

Acknowledgement

This review was undertaken under the auspices of the AfricalInteract project funded by the International Development Research Centre (IDRC).

About AfricalInteract: AfricalInteract is a platform enabling research-to-policy dialogue for adaptation to climate change among a broad range of African stakeholders in sub-Saharan Africa. These include civil society, researchers, policy-makers, donors, and the private sector working on adaptation to climate change in the agriculture and health sectors as well as urban areas with water and gender as cross cutting issues. The overall objective of AfricalInteract is to develop a platform for the effective and efficient transfer of information to policy makers, with the ultimate aim of enhancing the resilience of vulnerable populations. AfricalInteract is funded by the International Development Research Centre (IDRC) and coordinated by the West and Central African Council for Agricultural Research and Development (CORAF/WECARD) under the auspices of the Forum for Agricultural Research in Africa (FARA). The regional focus of AfricalInteract is based on the Regional Economic Communities in the four sub regions of sub-Saharan Africa. Focal organizations coordinating regional activities are as follows: The Association for Strengthening Agricultural Research in East and Central Africa (ASARECA) – East Africa; Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN) – Southern Africa; Commission des Forets d'Afrique Centrale (COMIFAC) – Central Africa; and Energie-Environnement et Developpement (Enda) – West Africa.

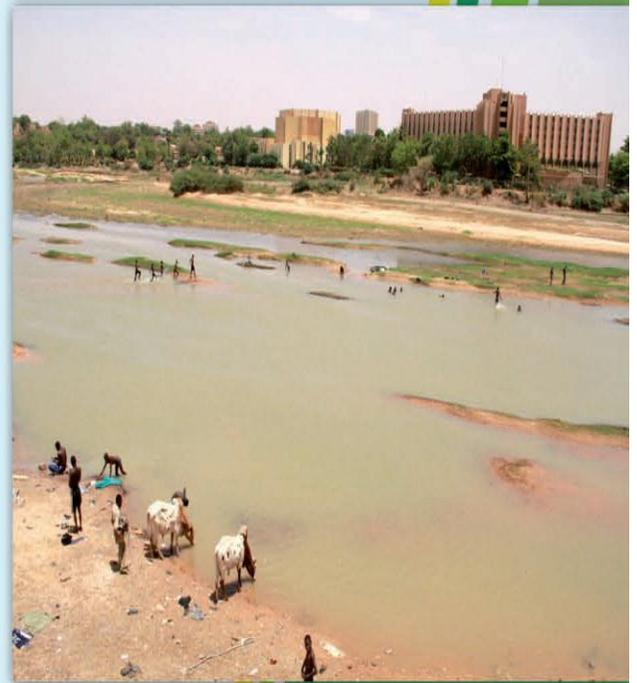
About CORAF/WECARD: The West and Central African Council for Agricultural Research and Development (CORAF/WECARD) is a constituent of the Forum for Agricultural Research in Africa, and comprising 22 National Agricultural Research Systems in West and Central Africa. CORAF/WECARD's mission is "Sustainable improvements to the competitiveness, productivity and markets of the agricultural system in West and Central Africa by meeting the key demands of the sub-regional research system as expressed by target groups" with strong alignment and commitment to the overall goal of the Comprehensive Africa Agriculture Development Programme of the New Partnership for Africa's Development. www.coraf.org



AfricalInteract

Enabling research-to-policy dialogue for adaptation to climate change in Africa

Research and Policies for Climate Change Adaptation in the East Africa Urban Sector SUMMARY



Chipso Plaxedes Mubaya,
Abdulai Jalloh,
and Hezron Mogaka

Chipo Plaxedes Mubaya¹, Abdulai Jalloh², Hezron Mogaka³

¹ Senior Programme Officer, African Climate Change Fellowship Programme (ACCFP), Institute of Resource Assessment (IRA), University of Dar es Salaam, P. O. Box 35097, Dar es Salaam, Tanzania

² Programme Manager, Natural Resources Management Programme, Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles/West and Central African Council for Agricultural Research and Development (CORAF/WECARD), 7 Avenue Bourguiba, BP 48, cp 18523 Dakar, Sénégal

³ Programme Manager, Natural Resource Management and Biodiversity; Association for Strengthening Agricultural Research in East and Central Africa (ASARECA), P. O. Box 765, Entebbe, Uganda

Acronyms and Abbreviations

CCAA	Climate Change Adaptation in Africa
DFID	UK Department for International Development
EAC	East African Community
GHEA	Great Horn of East Africa
IDRC	International Development Research Centre
IRA	Institute of Resource Assessment
NAPA	National Adaptation Programme of Action
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organisation
START	Global Change SysTem for Analysis, Research and Training
TMA	Tanzania Meteorological Agency
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

