 billion people expected to live there in the next forty years (Cleland, 2013). Between 1950 and 2010, the number of people living in Africa more than tripled, from 230 million to 811 million (FAO, 2011; World Bank, 2013). The continent is predicted to see rapid population growth going forward, adding another half a billion people by 2030 and eventually surpassing two billion by 2050. Zambia's population is expected to increase by more than half over the next several years, from 16.2 million in 2015 to 44 million in 2050. Growing populations and rising incomes will have important ramifications for the need for food, energy, and agriculture. There is enormous demand on agriculture to produce more food, fuel, and fiber for the expanding and increasingly affluent population (Tilman et al., 2011).

There is growing agreement that the primary cause of habitat degradation and biodiversity loss is agriculture, both on a subsistence and commercial scale (Slingenberg et al., 2009; Habibullah et al., 2016; Burkmar and Bell, 2015). According to Mwitwa et al. (2003) and Campbell et al. (2012), 90% of Zambia's loss of forest cover is thought to be attributable to the expansion and relocation of agricultural by smallholder and commercial farmers. Because there is more demand on limited resources, the status quo is made worse by growing incomes and population. For example, the 3.2% annual growth in urbanization rate (Gumbo et al., 2013) is expected to exacerbate the rates of deforestation as more infrastructure is developed for housing, energy, transportation, and irrigation (Campbell et al., 2012).

According to GRZ et al. (2017), Zambia's yearly deforestation rate is 276,021 hectares, or 6% of the country's total forest cover. Conventional and harmful agricultural practices that promote mono-cropping, burn bushes to prepare the land, use a lot of synthetic fertilizers, and dispose of pesticides and herbicides contaminate the land and the food sources for wildlife, birds, and other creatures that live near water bodies.

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The largest danger to biodiversity, a major source of greenhouse gas emissions, and a user of water and land resources is agriculture (Achard et al., 2002; Rudel, 2009; Foley et al., 2011). Africa's population is expanding quickly, which is increasing demand for food. Sub-Saharan Africa, which has lagged behind other parts of the world in terms of agricultural output, has long struggled with food security. The continent of Africa used to produce enough food to meet its own needs, but over the past century, population growth has outpaced agricultural productivity, exacerbating issues with hunger, malnutrition, and food insecurity (Sanchez, 2002; Sanchez and Swaminathan, 2005; Hazell and Wood, 2008; World Bank, 2008a; Todaro and Smith 2009).

Over the past three decades, the continent has reversed from being a net exporter of agricultural commodities to a net importer of them (Rakotoarisoa et al., 2012). The largest amount of agricultural imports, which have been growing exponentially, are from sub-Saharan Africa (SSA) in particular (FAO, 2011; Livingston et al., 2011). According to the Africa Progress Panel (2014), the import of food (except from fish) cost African nations $35 billion US dollars in 2011. The majority of farmers in Africa are smallholders, and they deal with a variety of issues pertaining to agricultural production, such as high input costs for fertilizers, low marginal returns, and decreasing productivity (Giller et al., 1997; Angelsen and Kaimowitz, 2001; Snapp et al., 2010; Tittonell et al., 2012; Vanlauwe et al., 2014) Intensifying agriculture has been suggested as a possible route to food security for impoverished households in Africa and beyond; however, inputs like fertilizer are frequently expensive and only marginally profitable for the rural poor (Morris et al. 2007; Tittonell and Giller, 2013). The increasing prevalence of input-intensive conventional agricultural intensification practices in Africa, along with the high demand for food, may exacerbate climate change and result in land conversion and degradation. Input-driven intensification, which aims to boost agricultural output through higher input utilization, is frequently supported by national policy. Production and yields in input-driven agricultural systems will rise, but these gains are frequently not sustainable. Unsustainable farming methods cause land degradation (Barbier, 1997; Sanchez et al., 1997; Symeonakis, 2007) and leave the soil unproductive (Giller et al., 1997).

5.0. Conclusion

Environmental sustainability in Zambia is at a critical juncture, reflecting a complex interplay of opportunities and challenges. The nation's rich biodiversity, including iconic ecosystems like the Kafue Flats and Luangwa Valley, presents significant conservation potential. However, unsustainable agricultural practices, deforestation, and mining activities pose severe threats to these natural resources. Zambia's heavy reliance on hydroelectric power, while generally renewable, is increasingly vulnerable to climate change-induced droughts, raising concerns about energy security.

Efforts towards sustainability are evident in initiatives such as the Zambia Environmental Management Agency (ZEMA) and various community-based conservation projects. However, these are often undermined by insufficient funding, limited public awareness, and weak enforcement of environmental regulations. Rapid urbanization and population growth further exacerbate environmental pressures, particularly in major cities like Lusaka.

For, Zambia to achieve genuine environmental sustainability, a multifaceted approach is essential. This includes strengthening policy frameworks, promoting sustainable land use practices, and enhancing climate resilience. Additionally, fostering community engagement and international partnerships can drive more effective conservation strategies. Embracing renewable energy diversification, beyond hydroelectric power, is also crucial. Ultimately, Zambia's path to sustainability hinges on balancing developmental goals with the imperative to preserve its environmental heritage for future generations.

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