

**Acknowledgement**

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

**About Africainteract:** Africainteract 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 Africainteract 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. Africainteract 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 Africainteract 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.

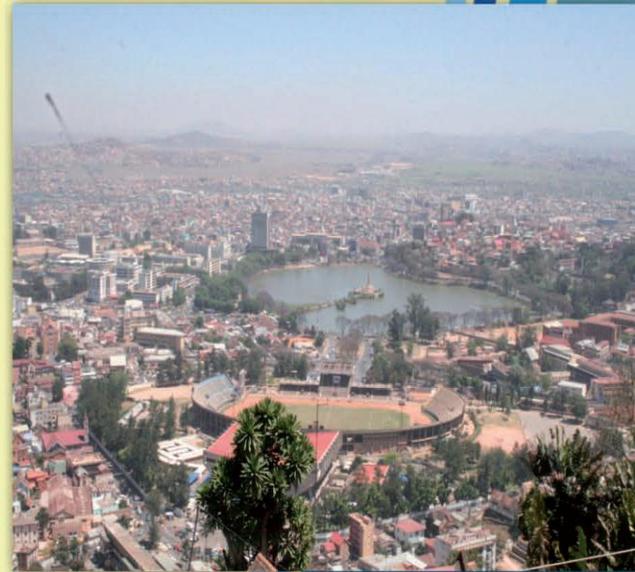
**About CORAF/WECARD:** The West and Central African Council for Agricultural Research and Development (CORAF/WECARD) is a constituent of the Forum for Agricultural Research in Africa, and comprising 22 National Agricultural Research Systems in West and Central Africa. CORAF/WECARD’s mission is “Sustainable 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](http://www.coraf.org)



AfricaInteract

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

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



Miriam Joshua,  
Abdulai Jalloh  
and Sepo Hachigonta



# Miriam Joshua<sup>1</sup>, Abdulai Jalloh<sup>2</sup> and Sepo Hachigonta<sup>3</sup>

<sup>1</sup>Senior Lecturer, Environmental Studies and Rural Development, University of Malawi, Chancellor College, Geography and Earth Sciences Department, P.O. Box 280, Zomba, Malawi

<sup>2</sup>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, Senegal

<sup>3</sup>Climate Change Programme Manager, Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN), 141 Cresswell Street, Weavind Park 0184, Pretoria, South Africa; Postal address: Private Bag X813, Silverton 0127, Pretoria, South Africa

## Acronyms and Abbreviations

COMESA	Common Market for East and Southern Africa
CSO	Civil Society Organisation
EAC	East African Community
IDRC	International Development Research Centre
IPCC	Intergovernmental Panel on Climate Change
LDC	Least Developed Country
NAPA	National Adaptation Programme of Action
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental Organisation
SADC	Southern African Development Community
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

## Table of Contents

### Contenu

Acronyms and Abbreviations.....	2
1. Introduction.....	3
2. Overview of the Southern Africa Urban Sector.....	4
2.1 Key facts for urban areas in the region .....	4
2.2 Climate change challenges in different parts of the region .....	5
2.3 Possible impacts of climate change in urban areas in the region .....	6

3.	Research Related to Climate Change in the Southern Africa Urban Sector .....	6
3.1	Vulnerability and adaptation of people in urban areas in the region .....	6
3.2	Lessons from adaptation projects and interventions in urban areas in the region .....	8
4.	Policies related to Climate Change in the Southern Africa Urban Sector .....	8
4.1	State of knowledge on policies and strategies for climate change adaptation in urban areas .....	8
4.2	Climate change considerations in regional urban area policies and strategies.....	9
4.3	Key policy actors and networks involved with adaptation to climate change in urban areas .....	10
5.	Gaps in Climate Change Adaptation Research and Policy in the .....	10
Southern Africa Urban Sector .....		10
5.1.	Key Research Gaps.....	10
5.2.	Key Policy Gaps .....	11
6.	Stakeholders and Opportunities for Collaboration in Research .....	11
on Climate Change in the Southern Africa Urban Sector.....		11
7.	Conclusion and Recommendations .....	11
7.1	Conclusion.....	12
7.2	Recommendations.....	12
<i>Recommendations for research</i> .....		12
<i>Recommendations for policy</i> .....		13
8.	References .....	14

## 1. Introduction

Climate trends and projections for countries in Southern African Development Community (SADC) show increases in minimum temperatures and inter-annual variability of rainfall events (Brown et al. 2012; Anderson et al. 2010; McSweeney et al. 2008; Christensen et al. 2007). These changes affect the health of fragile ecosystems, which support livelihoods of poor communities in rural and urban areas, and exacerbate poverty and health risks. However, the pace and extent of climate change and its impacts vary spatially; therefore locally generated adaptation approaches and active participation of local actors are important to climate change adaptation programmes.

