Regional Assessment

on Urban Vulnerability and Resilience in Southern African Development Community Member States

Strengthening Capacities for Reducing Urban Vulnerability and Building Resilience in Southern Africa

UN-HABITAT
FOR A BETTER URBAN FUTURE

DiMSUR
Disaster Risk Management, Sustainability and Urban Resilience

GFDRR
Global Facility for Disaster Reduction and Recovery

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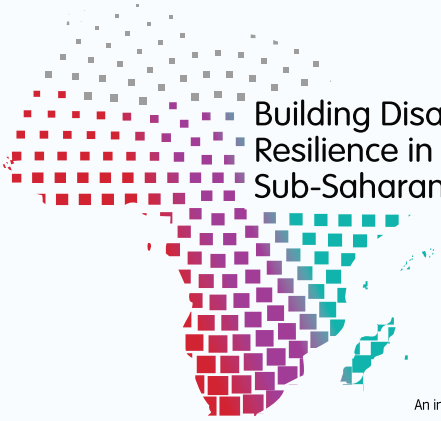

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WORLD BANK GROUP

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SADC
SOUTHERN AFRICAN DEVELOPMENT COMMUNITY
TOWARDS A COMMON FUTURE

DiMSUR
Disaster Risk Management, Sustainability and Urban Resilience

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FOR A BETTER URBAN FUTURE

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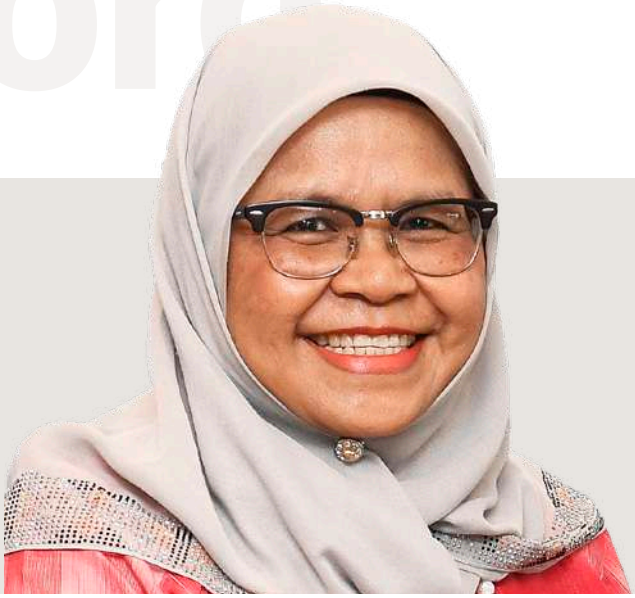
Foreword



In a world increasingly subject to interconnected and often devastating covariate shocks, rapid urbanization is a trend which shows no signs of desisting. This is no truer than in sub-Saharan Africa; the area expected to witness unprecedented movements of people from rural areas to cities.

Amongst the Southern African Development Community (SADC), Member States are urbanising at a particularly fast rate. The region encompasses 16 Southern African countries, housing a diverse consortium of vibrant market towns, rural communities, intermediate cities and metropolises, with tremendous opportunities for green economic growth and innovation.

Despite such potential, SADC faces threats from a variety of extreme natural hazards; floods, droughts, cyclones and earthquakes, made more frequent and severe by the growing impact of climate change. In combination with rapid urban expansion, most of which is unplanned, many of the most vulnerable are forced to settle informally in hazard prone areas. With limited resources to manage the threat of disasters or provide basic services, these settlements are sites of concentrated risk. As such, reducing urban vulnerability and building resilience to a wide range of shocks in Southern Africa is central to ensuring sustainable urban development in the region.

When we think about the future of rural, peri-urban and urban environments, cities must be at the forefront of mitigating and adapting to climate change. Contrary to static and consensual assumptions of the region, many steps have been taken by member states and the Secretariat in recent years to jointly address SADC's disaster risk profile. However, as the inevitable force of climate change becomes increasingly apparent, a more proactive, holistic and integrated approach is necessary to prevent and manage urban crises. Strong governance and comprehensive measures including those which enhance cities preparedness and response capacity, as well as their ability to adapt is key as we consider new and innovative pathways towards zero-carbon development.

Taking account of such challenges, this publication *Regional Assessment on Urban Vulnerability and Resilience in Southern African Development Community Member States* responds to the complexity and dynamism that SADC Member States face and provides the basis for a much-needed Urban Resilience Framework. It includes an examination of urban disaster risk and resilience in the region, vulnerability profiles of each country, city level analyses of vulnerability, and measures to foster institutional and policy discussions.

This supports a number of UN-Habitat's Flagship Initiatives, including "Resilient Settlements for the Urban Poor" and "Sustainable Development Goals Cities", and builds on a long history of strong collaboration and partnership between UN-Habitat, DiMSUR and SADC Secretariat, underlining the emergency response-development nexus and the importance of an urban perspective in disaster risk management and climate change adaptation.

In view of the 2030 Agenda and the fact that sustainable development increasingly depends on the management of urban growth, I hope policymakers and practitioners from each respective National Disaster Management Authority, as well as the SADC DRR Unit, will benefit from these practical insights, to both improve the current package of policies, strategies and plans of action in the region, and to capitalise on the potential this community so holds.

Ms. Maimunah Mohd Sharif
Under-Secretary-General and Executive Director, United Nations Human Settlements Programme (UN-Habitat)

Executive Summary

Africa is undergoing rapid urbanization with the total share of the urban population projected to increase to 60 per cent by 2050 from the current 40 per cent. This trend can also be observed in the region represented by the Southern African Development Community (SADC). In fact, SADC's 16 Member States[1] are among the world's fastest urbanizing countries. Due to a lack of local capacity and financial means to manage this rapid urban growth, much of the urban expansion has been taking place outside or in the absence of formal planning frameworks. As a result, the region has experienced a sprawl of urban settlements characterized by high vulnerability and high risk due to poor living conditions with a lack of basic and social services.

"The SADC region is highly susceptible to the impact of extreme climate events in particular floods, droughts, cyclones and earthquakes.

A striking aspect of urbanization in the region is the dichotomy of city-size. Only 11 urban settlements have a population exceeding 2 million, hosting around 40 per cent of the total urban population. At the same time around 60 per cent of the urban settlements in the region have less than 30,000 inhabitants. It is important therefore to keep in mind that megacities and small cities have different spatial, administrative and socio-economic features. They also have differentiated needs and opportunities when it comes to addressing disaster risk and adapting to climate change. In fact, given the trend of expanding secondary cities of smaller size and the socio-economic benefits that come with encouraging population movements away from primary towards secondary cities, these cities actually hold the key to building urban resilience in the SADC region.

"The challenges faced by each government in tackling multiple hazards domestically also have an impact on their ability to contribute to joint, sub-regional and regional efforts. SADC governments are, in fact, still suffering substantial gaps between their global/ regional commitments and national needs on the one hand, and their capacities on the other.

The SADC region is highly susceptible to the impact of extreme climate events in particular floods, droughts, cyclones and earthquakes. Urban risks are frequently exacerbated by the increasing unpredictability and severity of such events due to the influence of climate change affecting a range of urban sectors including water, food supply systems and health. People with low incomes, women and girls, youth, the elderly, persons with disabilities and other marginalized groups tend to be particularly vulnerable and often disproportionally affected. For this and the aforementioned reasons, urban resilience is an area that requires critical attention and its integration in current SADC policies and programmes is essential.

Although the SADC Member States have very diverse economies, some of the countries are among the world's least developed. The region continues to suffer from high unemployment, weak commodity prices, chronic fuel and food shortages, fiscal strains, increasing debt and high inflation. The COVID-19 crisis is already leading to additional economic losses. Gender inequality in the labour markets and gender-related issues remain a serious concern.

It is important to highlight that hazards and vulnerabilities faced by urban areas in the region transcend national boundaries and are shared by multiple countries such as: cities in the drought-prone semi-arid and sub-humid areas that cover parts of Angola, Botswana, Eswatini, Lesotho, Namibia, South Africa, Zambia and Zimbabwe; cities along the cyclone threatened south-eastern coast of the Indian Ocean in Madagascar, Malawi, Mozambique and the Indian Ocean islands; cities falling into the disaster-prone areas in the Zambezi River basin; and cities of the Great Rift Valley in the Democratic Republic of the Congo, Malawi, Mozambique and the United Republic of Tanzania. Therefore, since several countries could simultaneously be in a state of emergency putting a strain on relief efforts, shared knowledge and cooperation among countries – so that SADC Member States can learn from one another, support each other and coordinate appropriate actions – could make a significant difference when it comes to disaster risk preparedness.

Taking a regional approach to building urban resilience and establishing effective multi-jurisdictional coordination mechanisms is critical amongst the SADC Member States, particularly in areas with high levels of urbanization. Nevertheless, it must be considered that each country and sub-region in the SADC presents a high level of complexity due to their susceptibility to more than one hazard and other underlying vulnerabilities. Even when disaster risk management (DRM) measures are in place the focus

1 SADC Member States: Angola, Botswana, the Comoros, the Democratic Republic of Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, the United Republic of Tanzania, Zambia, Zimbabwe. Source: https://www.sadc.int/member-states

tends to be on emergency relief and response despite the fact that mitigation and prevention measures are more effective for achieving long-term resilience.

Improved governance is a crucial element to increasing coping capacities and as a consequence to decreasing the vulnerability of exposed populations. The challenges faced by each government in tackling multiple hazards domestically also have an impact on their ability to contribute to joint, sub-regional and regional efforts. SADC governments are, in fact, still suffering substantial gaps between their global/regional commitments and national needs on the one hand, and their capacities on the other.

The absence of regeneration and updating of priorities is visible in the lack of an urban focus in DRM. SADC cities face multiple challenges and therefore have different levels of vulnerability, and such vulnerabilities are the result of many interconnected factors which refer to both the physical and socio-economic spheres.

While some settlements can be more vulnerable than others because of particularly challenging threats – due to their specific location for example – for other cities vulnerabilities can be more hidden in the folds of the urban structure such as spatial inequalities and uneven access to services and opportunities. Moreover, all urban vulnerabilities must be considered against the broader context. In fact, even when sharing the same threats and similar weaknesses, the consequences of a common event can have different implications depending on the specific dynamics of a city, some going so far as to have repercussions beyond the city's and even the country's boundaries.

Understanding the context of these cities should go hand-in-hand with the investigation on how these cities are addressing such challenges, what kind of expertise and good practices they have developed, and which home-grown solutions can be exchanged with cities of similar profiles or shared hazards. This kind of South-South urban learning and exchange is critical to ensuring that localized, context-specific, indigenous and innovative climate change adaptation (CCA), disaster preparedness and response, and resilience building interventions are captured and replicated across the SADC region.

Strategies targeting both the physical and the socio-economic sphere are therefore required to effectively tackle urban vulnerabilities, but they must be supported by an overall well-functioning institutional set-up. To be effective, laws and regulations must be developed and enforced at the local level but should also refer to national and regional frameworks, where they exist. Disaster risk reduction (DRR) has become an important topic on the SADC agenda as shown by the increasing number of dedicated strategies and policy frameworks for, or related to, DRR and resilience and CCA/mitigation. Although at the regional level the SADC Regional Resilience Framework 2020–2030 has been developed and clearly mentions sustainable urban centres as one of its priorities, in general, the urban dimension of disasters is still not sufficiently reflected in the overall package of regional policies, strategies and plans of action. Clearly, as it occurs in most sub-Saharan African countries, urbanization is not yet seen as an opportunity for achieving structural transformation.

At the national level despite many SADC Member States having developed national resilience strategies, in general they are not yet able to establish and implement strategies that can promote urban development processes that ensure climate and disaster resilience and more balanced socio-economic dynamics. This aspect, paired with an urbanization pace which is so fast that it becomes highly difficult to manage, leads to the SADC and its Member States still being far from fully prepared to prevent and manage urban crises.

Drawing on the overall research conducted for this assessment, final conclusions and recommendations have been compiled and grouped into six thematic sets as follows:

→ **Enhancing policy, legislation and institutional frameworks with a stronger urban focus**
Along with a policy shift from disaster response to a more proactive, holistic and integrated DRM approach, the strengthening of the emergency response-development nexus and the integration of an urban perspective in DRM and CCA strategies is crucial. SADC institutional capacity and DRM coordination could be strengthened through better alignment of related strategies and plans at the different administrative levels and the establishment and/or strengthening of multi-jurisdictional coordination mechanisms.

“Although the SADC Member States have very diverse economies, some of the countries are among the world's least developed. The region continues to suffer from high unemployment, weak commodity prices, chronic fuel and food shortages, fiscal strains, increasing debt and high inflation.

→ **Capacity building, knowledge and information management**

Improving disaster risk preparedness/responses and urban resilience is essential and could be done by gradually integrating age-appropriate educational messages into formal curricula and non-formal educational and training initiatives. With this purpose, both academic institutions and the private sector can play an important role in supporting national and local governments.

The development of a regional body of knowledge and expertise to tackle urban risks and to identify and implement concrete solutions is urgently needed. The data gap on disaster risks in urban areas calls for comprehensive multi-hazard risk assessments in urban areas, improved data collection mechanisms, harmonization of methodologies between hazards and risks research institutions, and more data sharing across institutional and political boundaries.

> **"To be sustainable, cities are supposed to provide decent job opportunities and/or regular sources of income, especially targeting youth and the low-income class..**

> **"To reinforce the system of cities, delocalizing some socio-economic functions of primary cities to secondary and tertiary cities could help to reduce migration of the rural youth towards the capital cities.**

→ **Strengthening regional and national urban planning for building resilience**

Spatial planning efforts for enhancing urban resilience should neither be restricted to city boundaries nor to current scenarios. Urban plans need to be prepared in a participatory manner – including vulnerable groups in DRM planning and decision-making processes – to harness local knowledge and ensure community ownership while embracing a long-term vision of city development that takes into consideration the projected impacts of climate variability and change. To reinforce the system of cities, delocalizing some socio-economic functions of primary cities to secondary and tertiary cities could help to reduce migration of the rural youth towards the capital cities. A better inclusion of local authorities in national/sub-national planning and budgeting processes is also critical.

→ **Disaster risk financing and socio-economic considerations**

Establishing mechanisms that enable endogenous capacity development and institutional strengthening is necessary in the SADC region in order to move away from the funding dependency on external partners for supporting policy, institutional capacity and programme development and implementation. Several countries have developed disaster risk financing strategies while a few others have different forms of financing mechanisms in their legislation or policies, and the operationalization of these instruments is essential. To be sustainable, cities are supposed to provide decent job opportunities and/or regular sources of income, especially targeting youth and the low-income class. Therefore, addressing informality requires developing pro-poor urban policy frameworks that enable not just physical upgrading but especially socio-economic upgrading by creating better income opportunities for low-income groups.

→ **Promoting durable urban solutions**

There is a need to promote nature-based solutions for urban climate adaptation and DRR, and to provide architectural and engineering climate-proof designs, options and solutions that fit a variety of requirements and local contexts. Shifting to a green economic model can provide an opportunity to innovate, diversify and create employment while better adapting to climate change at the same time. Ensuring access to and continuity of infrastructure and basic services, even in times of disaster, is crucial to meet the vital needs of urban populations and to allow a city to keep functioning.

→ **Strengthened inter-country and inter-city cooperation**

Increased collaboration among countries is absolutely essential to mitigate transboundary/common hazards. In the context of risk reduction and resilience building for urban areas, a number of city networks exist which include SADC countries. Cities can learn from each other on these important topics sharing knowledge, lessons learned and best practices considering that they are at the forefront of prevention, preparedness, response and recovery when disasters strike.

Contents

Acronyms

ACP	African, Caribbean and Pacific Group of States
AFD	French Development Agency
AfDB	African Development Bank
AFSUN	African Food Security Urban Network
AIDS	Acquired Immunodeficiency Syndrome
ARC	Africa Risk Capacity
ATU	African Telecommunications Union
AU	African Union
BNGRC	Madagascar National Office for Risk and Disaster Management
CityRAP	City Resilience Action Planning
CC	Climate Change
CCA	Climate Change Adaptation
CoMSSA	Covenant of Mayors in sub-Saharan Africa
COVID-19	Coronavirus Disease 2019
CRPT	City Resilience Profiling Tool
CSCN	Commonwealth Sustainable Cities Network
CSIR	Council of Scientific and Industrial Research
CSO	Central Statistics Office
DHS	Demographic and Health Surveys
DiMSUR	Technical Centre for Disaster Risk Management, Sustainability and Urban Resilience
DIPECHO	Disaster Preparedness European Community Humanitarian Office
DoDMA	Malawi Department of Disaster Management Affairs
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EAC	East African Community
EU	European Union
FAO	Food and Agriculture Organization
FERDI	Foundation for Studies and Research on International Development
FSIN	Food Security Information Network
GCRN	Global Resilient Cities Network
GDP	Gross Domestic Product
GFDRR	Global Facility for Disaster Reduction and Recovery
HIV	Human Immunodeficiency Virus
ICLEI	Local Governments for Sustainability
ICT	Information and Communication Technologies
IFAD	International Fund for Agricultural Development
IFRC	International Federation of Red Cross and Red Crescent Societies
IFPRI	International Food Policy Research Institute
IIAG	Ibrahim Index of African Governance
ILO	International Labour Organization
IMF	International Monetary Fund
INGC	Mozambique National Institute of Disaster Management

IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
NBS	Nature-based Solutions
NDC	Nationally Determined Contributions
NGO	Non-Governmental Organization
OCHA	Office for the Coordination of Humanitarian Affairs
OECD	Organisation for Economic Co-operation and Development
ORSEC	Organisation de Secours en Cas de Catastrophe
REC	Regional Economic Community
RELIEF Kit	Resilience Through Investing in Ecosystems-knowledge, Innovation and Transformation of Risk Management
RIASCO	Regional Inter-Agency Standing Committee
RIDMP	Regional Infrastructure Development Master Plan
RISDP	Regional Indicative Strategic Development Plan
RVAA	Regional Vulnerability Assessment and Analysis Programme
SACN	South African Cities Network
SADC	Southern African Development Community
SADC GMI	SADC Groundwater Management Institute
SASDiR	Southern Africa Society for Disaster Reduction
SHOC	SADC Humanitarian and Emergency Operations Centre
SIDS	Small Island Developing State
SNGRC	National Strategy for Disaster Management of Madagascar
SOFI	The State of Food Security and Nutrition in the World
UCLG	United Cities and Local Governments
UCLG-A	United Cities and Local Governments-Africa
UDP	Urban Development Plan
UHI	Urban Heat Island
UN	United Nations
UNAIDS	Joint United Nations Programme on HIV and AIDS
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNECA	United Nations Economic Commission for Africa
UN-Habitat	United Nations Human Settlements Programme
UNICEF	United Nations Children's Fund
UNISDR	United Nations International Strategy for Disaster Risk Reduction
USAID	United States Agency for International Development
USD	United States Dollars
WFP	World Food Programme
WHO	World Health Organization
WIEGO	Women in Informal Employment: Globalizing and Organizing
ZAMCOM	Zambezi Watercourse Commission

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Debris from a destroyed road between national parks Manyara and Ngorongoro, Tanzania
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Introduction

This regional assessment report is intended to provide an evidence-base for deriving implementable recommendations for initiating an Urban Resilience Framework for the SADC region. For this purpose, the report targets the SADC Member States – especially their National Disaster Management Authorities – as well as the SADC DRR Unit, by presenting practical insights on the current disaster risk landscape in the region. It further intends to highlight existing interlinkages between urbanization and climate change and to identify hotspots in the region through analysis carried out at different levels. In fact, while the first chapter is intended to present an overview of the entire SADC region providing details about socio-economic data, urbanization dynamics and related vulnerabilities, the second and third chapters delve into the sub-regional, national and city-level scales, highlighting on the one hand the transboundary nature of some hazards – and therefore the importance of regional cooperation and knowledge sharing – and on the other hand, the implications a multi-hazardous environment (which characterises each SADC Member State) has at the national level. Specific additional data for each SADC Member State is provided in Annex 1 through 16 country profiles, and in Annex 2 where individual city profiles are presented for Moroni (Comoros), Zomba (Malawi), Maputo (Mozambique) and Lusaka (Zambia), the subject of the case studies presented in Chapter 3. Following the research on the status of vulnerability, Chapter 4 is dedicated to the analysis of institutional and policy frameworks for DRR using the same layered structure to highlight potential connections and influences between the different levels (e.g. if and how regional frameworks are reflected at the national and local levels), and/or possible gaps that should be filled. This chapter also serves as a filter through which all the information presented in the previous chapters is sifted in order to draw conclusions and final recommendations.

A young girl stands in line at a feeding scheme after a cyclone in Beira, Mozambique © Shutterstock/Charl W Folscher

African schoolgirls walking long distances to collect scarce water due to droughts
© Riccardo Mayer/Shutterstock

1

Presenting the context

Throughout the 21st Century, disaster risk in cities has increasingly been shaped by two inter-related factors: urbanization and climate change. It is now understood that disaster risk is often closely intertwined with urban poverty and that this linkage is aggravated by climate change. It is therefore crucial to begin by presenting the main characteristics of the SADC region in terms of socio-economic data, urbanization dynamics and related vulnerabilities to get a clear understanding of how these factors influence disaster risk – and therefore urban resilience – when combined with climate change impact and the main human-induced and natural hazards.

1.1 Framing the theme

As a starting point, it is essential to fully understand the relationships between urban resilience and sustainability. Urban resilience has emerged as an aspiration closely linked to sustainable development. But what exactly are the relationships between resilience and sustainability? Vague or narrow definitions of these concepts have all too often hampered action and the transformation processes required.[2] In fact, these concepts are tightly interlinked and mutually reinforcing which is directly reflected in UN-Habitat's definition of urban resilience as the ability of any urban system and its inhabitants to maintain continuity through shocks and stresses while adapting and transforming toward sustainability.[3] Therefore, in order to build resilience and achieve sustainability, national and local governments as well as other relevant stakeholders have to tackle all dimensions of urban settlement, taking into consideration cross-cutting issues across the different layers of urban planning and city management.

60%

The percentage to which Sub-Saharan Africa's total share of urban population is projected to increase by 2050 from the current 40 per cent as the region is undergoing rapid urbanization.

It is important to highlight that hazards and vulnerabilities transcend national boundaries thus taking a regional approach to building urban resilience is critical amongst SADC Member States. From this perspective, identification of cities and areas beyond national boundaries with similar climate, hazard and vulnerability profiles may encourage experience and knowledge sharing and cooperative interventions. For instance, most of the largest river basins in Southern Africa are transboundary, including some city/urban regions implying a need for policy and governance beyond the country level. Other examples include: cities in the drought-prone semi-arid and sub-humid areas that cover parts of Botswana, Malawi, Mozambique, Namibia, South Africa, Zambia and Zimbabwe; cities along the East African Rift Valley susceptible to earthquakes and volcanic activity; cities along the south-eastern coast of the Indian Ocean (Indian Ocean islands, Madagascar and Mozambique) that are regularly affected by cyclones, tropical storms and associated flooding; and cities around Victoria Falls, a major tourism region shared by Botswana, Namibia, Zambia and Zimbabwe.

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Urbanization is a megatrend globally which despite its multiple challenges provides significant opportunities. Cities can be looked at as innovation hubs in alternative energy initiatives and new ways for reducing the use of fossil fuels.

Along with other adaptation and green economy solutions cities, especially in the developed world, often have the population size, technological capability and institutional knowledge needed to apply such solutions at a large scale. An example of opportunity in urbanization can also be found in emerging secondary cities where, although often having the fastest urbanization rates, there is the potential to tackle already known challenges in advance (see section 1.2). Clearly defining the issue is a first step in confronting one of today's most complex topics for people, the planet and prosperity. The close relationship between worsening climate change related impacts and rapidly accelerating urbanization is becoming increasingly obvious, resulting in heightened urban disaster risk. However worldwide, cities are leading the charge to build their resilience to hazards, and tackle and adapt to the impacts of climate change. With ever-growing populations, especially in the global south, cities hold the key to the challenge of sustainable development.

1.2 Urbanization and vulnerability

Sub-Saharan Africa is undergoing rapid urbanization with the total share of urban population projected to increase to 60 per cent by 2050 from the current 40 per cent. The total population in the SADC region has grown from 277 million in 2010[4] to over 340 million in 2018,[5] and is expected to continue growing to around 500 million[6] by 2050. Botswana, South Africa and Angola are currently the three most-urbanized countries, while Malawi, Eswatini and Lesotho are the region's least-urbanized. Looking at the projections for 2050, Botswana, South Africa and Angola will continue to remain the most-urbanized, while Lesotho will move up in the ranking and be replaced by the Comoros in the three least-urbanized countries. In the timespan between 2020 and 2050, the United Republic of

2 Elmqvist and others, 2019, pp. 267–273
3 Source: https://urbanresiliencehub.org/what-is-urban-resilience
4 https://www.sadc.int/about-sadc/overview/sadc-facts-figures/
5 SADC, 2018
6 Davis-Reddy and Vincent, 2017

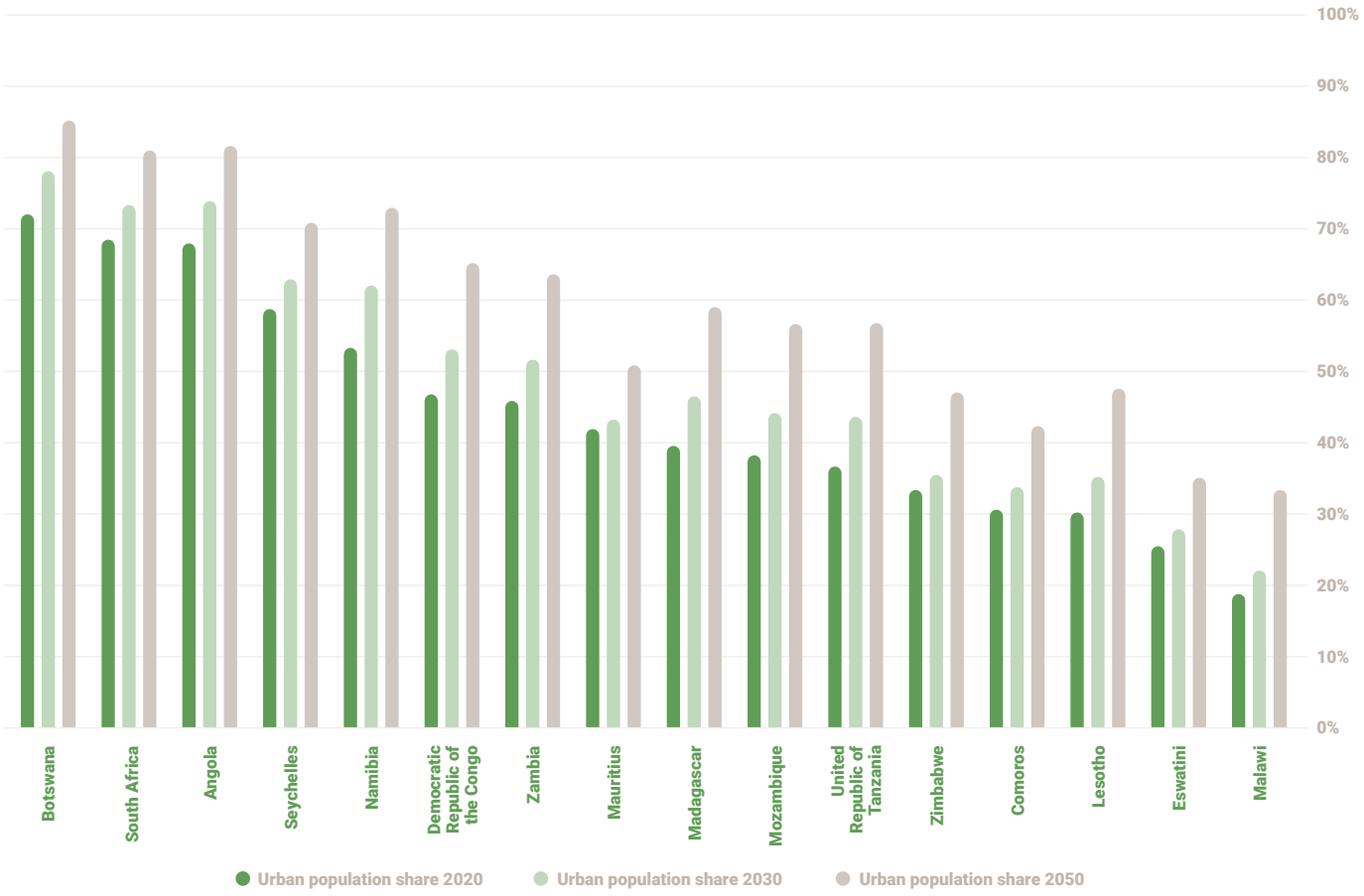


Figure 1: Urban and rural population share in 2020, and projections for 2030 and 2050 in SADC Member States. Data source: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Tanzania, Namibia and Madagascar will have the fastest urbanization rates (see figure 1).

