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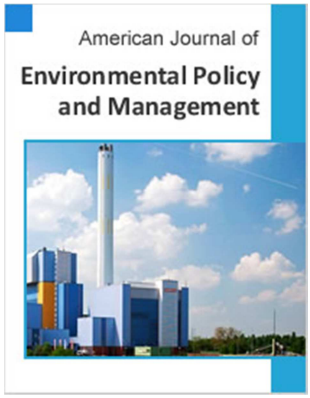

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Urban Environmental Security in a Continuously Growing City in Sub-Saharan Africa in the Climate Change Era: A Case of Kampala, Uganda

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Abstract
The total well-being of urban dwellers in a continuously growing city depends on its urban environmental security. However, climate change impacts may increase stress that may be affecting the continuously growing urban settings in Sub-Saharan African countries. This is mainly because of the inadequacy in planning and preparation for the consequences of the rapid urbanization in most of the continuously growing cities. The study investigates the urban environmental security in a continuously growing city in Sub-Saharan Africa using Kampala capital city in Uganda as a case study. The study relates infrastructural development to implications of rapid urbanization and climate change in Kampala. It also examines the relationship between urban food security and conditions of living of the residents. The study further analysis the indispensability of water security, forests and wetlands in Kampala capital city in the climate change era. The study advocates sustainable urban environmental security processes as a panacea to urban-related threats in a continuously growing city.

1. Introduction

The twentieth century has made the word 'security' to grow farther than its expected with some appendages which give it a broader meaning. These recently developed security concepts discuss security in a wider view thereby enveloping, targeting and addressing the current needs of the society. However this nowadays security still adhere to its traditional root and goal of preventing conflict and ensuring peace. Urban environmental security is one of the recent development concepts from the security paradigm.

Urban environmental security is developed to encourage sustainable development in cities and metropolis. This is on the basis that sustainable development encourages human development, societal development and averse to crisis and conflict. Urban environmental security apart from being a protégée of security also align with the

concept of environmental security whose definitions and development tends towards the assessments of threats to the society and nature capitals. Urban environmental security is also referred to as urban ecological security.

Urban environmental security as the assurance of protection against threats to the physical and mental health of urban residents which include life support systems and urban, social, and economic sustainable development [1]. It is also a process that focuses on the total well-being of urban dwellers or residents encouraging prevention and management of urban ecological degradations thereby ensuring the provision of sustainable ecological services to urban communities [2]. It is the practice of integrating the urban landscapes to provide enough ecological services that will support the development of socioeconomic system thereby maintaining sustainable development [3]. Thus, urban environmental security focuses on the preservation of urban landscapes and its ecological services for the future generation.

The well-being of most of the urban areas in Sub-Saharan Africa countries nowadays is being threatened because of their recent continuous rapid urbanizations and population growth. Statistical records on world urbanization are showing cities growing faster than the total population of the world [4]. Nevertheless, increasing urbanization is always a driver for and consequences of socioeconomic and technological developments both nationally and regionally but with the urban residents having greater demands for resource consumption than its rural counterparts but with adverse effects on its ecosystems [5].

However, most of the cities in Sub-Saharan Africa never anticipated nor prepared for their current population status, thereby making them overshoot their facilities and exasperating the societal environmental and social conditions. Such cities include Lagos mega-city in Nigeria, Dar es Salaam in Tanzania, Dakar in Senegal, Luanda in Angola, Nairobi in Kenya, Khartoum in Sudan and Kampala in Uganda, etc.

This study stands on the conceptual frameworks that cities with growing populations are likely going to be topmost among the sufferers of resource constraints and climate change making them to be susceptible to socio-environmental issues and challenges [6]. Thus, this study chooses Kampala capital city in Uganda as a case study in examining the urban ecological security of a continuously growing urban center in Sub-Sahara Africa. This is on the premise that Kampala's rapid urbanization and population growth sharply increased in recent years thereby putting pressure on its socio and environmental components. This subjects the urban society to socio environmental challenges and adverse climate change threats (and implications) with negative consequences that may be unfriendly to urban residents especially the vulnerable urban poor. Therefore, the study analyzes the concept of urban environmental security in a climate change era for Kampala as a continuously growing city in the developing world and Sub-Saharan Africa.