There is growing interest in and support for research in adaptation to climate change in Africa. Stock-taking, synthesis and review of research results from various sources and the way these

results feed into policy formulation for climate change adaptation in urban sectors of Southern Africa is desperately needed. It is critical that sector policies in climate change adaptation are appropriately informed by the existing body of knowledge on climate change and variability generated from the scientific research. In this context, AfricaInteract and CORAF/ WECARD, with support from IDRC, commissioned a desk review of research and policies related to climate change adaptation in the urban sector in Southern Africa. The main objective of the review was to contribute to the building of a knowledge base and support research-based policy formulation for climate change adaptation in the Southern African urban sector. 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 stakeholder involvement could be improved?

This publication presents an overview of urbanization and climate change trends and associated implications in urban areas of Southern Africa and is a Summary of the main report published by CORAF/WECARD and Future Agricultures.

## **2. Overview of the Southern Africa Urban Sector**

### **2.1 Key facts for urban areas in the region**

Southern Africa is the most urbanized region in Africa, a position achieved in the decade 2000-2010. High urbanization is the result of rural-urban migration and high population growth rates. Migration occurs from pull factors of urban centres, such as perceived job opportunities and better infrastructure and services, in addition to push factors from rural areas, such as land shortages and declining benefits from agriculture-based livelihoods (Meyer-Ohlendorf 2009). Urbanization in Southern Africa increased from 53.8 to 58.7 percent over this decade and is

expected to reach about 66 percent by 2025 (UN-Habitat 2010). Currently the urbanisation rate depicts a declining trend to 4.9 percent for 2000-2010, and is expected to slow down further to 2.1 percent in the 2040-2050 decade.

Urbanization rates of individual countries in the region for the same period vary significantly. Malawi is one of the least urbanized nations in Southern Africa, with less than 20 percent of the population living in areas classified as urban, whereas South Africa is the most urbanized nation in the region at 61.5 percent. Currently, the urbanization rate is at 5.2 percent per annum, the fifth highest in Africa, and approximately 25.1 percent of the national population is projected to live in urban areas by 2020 (Joshua et al. 2010).

For Zimbabwe, urbanization rates have remained relatively constant since the 1970s at between 2 and 3 percent increase per year. At the current rate, the Malawian and Zimbabwean urban populations are expected to double by 2030 and 2043, respectively. Therefore, population growth in Southern Africa is becoming largely an urban phenomenon over the years (UN DESA 2012; Satterthwaite 2007). Such development may have significant implications on climate change issues such as causes, impacts, vulnerability and adaptation which require special attention in policy discourses.

These trends in urbanisation and poverty have social, economic and environmental knock-on effects on national, sub national and local governments and all relevant stakeholders. Local governments have limited capacity to provide employment opportunities, affordable housing and social services for the growing population. Additionally, access to suitable land for housing is highly bureaucratic and too expensive for the poor who therefore meet their housing demands through informal structures which usually lead them to occupy marginal urban lands that are typically below local authority minimum development standards. These factors lead to the development of slums, informal settlements and overcrowding conditions (UN-Habitat 2010). Slums mushroom on marginal land, without social amenities and highly vulnerable to natural hazards such as floods and landslides. Climate change is therefore expected to worsen the vulnerability of these communities.

## **2.2 Climate change challenges in different parts of the region**

Climate scenario projections for the Southern Africa show a rise in temperatures of about 3°C (almost 1.5 times the global mean response) up to the year 2099 (Anderson et al. 2010; Christensen et al. 2007). Changes are also expected in the intensity and frequency of extreme rainfall events (storms) and the rainfall season patterns (e.g. onset, cessation and length) (Brown et al. 2012). For South Africa, scenario projections show a reduction in summer rainfall in the range of 5 to 10 percent in the eastern part of the country, whereas the western part is projected to experience a marginal increase in early winter rainfall (Government of South Africa

2011; 2004). For Zimbabwe, average rainfall across the country shows a declining trend of five percent between 1900 and 2000, with the 1980s and 1990s as the driest periods (Government of Zimbabwe 2010). In Malawi, there is increasing uncertainty and variability of climatic trends, with greater inter-annual rainfall variability and temperature increases (Ngongondo et al. in press McSweeney et al. 2008). Generally, observed temperature shows that mean annual temperature has increased by 0.9°C between 1960 and 2003 (Government of Malawi 2010b; McSweeney et al. 2008).