Table of Contents

Acronyms and Abbreviations

Contenu

Acronyms and Abbreviations.....	2
1. Introduction.....	4
2. Overview of the East Africa Urban Sector	5
2.1 Rates of Urbanization	5
2.2 Climate change challenges and impacts of climate change in urban areas.....	6
2.3 Climate change implications for key challenges in urban areas	7
3. Research Related to Climate Change in the East Africa Urban Sector.....	7
3.1 Implications of climate change and vulnerability in a multi-stressor context	8
3.2 Options for reducing vulnerability and strengthening adaptive capacity.....	8
3.3 Key barriers to adaptation in urban areas	9
4. Policies related to Climate Change in the East Africa Urban Areas.....	9
4.1 Climate change considerations in regional urban area policies	9
4.2 Climate change considerations in national government urban area policies.....	10
4.3 Urban area considerations in climate change policies and strategies.....	10
4.4 Key arguments for policies on adaptation to climate change in urban areas	10
5. Gaps in Climate Change Adaptation Research and Policy in the.....	11
East Africa Urban Sector.....	11
5.1 Key research gaps on climate change adaptation in urban areas	11
5.2 Key policy gaps with regard to climate change adaptation in urban areas in national policy frameworks.....	12
5.3 Key research-policy gaps.....	12
6. Stakeholders and Opportunities for Collaboration in Research	12
on Climate Change in the East Africa Urban Sector.....	12
7. Conclusion and Recommendations	13
7.1 Conclusions	13
7.2 Recommendations.....	15
8. References.....	15

1. Introduction

Growing research interest in and support for adaptation to climate change in Africa, especially on the impact on the urban sector, the implications of limited knowledge base and national policies, emphasize the need for priority actions to address climate change adaptation issues. It is becoming increasingly necessary to conduct stock-taking, synthesis and review of research results on climate change and the way the results feed into and influence policy formulation to enhance climate change adaptation in the urban sectors of African countries.

With support from IDRC, AfricaInteract and CORAF/ WECARD commissioned a desk review of research and policies related to climate change adaptation in the urban sector in Africa. The objective of this study is to enhance the knowledge base and to support research-based policy formulation for climate change adaptation in urban areas of sub-Saharan Africa. This review assessed the existing knowledge base on the impact of climate change on the urban sector of East Africa and documented current research and the state of knowledge of climate change impact on urbanization and related threats. The extent to which urbanization issues are mainstreamed into broader climate change policies and how these policies address climate change issues in the urban sector were also reviewed. Specifically, the review was guided by the following key questions:

1. What is the role of climate change challenges in the context of the multiple challenges and opportunities facing urban areas in the region?
2. What is the current state of knowledge on adaptation to climate change in urban areas in the region?
3. What is the current state of knowledge on whether and how research findings are integrated in urban area policies in the region?
4. What are the major gaps in research on adaptation to climate change in urban areas?
5. What is needed to ensure that research findings are better integrated into urban area policies?
6. What is the current state of knowledge on the stakeholders involved with research and policy on adaptation to climate change in urban areas in the region, and how could stakeholder involvement be improved?

The review focused on five East African countries, namely Burundi, Kenya, Rwanda, Tanzania and Uganda, which make up the East African Community (EAC). This publication is a Summary of the main report published by CORAF/WECARD and Future Agricultures.

Definitions of Key Terms

Adaptation: Adaptation to climate change is defined as adjustments made in natural and human systems as a response to actual or anticipated climate stimuli or the effects of the stimuli (Adger et al. 2007).

Vulnerability: the 'ability or inability of individuals and social groupings to respond to, in the sense of cope with, recover from or adapt to, any external stress placed on their livelihoods and wellbeing' (Kelly and Adger 2000: 22).

Resilience: Resilience refers to the capability of a natural or human system to deal with disturbances without changing its basic structure and function, including transformation to a better state in some cases (Traerup 2012; IPCC 2007). This includes being able to self-organise and adapt to any long or short term stresses.(IPCC 2007).

Urban area: The United Nations describes an *urban area* as comprising a city or town in its proper terms. There is a lack of common definitions on urban areas due to national variations in characteristics that distinguish urban from rural; hence, no global basis exists for defining the term (UN 2012; 2006 FAO 2005). A number of terms are also used differently by different countries to define 'urban', among them 'urban centres', 'major cities', 'administrative centres' or 'municipalities', and country-specific criteria are set out to distinguish between 'rural' and 'urban'.

2. Overview of the East Africa Urban Sector

2.1 Rates of Urbanization

By 2008 more than half the world's population was living in urban centers, and this proportion is growing. The rate of urbanization in the East Africa Community countries is consistent with global urbanization. The Great Horn of East Africa (GHEA), records the most rapid urbanization rate in Africa (Rockefeller Foundation 2010). Between 2005 and 2010, nine of the 30 fastest growing cities in the world are in the GHEA. The rapid urbanization of Rwanda came later than other countries (Rockefeller Foundation 2010; Mirzaie et al. 2007; UN 2006; UNDP 2006).

