A Look Into Climate Change Policy And Implementation In Uganda; A Focus On Wetlands

Elaru Joshua, Graduate Student, UNEP-Tongji Institute of Environment for Sustainable Development, Tongji University, Shanghai, China.
Hongtao Wang, Professor-in-charge, UNEP-Tongji Institute of Environment for Sustainable Development, Tongji University, Shanghai, China.

Abstract
Climate change is having an important impact on the socioeconomic situation in Uganda. The realization of this importance has led to a direction of efforts towards climate change adaptation and mitigation through the installation of the National Climate Change policy and the Climate Change Department. Although the policy has an extensive coverage in preventing and limiting the negative impacts of climate change, its implementation has failed to adequately utilize and exploit wetland resources. Wetlands in Uganda are widely distributed and promote climate change adaptation and mitigation through their ecosystem hydrology, carbon retentive functions and by the provision of economic diversification options. This paper suggests the adoption of public-private partnerships, government interdepartmental cooperation and climate predictive tools to encourage wetland use in tackling of climate change and its adverse impacts on the country’s population.

Keywords: Climate change, mitigation, adaptation, wetlands and policy

Introduction
Climate change is one of the most significant issues being faced by nations in the 21st century. This is particularly true for developing nations whose populations are still highly dependent on agriculture which is highly susceptible to climate change impacts (Hepworth & Goulden, 2008). Uganda, a nation in East Africa is a good example of the country that is already affected and will continue to experience the impacts caused by human induced climate change (Magrath, 2008). It is estimated that over 80% of the country’s population depends on agriculture as a main economic activity and also depends on natural systems for water supply (Kakuru et al., 2013). And to further complicate the situation, East Africa’s climate has always been naturally dynamic being affected by significant changes in temporal and spatial rainfall largely attributed to huge oscillations in oceanic and atmosphere circulation which include events like El-Nino Southern Oscillation (Hepworth & Goulden, 2008).

The impact of climate change has gained recognition with government policy, resources and academic research being directed towards it. There was a realization that being one of the least developed nations it has a low capacity to adapt and so is highly vulnerable to the negative impacts of climate change (CCD, 2016). This prompted the creation of the climate change department (CCD), formerly the climate change unit within the ministry of the water and environment whose main objective is to strengthen the nations commitment and implementation to the united nations framework convention on climate change (UNFCCC) and the Kyoto protocol (CCD, 2016).

The Uganda national climate change policy that charts the CCD, focuses on climate change adaptation and mitigation prioritizing key sectors of import to ensure implementation of the policy. These key sectors include agriculture, forestry, energy, wetlands and water systems just to mention a few of them. This policy is comprehensive in its stating the importance of all sectors in the fight against climate change (Ministry of water and Environment, 2012).

But a critical look into the actual implementation and focus of CCD action and policy shows a large emphasis is only being placed on projects based in forest and water management. The same trend is also being replicated in the area of academic research. This shows a lack of focus on the wetland sector an important area which this paper will address. This diverse sector plays a significant role not only in climate change adaptation but also in mitigation measures.

Understanding the importance of wetlands in the overall management and implementation of climate change policy will provide for unique solutions to improve the adaptation to and mitigation of climate change in Uganda. This will provide ideas towards change in the policy with practical schemes and measures that can be applied to ensure sustainable development in attaining the UNFCCC goals on climate change.

Climate change impacts in Uganda
Uganda like most low developed countries has a complicated and difficult relationship with climate change and its impacts. Historically, as a nation it has had a
marginal benefit from and contributed very little to greenhouse emissions, the leading cause of climate change. But now it is among the nations whose population is highly impacted, vulnerable and least resilient to climate change (Althor et al., 2016). Uganda’s carbon dioxide emissions have been approximately 0.1 metric tons per capita for the last 5 years with these emissions mainly from the transport and household sectors. These emissions are far below the average sub-Saharan Africa average of 0.8 metric tons per capita (WorldBank, 2016). Despite this low contribution to emissions the impacts of climate change in Uganda are already being noticed. Temperatures are expected to increase by 1.5 °C in the next 20 years and by up to 4.3 °C in the year 2080 (Hepworth & Goulden, 2008). In addition, changes to rainfall patterns are also expected with total annual rainfall amounts predicted to be less certain in the future. Regardless these changes are expected to have a significant impact on water and food availability, human health and natural resource management (Table 1). The increase in the occurrence of drought events has already been recorded by Uganda National Adaptation Programmes of Action (NAPA) showing a recent spike in the occurrence in the more recent years (Figure 1).