### **2.3 Possible impacts of climate change in urban areas in the region**

Agriculture is a dominant source of livelihoods for rural people. Low agricultural production will lead to shortages of raw materials for urban agro-based industries and decreases in local supplies and local farmers' income that support urban economies (Satterthwaite et al. 2007: 56). Low agricultural yields also lead to increased rural-urban migration in search of non-farm livelihoods, resulting in growth of slums, more pressure on already limited resources and shortages in food supplies in urban areas, which predominantly rely on rural production (Brown et al. 2012; Government of Malawi 2010b; Joshua et al. 2010; Meyer-Ohlendorf 2009; Eriksen et al. 2008; Joshua et al. 2008; Barrios et al. 2006). Increasing temperatures will result in heat waves, sea level rise, increased occurrence and severity of forest fires, water stress and heat stress (UN-Habitat 2011a). Sea level rise and storm surges will adversely affect the coast and coastal infrastructure through coastal erosion and saline intrusion. Saline intrusion in aquifers will limit people's access to potable and fresh water from groundwater supplies in coastal cities (Satterthwaite et al. 2007). The impacts of climate change are expected to affect urban areas differently depending on differences in vulnerability. However, the poor, especially those living in slums, are most vulnerable. Women are particularly vulnerable due to their socially constructed gender roles and inequities, which need to be addressed. Continued urbanization in all South African urban areas is expected to grow further. The majority of the migrants are the economically active men or youth whose needs have to be integrated into urban plans to reduce their vulnerability as well as vulnerability of the young and old left in their home villages.

## **3. Research Related to Climate Change in the Southern Africa Urban Sector**

### **3.1 Vulnerability and adaptation of people in urban areas in the region**

Most of the research on climate change in Southern Africa have focused on rural areas, despite the economic importance and associated vulnerabilities of urban areas (Brown et al. 2013;

2012; Adaptation Partnership 2011; UN-Habitat 2011a; Chagutah 2010; Zvigadza et al. 2010). In Malawi, a study explored implications of urban-rural links on vulnerability and identified coping and adaptation strategies of communities in Blantyre and three smaller towns, identified vulnerabilities and coping or adaptation strategies that were spatially and socially differentiated, and suggested that planning for urban adaptation, plans should integrate dimensions to produce effective outcomes (Joshua et al. 2011; 2010). In particular, women, children, youths, the elderly and the poor are the most vulnerable groups to the impacts of climate change and climate variability. Their adaptation to climate change is weak due to limited capacity, institutional support and access to relevant information for informed decisions and actions.

In Zimbabwe a study conducted in the rural area of Chiredzi showed significant exodus of young people to urban areas and neighboring countries. This rural-urban migration increases vulnerability of the urban and rural poor (McDevitt 2009). Farmers are advised to grow resilient crops in order to cope with declining rainfall. To address water challenges in Bulawayo, the local authority charges high tariffs to other cities obtaining water from its area of control, prohibits use of hosepipes for irrigation and rations water during critical water shortage periods.

South Africa has taken steps to address urban adaptation guided by reliable climate and local vulnerability assessments, in some cases in collaboration with other cities within the region (UN-Habitat 2011a). Two cities, eThekweni (Durban) and Cape Town, have established adaptation policies and plans which currently guide adaptation actions (Ziervogel and Parnell 2010). For the City of Durban, an assessment of the projected impacts of climate change, through 2100, suggests negative economic and health implications of the future climatic risks (see Carmin et al. 2012; Farrell 2010; Satterthwaite et al. 2007; Naidu et al. 2006). Climate projections in Durban are based on collaborative research undertaken by the Universities of Pretoria, KwaZulu Natal, and Cape Town, using a regional downscaling model.