This trend is a result of a number of factors but is driven by increasing rural-urban migration patterns. People in rural areas are moving into cities in search of better opportunities for employment, education and improved social status as well as fleeing areas of environmental deterioration. While climate induced urban migration is still modest, it is continually increasing. Other significant factors affecting the urbanization trend include natural population growth and the reclassification of rural areas to urban zones. The increase in urban populations has the potential to bring socio-economic benefits and spark innovation, but only if urbanization is well managed and is environmentally conscious (see figure 2). Unfortunately many governments, especially in developing countries, are unprepared to meet the growing demands associated with rapid urbanization.

Due to a lack of local capacity and the financial means to manage such rapid urban growth, much of the population expansion is taking place outside or in the absence of formal planning frameworks. Officials cannot keep up with the pace of urban migrants entering the city and are failing to develop zoning plans and assign areas for new settlements. Consequently a large share of the housing demand, primarily for the poor, is being met through informal means and is leading to expanding informal urban settlements characterized by poor living conditions and lack of access to basic services and infrastructure. In 2018, the proportion of urbanites living in informal settlements in SADC countries was around 55 per cent[7] (see Annex 1 for data of

“Due to a lack of local capacity and the financial means to manage such rapid urban growth, much of the population expansion is taking place outside or in the absence of formal planning frameworks. Officials cannot keep up with the pace of urban migrants entering the city and are failing to develop zoning plans and assign areas for new settlements.

7 Data elaborated from UN-Habitat, *World Cities Report 2020 – The Value of Sustainable Urbanization*

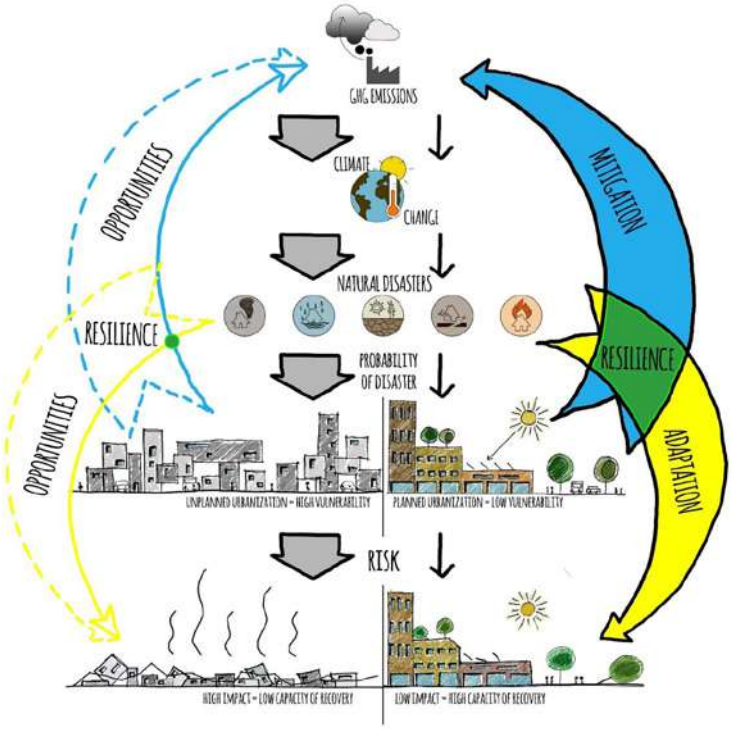


Figure 2: Resilience – adaptation and mitigation

individual countries). One major issue resulting from such uncontrolled growth is urban sprawl. In highly congested cities, settlements encroach peri-urban spaces and surrounding farmlands, mushrooming along roads entering the city, turning them into urban areas. This type of development is especially evident around large cities making it difficult to distinguish where the urban area begins and the rural area ends. Smaller settlement clusters are being sucked up by the sprawling urban structure forming vast urban agglomerations. According to a 2019 study of 25 African cities, urban built-up areas expanded on average by five per cent between 2000–2014.[8]

With growing distances to the city centre and a desire to be closer, some resort to building informal urban settlements into any seemingly vacant spaces within the city. These are often located in areas vulnerable to hazards such as wetlands, riverbeds or hillsides. As a result, large shares of the global urban population are increasingly exposed to different forms of natural or human-induced disasters, often with catastrophic long-lasting consequences that have plunged not only these cities but entire countries into economic and/or social decline.

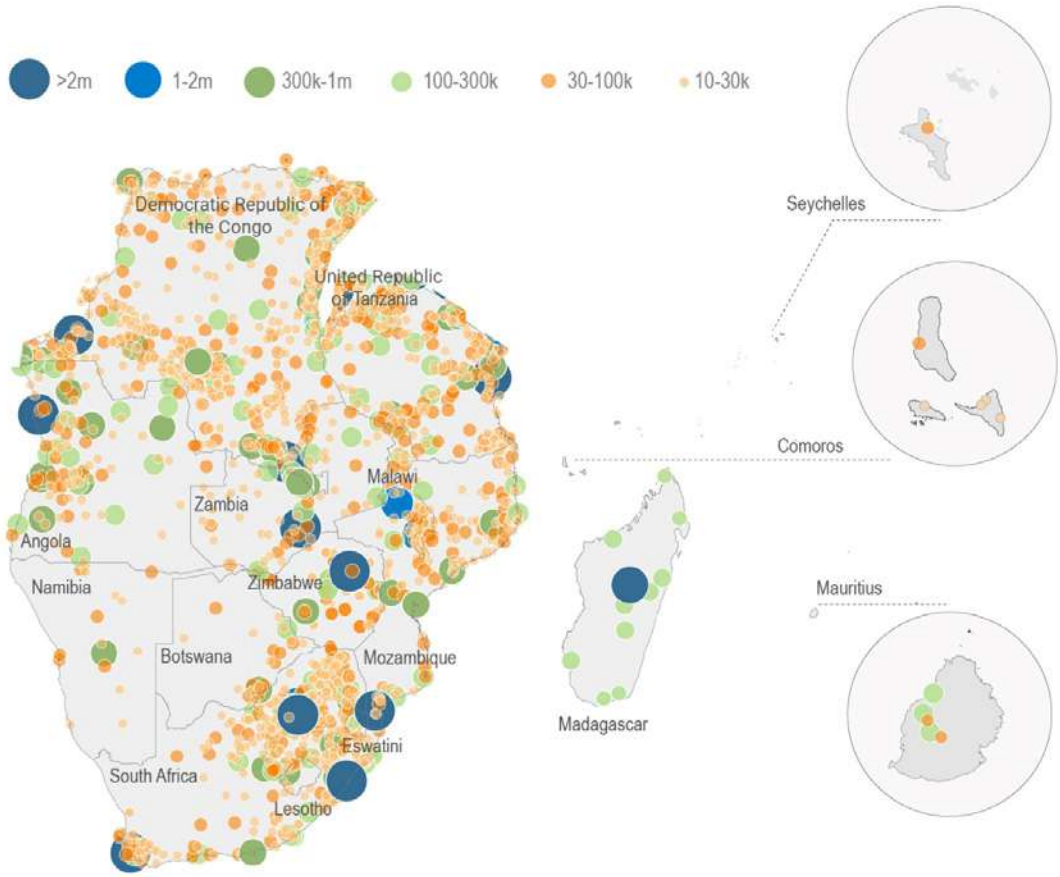
Urbanization increases housing demand in cities hence leading to higher prices for existing housing and new developments. For some it may lead into being forced out of their homes as the rents grow too high. Certain areas attract or are accessible to limited groups of people, which may result in the development of gated communities, stigmas and prejudices toward some areas, and cause segregation.

Urbanization has substantial implications on the environment. Urban sprawl encroaches on space from farmlands surrounding the city. Within cities, urban green areas often end up having to move to make way for new developments or informal settlements and the multiple beneficial functions of green areas are reduced. Green areas cool the city reducing the impact of urban heat island (UHI) effect, clearing the air of pollutants and greenhouse gases. Urban green areas have great potential to act as stabilizing components against hazardous shocks and stresses. In addition, they provide ecosystem services to urban dwellers. Rising populations require increased energy, mostly for transportation and cooking. For cities in the SADC region, this results in high concentrations of pollutants and small particulate matter in the air due to charcoal cooking stoves and cooking on open fires, as well as inefficient engines in most vehicles. This low air quality can be harmful to human health.

As a growing population consumes food and other products, the amount of waste accrues, making waste management one of the most prominent challenges for cities in southern Africa. If not handled properly, urban waste may damage nature and water reserves, and be harmful to human health.

The relation between poor solid waste management and inefficient drainage systems in urban areas also needs to be highlighted. Similarly to what occurs in most developing countries globally, cities in Southern Africa are often characterized by open drainage channels which are filled with uncollected solid waste, especially plastic. Consequently when it rains, clogged drainage channels do not allow an uninterrupted flow of water, increasing the risk of flooding. Compounding the level of vulnerability of urban areas in Southern

8 G Xu, T Dong, PB Cobbinah, L Jiao, NS Sumari, B Chai et al, *Urban expansion and form changes across African cities with a global outlook: Spatiotemporal analysis of urban land densities.* Journal of Cleaner Production, 1 July 2019, Volume 224: pp. 802–10



Map 1: Cities categorized by total amount of urban population in the SADC Region. Source: information adapted from Africapolis.org (OECD, and Sahel and West Africa Club Secretariat), 2015 and UN-Habitat, 2019

Africa is the concentration of poor and slum dwellers in areas considered unsuitable for human habitation (flood-prone areas, areas subject to landslides or land near a waste landfill) exposing them to physical and health hazards. It is easy to see the direct correlation between levels of urban poverty and disaster risk.

Just as habitats transform peri-urban farmlands into urban areas, agricultural land is similarly destroying forests and other natural resources. In sub-Saharan Africa, forests are typically cut down for charcoal and firewood causing acute deforestation, land degradation and escalating biodiversity loss. It can be observed that a phenomenon such as deforestation, which is closely linked to urbanization, gains particular significance when urban settlements are exposed to hazards exacerbating their adverse effects. For example, soil erosion is usually one of the first visible impacts of deforestation preventing rainwater from percolating slowly into the soil to recharge groundwater stocks and aquifers, thus triggering landslides. Deforestation in SADC countries is mainly livelihood-related and the outcome of (i) clearing forestland for cultivation, (ii) high dependence on fuel wood for cooking and (iii) frequent and uncontrolled fires[9]. Between 1990 and 2010, forest cover in some SADC countries was reduced by more than 17 per cent.

A notable urbanization trend is the emergence of secondary cities which are defined by UN-Habitat as cities with a population of 100,000 to 500,000. Rural-urban migration is increasingly directed to secondary cities instead of the main urban cluster within nations. In sub-Saharan Africa, more than 60 per cent of the urban population are living in cities

9 United Nations Economic Commission for Africa, *Assessment report on mainstreaming and implementing disaster risk reduction in Southern Africa*, 2015

of fewer than 1 million inhabitants compared to just 28 per cent in primary cities.[10] Such dichotomy in city sizes is very clear in the SADC region (see map 1). With Dar es Salaam and Luanda expected to become megacities (over 10 million inhabitants) in the next 10 years, together with Kinshasa (13.9 million[11]) and Gauteng (the Johannesburg-Pretoria area,15.2 million[12]) the region's number of megacities will expand to four.

Currently, only 11 SADC cities have a population above 2 million hosting around 40 per cent of the region's total urban population. However, the share of cities with population sizes ranging from 1 to 2 million is even lower. There is a clear gap between cities exceeding 2 million people and small cities with fewer than 100,000 inhabitants. The majority (64 per cent) of urban settlements have less than 30,000 inhabitants. Such disparities also mean differentiated needs and opportunities when it comes to addressing disaster risk and adapting to climate change. The quickly mushrooming megacities face challenges of complex road and transport systems and dense populations. However, in the increasingly proliferating smaller cities, although often less developed, municipal leadership has a more direct access to its constituencies, tackling challenges of a smaller scale.

"Most of the rapid (thus difficult to manage) urban population increase in the region is constituted by poor rural migrants looking for job/income opportunities but unable to pay the "price" of formally living in the city.

"According to the International Labour Organization, more than 85 per cent of employment in Africa is informal.

Secondary cities are often characterized as sub-national, regional administrative hubs – extensions of a metropolitan area or located along major transportation corridors. Secondary cities face many of the same problems and challenges as large cities with inadequate governance structures being the most notable, including deficiencies in urban and economic planning. Generally, infrastructural development and the provision of public services have been disproportionally centred to primary cities leaving secondary cities underdeveloped.[13] Such deficiencies make attracting investment difficult, however, these emerging urban zones have the opportunity to tackle some of the challenges before they manifest. By learning from cities having already gone through rapid urbanization, secondary cities can develop into more inclusive and just cities avoiding some of the mistakes and shortcomings of larger cities. For national governments, investing in secondary cities can alleviate centralization and the burden being placed on primary cities.

The SADC region is highly susceptible to the effects of extreme climate events and its cities, especially coastal ones, are increasingly vulnerable to climate change impacts such as sea level rise, cyclones and flooding. Cities generally are often more vulnerable than rural areas, not only because of their high concentrations of people and assets, but also because of their complex patterns of economic infrastructure and services. Map 2 shows a high level of overlap between the geographic distribution of human settlements in the SADC region and the areas of high exposure to natural hazards such as floods, cyclones, landslides, earthquakes and drought. When combined with a low coping capacity, this aggregation can add to vulnerability levels, thus increasing the overall disaster risk. Although the economic impact of extreme hydrometeorological events has mainly been felt in the region's urban areas, it is necessary to clarify that rural communities have also been highly affected by these events, leading to increased food insecurity which has led to reduced coping capacity of poor households and communities engaged in subsistence agricultural activities.

The SADC region has had only two favourable agricultural seasons since 2012 and many areas have yet to fully recover from the devastating impact of the 2015–2016 El Niño season.[14] In 2019, over 30 million people in 11 countries of Southern Africa faced acute food insecurity with data reporting a grave deterioration in the Democratic Republic of the Congo, Zambia and Zimbabwe. Madagascar and Mozambique were the only two countries to experience slight improvements between 2018 and 2019 although the cyclonic events in 2019 and the recent drought in Madagascar (which has been defined as the worst in 40 years affecting up to 1 million people) has reversed that situation. The requirements of food provision are changing with

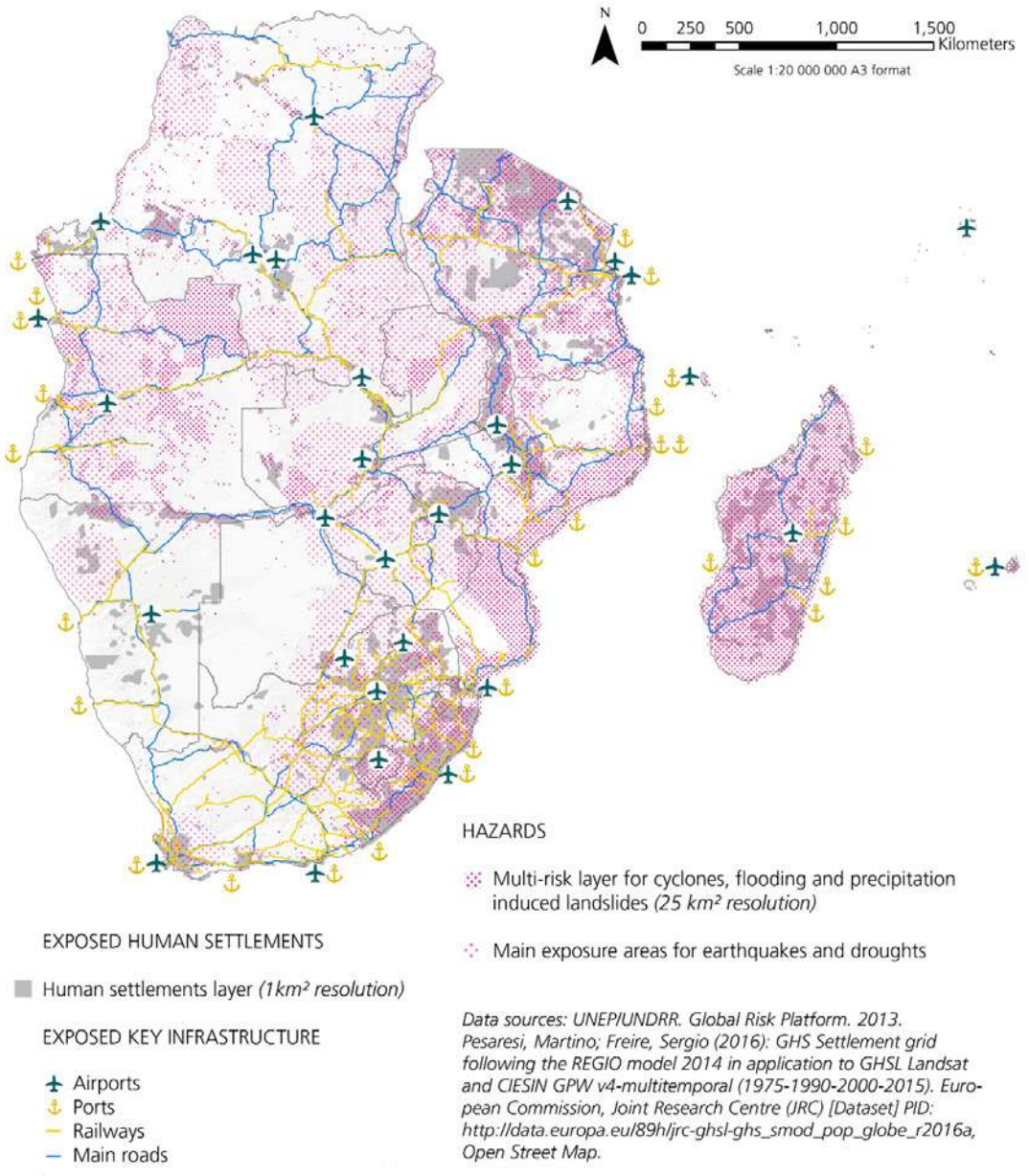
10 D Githira, S Wakibi, IK Njuguna, G Rae, S Wandera, J Ndirangu, *Analysis of Multiple Deprivations in Secondary Cities in Sub-Saharan Africa* [Internet], UNICEF and UN-Habitat, 2020 [cited 2021 Mar 31]. https://unhabitat.org/analysis-of-multiple-deprivations-in-secondary-cities-in-sub-saharan-africa

11 Projections démographiques 2019–25, Institut National de la Statistique. http://ins.mkbco.pro/Statistiques/Statistiques-D%C3%A9mographiques-et-Sociales/Publications-statistiques-d%C3%A9mographiques-et-sociales/id/46/publications-statistiques-demographiques-et-sociales

12 Statistics South Africa, Mid-year population estimates, 2019. https://www.statssa.gov.za/publications/P0302/P03022019.pdf

13 Statistics South Africa, Mid-year population estimates, 2019. https://www.statssa.gov.za/publications/P0302/P03022019.pdf

14 FAO, IFAD, UNICEF, WFP and WHO, *The State of Food Security and Nutrition in the World 2019, SOFI, 2019*



Map 2: Human settlements and exposed assets

"The SADC region is highly susceptible to the effects of extreme climate events and its cities, especially coastal ones, are increasingly vulnerable to climate change impacts such as sea level rise, cyclones and flooding.

the growing population. While agricultural production within cities is being more widely recognized, cities are still heavily reliant on food production in rural areas. For a long time food systems have been absent from urban plans but they must be included considering that nutrition is a basic human need and crucial to security.

Aggravating the impact of natural disasters are the impervious surfaces in cities where flood and runoff waters do not percolate into the soil. Furthermore, urban risks are now frequently exacerbated by the increasing unpredictability and severity of such events due to the influence of climate change affecting a range of urban sectors including water, food supply systems and health. People with low incomes, especially women and girls, youth, the elderly and persons with disabilities, tend to be particularly vulnerable and often disproportionally affected. The unfolding Coronavirus Disease 2019 (COVID-19) pandemic has once more highlighted how disasters can wreak havoc on people, cities and countries.

The high level and concentrated nature of interdependent activities in cities increases the risk of infectious diseases spreading rapidly because social distancing is often difficult in urban environments and particularly difficult to implement in marginal settlements such as urban informal areas and other at-risk high-density communities. COVID-19 has shown that broad-based access to basic services such as safe water and sanitation is essential to curbing the spreading of infectious diseases. Yet today in sub-Saharan Africa, 400 million people lack access to the minimum of basic drinking water, with the number of people lacking access to basic sanitation reported at 708 million.[15] Urban resilience is an area that requires critical attention in the Southern Africa region.

"Unemployment as a share of the total labour force is higher among females than males in all SADC countrieswith unemployment among young women particularly high in Lesotho, Namibia and South Africa.

1.3 Socio-economic overview and urban context

Although SADC Member States have very diverse economies, some of these countries are among the world's least developed nations according to key economic and social indicator rankings. The factors behind the deterioration of such indicators have also significantly contributed to increasing vulnerability in the region.

170 Million

The minimum number of people in the SADC region that survive on less than one USD per day, which is projected to grow to over 300 million by 2050.

Despite experiencing real Gross Domestic Product (GDP) growth from 1.2 to 2 per cent in 2017 and 2018, the region continues to suffer from high unemployment, weak commodity prices, chronic food and fuel shortages, fiscal strains, increasing debt and high inflation. The projected slower growth from 2019 onwards for some countries is likely to stifle social progress and poverty reduction efforts, and the COVID-19 crisis is predicted to result in further socio-economic losses to the entire region. Although the extent of the pandemic impact is yet to be determined, GDP projections show a widespread recession in the SADC region for 2020[16] (see figure 3).

Rising poverty is among the region's complex challenges and adds to increasing its vulnerabilities. Currently, more than 170 million people in the SADC region survive on less than one USD per day and this number is projected to grow to over 300 million by 2050.[17]

With an overall annual urban population growth of 4 per cent in 2019, sub-Saharan Africa is the world's fastest urbanizing region[18] which, when compared to other regions, is happening at lower levels of per capita GDP.[19] On closer analysis of SADC Member States this trend is particularly evident: countries with the highest urbanization rates – the United Republic of Tanzania, the Democratic Republic of the Congo, Madagascar, Mozambique and Malawi – have the lowest GDP per capita[20] (see figure 4).

Most of the rapid (thus difficult to manage) urban population increase in the region is constituted by poor rural migrants looking for job/income opportunities but unable to pay the "price" of formally living in the city. Although the proportion of the population living in informal settlements varies considerably among SADC Member States, much of the urban expansion in this region is unplanned and unregulated leading to challenges in serious infrastructure (roads and drainage), housing and provision of basic services.

With increased population numbers, the competition for employment becomes more and more demanding. High levels of unemployment disproportionally affects women and youth[21] as their livelihoods rely mainly on the informal economy which can neither be effectively supported, taxed nor monitored by governments, and without formal recognition people are left out of any existing social security services. In most cases, business owners do not have rights to the land they operate on and eviction is a constant threat. According to the International Labour Organization, more than 85 per cent of employment in Africa is informal.[22]

15 UNICEF/WHO, *Progress on household drinking water, sanitation and hygiene 2000–2017* [Internet], UNICEF/WHO, 2019 [cited 2021 Apr 7], p. 140. https://washdata.org
16 Data elaborated from the World Bank Open Data and International Monetary Fund, 2020, *World Economic Outlook: A Long and Difficult Ascent,* Washington, DC, October
17 African Food Security Urban Network
18 Comparison made considering the following seven geographic regions: East Asia and Pacific, Europe and Central Asia, Latin America and the Caribbean, Middle East and North Africa, North America, South Asia and Sub-Saharan Africa. Data source: The World Bank Open Data, 2019
19 SV Lall, JV Henderson and AJ Venables, *Africa's Cities: Opening Doors to the World,* World Bank, Washington, DC, 2017
20 Data elaborated from the World Bank Open Data, 2019
21 https://www.sadc.int/themes/social-human-development/employment-labour/
22 ILO, *Women and men in the informal economy: a statistical picture.* Third edition [Internet]. Vol. 28, ILO Publications. 2018 [cited 2021 Mar 30]. http://www.ilo.org/global/publications/books/WCMS_626831/lang--en/index.htm

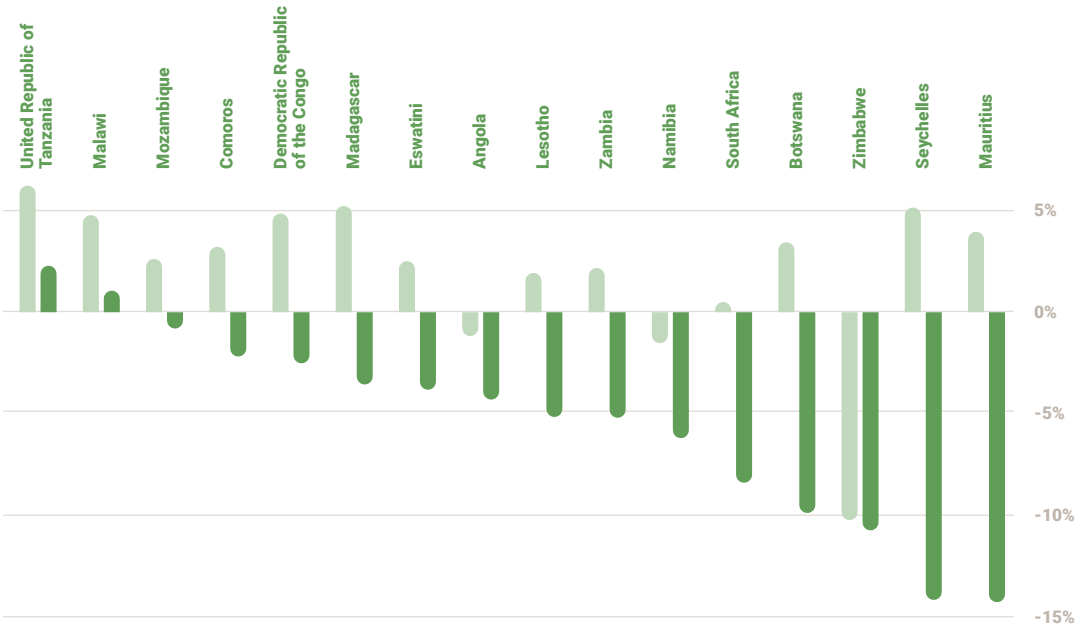


Figure 3: Comparison between the 2019 and 2020 GDP annual percentage changes in the SADC region by country

"Although SADC Member States have very diverse economies, some of these countries are among the world's least developed nations according to key economic and social indicator rankings.