Projections show that Nairobi, Dar es Salaam and Kampala are likely to grow faster than they did between 2005 and 2010. Although Kampala is also rapidly urbanising by 2002 the overall rate of urbanisation was at 20 percent and 22 percent respectively for Kenya and Tanzania but only 12 percent for Uganda. For Uganda, urbanization is projected to reach 21 percent by 2030

(Cities Alliance 2010; Muzzini and Lindeboom 2008; UNFPA 2007). The rate of urbanization for Burundi is growing fast at 4.9 percent per year, urbanization in this country is currently at only 11 percent (CIA World Factbook 2012) and the country is the least urbanised in the region (Kolmannskog 2010). This rapid urbanisation for the EAC countries is a consequence of uneven development between rural and urban areas (Brückner 2012; Poelhekke 2011; Mirzaie et al. 2007; Barrios et al. 2006; Fay and Opal 2000).

2.2 Climate change challenges and impacts of climate change in urban areas

East Africa has experienced increased temperatures since the 1980s, particularly seasonal mean temperatures in Kenya and Uganda, and mean temperatures are projected to rise more than 2°C by the end of the century (Anyah and Qiu 2012; Funk et al. 2012). Mean annual temperatures are likely to increase in Tanzania, Kenya and Burundi (Watkiss et al. 2011; Christy et al. 2009; Government of Burundi 2007). Precipitation trends in East Africa show a decrease in precipitation in the 'long rain' season (March to May/June) and similar trends in the monsoon rains (June to September) throughout the GHEA over a period of 60 years, including a general variability in rainfall (Funk et al. 2012; Williams and Funk 2010; IPCC 2007).

Reliable evidence on the risk and impacts of climate change on urban areas in East Africa is lacking (Omondi et al. 2012; Kithiia 2010; Dodman 2009; Huq et al. 2007; IPCC 2007). Studies indicate that the cities of East Africa are crowded and in sub-standard physical conditions as city authorities fail to match infrastructural development with their growing populations (Archambault et al., 2012; Brown 2012; PASS et al. 2011; Yuen and Kumssa 2011; UN-Habitat 2008b; 2005; 2003; Majale 2008; Nkurunziza 2007; Action Aid 2006). Possible impacts identified for the region's urban areas include high general urban heat and high noon temperatures, as well as sea level rise, flooding and coastal erosion that could affect the seaport cities of Dar es Salaam and Mombasa, both major commerce and administration nerve centres (Bunce et al. 2009; Kithiia 2010; McCarthy et al. 2010; Awuor et al. 2008; Shisanya and Khayesi 2007). Inland flooding has also been observed and projected for EAC urban areas. Case studies show that cities in Kenya, Rwanda, Uganda and Tanzania were heavily affected by floods in 2002 and remain prone to flooding due to climate change (Lwasa 2010; Douglas et al. 2008). Droughts have also been shown to affect urban centres such as Naivasha in Kenya in a number of ways, among them electricity blackouts and decline in agricultural yield (Simon 2010).

Impacts from climate change in major urban areas in East Africa are likely to hit hardest the urban poor (women, children and the elderly, including people with underlying medical conditions) who live in informal settlements and lack adequate access to basic urban amenities

(Kithiia 2011; Kithiia 2010; UN-Habitat 2010; Douglas et al. 2008; Moser and Satterthwaite 2008). These people are less mobile, and have limited income and assets (Moser and Satterthwaite 2008). Research shows that the impact of climate change could be less problematic in cities that have adequate infrastructure and robust local governance systems (Kithiia 2011).

2.3 Climate change implications for key challenges in urban areas

High population growth rates culminate in increasing levels of urbanization, and subsequently exposure to climate risk, particularly for the urban poor (Kithiia 2011; Kithiia 2010; UN-Habitat 2010; Douglas et al. 2008; Moser and Satterthwaite 2008). The rapid urbanization in East Africa has been partly driven by the decline in rural development and a decrease in the value of agricultural livelihoods, which has subsequently triggered rural-urban migration in all of the countries under review (Brückner 2012; Rockefeller Foundation 2010; Mendel 2006; Todaro 1995). Unemployment, poor housing and inadequate sanitation and waste management facilities are responsible for making cities more exposed to climate impacts such as flooding, in Kampala, Dar es Salaam, Mombasa, Kibera and other African cities (Poelhekke 2011; Lwasa 2010; Awuor et al. 2008; KCC 2008; Tenywa et al. 2008; Mendel 2006).

Coastal cities in the region, such as Mombasa in 2006, are especially prone to flooding due to sea level rise, leading to a disruption in the economy from suppressed tourism activity and other disturbances (Awuor et al. 2008). Disruptions in water availability affect domestic water systems and trigger sanitation-related disease outbreaks; these, as well as disturbances in transport systems and electricity supply, are much more significant in informal settlements (Böhm et al. 2010; Lwasa 2010; Lwasa et al. 2009; Twinomugisha et al. 2008; Omumbo et al. 2005). Furthermore, research results indicate that saltwater intrusion and shortages of fuel wood, particularly in times of interrupted electricity supply, pose challenges for city-dwellers and EAC member states. Reductions in water levels can also increase energy costs by affecting hydro-electricity generation in Uganda, Tanzania and Kenya (Gichere et al. 2011).