Durban City also accesses data from the South African Navy to project possible sea level rise as part of the Global Sea Level Observing System project (Johnson and Breil 2012). Researchers use the physical indications from modelling and four integrated scenarios for the future development of the cities to generate results that are communicated for informed decision-making. This research provides high quality scientific climate models that can enhance cities adaptation to climate risks (Johnson and Breil 2012). Similarly, in 2009 the city of Cape Town 'established a climate change knowledge think-tank regrouping academics and scientists to undertake reviews and assessments of the effects of climate change on the city' (UN-Habitat 2010: 228). This research is expected to guide the city in its response to climate change (UN-Habitat 2010). The University of Cape Town's Climate Systems Analysis Group (CSAG) has

developed downscaled climate change scenarios that use global circulation models linked to local station data (Ziervogel et al. 2010: 100). Researchers use these scenarios to interpret some of the expected changes, for example on water resources and vulnerabilities for the Western Cape. The Civil Engineering Department at the University of KwaZulu Natal provides expertise on urban water management to the local government (Ziervogel et al. 2010).

### **3.2 Lessons from adaptation projects and interventions in urban areas in the region**

In urban agriculture there is need to promote technologies that require less water, less land and fewer inputs, and that addresses seasonality patterns of products (Joshua et al. 2012a). Vegetables form an important component of urban households' diets and incomes, especially for the poor. In a participatory action research project involving Malawian urban farmers and the local government, Joshua et al. (2012a ) identified high yielding and profitable vegetables as well as technologies that withstand high temperatures and low water supply. The farmers received training on effects of climate change on horticultural production, entrepreneurship and recommended in-field horticultural practices. A combination of sunken beds, mulching and use of organic manure were identified as best technologies in both Mulanje and Chikhwawa urban sites. The farmers also adopted staggered planting to retain market supply of vegetables and earn more income. This project showcased a multidisciplinary approach to adaptation programmes as an effective way to influence policy and upscale successful adaptation strategies. This was achieved by bringing together key stakeholders within the urban-rural linked food and agricultural systems.

## **4. Policies related to Climate Change in the Southern Africa Urban Sector**

### **4.1 State of knowledge on policies and strategies for climate change adaptation in urban areas**

Except South Africa, development policies in most Southern African countries have paid little attention to urbanization and climate change impacts on the urban sector. Countries have attempted to manage urbanization by promoting rural development, because urban growth is considered a problem and not an opportunity (Schensul 2012; Brown 2011; UN-Habitat 2010).

South Africa, Zimbabwe and Malawi are signatories to several multilateral environmental agreements, some of which directly address climate change issues, such as the UNFCCC and the Kyoto Protocol. In response to climate change challenges, the Government of Malawi has adopted two strategies for addressing climate change adaptation and sustainable development; these are the NAPA and the Malawi Growth and Development Strategy (MGDS) (Brown 2011;

Government of Malawi 2011; 2006). The NAPA, a requirement of the UNFCCC, identifies and prioritizes critically important adaptation activities for which further delay might increase vulnerability or lead to higher adaptation costs over the long term (Brown 2011). The MGDS is an overarching development strategy for Malawi, which attempts to translate the Millennium Development Goals (MDGs) to Malawi's localised context. The MGDS recognises the risks posed by climate change in achieving the MDGs (Government of Malawi 2011). In 2012, the Malawian Ministry of Environment and Climate Change launched the National Environment and Climate Change Communication Strategy which aims at increasing public awareness and promoting positive behavioural change for sustainable development (Government of Malawi 2012). However, all of these documents focus on rural vulnerability and adaptation.

Zimbabwe's urban policy does not explicitly address climate change (Brown et al. 2012), because of lack of a national climate change framework which could guide integration of climate change concerns in the urban policy. The National Climate Change Office is mandated to assist the government in designing climate change policies (Chagutah 2010) and is in a process of developing a 'Climate Change Response Strategy' (Brown et al. 2013; 2012). Currently, climate change is addressed by environmental legislation, mainly through the Environmental Management Act.

In South Africa, the local governments have taken a proactive role in addressing climate issues at the local level, and the urban sector is not ignored. Some cities have developed climate change adaptation plans at city and sectoral levels, to provide a framework within which local government departments, the private sector and civil society can prepare and implement their contributions to strategies for adaptation within development or investment plans (UN-Habitat 2011a). In 2004, South Africa produced a National Climate Change Response Strategy aimed at integrating climate change response programmes across national and regional boundaries (Carmin et al. 2012; Farrell 2010; Government of South Africa 2004). A National Climate Change Response Policy was launched in 2012, which integrates urban vulnerability and recommended responses, and clearly stipulates the role of provincial and national government in addressing urban adaptation (Government of South Africa 2012a). The South Africa government has also developed a national Strategic Plan which addresses capacity gaps at all levels (Government of South Africa 2012b) and integrates gender concerns into the climate change policy responses through a green paper that integrates and provides adaptation strategies in all major areas that concern women's vulnerability. (Gender CC/CGE/GENSA 2011).