Gender inequality in the labour markets and inadequate mainstreaming of gender related issues in policy formulation and programme implementation among SADC countries also remains a concern.[23]

Unemployment as a share of the total labour force is higher among females than males in all SADC countries[24] with unemployment among young women particularly high in Lesotho, Namibia and South Africa. Apart from agriculture, women are underrepresented in paid employment in all SADC countries where data is available.[25]

Urban mobility is a key aspect when it comes to job accessibility. The level of public transport varies across cities but it is often highly underdeveloped forcing people to commute by private means. In cities where transportation planning cannot keep up with the rapid urbanization, increasing distances highlights the need for private cars. However, the road network cannot sustain the growing volume of traffic causing huge congestion, especially in large cities, with the result of long commuting times. In South Africa for instance, the average journey to work takes 47 minutes.[26]

Aggravating the problem is the monocentric structure of most cities with only a few roads entering the city centre where most employment opportunities are located. Those who do not have access to a private car often use public transportation such as informal small buses to get to work. Employment is not always in the central business district. Due to a lack of horizontal transport lines, urban dwellers often end up having to commute to the centre of the city in order to change to a different line to reach their final destination, increasing the congestion in the centre as well as journey time. For the urban poor, cycling and walking are other common modes of transport, especially in areas with improper roads. In Dar es Salaam, 70 per cent of the population report cycling or walking as their primary mode of transport.[27]

23 https://www.sadc.int/themes/social-human-development/employment-labour/
24 https://www.sadc.int/about-sadc/overview/sadc-facts-figures/
25 Ibid.
26 S Stone, *Travel Times in Africa – Does the Marchetti Constant hold here and is it useful in travelling to Practopia?* 2017 [cited 2021 Mar 29]; (May). www.samsetproject.net
27 SV Lall, JV Henderson and AJ Venables, *Africa's Cities: Opening Doors to the World,* [Internet], World Bank, Washington, DC, 2017 [cited 2021 Mar 29]. https://openknowledge.worldbank.org/handle/10986/25896

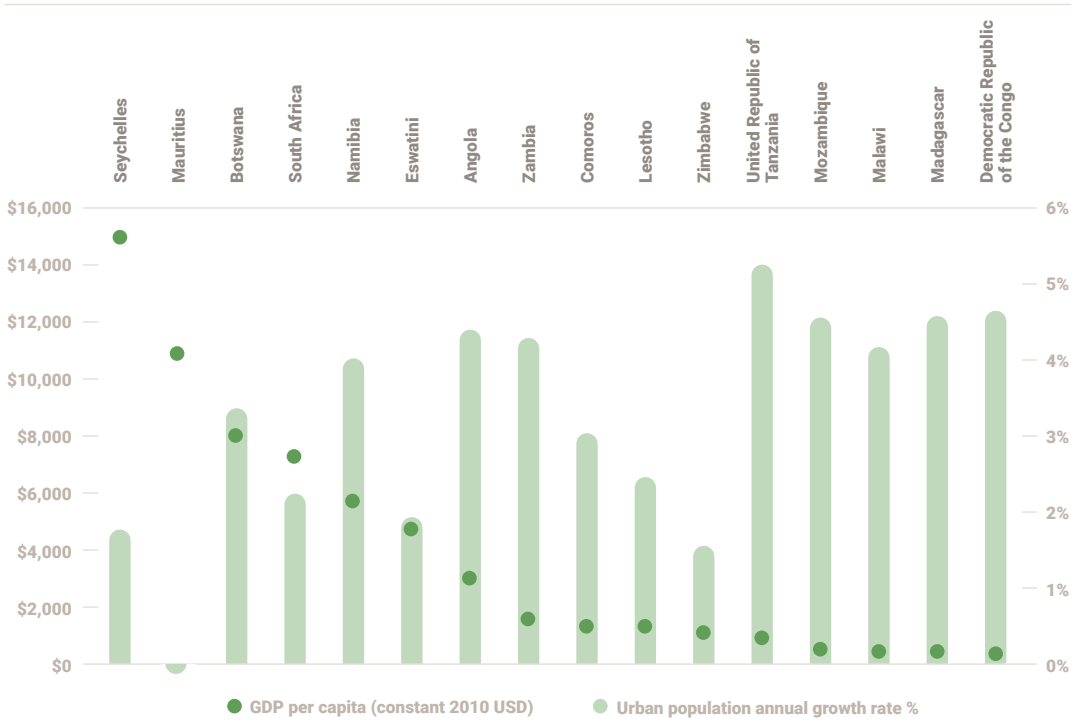


Figure 4: Comparison between population growth rate and GDP per capita in 2019 in the SADC region by country

> **The shift in urbanization trends from primary to secondary cities causes an extraordinary burden on the latter in the immediate-term since they are often not prepared or equipped to meet the needs of a rapidly increasing population.**

However, distances to the city can be large in sprawling urban areas and the infrastructure for cyclists and pedestrians is essentially absent. The favouring of automobility and lack of planning efforts for public transport continues to neglect the low-income groups contributing to widening differences in incomes, job and housing insecurity; denied access to social welfare; and consequently, overall inequality.

1.4 Chapter highlights

The analyses presented in this chapter providing an overview of urban disaster risk and vulnerability in the SADC region, illustrate the following critical points:

Firstly, there is evidence that SADC Member States are increasingly facing multiple and recurrent severe disaster risks in urban areas due to (i) the worsening effect of climate change which intensifies the impacts of hydrometeorological hazards, (ii) uncontrolled and unplanned urbanization and (iii) existing socio-economic vulnerabilities. Unfortunately, projections tend to show that this scenario is likely to worsen in the decades to come. It is important to have a good understanding of the underlying causes of the vulnerability in the SADC region in order to tackle them through better informed DRR interventions such as proper spatial planning, climate proof design and infrastructure, and resilient construction. Moreover, since high levels of coping capacity of exposed populations contributes to lowering their vulnerability, it is crucial to aim at improved governance, stronger institutions, healthier economic conditions and stronger disaster risk preparedness and emergency response in the communities. It is worth reiterating that any intervention has to take into account the differentiated needs and opportunities of megacities and secondary cities in the region which depend on several features (e.g. spatial, economic, administrative, etc.) and therefore the level of complexity of each urban settlement (more details about how natural hazards could have a different impact on cities depending on their specificities are provided in section 3.2).

Secondly, that urbanization, fuelled by natural population growth and the influx of migrants coming from rural areas or smaller urban centres looking for job/income opportunities and access to improved basic and social services, needs to be better

planned and managed to achieve urban resilience. Well-planned urbanization should be prioritized in national development agendas and framed according to proper policies and institutional set ups, which is something this report explores more deeply in the next chapters. It is evident that sprawling urban areas, especially those located in vulnerable spots, compound to increasing levels of disaster risk.

The shift in urbanization trends from primary to secondary cities, while a very positive development in the long-term, causes an extraordinary burden on the latter in the immediate-term since they are often not prepared or equipped to meet the needs of a rapidly increasing population. In such fast-growing urban systems, where proper planning is a challenge, infrastructure and basic services are quickly overloaded and, therefore, not ready to respond properly in case of hazardous events. It is necessary to differentiate the needs of secondary cities as opposed to primary cities towards resilience building. Considering the important emerging role of smaller urban centres in the SADC region and their increased vulnerability, specific solutions must be designed for these contexts. To address these needs, UN-Habitat developed the City Resilience Action Planning (CityRAP) Tool in partnership with the Technical Centre for Disaster Risk Management, Sustainability and Urban Resilience (DiMSUR), as a way to enable city administration officials and community members in small to intermediate-sized cities in developing countries to build the urban resilience of their communities.[28]

Thirdly, the chapter highlights how the socio-economic component plays a fundamental role in the complex scenario of urban disaster risk. The reduced economic capacity of individuals, informality and inequalities do not allow communities to be properly equipped to face any shocks that affect the urban system, thus increasing their vulnerability. Cities are often the places where most of the country's GDP is concentrated and where opportunities for development lie. However, urbanization does not always mean economic growth. If countries are ill-equipped to manage the rapid urban population growth rate lacking, for example, adequate planning, infrastructure and services, a city's inherent potential towards development could be severely compromised.

28 http://dimsur.org/3-cityrap-tool/

Volunteer action in solidarity with victims of a cyclone at the port of Maputo, Moçambique
© Victor Espadas Gonzalez/Shutterstock

2

Transboundary hazards and governance: sub-regional and national implications

The transboundary nature of some hazards in the region leads to many neighbouring SADC Member States being exposed to the same type of events, meaning that not only do they share the same immediate impact, but are also likely to suffer similar after-effects. Since several countries could simultaneously be in a state of emergency putting a strain on relief efforts, shared knowledge and cooperation among countries could make a significant difference when it comes to disaster risk preparedness.

The first part of this chapter will explore the coordination and collaboration implications of shared hazards across national borders, while the second half will focus on common trends and issues that can be observed at the national level across SADC countries. These two dimensions hold the key to understanding the region's governance and institutional capacities to prepare for and respond to disasters regardless of their scope of impact.

2.1 Risk analysis

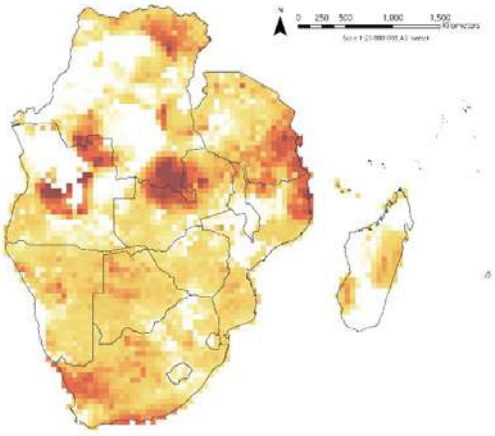
In line with global trends, natural hazards in the SADC region have been increasing in frequency and intensity over the past three decades. The entire region is affected (in descending order of exposure) by drought, floods, cyclones and earthquakes. However, these hazards are only the most extensive ones and it is worth noting that there are countries and cities in the region affected by other hazards such as sea level rise and volcanic eruptions (see more details in section 2.2 and in the country profiles in Annex 1). Disasters resulting from these hazards have a domino effect on urban systems as they have both primary impacts (infrastructure damage and loss of lives and livelihoods) locally, and also secondary ripple effects in neighbouring and distant cities and towns due to the interconnectedness of trade networks and ecosystems.

Ecosystems do not follow administrative boundaries. As shown on the maps, several of the aquifers and river basins determining major floods and droughts are transboundary. Therefore collaboration among countries is needed on ecosystem management towards mitigating hazards.

As discussed in Chapter 1, droughts predominately occur in the semi-arid and sub-humid areas of Botswana, Malawi, Mozambique, Namibia, South Africa, Zambia and Zimbabwe (see map 3). Between 1980 and 2000, the SADC region was struck by four major droughts. Map 4 identifies 15 transboundary aquifers which registered major drought events in the region.

Cyclones and tropical storms mostly affect countries along the Indian Ocean's coast, primarily Indian Ocean islands, Madagascar and Mozambique (see map 5). The areas of land affected are vast, particularly in Madagascar, but what is equally important is that cyclones threaten many coastal cities in Mozambique, and river basins stretching inland to cities in neighbouring countries such as Malawi and Zimbabwe, where they could cause flooding and subsequent landslides. Storm events often lead to severe flooding and cause acute damage and losses, particularly during the cyclone season from November to May.

Flooding occurs when water levels in a channel, lake or river rise (due to a cyclone or other meteorological phenomena) and cover nearby areas. They are



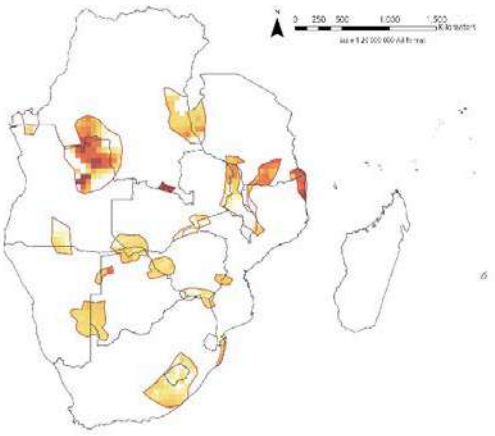
DROUGHT EVENTS FROM 1980–2020
Median of 1980s, 1990s, 2000s and 2010s decades

Palmer drought index
- -2 Moderate drought
- -3 Severe drought
- -4 Extreme drought

☐ SADC countries

Data source: Barichivich J, Osborn TJ, Harris I, van der Schrier G and Jones PD (2020) Drought [in "State of the Climate in 2019"]. Bulletin of the American Meteorological Society 101, S1-S429.

Map 3: Drought events in the SADC region



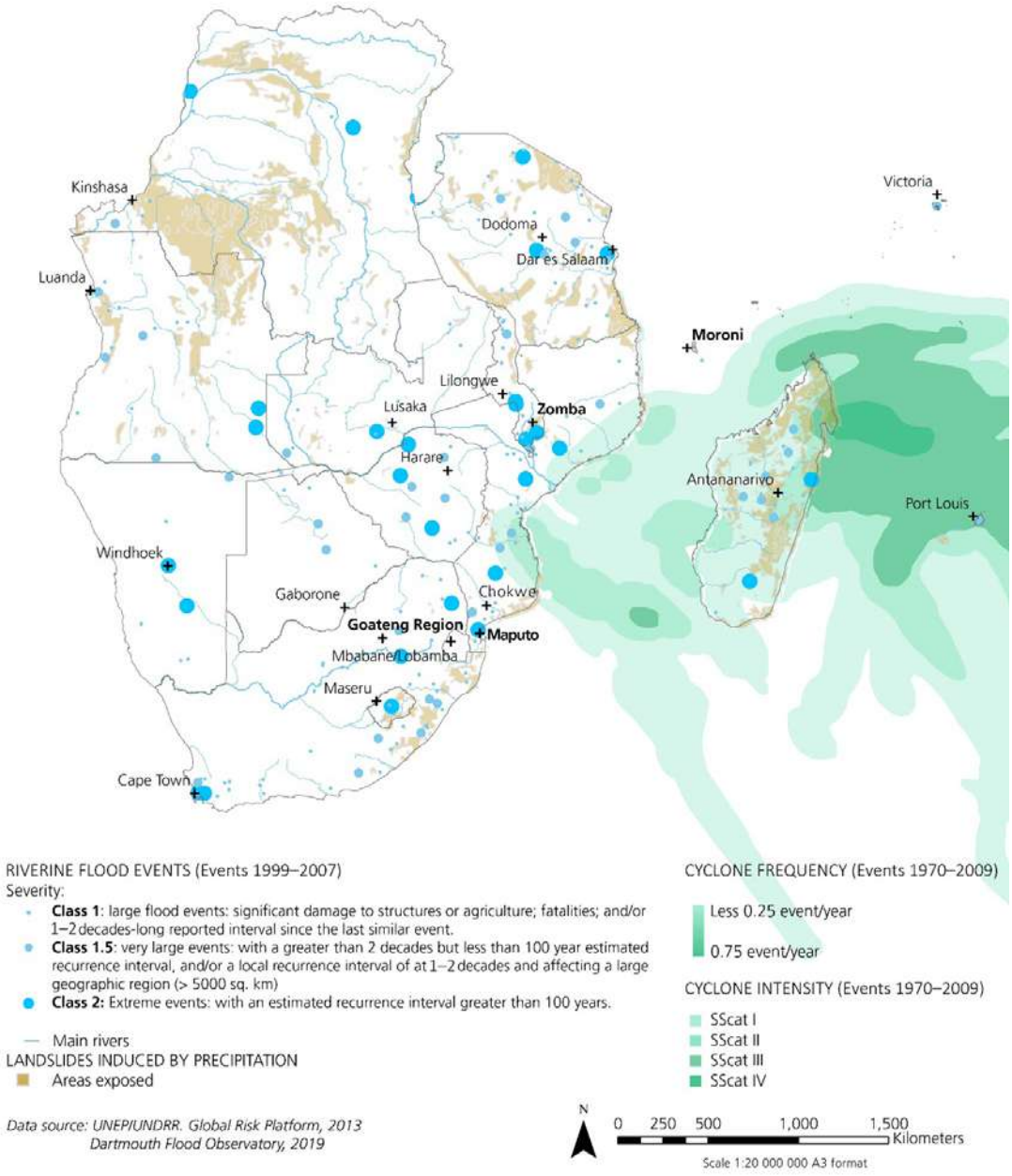
DROUGHT EVENTS FROM 1980–2020
Median of 1980s, 1990s, 2000s and 2010s decades

Palmer drought index
- -2 Moderate drought
- -3 Severe drought
- -4 Extreme drought

☐ Transboundary aquifers
☐ SADC countries

Data source: Barichivich J, Osborn TJ, Harris I, van der Schrier G and Jones PD (2020) Drought [in "State of the Climate in 2019"]. Bulletin of the American Meteorological Society 101, S1-S429.

Map 4: Drought events in transboundary aquifers

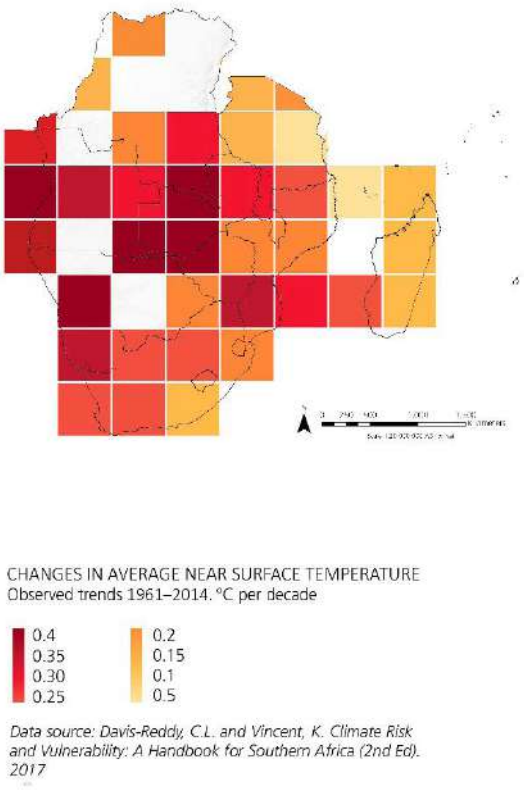


Map 5: Cyclones, floods and landslides overview: intensity and frequency

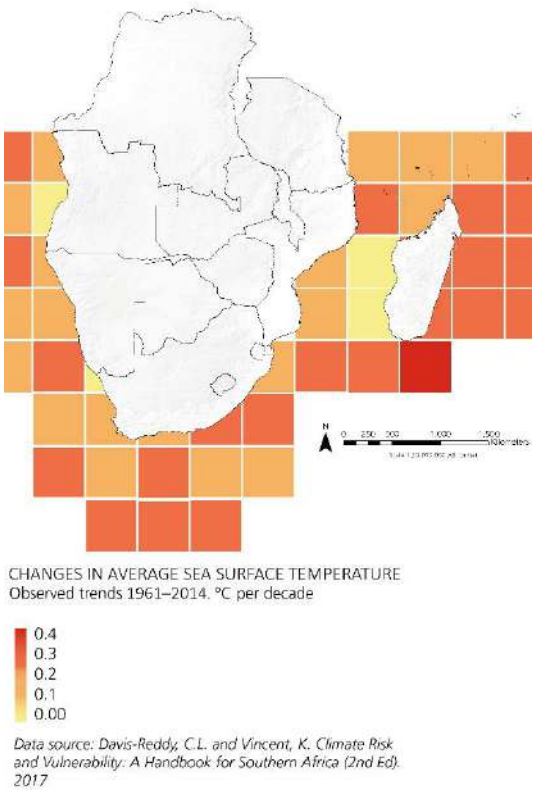
common events in the Congo, Limpopo, Okavango and Zambezi River basins, affecting cities and human settlements mainly in Angola, Botswana, the Democratic Republic of the Congo, Mozambique, Namibia, South Africa, Zambia and Zimbabwe (see map 5). To manage floods – through prevention and response – it is critical to work at the watershed level.

The East African Rift Valley, stretching from Eritrea to Mozambique, is a region of active fault lines, earthquakes and volcanic activity. Situated at the boundary of two tectonic plates, the area can be considered a unique, interlinked, earthquake-prone hotspot. There are several active volcanoes in the area and on the Indian Ocean island of the Comoros (see section 2.2).

Projections suggest that the region will experience an increase in the severity of floods, droughts and storm surges well into the 21st Century due to human activity and its impact on the climate. Data further predicts an increasing number of cyclones



Map 6: Climate change surface temperature



Map 7: Climate change sea surface temperature

in the south-western SADC region which, without reduction in vulnerability, will increase the risk of disasters in decades to come.[29] An estimated 11 per cent of the SADC region's total population live in coastal areas less than 100 m above sea level, making them exceedingly vulnerable to cyclones and floods.

The impact of climate change is not equally distributed around the world in spatial terms and the most severe impact occurs around the equator. In terms of temperature and rainfall patterns, this means that the northern part of the SADC region is within the high-impact belt. As an example, between 1950 and 2000, Namibia and Botswana experienced annual minimum temperature increases at a rate of 0.023 and 0.017 degrees Centigrade respectively.[30] The impact of rising temperatures is more severe in urban areas where the concentration of buildings and impermeable soils is higher: both the day and night air temperatures in cities are 2° to 4° Centigrade higher than in the countryside (the phenomenon known as the UHI effect). Projections indicate that Botswana, Namibia, parts of north-western South Africa and Zimbabwe are likely to experience the region's greatest warming. This is likely to result in more pests, diseases and adverse impacts on key sectors such as forestry, agriculture and health. The SADC region is today experiencing more frequent hot days and fewer extremely cold days, both of which will exacerbate existing vulnerabilities in the region.[31] Changes in average temperatures are presented in maps 6 and 7.

Another significant climate change related impact in the region is the altered rainfall pattern. Since 1950, the SADC region has experienced a downward trend in rainfall with below-normal rainfall years becoming more frequent. The 2017/18 dry spells resulted in reduced cereal harvests while inadequate

29 Lesolle, 2012
30 Ibid
31 Nhamo and others, 2019

precipitation during the 2018/19 season resulted in adverse impacts on agriculture, water resources and hydropower generation in most of the SADC region.[32] Projections for Botswana, Namibia and Zimbabwe suggest a 90 per cent probability that drought-affected areas will continue to expand. Between 2000 and 2010, agriculture, on which over 70 per cent of the SADC population depend on for food, income and employment, was the third-largest GDP contributor (an estimated 17 per cent[33]) but recurrent intense zdroughts, floods and cyclones have had major damaging impacts.

Precipitation changes do not only mean more water shortages and droughts but also more severe and concentrated rainfall. While the latter can be positive in the countryside feeding groundwater resources or other water storage facilities, the high shares of impermeable soil and often poor drainage systems in cities make them more vulnerable to flooding. According to recent projections, an increase in the frequency of extreme rainfall events is likely to affect the eastern parts of Southern Africa including Mozambique, the United Republic of Tanzania, parts of Zambia and Zimbabwe, the northeast of South Africa and the west coast of Madagascar.[34]

The increased frequency and magnitude of cyclone activity in the SADC's Indian Ocean region is a trend well expressed by recent events such as the two tropical cyclones (Idai and Kenneth) that affected the Comoros, Malawi, Mozambique and Zimbabwe. Within the same 2019 season, Cyclone Eloise caused flooding along the Limpopo River and affected Botswana, Eswatini, Madagascar, Mozambique, South Africa and Zimbabwe

Sea level rise is also increasingly becoming an important challenge for the SADC region especially for its island and coastal states: Angola, the Comoros, Madagascar, Mauritius, Mozambique, Seychelles, South Africa and the United Republic of Tanzania. In Mozambique, more than 60 per cent of the population lives within 50 km of the coast. Between 1998 and 2007, the local mean sea level rose by 2.1 mm annually and, over the past five years, it rose by around 3.8 mm annually.[35] Rising sea levels have left Seychelles in danger of losing its protective barrier reef and continued sea level rise threatens its very survival.

2.2 Hazard-related clusters of countries

Before focusing on the aspects of risk and vulnerability that are specific for each country, it is worth exploring the sub-regional level dynamics in the context of transboundary hazards. To do that, SADC Member States are presented in this section as clusters of countries experiencing the same shocks and stresses due to the transboundary nature of most of the hazards affecting the region. Four main natural hazards are considered for this purpose: earthquakes, droughts, floods and cyclones. One cluster is presented for each hazard as an example of impact from a sub-regional point of view. This approach is non-exhaustive with regards to the variety of situations that can arise from, and on how many countries could be affected by, a specific hazard. Nor it is meant to deny the complexity of disaster risk in each individual country. The aim is to highlight in a more evident way inter-country implications of shared challenges.

→ **Semi-arid drought prone areas: focus on Angola, Botswana, Eswatini, Lesotho, South Africa, Namibia, Zambia and Zimbabwe.**
Although the discussion of drought focuses on the SADC countries in the south, central and western part of the region – Angola, Botswana, Eswatini, Lesotho, South Africa, Namibia, Zambia and Zimbabwe – it is important to mention that droughts also significantly affect other countries belonging to the semi-arid region of Southern Africa such as Madagascar and Mozambique, especially in their southern parts.

