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Strengthening climate change adaptation capacity in Africa- case studies from six major African cities and policy implications

Walter Leal Filho [a], Abdul-Lateef Balogun [b], Desalegn Yayeh Ayal [c], E. Matthew Bethurem [d], Miriam Murambadoro [e], Julia Mambo [e], Habitamu Taddese [f], Gebrekidan Worku Tefera [g], Gustavo J Nagy [h], Hubert Fudjumdjum [i], Paschal Mugabe [i]

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Highlights

- Vulnerability of human habitats to the effects of climate change in the studied cities rank among the lowest quartile worldwide.
- The high vulnerability is severely aggravated by the cities' poor adaptation capabilities.
- Building good governance is the corner stone of effective and efficient climate change adaptation measures implementation.
- Strong policies and institutions, national and city-level planning, and responsive governance are key factors to foster climate management in African cities.
- Climate change adaptation strategies should be incorporated in government policies together with urban development plan, and disaster risk management.

Abstract

Africa is one of the most vulnerable regions in respect of climate change. As the African continent struggles to adapt to climate change, a variety of measures are being pursued to alleviate the resultant pressures on people, properties and their livelihoods in several African cities. Collectively, they show that climate change adaptation in Africa is not as hopeless as widely claimed, and that there are some promising prospects. The literature shows a deficiency on studies which examine the extent to which climate change adaptation is being pursued in African cities. This paper addresses this need, and outlines some of the most important climate threats (e.g. increasing temperatures, droughts, sea level rise, sea and river flooding) and synergic non-climate factors, as well as recent progress made in respect of implementing climate change adaptation in African cities. Rather than adopt a general description of trends, this research focuses on concrete case studies from six major cities across the central, western, and eastern regions of the African continent (Douala, Lagos City, Dar-es-Salaam, Accra, Addis Ababa and Mombasa). The vulnerability and adaptive capacity status of the studied cities are discussed. Difficulties and challenges encountered in implementing adaptation policies in these areas are also highlighted. Furthermore, some successful examples of climate change adaptation initiatives in the surveyed cities are provided. Finally, the paper outlines some of the policy measures which can be implemented towards strengthening the capacity of African cities to adapt to a changing climate.

Introduction

Scientific evidences on weather patterns across many parts of the globe indicate a changing climate (Dodman, 2011; IPCC et al., 2012; Wilson, 2014), particularly in respect of an increase in extreme events worldwide since 1950 (Herring et al., 2014; Hulme, 2014). Africa has

been identified as highly vulnerable to climate change and variability (IPCC, 2007a; Epule et al., 2017). This is largely due to economic and social problems and multiple stressors, which exacerbate the exposure and sensitivity across the continent to weather and climate extremes. The impacts of climate change are felt at various spatial scales but responding to climate change in African cities is challenging. There is a dearth of scientific works focused on the impacts of climate change in African cities (Nkhonjera, 2017). Most existing works on Africa focus on the more developed Southern Africa sub-continent (Klausbruckner et al., 2016; Novellie et al., 2016; England et al., 2018) while there is a proportionally sparse number of scientific works on other regions of the African continent, which are relatively less developed and more vulnerable. This paper tries to address this gap by focusing on concrete examples from cities across western, eastern and central Africa including Cameroon, Nigeria, Tanzania, Ghana, Ethiopia and Kenya.

The impacts of climate change are expected to be higher in cities that have a low adaptive capacity due in part to limited resources, social and institutional networks, technology, the level of human development and political will of governments (UNEP, 2011). Even though climate risks are often discussed at the national scale, urban areas are increasingly seen as having a pivotal role in the climate agenda. At present, decision-makers face significant challenges when adopting suitable strategies in respect of adaptation action, and the tools to be used to reduce losses and damages arising from climate hazards including (ND-Gain, 2017):

- Uncertainty of urban climate hazards
- Lack of reliable data/measurements to prioritize adaptation actions
- Limited availability of data to understand and track urban vulnerability to climate change
- Difficulties in integrating scientific information into future legislation and adaptation procedures

As one of the Sustainable Development Goals (SDGs), Climate Action proposes to strengthen resilience and adaptive capacity to climate-related hazards and natural disasters (United Nations, 2015). Urban areas are known to be particularly susceptible to external shocks and stresses. Therefore, cities are expected to increasingly experience climatic effects in the form of more intense and frequent extreme weather events. This will put millions of people at risk, especially the poor, who are particularly vulnerable (UN-Habitat, 2015). Since social, economic, and environmental sustainability can be improved by the disaster risk management and adaptation approach, addressing the fundamental causes of vulnerability is a prerequisite for sustainability in the context of climate change (IPCC et al., 2012).