3. Research Related to Climate Change in the East Africa Urban Sector

3.1 Implications of climate change and vulnerability in a multi-stressor context

Research on EAC member states outlines a number of factors that compound experiences of impacts from climate change in urban areas. There is a dominant view that local climate planning for cities is likely to succeed if climate change is considered within a framework of multiple stressors (Kithiia and Dowling 2010). Studies show that the impacts of flooding in the cities in the regions would not be severe if the cities did not have solid surfaces that cause water run-off, and if they did not lack parks and green spaces to absorb water flows as well as sound drainage systems (Mendel 2006). Studies on the region highlight key factors that heighten vulnerability for city-dwellers, these include food insecurity and poverty, resource-based conflicts and over-reliance on rain-dependent systems (Marchiori et al. 2012; Omondi et al. 2012; Parnell and Walawege 2011).

Understanding population trends with regards to climate change is important for achievement of informed policy responses (Satterthwaite 2009). In Mombasa, Dar es Salaam, Nairobi and Kampala, research shows that population increases are associated with housing challenges and exposure and sensitivity to flood risk as residents construct makeshift housing structures that are built of weak and inadequate materials (Gichere et al. 2011; Kithiia and Lyth 2011; Lwasa 2010, Magezi 2011; Awuor et al. 2008). This population growth has led to the mushrooming of settlements in undesignated areas, which has compromised the improvement of infrastructure such as roads and drainage systems, making rescue operations difficult to implement in times of shocks (Awuor et al. 2008).

3.2 Options for reducing vulnerability and strengthening adaptive capacity

Available research on adaptation to climate change in urban areas in East Africa highlights options for reducing vulnerability and strengthening adaptive capacity to current and future climate change and non-climate impacts. At the individual level, it is important to promote resilience for individual households, for instance by providing access to information on weather and any looming crises in time for households to make decisions regarding immediate responses (Gichere et al. 2011; Goulden et al. 2009; Douglas et al. 2008). It would be important to follow up on this information dissemination exercise to ensure that households engage in activities that make them more resilient in times of shock by providing training and the necessary infrastructure (Archambault et al. 2012). Studies in East Africa on community-based adaptation strategies that could be employed by urban communities to address poverty and impacts from climate change issues offer possibilities for adaptation; these include domestic energy briquettes from wastes, greening and urban agriculture, household level rainwater harvesting and nutrient recycling from wastes (Lwasa 2010).

3.3 Key barriers to adaptation in urban areas

Research documents a number of barriers to adaptation in East Africa, including low adaptive capacity of the urban poor and limited climate change awareness to encourage early adaptation measures (Lwasa 2010). In some cases, when these urban poor receive support from NGOs and governments, there is top-down planned adaptation support that does not adequately foster adaptation for the urban poor (Ludi et al. 2012). This barrier extends beyond the lack of adaptation capacity of individual households to that of city authorities and institutions that lack adequate human and financial resources for effective implementation of adaptation activities (Kithiia 2010; Kithiia and Dowling 2010; Lwasa 2010; Prasad et al. 2009; ActionAid 2006).

4. Policies related to Climate Change in the East Africa Urban Areas

4.1 Climate change considerations in regional urban area policies

Regional policies and strategies in the East Africa region make very little mention of climate change considerations; thus climate change issues are rather add-ons to other sectoral issues. Adaptation efforts are also not integrated into other national development programmes. However, the New Partnership for Africa's Development (NEPAD) makes reference to the importance of providing efficient environmental services in cities through properly planned and managed public utilities; control of industrial pollution; sound management of coasts; adequate water and sanitation; and efficient waste management (NEPAD 2005). Seven African cities, including Nairobi in East Africa, were selected for the NEPAD pilot Cities Programme. Although there is weak commitment on climate change in the programme, members of the NEPAD Cities Programme convened in Durban at the Seventeenth Conference of Parties (COP17) to the United Nations Framework Convention on Climate Change (UNFCCC) to share experiences regarding climate change adaptation activities for achieving sustainable local development in their cities.

East Africa Community countries have reviewed their land and urban policies and legislation under the Bamako Plan of Action Framework in the face of rapid urbanization to increase access to secure tenure and affordable housing. In EAC strategies, UN-Habitat and UNEP launched a new initiative in June 2011, working with all EAC members states to promote energy efficiency in buildings and updating city-level codes and standards that respond to regional realities, but specific consideration of climate change in urban planning and development is

limited. In East Africa, there is no standalone policy or strategy on urban planning and development. Rather, urban development issues are addressed in other strategies, such as the Regional Strategy on Scaling-up Access to Modern Energy Services and the EAC Development Strategy (2011). The EAC Development Strategy mentions global warming and environmental degradation, including institutionalizing long term urban planning and support for urban development and housing in the East African region.