With regards to the focus countries, two major recent droughts related to El Niño events should be highlighted. The first drought took place during the 2015/16 agricultural season – registered as the strongest El Niño event of the previous 50 years – particularly affecting the south-central and east-central parts of the region forcing Eswatini,

32 https://www.sardc.net/en/southern-african-news-features/normal-to-below-normal-rainfall-forecast-for-sadc-region/
33 https://www.sadc.int/about-sadc/overview/sadc-facts-figures/
34 Davis-Reddy and Vincent, 2017
35 Facknath, 2014

Figure 5: SADC semi-arid drought prone countries

Lesotho, Namibia, Zimbabwe and many provinces of South Africa to declare drought emergencies.[36] The second drought started during the 2018/19 cropping season – when many countries were still struggling because of the effects of the previous drought – mostly affecting the central and western part of the SADC region leading Angola, Botswana and Namibia (once more) to declare national drought emergencies.[37]

→ The direct impact of drought has a ripple effect in multiple ways. Water shortages affect households, industries and the agropastoral sector which often suffers from heavy crops and livestock losses. As a result, reduced staple food stocks and supply leads to an increase in food prices and to a decrease in income levels especially of agropastoral households who find themselves with reduced purchasing power. With droughts affecting multiple countries over a considerable period of time, it is not difficult to imagine that water availability, food and livelihood security are at stake for millions of people. As a result of the 2018/19 drought, approximately 10.8 million people were already reported to be facing severe food insecurity in Southern Africa as 2018 came to an end.[38]

“As Southern Africa relies substantially on hydroelectrical power sources, another considerable consequence of droughts is the interruption of electrical services. This can have transboundary effects where hydropower generation plants serve more than one country under the same rainfall patterns, as does the Kariba Dam in the Zambezi River supplying electricity to both Zambia and Zimbabwe.

Secondary consequences of droughts can be transboundary as with their direct impact. Food insecurity and water scarcity are some of the key drivers of the movement of people and livestock that can happen within the same country or can lead to inter-country migration. As an example, incidences of transboundary diseases – such as foot-and-mouth disease – were reported in 2016 as a result of the increased movement of animals looking for water and pasture[39] across the border between Angola and Namibia. In March 2021, many Angolans were reported to have illegally crossed the border with Namibia in search of food, water, medical services and employment opportunities.[40] As Southern Africa relies substantially on hydroelectrical power sources, another considerable consequence of droughts is the interruption of electrical services. This can have transboundary effects where hydropower generation plants serve more than one country under the same rainfall patterns, as does the Kariba Dam in the Zambezi River supplying electricity to both Zambia and Zimbabwe.

Even though cities may appear to be less affected by the impact of drought than by other types of natural hazards, they in fact suffer heavy consequences albeit different in nature. A drought will not cause immediate physical damage to buildings and infrastructure as an earthquake or a cyclone might, but it does put cities under a different type of stress. Food insecurity pushes people to migrate, and when it comes to rural-urban migration, one of the impacts is the increased pressure on urban systems resulting in informality and increased urban poverty. Drought also puts a heavy toll on the urban economy largely due to power shortages. The frequent power cuts faced by cities located in drought prone areas in Southern African cause major

36 FAO (2016), El Niño set to have a devastating impact on southern Africa's harvests and food security. http://www.fao.org/news/story/en/item/382932/icode/
37 SADC (2019), Synthesis Report on the State of Food and Nutrition Security and Vulnerability in Southern Africa. https://www.sadc.int/files/7315/6284/6868/SADC_2019_Synthesis_Report_on_the_State_of_Food_and_Nutrition_Security_and_Vulnerability_in_Southern_Africa.pdf
38 OCHA, (2019), Southern Africa: Humanitarian Snapshot (November–December 2018). https://reliefweb.int/report/malawi/southern-africa-humanitarian-snapshot-november-december-2018
39 FAO, (2016), Southern Africa El Niño Response Plan (2016/17). http://www.fao.org/3/i5981e/i5981e.pdf
40 IFRC, (2021), Emergency Plan of Action. Namibia: Angolans Migrants. https://reliefweb.int/sites/reliefweb.int/files/resources/MDRNA012do.pdf

disruptions to the activities of micro, small and medium businesses which are vital drivers of urban economic growth.

All of the focus countries have disaster management frameworks in place, and some of them even have quite recent and specific hazard-related legislation (e.g. Drought Recovery Framework 2018–2022 for Angola). However, even when present, such legislation generally focuses on response and emergency relief, lacking the strategies to build community preparedness and resilience to recurrent drought. This is demonstrated by a recent comparative study on the response to drought of the governments of Eswatini and Lesotho.[41]

Groundwater can play a key role in providing water security and resilience to drought while also supporting social and economic development – if it is managed in a sustainable manner. To date, many of the focus countries – for example Eswatini, South Africa and Zimbabwe – have no explicit groundwater management policy. And where legislation does exist, it is often outdated, not properly implemented or lacks measures for sustainability. In Botswana, for example, groundwater is the primary resource for domestic use although little attention is paid to conservation.[42] One notable initiative in this area at the regional level is the SADC Groundwater Management Institute. Established in 2011, it recently developed the new SADC Groundwater Management Programme 2021–2031[43] focusing on building capacity in institutions, generating and disseminating information, and promoting innovative groundwater infrastructure programmes for resilient livelihoods in Member States. This programme also takes into consideration urbanization impacts and the needs of urban centres, highlighting that more and more cities (especially coastal) rely on groundwater resources but also that more sustainable models of development are needed.

→ **Flood prone areas in the Zambezi River basin: focus on Mozambique and Zambia.**

The Zambezi River is the fourth longest river in Africa, and its basin is one of the most important in Southern Africa, however, its runoff is highly vulnerable to climate change impact. Facing the 'worst' potential effects of climate change among 11 major African river basins,[44] the Zambezi River with all its wealth as a water source also hides great dangers and potential disasters.

More than 40 million people make use of the Zambezi River, of which the basin represents the backbone of life in the region not only as a water source for domestic use and irrigation but also as an engine that supports many economic activities.

Taking a closer look at the Zambezi River, in addition to seasonal floods, cyclone-induced floods are becoming more frequent.[45] These flood events are also more and more unpredictable which causes increasing difficulties in flood forecasting and preparation, consequently generating more damage to houses, crops and livestock.

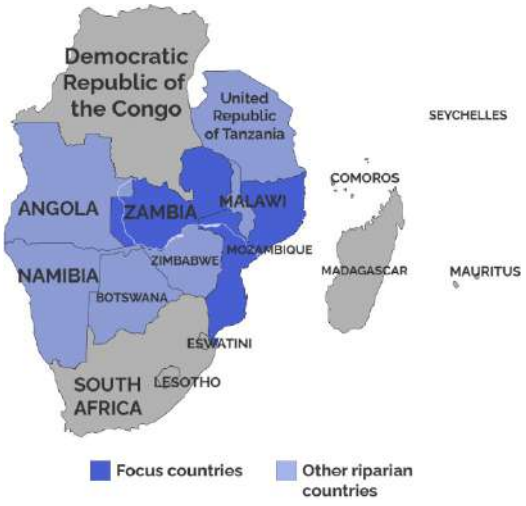


Figure 6: SADC flood prone countries in the Zambezi River basin

1992

The year in which SADC was established and when discussions among its Members States paved the way to establish the Protocol on Shared Watercourses (revised in 2000). Afterwards, the idea of establishing an intergovernmental body to regulate and govern the efforts in the basin region were revived with the establishment of the Zambezi Watercourse Commission (ZAMCOM).

41 JK Kamara, BW Sahle, KE Agho, AMN Renzaho, *Governments' Policy Response to Drought in Eswatini and Lesotho: A Systematic Review of the Characteristics, Comprehensiveness, and Quality of Existing Policies to Improve Community Resilience to Drought Hazards,* Discrete Dynamics in Nature and Society, Volume 2020, Article ID 3294614, 17 pages, 2020. https://doi.org/10.1155/2020/3294614

42 SADC GMI, (2020), *Developing a new SADC Groundwater Management Programme 2021–2031*. SADC GMI report: Bloemfontein, South Africa. https://sadc-gmi.org/wp-content/uploads/2021/03/Developing-a-new-SADC-Groundwater-Management-Programme-2021-2031_Final.pdf

43 Ibid

44 IPCC, 2001

45 STUDY C, (2004), *Zimbabwe: Flood management practices – Selected flood prone areas Zambezi Basin*

“The impact of cyclones on Southern Africa’s countries and their consequences at national and transnational scale, have shown how extreme weather events transcend borders, plunging all countries caught unprepared into disarray. In a context in which weather patterns are worsening due to climate change, overcoming national vulnerability and building resilience is necessary.

The correlation between floods and droughts is an important factor in the severity of flood events in many ways. In Zambia, for example, a semi-arid country, decisions on whether to release water from the dams in anticipation of floods is further complicated by the uncertainty of flood forecasts.[46] And not releasing the water can lead to disastrous implications. In December 2020, heavy rain resulted in the bursting of the Kandesha Dam displacing more than 500 households, leaving more than half of them with damaged houses. The floods weren’t limited to Zambia, the effect of the spillage coupled with the heavy rainfall in January 2021 displaced around 100 families in the Maganja da Costa District and 200 families in the Mocuba District along the river in Mozambique. In February 2021, in Zambia alone, the continuation of above normal rainfall led to 18 additional villages being affected with 4 villages totally submerged.[47]

As the river basin heads towards a drier future (with some exceptions in northern Zambia which have a wetter climate),[48] coupled with riverbank instability caused mainly by the sudden closure of the dam flood gates leading to the river widening,[49] the river’s stability is being threatened. In turn, this threatens the stability of the whole basin region and not only the riverside areas. The instability has a deep impact on many sectors such as energy and hydropower, irrigated agriculture, tourism, fisheries and water provision. Even though urban settlements in the basin may not always be directly affected by flood events and displacement, they are certainly vulnerable to this instability being major consumers of energy, water and food.

While the Zambezi Basin’s urban population is rather low today, future projections indicate that by 2050, it will cross the 50 per cent benchmark (except for Malawi).[50] Over 80 per cent of this population will be in only three countries (Malawi, Zambia and Zimbabwe). These high rates of urbanization pose many challenges both for the growing urban agglomerates and on the river itself.

On the one hand, urbanization has a clear impact on the quality and the quantity of available water.[51] Mining activities, solid waste and wastewater are among the biggest challenges facing the future of the water in the basin. Climate change ramifications and implications on the river’s flooding patterns also place a real threat on urban areas that are lacking adequate planning and proper services. This two-way relationship between the river and urban areas requires not only a concrete cooperative management of the river, but also effective urban governance and serious efforts to build urban resilience in areas adjacent to the river.

Since the 1940s, interventions have been dedicated to bringing together the riparian states [52] to coordinate and jointly manage the Zambezi River and its basin, yet these efforts have been hindered by the absence of any regional frameworks. In 1992 when SADC was established, discussions among SADC Members States paved the way to establish the Protocol on Shared Watercourses (revised in 2000). Afterwards, the idea of establishing an intergovernmental body to regulate and govern the efforts in the basin region were revived with the establishment of the Zambezi Watercourse Commission (ZAMCOM).

The ZAMCOM Agreement was signed in 2004 in Botswana by ministers responsible for water from seven of the eight riparian states: Zambia did not sign until 2013.[53] The primary objective of the ZAMCOM Agreement is “to promote the equitable

46 EK Madamombe, (2004), *Zimbabwe: Flood management practices – Selected flood prone areas Zambezi Basin.* Unpublished Paper, Wmo/Gwp Associated Programme on Flood Management
47 Emergency Plan of Action, Zambia: Dam Spillage in Mumbwa, 2021
48 C Fant, Y Gebretsadik, A McCluskey et al, *An uncertainty approach to assessment of climate change impacts on the Zambezi River Basin*, Climatic Change 130, pp. 35–48 (2015)
49 O Khan, E Mwelwa-Mutekenya, A Crosato and Y Zhou, (2014, November), *Effects of dam operation on downstream river morphology: the case of the middle Zambezi River,* Proceedings of the Institution of Civil Engineers-Water Management (Vol. 167, No. 10, pp. 585–600), Thomas Telford Ltd.
50 Ibid
51 P Drechsel, M Qadir and D Wichelns, (Eds.), (2015), *Wastewater: economic asset in an urbanizing world,* Springer
52 The eight riparian states that share the Zambezi River Basin are Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia and Zimbabwe
53 CK Lumosi, C Pahl-Wostl and G Scholz, (2019), *Can ‘learning spaces’ shape transboundary management processes? Evaluating emergent social learning processes in the Zambezi basin*, Environmental Science & Policy

and reasonable utilization of the water resources of the Zambezi watercourse as well as the efficient management and sustainable development thereof." In 2019, ZAMCOM endorsed the Zambezi Strategic Plan for the Zambezi Watercourse.

This model of cooperative management and development of the water resources of the basin highlights the importance of recognizing the need to work together and find cooperative solutions to the big threat of climate change, and represents a firm step towards a shared vision and more coordinated frameworks in the region for the future.

→ **Indian Ocean cyclone prone areas: focus on Madagascar, Malawi, Mozambique and Small Island Developing States**

The SADC Member States most affected by recurrent cyclones are coastal and island nations in the south-east including the south-west Indian Ocean islands, Madagascar and Mozambique.[54]

Climate change is projected to have a negative impact on both the intensity and frequency of cyclones leading to worsened predictability. In 2018–2019, for the first time ever, two cyclones of significant magnitude (Idai and Kenneth) made landfall during the same season, and intense tropical cyclones recorded new highs with 15 and 9 instances respectively in each year. At its peak in March 2019, Cyclone Idai having reached the level of an intense tropical storm, made landfall in Beira on the coast of Mozambique before moving westward and reaching the mountainous eastern area of Zimbabwe and the Southern and Central regions of Malawi.[55] Just over a month later, Cyclone Kenneth, the strongest cyclone ever to hit the African continent, made landfall on the Comoros and continued on to Mozambique leaving 374,000 people in need of emergency assistance.[56] Madagascar, Seychelles and the United Republic of Tanzania were also affected by the two cyclones.

Figure 7: SADC cyclone prone countries

Cyclone Idai primarily affected Mozambique's provinces of Inhambane, Manica, Sofala, Tete and Zambezia, causing severe flooding and large storms in the coastal city of Beira and surrounding areas, with more than 1.5 million people affected and an estimated 3,000 square km of land and 715,378 hectares of cultivated land flooded.[57] In Beira, the scale of the damage was massive and horrifying, with 90 per cent of the area reported to be completely destroyed (IFRC, 2019). Between 1990–2014, 53 per cent of nationally reported economic losses in Mozambique were due to cyclones. The combination of strong winds, intense precipitation, increased river flows and maritime over-elevation have generated, on several occasions, catastrophic consequences. The coastal areas of Mozambique and Madagascar have a long history of dealing with cyclones. Madagascar is the SADC country most affected with an average of 1.5 cyclones hitting the country annually, each one affecting around 700,000 people (OCHA, 2021) and causing 85 per cent of total annual losses mostly in the residential sector (GFDRR, 2016). The intensity with which Cyclones Idai and Kenneth affected the inland countries of Malawi and Zimbabwe was unprecedented. In

"In the United Republic of Tanzania, the hilly terrains and steep slopes of cities like Arusha, Mbeya and Mwanza are susceptible to the landslides resulting from earthquakes and tremors. In the Kagera region in 2016, for example, an earthquake measuring 5.9 on the Richter scale, felt in both the United Republic of Tanzania and Uganda, caused damage to buildings which led to homelessness and acute food insecurity.

54 AF Mavume, L Rydberg, M Rouault and JRE Lutjeharms, *Climatology and Landfall of Tropical Cyclones in the South-West Indian Ocean*, Western Indian Ocean Journal of Marine Science, 2010 Jul 16;8(1)

55 *After the storm: one year on from Cyclone Idai*, Oxfam International [Internet], [cited 2021 Apr 29]. https://www.oxfam.org/en/after-storm-one-year-cyclone-idai

56 OCHA, *Cyclones Idai and Kenneth,* OCHA [Internet]. OCHA, 2019 [cited 2021 Apr 29]. https://www.unocha.org/southern-and-eastern-africa-rosea/cyclones-idai-and-kenneth

57 Mozambique Cyclone Idai: Post Disaster Needs Assessment. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_704473.pdf

Zimbabwe, the cyclones affected 270,000 people (OXFAM, 2019), while in Malawi the cyclones and associated floods affected over 975,600 people (5.4 per cent of the population) especially in the frontier regions of the Lower Shire Valley.[58] Almost 94 per cent of households in the Nsanje district were affected by heavy rains and floods, and experienced agriculture damage and resulting bad harvest contributing to a higher incidence of food insecurity post flooding.[59]

Aggravating the vulnerability in coastal and island nations is the fact that most urban centres, and therefore population and assets, are located on the coasts where they are increasingly exposed to cyclones and their related impact. In Madagascar, some of the most rapidly growing cities such as Taolagnaro and Toamasina (see map 19 in Annex 1) are located on the eastern coast. Combined with poor urban management and a lack of building regulation urban settlements, especially the informal ones, are highly susceptible to the impact of cyclones and resulting floods. According to the National Strategy for Disaster Management of Madagascar, some infrastructure was not designed to withstand recurring natural disasters. This situation is not only the result of extreme conditions but also of non-compliance with construction standards, particularly anticyclonic ones (SNGRC, 2014).

“The impact of climate change is not as clear for earthquakes and volcanic eruptions as it is for other natural hazards. Since both events are occurring in the crust of the earth, changing weather patterns or climatic conditions are not affecting these phenomena to the same intensity as with, for example, tropical cyclones and droughts.

In April 2019, prior to hitting Mozambique again between the northern provinces of Cabo Delgado and Nampula, [60] Cyclone Kenneth made landfall over Grande Comore Island in the Comoros producing torrential rains and strong winds, and generating heavy flooding.[61] Post-Kenneth, sectoral recovery interventions identified were agriculture, emergency shelter, water/hygiene/sanitation, education and health, and energy and infrastructure sectors (OCHA, 2020). Together with the Comoros, other Small Island Developing States (SIDS) are located among the most vulnerable regions in the world in relation to the intensity and frequency of natural hazards. Due to their unique characteristics such as their small size, remoteness, narrow resource and export bases, exposure to global environmental challenges and external economic shocks,[62] SIDS are particularly exposed to high levels of disaster risk which are exacerbated by climate change. Sea level rise and associated flooding together with increasing cyclonic activity are the main risks for SIDS.

The impact of cyclones on Southern Africa’s countries and their consequences at national and transnational scale, have shown how extreme weather events transcend borders, plunging all countries caught unprepared into disarray. In a context in which weather patterns are worsening due to climate change, overcoming national vulnerability and building resilience is necessary. When it comes to cyclones, preparedness and response in individual countries varies quite significantly, and coordinated and joint efforts between countries are still weak. A successful regional interaction is DiMSUR, the platform developed to deliver cooperative actions on DRR, CCA and urban resilience in Madagascar, Malawi, Mozambique and the Comoros. The Tropical Cyclones Centre La Réunion (RSMC) also has regional capabilities. Although not a part of the SADC framework, the forecasting reports provided by the centre are vital in identifying the development of cyclones such as Idai and Kenneth. Good practices already exist on which to build and expand, and there is clearly ample room for further collaboration and knowledge sharing.

→ **Seismic and volcanic zone of the Great Rift Valley: focus on the Democratic Republic of the Congo and the United Republic of Tanzania**

`In the SADC region, the active seismic and volcanic zone is located in the Great Rift Valley characterized by the Great Lakes formed by the diverging tectonic zone. Countries through which

58 *The Impact of Cyclone Idai on the poorest,* Concern Worldwide, July 2020. https://admin.concern.net/sites/default/files/documents/2020-08/The%20impact%20of%20Cyclone%20Idai%20Final.pdf?_gl=1*5fsi5*_ga*MTc4NDc4NjY1OS4xNjIwNzY4NDc3*_ga_RLZ9XCKFP1*MTYyMDkwMDY4Ni4yLjEuMTYyMDkwMDcwMy40Mw

59 Concern’s Graduation Programme in Malawi (2017–2021), Report on the Effects of Cyclone Idai. https://admin.concern.net/sites/default/files/documents/2020-08/GaMEBaseline2FloodReport.pdf?_gl=1*ikbfmr*_ga*MTc4NDc4NjY1OS4xNjIwNzY4NDc3*_ga_RLZ9XCKFP1*MTYyMDkwMDY4Ni4yLjEuMTYyMDkwMDcwMy40Mw

60 *Mozambique Cyclone Idai: Post Disaster Needs Assessment.* https://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_704473.pdf

61 USAID, 2019. https://www.usaid.gov/cyclone-idai/fy19/fs10

62 The Future We Want, United Nations Conference on Sustainable Development, Rio+20 June 2012, Rio de Janeiro, Brazil, p. 178. https://sustainabledevelopment.un.org/content/documents/733FutureWeWant.pdf)

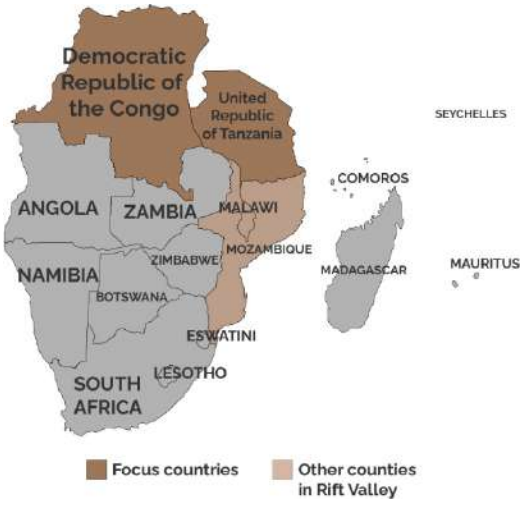


Figure 8: SADC seismic and volcanic countries of the Great Rift Valley

the Rift Valley passes include the Democratic Republic of the Congo, Malawi, Mozambique and the United Republic of Tanzania. Furthermore, besides Mount Karthala in the Comoros, all active volcanoes of the SADC region can be found in the Democratic Republic of the Congo and the United Republic of Tanzania. These two northernmost continental countries of the SADC region have a few geographic and socio-economic traits in common and share similar hazard vulnerabilities. Located roughly on the same latitude, they both sit in the tropical climate zone. The two countries cover the whole continent from east to west, sharing a border at Lake Tanganyika. Being on opposite sides of the continent and two of the largest countries by land area, there are some climatic and vegetative variations, however.

The Rift Valley is notorious for its active seismic and volcanic activity, which places cities in its proximity under serious and quite particular threats. The Goma region of the Democratic Republic of the Congo is particularly vulnerable with its two active volcanoes, Nyamulagira and Nyiragongo, threatening urban and rural populations. Nearby cities like Bukavu and Goma have been affected in the past, most recently in May 2021 when lava flowed from Mount Nyiragongo destroying around 500 houses, causing the loss of lives and livelihoods and displacing hundreds of already vulnerable people. The 2002 eruption of the Nyiragongo resulted in the displacement of 400,000 people in Goma.[63] The risk of cities being destroyed by eruptions and earthquakes remains high with much of the infrastructure unable to withstand potential shocks. Scarce data also makes vulnerability assessments difficult.

In the United Republic of Tanzania, the hilly terrains and steep slopes of cities like Arusha, Mbeya and Mwanza are susceptible to the landslides resulting from earthquakes and tremors. In the Kagera region in 2016, for example, an earthquake measuring 5.9 on the Richter scale, felt in both the United Republic of Tanzania and Uganda, caused damage to buildings which led to homelessness and acute food insecurity.[64] And in 2005, a 6.8 magnitude earthquake was felt at Lake Tanganyika right on the border of the two countries.[65] In addition to damage caused by tremors, cities on the coasts of the larger lakes, such as Kigoma in the United Republic of Tanzania and Uvira in the Democratic Republic of the Congo may be affected by consequent flooding from water level rise. The risk of a tsunami forming in one of the Great Lakes is not as acute as it would be in a convergent zone – the Great Rift Valley being a divergent zone – but it cannot be ruled out.

Both the Democratic Republic of the Congo and the United Republic of Tanzania have developed disaster management plans: Plan d'Organisation de Secours en Cas de Catastrophe (ORSEC), 2012[66] and the Disaster Management Act, 2015[67] respectively. The two documents address different elements of DRM as targets of action such as prevention, mitigation, preparedness, response and recovery for a multitude of different hazards. Both plans specifically mention seismic and volcanic activity as prominent hazards for each country.

> **"SADC Member States are affected by multiple natural hazards depending on geophysical, hydrological, climatological, meteorological and biological factors. Malawi, for example, which lies along the Great Rift Valley, falls almost entirely in the Zambezi River basin and is in the path (at least with its southern part) of cyclones generating in the Indian Ocean, is one of the countries experiencing multiple extreme natural events.**

63 S Loughlin, C Vye-Brown, R Sparks, S Brown, *Global volcanic hazards and risk: Summary background paper for the UN-ISDR Global Assessment Report on Disaster Risk Reduction 2015* [Internet], 2014 [cited 2021 Apr 28].
64 Tanzania: Earthquake – Sept 2016, ReliefWeb [Internet], [cited 2021 Apr 28]. https://reliefweb.int/disaster/eq-2016-000098-tza
65 East Africa: Earthquake – Dec 2005, ReliefWeb [Internet], [cited 2021 Apr 28]. https://reliefweb.int/disaster/eq-2005-000203-tza
66 République Démocratique du Congo, Gouvernement de la Republique, *Plan ORSEC*, OCHA, Croix-Rouge de la Rep. Dem. Du Congo, Fédération Internationale des Sociétés de la Croix-Rouge et du Croissant-Rouge, PDUD, 2012
67 *Tanzania: The Disaster Management Act, 2015 – Policy, Plans & Statements*, PreventionWeb.net [Internet], [cited 2021 Apr 28]. https://www.preventionweb.net/publication/tanzania-disaster-management-act-2015

The ORSEC plan includes an assessment of the response capacity toward a volcanic eruption and identifies the Goma Volcano Observatory, the Luiro Research Centre along with other authorities and scientists as the observing bodies for volcanic activity, however, neither plan goes into detail on any specific actions or measures taken in regard to seismic and volcanic hazards. Other types of DRR initiatives are present in countries such as the Democratic Republic of the Congo where, as part of an International Union for Conservation of Nature (IUCN) implemented Resilience through Investing in Ecosystems-knowledge, innovation and transformation of risk management project, a contingency plan was created for the possible eruption of the Nyiragongo volcano.[68]

“ In many SADC countries, governments and humanitarian actors are most experienced in disaster preparedness and response in rural areas as most developing countries had a predominantly rural population in the past. This has translated in the allocation of more financial and human resources for climate and disaster resilience to rural areas as compared to urban areas.