## **4.2 Climate change considerations in regional urban area policies and strategies**

In recognition of the significance of climate change to people's livelihoods and countries' development, the Secretariats of COMESA, EAC and SADC have jointly developed a

comprehensive approach to address climate change: the African Climate Solution (Adaptation Partnership 2011; COMESA/SADC/EAC 2011). This initiative highlighted the need to mainstream climate adaptation and mitigation into poverty reduction strategies and economic development plans. The aim of the African Climate Solution is promotion of sustainable agriculture and land-use practices, biodiversity conservation, maintenance of environmental services, successful adaptation to climate change and improvements in rural livelihoods, as well as delivery of cost-effective and verifiable reductions in greenhouse gas emissions. The African Union, NEPAD, COMESA, EAC and SADC have also committed to active participation in the negotiations concerning future commitments under the UNFCCC and the post-Kyoto Protocol climate regime (COMESA/SADC/EAC 2011).

#### **4.3 Key policy actors and networks involved with adaptation to climate change in urban areas**

A wide variety of policy actors and networks are responding to climate change in urban areas at international, regional, national and local level, include United Nations specialized agencies, International, Multilateral, Bilateral, Regional, and National, NGO and City-level actors, initiatives and networks. National governments have signed international agreements such as the UNFCCC aimed at mitigation and response to disasters (Johnson and Breil 2012; UN-Habitat 2010). They also negotiate development policy loans to support climate adaptation budgets, and climate change aspects are increasingly integrated into donor policies (Johnson and Breil 2012). Civil society organizations (CSOs) play a critical role in climate change governance. They are involved in research and policy analysis, lobbying and advocacy, capacity building and knowledge sharing, adaptation initiatives, resource mobilization and coordination, all of which influence policy formulation and implementation.

### **5. Gaps in Climate Change Adaptation Research and Policy in the Southern Africa Urban Sector**

#### **5.1. Key Research Gaps**

Little research has been conducted on the urban spatial system in most parts of Southern Africa. Most research activities are heavily influenced by rural bias, neglecting urban vulnerabilities which are manifested in urbanization trends and associated relationship with climate change risks. Additionally, local actors have low technical capacity and meager financial resources and no mandate to integrate urban adaptation into their plans. Hence most countries in Southern Africa, including Malawi and Zimbabwe, lack empirical evidence on urban vulnerability (Brown et al. 2012). Most of the research conducted focus on agriculture and freshwater resources and research areas that remain underexplored, include (i) modelling of climate risks for specific urban areas to provide city or urban level relevant climate information

and reduce uncertainties, (ii) assessment of vulnerabilities, (iii) coping and adaptation strategies of different urban areas and social groups; (iv) an understanding of urban-rural linkages and impacts of climate change; and (v) assessment of the role and capacity building needs of local governments. These research gaps apply to all countries in Southern Africa

## **5.2. Key Policy Gaps**

Climate change responses in the Southern African countries are rurally biased (Brown et al. 2012; Brown 2011), suggesting that urban areas are largely ignored in climate change policy debates. This is evident in the low recognition of urban vulnerabilities in National Communications to the UNFCCC from Malawi and Zimbabwe (Government of Malawi 2010b; Government of Zimbabwe 1998). Many NAPA projects ignore the importance of structural and institutional reforms that are needed to mainstream or integrate climate adaptation into national policy and planning as well as supporting adaptation capacity within local government (Meyer-Ohlendorf 2009; Satterthwaite et al. 2007). The Malawi Growth and Development Strategy (Government of Malawi 2011) ignore vulnerability of urban areas despite their economic importance. Meanwhile, the National Physical Development Plan supports a policy of decentralised growth aimed at reducing urbanization (Brown 2011). This suggests that there is lack of relevant policies that mandate local governments in urban areas to integrate adaptation into city or urban plans and budgets. Current environmental management legislation and policies are outdated in light of the predicted severity of climate change effects and scope of vulnerability (Brown et al. 2012; Satterthwaite et al. 2007). South Africa launched its National Climate Change Response Policy in 2012 (Government of South Africa 2012a), but other countries in Southern Africa are yet to develop such policies.