2. Methods

The study is a review of the literature on urban studies and environmental sustainability in analyzing the urban environmental security of a continuously growing Sub-Saharan African urban center using Kampala capital city in Uganda as a case study. The study examines the rapid urbanization of Kampala city through analysis of its population growth from the 1990's using Uganda Bureau of Statistics data in the *"National Population and Housing Census 2014-Main Report"*. It also investigates the infrastructural development of the city in line with the current climate change conditions. It further examines the urban ecological security of Kampala city through data from relevant scientific articles analyzing its food security, water security, wetland encroachment alongside climate change.

2.1. Urbanization in Kampala

Rapid urbanization culminating in urban growth has recently become a common phenomenon in some Sub-Saharan African countries and in some other parts of the world. Statistical records have shown that the world urbanization is growing faster than the total population of the world [4]. In the year 1900, the urban population in the world increased from 200 million (about 15% of world population) to 2.9 billion (about 50% of world population) in 2000 [7].

The population of the world is projected to increase by 2.5 billion when passing from 6.7 billion in 2007 and expected to be 9.2 billion in 2050, while its urban population is estimated to increase from 3.3 billion people in 2007 to 6.4 billion people in 2050 [8]. The rapid urbanization being experienced in different parts of the world is also common to some of the cities in Uganda. This is also expressed in Kampala which is Uganda's capital city.

Kampala capital city is located in the central region of Uganda by the shore of Lake Victoria. It is situated at the average altitude of about 1,120m above sea level on around twenty-four low flat-topped hills that are surrounded by wetland valleys [9]. Statistics of the census conducted in Uganda from the Uganda Bureau of Statistics show that there has been a continuous increase in the country's population since the independence in 1962 which has also been expressed in most of its urban areas. Also, the 2014 population census conducted in Uganda presented the population of Uganda as 34.6 million people representing an increase of 10.4 million people from its 2002 census [10].

In *the "National Population and Housing Census 2014-Main Report"* produced by the Uganda Bureau of Statistics in 2016, Kampala capital city which is 7928 square kilometers is depicted as the most populous urban area in Uganda with a population of 1,507,114 in the year 2014 which was an increment from the census value of 1,189,142 in the year 2002 and 774, 241 in the year 1999 (Table 1). The data shows an increase of 414,905 people in the city population from 1999 to 2014 while there was an increase of

317, 972 people from 2002 to 2014. This is further represented in figure 1 below. Thus, figure 1 below depicts the population increase in Kampala city using the statistics from the *"National Population and Housing Census 2014-Main Report"* from the year 1999 to 2014. There was a 53.59% increment in the population of people in Kampala between 1999 and 2002 while between 2002 and 2014 the population census figures showed 21.10% increment in the number of people in the city.

Table 1. *Kampala Capital City (Uganda) Population Increases.*

Year	Population
1999	774,241
2002	1,189,142
2014	1,507,114

Census figure from *National Population and Housing Census 2014-Main Report* [10]