Table 1: Climate change impacts in Uganda. Source; (Hepworth & Goulden, 2008)

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water and health</td>
<td>Change in river flow regimes: Higher temperatures and melting of Rwenzori glaciers temporarily increasing and then reducing flows in the Semiliki river downstream</td>
</tr>
<tr>
<td></td>
<td>Water scarcity: Higher temperatures, evaporation and recurrent drought leading to stress, higher demands for water, conflict, and biodiversity loss. Partially implemented water resource regulation system hands legal access to water to the powerful</td>
</tr>
<tr>
<td></td>
<td>Flooding: Higher mean and increased intensity rainfall, coupled with land degradation and encroachment raises risks of loss of life and property and damage to infrastructure via flooding</td>
</tr>
<tr>
<td></td>
<td>Malaria: Extension into higher or once cooler areas with temperature increase where resistance may be low</td>
</tr>
<tr>
<td></td>
<td>Water Bourne Disease: Flooding is associated with diarrheal disease including cholera epidemics, particularly where sanitation is poor and in slum areas</td>
</tr>
<tr>
<td>Agriculture and food</td>
<td>Higher average rainfall, high intensity events: Crop damage and soil erosion</td>
</tr>
<tr>
<td></td>
<td>Pastoralists: Increase in rainfall in semi-arid areas could be beneficial, given mobile to take advantage of the rains. Droughts reduce viability of cattle corridor and precipitate conflict</td>
</tr>
<tr>
<td></td>
<td>Fisheries: Changes in nutrient cycling and loss of spawning brought by temperature and water level change reduce productivity</td>
</tr>
<tr>
<td>Natural resources</td>
<td>Species extinctions: As niches are closed out by shifts in climate regime</td>
</tr>
</tbody>
</table>
Climate change vulnerability is described as the potential for societies to be adversely affected by a climate event or change. While climate change resilience is the ability to cope and recover from the impacts of such an event. Uganda is labeled as one of the most vulnerable and least prepared countries in the world to climate change by the International Climate Risk Report (Magrath, 2008). And this high vulnerability and low resilience was shown in the aftermath of flooding that occurred in parts of the country in 2007 as a year later a request for food aid was still being delivered.

Climate change adaptation of the affected society is another important aspect in climate change studies and is described as practical adjustments carried out to manage the risks of climate change. The communities in Uganda have a low adaptability to climate change due to low financial and social capital. A high dependence on agriculture as a dominant economic activity and high poverty rates brings about a low diversity in income and livelihoods (Beg et al., 2002). This lack of diversity in income and livelihoods leads to poor adaptability to climate events as the population lacks alternative socioeconomic solutions.

**Climate Policy And Wetlands**

The Ugandan government, civil society and academia have recognized the significance and impact of climate change on Ugandan society. This commitment to climate change issues shows as Uganda is a signatory to all the UNFCCC resolutions like the Kyoto protocol and Paris climate deal. This has been backed up with regulatory and policy decisions aimed at the tackling of climate change and its impacts (CCD, 2016).

This policy identifies wetland ecosystems as a priority area for practical intervention to ensure climate adaptation and mitigation for the country’s populous (Ministry of Water and Environment, 2012). In its policy towards climate adaptation it states that ‘To promote long-term wetland conservation and restoration of degraded wetlands so that they can continue to provide global services, including mitigating climate change, while supporting the sustainable development needs of communities and the country’. And in its policy priorities towards climate mitigation it states that ‘To promote a balance between conservation and sustainable use of wetlands to reduce Green House Gas emissions’.

Although this policy places an emphasis on wetlands towards management of climate change a critical look at the implementation shows that this is not the case. When it comes to the practical implementation of the policy, wetlands barely play a role and this was clear as of the 10 projects being managed by the CCD, non is directly involved in the utilization of wetlands to combat climate change (CCD, 2016). These projects focus largely on adaptation schemes with emphasis on sectors like forestry, water and energy resource management.

Wetlands are one of the most valuable and widely distributed natural resources in Uganda covering approximately 30,105 square kilometers, representing 13% of the country’s total area (Turyahabwe et al., 2013). It is estimated that 80% of people who live adjacent to wetlands utilize their resources for economic and food needs and that wetlands employ at least 10 percent of the Ugandan population (Kakuru et al., 2013). The direct accessibility that the local population already has with the wetlands makes them a suitable tool to ensure that climate change mitigation and adaptation can be carried out sustainably and with community support.

**Climate Change Mitigation And Adaptation**

Wetland hydrology functions are probably the most significant aspect towards improving adaptability and resilience that can be availed to communities. This is particularly significant in a highly agricultural society like Uganda where 80% of the population effectively lives off agriculture. So the availability of adequate water resources for agriculture either to feed crop growing or pastoral needs is essential as climate change affects water availability by changing rainfall seasons and patterns in many areas. Since wetlands are floodplains they have the ability to store water in high rainfall periods and later provide this excess water resources to surrounding communities safely for agriculture and domestic purposes. Wetlands provide a readily available water damming function limiting the negative impacts of erratic weather changes.

Furthermore, wetlands are very effective in protecting surrounding areas from extreme weather conditions like droughts and flooding that can cause loss of property, crops and lives (Erwin, 2009). These floodplain ecosystems limit the effects of flooding by retaining excess waters and then release wet season flows slowly in periods of drought avoiding climate change induced famines. These floodplains can also recharge groundwater aquifers in water rich times.
Wetlands improve community adaptability by enabling the community to diversify to other economic activities when agriculture is made infeasible by the extreme climate conditions like droughts. Activities like fishing and fish farming, ecotourism, construction and craft making are already being exploited by communities living near wetlands and can provide an alternate means of livelihood to vulnerable populations. Fishing and fish farming resources provided by wetlands are particularly significant as fish provide an alternate source of food and income. It was estimated by Kakuru et al. (2013) that wetlands provide 6.3 US dollars per hectare per year just from acting as fish spawning grounds.