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

The stakeholders involved with research and policymaking on climate change adaptation in urban areas in Southern Africa include international, multilateral and bilateral organisations; different tiers of government; grassroots groups and local communities; private enterprises and institutions; NGOs and CSOs; networks; and individuals. Stakeholders involved in mitigation are drawn from the energy, transportation, forestry and agriculture sectors.

## **7. Conclusion and Recommendations**

## 7.1 Conclusion

Southern Africa remains the most urbanised region in Africa. Within the region South Africa has the most urban population (61.5 percent), while Malawi is one of the least urbanised nations (less than 20 percent) but is the fastest urbanising country in the world. Between 1950 and 2010, average annual urban population growth rates were higher than rural rates in all the study countries, and projections show further increases in urban population, suggesting that population growth in Southern Africa is largely an urban phenomenon. Rapid urbanisation has social, economic and environmental knock-on effects for national and local governments and all relevant stakeholders. The urban poor are forced to access land for housing in informal sites which are highly vulnerable to natural hazards and are poorly serviced by local governments. Climate change is therefore expected to worsen vulnerability of these communities. Urban areas in Southern Africa are highly vulnerable to these impacts of climate change, potentially leading to water stress, energy crisis, food insecurity, human health problems, destruction of infrastructure and, in coastal cities, sea level rise.

Options to reduce urban vulnerability include mainstreaming adaptation into city plans, and supporting pro-poor programmes to reduce vulnerability of the poor. One way to achieve this is through the NAPA process which facilitate mainstreaming and implementation of adaptation. The other option is to have legislation that mandates urban authorities to act. Research should provide relevant empirical evidence for informed policy. In addition, urban legislature (policies and laws) in most countries are outdated to manage climate change effects.

In South Africa, cities have developed evidence-based adaptation strategies and mainstreamed urban adaptation in their city plans and budgets. The cities have city networks which facilitate knowledge sharing and learning and consequently improve capacity of city managers to manage and solve city-based climate change problems.

## 7.2 Recommendations

### ***Recommendations for research***

There is need for:

- detailed vulnerability assessments of all urban areas to show which areas and groups of people are most vulnerable to climate change risks;
- rigorous downscaled modelling of climate data for localised assessments of all urban areas to ensure availability of locally based information;
- research on political economy or policy processes to improve uptake of unbiased and credible evidence;
- detailed assessments of rural-urban linkages and impacts of climate change; and

- dissemination of results to a wide audience using various media to increase uptake of credible evidence.

### ***Recommendations for policy***

- Southern African countries should provide appropriate institutional frameworks that form a strong basis for mainstreaming adaptation into urban planning. Urban adaptation to climate change should be integrated into national climate change policies, in which local municipalities and authorities are clearly mandated.
- Malawi and Zimbabwe should ensure that NAPAs are deliberately targeted at vulnerable groups in specific localities. Southern African countries should also adopt a more holistic approach to climate change, focusing on rural and urban areas' vulnerability and adaptation to climate change. Thus the development of national climate and development policy frameworks should integrate complementary and differentiated urban and rural strategies.
- Governments in Southern Africa should recognise urban vulnerability to climate change and develop ongoing food security programmes that enhance adaptation of the urban poor as well as rural producers. Governments should consider developing policies that encourage peri-urban agriculture as an adaptation strategy away from human settlements.
- As rural-urban migration continues, Southern African governments should consider integration of climate change management in urban and rural areas with social safety nets that enhance adaptation. To achieve compromise between the increased land demands of urbanisation governments should develop policies that aim to protect valuable agricultural areas in peri-urban areas.
- Countries such as Malawi should consider promoting compact development in addressing land pressures resulting from urbanisation. Southern African countries should promote policies that include climate change education and research to ensure development of a resilient population and competent research centres.
- Governments in Southern Africa should develop policies whereby research centres and universities are mandated to sustain production of high quality empirical information on climate change for informed policy formulation.