The active seismic zone along the borders of the Democratic Republic of the Congo and the United Republic of Tanzania, as well as the geographical extent of earthquakes makes them a truly transboundary hazard. While volcanic activity is more location specific, the side effects may cross borders as was the case in 2002 and again in 2021 when the majority of the displaced persons in the Democratic Republic of the Congo were forced to flee to Rwanda. Currently, collaborative efforts are absent although two United Republic of Tanzania institutions of higher education have programmes on disaster management and are part of PeriPeri U, a partnership of African universities that span the continent and are committed to building local disaster risk related capacity. The United Republic of Tanzania, being a part of the East African Community (EAC), has some cooperation within the EAC but not on seismic and volcanic hazards. Similarly, the Democratic Republic of the Congo coordinates to some extent with other central African countries. Considering the uniqueness of the area and the sharing of these particular risks, the two countries (along with other SADC countries in the Great Rift Valley) are in a position where collaboration in DRM and learning from one another should be encouraged and could prove highly beneficial.

The impact of climate change is not as clear for earthquakes and volcanic eruptions as it is for other natural hazards. Since both events are occurring in the crust of the earth, changing weather patterns or climatic conditions are not affecting these phenomena to the same intensity as with, for example, tropical cyclones and droughts. However, some correlation has been detected such as melting glaciers at the top of volcanoes reducing the pressure needed for the volcano to erupt or rising sea levels and the changing pressure of large masses of water on fault lines triggering earthquakes.

2.3 Zooming in – a look at governance mechanisms

The previous section explored transboundary hazards affecting multiple SADC Member States simultaneously and how bilateral, multilateral and regional coordination can better prepare all affected countries. This section focuses on the national level to examine the challenges facing the governments of these countries in tackling multiple hazards domestically, which will also impact on their ability to contribute to joint, sub-regional and regional efforts. Understanding common challenges and opportunities in terms of governance and institutional capacities on DRR and CCA in SADC Member States helps to shed light on the region’s overall strengths and weaknesses in preparing for and tacking the myriad of implications of increasing climate change effects and disasters.

SADC Member States are affected by multiple natural hazards depending on geophysical, hydrological, climatological, meteorological and biological factors. Malawi, for example, which lies along the Great Rift Valley, falls almost entirely in the Zambezi River basin and is in the path (at least with its southern part) of cyclones generating in the Indian Ocean, is one of the countries experiencing multiple extreme natural events. To define the vulnerability of a country it is necessary to contextualize the factors determining their exposure against a background of socio-economic aspects, coping capacities and disaster risk governance among others. It is necessary to understand the different dynamics happening in the rural and the urban contexts and how they can influence each other. In Annex 1, single dashboards for each SADC Member State are used to present key

68 J McBreen, *Regional Assessment on Ecosystem-based Disaster Risk Reduction and Biodiversity in South America. A report for the Resilience through Investing in Ecosystems – knowledge, innovation and transformation of risk management (RELIEF Kit) project,* International, Iucn, 2016;i + p. 79

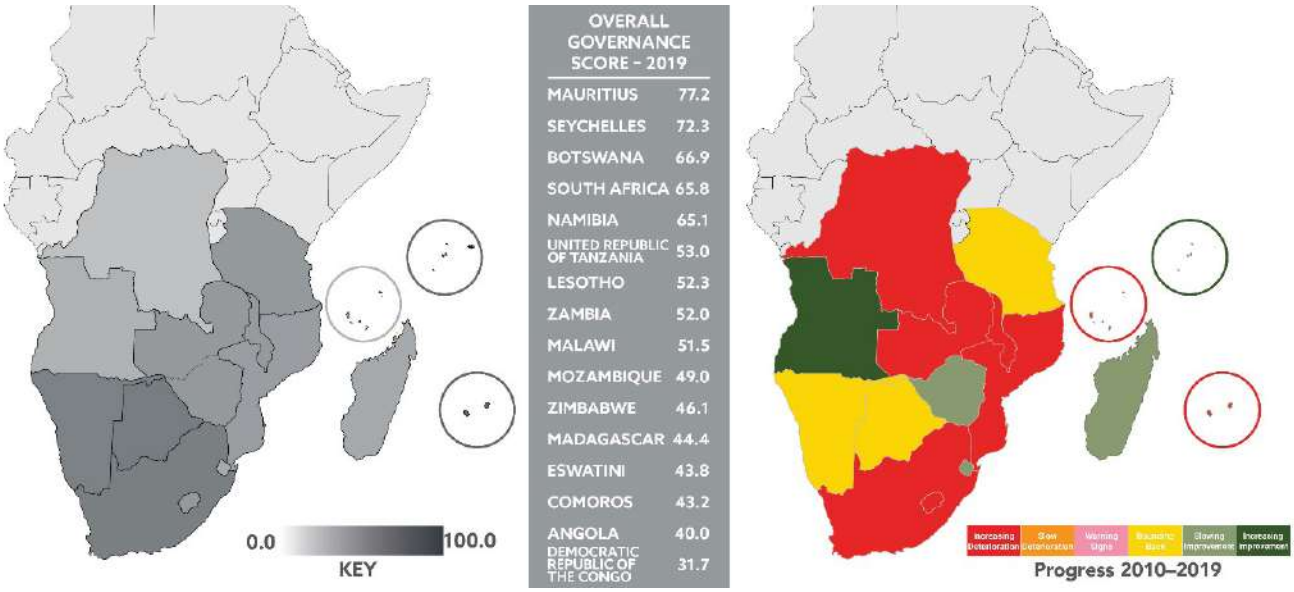


Figure 9: Governance status in SADC 2019 – IIAG

data such as distribution of population in the country, access to urban basic services, main hazards, and urbanization dynamics using graphs and maps. To gather information about these topics, besides the classic desk and literature review, a questionnaire was drafted for the purpose and shared with national DRM officials in each one of the 16 SADC Member States. The questionnaires were completed directly or through virtual interviews.

Improved governance, as highlighted in Chapter 1, is a vital element in increasing coping capacities and hence decreasing the vulnerability of exposed populations. However, governments of SADC countries are still suffering substantial gaps between their global/regional commitments and national needs on the one hand and their capacities on the other. According to the latest edition of the Ibrahim Index of African Governance,[69] the SADC region in general scores a humble 53 per cent, slightly higher than the African average of 49 per cent. Looking at figure 9, we can get a sense of how much the SADC Member States are evolving in terms of governance in general. While there has been a good improvement in some countries in the past 10 years (Seychelles +7.8 per cent, Zimbabwe +7.4 per cent), other countries have been struggling (the Comoros – 2.6 per cent, the Democratic Republic of the Congo – 2.8 per cent).

Despite many countries commitment to governance reforms, their efforts are fragmented or limited to certain sectors in most cases. Many SADC countries, for example, are rich in natural resources that, when combined with inadequate governance, have resulted in unsustainable growth or development. As a result, many governments have focused almost entirely on resource governance reform, ignoring other areas.[70]

In terms of urban disaster risk, most of the governments of SADC Member States have low capacity to deal efficiently with natural hazards[71] which significantly increases the vulnerability of their countries. With the continuous increase in losses, damage and exposure to natural hazards coupled with higher levels of vulnerability to climate change implications in most cities, the disaster risk probability is often very high. Thus, risk governance in particular is quite essential and requires consideration of the legal, institutional, social and economic contexts.[72]

> **"SADC Member States have already taken a number of necessary and bold initiatives on governance to support and advance sustainable growth and development in the region such as the resource governance reforms in Botswana, open government and anti-corruption reforms in Seychelles and other broader institutional reforms in South Africa.**

69 The Ibrahim Index of African Governance, 2019. https://iiag.online/data.html?meas=GOVERNANCE&loc=g4&view=map#
70 J Schoeberlein, (2020), *National strategies for advancing good governance in Africa*, Transparency International
71 D Van Niekerk and C Coetzee, (2012), *African experiences in community-based disaster risk reduction*, Emerald Group Publishing Limited
72 O Renn, (2017), Risk governance: coping with uncertainty in a complex world, Routledge

The shift from focusing on humanitarian response in urban context to resilience in SADC countries has proved to be particularly complex. This is because response is still not managed on the basis of a clear understanding of how disasters and crises impact on urban dynamics/challenges and existing vulnerabilities, and on a clear assessment on how, if properly managed, urbanization dynamics might represent an opportunity for more effective preparedness and responses (e.g. as mentioned in Chapter 1, investing more in secondary cities leveraging their fastest urbanization rates in order to discourage the movement towards the already overcrowded primary and megacities on the one hand, and enhancing capacities and resources of smaller cities on the other). Humanitarian response is not yet strongly linked with recovery plans and long-term resilience (a building back better approach). There is a lack of integrated humanitarian-development response which is crucial for humanitarian exit strategies, especially in urban contexts. Strategic approaches linking humanitarian response such as long-term resilience and development, would act as a crisis modifier in SADC countries.

“In general, although the African continent has seen considerable innovation in recent years in new contingent mechanisms to cover disaster-related losses, only a very small fraction of countries are effectively using risk-retention and risk-transfer mechanisms as part of a national disaster risk financing strategy in order to mitigate the fiscal impacts of disasters.

SADC Member States have already taken a number of necessary and bold initiatives on governance to support and advance sustainable growth and development in the region such as the resource governance reforms in Botswana, open government and anti-corruption reforms in Seychelles and other broader institutional reforms in South Africa.[73] But these initiatives are still constrained by some critical challenges that need to be tackled to enhance the prospects of governance and to attain development objectives. Most notable opportunities for growth and improvement in terms of urban governance are in the following areas:

(i) Technical capacities on urban resilience

One of the main factors in the high vulnerability of SADC countries to natural hazards – besides the geographical location and the different political, social and military instabilities – is the relatively low capacity of governance and technical expertise. This vulnerability coupled with a low commitment towards climate change and DRM issues (as reflected in budgets and national development instruments) makes these countries more prone to natural disasters and climate change implications.[74]

In many SADC countries, governments and humanitarian actors are most experienced in disaster preparedness and response in rural areas as most developing countries had a predominantly rural population in the past. This has translated in the allocation of more financial and human resources for climate and disaster resilience to rural areas as compared to urban areas. In Malawi, for instance, following a lengthy devolution process, resources have now been included in the national budget for DRM, and DRM personnel have been recruited and deployed to local authorities. However, the personnel and funds have only been made available to rural districts leaving out cities, municipalities and towns. The medium- and long-term aspects of disaster management in urban areas have not been given significant attention by governments that have focused mostly on emergency response, leaving gaps in knowledge, experience and coordination. In recent years, while more and more attention has been paid to urban disasters and related interventions, there still remains a need for the integration of such actions with broader regional disaster management programmes and frameworks.

The majority of policy, guidelines and other regulatory instruments on DRM or related areas in the countries also tends to be skewed towards rural areas. There is, therefore, an urgent need to revise these so that they should also include and promote urban vulnerability and resilience. Additionally, as cities are on the front-line of climate change, city networks are an increasingly important element in supporting and advancing city-to-city learning. Aside from contributing to capacity building, this coordination between cities helps them to keep pace and cope better with the rapid changes. Several networks have been established in many SADC countries (see table 2 and figure 16).

(ii) Vertical coordination

Regardless of global or regional level DRM frameworks such as the Sendai framework or the SADC *Gender-Responsive Disaster Risk Reduction*

73 J Schoeberlein, (2020), *National strategies for advancing good governance in Africa*, Transparency International

74 Mukute, Mutizwa and Tafadzwa, Marange and Chris, Masara and Lotz-Sisitka, Heila and Pesanayi, Tichaona and Bal, Aydin, (2012), *SADC Future Capacity Building, Capacity assessment for environmental policy implementation*

People wait in line at a medical tent in the aftermath of a cyclone, Mozambique © Shutterstock/Charl W Folscher

Strategic Plan & Action Plan 2020–2030 being in place to guide DRM, coherent domestication is lacking in most SADC countries. Moreover, the same is evident in coordination between national and local levels within each country. For an urban area, local government is in the best position to promote preparedness and response efforts, establish necessary communication channels, mobilize and train first responders and communities, and execute resilience building interventions. However, linkages between local and national levels are often lacking in SADC countries with needs and systems identified at the local level not being reflected in national policies and frameworks. In turn these national initiatives are not properly trickling down to and being fully implemented by city municipalities. Talanoa Dialogue conducted in South Africa by Local Governments for Sustainability (ICLEI) in 2018, for example, revealed that urban local governments provided limited input to the development of the country's Nationally Determined Contributions (NDC) and had no knowledge of the text included in the NDC.[75]

Local governments also play an essential role in enforcing national legislation and regulations such as building codes which are elemental to building resilience. Non-compliance by the general public to follow such regulations weakens the effectiveness of national strategies. In the aftermath of a tropical storm in Seychelles in 2013, for example, a World Bank damage and loss assessment revealed that much of the impact could have been reduced with better enforcement of regulations on construction and land use planning.[76]

Hampering vertical coordination is the centralized nature of DRM where the responsibility is placed at the national level. Usually consolidated institutionally in National Disaster Risk Management Centres –

"Gender integration in the design, planning and implementation of national and local policies and interventions guarantees a much higher level of community resilience. And disruptions in sharing early warning information between administrative levels and with the local communities when needed may cause avoidable negative impacts.

75 ICLEI (2018), *Talanoa Dialogues in Africa*. https://africa.iclei.org/wp-content/uploads/2020/03/2018_Fractal_Talanoa-dialogue-booklet_English.pdf

76 *Seychelles Damage, Loss and Needs Assessment (DaLA), 2013 floods: a report by the Government of Seychelles* (English), Washington, DC, World Bank Group. http://documents.worldbank.org/curated/en/689161468106741988/Seychelles-Damage-Loss-and-Needs-Assessment-DaLA-2013-floods-a-report-by-the-Government-of-Seychelles

which are often located within the executive branch of the government – they generally seem to have small budgets and limited human resources given their important function and cross-cutting nature. Most countries have disaster management plans at the national level but DRR is often not streamlined into local development plans or local disaster management plans are not aligned with national plans. Many SADC countries are making efforts to decentralize their DRR governance structure. The Disaster Risk Management for Resilience Programme in Malawi, for example, aims to strengthen sub-national level coordination and devolve and institutionalize DRM to local urban authorities in addition to fiscal decentralization (UNDP, 2019).

Finally, the lack of coordination between national and local levels of governance also has a significant effect on disaster risk as it relates to the management of basic services. As is evident from the city case studies in Chapter 3, in most urban areas of SADC weak infrastructure and basic service delivery, especially in unplanned and informal areas, is a major impediment to building resilience which can only be properly addressed through coordination between national and local institutions.

“ Obtaining quality statistical data is not a new challenge to sub-Saharan Africa, it has been hampered historically by factors such as conflict, instability, financing and even political will in some cases.

(iii) Community involvement

Another challenge of consultation and coordination within countries is the lack of involvement of communities, experts and technicians other than public officials. For any strategy to be effective it requires ownership and local dialogue between all stakeholders involved including representatives of the marginalized. Urban resilience building is most effective when it integrates mechanisms for improving the coping capacity of local populations which can be institutionalized and organized at both national and local levels. It is of critical importance that vulnerable groups such as women, children and youth, the elderly, migrants, ethnic minorities and persons with disabilities are actively involved in resilience building and disaster preparedness at all levels, and that their needs and aspirations are taken into consideration. An assessment conducted by HelpAge following Cyclone Idai in 2019 in Malawi, Mozambique and Zimbabwe, for example, revealed limited engagement of older persons in planning and implementation of preparedness and response interventions.[77]

Gender integration in the design, planning and implementation of national and local policies and interventions guarantees a much higher level of community resilience. And disruptions in sharing early warning information between administrative levels and with the local communities when needed may cause avoidable negative impacts.

(iv) Financing

An overarching challenge for the SADC Member States has to do with financing DRM. Some national strategies include the establishment of specific DRM funds, but more often than not the emphasis is on relief, response and recovery instead of mitigation and preparedness. On the legislative front, Botswana, Eswatini, Malawi, Namibia, Zambia and the United Republic of Tanzania have specified setting up a DRM fund in their legislation; however, operationalization of such a fund has remained a challenge across the region. Without linking policies to local level preparedness programmes this situation will continue to exist. Moreover, the existing funds are centralized at the national level causing delays in mobilization to district or local levels. Most local governments lack the capacity to mobilize finances by themselves and any existing microfinancing schemes are usually directed to small businesses.

Another avenue for obtaining funds is through private investment. The challenge here is that it is often only possible after investments to infrastructure and business environment by the municipality. Currently, a big portion of financing has been the responsibility of external humanitarian and development funds often through an intergovernmental agency. Besides the risk transfer mechanisms that countries have adopted such as the Africa Risk Capacity (ARC), Member States are also exploring alternative risk transfer and risk sharing mechanisms to manage disaster risks. In October 2019, the SADC Secretariat signed a three-year memorandum of understanding with ARC which will broaden disaster risk financing and be integrated into policy frameworks in the

77 HelpAge, (2019), *Rapid needs assessment of older people. Cyclone Idai, Sofala Province, Mozambique*: https://www.helpage.org/silo/files/rapid-needs-assessment-of-older-people-cyclone-idai-sofala-province.pdf *Zimbabwe:* https://www.humanitarianlibrary.org/sites/default/files/2019/12/RNA-OP_Zimbabwe%20April%202019.pdf

Malawi: https://www.humanitarianlibrary.org/sites/default/files/2019/12/RNA-OP_Malawi%20Final.pdf

region. A number of countries (Eswatini, Lesotho, Madagascar, Malawi, Mozambique, Namibia, Zambia and Zimbabwe), working with partners such as the World Food Programme and the Red Cross have adopted forecast-based financing to promote early action and safeguard against losses from disasters, while other countries are exploring various index-based insurance mechanisms.

Mozambique created a disaster management fund in 2017 which became operational in 2019, receiving approximately 0.1 per cent of the state budget with a sovereign risk transfer mechanism in place. Malawi developed a National Disaster Risk Financing Strategy in 2019 and included the creation of a DRM fund as a cornerstone of their Disaster Risk Management Bill.

Several Member States have been supported by the World Bank to strengthen their disaster risk financing mechanisms, including a USD 21 million grant to Malawi that will, in part, fund the design of a parametric insurance instrument that will provide protection against more severe disaster events.[78] SADC Member States such as Madagascar and Zimbabwe are participating in the flagship programme on disaster risk financing (Africa Disaster Risks Financing Programme), funded by the Africa Development Bank to strengthen their DRM and financing capacity, including adoption of risk insurance mechanisms.

In general, although the African continent has seen considerable innovation in recent years in new contingent mechanisms to cover disaster-related losses, only a very small fraction of countries are effectively using risk-retention and risk-transfer mechanisms as part of a national disaster risk financing strategy in order to mitigate the fiscal impacts of disasters. Only 7 (Comoros, Lesotho, Madagascar, Malawi, Mozambique, Zambia and Zimbabwe) of the 16 Member States are members of ARC, and of these, only Madagascar and Zimbabwe were part of the 2019/20 risk pool. Furthermore, where these mechanisms are in place, they are only covering a portion of the contingent liabilities resulting from the materialization of natural hazards as disasters. Without a comprehensive strategy for disaster risk financing, countries may find themselves in a position of severe shortfall in the event of a disaster.

A transition to fiscal consolidation is an important factor towards improving the debt sustainability of a country. Building overall resilience can contribute to protecting social and economic gains against future external shocks including those triggered by adverse natural phenomena. Supporting countries to be better financially prepared to respond to context specific shocks is a new yet rapidly expanding area of interest and research. In this regard the World Bank Group has been promoting risk financing approaches embedded in broader sovereign risk management strategies. Countries would not be only embracing tools and instruments to strengthen financial resilience but also driving innovation in the sector.

Countries are also exploring the potential cost-savings they can achieve through risk layering, establishing a suite of complementary risk financing instruments such as contingency funds, contingent credit and insurance. A disaster risk finance diagnostic carried out in Lesotho estimated that, through adopting such an approach, the government could save on average USD 4 million per year, and for an extreme disaster as much as USD 42 million. While laws of several countries have clauses on disaster risk funding mechanisms, operationalization remains a challenge compounded by centralization of resources.

“Mozambique created a disaster management fund in 2017 which became operational in 2019, receiving approximately 0.1 per cent of the state budget with a sovereign risk transfer mechanism in place.

(v) Disaster risk reduction linkages to climate change adaptation

While DRR and CCA are well-known concepts and there is a significant overlap between the problems they both seek to address, communities of both fields have been operating largely in isolation. Primarily this stems from the fact that they were developed in parallel and carried out by different departments, ministries and/or agencies in all but three SADC countries (Mauritius, Mozambique and Seychelles.)[79]

There is growing recognition of the need to integrate those two concepts together in order to come up with more efficient and innovative solutions to

78 World Bank, (2021), *Global Risk Financing Facility (GRiF) Annual Report 2020*. https://www.globalriskfinancing.org/publication/global-risk-financing-facility-grif-annual-report-2020

79 L Nemakonde and D Niekerk, (2017), *A normative model for integrating organizations for disaster risk reduction and climate change adaptation within SADC Member States*, Disaster Prevention and Management: An International Journal. 26. 10.1108/DPM-03-2017-0066

A tropical cyclone destruction at the center of Maxixe city, Mozambique © Shutterstock/Tonis Valing

reduce vulnerabilities and build an environment resilient to disasters.[80] Despite the challenges there is evidence demonstrating the efforts of SADC Member States to integrate DRR and CCA. A 2020 report by the United Nations Office for Disaster Risk Reduction (UNDRR)[81] that reviewed 50 DRR and CCA policies and 40 Intended Nationally Determined Contributions, demonstrates some effort being made in sub-Saharan Africa to integrate DRR and CCA, though the majority of cases are incidental rather than structural with more evidence of CCA being integrated into DRR than vice versa. Namibia has set up mechanisms for mainstreaming DRR and CCA; the National Climate Change Adaptation Policy in Mauritius has specific strategies to mainstream DRR into CCA; and Mozambique's Climate Change Strategy talks of strengthening disaster response and early warning systems within the social protection pillar. On institutional arrangements, Malawi has merged national technical committees responsible for DRR and CCA into one. The African Union's Programme of Action for implementation of the Sendai Framework contains a target to "Increase integration of DRR in regional and national

80 N Dias, G Clegg, D Amaratunga, and RP Haigh, (2019), *A Resilient Environment through the Integration of CCA and DRR: An Overview of Existing Challenges*, International Journal on Advanced Science Engineering and Information Technology, 9(1), pp. 129–135

81 UNDRR (2020), *Disaster Risk Reduction and Climate Change Adaptation, Pathways for policy coherence in Sub-Saharan Africa*

sustainable development and CCA frameworks, mechanisms and processes." Between 2015 and 2018, SADC countries had moved on average from 'limited achievement' to 'moderate achievement' in terms of integration with the Democratic Republic of the Congo, Malawi, Mozambique, Zambia and Zimbabwe having made the most progress in integrating DRR into CCA.[82]

This integration faces many challenges, particularly in the SADC region, such as disorganized institutional set-ups, unclarity of roles and responsibilities, different political priorities, competing financial resources and mandates, and lack of coordination between different relevant stakeholders. Most of these challenges were seen in Malawi after the government adopted a decentralized planning system and tried to integrate climate risk management into the District Development Planning System.[83]

Both DRR and CCA aim at reducing vulnerabilities, both use non-structural measures, and each of them benefits the other's progress. These common grounds should not be overlooked, rather they should be the basis of building a strong nexus between the two.

(vi) Data availability

The lack of rigorous and statistical data is not just a technical issue today, having massive negative implications on all aspects of governance and sustainable development. Without reliable data and evidence, policymakers are essentially stabbing in the dark when it comes to taking decisions on how best to prepare their societies for and respond to natural disasters and climate change. Since resilience is such a broad and encompassing concept it is also very data heavy, as evidence-based urban resilience building requires information about a broad range of societal, economic, political, scientific and meteorological factors. When it comes to understanding urban resilience in particular, in the SADC region – before even looking at available data – there is a fundamental challenge that stems from the vagueness and ambiguity on the classification of urban and rural areas in different countries.

Obtaining quality statistical data is not a new challenge to sub-Saharan Africa, it has been hampered historically by factors such as conflict, instability, financing and even political will in some cases.[84] There are many obstacles to an effective and efficient data collection process. The available data is usually too weak, not disaggregated or too limited in terms of spatial coverage.[85] These weaknesses affect many areas, including assessments of risk and vulnerability, especially in urban centres.

While efforts have been made for countries to report on progress in implementation of the Sendai Framework for Disaster Risk Reduction through the Sendai Monitor, very few countries are able to consistently report, with data gaps in those reporting. The use of platforms such as the DesInventar for capturing and recording disaster loss and damage data is a good innovation, however, such databases are not widely used and where they are used, they are less frequently updated. Another challenge has been differences in the parameters and definitions used for international disaster loss databases that fail to capture data that is recorded in national databases.

Several networks are already in place working between countries to support collecting and disseminating data, however, there are also other academic networks. Periperi U and the Resilience Academy aim towards reducing disaster risks through building sustainable 'multi-tasking' capabilities in disaster risk and vulnerability reduction capacity building in different countries. There are also a growing number of dedicated departments and courses (at both undergraduate and postgraduate levels) focusing on DRR and CCA in different universities (e.g. Malawi University of Science and Technology and North West University, South Africa). These departments are one answer to the challenge of lack of capacity in the region and they will prove more effective as they expand.

82 SADC, (2018), *REPORT ON DISASTER RISK REDUCTION 2015–2018: An Addendum to the Biennial Report on the Programme of Action for the Implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030 in Africa*. https://www.preventionweb.net/files/73056_sadcbiennialreport20152018.pdf

83 A Olhoff, (2011), *Opportunities for Integrating Climate Change Adaptation and Disaster Risk Reduction in Development Planning and Decision-Making: Examples from Sub-Saharan Africa*, 2011 Global Assessment Report on Disaster Risk Reduction: Revealing Risk, Redefining Development, United Nations International Strategy for Disaster Reduction

84 J Borel-Saladin, *Data Dilemmas: Availability, Access and Applicability for Analysis in Sub-Saharan African Cities*, Urban Forum 28, pp. 333–343 (2017). https://doi.org/10.1007/s12132-017-9320-5

85 E Osuteye, C Johnson and D Brown, (2016), *The data gap: An analysis of data availability on disaster losses in sub-Saharan African Cities*

Based on proper data sets and data management, there is a need for developing future risk scenarios of the potential impact of climate variability and change in urban areas, which would contribute towards enhancing national governments' understanding of their risk profiles and their capacity to integrate preparedness and resilience-building considerations into their respective development planning processes.