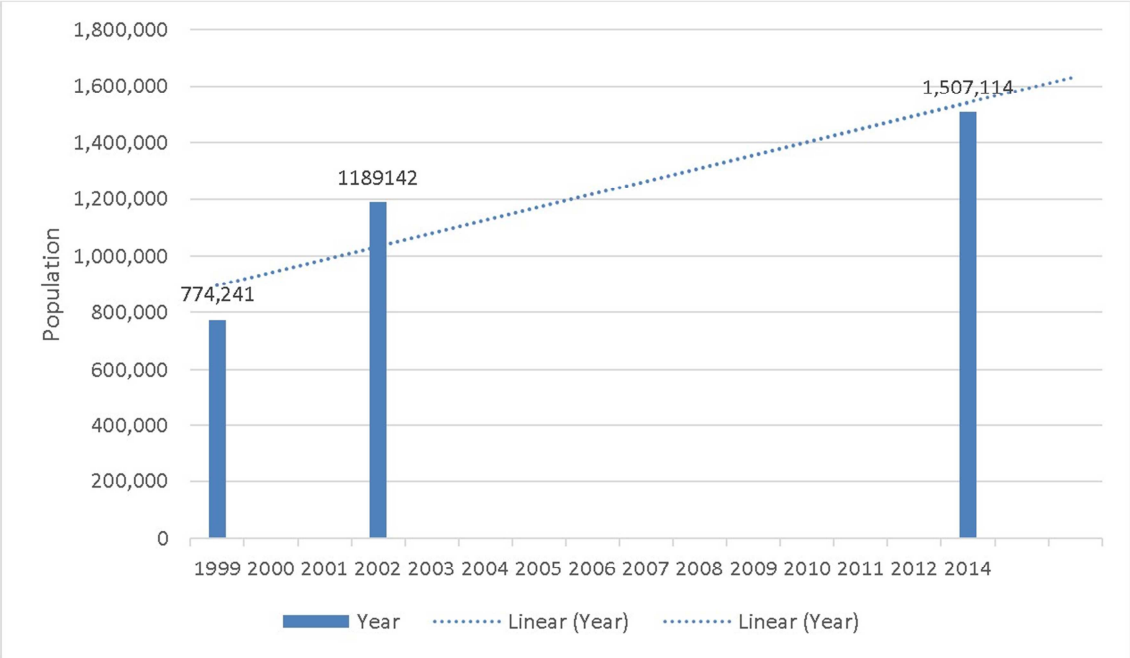

Figure 1. *Column representing the Population Data of Kampala Capital City from 1999 to 2014 from the "National Population and Housing Census 2014-Main Report" Data.*

The continuous increase in the population of Kampala capital city may be attributed to its metropolitan and industrial nature apart from being the seat of the national government. The peace and stability that is being witnessed in Uganda since the 1990's have also contributed immensely to the growth of its capital city Kampala which is fast becoming the economic and business hub for neighboring countries of the East African region.

Kampala capital city population growth is encouraged by continuous urban-rural migration where the migrants expect economic opportunities in the metropolis. The city is also a distribution center for goods and products within Uganda and neighboring countries like Rwanda, South Sudan and Democratic Republic of Congo [11]. Consequently, people troops into Kampala daily for business activities thereby making the day's population be more than double its actual population figure. The city day's population for people accessing the city center by road is approximately 3.5 million people [12], as compared to the city's population of 1,507,114 [10].

Kampala capital city has a major characteristic which is common to most of the urbanized and growing big cities in the Sub-Saharan African countries where there is the reproduction of poverty due to lack of jobs thereby encouraging the growth of urban slums where most the components of environmental security and sustainability are hampered [13] [14]. Income of urban or city dwellers determines their place of abode. Due to the level of poverty in Sub-Saharan African countries urban centers, about three-quarters of the urban population live in slums [15].

The continuous growth of most of the cities in Sub-Saharan African countries which include Kampala capital city were not anticipated in the colonial, pre-independence and early post-independence days which makes the existing facilities and infrastructures such as waste management, environmental components, drainage systems, power systems and health systems not to cope favourably with the unexpected rapid urbanization [16]. Moreover, the threats of global climate change being witnessed in different parts of the world could exacerbate existing social and economic challenges facing urban areas such as rapid urbanization and poverty [17].

However, the inadequacy of sustainable environmental and urban planning policies coupled with weak and ineffective administrative and enforcement mechanisms of the Kampala city existing environmental laws and policies by the city authority might have contributed immensely to the distortion of the city's environmental components thereby impinging on

the city's environmental security and sustainability. This also encourages and aggravates the negative implications of adverse climate change in the urban society.