## 8. References

- Brown, D. (2011) 'Making the Linkages between Climate Change Adaptation and Spatial Planning in Malawi', *Environmental Science & Policy*, 14:940-949
- Brown, D., Rance Chanakira, R., Chatiza, K., Dhliwayo, M., Dodman, D., Masiwa, M., ... and Zvigadza, S. (2012) *Climate Change Impacts, Vulnerability and Adaptation in Zimbabwe*, IIED Climate Change Working Paper, London, UK: International Institute for Environment and Development
- Brown, D., Dodman, D. and Zvigadza, S. (2013) *Climate Change Responses in Zimbabwe: Local Actions and National Policy*, IIED Briefing, London, UK: International Institute for Environment and Development
- Carmin, J., Anguelovski, I. and Roberts, D. (2012) 'Urban Climate Adaptation in the Global South: Planning in an Emerging Policy Domain', *Journal of Planning Education and Research*, 32:18-32
- Chagutah, T. (2010) *Climate Change Vulnerability and Adaptation Preparedness in Southern Africa: Zimbabwe Country Report*, Cape Town: Heinrich Böll Stiftung Southern Africa
- Christensen, J. H., Hewitson, B., Busuioc, A., Chen, A., Gao, X., Held, R., ... and Dethloff, K. (2007) 'Regional Climate Projections', in *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge, UK: Cambridge University Press, pp.847-940
- CLACC (2009) *Climate Change and the Urban Poor: Risk and Resilience in 15 of the World's Most Vulnerable Cities*, London, UK: International Institute for Environment and Development, Capacity Strengthening in Least Developed Countries for Adaptation to Climate Change
- COMESA/SADC/EAC (2011) *Programme on Climate Change Adaptation and Mitigation in Eastern and Southern Africa*, Lusaka, Zambia, Arusha, Tanzania and Gaborone, Botswana: Common Market for East and Southern Africa, East African Community and Southern African Development Community
- Dodman, D. (2010) 'Urbanization and Climate Change Risk', in Mclean, D. (ed), *World Disaster Report 2010: Focus on Urban Risk*. Report of the International Federation of Red Cross and Red Crescent Societies, Saint-Just-la-Pendue, France: Imprimerie Chirat
- Dodman, D. (2011) *Climate Justice, Resilience and the Coastal City*, presented at Social Justice and Development, 4 October, Amsterdam, The Netherlands: International Development Studies, University of Amsterdam
- Farrell, L.A. (2010) *Mainstreaming Climate Change Adaptation into Urban Development: Lessons from Two South African Cities*, Masters thesis, Stanford, CA: Stanford University
- Gaile, G.L. (1992) 'Improving Rural-Urban Linkages Through Small Town Market Based Development', *Third World Planning Review*, 14(2):131-148

Government of Malawi (2006) *National Adaptation Programme of Action (NAPA)*, Lilongwe, Malawi: Ministry of Natural Resources and Environmental Affairs

Government of Malawi (2008) *National Education Sector Policy and Plan (NESP)*, Lilongwe, Malawi: Ministry of Education

Government of Malawi (2010a) *Millennium Development Goals Progress Report*, Lilongwe, Malawi: Ministry of Finance and Economic Planning

Government of Malawi (2010b) *Second National Communication of Malawi to the United Nations Framework Convention on Climate Change*, Lilongwe, Malawi: Ministry of Natural Resources and Environmental Affairs.

Government of Malawi (2012) *National Climate Change Policy*, Lilongwe, Malawi: Ministry of Environment and Climate Change Management

Government of South Africa (2004) *South African National Climate Change Response Strategy*, Pretoria, South Africa: Government of South Africa

Government of South Africa (2010) *Millennium Development Goals Country Report 2010: South Africa*, Pretoria, South Africa: Statistics South Africa

Government of Zimbabwe (1998) *Initial National Communication to the United Nations Framework Convention on Climate Change*, Harare, Zimbabwe: Ministry of Environment and Natural Resources

Government of Zimbabwe (2010) *2010 Millennium Development Goals Status Report Zimbabwe*, Harare, Zimbabwe: Ministry of Labour and Social Services

Government of Zimbabwe (2013) *Second National Communication to the United Nations Framework Convention on Climate Change*, Harare, Zimbabwe: Ministry of Environment and Natural Resources

IPCC (2007a) *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge, UK: Cambridge University Press

IPCC (2007b) *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

IPCC (2012) *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change*, Cambridge, UK: Cambridge University Press

Johnson, K. and Breil, M. (2012) *Conceptualizing Urban Adaptation to Climate Change: Findings from an Applied Adaptation Assessment Framework*. Research Papers, Lecce, Italy: Centro Euro-Mediterraneo sui Cambiamenti Climatici

Joshua, M.D., Ngongondo, C., Chipungu, F., Stathers, T., Liwenga, E., Lamboll, R. and Majule, A. (2010) *Situation Analysis: Exploring Rural Urban Linkages and Impact of Climate Change*. Working Paper, Zomba, Malawi: Natural Resources and Environment Centre, Chancellor College