Wetlands have the capacity to act as carbon sinks and this ability has been found to be significant in mainly tropical and subtropical wetlands which are found in Uganda. Although wetlands are known to release methane a greenhouse gas, the effect of their carbon retention makes them net greenhouse retentive sinks important in climate change mitigation and prevention (Mitsch et al., 2013).

Temperatures are expected to climb up by 1.5 °C in Uganda over the next 20 years and this expected to affect species habitats in different parts of the nation. This could lead to habitat loss for a number of endemic species and conversely could increase the habitats for some invasive and dangerous species like mosquitoes to previously unaffected areas (Thuiller, 2007). Wetland ecosystems have the capability to maintain temperatures in surrounding areas by regulating the micro climates of these areas and thus mitigating these thermodynamic negative impacts (Chatterjee et al., 2010).

Challenges And Solutions

Wetlands make up about 6% of the earth’s land cover but it is estimated that that approximately 50% of the global wetlands were lost in the twentieth century. The millennium ecosystem assessment identified wetlands as the habitat most affected by development leading to an accelerated loss in comparison to other ecosystems (Assessment, 2005). The Global loss is mainly attributed land use conversions and changes with 50% attributed to agriculture, 30% to forestry and 10% to peat extraction (Moses, 2008) and this trend of wetland loss is being exhibited in Uganda as well. It is estimated that about 50% of Uganda’s wetlands are undergoing some type of human exploitation with an approximate 30% of wetlands being lost between 1994 and 2009 (Turyahabwe et al., 2013). Despite being a very important resource towards climate change mitigation and adaptation, wetlands are being misused and lost limiting their current and future impacts on climate change. So any climate change policy being put forward and implemented has to tackle the issue of wetland loss, as a non-existent resource cannot be utilized.

Firstly, the CCD should put a higher emphasis on wetland protection and utilization in the implementation of the National climate change policy. This should be done by integrating the wetland inspection division into planning and running of the CCD programs. The wetland inspection division is the government department responsible for implementing the Uganda national wetlands conservation and management program and is in charge of providing guidelines and technical expertise necessary to the sustainable use of wetlands in the country. This collaboration between the two government departments will ensure that wetland use is incorporated into the planning and execution of climate change projects and schemes. And thus enabling sustainable utilization of these ecosystems in the management of climate change impacts.

A public-private partnership program should be set up with the express purpose of promoting sustainable use of wetland resources towards climate change adaptation by providing financial incentives towards the maintenance of current and restoration of wetlands. This program would work in a similar fashion to the Reduced Emissions from Deforestation and Forest Degradation+ (REDD+) program which is already being utilized as part of the National climate change policy. This novel program would provide resources towards wetland management in areas where wetlands are vulnerable to over exploitation and loss by providing financial resources to local communities to maintain the ecosystems. The program would focus encouraging the sustainable use of
wetlands by providing resources and expertise towards diversification programs that limit the human impact on the ecosystems like Ecotourism and fish farming.

Academic research is an important way to ensure that public and administration focus is directed towards the most significant issues and the solutions to address them. So the climate change policy administrators should encourage the academic research into the interaction between the sectors like wetlands and climate change science. This will improve the understanding of this complex system interactions enabling a more efficient resource utilization. This could improve which programs are implemented leading to the most effective methods and systems in promoting climate change mitigation and adaptation in the country. In the wetland sector this could focus on the socioeconomic benefits provided by ecosystem services like water recharge, drought prevention and carbon retention. This research could also provide further justification like unaccounted for economic benefits of programs beyond the limiting of negative climate change impacts and thus promoting political and social support.

The development of flood and drought prevention tools is an effective way to manage climate change impacts through wetland use. An example is the OPIDIN (Outil de Prédiction des Inondations dans la Delta Intérieur du Niger) which is a tool which has been developed based on extensive research. OPIDIN is able predict flood events and levels throughout the Niger delta several months in advance; this information helps the local communities by ensuring that they can better utilize water resources for farming and fishing practices according to the expected water availability over the year. A similar tool can be developed for the areas of eastern and western Uganda prone to flooding, protecting the local communities from negative impacts of climate change while taking advantage of available wetland resources.

**Conclusion**

Wetlands are an effective tool towards promoting climate change adaptation and mitigation in Uganda as they are one of the most widely dispersed and available resources throughout the country. Their hydrological ecosystem services, carbon retentive functions and ability to promote economic diversity enables them to be an effective medium in protecting populations from climate change impacts. And in a low developed agrarian country like Uganda these ecosystems are far more important and the National climate change policy should focus on their utilization. Policy implementation should be focused on and highlighted as it will improve the effectiveness of the policy in using wetlands as a force in combating climate change impacts. The protection of available wetland resources and wetland restorations should be emphasized by promoting the sustainable use of wetland resources through strong regulations, economic diversification programs and public sensitization.

**References**


