

Future City

Volume 4

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Future City Description

As of 2008, for the first time in human history, half of the world's population now live in cities. And with concerns about issues such as climate change, energy supply and environmental health receiving increasing political attention, interest in the sustainable development of our future cities has grown dramatically.

Yet despite a wealth of literature on green architecture, evidence-based design and sustainable planning, only a fraction of the current literature successfully integrates the necessary theory and practice from across the full range of relevant disciplines.

Springer's *Future City* series combines expertise from designers, and from natural and social scientists, to discuss the wide range of issues facing the architects, planners, developers and inhabitants of the world's future cities. Its aim is to encourage the integration of ecological theory into the aesthetic, social and practical realities of contemporary urban development.

More information about this series at <http://www.springer.com/series/8178>

Stephan Pauleit • Adrien Coly
Sandra Fohlmeister • Paolo Gasparini
Gertrud Jørgensen • Sigrun Kabisch
Wilbard J. Kombe • Sarah Lindley
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Urban Vulnerability and Climate Change in Africa

A Multidisciplinary Approach

 Springer

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Cover illustration: The aftermath of the flooding of April 2014 in Dar es Salaam, Tanzania. Roads and businesses are submerged under water, making access impossible to homes, schools and workplaces. Local newspapers reported the flood as one of the most destructive events the city has experienced in years due to the extent of the damage both to public infrastructure and private property.

Photo: Eric Schaechter; commissioned by the Helmholtz Centre for Environmental Research-UFZ
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Preface

Africa, a continent of diversity and contrasts, is often perceived through news stories of political unrest and humanitarian crisis. Documentaries on the wealth of natural resources and wildlife might also be part of the general image. Yet, many other and very different facets of this continent exist; one of these, frequently overlooked by media coverage, is its enormous drive towards urbanisation. Fuelled by strong overall population growth and migration from the rural areas towards cities, African urban areas are expanding at an incredible pace. The city of Dar es Salaam, for instance, which is one of the case study cities treated in this book, is predicted to double its population from over four million currently to more than eight million in the coming 15 years. While the potential of urbanisation for furthering economic development and social progress is increasingly recognised by African leaders, it also poses enormous challenges – rapid urban population growth goes hand-in-hand with informal settlements, which usually lack basic infrastructure. Poverty is rampant. To successfully address these challenges of urban growth alone would be more than sufficient to absorb all of the efforts of policy-makers and researchers alike for the next decades.

Africa is also the continent where climate change will be particularly severe. Increasing frequencies and intensities of heat waves, droughts, sea level rise and storm surges, rainstorms and landslides are predicted to hit the continent, and are doing so already today. Urban areas are especially vulnerable as they are often poorly planned and built in zones that are exposed to natural hazards. Consequently, climate related disasters are claiming an ever-increasing toll on human lives and threatening the development of Africa's urbanising societies.

And yet, despite all of these challenges, urbanisation is the future of the African continent due to the developmental potential it offers. The task ahead is thus to find ways for more sustainable and climate resilient urban areas. At present, an understanding of how urbanisation and climate change interact in Africa is still scarce. A lack of regional and local data on climate change makes it difficult to translate potential changes into hazards. Knowledge on the vulnerability of urban society and its ecosystems, built environment and critical infrastructure, such as roads and

hospitals, is widely absent. Considering these factors, what action is due? As the high degree of informality indicates, the capacity for planning and management of urban areas is very low in Africa. How can governance of urban areas be strengthened and civil society be supported to build climate resilience?

CLUVA – ‘CLimate Change and Urban Vulnerability in Africa’ was a research project funded by the European Union within its 7th Framework Programme between 2010 and 2013 to address these questions. For the first time, a systematic study of African cities’ vulnerability to climate change was applied in an inter- and trans-disciplinary research project. The main target was to develop an integrated approach to the assessment of urban vulnerability to climate change and to identify suitable strategies that may enhance the climate resilience of African cities. Not least, the project aimed to transfer new knowledge and tools to practice and increase the research capacity in this field in Africa.

The consortium consisted of six African and seven European partner organisations, led by AMRA, the Research Center for Analysis and Monitoring of Environmental Risks, located in Naples, Italy. The project team comprised expertise from a range of disciplines, including climate change modelling, hazard and risk assessment, the study of vulnerability, urban planning and governance analysis. Researchers from the following organisations were involved: Addis Ababa University, Ethiopia • AMRA Scarl, Italy (coordinator) • Ardhi University, Tanzania • Centro Euro-Mediterraneo per i Cambiamenti Climatici Scarl, Italy • Council for Scientific and Industrial Research, South Africa • Helmholtz-Zentrum für Umweltforschung UFZ, Germany • Københavns Universitet, Denmark • Norsk Institutt for By- Og Regionforskning, Norway • Technische Universität München, Germany • Université de Ouagadougou, Burkina Faso • Université de Yaoundé I, Cameroon • Université Gaston Berger de Saint Louis, Senegal • University of Manchester, UK.