Manda, M.A. Z (2007) 'Mchenga: Urban Poor Housing Fund in Malawi', *Environment and Urbanization*, 19:337-359

McDevitt, A. (2009) *Helpdesk Research Report: Climate Change and Zimbabwe*, Governance and Social Development Resource Centre

McSweeney, C., New, M. and Lizcano, G. (2008) *UNDP Climate Change Country Profiles: Malawi* / <http://country-profiles.geog.ox.ac.uk/index.html?country=malawi&d1=reports> [accessed 29 June 2012]

Meyer-Ohlendorf, L. (2009) *Climate Change, Vulnerability and Adaptation in Sub-Saharan African Cities: New Challenges for Development Policy*. Research Project on Climate Change and Development, Bonn, Germany: German Development Institute

Mkwambisi, D. (2009) Urban Agriculture and Food Security in Lilongwe and Blantyre, Malawi, in Redwood, M. (ed), *Agriculture in Urban Planning: Generating Livelihoods and Food Security*, London, UK: Earthscan

Mukheibir, P. and Ziervogel, G. (2006) *Framework for Adaptation to Climate Change in the City of Cape Town*, Cape Town, South Africa: University of Cape Town

Mukheibir, P. and Ziervogel, G. (2007) 'Developing a Municipal Adaptation Plan (MAP) for Climate Change: the City of Cape Town', *Environment and Urbanization*, 19(1):143-158

Mukheibir, P. and Ziervogel, G. (2009) 'Developing a Municipal Adaptation Plan (MAP) for Climate Change: the City of Cape Town', in Bicknell, J., Dodman, D. and Satterthwaite, D. (eds), *Adapting to Climate Change: Understanding and Addressing the Development Challenges*, London, UK: Earthscan

Mutonodzo, C. (2009) 'The Social and Economic Implications of Urban Agriculture on Food Security in Harare, Zimbabwe', in Redwood, M. (ed), *Agriculture in Urban Planning: Generating Livelihoods and Food Security*, London, UK: Earthscan

Naidu, S., Hounscome, R. and Iyer, K. (2006) *Climatic Future for Durban: Revised Report*.

Prepared for: EThekweni Municipality by: CSIR Environmentek [Ngongondo, C.S.](#), [Xu, Chong](#)

Roberts, D. (2009) 'Thinking Globally, Acting Locally: Institutionalizing Climate Change at Local Government Level in Durban, South Africa', in Bicknell, J., Dodman, D. and Satterthwaite, D. (eds),

*Adapting to Climate Change: Understanding and Addressing the Development Challenges*, London, UK: Earthscan

Roberts, D. (2010) 'Prioritizing Climate Change Adaptation and Local Level Resilience in Durban, South Africa', *Environment and Urbanization*, 22(2):397-413

SADC (2008) *SADC Today: Poverty and Development*, Gaborone, Botswana: Southern African Development Community

Satterthwaite, D. (2007) *The Transition to a Predominantly Urban World and its Underpinnings*. Human Settlements Discussion Paper. London, UK: International Institute for Environment and Development

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

UN DESA (2012) *World Urbanization Prospects: The 2011 Revision*, New York, NY: Department of Economic and Social Affairs, Population Division

UN-Habitat (2008) *State of the World's Cities 2008/9*, Nairobi, Kenya: United Nations Human Settlements Programme

UN-Habitat (2010) *State of African Cities 2010*, Nairobi, Kenya: United Nations Human Settlements Programme

UN-Habitat (2011a) *Cities and Climate Change: Global Report on Human Settlements (2011)*, Washington, DC: Earthscan Ltd

UN-Habitat (2011b) *Malawi Urban Housing Sector Profile*, Nairobi, Kenya: United Nations Human Settlements Programme

Ziervogel, G. and Parnell, S. (2010) *South African Coastal Cities' Response to Climate Change Adaptation: Moving from Projects to Process*, presented at the Berlin Conference on the Human Dimensions of Global Environmental Change, 8<sup>th</sup> -9<sup>th</sup> October 2010, German Development Institute/Deutsches Institut für Entwicklungspolitik (DIE), Berlin, Germany

Ziervogel, G., Shale, M. and Du, M. (2010) 'Climate Change Adaptation in a Developing Country Context: The Case of Urban Water Supply in Cape Town', *Climate and Development*, 2:94-110