4.2 Climate change considerations in national government urban area policies

Kenya has just finalized a National Urban Development Policy (2011) that was developed following the National Constitution in 2010. The policy recognizes that climate change impacts are being experienced and incorporates a section on land, environment and climate change. The Policy thus creates a framework for the planning, development and management of public open spaces, parks and recreational facilities, including creating structures for mainstreaming disaster risk management and climate change planning in urban planning and development (National Urban Development Policy 2011).

In Tanzania, climate change is not considered in urban area planning although reference is made to environmental management and in the gazette of the swamps in the city as 'hazard lands'. Uganda does not have a national urban policy to guide its activities. The current Climate Change Legislature draws its legitimacy from the Constitution of the Republic of Uganda (1995) and international conventions such as the UNFCCC, which Uganda ratified in 1994, and the Kyoto Protocol. There are no urban or climate change policies, and the Kampala City Council has not adopted climate change in its agenda, but recent country level interventions and creation of the Climate Change Unit provide an entry point into developing an Urban Planning Policy.

4.3 Urban area considerations in climate change policies and strategies

Four of the EAC member states have developed National Adaptation Programmes of Action (NAPAs) under UNFCCC processes to assess vulnerabilities and explore possible impacts and adaptation priorities (UNFCCC 2002). Kenya has developed a National Climate Change Strategy and Tanzania has published a National Climate Change Strategy, which identifies urban area vulnerability to climate change. In Uganda no climate change strategy has been developed, and the city councils have not formally adopted the climate change agenda.

4.4 Key arguments for policies on adaptation to climate change in urban areas

The importance of adaptation policies is recognized in East Africa, but the emphasis is in implementation of low cost integration of climate change adaptation in municipal-level

planning to build adaptive capacity (Kithiia and Dowling 2010). The rapid rate of urbanization and poverty in the EAC (Brückner 2012; Poelhekke 2011; Rockefeller Foundation 2010; Mirzaie et al. 2007; Barrios et al. 2006; Fay and Opal 2000) demands robust and effective national and regional holistic policies and planning that target inequalities in the urban areas of the region where the business elite dominate the urban space (UN-Habitat 2010). These policies are holistic in targeting waste management, infrastructural development, real estate, water and sanitation.

5. Gaps in Climate Change Adaptation Research and Policy in the East Africa Urban Sector

5.1 Key research gaps on climate change adaptation in urban areas

Research in East Africa provides limited evidence of knowledge creation on climate change adaptation in urban areas (Kithiia 2010; Archer 2008). Some studies consider migration as a major driving force of population growth, while other studies demonstrate a balance between migration and natural population growth in the region's urban areas. More research is required on the dynamics of migration and its root causes in the context of cultural frameworks and natural population growth. There is concern that alarmist predictions of climate change-induced rural-urban migration may result in inappropriate policies that will do little to protect the rights of the members of populations that are most vulnerable to climate change (Satterthwaite 2009; Tacoli 2009).

Other studies have focused on local-level adaptation to climate change in the urban areas in East Africa region but not much research has been devoted to exploring 'innovative and cost effective' ways of addressing climate change issues in urban areas (Kithiia 2010). This dearth of adaptation studies is more pronounced for inland cities than for coastal cities in the region (Lwasa 2010). These kinds of studies are important for recommending best practices in the region and for convincing policymakers about the importance of committing resources to research on climate change adaptation.

Very little research on climate change adaptation in urban areas in the region focuses on opportunities or localised benefits that may arise from climate change. There are no deliberate efforts by researchers to explore this dimension in terms of reducing vulnerability and building adaptive capacity for the urban poor. This represents a research gap that needs specific studies dedicated to understanding how the urban poor may also take advantage of climate change impacts. Furthermore, there is very limited research attention to gender as a dimension of climate change adaptation in urban areas in the region. Only cursory mention is made of

women as a component of the marginalized and most vulnerable sector of the population to climate change impacts.

5.2 Key policy gaps with regard to climate change adaptation in urban areas in national policy frameworks

In East Africa urbanization is taking place at a high rate due to rural-urban migration and natural population growth. Rural-urban migration is not the major driver of population growth; it rather works in combination with limited planning and development to accommodate natural population growth. Essentially, there is a major gap between national and local action plans. Effective adaptation strategies require exploring linkages between national, regional and local policies and linking activities at different scales, such as between rural and urban areas. There is little coordination of policies and actions on opportunities that may arise in slum upgrading as an adaptation strategy to climate change.

5.3 Key research-policy gaps

Successful strategies depend on robust urban planning processes that reduce the dichotomy between governing institutions and networks of local capacities. In addition, national urbanization policy frameworks will have to complement local strategies for the envisaged changes, including identifying levers by which action can be triggered and sustained. Limited knowledge exchange on climate change adaptation is evident in the small community of professionals and researchers in the region (Kithiia 2010; Archer 2008). Researchers point out that knowledge on adaptation to climate change in the region is available in research communities and institutes, but is poorly shared with policymakers (Lwasa 2010). The implication is that good practices of adaptation to climate change are overlooked when they could be useful for policy formulation and decision-making in the region.