(vii) Utilization of nature-based solutions and ecosystem restoration

Parallel to administrative and financial solutions for DRR, equally important and arguably more sustainable are nature-based solutions and ecosystem restoration such as green infrastructure or mangrove restoration. Long-term exploitation of natural resources has resulted in the degrading of nature's own defence mechanisms toward natural hazards. For instance, deforestation causes desertification, soil degrading and unbearable heat which consequently compromises food security and human health. This is extremely apparent in the SIDS whose entire existence could be threatened. It is not surprising, therefore, to see Seychelles as the first country to include nature conservation in its constitution.

"Plenty of home-grown solutions and expertise in urban disaster preparedness and response already exists in the SADC region, however there is not enough in the way of cross-fertilization and regional coordination including exchanges/ lesson learning exercises to proliferate locally developed ideas to other cities and countries in the region.

"While SADC Member States face several challenges for building urban resilience, strengthening governance remains one of the key issues that, when properly addressed, can majorly contribute to tackling the majority of the others.

A 2016 regional assessment on ecosystem-based DRR and biodiversity in Eastern and Southern Africa by IUCN,[86] conducted in nine countries (including Madagascar, Malawi, Mozambique, Namibia, South Africa and Zimbabwe) revealed that while there is acceptance on the role of ecosystem/biodiversity in reducing disaster risk, incorporation of eco-DRR in relevant policy instruments and strategies is lacking. The IUCN report revealed evidence of current projects that have components of eco-DRR, though most of them are donor-funded, led by Non-Governmental Organizations (NGOs) and predominantly from the CCA perspective. Even where universities exist that offer courses on DRM, the issue of eco-DRR is hardly covered. Part of the reason could once again be that the plans rarely go into detail on actual measures taken. Other reasons might be the limited knowledge of ecosystem services and the multifunctionality of nature, or even a disregard towards nature. Chapter 3 explores this issue further, examining possible solutions for SADC countries.

2.4 Chapter highlights

This chapter has shown that most of the natural hazards impacting the region are transboundary and therefore there is an urgent need for greater inter-country cooperation so that SADC Member States can learn from one another, support each other and coordinate appropriate actions. Although the analysis examined just one hazard at a time, each country and sub-region in the SADC presents a higher level of complexity due to their susceptibility to more than one hazard and other underlying vulnerabilities. It is therefore also important to analyse the national and local contexts looking for linkages among the different levels. On the one hand this might allow an effective trickle-down effect of policies and regulations from regional through national to city level. And on the other hand, a real influence of local level initiatives both at the national level (e.g. through city-to-city cooperation), and at the regional level facilitating the exchange between neighbouring countries when it comes to transboundary issues. As an example this could be done in the field of early warning, especially in relation to cyclones and related major rainfall events, but also regarding upstream/downstream management of transboundary river basins.

As presented in the chapter, initiatives tackling specific hazards at different levels are already present but cross-sectional regional efforts are also needed. The establishment of a dedicated SADC DRR Unit is certainly a good start in terms of strategy and policy coordination, however, more needs to be done in terms of emergency preparedness, response, recovery, institutional capacity building and knowledge creation and management. The two latter issues can be promoted through the establishment of Centres of Excellence such as DiMSUR (see section 2.2) and would ideally lead, in the medium to long term, to the adoption of strategies and implementation of action plans at the various territorial levels, embedding vulnerability reduction measures and fostering resilience.

Plenty of home-grown solutions and expertise in urban disaster preparedness and response already exists in the SADC region, however there is not enough in the way of cross-fertilization and regional

86 IUCN, (2017), *Regional Assessment on Ecosystem-based Disaster Risk Reduction and Biodiversity in Eastern and Southern Africa*. https://www.preventionweb.net/publications/view/51457

coordination including exchanges/lesson learning exercises to proliferate locally developed ideas to other cities and countries in the region.

A feature that emerges at both regional and national levels is the focus of DRM on relief and response despite mitigative and preventative measures being more effective for achieving long-term resilience. Similarly, the concepts of DRR and CCA are not treated coherently. The absence of regeneration and updating of priorities is visible in the lack of an urban focus in DRM, which further leads to disconnections in coordination, be it between national and local levels or with the ability of implementing rural-designed policies to urban contexts. Overall, the lack of coordination and coherence between different levels of governance or ministries and public offices with responsibility is an obstacle to progress. The apparent lack of funds which do not allow investment for capacity building and data management, nor implementation, does not help. Consequently, sustainable and multifaceted methods such as nature-based solutions end up getting overlooked and underutilized.

While SADC Member States face several challenges for building urban resilience, strengthening governance remains one of the key issues that, when properly addressed, can majorly contribute to tackling the majority of the others. The governance challenges described are closely interlinked and therefore cannot be addressed separately. It takes a proactive and comprehensive approach to tackle them effectively and successfully. Due to their close linkages, starting the process of improving governance measures in one aspect could lead into a snowballing effect of improvements in other sections and even spread across the region.

Volunteer action in solidarity with victims of a cyclone at the port of Maputo, Mozambique © Shutterstock/Victor Espadas Gonzalez

An African man behind a damaged building after an earthquake © BearFotos/Shutterstock

3

City level analysis of vulnerability

The core of the multi-level analysis of this report is the urban dimension, explored in this chapter from different angles in order to delve more deeply into urban-specific vulnerabilities and their causes and effects. Within the broader context of the region, the first section provides the results of a rapid assessment of 20 SADC cities, outlining their general vulnerabilities through the lens of five selected indicators, while the second section focuses on four case studies to provide a comparative overview of the main challenges that cities with different characteristics face in relation to one specific common hazard, and to highlight any differences and/or commonalities. For each one of the four selected cities, a detailed profile is presented in Annex 2, supporting the information with maps specifically produced for the purpose. As a conclusion to this chapter, adaptive solutions to tackle vulnerability and to build resilience at the city level are presented.

3.1 Vulnerability overview for 20 cities of the SADC region

This section explores the status of vulnerability at the local level using a sample of 20 cities from the 16 SADC Member States. The purpose of this research is to have an overview of different cities in the region comparing their general vulnerability and ranking them according to their specific climate and disaster risks.

Selection of the cities began with the identification of urban settlements with known vulnerabilities either in terms of high population growth, urbanization rate or disaster risk. One city was chosen from each SADC country, with an additional four cities that stood out in the regional context in terms of disaster risk also included. In Mozambique, for example, Beira was chosen (along with Maputo) as the city was struck by Cyclone Idai in March 2019.

The methodology used to build this comparative overview is inspired by the City Resilience Profiling Tool (CRPT), one of UN-Habitat's flagship tools for urban resilience, which provides a cross-cutting diagnostic for resilience-based urban development through a framework for data collection – the final goal of which is the creation of a baseline for future actions.[87] Because this would have fallen out of the scope of this report, the CRPT was not implemented in full in the 20 cities. CRPT analysis used for outlining a city profile and its spatial context, administrative structure and socio-economic aspects, etc. were considered when building the methodology for this research and, along with elements contributing to high levels of vulnerability in the urban settlements presented in the previous chapters, served as a basis for the identification of five indicators: i) poverty levels, ii) economic vulnerability, iii) urban development legislation, iv) informal settlements, and v) exposure to hazards.

Data for each indicator was gathered for the 20 cities using information from different sources while still trying to organize the results in a comparable way. To achieve this result, four vulnerability levels were identified for each indicator establishing a scoring system to categorize them ranging from 1 (low vulnerability) to 4 (high vulnerability) according to the scoring scale presented in table 1.

Of course, vulnerability is a multi-tiered topic and this is not exhaustive research of all its urban-related aspects. Nevertheless, it showed interesting results and could be a good starting point for further research, even considering a larger number of cities in the region.

The sum of the partial scores allowed the calculation of the total vulnerability score for each selected city of the SADC region (see figure 10).

The top five most vulnerable cities of the analysed sample (Antananarivo, Beira, Blantyre, Moroni and Zomba) all belong to the south-east region of SADC which, as is clear from the risk analysis in chapter 2, is an area highly exposed to more than one hazard. These include: cyclones originating from the Indian Ocean and the resulting flooding (see map 5); droughts (see maps 3 and 4); and, due to the presence of the East African Rift Valley, more frequent earthquakes. The vulnerability of this area is also increased by the high concentration of exposed assets and human settlements (see map 2). Antananarivo, Beira, Blantyre, Moroni and Zomba are also characterized by high levels of informal settlements, economic vulnerability and poverty, and weak urban development legal frameworks which, combined with the high exposure to one or more natural hazards, contribute to increase their level of vulnerability.

At this point it is important to mention that understanding the context of these cities and their vulnerabilities is just the starting point. The focus should be on investigating how these cities are addressing their challenges, what kind of expertise and good practices they have developed, and identifying home-grown solutions that can be shared and used between cities with similar profiles or those with shared hazards. This kind of South-South urban learning and exchange is critical to ensuring that localised, context-specific, indigenous and innovative CCA, disaster preparedness and response, and resilience building interventions are captured and replicated across the SADC region. This report attempts to highlight some of these solutions but further research, compilation and exchange will be necessary to gain their full benefits regionally.

Reducing the impact of floods in Lusaka has attracted significant investment and attention.

USD 355 Million

The cost of commissioned Lusaka Water Supply, Sanitation and Drainage Project in 2015 with the support of the Millennium Challenge Corporation.

In 2020, the President of the Republic of Zambia further instructed the Disaster Management and Mitigation Unit and other stakeholders to find a permanent solution to floods in Lusaka.

87 http://urbanresiliencehub.org/wp-content/uploads/2018/08/CRPT-Guide-18.07-Pages-small.pdf

Indicators	Scores			
	1	2	3	4
POVERTY LEVELS	Share of urban population living in poverty 0–20%	Share of urban population living in poverty 20–40%	Share of urban population living in poverty 40–60%	Share of urban population living in poverty > 60%
ECONOMIC VULNERABILITY	Low economic vulnerability	Medium economic vulnerability	High economic vulnerability to at least 1 type of disaster	High economic vulnerability to at least 2 types of disaster
URBAN DEVELOPMENT LEGISLATION	Presence of a city master plan and sectoral plans (waste/water management plans, transport plan, etc.)	Presence of an updated city master plan	Presence of an outdated city master plan	Absence of a city master plan
INFORMAL SETTLEMENTS	Share of Informal Settlements 0–20%	Share of Informal Settlements 20–40%	Share of Informal Settlements 40–60%	Share of Informal Settlements >60%
EXPOSURE TO HAZARDS	Low exposure	Medium exposure	High exposure to at least 1 type of disaster	High exposure to at least 2 types of disaster

Table 1: Scoring scale for the vulnerability analysis at the city level

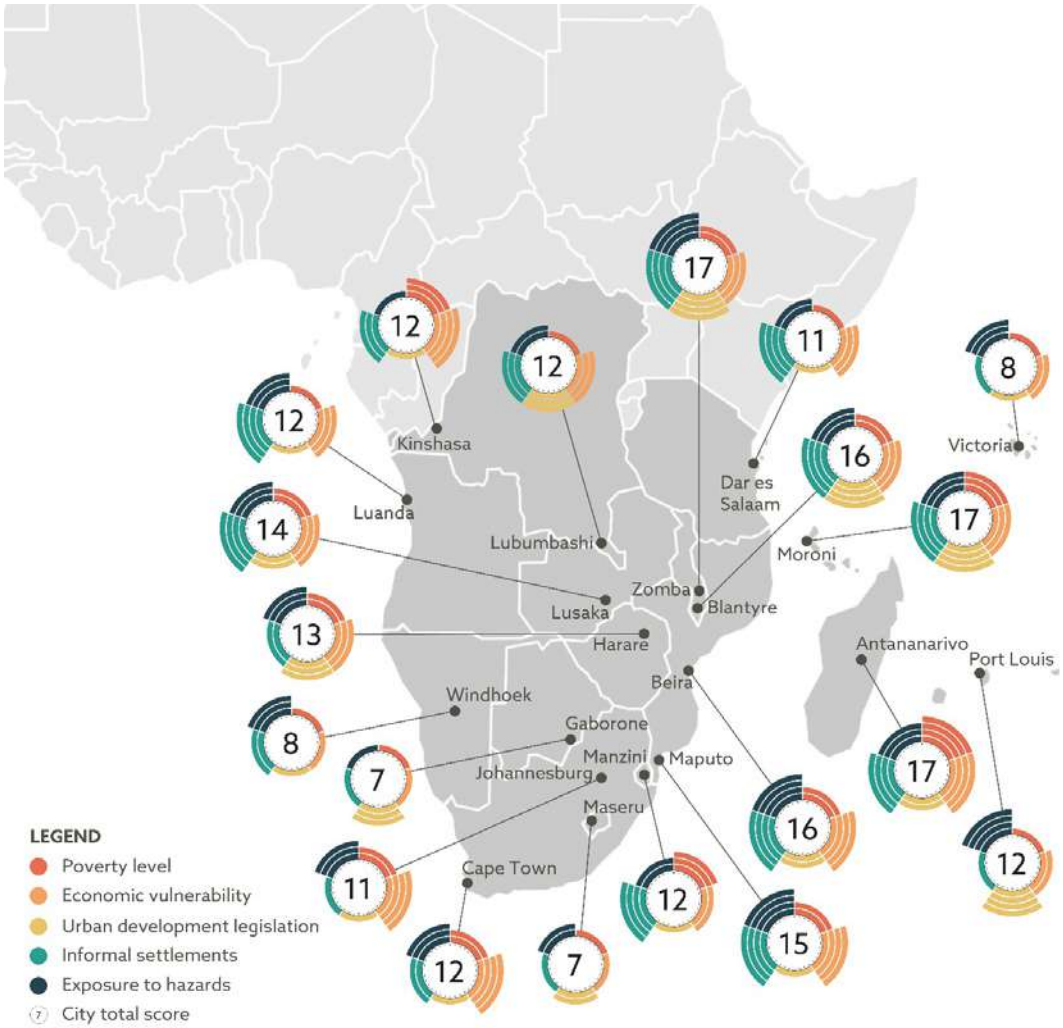


Figure 10: Vulnerability ranking for a sample of 20 SADC cities

"Analysis of climate projections from the most recent set of global climate models indicate that heavy rainfall will become more frequent and/or intense over Zambia as a whole. And analysis of regional climate model projections for Africa suggests that heavy rainfall will become more frequent or intense in the Lusaka region (FRACTAL, 2018).

3.2 Case studies – four cities, one common threat

As illustrated in chapter 2, the main natural hazards in the region have a transboundary nature. Therefore, cities belonging to different countries are often vulnerable to the same threats. To explore this topic, 4 cities were selected out of the 20 with the aim of choosing a group of settlements that are relatively broadly representative but have different features such as size or geographical location. Moroni (the Comoros), Zomba (Malawi), Maputo (Mozambique) and Lusaka (Zambia) were selected, providing a mix of coastal and landlocked cities, capital and secondary cities, and different population sizes. An overview of their main characteristics, vulnerabilities, urbanization trends and overall exposure to hazards, is provided for each one of them in Annex 2.

Although these four cities present a complex scenario in terms of overall disaster risk (as also shown by their high vulnerability ranking in figure 10 in section 3.1), the common hazard of floods has been the focus for this analysis as an example of urban impact, consequences and response to the same type of event.

The key reason for highlighting a single hazard for all four cities is to stress two points. Firstly that cities with different characteristics – in terms of population, spatial extension, economic dynamics, etc. – can have differentiated needs and opportunities, and that the impact of climate related hazards entails different levels of complexity depending on the specific context. And secondly that cooperation, even at city level, would be beneficial and could serve as a catalyst for developing or improving local/endogenous solutions or contributing to increased South-South exchange of capacity and knowledge.

The impact of the floods has resulted in social and economic losses in all four cities, whether a consequence of tropical cyclones or intense rains and/or because of common circumstances such as (i) inadequate legislation and capacity to enforce development control, (ii) rapid urbanization, (iii) rapid growth of informal settlements, (iv) inadequate infrastructure and basic services and (v) high levels of unemployment and poverty. It is also evident that structural specificities imply some differences in terms of impact in each city.

“Being a coastal city, Maputo is also affected by sea level rise, a trend expected to grow faster and faster over the next years leading to a projected global mean rise between 43 cm and 84 cm by 2100.

Most parts of Lusaka experience annual flooding during the five-month rainy season, and the situation is only expected to get worse as the city’s population is likely to double by 2035 (CSO, 2010).

Lusaka

Floods in Zambia’s capital Lusaka are a historical and endemic problem. Most parts of Lusaka experience annual flooding during the five-month rainy season, and the situation is only expected to get worse as the city’s population is likely to double by 2035 (CSO, 2010). As illustrated in Annex 2, the rapid increase in the growth of informal settlements in the city where the majority of its population lives, has not only created the need for more infrastructure and services but has increased vulnerability to potential disasters.

The city of Lusaka is located on a low lying, flat plateau (with a gradient of 0.2 per cent) of highly permeable limestone which is easily saturated. The water table is high and thus the city is naturally susceptible to flooding (MLGH, 2009; CDC, 2019). In fact, the city was founded on a swampland with many flood hotspots (FRACTAL, 2018).

Lusaka has been subject to annual flooding as far back as the 1900s. The worst floods occurred in 1978, 1988 and 2009 causing severe damage to infrastructure, houses, public building and crops, while leaving a combined population of close to 100,000 people homeless with thousands of cholera cases (Mulwanda, 1993; IFRC, 2010; Phiri, 2014).

As the groundwater table rises due to incessant rain, low-lying areas where most informal settlements are located are at risk of flooding (Nchito, 2007; MLGH, 2009). Analysis of climate projections from the most recent set of global climate models indicate that heavy rainfall will become more frequent and/or intense over Zambia as a whole. And analysis of regional climate model projections for Africa suggests that heavy rainfall will become more frequent or intense in the Lusaka region (FRACTAL, 2018).

In addition to physical and climate related factors, several social factors have contributed to Lusaka’s annual floods. These include: uncoordinated city development which has contributed to the spiralling growth of informal settlements mainly located in flood prone areas with insufficient infrastructure and services; poor design and maintenance of drains; and poor solid waste management disposal practices (MLGH, 2009; FRACTAL, 2018).

During the CityRAP process (see box) conducted with the City of Lusaka by UN-Habitat in 2019, these factors were identified as being critical in contributing to the city's risk for potential disasters.

Over the last three decades floods (and droughts) have cost Zambia more than USD 13.8 billion in disaster losses, equivalent to a 0.4 per cent loss in annual economic growth (Irish Aid, 2018). As highlighted in Annex 2, Lusaka which contributes to a significant share of this growth, has been at the forefront of these losses.

The political cost of recurrent floods in Lusaka has also been high. In 2008, residents of Kanyama informal settlement, the city's largest informal settlement which has been experiencing severe flooding, voted for an opposition parliamentary candidate because residents inter alia thought that the opposition would make Kanyama a better place to live (Chisola, 2012).

Reducing the impact of floods in Lusaka has attracted significant investment and attention. In 2015, the government commissioned a USD 355 million Lusaka Water Supply, Sanitation and Drainage Project with the support of the Millennium Challenge Corporation.[88] In 2020, the President of the Republic of Zambia further instructed the Disaster Management and Mitigation Unit and other stakeholders to find a permanent solution to floods in Lusaka.[89]

Maputo

In the last two decades Maputo has been affected by several coastal and inland flooding episodes majorly impacting on the city. Maputo experienced floods in 2000, 2003, 2012, 2013, 2018, 2019, 2020 and 2021. The events of 2000 and 2013, in particular, were quite remarkable in terms of damage and impact. In 2000, a combination of several factors caused a prolonged crisis in southern Mozambique. The rainy season, which started in late 1999, saw the compounding effect of two subsequent cyclones (Connie and Eline), followed by severe tropical storms. In 2013, heavy rains lasting over a week caused a substantive increase of the levels in the main river basins of central and southern Mozambique.

Although part of the city is located in elevated areas, most of the population resides in the lowest-lying flood prone areas, often in informal settlements. Many infrastructures are also in areas at risk, such as the port and all related services and facilities located close to the estuary which, although being quite protected from the impact of cyclones, is very prone to floods.[90]

Being a coastal city, Maputo is also affected by sea level rise, a trend expected to grow faster and faster over the next years leading to a projected global mean rise between 43 cm and 84 cm by 2100.[91] A projection of the 5 m contour along the coast showing the areas at risk either from rise in sea level or from the impact of an intense tropical cyclone (or a combination of both) is presented in the Maputo disaster risk map 43 in Annex 2. Along with floods, one of the major consequences of this phenomenon is coastal erosion threatening infrastructure and natural features.

Besides its physical characteristics and exposure to natural hazards, the city of Maputo presents several features contributing to the exacerbation of flood impact. One of the most significant is the rapid and often unplanned urbanization in hazard-prone areas, largely due to rural-urban migration which has left the Maputo Metropolitan Area hosting around 40 per cent of the entire country's urban population (UN-Habitat, 2010). When a disaster such as floods strike the city these settlements, which are home to a large part of the urban poor, are the most affected because they are located in high-risk lowlands and because there is no proper infrastructure and services to cope with the impact of such a hazard. The World Bank reports that basic solid waste collection reaches only 30 per cent of Maputo's residents, with a similar percentage for adequate drainage and a road network that is not maintained.

“Besides its physical characteristics and exposure to natural hazards, the city of Maputo presents several features contributing to the exacerbation of flood impact. One of the most significant is the rapid and often unplanned urbanization in hazard-prone areas, largely due to rural-urban migration which has left the Maputo Metropolitan Area hosting around 40 per cent of the entire country's urban population (UN-Habitat, 2010).

88 https://www.linkedin.com/pulse/millennium-challenge-account-zambia-signs-contract-account-zambia/

89 Lusaka Times, 2020. https://www.lusakatimes.com/2020/11/05/president-lungu-demands-for-permanent-solution-to-floods-in-lusaka/, 15 April 2020

90 INGC, 2009, Synthesis report, INGC Climate Change Report: Study on the impact of climate change on disaster risk in Mozambique, [B van Logchem and R Brito (ed.)], INGC, Mozambique. http://www.cgcmc.gov.mz/attachments/article/98/Synthesis_Report_ClimateChange_Fin_Port_Low.pdf

91 N Abram, JP Gattuso, A Prakash, L Cheng, MP Chidichimo, S Crate, H Enomoto, M Garschagen, N Gruber, S Harper, E Holland, RM Kudela, J Rice, K Steffen and K von Schuckmann, 2019: Framing and Context of the Report, IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [HO Pörtner, DC Roberts, V Masson-Delmotte, P Zhai, M Tignor, E Poloczanska, K Mintenbeck, A Alegría, M Nicolai, A Okem, J Petzold, B Rama, NM Weyer (eds.)]. https://www.ipcc.ch/srocc/

The weaknesses stemming from the absence of a proper city-wide infrastructure network not only fall on the most vulnerable areas but on the whole urban system. A capital city like Maputo, which is responsible for a large part of Mozambique's GDP (see Annex 2), hosts a complex network of services and economic activities that are severely impacted by disastrous events. During floods in 2000, the Limpopo railway line connecting Maputo with Zimbabwe suffered tremendous damage with a few kilometres completely submerged and other stretches severely compromised because of craters opened by floodwater underneath the lines. Similar damage was made to the two lines connecting Maputo with Eswatini and South Africa.[92]

The 2000 floods also caused serious disruptions in access to clean water, sanitation and electricity for the inhabitants of both Maputo and Matola Municipalities. The importance of well-functioning infrastructure also became evident in 2013 when the huge quantity of rainwater was such that the drainage system was unable to contain it. Several access roads were flooded blocking the movement of people and goods in and out of the city, buildings and houses were destroyed and damaged, and several deaths by electrocution and drowning were reported. Maputo's services need complex management which is sometimes difficult to achieve given the city's extension and high population, but it is fundamental to avoid further risks when the city is struck by floods and other types of hazards. A practical example of the relation between basic services management and disaster risk can be seen in the collapse of a 12 m high pile of waste at a dump site on the outskirts of Maputo following heavy rains in 2018, which caused many people to lose their homes and around 17 deaths.[93]

Due to the high levels of poverty, most residents of Zomba use firewood for both fuel and livelihoods (IFRC, 2018). Deforestation on Zomba mountain, combined with torrential rain, has therefore resulted in the flash floods that cause destruction around the city (FloodList, 2015).

Moroni

Moroni, as are most of the urban settlements in the Comoros, is a coastal city exposed to a wide range of water-related hazards from tropical storms to sea level rise.

In addition to the more recent impact caused by Cyclone Kenneth which hit the Comoros archipelago in April 2019 causing floods in all the three islands of the country, Moroni has experienced multiple floods over the last few years particularly in 2009 and in 2012, the latter being considered as one of the largest disasters in the Comoros islands in decades.[94]

Moroni is located at the foot of Mount Karthala volcano with some settlements built on lava flows (see Annex 2). Whilst it is not very common for new lava flows to follow the same path as before making the area unlikely to suffer from major consequences from a volcanic eruption, the volcanic ash makes the soil less able to absorb large quantities of water,[95] increasing the risk of floods. There is a large water catchment area right above the city which, although well forested, is not properly organized in terms of water management.[96] It is also worth noting that Moroni, in line with regional trends, has experienced rapid urbanization in recent decades mostly in the absence of proper regulations. This has led to the creation of sprawling informal settlements (as is shown in Annex 1, more than half of today's urban population of the Comoros live in slums) exacerbating its vulnerability to disastrous events such as floods. During the implementation of CityRAP in Moroni in 2018, it was also noted that the precariousness of the sanitation infrastructure, housing and waste collection system, as well as the limited access or use of public health and hygiene services, weighs on the well-being of the inhabitants, increasing their vulnerability in the event of crisis.

The floods of 2012 had a dire direct impact on Moroni in terms of damage to roads and other transport infrastructure; to houses; to schools and faculties of the University of Comoros; to two power stations causing them to work at limited capacity; and to water and sanitation facilities such as wells and pumping stations (also dependant on electricity generated by the power stations) that were flooded leaving around 120,000 people without drinking water in the capital.[97] Maintenance of infrastructure and basic services also plays an important role when it comes to DRM and, although no formal study was undertaken, it was estimated that up to 50 per cent of the water capacity leaks out in the Moroni water and sanitation system alone.[98]

"The 2000 floods also caused serious disruptions in access to clean water, sanitation and electricity for the inhabitants of both Maputo and Matola Municipalities. The importance of well-functioning infrastructure also became evident in 2013 when the huge quantity of rainwater was such that the drainage system was unable to contain it.