In CLUVA, we concentrated on Sub-Saharan cities because of the particular need for a better evidence base in this huge part of Africa. Five case study cities were selected to represent the different geographic settings, processes of urbanisation and climate change impacts to be expected. These were:

- Saint Louis, a comparatively small town in Senegal, which is designated as a world heritage site due to its history as a trading town and its richness in colonial architecture. Located on islands of the Senegal river and a small strip of land between the river and the Atlantic ocean, it is mainly threatened by sea level rise and increased flooding from the Senegal river.
- Ouagadougou, the capital of Burkina Faso in the Sahel zone. Perhaps surprisingly, pluvial flooding puts the city most at risk but drought events and the consequent migration of rural people to the city are also a major threat.
- Douala in Cameroon, the large city at the mouth of the Wouri river where riverine and pluvial flooding are already now posing great problems which will be exacerbated by sea level rise.
- Addis Ababa, the capital of Ethiopia, and Dar es Salaam, Tanzania, where again, riverine flooding is the major environmental risk. Dar es Salaam may also be affected by a rising sea level and tropical storms.

This book provides a synthesis of the most relevant results of the CLUVA project. Its ambition is to cover the entire approach developed and applied in CLUVA. In addition, it contains contributions by renowned scholars in urban planning, social and political science, which helped us to substantially widen, and sometimes also challenged, our own insights from the CLUVA research. For instance, while the focus of CLUVA was on adaptation to climate change, Susan Parnell convincingly argues for the need to link the predominant adaptation and anti-poverty agendas with planning for mitigation in her invited contribution to the book. It is recognised that such an approach will require a fundamental reform and strengthening of urban planning in African cities.

Certainly, the book cannot give definite answers to the questions stated above; it intends, however, to offer the reader new perspectives on the challenges of urbanisation and climate change and to illustrate entry points for further action, both from local governments as well as the international community. The editors of this book and the researchers that were intensely involved in the CLUVA project believe that we made some useful advances in:

- Developing and applying novel approaches and tools to climate modelling which resulted in improved climate change data, hazard, vulnerability and risk assessments, as well as scenario modelling to support urban planning;
- Generating and disseminating new knowledge on the entire chain of climate change science for adaptation of Sub-Saharan cities, from producing detailed information of climate change scenarios to specific assessments of how social vulnerabilities of local communities interact with the physical vulnerability of houses in informal settlements and critical infrastructures. For the first time, the project produced information on the ecosystem services provided by the cities' green and blue spaces that may inform green infrastructure planning for adaptation. Governance and urban planning studies gave clear insights into current barriers to adaptation but also identified approaches that may work for building climate resilience. The project resulted in 45 deliverables and a number of scientific, policy-orientated and popular publications, conference presentations and posters (see www.cluva.eu);
- Building capacity by establishing new networks between researchers from Africa and Europe and between researchers and local stakeholders which we hope will persist and can even be strengthened in the future. At the time of writing, consortium partners are already involved in new projects that build on the CLUVA results. We are particularly proud of the extensive number of students that were able to do their PhD research within the CLUVA project. Several PhD workshops were organised, and Master students have also made valuable contributions to the project. Hopefully, this next generation will boost the science on climate change and urbanisation in Africa. Beyond strengthening scientific capacity, the project further co-produced a set of teaching modules on Master's level in the framework of UN Habitat's Cities and Climate Change Academy (CCCA) that involves a number of universities worldwide.

These achievements provide us with optimism that CLUVA has been able to make a significant impact on the science and practice of climate change adaptation in Africa. However, it is up to the reader of this book and those stakeholders that

were collaborating with us during the project to decide whether we were able to fulfil our ambitions.

The CLUVA project was funded as a collaborative project by the European Union's 7th Framework Programme (Grant agreement no: 265137). We are thankful to our project officers from Directorate-General for Research and Innovation for having been greatly supportive of our project.

Working in a large consortium from two continents has been challenging, but in the end, a highly rewarding enterprise. Not least, establishing and maintaining an effective communication required a great effort from all of the partners. The project would not have come to a successful ending without a highly dedicated coordinator. We are deeply grateful to Guy Weets for safely guiding us through all of the project's stages and never losing his good temper when confronted with the difficult task to keep ends together. He was supported by an excellent project management team at AMRA Scarl, Italy, among which Angela Di Ruocco and Alfonso Rossi Filangieri need to be commended. The members of CLUVA's Scientific Advisory Board played an important role in supporting the project with constructive comments and advice. These were: Prof. Jochen Zschau, University of Potsdam, Claude Ngomsi and Bernhard Barth, both UN-Habitat.

We would further like to thank all the people associated with our case study cities – whether politicians, administrators, members from NGOs and development aid organisations or residents – for their great help, dedication and kindness by which they supported the project through hosting and attending workshops, meetings and conferences, being available for interviews, providing us with data, and more. Our partners Bernhard Barth and Fernando Cabrera (UN-Habitat), Vilma Hossini (UN University) and David Dodman (IIED) need to be especially mentioned for their willingness to join forces in the frame of the Cities and Climate Change Academy (CCCA). We are also very grateful to the African Union for hosting our final conference in Addis Ababa.

Sincere thanks go to Ben Wisner, Mark Pelling, Adolfo Mascarenhas, Ailsa Holloway, Babacar Ndong, Papa Faye, Jesse Ribot, David Simon and Susan Parnell who greatly enriched this book with their invited contributions.

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