CHALLENGES OF CLIMATE CHANGE IN MOUNTAIN ECOSYSTEMS IN AFRICA

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1. The African Mountains

Africa is one of the largest continents of the world and comprises of complex geological history and systems, which have led to a range of relief and topography, including plains, plateaus, rift valleys and mountains and highlands.

Mountains and highlands comprise the most spectacular and important landscape of the continent. These features were formed by a combination of tectonic, orogenic and volcanic activities that affected the basement complex rock structure of the continent.

In some countries the mountains landscape account for quite a significant proportion of the land surface (e.g. over 10% in Uganda).

The mountains and highlands are widely distributed over the continent, but are concentrated in the eastern, north-western central and southern Africa, although they are most extensive in the eastern and north-western parts of the continent.

The heights of the mountains and highlands vary widely, from about 1,5000m above sea level to over 5,000m above sea level.

Mount Kilimanjaro astride the borders of Kenya and Tanzania rises to about 6,000m above sea level, while Mount Kenya in Kenya and Mount Rwenzori in Uganda, both rise to over 5,000m a.s.l.

Although close to the equator, these three mountains are snow capped at their tops, due to altitudinal effect; and this makes the mountains unique ecosystems of the world (e.g. for research in climate change).

The other important mountains and highlands include the Ethiopian highlands in eastern Africa; the Atlas Mountains in the north-western Africa in Tunisia, Algeria and Morocco; the Virunga Mountains in central Africa and the Drakensberg mountains in southern Africa.

2. Perspectives of African mountain Ecosystems

2.1 Significance of mountain ecosystems

The uniqueness of the mountain and highland landscapes presents both opportunities and management challenges.

Opportunities because they comprise important natural resources, ecosystems and services; including:

Acting as water towers and hence important watersheds/water sources – the mountains act as water towers due to the uniqueness of the ecosystem to induce low evapo-transpiration and high precipitation.

Most of the mountains are home to indigenous communities (e.g, the Ndorobo or forest dwellers). The traditions, cultures and practices of these people need to be preserved.

The climate and soils in most mountainous areas are conducive to important agricultural production; as well as important biodiversity enclaves (with both endemic and threatened species).

The challenges include the fragility of the ecosystems thereof, including slopes that are prone to soil erosion and landslides and other mass wasting processes, whose occurrences are dominantly of catastrophic proportions.

Of recent, the impact of climate change often associated with extreme weather events, has become yet an added and more serious challenge; triggering disastrous soil erosion, landslides and floods.

The environment is conducive, leading to high population densities, whose livelihoods are dependent on subsistence agriculture that lead to intense tillage of land; hence land pressures are extremely high, leading to high risks of encroachment on fragile areas and environmental degradation.

In some areas, we are to find some of the highest rural population densities in the world and yet, in most cases, due to dominantly steep slopes, over 50% of the land is too steep to cultivate without risking catastrophic erosion problems.

Low levels of awareness, land management technologies and high occurrence poverty among the mountain communities exacerbates their inability to meet the new challenges of climate change sustainable development.

2.2 African networking on mountain ecosystems

Networking efforts are still limited, despite the importance of the ecosystems. The earliest networking in form of African Mountains Association was formed sometime back in mid 1988s, by an African research expert group, as an affiliate of the “International Mountain Research and Development”.

The main objective was: to carry out research and disseminate the research information, to assist in policy and extension decisions.

The Association formed and operated through a network up to country level through country chapters of the association.

The information was mainly disseminated through the International Mountain Research and Development publication. Uganda has a country chapter of the Association, and a number of research papers/information contributed by country experts has been published both in the research publication and books on mountain ecosystems.

Individuals in the expert group, including those from Uganda participated in contributing information that was compiled in a book form and used at the Earth Summit to advocate for special consideration of mountain ecosystems, and subsequently fed into Chapter 13 of Agenda 21.

Of recent, however, networking of the Association has declined both at continental and country chapter level, mainly due to lack of resources for network meetings, research and scheduled workshops for expert sharing and later dissemination of research information. There is need

In Uganda, and other countries of Africa, initiatives on mountain ecosystem management continue but on very limited scale, including research and advocacy continue, including hosting international meetings and workshops, as well as celebrating the World's Mountain Day that falls on 11th December every year.

3 Mountain ecosystems management initiatives in Uganda

3.1 Government Policies and Legislations

Recognition of the need for mountain ecosystems management in Uganda and indeed in the rest of Africa dates back to early times of the C20th, resulting in designating most of the upper slopes of the mountains and sensitive parts of highlands, or important watersheds, conservation areas (mostly, forest reserves).

Currently, high altitude areas on all the mountains in the country are managed as conservation areas, mainly for watershed and biodiversity conservation purposes.

Challenges of encroachment on these conservation areas by surrounding communities remain a challenge and are on the increase due to population pressure and lack of alternatives sources of livelihoods.

3.2 Sustainable management practices

A range of projects (largely conservation and development in nature) have been implemented by Government focusing on the following:

Educating communities surrounding the conservation areas appreciate the value of conservation;

Promotion of integrated sustainable land management and initiatives and activities that provide alternative sources of livelihoods;

Promotion of collaborative management of the conservation areas between the conservation authorities of government and the communities, and including regimes of access by the same communities to some of the resources in the conservation areas

The projects have not been successful enough to alleviate poverty among the mountain communities, reduce land pressures and reverse encroachment pressures on the conservation areas.