92 https://reliefweb.int/report/mozambique/mozambique-natural-disasters-floods
93 http://floodlist.com/africa/mozambique-maputo-garbage-collapse-february-2018
94 https://reliefweb.int/sites/reliefweb.int/files/resources/Comoros_Flash_Floods_Emergency_Appeal_Evaluation.pdf
95 *Comoros Flooding 2012, Early Recovery Plan.* https://reliefweb.int/sites/reliefweb.int/files/resources/FINAL%20VERSION_REVISED_Comoros%20ERP_29082012-light.pdf
96 *IFRC, 2013, Comoros Flash Floods Emergency Appeal Evaluation.* https://reliefweb.int/sites/reliefweb.int/files/resources/Comoros_Flash_Floods_Emergency_Appeal_Evaluation.pdf
97 *Comoros Flooding 2012, Early Recovery Plan.* https://reliefweb.int/sites/reliefweb.int/files/resources/FINAL%20VERSION_REVISED_Comoros%20ERP_29082012-light.pdf
98 Ibid

As part of SIDS, the Comoros has some characteristics in common with other SIDS in the region for example Mauritius and Seychelles, that makes them unique from other SADC countries. Because of their reduced total land area and despite their low population, these countries have a much higher urban land cover. In the Comoros around 10 per cent of the total national land is urban (see map 35 in Annex 1) compared to a much lower average in the non-island countries. This goes to show that although other countries have clear linkages to the rural context, cities and/or urban agglomerations are satellites in the overall national structure working to very unique dynamics. In SIDS this duality between the urban and rural contexts is less extreme. The floods of 2012 also caused considerable damage to the agricultural sector with the loss of crops and livestock, leaving poor rural communities the most affected. Urban-rural linkages are even stronger in a country like the Comoros where, besides the obvious connection due to its limited area, agriculture in 2012 accounted for 70 per cent of the population's activity and was the only export sector.[99] Urban and rural vulnerabilities, in relation to DRR, therefore cannot be considered independently and completely detached from each other.

Zomba

Zomba is located at the foot of a plateau in a mountainous area (see Annex 2). Floods in the city are often severe and accompanied by serious landslides with devastating impact on private and public infrastructure, and on human life. The floods of December 1946 have been recorded as one of the worst floods in Zomba's history (Edwards,1948).

Since then, in addition to the floods of 2015 highlighted in Annex 2, Zomba has been affected by recurrent severe floods in 1983, 1989, 1992, 1996, 1998, 2000, 2002, 2004 and 2020.100 In the floods of 2000, close to 5,000 families were affected and over 500 hectares of crops were washed away, robbing the primary source of livelihood for the majority of the population in this small city (CIDI, 2001).

The areas most affected by flooding are those lying along the Lake Chilwa basin and along the banks of rivers feeding the lake (CIDI, 2001). What further complicates the situation in Zomba is the Chagwa dam on Zomba mountain. In March 2019, the Department of Disaster Management Affairs (DoDMA) released a statement warning residents in and around Zomba city to be prepared for significant flooding as a result of severe weakening of the Chagwa dam due to heavy rain (DoDMA-UNDP, 2019).

Heavy seasonal rains have also caused flooding in Madagascar, Mozambique and Zimbabwe (UNDRR, 2015). And in the 2019/20 season, Cyclone Idai exacerbated the flooding situation in Zomba (UNICEF, 2019).

Similarly to Lusaka, Maputo and Moroni, several socio-economic factors have contributed to flood disasters in Zomba in addition to the physical and climate related factors.

Local observers suggest that deforestation in upland areas has contributed to the current flood disasters. Due to the high levels of poverty, most residents of Zomba use firewood for both fuel and livelihoods (IFRC, 2018). Deforestation on Zomba mountain, combined with torrential rain, has therefore resulted in the flash floods that cause destruction around the city (FloodList, 2015).

Because agriculture and downstream agro-processing generate 50 per cent of GDP and 80 per cent of total export earnings and employment in Malawi, economic losses due to extreme climate events are significant: the country loses 1.7 per cent of its GDP on average every year due to the combined effects of droughts and floods (IFPRI, 2010). This is equivalent to almost USD 22 million (at 2005 prices), and it is smaller-scale farmers, especially those in the flood-prone southern regions of the country like Zomba, who are worst affected (IFPRI, 2010).

During the CityRAP process (see box) conducted in 2016, all five catalytic priority actions to reduce Zomba's exposure to potential disasters were directed towards reducing the impact of floods on the city.

10%

The approximate amount of total national land of the Comoros that is urban (see map 35 in Annex 1) compared to a much lower average in the non-island countries. This goes to show that although other countries have clear linkages to the rural context, cities and/or urban agglomerations are satellites in the overall national structure working to very unique dynamics.

99 *Comoros Flooding 2012, Early Recovery Plan.* https://reliefweb.int/sites/reliefweb.int/files/resources/FINAL%20VERSION_REVISED_Comoros%20ERP_29082012-light.pdf

100 The Times, 2020. https://times.mw/floods-hit-zomba-areas/, 20 April 2020

City Resilience Planning (CityRAP) Tool

CityRAP is a participatory resilience planning process used for training and building the capacity of city managers, municipal technicians and key urban stakeholders of small to intermediate sized cities – or neighbourhoods within bigger cities or metropolitan areas – in developing countries to understand urban risk and plan practical actions aimed at reducing risk and progressively building resilience against natural and other hazards in the city. CityRAP targets local governments with limited experience in risk reduction and resilience planning and an urban population size at a maximum of 250,000 people. The process – which has a duration of three to four months – leverages local knowledge and builds an inclusive process for a wide range of urban stakeholders, including community representatives and dwellers, guiding them in taking informed and strategic decisions on priorities to build the resilience of their city. These decisions are then converted into implementable activities and actions. The adoption of a bottom-up approach is central to the process. The whole process is designed so that local governments can adapt and implement it with minimal intervention from outside technical experts.

The final output of the process is the City Resilience Framework for Actions (RFA) that is a framework which allows existing and future plans to fit and create synergies for mainstreaming resilience, that is why it is designed as an enabling rather than prescriptive tool, as the core principle is fostering ownership by local government and communities. The core of the City RFA consists of a list of priority actions identified throughout the process to be implemented through concrete activities in the short-, medium- and long-term. The City RFA supports city managers for target setting, performance assessment, monitoring, management and decision-making purposes. Moreover, it can easily be translated into bankable projects to attract donor funds or private sector investments for implementing practical resilience building initiatives and programmes in the city.

“To be effective, urban resilience strategies must relate closely to the local level. They should: a) be implemented by local authorities, b) involve local communities, and c) be tailor-made to the local urban conditions and climate.

Besides being prone to flooding because of their location and the geophysical characteristics of their territory, these four cities have other common weaknesses that make them susceptible to the damaging effects of floods. However, when considered against specific contexts, these commonalities reveal different levels of complexity. This means that DRM cannot consider urban settlements as a uniform group, but has to go more in-depth, tailoring strategies to their needs.

Looking at the four case studies it is clear how in a bigger city – which also often happens to be the capital city – the economic implications of floods can be more extensive. Activities concentrated in those cities are sometimes of a national scale, for example, Lusaka and Maputo contribute to a large portion of their respective national GDPs, or even a transnational scale such as the flood damage in Maputo which affected the port and railway lines connecting the city to Eswatini, South Africa and Zimbabwe.

The balance changes when considering smaller contexts like the Comoros and Malawi where most of the economy is led by the agricultural sector. This sector is responsible, in the main, for all export earnings and is therefore a big contributor to the national GDP. It is inevitable, when disaster strikes, that damage to this sector also has a great resonance on the urban context.

Further differentiation should be made for cities like Moroni, the capital and largest urban settlement of the country – despite hosting just 55,000 inhabitants – containing the national administrative and commercial centre. In such a condensed context every aspect is much more interrelated making it difficult to consider the urban and rural contexts as two separate realities, including when it comes to DRM strategies.

It is clear that to increase urban resilience to hazardous events – along with the necessary actions regarding urban planning and governance, physical infrastructure and basic services – socio-economic interventions are critical and must consider the characteristics of the specific context. Developing and sharing dedicated knowledge with urban communities having similar traits can allow them to thrive and overcome future crises.

3.3 Possible urban solutions for resilience building

Despite the complex scenario each different type of urban settlement has to face when it comes to DRR and management, there are possible solutions and good practices which represent a basis upon which to start building urban resilience.

→ **Combating city fragmentation by mainstreaming urban planning**

The master plans for many African cities were drawn up during a period when current urban population growth rates and poverty levels were not anticipated. These urban plans assumed an orderly and law-abiding population that were willing to comply with zoning and building laws designed for middle-income, car-owning and formally employed families. Before 2000, the realities of land occupation in the city bore no resemblance to current realities (Watson and Agbola, 2013:5).

Along with other factors like high population growth rates, natural or human-induced hazards and weak governance, spatial features are crucial for determining vulnerability levels of a city. As illustrated in the previous paragraphs, sub-Saharan Africa's cities are currently going through rapid urban expansion. In the SADC region for example, Chapter 1 clearly shows that in nearly every Member State, urban centres are experiencing significant growth which is not often paired with proper planning. In anglophone cities particularly where in the colonial era the British adopted more centralized and standardized urban institutions, the development of new parts of urban settlements has been conducted in a scattered way, usually occupying areas on the outskirts where land is cheaper, leading to the creation of very fragmented and dispersed patterns. Because of this cities often lack adequate road networks, sewerage systems and other basic services because the cost for their realisation is often too high. From a socio-economic point of view, this leads to a disconnect of people from one another and from economic and job opportunities because commuting is too slow and too expensive.[101]

To be effective, urban resilience strategies must relate closely to the local level. They should: a) be implemented by local authorities, b) involve local communities, and c) be tailor-made to the local urban conditions and climate. For this to happen, a cascade of strategic decisions and steps must have been taken at national and regional levels, where the overall framework for local implementation gets designed and standards are established.

→ **The need to increase access to employment and promote job diversification**

The absence of adequate road networks and transportation systems is one of the causes of reduced access to job opportunities. Commuting is often too expensive and people prefer to walk instead of using collective urban transportation systems, contributing to the creation of separated, local labour markets and increasing unemployment rates.[102]

Access to job and income opportunities for individual households is a key ingredient for building urban resilience as it allows the local population to withstand the consequences of shocks and stresses. Without regular income, urban households remain at risk of being affected by food insecurity, being forced into criminality or to living in substandard housing conditions, highly exposed to the effects

"Along with other factors like high population growth rates, natural or human-induced hazards and weak governance, spatial features are crucial for determining vulnerability levels of a city.

"The notion of 'sense of place' is an integral component of urban resilience and essential for the formation, maintenance and growth of social networks. It both improves urban resilience and reinforces social networks by strengthening community trust and reciprocity by providing incentives for collective action and by facilitating the pooling of skills and resources in the community (McMillen et al. 2017).

Urban Planning	Encompasses social, economic and environmental considerations.
	Provides processes and tools for mainstreaming climate change into town development.
	Represents the starting point for considering the direction of future urban growth.
	Operates at both the town-wide scale as well as at site-specific level.
	Has potential to incorporate legal and economic incentives for green development.
	Can be a vehicle for inclusive and participatory planning and management of urban development.
	It is a process familiar to the Southern Africa sub-region, typically in the form of urban master plans and land-use plans.

101 SV Lall, JV Henderson and AJ Venables, 2017, *Africa's Cities: Opening Doors to the World*, World Bank, Washington, DC
102 SV Lall, JV Henderson and AJ Venables, 2017, *Africa's Cities: Opening Doors to the World*, World Bank, Washington, DC

of natural hazards and without adequate access to basic services such as water and sanitation. The latter affects public health conditions thus contributing to the spreading of diseases. All these factors lead to increased vulnerability.

If well-planned and managed, cities can attract investment and become drivers of socio-economic development by creating jobs, increasing household incomes, reducing social tensions and crime, increasing equality and inclusion, promoting social mixing and enhancing security and safety, among other aspects.

In particular, diversity refers to the capacity of a multi-nodal system to ensure that failure of one component does not cause the failure of the entire system. This could be translated in considering social variation as a resource. For example, applying this concept to income diversification, it has been shown in Madagascar, Mauritius, Seychelles and the United Republic of Tanzania that coastal fishermen are more likely to leave fishing in response to declining catches if they come from households with more diverse livelihood portfolios. Not only does such livelihood flexibility increase the resilience of individual households, it also reduces the pressure on parts of the system, thereby enhancing resilience across society.

→ Enhancing urban management and social integration

Urban governance is the sum of the many ways individuals and institutions, public and private, plan and manage the common affairs of the city.[103] It is a continuing process through which conflicting or diverse interests may be accommodated and cooperative action can be taken. Participatory urban governance, in contrast, refers to processes and administrative structures that allow for the participation of a broad range of local actors in decision-making and public policies and strategies towards improved urban planning, management and development.

Traditionally, human settlements were often divided spatially into neighbourhoods with strong social networks. As urbanization intensified and virtual communication networks gained increasing strength, concerns arose about the decline of traditional urban social networks. Social networks tend to provide mutual support when needed. They are also vital for information flows and for sharing experiences, including traditional local knowledge and understanding how coping capacities have evolved.

The notion of 'sense of place' is an integral component of urban resilience and essential for the formation, maintenance and growth of social networks. It both improves urban resilience and reinforces social networks by strengthening community trust and reciprocity by providing incentives for collective action and by facilitating the pooling of skills and resources in the community (McMillen et al. 2017). It also improves households' willingness to take preparation measures against potential future risks because people are motivated to protect places that are meaningful to them.

Integration in system components seeks to tackle multiple urban challenges in a coherent and supporting manner instead of working from sectoral or departmental 'silos'. Social integration can be fostered by urban planning. The way in which neighbourhoods have been designed can promote co-living of different ages, incomes and ethnic groups. In this perspective, gender integration – both in the planning and implementation phase of an urban project – guarantees a much higher level of social cohesion and hence a higher level of community resilience.

"Fortunately, recent understanding of the linkages between climate change, environmental problems and sustainable development has shifted from a one-sided scientific focus towards a transdisciplinary and more holistic eco-systemic perspective that also includes socio-economic aspects.

Reducing the impact of floods in Lusaka has attracted significant investment and attention.

USD 355 Million

The cost of commissioned Lusaka Water Supply, Sanitation and Drainage Project in 2015 with the support of the Millennium Challenge Corporation.

In 2020, the President of the Republic of Zambia further instructed the Disaster Management and Mitigation Unit and other stakeholders to find a permanent solution to floods in Lusaka.

103 https://mirror.unhabitat.org/content.asp?typeid=19&catid=25&cid=2097

Fortunately, recent understanding of the linkages between climate change, environmental problems and sustainable development has shifted from a one-sided scientific focus towards a transdisciplinary and more holistic eco-systemic perspective that also includes socio-economic aspects. Because of this shift, environmental research strategies are changing from a mono-disciplinary emphasis on the natural sciences toward a trans-disciplinary focus on the co-production of knowledge that includes natural and social scientists, policymakers and society at large.

Resilience-oriented planning acknowledges the importance of these interactions and puts people at the centre of planning activities. Participation and communal action should not only be an integral part of the planning process but also during both the pre- and immediate post-disaster periods. Stakeholder engagement should further be prioritized during the longer-term post-disaster period getting people (and not just property owners) involved in the reconstruction process. This constitutes an important step in building their capacities, their empowerment and in the enhancement of resilience, adaptive capacity and sense of place.

→ **Resilient infrastructure and nature-based solutions**

Considering the increasing number of shocks and stresses that have affected cities around the world in recent years, it is essential that the design and management of housing, public spaces, green areas, infrastructure and basic services fully integrate the concept of resilience. Ensuring access to and continuity of infrastructure and basic services, even in times of disaster, is crucial to meeting the vital needs of urban populations and to allow a city to keep functioning.

Housing and community infrastructures are a priority sector to mainstreaming DRR strategies. It is imperative to prioritize safer planning, resilient design and construction of housing and public infrastructure in regard to natural hazards. Three main types of resilient infrastructure approaches can be identified (see figure 11):

i. **Grey infrastructure,** based on hard or engineering approaches, apply or modify constructed or engineered elements and systems to remedy existing or anticipated problems arising from climate change. It tends to reflect more traditional approaches based on increasing robustness and size in response to or in anticipation of more intense disaster events. Engineering approaches that seek to eliminate risk factors through technological fixes and physical planning interventions such as construction of coastal walls and levees, may not be sufficient for safeguarding communities. Eliminating risk by avoiding exposure (e.g. through appropriate site selection) and enhancing resilience to risk should be emphasized (Syphard et al. 2013). Planning authorities should understand the possibility of risk, and develop innovative and adaptive planning and design strategies so that the system can experience a safe failure, which means that failure is contained and minimized ("safe-to-fail" instead of "fail safe") (Ahern et al. 2014).

ii. **Blue and green infrastructure** use ecosystem elements and nature-based solutions to remedy existing or anticipated problems arising from climate change. Green and blue adaptation and measures can promote climate resilience through, for example, better storm water run-off management that uses wetlands as flood/storm surge protection and sea-rise defences, or tree planting in urban areas to reduce the UHI effect (Foster, Lowe and Winkelman 2011). The latter may also help in absorbing pollutants, conserving energy, reducing erosion or providing other cost-effective and environmentally sustainable services (Svendsen, Northridge and Metcalf 2012). Blue and green approaches have also been linked to a higher quality of life and well-being as well as higher physical activity levels.

"Analysis of climate projections from the most recent set of global climate models indicate that heavy rainfall will become more frequent and/or intense over Zambia as a whole. And analysis of regional climate model projections for Africa suggests that heavy rainfall will become more frequent or intense in the Lusaka region (FRACTAL, 2018).

iii. **Mixed or hybrid approaches,** based on ecosystem functions complemented by engineered infrastructures in urban areas.

The answer to spatial problems, in relation to green networks (e.g. urban natural areas and their connections) and infrastructures, has to be found in an African context. The master plans for many African cities are outdated and have been superseded by the current spontaneous development of the cities patterns. As a result of the lack of formal zoning plans, land-use regulations and planning control in many African cities – along with the need to provide basic human needs such as housing, infrastructure and facilities – the "green" agenda was not prioritized in planning approaches.

Even if there is still little evidence of integrated green planning, the ecosystem approach is gaining importance. It recognizes that humans are an integral part of ecosystems and stresses the need for holistic and integrated decision-making (Cadman 2010:16). Over the past 10 years, South African local government authorities have come to play an increasingly important role as users and managers of biodiversity, and it is at local government level that many day-to-day, operational decisions about land and natural resource use are made (Cadman 2010:49).

Nature-based solutions (NBS) can be defined as "living solutions inspired by, continuously supported by and using nature, which are designed to address various societal challenges in a resource-efficient and adaptable manner and to provide simultaneously economic, social and environmental benefits." (Maes and Jacobs 2015). Examples include provision of urban green to ameliorate high temperatures or regulate air and water flows (Kabisch et al. 2017) and green and blue infrastructure that can provide responses for issues of air quality and climate regulation, water flow regulation, water purification and waste treatment, DRR, erosion regulation, disease regulation and health, which are often more efficient and cost-effective solutions than more technical approaches (EC 2015).

Increasingly, NBS become cost-effective alternatives or complements to grey infrastructure to decrease vulnerability to hazards and mitigate disaster risks. Ecosystems are used to address hazards by making use of natural processes and ecosystem services to, for instance, decrease risks of flooding, erosion and landslides, as well as drought.

NBS initiatives in the SADC region are manifold and include the three following examples:

— A recently started regional project funded by the Adaptation Fund entitled, Building urban climate resilience in south-eastern Africa, and implemented by UN-Habitat, includes mangrove rehabilitation and tree planting to reduce the risks of flooding and land/coastal erosion (https://www.adaptation-fund.org/project/building-urban-climate-resilience-south-eastern-africa-madagascar-malawi-mozambique-union-comoros-2/)..

— The Local Action for Biodiversity: Wetlands South Africa project (2015–2018) led by ICLEI Africa and funded by the United States Agency for International Development (USAID) worked in partnership with nine District Municipalities and two Metropolitan Municipalities across South Africa. It aimed to improve local government knowledge and understanding of the value of wetlands, initiated the process of integrating wetlands and ecosystem services into local government planning and decision making and to implement and pilot on the ground wetland actions and projects within the participating municipalities. Overall, it improved wetlands governance in the participating cities to varying degrees of success.

— The United Kingdom's Department for International Development and the World Bank established the United Republic of Tanzania Urban Resilience Programme to support the Government of the United Republic of Tanzania in its endeavour to increase resilience to climate and disaster risks. It includes participatory risk mapping at community level and investments for urban flood control in Dar es Salaam through an integration of traditional grey infrastructure focused measures combined with NBS.

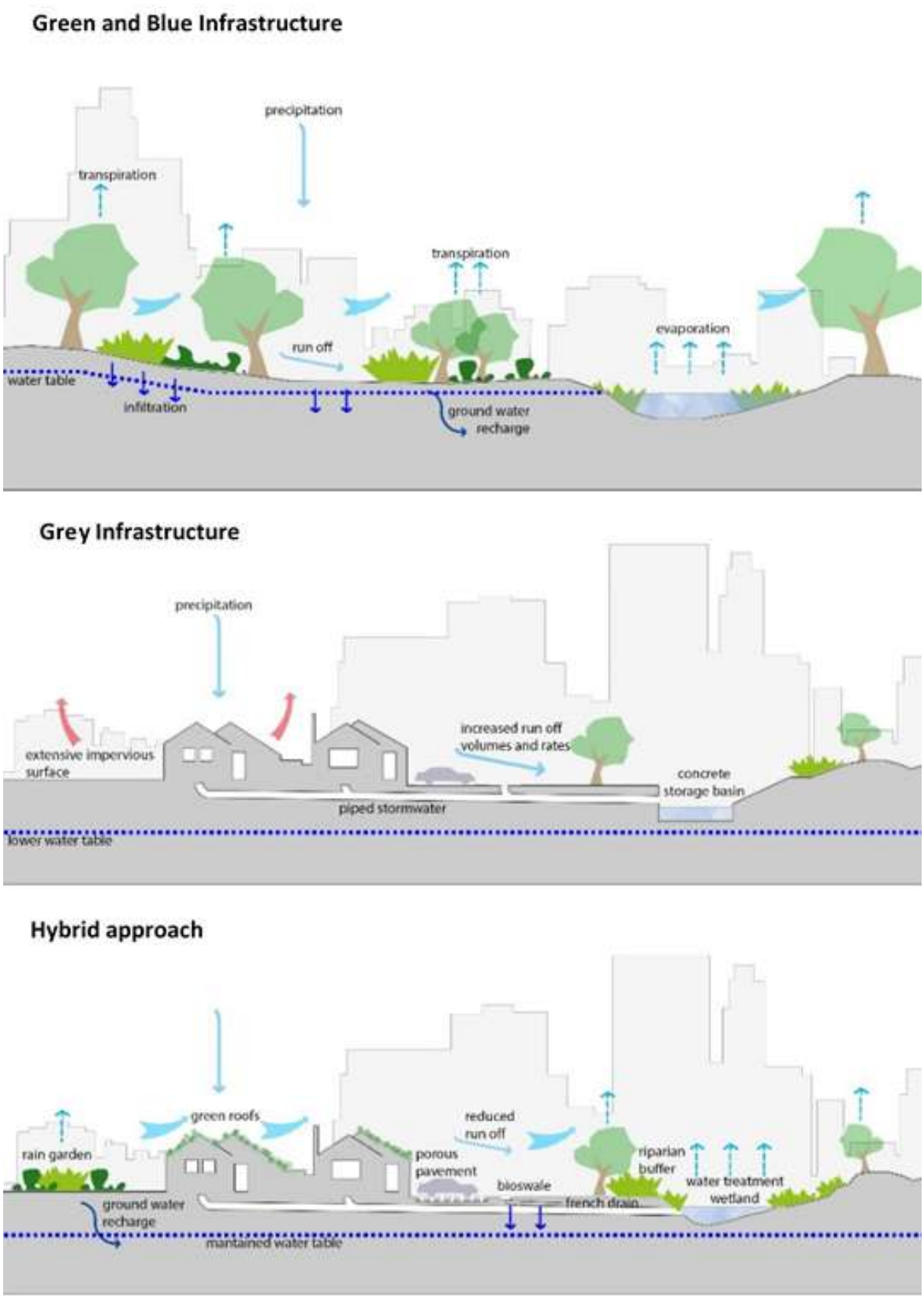


Figure 11: Infrastructure approaches for a resilient city / Arianna Francioni

→ Adaptive architecture

In areas of high urban asset concentrations, the urban shape affects the incoming solar radiation and ventilation conditions causing heat traps in human-made surfaces (Givoni 1998, Emmanuel 2005). In addition, the natural water cycle is significantly modified in cities as a result of surface sealing and vegetation removal. If rainwater becomes run-off, it cannot evaporate through plants as effectively as it would in natural environments (Schmidt 2010). Consequently in cities, the cooling effect of vegetation is being restrained. These phenomena lead to microclimatic conditions and UHI effects unfavourable to the population. On the other hand, urban form and surface design can also play a significant role in adaptation strategies. Urban surfaces can be (re)designed to alleviate the UHI effect through purposefully influencing the natural energy flows via intentional street orientation and considered proportions of built masses, shading and ventilation, or through enhancing the ratio of evaporative surfaces and vegetated areas in cities. Additional natural cooling effects can be provided during hot summers.

Climate-responsive strategies such as those above should guide at least part of official urban CCA programmes. Regrettably, city managers seem to underestimate the urgency of undertaking adaptation strategies. No legally binding climate-related urban design guidelines have been adapted yet.

The area that covers the multi-disciplinary field of buildings designed and adapted to their environment and their inhabitants is called adaptive architecture. It considers buildings, surfaces, components and modules, spatial features and technical systems as elements of adaptation so as to make the built environment flexible, interactive and responsive to current climate conditions and future changes. It seeks to mitigate the risk of disaster impacts through a disaster-sensitive approach to the construction and planning of settlements.

Communities in the Southern African region and along the south-west Indian Ocean coast have traditionally adapted to their environment. In several areas of Madagascar, for instance, traditional builders have profound knowledge of the hazards and how to adapt to them. However, the recurring nature and increasing strength of these hazardous events, coupled with unplanned settlement growth, exceeds communities' capacities to construct appropriately. This also concerns the more formal built environment that, in the haste of building rapidly and cheaply, often disregards the very concepts of adaptation to the environment that they would traditionally consider. There is a need to reintroduce basic concepts of adaptation, on the one hand, and to disseminate economically viable solutions, on the other. Over the last decade, Southern Africa has been a valuable laboratory of experiments with resistant housing and basic infrastructure in both local and conventional materials.

Examples of adaptive architecture measures by hazard:

Increasing temperatures/UHI effect

— Design cooling-load-avoidance measures into buildings;
— Design natural ventilation into buildings;
— Limit heat production through high-efficiency lighting and equipment;
— Model energy performance with higher cooling design temperatures; and
— Provide landscaping to minimize cooling requirements.

Water shortages and droughts

— Avoid new development in the driest regions;
— Apply water-efficient fixtures and appliances;
— Plumb buildings with water-conserving fixtures and grey water separation;
— Harvest rainwater; and
— Plant native, climate-appropriate vegetation.