2.2. Climate Change, Infrastructures and Kampala City

Infrastructural development is a veritable key to the designing and improvement of climate change adaptation and mitigation strategies for urban society. Nevertheless, the likelihood of increased stress being faced by the urban societies in most developing nations and Sub-Saharan African urban and cities including Kampala capital city in Uganda could be attributed to the increasing rapid urbanization without an adequate corresponding increase in infrastructural development.

Kampala capital city in Uganda like other cities in different parts of the world is expected to have changes in its frequency of extreme climate conditions which include floods, droughts, and storms [18]. Thereby making its urban residents be vulnerable to adverse climate change impacts. Also, the statistics of urban in Sub-Sahara Africa depicts that 1 billion residents of urban are living in its slums that lack basic infrastructures and services while more than fifty percent of its urban population could not access basic sanitation and about 20 percent could not also access safe water [19].

Kampala City is not an exception in this uncomely development in Sub-Sahara Africa. In Kampala city, slums are primarily located on floodplain and wetlands that are susceptible to flooding during raining seasons. Based on the Fourth Intergovernmental Panel on Climate Change Assessment Report and its Global climate change models, rainfall of 10 to 20% has been predicted for most of the countries while there is expected a decrease in the semi-arid cattle corridor [20]. With climate change, there is an expectation of an increase in precipitation level in Kampala, Uganda.

Though the average near surface temperatures increased one degree Celsius between 1979 and 2005, however rainfall never changed significantly from 1951 to 2005, thereby no robust projections concerning intensity and frequency of heavy rains but literature and history suggest they have been increasing [21]. In the recent time, heavy rainfall during the two rainy seasons in Kampala city has sometimes led to flooding in the slums and other informal settlements areas. Bwaise, Kyambogo on Jinja road, Natete, Clock Tower, Nalukolongo, and Namasuba are locations in Kampala city that have recently experienced flooding due to infrastructural decay coupled with climate influence.

The flooding at many times permeates leaking city water pipe with toxic and unhealthy materials which at times leads to outbreaks of diseases such as cholera, dysentery, typhoid, and diarrhea in some places within the metropolis [22] [23]. Though the data for the city region may not be available, 45% of the residential buildings in Kampala city boundaries have been estimated to be situated in flood-prone areas [20]. However, the urban poor is expected to be affected most by adverse climate change impacts in Kampala capital city since they reside mostly in slums and precarious settlements where basic infrastructures and essential services are deficient.

Also, there has been the construction of unregulated shelter by the urban poor in slums at Katanga, Kivulu, Kalerwe and Bwaise in Kampala city which has reduced infiltration thereby increasing runoff to about six times of what would have occurred naturally [24]. Consequently, with the limited basic infrastructures and situation of the slums in Kampala capital city, the risks of the urban poor to adverse climate change impacts are exacerbated [19]. This is because poverty makes the urban poor to lack the needed adaptive capacity for climate change impacts thereby increasing their vulnerability.

A quantitative cost of annual damages caused by flood in Kampala in this climate change era conducted by the Uganda's Ministry of Water and Environment Climate Change department was estimated to be between 1.3 million US dollar and 7.3 US million dollar in 2013 and could rise to between 3.7 million US dollar and 17.6 million US dollar by 2025 and expected to rise to 33.2 million US dollar to 101.7 million dollars by 2050 if the intensity of the flooding never changed [21]. Therefore, with this huge cost, there is a need for sustainable urban and environmental planning and management for the city that will forestall the continuous loss of resources that could be annexed for human development.

2.3. Climate Change and Urban Food Security in Kampala

Through the definition of the food security of the United Nations Food and Agriculture Organization [25], urban food security is determined by its food availability and food access. However, in most of the urban societies in Sub-Saharan Africa which include Kampala capital city, urban agriculture is limited with few smallholder farming being carried out thereby making the urban food availability dependent on rural and suburban agricultural production. This is mostly because lands in most of the urban settings are converted to residential and commercial purposes to accommodate the growing urban population and its growing economic activities.