6. Stakeholders and Opportunities for Collaboration in Research on Climate Change in the East Africa Urban Sector

Stakeholders involved in climate change adaptation research and policy formulation in East Africa include research institutes, universities and government departments. In Tanzania, the Institute of Resource Assessment (IRA) at the University of Dar es Salaam has been involved in a CCAA-funded project on understanding rural-urban linkages in Tanzania. Another CCAA project addressed action in cities (Sub-Saharan African Cities: A Five-City Network to Pioneer Climate Adaptation through Participatory Research and Local Action in Cape Town, Dar es Salaam, Maputo, Windhoek, Port St. Louis), with Tanzania as one of the focus countries. This project

was implemented in the region by the Stockholm Environment Institute. The Tanzania Meteorological Agency (TMA) and Ardhi University also partner with IRA and other university departments to conduct research and to engage policymakers, in a science-policy dialogue that was implemented in 2009. These institutions have engaged communities, government departments and agencies from the research design stage in participatory action research.

In Uganda, climate change research on urban areas has been done through the Climate Change Unit located in the Meteorology Department of the Ministry of Water and Environment. Climate change scientists conduct research within this unit, and others also conduct research from Makerere University. The Uganda Association of Impact Assessment and the business community have also increasingly become involved in climate change debates and research. Participating institutions in Uganda that have taken a lead in climate change issues include the Carbon Credit Bureau by implementing the Clean Development Mechanism (CDM) (Lwasa et al. 2009).

Kenya, Uganda and Tanzania have set up task forces for climate change adaptation policy formulation. Stakeholders in this process consist of central governments with representatives from ministries of agriculture, livestock development, local government, public health and social services. These ministries work in consultation with interest groups and major research institutes such as the Kenya Agricultural Research Institute (KARI), Mazingira Institute, Nairobi and Environs Food Security, Agriculture and Livestock Forum (NEFSALF), Nairobi City Council and Provincial Department of Agriculture in Kenya. A case in point is during the development of the Urban and Peri-Urban Agriculture and Livestock Policy (2010).

7. Conclusion and Recommendations

7.1 Conclusions

1. What is the role of climate change challenges in the context of the multiple challenges and opportunities facing urban areas in the region?

East Africa has experienced increased temperatures since the 1980s, particularly seasonal mean temperatures in Kenya and Uganda, and a rise of more than 2°C is projected by the end of the century. Climate change impacts have exacerbated the challenges for urban residents, particularly amongst the poor. Some of these challenges include limited capacity and awareness of climate change; high unemployment levels; poor housing; inadequate sanitation and waste management facilities; and inadequate and congested infrastructure.

2. What is the current state of knowledge on adaptation to climate change in urban areas in the region?

Climate change adaptation is adopted in individual households, community, local government, national and regional levels. Urban agriculture and other mechanism of adapting to climate change contribute to building resilience in the event of future shocks. Research shows that collaboration and partnerships are keys in the adaptation process, through engaging communities and committing resources to support the process.

3. What is the current state of knowledge on whether and how research findings are integrated in urban area policies in the region?

Currently, there are limited efforts in knowledge sharing for climate change adaptation and a small community of professionals and researchers is operational in the region. This limits analytical capacity to advance changes among key decision-makers. Available knowledge on adaptation to climate change in the region's research communities and institutes is poorly shared with policymakers for action.

4. What is needed to ensure that research findings are better integrated into urban area policies?

The current thinking among policymakers is that migration is a problem, yet it is important to shift focus to the role of urban planning in supporting and accommodating mobility and addressing the informal systems and inequalities in the region's urban areas. The East Africa region requires a more robust institutional framework regarding urban planning that is better resourced and has the expertise to implement a suite of locally developed strategies on climate change adaptation.

5. What is the current state of knowledge on the stakeholders involved with research and policy on adaptation to climate change in urban areas in the region, and how could stakeholder involvement be improved?

Research institutes, university and government departments in East Africa have been conducting research and linking up with policymakers. In Uganda, significant climate change research on urban areas has been done through the Climate Change Unit that is located in Meteorology Department of the Ministry of Water and Environment. TMA and Ardhi University also partner with IRA and other university departments to conduct research and to engage policymakers in a science-policy dialogue that was implemented in 2009.

Policymakers are not adequately informed by experts on facts regarding climate change and its implications for the urban poor to facilitate informed decision making on climate change adaptation. There is currently no framework for assessing adaptation costs in the region, yet this is important for city plans. Furthermore, there is a major gap between some national and

local action plans and there is minimal coordination of policies and actions on opportunities that may arise in slum upgrading as an adaptation strategy to climate change.