Of recent, initiatives have been started, to implement regional projects that address cross border mountain ecosystem challenges, given the fact that many of the mountain ecosystems are cross-border in nature between tow or more countries. An example is the Mount Elgon Regional Ecostsystem Conservation Programme, executed by the East African Community, and implemented by Kenya and Uganda.

3.3. Ecosystem Approach for Restoration and conservation of Conservation of mountain ecosystems in Uganda

According to Government policy on environment, mountainous and hilly areas are classified as fragile ecosystems and are given priority in environmental conservation and sustainable land management efforts, together with wetlands, riverbanks and lakeshores.

In 2002, Government through the National Environment Management Authority (NEMA), embarked on building capacity at the district and community levels in adopting an ecosystem approach to conserve fragile ecosystems.

This initiative is being undertaken in accordance with the recommendations and guidelines provided by the International Convention on Biological Diversity (CBD).

A total of 27 sites were identified, a number of them representing mountain ecosystems capacity built, community-based restoration conservation action plans developed.

The community action plans are now under implementation by the communities themselves, led by community site ecosystem committees and supervised by sectoral experts at the district level.

Results so far indicate good and interesting successes that contribute not only to improved levels of local ecosystem conservation, but also improved resources productivity, especially soil and water resources.

This approach is very relevant in building climate change adaptation capacities at a community level, with the belief and scientific evidence that health ecosystems are better placed to withstand the shocks and general impacts of climate change.

4. Impacts of climate change on the mountains

4.1 The African Perspective

Like most other types of landscapes of the continent, the impacts of climate change have already been felt, and are on the increase; however, the magnitudes of these impacts are evidently much greater.

The main impacts include reduced areas of snow on the snow capped mountains of Kirimanjaro in Kenya-Tanzania, Mount Kenya in Kenya and Mount Rwenzori in Uganda, evidence of a warmer earth, attributed to global warming.

The implications of this phenomenon are far reaching, including changes in micro-climate, reduced water flow of the numerous snow-fed streams that flow from these mountains.

The streams serve as water sources for communities in surrounding lowlands and beyond, for livelihoods and development, and as important tributaries to international rivers such as the Nile.

Other impacts include changes in ecological dynamics that have sparked off a range of other impacts including diseases and species displacement or disappearance.

4.2 The Ugandan Perspective

In Uganda, the impacts of climate change in the mountainous areas are already devastating. They mainly include landslides and floods disasters arising from extreme rainfall, and extension of malaria fever due to warmer temperatures.

During 1997/98, the climate change driven El-Nino led to devastating soils erosion landslides and flooding country wide, with a heavier toll taken on mountainous, leading to loss of life, arable land, property.

Early March this year, 2010, the people of Bududa District on Mount Elgon in the eastern region rose to a rude and devastating shock, where unusually high and prolonged rainfall led to the

disintegration of parts of the mountain slopes, leading to loss of over 350 lives and property in a massive landslide. Resettlement of the survivors in safer places out of the mountain is on going.

The same disasters affected many mountainous and hilly areas in the west and south-west. For example, on the 16th May of the same year, similar unusually high and prolonged rainfall event led to a disintegration of the mountain and hill slopes in Kabale District leading to massive landslides in several parts of the district. The damage caused to prime agricultural land, life and property was far reaching.

Temperatures in some areas of the mountains are reported to have increased by 3^0C, and this has made it possible for the malaria vector mosquito to extend its habitat into the mountains which used to be too cold for the mosquito to thrive.

Already, a dramatic increase in mortality rates among the mountain communities associated with malaria epidemics has been recorded, especially in the Kigezi region in the south-western mountains and highlands.

A reduction in water resources has also, been recorded, both soil water and water in streams and wetlands, an indication of reduced hydrological potential and agricultural productivity in these mountains.

5. Climate change mitigation and adaptation and challenges

There are many challenges faced in climate change adaptation in the country. These mainly relate to inadequate capacities of the affected communities. Mountain communities need early warning systems to be able to respond in time and avoid the impending climate change triggered disasters.

Information gathering and dissemination infrastructures are largely inadequate or non-existent (e.g. weather and slope stability information).

The high levels of poverty further make the affected communities very vulnerable, and take long to get out of the situation after such disasters.

Many of the innovative and effective technologies required in resource and development management such as land and social and economic infrastructures require financial investment levels that remain largely unaffordable and unavailable to the communities.

6. What next?

Some experts contend that mountains are forgotten ecosystems by the world community, and probably a stand alone international convention to conserve these ecosystems should have been considered at the time other environment conventions were being negotiated.

At this advent of climate change and its impacts, the mountain ecosystems and communities need special and urgent attention; given the importance fragility/extreme vulnerability and unique value, functions, and cultures of the ecosystems and communities in these areas.

At this time when climate change negotiations are ongoing, the attention of the mountain ecosystems and communities should be put high on the agenda, ensure that they do not lose out like it appears to have been, since the 1992 Earth Summit.

Advocacy for climate change mitigation and adaptation and general environmental sustainability the mountain ecosystems of the world must rise higher than ever to ensure that the integrity and

security of these ecosystems are not compromised or decimated by the predicted, as well as already visible impacts of climate change.

Uganda has been in the forefront in this advocacy and practical interventions, both at Governmental and non-Governmental institutions level and at community levels, despite the daunting challenges.

The mountain ecosystem communities face insurmountable challenges, of continued existence in a fragile environment whose ability to sustain their livelihoods has been greatly undermined by impacts of climate change, cause of which in none of theirs. As a special priority, these people deserve and need help from the international community, to be able to adapt to the new challenges.

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