Therefore, urban food security is solely dependent on food supply through urban-rural interfaces. It also depends on the socio-economic well-being of the urban residents. Consequently, the access to food products for urban residents depends on economic status (income and expenditure of residents) food prices and markets [26] [27]. Since, the year 1993, statistical records have shown that progress has been made in the reduction of poverty in Uganda since the poverty rate has been falling continually [28]. Kampala capital city is not an exception to this laudable experience of the nation. Nevertheless, the continuous rapid urbanization and growth of Kampala with no adequate preparation for intending migrants and residents is also increasing negative threats on the socioeconomic concerns of the residents. This is because

it increases competition for available socioeconomic services of the city as well as food security stress.

The Uganda Global hunger index of the year 2016 is 26.4[1] showing the needs for coercive processes in the encouragement of food security in the country. The food stress and needs of the city are increasing daily because of its increasing urbanization. Also, there are some other parts of the country such as Karamoja region that has been suffering from drought due to insufficient rain for some time which some literature has attributed to climate change. Also, the increase in the number of refugee in the country which is 1.25 million people elevate the increase and pressure on food need in the nation [29] [30].

In the end, more pressure is put on the food security of Kampala since some of the refugees from Uganda's neighboring war-torn countries relocate to the Kampala capital city for better living. Also, some of the citizenries of Uganda from the drought area in Karamoja sometimes move to Kampala capital as a succor to the dearth being witnessed in their domain.

The relationship between water security, forests, wetlands and food security cannot be underestimated in this climate change era when considering urbanization tendencies of a rapidly growing city like Kampala. This is because, wetland and forests serve as natural water purification systems and regulate water availability thereby preserving desertification and salinization while forests have also been known to regulate climate and rainfall [31].

Forests are disappearing fast in Kampala city since it is being replaced by built environment. Data from the Wetland Management Department, Ministry of Water and Environment and Uganda Bureau of Statistics has shown that Uganda has lost about 11,268 square kilometers of wetland from 1994 to 37,575 square kilometer in 2009 which represents about 30% of the country's wetlands [32].

Kampala capital city has a big chunk of the Uganda wetland. The wetland is essential to the needs of Lake Victoria. Lake Victoria is the source of drinking water and aquatic foods for Kampala and its environs. Therefore, the continuous encroachment and conversion of Kampala wetland and forests to physical structures and buildings hinders the city from partaking fully of the ecosystems services being rendered by forests and wetlands in this climate change era and at the end putting pressure on urban food security.

3. Conclusion

Urban environmental security is cogent to environmental sustainability and human development in a continuously growing city. Scientific articles suggest urban development and growth influences climate change while on the other hand, climate change adverse impacts also have implications on every urban society and its residents. These signify the needs for sustainable urban environmental security in every city in order for the urban dwellers to enjoy the benefits of urban society and encourages its preservation.

Key to sustainable urban environmental security for a continuously growing city in Sub-Saharan Africa such as Kampala city lies in effective and enforcement of urban and environmental sustainability policies which includes urban planning, city environmental and building laws which will include preservation of wetlands, sustainable waste management, controls of effluents from industries, control and management of the remaining forest in the city and the sustainable management of parks. All these will inspire environmental conservation and at the end preserve water security and boost food security.

Urban agriculture mostly through small holder farming may be encouraged to enhance food security among the urban dwellers. This can be done through the creation of demonstration centers that train people on how to practice back yard farming despite limited land. Increase of infrastructural development that is corresponding to the level of rapid urbanization and growth being witnessed by the city should be prioritized by all levels of government to encourage sustainable urban environmental security of the city.

Furthermore, the education and awareness of the urban dwellers on climate change and environmental sustainability is essential in the determination of the future nature of the city. Here, the governmental and non-governmental organisation will need to be informed in the disseminations of information of implications of climate change to urban society and needs for urban and environmental sustainability. More so, education policies should include urban studies and management in school curricula from the pre-school in order to create in the growing children the skills, management, and affection of their urban society.