7.2 Recommendations

Scientists/Researchers: Research scientists should provide scenarios for future climate changes, particularly on rainfall trends both at local and national levels and be more proactive in targeting policy and policymakers in local platforms where their research can feed into climate change formulation processes. Scientists should conduct research that targets the gaps that have been identified for this region in order to present policymakers with concrete evidence on these issues to develop robust pro-poor policies and strategies for climate change adaptation in urban areas.

Researchers in East African countries should take advantage of the emerging opportunities for collaboration and strengthening of networks within and without the region, among them the World Urban Forum and the Africa Centre for Cities. In their own countries and region, the national parliamentary forums for climate change and the East Africa Parliamentary Forum for Climate Change respectively can be invaluable to the cause.

National and regional level policymakers: Governments should commit adequate resources for the procurement of downscaling equipment and building capacity that can improve the quality of forecasts and scenarios. National governments in East Africa should invest resources in building the capacity of urban authorities in aspects such as fiscal management and monitoring and evaluation of climate related plans and strategies, and national policy formulation in climate change adaptation should involve all stakeholders in the process. To regulate trade-offs in policymaking, national policies should be aligned to international conventions such as the UNFCCC.

Urban Communities: Urban communities should shift from the current exclusively individual household adaptation strategies, such as shelter protection in times of floods, to self-mobilize community driven strategies such as protecting local facilities, streets, drainage systems and solid waste management, both as coping and adaptation measures.

8. References

ActionAid (2006) *Climate Change, Urban Flooding and the Rights of the Urban Poor in Africa: Key Findings from Six African Cities*, Johannesburg, South Africa: ActionAid International Secretariat

Adger, W.N., Agrawala, S., Mirza, M., Conde, C., O'Brien, K., Pulhin, J., ... and Takahashi, K. (2007) 'Assessment of Adaptation Practices, Options, Constraints and Capacity', in *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge, UK: Cambridge University Press

Anyah, R.O. and Qiu, W. (2012) 'Characteristic 20th and 21st Century Precipitation and Temperature Patterns and Changes over the Greater Horn of Africa', *International Journal of Climatology*, 32(3):347-363

Archambault, C.S., de Laat, J. and Zulu, E.M. (2012) 'Urban Services and Child Migration to the Slums of Nairobi', *World Development*, 40(9):1854-1869
Archer, E. (2008) *Developing Doctoral and Postdoctoral Research Fellowships in Support of Climate Change Adaptation in Africa*, presented at the ACCFP Workshop to Assess Needs and Opportunities, 11-13 March, Dar es Salaam, Tanzania: African Climate Change Fellowship Program

Awuor, C.B., Orindi, V.O. and Adwera, A.O. (2008) 'Climate Change and Coastal Cities: The Case of Mombasa, Kenya', *Environment and Urbanization*, 20:231-242

Barrios, S., Bertinelli, L. and Strobl, E. (2006) 'Climatic Change and Rural-Urban Migration: The Case of Sub-Saharan Africa', *Journal of Urban Economics*, 60(3):357-371

Brown, A.M. (2012) *Uganda's New Urban Policy: Participation, Poverty, and Sustainability*, presented at Sustainable Futures Conference: Architecture and Urbanism in the Global South, 27-30 June, Kampala, Uganda: Uganda Martyrs University

Brückner, M. (2012) '[Economic Growth, Size of the Agricultural Sector, and Urbanisation in Africa](#)', *Journal of Urban Economics*, 71(1): 26-36

Christy, J.R., Norris, W.B. and McNider, R.T. (2009) 'Surface Temperature Variations in East Africa and Possible Causes', *Journal of Climate*, 22(12):3342-3356

CIA World Factbook (2012) *Rate of Urbanization (%)*, Washington, DC: Central Intelligence Agency / www.photius.com/rankings/population/urbanization_rate_of_urbanization_2012_0.html

Cities Alliance (2010) *Annual Report: An Alliance in Transition*, Cities Alliance, Cities Without Slums; Washington, DC: USA. 42pp

Dodman, D. (2009) 'Blaming Cities for Climate Change? An Analysis of Urban Greenhouse Gas Emissions Inventories', *Environment and Urbanization*, 21:185-201.