Presently, many governments across the African continent work in complex political contexts, struggling to meet service delivery backlogs within largely poor local communities. Poverty is widespread in many African countries, which further compounds the devastating effects of climate change. Local authorities assume that poor people in urban areas can cope and recover easily from climatic and non-climatic shocks and stresses as compared to their rural counterparts, which is not always the case (UNHSP, 2003; Murambadoro, 2007; Adenle et al., 2017).

Due to a combination of inadequate governance systems and economic hardships, many local authorities across African cities struggle to cope with the intensive migration seen from rural areas to cities. It is assumed that urban populations can cope and recover easily from climatic and non-climatic shocks and stresses in comparison to their rural counterparts. However, this might not be necessarily true due to the relative complexities of urban livelihoods, which ultimately influence the adaptation strategies that are adopted (Murambadoro, 2007). Unfortunately, there have been limited in-depth analyses of what African cities are doing to adapt (Cabral et al., 2017; Nkhonjera, 2017), which makes it difficult to appraise existing strategies. Epule et al.'s (2017) work focused on the Sahel, which are mainly desert Northern regions of different African Countries. This work chronicled national and regional level interventions, rather than city level initiatives. Thus the following questions arise:

- Are the vulnerability and adaptive capacity of African countries and cities commensurate with their exposure, economic and socioeconomic development status?
- Are existing climate change strategies and policies adequately addressing the vulnerability and adaptive challenges of African cities?

The aims of this paper, which provides a novel approach in studying the extent to which climate change impacts African cities, are threefold: (i) to review climate change impacts in major African cities through six case studies (Douala, Lagos, Dar-es-Salaam, Accra, Addis Ababa, and Mombasa), ii) to make a cross-comparison of adaptation measures and strategies, and iii) to list a set of lessons learned and recommendations which may help to improve current trends.

Section snippets

Climate change impacts in African cities

Climate change is one of the major problems currently facing cities globally. Various projections suggest an increase in both the frequency and magnitude of extreme weather events (IPCC et al., 2012). Despite their high level of vulnerability, African cities are underrepresented in climate change research and assessments of successful adaptation initiatives (Cabral et al., 2017; Nkhonjera, 2017). This is partly because local climate change challenges, vulnerabilities, priorities, and …

Methods used

Six case studies of different African cities, and their respective climate change challenges and adaptation strategies, are presented in this section. The cities include: i) Douala, Cameroon in Central Africa, ii) Lagos, Nigeria, and iii) Accra, Ghana, in West Africa, iv) Dar-es-Salaam, Tanzania, v) Mombasa, Kenya, and vi) Addis Ababa, Ethiopia in East Africa (Fig. 1). The choice of this sample is a convenience one: the scientists who have taken part in this study are part of the International …

National-level development, vulnerability and readiness indices

The extent of the climate vulnerability in any given place will depend on the frequency and intensity of extreme events, the fraction of exposed people, its development, wealth and economic conditions (e.g. GDP, poverty), prevailing political institutions (e.g. GR), and the political will to prioritize adaptation strategies (Leal Filho et al., 2017; Villamizar et al., 2017). Table 1 shows that the studied countries are below the world average development, ranging from Nigeria (GDP-PPP U$ 5,960, …

Conclusions, lessons learned and recommendations

This study has a set of limitations. The first one is the fact that it could only cover a small number of African cities. Secondly, the data gathered only offer a profile of current trends and does not provide historical data. Nonetheless, the study provides a timely contribution towards an understanding of the policy gaps and problems African cities face in their attempts to cope with the impacts of climate change, also emphasising the positive influence of policies in the adaptation process. …

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