However, location specific climate change adaptation and mitigation strategies will need to be identified and developed for some of the areas that may be facing adverse impacts of climate change such as places prone to floods or susceptible to an outbreak of diseases. This is of utmost importance because the urban poor in a continuously growing city in Sub-Saharan Africa is more vulnerable to climate change impacts because they sometimes lack the ability to cope with climate change impacts because of their little incomes. Most of the areas that are liable to impacts of climate change lack modern infrastructures and facilities that will encourage their coping abilities.

The city will need to establish an urban environmental governance for sustainable and functional urban environmental security. The principles of urban governance encourage every stakeholder in the city such as the local government, regional, national (central) governments, academia, researchers, industries, non-governmental organizations, faith based organizations and market forces to be involved in the running of the city.

1 Global Hunger Index measures and tracks hunger globally, regionally and locally every year by International Food Policy Research (IFPRI). 2016 Global Hunger Index accessed online http://ghi.ifpri.org/ July 7, 2017.

References

[1] Zhao, O. and Yang, Z. Advances in assessment methods for the urban ecological security in China. *ISEIS Publication series* number P002. International Society for Environmental Information services, 2007.

[2] Akiyode O. O. Urban Environmental Security in Developing Economy Mega-city: A Case Study of Lagos, Nigeria. *Journal of Sustainable Development in Africa* Vol. 12, No. 5, 2010.

[3] Zhaoxue L. and Xu L. Evaluation Indicators for Urban Ecological Security Based on Ecological Network Analysis. International Society of Environmental Information Science 2010 Annual Conference (ISEIS). Procedia Environmental Science 2 (2010) 1393-1399, 2010.

[4] United Nations. World urbanization prospects. The 2003 revision. *United Nations, 2014.*

[5] Jianguo W., Xiang W. and Zhao. Urban Ecology in China: Historical Developments and Future Directions. Landscape and Urban Planning 125 (2014) 222-233. Elseiver, 2014. http://dx.doi.org/10.10.1016/j.landurbplan.2014.02.010

[6] Hodson M and Marvin S. Urban Ecological Security': a New Urban Paradigm? *International Journal of Urban and Regional Research.* Vol. 33.1 pp 193-215, 2009. DOI: 1111/j.1468-2427.2009.00832.x.

[7] McGranahan, G., Marcotullio, P., Bai, X., Balk, D., Douglas I., Braga, T., Elmqvist T., Rees W., Satterthwaite D., Songsore J., Eades J., Zlotnik H., and Ezcurra, E. Urban Systems. *Center for International Earth Science information (CIESIN).* Columbia University, 2005.

[8] United Nations (2008). United Nations Population Prospects. The 2007 Revision Population Database. *United Nations*. Accessed online July 4, 2017 at http://www.un.org/esa/population/publications/wup2007/2007WUP_Highlights_web.pdf

[9] UN-Habitat. Kampala, Uganda. *Cities and Climate Change Initiatives*. United Nations Human Settlements Programme (UN-HABITAT), 2008.

[10] UBOS. *National Population and Housing Census 2014-Main Report*. Uganda Bureau of Statistics (UBOS), 2016.

[11] KCCA. Kampala Climate Action. Kampala City Council Authority, Kampala, Uganda, 2016.

[12] Serwadda I. Transforming Kampala into a Sustainable Energy Efficient City. Case: Energy Audit of KCCA buildings to ascertain the CO2 emission levels. Adetef Project Kampala, 3rd of October 2014.

[13] Davis, M. (2006). Planet of Slums. *Verso UK, New York*.

[14] Akiyode O. O. (2013). Implications of Urbanization on Environmental Security in Developing Economy Countries: A Case Study of Nigeria. *Journal of Sustainable Development in Africa* Vol. 15, No 3. Clarion University of Pennsylvania, Clarion.