- FAO (2007) *Food for the Cities – Multidisciplinary Initiative*, Rome, Italy: Food and Agriculture Organization
- FAO (2005) *Mapping Global Urban and Rural Population Distributions*. Environment and Natural Resources Working Paper No. 24, Rome, Italy: Food and Agriculture Organization
- Fay, M. and Opal, C. (2000) *Urbanization Without Growth: A Not So Uncommon Phenomenon*. Working Paper 2412, Washington, DC: The World Bank
- Funk, C., Michaelsen, J. and Marshall, M. (2012) 'Mapping Recent Decadal Climate Variations in Precipitation and Temperature Across Eastern Africa and the Sahel', in Wardlow, B.D., Anderson, M.C. and Verdin, J.P. (eds), *Remote Sensing of Drought: Innovative Monitoring Approaches*, Boca Raton, FL: CRC Press, pp.331-358
- Gichere, S.K., Sikoyo, G.M. and Saidi, A.M. (2011) 'Climate Change and its Effect on Cities of Eastern African Countries', in Yuen, B. and Kumssa, A. (eds), *Climate Change and Sustainable Urban Development in Africa and Asia*, Heidelberg, Germany: Springer Science+Business Media
- Government of Burundi (2007) *National Adaptation Plan of Action (NAPA)*, Bujumbura, Burundi: Ministry of Land Management, Tourism and Environment
- IPCC (2007) *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge, UK: Cambridge University Press
- Kithiia, J. (2011) 'Climate Change Risk Responses in East African Cities: Need, Barriers and Opportunities', *Current Opinion in Environmental Sustainability*, 3(3):176-180
- Kithiia, J. (2010) 'Old Notion – New Relevance: Setting the Stage for the Use of Social Capital Resource in Adapting East African Coastal Cities to Climate Change', *International Journal of Urban Sustainable Development*, 1:17-32
- Kithiia, J. and Lyth, A. (2011) 'Urban Wildscapes and Green Spaces in Mombasa and their Potential Contribution to Climate Change Adaptation and Mitigation', *Environment and Urbanization*, 23:251-265
- Lwasa, S. (2010) 'Adapting Urban Areas in Africa to Climate Change: The Case of Kampala', *Current Opinion in Environmental Sustainability*, 2:166-171
- Lwasa, S., Koojo, C., Mabiiriizi, F., Mukwaya, P. and Sekimpi, D. (2009) *Assessment of Cities and Climate Change in Kampala and Uganda (2009)*. Prepared within the framework of the Cities and Climate Change Initiative, Nairobi, Kenya: United Nations Human Settlements Programme
- McCarthy, M.P., Best, M.J. and Betts, R.A. (2010) 'Climate Change in Cities due to Global Warming and Urban Effects', *Geophysical Research Letters*, 37(9)

Mirzaie, M., Haghshenas, N.M., Moshfegh, M. and Javadkhani, H. (2007) *Demographic Dimensions of the Urbanization Process in Selected African Countries: New Prospects and Challenges*, presented at the Fifth African Population Conference, 10-14 December, Arusha, Tanzania: Union for African Population Studies

Muzzini, E. and Lindeboom, W. (2008) *The Urban Transition in Tanzania: Building the Empirical Base for Policy Dialogue*, Washington, DC: The World Bank

Omondi, P., Awange, J.L., Ogallo, L.A., Okoola, R.A. and Forootan, E. (2012) 'Decadal Rainfall Variability Modes in Observed Rainfall Records over East Africa and their Relations to Historical Sea Surface Temperature Changes', *Journal of Hydrology*, 464:140-156

Satterthwaite, D. (2009) *The Implications of Population Growth and Urbanization for Climate Change*, paper presented at the Expert Group Meeting on Population Dynamics and Climate Change, 24-25 June, London, UK: United Nations Population Fund and International Institute of Environment and Development

Satterthwaite, D., Huq, S., Pelling, M., Reid, H. and Lankao, P. R. (2007) *Adapting to Climate Change in Urban Areas; The Possibilities and Constraints in Low- and Middle-Income Nations*, London, UK: International Institute for Environment and Development

Simon, D. (2010) 'The Challenges of Global Environmental Change for Urban Africa', *Urban Forum*, 21:235-248

Twinomugisha, B., Byarugaba, B., Nalugya, P., Kovats, S. and Bell, J. (2008) *Climate Change and Health in Uganda*. CLACC Working Paper 8, Kampala, Uganda

UN (2012) *World Population Prospects: The 2011 Revision*, New York, NY: The United Nations

UN (2006) *World Population Prospects: The 2005 Revision*, New York, NY: The United Nations

UN (2004) *World Population Prospects: The 2003 Revision*, New York, NY: The United Nations

UNDP (2006) *Human Development Report*, New York, NY: United Nations Development Programme

UNFCCC (2002) *Kyoto Protocol Status of Ratification*, Bonn, Germany: United Nations Framework Convention on Climate Change

UN-Habitat (2012) *Promising Practices on Climate Change in Urban Sub-Saharan Africa*, Nairobi, Kenya: United Nations Human Settlements Programme

UN-Habitat (2010) *Vulnerability Assessment and Climate Change Adaptation Planning*, Nairobi, Kenya: United Nations Human Settlements Programme

Watkiss, P., Downing, T., Dyszynski, J., Pye, S. et al (2011) The economics of climate change in the United Republic of Tanzania. Report to Development Partners Group and the UK Department for International Development. Published January 2011. Available at: <http://economics-of-cc-intanzania.org/>

Yuen, B. and Kumssa, A. (eds), (2011) *Climate Change and Sustainable Urban Development in Africa and Asia*, Heidelberg, Germany: Springer