[15] Myers N. and Kent, J. The New Atlas of Planet Management. *University of California Press, 2005.*

[16] Ayeni A. O. and Akiyode O. O. The Implications of Urbanization and Climate Change on Water Security: Case of Lagos Mega-City, Nigeria. In Water Resources and National Development. Mbajiorgu C. C., Obeta M. C. and Anyawu C. N. (eds). Proceedings of the 5th Annual National Conference Nigerian Association of Hydrological Sciences (NAHS) Vol. 5, pp. 447-453. *University of Nigeria Nsukka*, October 21-24, 2013.

[17] Gasper R., Blohm A. and Ruth M.. Social and economic impacts of climate change on the urban environment *Current Opinion in Environmental Sustainability* 2011, 3: 150–157 Elsevier B. V. DOI 10.1016/j.cosust.2010.12.009.

[18] Hepworth, N. and Goulden, M. Climate Change in Uganda: Understanding the implications and appraising the response, *LTS International, Edinburgh, 2008.*

[19] Baker J. L. Climate Change, Disaster Risk and the Urban Poor Cities building resilience to for a Changing World. *Urban Development Series*. The International Bank for Reconstruction and Development / The World Bank, 2012.

[20] UN-Habitat. Kampala Climate Change Assessment: A Summary. *Cities and Climate Change Initiatives*. United Nations Human Settlements Programme (UN-HABITAT), 2009.

[21] Gracia J. and Markandya A. (2015). Economic Assessment of the Impacts of Climate Change in Uganda. Case Study: Economic Assessment of the Impacts of Climate Change in Kampala Urban Area. Ministry of Water and Environment. Climate Change Department. The Republic of Uganda.

[22] New Vision. Kampala Flood Problems and Proposed Solution. New Vision Newspaper January 5, 2017. Accessed online July 4, 2017 at http://www.newvision.co.ug/new_vision/news/1318525/kampala-flood-proposed-solutions

[23] IIED. Climate Change and Urban Poor: Risk and Resilience in 15 of the World's Most Vulnerable Cities. *The International Institute for Environment and Development (IIED).*

[24] Mabasi T. Assessing the Impacts, Vulnerability, Mitigation and Adaptation to Climate *Change in Kampala City Fifth Urban Research Symposium 2009.*

[25] Food and Agriculture Organization of the United Nations (FAO). Food Security. Policy Brief. Issue 2, June 2006.

[26] Cohen M. J. and Garrett J. L. The food price crisis and urban food (in)security. Environment and Urbanization. International Institute for Environment and Development (IIED), 2010. Vol 22 (2): 467-482 DOI: 10.1177/0956247810380375

[27] Food and Agriculture Organization of the United Nations (FAO). An Introduction to Basic Concepts of Food Security. EC-FAO Food Security Programme, 2008.

[28] IBRD-IDA. The Uganda Poverty Assessment Report 2016. The International Bank of Reconstruction and Development and The International Development Association World Bank (*IBRD-IDA World Bank)*.

[29] The Guardian. Tensions rise as Uganda neighbourly refugee policy starts to feel the strain. 2017 Accessed online July 07, 2017 at https://www.theguardian.com/global-development/2017/may/21/uganda-refugee-policy-breaking-point

[30] Fews Net. Funding shortfalls expected to contribute to increased food insecurity among refugees. Famine Early System Network. Food Security Outlook June 2017 Accessed online July 07, 2017 at http://www.fews.net/east-africa/uganda

[31] Convention on Biological Diversity (COBD). Water Security Depends on Forests and Wetland. COP 11 Presentation. Convention on Biological Diversity: International Year of Forest 2011 http://www.ramsar.org/document/cop11-presentation-water-security-and-the-importance-of-wetlands-as-natural-infrastructure Accessed July 9, 2017.

[32] Turyahabwe, N., Kakuru W., Tweheyo M. and Tumusiime, D. M. Contribution of wetland resources to household food security in Uganda. *Agriculture & Food Security*, 2013. DOI: 10.1186/2048-7010-2-5.