Storm water/flooding and rising sea levels

— Avoid building in flooding and cyclone prone zones;
— Expand the storm water management capacity and rely more on natural systems (wetlands);
— Raise buildings off the ground through stilting;
— Promote the use of flooding resistant construction materials;
— Apply breakaway panels on pier foundations in flood-prone areas so that floodwaters pass under a house without destroying it;
— Provide for flood vents (permanent openings in foundation walls) that allow floodwaters to escape;
— Elevate mechanical and electrical equipment; and
— Apply planning measures for rising sea levels in coastal areas.

Figure 12: Improving water access through harvesting tanks in Chicualacuala, Mozambique. UN-Habitat, INGC

Figure 13: Elevated school and safe haven in Chikwawa, Malawi. UN-Habitat, Habitat for Humanity, DoDMA, funded by DIPECHO

Cyclones and strong winds

— Install exterior window shutters;
— Install outward-opening doors less likely to be pushed inward in intense winds;
— Design walls that help resist uplift using hurricane straps and other fasteners that provide a continuous load path from the foundation to the roof;
— Anchor walls properly to foundations or frost walls;
— Apply walls that resist shear and lateral forces, using engineered wall bracing or shear panels for frame walls and use of re-bar for masonry walls;
— Design roof geometries (such as hip roofs) that are less prone to wind damage than gable roofs;
— Install continuous roof underlayment; and
— Install high-strength roof sheathing that can resist uplift.

Wildfires

— Specify Class A fire ratings for roofs, which guarantees the highest resistance to fire;
— Eliminate gutters on roofs or design and maintain them to be completely free of leaves and vegetation to minimize fire risk;
— Avoid vented roofs or protect vents from ember entry;
— Install high-performance, tempered windows;
— Choose deck materials carefully and avoid flammable materials;
— Install non-combustible siding; and
— Manage vegetation around homes.

Figure 14: Low-cost anti-cyclonic individual houses using local materials in Maroansetra, Madagascar. Medair, UN-Habitat

Power interruptions

Design buildings to maintain passive survivability (high-performance building envelope: high insulation levels, triple-glazed windows in cooler climates, etc.), cooling-load avoidance features, natural ventilation and passive solar heating;
— In urban and suburban areas, maintain access to the sun for site-generated electricity and solar-thermal energy; and
— Plan and zone communities to maintain functionality without power.

3.4 Chapter highlights

Discussing cities immediately brings to mind their physical assets like buildings and infrastructure, the same assets that become so crucial when hazardous events take place. Therefore, adaptive construction techniques, sustainable and resilient infrastructure, and strategic urban planning are all ideal solutions to improve the preparedness and adaptation of cities.

Cities would have no reason to exist without their inhabitants, therefore the socio-economic dynamics are just as important as the more tangible features of a city. In fact, urban resilience goes well beyond physical interventions: while they allow the urban machine to remain well-oiled, social and economic aspects are responsible for its healthy growth. These two aspects fuel each other in the path towards resilience.

Urban vulnerabilities are the result of many intertwined factors which refer to both the physical and the socio-economic sphere. While some settlements can be more vulnerable than others because of particularly challenging threats (such as their specific location as is the case of cities in the cyclone prone south-east region of SADC – see figure 10 on the vulnerability ranking of 20 SADC cities), for other cities vulnerabilities can be more hidden in the folds of the urban structure such as spatial inequalities and uneven access to services and opportunities. All urban vulnerabilities must be considered against the broader context. In fact, even when sharing the same threats and similar weaknesses, the consequences of a common event can have different implications depending on the specific dynamics of a city, some going so far as to have repercussions beyond the city's and even the country's boundaries (see example on damage to the railway lines in Maputo in section 3.2).

Strategies targeting both the physical and the socio-economic sphere are therefore required to effectively tackle urban vulnerabilities but they must be supported by an overall well-functioning institutional set-up. To be effective, laws and regulations must not only be developed and enforced at the local level, but they should also refer to national and regional frameworks, where they exist.

Along with a proper vertical coordination, horizontal cooperation through knowledge sharing among cities with similar challenges is also key in achieving urban resilience.

Collapsed houses and flooded roads after a hurricane in Pemba, Mozambique © Shutterstock/Fivepointsix

Pedestrians and motorists risking their lives to transport passengers in a flooded road in Kigali, Rwanda
© Emmanuel Kwizera/Shutterstock

4.

Institutional and policy discussion

The aim of this chapter is to present the policy instruments guiding urban resilience within the SADC region and its Member States. It primarily focuses on areas of synergy, convergence, divergence and contradictions among these instruments at the various levels. Key to understanding policy instruments is the institutional framework, and this chapter further presents examples of collaboration among cities, municipalities and towns at regional and national levels, highlighting important entry points for strengthening urban resilience to disasters and other shocks and stresses associated with climate change and climate variability.

4.1 Regional coordination

Regional cooperation is crucial for effective DRR and resilience building in both urban and rural areas, and regional mechanisms are playing increasingly important roles. Taking a regional approach has the potential to deliver an integrated model which could support holistic decision making and peer-to-peer learning in areas suffering from similar transboundary disasters, because it takes into account the critical influences of urban regional systems.

"In general, the urban dimension of disasters is still not sufficiently reflected in regional policies, strategies and plans of action. Clearly, as it occurs in most sub-Saharan African countries, urbanization is not yet seen as an opportunity for achieving structural transformation.

Coordinated approaches, regional knowledge management and standardized practices across SADC Member States can significantly strengthen their collective effectiveness in disaster prevention, preparedness, response and resilience building at all levels. Additionally, in light of increasing climate change effects, there is more and more migration and displacement between and within countries in the same region, elevating the need for joint planning and decision-making. This section analyses the SADC region's DRR governance mechanism and its structural efforts to reduce urban vulnerability to disaster risks while fortifying prevention, preparedness, response, recovery and resilience.

1 Million

The minimum number of people that were displaced in Southern Africa by unexpectedly heavy floods in 2007 after which SADC began to meet annually to prepare for future disaster occurrences.

SADC Institutional Set-up

As highlighted in Chapter 2, the magnitude and frequency of national and transboundary disasters in the SADC region has increased in the past two decades. When unexpectedly heavy floods displaced more than a million people in southern Africa in 2007, SADC began to meet annually to prepare for future disaster occurrences. This culminated in establishing a dedicated DRR Unit within the SADC Secretariat, under the Organ on Politics, Defence and Security Cooperation, responsible for coordinating regional preparedness and response programmes for transboundary hazards and disasters, as well as the inauguration of the SADC Regional Platform for Disaster Risk Reduction in 2011.

At its meeting held in Dar es Salaam in August 2019, the SADC Council of Ministers directed the Secretariat to re-activate the Committee of Ministers responsible for Disaster Risk Management, to convene before the meeting of the Council of Ministers and to report on progress to the Council. The Committee of Ministers responsible for DRM met in February 2020 and reviewed progress on DRM in the region. The Ministers recommended that the Council should activate the Technical Committee on Disaster Risk Management which now meets every year as per the Terms of Reference (SADC/DRR/1/2021/03).

At its August 2019 meeting, the SADC Council of Ministers also directed the Secretariat to expeditiously finalize the operationalization of the *SADC Disaster Preparedness and Response Mechanism* by August 2020. This will include a SADC Regional Disaster Preparedness Fund; operationalization of the SADC Humanitarian and Emergency Operations Centre (SHOC) and development of Standard Operating Procedures as well as for the Emergency Response Team (ERT); operationalization of the SADC Joint Operational Centre/Regional Movement and Coordinating Centre to coordinate SADC emergency response and humanitarian assistance pre, during and post disasters management; and other related measures. At the last SADC meeting of the Committee of Ministers responsible for DRM, held virtually and hosted by the Government of the Republic of Mozambique in May 2021, Ministers noted the progress made on these measures.

SADC regional strategies, frameworks and plans related to DRR, climate change and resilience

SADC was the first African Regional Economic Community to draft a strategy to enhance DRR coordination in the region (2001), followed by successive DRR strategies for 2006–2010 and for 2011–2015 (although the latter was developed but not approved nor implemented). For the current period the *SADC Preparedness and Response Strategy and Fund 2016–2030*, the DRR Strategic Plan & Plan of Action 2018–2030 (currently still in draft form) and the Regional *Resilience Framework 2020–2030* have been developed. Each one of these strategies takes into account international and continental objectives as set out in main policies and frameworks at the international and African level as illustrated in figure 15.

People fixing a damaged roof after a cyclone, Beira city, Mozambique © Shutterstock/MiroS Lav

While SADC has not developed a protocol on DRR or management, the multi-disciplinary nature of DRM means that several existing SADC protocols are relevant:

- The ***Protocol on Politics***, *Defence and Security Cooperation* in Article 2 states that a specific objective of the Organ on Politics, Defence and Security Cooperation shall be to "enhance regional capacity in respect of disaster management and coordination of international humanitarian assistance."

- The ***Protocol on Health*** (1999) in Article 25 on Emergency Health Services and Disaster Management states that parties shall: (i) cooperate and assist each other in the coordination and management of disaster and emergency situations; (ii) collaborate and facilitate regional efforts in developing awareness, risk reduction, preparedness and management plans for natural and human-induced disasters; and (iii) develop mechanisms for cooperation and assistance with emergency services.

- The ***Regional Water Policy*** (1995) includes policy provisions covering people's protection from water related disasters, including personal security and property protection, disaster prediction, and management and mitigation.

Over the last two decades, SADC has developed various strategies and policy frameworks for, or related to, DRR, resilience and CCA/mitigation. However, these: (i) are not yet well-aligned with each other; (ii) often have a narrow sectoral perspective; and (iii) are being implemented through different multi-country and national initiatives following a piecemeal approach. In general, the urban dimension of disasters is still not sufficiently reflected in regional policies, strategies and plans of action. Clearly, as it occurs in most sub-Saharan African countries, urbanization is not yet seen as an opportunity for achieving structural transformation. This is problematic considering the rapid growth of urbanization and the high exposure of cities and towns to different types of hazards.

"Coordinated approaches, regional knowledge management and standardized practices across SADC Member States can significantly strengthen their collective effectiveness in disaster prevention, preparedness, response and resilience building at all levels.

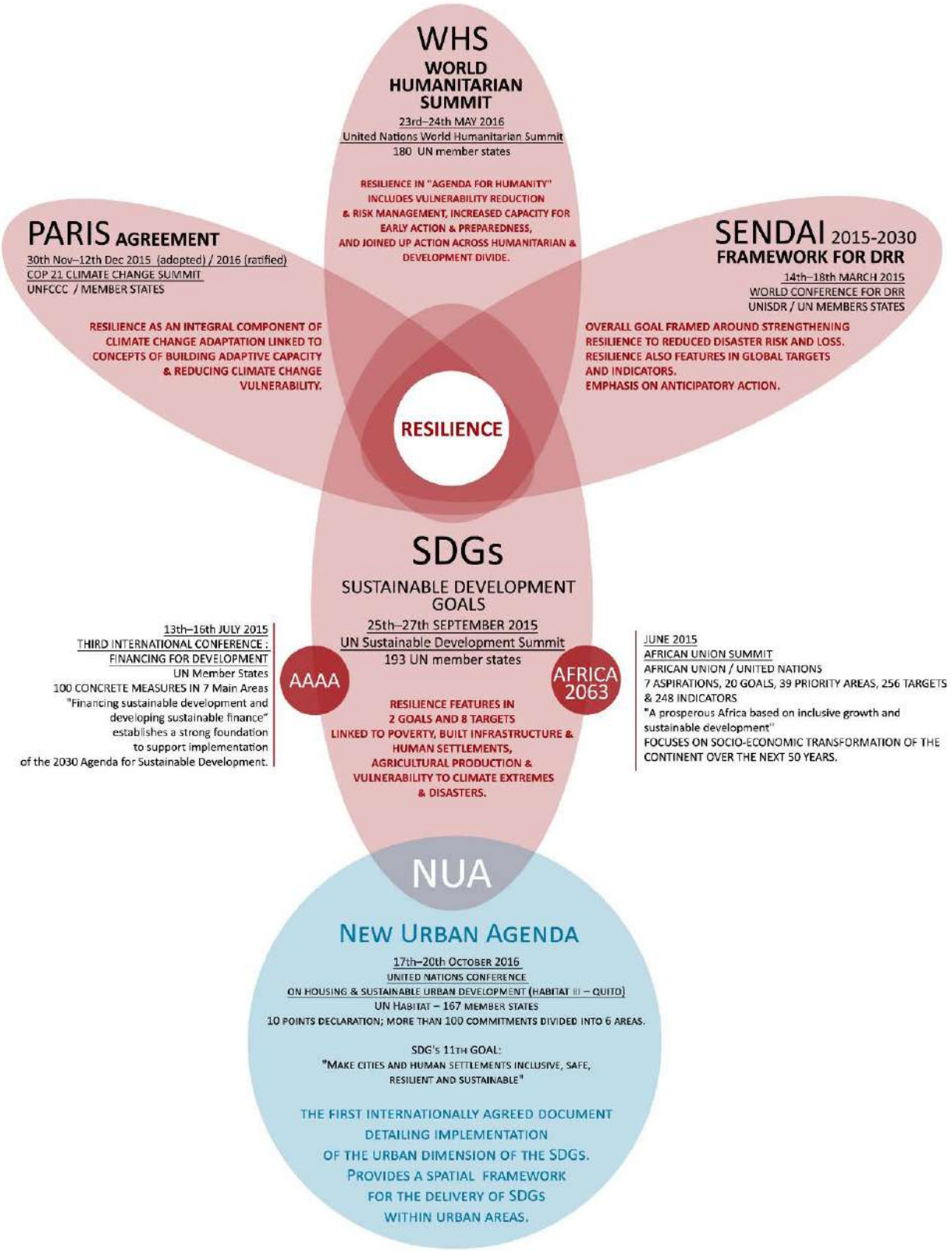


Figure 15: International frameworks relevant to DRR within SADC / Arianna Francioni

Review of applicable SADC policies & strategies

1. SADC policies and strategies related to infrastructure

The *SADC Infrastructure Vision 2027* conceived at the Lusaka Summit in 2007 focused on establishing a strategic framework for guiding the development of seamless and cost-effective transboundary infrastructure. In 2012, a *Regional Infrastructure Development Master Plan* (RIDMP 2012–2017) was developed based on six pillars: energy, transport, information and communication technologies (ICT), meteorology, transboundary water resources and tourism (Transfrontier Conservation Areas).[104] In 2020, the *SADC Regional Indicative Strategic Development Plan* (RISDP) 2020–2030 stressed infrastructure's strategic role in regional integration and socio-economic development.[105]

The RIDMP study revealed that the region was facing challenges in the provision of adequate regional infrastructures, including: a) insufficient energy supply to serve increased production and broad-based access; b) too costly, unpredictable transport and logistics services, especially for landlocked states; c) lack of low-cost access to ICT; d) inadequate meteorological services for the effective and efficient planning and management of water resources, energy production, transport services and other climate-sensitive sectors; e) unacceptably high numbers of citizens without access to safe drinking water, adequate sanitation or water for irrigation for agricultural production and food security; and f) slow responses to new tourism trends and opportunities.[106]

While the SADC region has since made significant progress with some regional infrastructures (e.g. connecting nine SADC countries to a regional electricity power grid – the Southern African Power Pool),[107] a 2019 assessment revealed that only 5 per cent of the infrastructure projects prioritized in the first phase of the RIDMP, had actually been completed. The SADC region has not only been facing fundraising challenges but has also been affected by limited capacity to develop bankable project proposals.[108]

2. SADC urbanization policies and strategies

As stated in Chapter 1, an overall trend in the SADC region has been increasing urbanization. Most of the urban growth is spurred by net immigration.[109] The attraction of urban areas lies in factors common to almost all SADC countries: a search for economic opportunities, better educational amenities, and social and infrastructural services or facilities.[110]

Although some Member States have addressed rural-to-urban migration and urbanization through their national population policies; most neither have explicit urban policies nor urban and municipal legal planning frameworks and adequate implementation capacity.[111]

The obvious challenge for SADC countries is to manage rapid urban population growth in the light of glaring capacity deficits in infrastructure development planning, in the provision of social services, in creating access to employment and economic opportunities, in reducing poverty particularly among urban youth, women and the elderly, in the containment of crime and insecurity and in the provision of recreational facilities.[112]

3. SADC decentralization policies and strategies

The past two decades have witnessed the introduction of decentralization and local government reform throughout the SADC region to improve citizen engagement in the provision of infrastructure and basic services during rapid urbanization.[113] Most SADC countries have established decentralization or local government reform policies to provide guidance on improving citizen engagement. However, despite widespread advocacy and praise for decentralization, the implementation and outcomes vary from one country to another. Differences in progress can be attributed to countries' socio-economic diversity, prevailing national legal and institutional frameworks and the degree of political will to actually implement decentralization and the effects of decentralization (or lack thereof) in general.[114]

4. Other relevant regional mechanisms

The SADC RISDP emphasises that cooperation in food security policies has led to an effective disaster risk preparedness and management mechanism by implementing programmes and projects aimed at multi-hazard early warning and mitigation of disaster impacts. It includes the following institutions and programmes: a) the Climate Services Centre; b) Water programmes; c) the Natural Resources Management Programme; d) the Agricultural Information Management System; e) the Regional Remote Sensing Unit; and f) the Regional Vulnerability Assessment and Analysis Programme (RVAA) coordinated under the SADC DRR Unit.

The SADC RVAA Programme has facilitated the strengthening of a RVAA system. The RVAA Programme, comprising regional and national vulnerability assessment committees, has become a critical source of information for emergency responses and development programming to governments and their development partners. Resource and political constraints are a concern, notably because political approval is required before analysis results can be made public, hence the analyses may not always reflect the true picture.[115] Importantly, since 2008, there has been a concerted effort to better understand urban livelihoods and how they are impacted by shocks. This urban perspective is commendable and crucial to understanding not only urban vulnerabilities but also the dynamics of rural-urban linkages in this context.

104 SADC, 2012
105 SADC – *Short Term Action Plan Assessment, 2019*
106 SADC, 2012
107 Ibid
108 SADC – *Short Term Action Plan Assessment, 2019*
109 SADC, 2013
110 Ibid
111 Ibid
112 SADC, 2013
113 P Kundishora, 2009
114 Ibid
115 UNECA, 2015, p. 22

4.2 Resilience frameworks at country and city levels

At the time the SADC Secretariat was developing the regional resilience framework, Eswatini, Lesotho, Malawi and Zimbabwe had already developed their national frameworks. Since then, the South African cities of Cape Town and Durban have also developed their own city-level resilience strategies as part of the 100 Resilient Cities Initiative.[116] Other urban centres in SADC Member States have developed DRM plans or other related frameworks to guide resilience building. For example, four cities, two municipalities and one town council in Malawi have developed DRM plans with support from the national government and the United Nations Development Programme (UNDP).

The SADC Regional Resilience Framework 2020–2030 has been developed "to allow for, and find alignment and coherence with, these existing strategies and plans."[117] The framework has seven priority areas. Each priority area then has its specific objectives:

- **Priority 1:** Integrated governance and informed decision-making
- **Priority 2:** Social and human protection and mobility
- **Priority 3:** Food and nutrition security
- **Priority 4:** Robust and connected infrastructure
- **Priority 5:** Sustainable urban centres
- **Priority 6:** Natural resources management, protection of biodiversity and conservation
- **Priority 7:** Understanding disaster risks including climate change

"The resilience building activities of the United Nations are shaped by the Strategic Framework to Support Resilient Development in Africa of the Regional United Nations Development Group for Eastern and Southern Africa.

While some synergies can be observed from the resilience policy instruments developed, generally there is still a disconnect/non-alignment between the strategies from regional to city level. As mentioned in Chapter 3, vertical coordination is often lacking especially regarding integration of the urban perspective in frameworks at national level. Of the four countries mentioned previously – Eswatini, Lesotho, Malawi and Zimbabwe – it is of note that neither of their resilience strategies include specific priorities on urban centres and their resilience.

Solutions should be brought from the regional and national levels to the ground and common approaches facilitated to make impactful progress. To facilitate this, national DRR entities should work together with local entities so that national coordination is aligned rather than often scattered.

4.3 Regional networks

Other regional, multilateral and bilateral initiatives and networks exist that complement the efforts of the SADC Secretariat and its Member States. These include civil society and academic actors who drive DRR, CCA and resilience building. The networks perform crucial roles in bringing different players together and have been used as vehicles to build urban resilience, amongst others. The two cities that have developed resilience strategies in Africa (Cape Town and Durban), for example, have done so under the umbrella of the 100 Resilient Cities Network. This brief overview only relates to sub-regional and regional and global initiatives although a multitude of initiatives exist at national and local levels as well.

The resilience building activities of the United Nations are shaped by the Strategic Framework to Support Resilient Development in Africa of the Regional United Nations Development Group for Eastern and Southern Africa. It proposes a number of principles which inform programming by United Nations Country Teams.

Southern Africa's Regional Inter-Agency Standing Committee (RIASCO) is part of a global network of inter-agency standing committees established for coordination, policy development and decision making involving key United Nations and non-United Nations humanitarian partners. Its Resilience Working Group provides support to SADC and has facilitated the preparation of the SADC Regional Resilience Framework 2020–2030, which was approved in February 2020. RIASCO pays significant attention to rural to urban migration caused by disaster displacement, but doesn't go as far as to explicitly target disaster preparedness and resilience building in cities. This dimension is critical, and must be emphasized in the regional humanitarian and development coordination networks.

116 *The Rockefeller Foundation-sponsored 100 Resilient Cities*. https://www.rockefellerfoundation.org/100-resilient-cities/
117 SADC, 2018

Some civil society organizations from the SADC region are joined under an umbrella organization, the Global Network of Civil Society Organizations for Disaster Reduction. Others, such as Oxfam, are linked to both RIASCO and are also part of the Executive Board of DiMSUR, a knowledge centre founded by the Governments of the Comoros, Madagascar, Malawi and Mozambique, facilitated by UN-Habitat (see Introduction).

On one hand, it is widely recognized that many humanitarian partners and countries have gained the expertise and capacity to operate in urban settings. However, there remains a lack of information, evidence and consideration of the specificities of urban contexts in, and their impacts on, humanitarian operational responses and strategies. There is a need for better tracking of actions, use of the full scope of available tools, as well as developing a clear picture of existing resources, partners' institutional urban policies, tools and good practices.

On the other hand, a number of city networks exist which include SADC countries. Some of these networks focus especially on CCA, risk reduction and resilience building for urban areas, but often with more general mandates. It is essential that cities can learn from each other on these important topics, taking into consideration that they are at the forefront of prevention, preparedness, response and recovery when a disaster strikes. Better alignment and coordination between the humanitarian and development networks and the city networks would greatly benefit the arena of urban DRR, resilience and CCA. Table 2 details the relevant city networks (see also figure 16).

Young children in line at a feeding scheme in the aftermath of a cyclone in Beira, Mozambique - Shutterstock/Charl W Folscher

	Name of network	Rationale of network	SADC member cities
TRANS-NATIONAL NEWORKS WITH SADC MEMBERS	**C40**[118]	A global network of megacities committed to addressing climate change with 96 affiliated cities in 47 countries. C40 supports cities to collaborate effectively, share knowledge and drive meaningful, measurable and sustainable action on climate change.	Dar es Salaam (the United Republic of Tanzania); and Johannesburg, Cape Town and Durban (South Africa).
	Global Resilient Cities Network (GCRN)[119]	GCRN emerged from the 100 Resilient Cities Programme and seeks to drive urban resilience action to protect vulnerable communities from climate change and other physical, social and economic urban adversities and challenges. The network aims to continue supporting cities and their Chief Resilience Officers in future-proofing their communities and critical infrastructure.	Cape Town and Durban (South Africa).
	Metropolis[120]	Metropolis serves as a hub and platform for cities to connect and share experiences on a wide range of local and global issues, in addition to being the focal point of worldwide experience and expertise on metropolitan governance.	Antananarivo (Madagascar); Durban, Gauteng and Johannesburg, (South Africa); and Harare (Zimbabwe).
	Cities4Forests[121]	Cities4Forests helps cities from around the world connect with and invest in urban, nearby and faraway forests. It encourages cities to better conserve, manage and restore forests and provides technical assistance to align local policy, shared knowledge, peer-to-peer learning and communication activities to help cities take climate action together.	Antananarivo (Madagascar), and Johannesburg (South Africa).
	Commonwealth Sustainable Cities Network (CSCN)[122]	CSCN was formed to enable the Commonwealth Local Government Forum members, and its city/municipal members in particular, to come together to look at key issues relating to effective urban management and creating inclusive and resilient cities in line with Sustainable Development Goal 11.	Cities in Angola, Botswana, Eswatini, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, the United Republic of Tanzania and Zambia.
	United Cities and Local Governments (UCLG)-Africa (UCLG-A)	UCLG-A is an umbrella international organization for cities, local and regional governments, and municipal associations at the level of the African continent that is concerned with representing and defending the interests of local governments. It is part of the UCLG network which is a decentralized structure composed of seven regional sections, one metropolitan section (Metropolis) and one section for regional governments.	40 national associations from all African regions and 2,000 cities are members of UCLG-A.
AFRICAN NETWORKS WITH SADC MEMBERS	**Covenant of Mayors in sub-Saharan Africa (CoMSSA)**[123]	Started in 2015, CoMSSA supports sub-Saharan cities in their fight against climate change and in their efforts in ensuring access to clean energy.	Cities in the Comoros, the Democratic Republic of the Congo, Eswatini, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, the United Republic of Tanzania, Zambia and Zimbabwe.
	African Smart Towns Network[124]	The French Development Agency (AFD) is supporting 12 African cities in their efforts to make the transition to digital platforms. The municipalities' aim is to collectively develop and share skills in digital services across sectors to become sustainable smart cities.	Maputo, Mozambique.
	South African Cities Network (SACN)[125]	SACN is an established network of South African cities and partners that encourages the exchange of information, experience and best practices on urban development and city management.	Buffalo city, Ekurhuleni, Ethekwini, Johannesburg, Mangaung, Msunduzi, Nelson Mandela Bay and Tshwane.
	Local Governments for Sustainability (ICLEI) Africa[126]	ICLEI is a global network of more than 1,750 local and regional governments committed to sustainable urban development active in 100+ countries that seeks to influence sustainability policy and drive local action for low emission, nature-based, equitable, resilient and circular development.	124 cities, towns and regions in Africa.

Table 2: City networks in the SADC region and beyond

118 https://www.c40.org/
119 https://www.rockpa.org/project/global-resilient-cities-network/
120 https://www.metropolis.org/members
121 https://www.wri.org/our-work/project/cities4forests
122 https://www.clgf.org.uk/regions/clgf-southern-africa/; https://www.clgf.org.uk/regions/clgf-east-africa/
123 http://comssa.org/
124 https://www.afd.fr/en/actualites/12-african-cities-making-digital-transition
125 http://sacities.net
126 https://africa.iclei.org

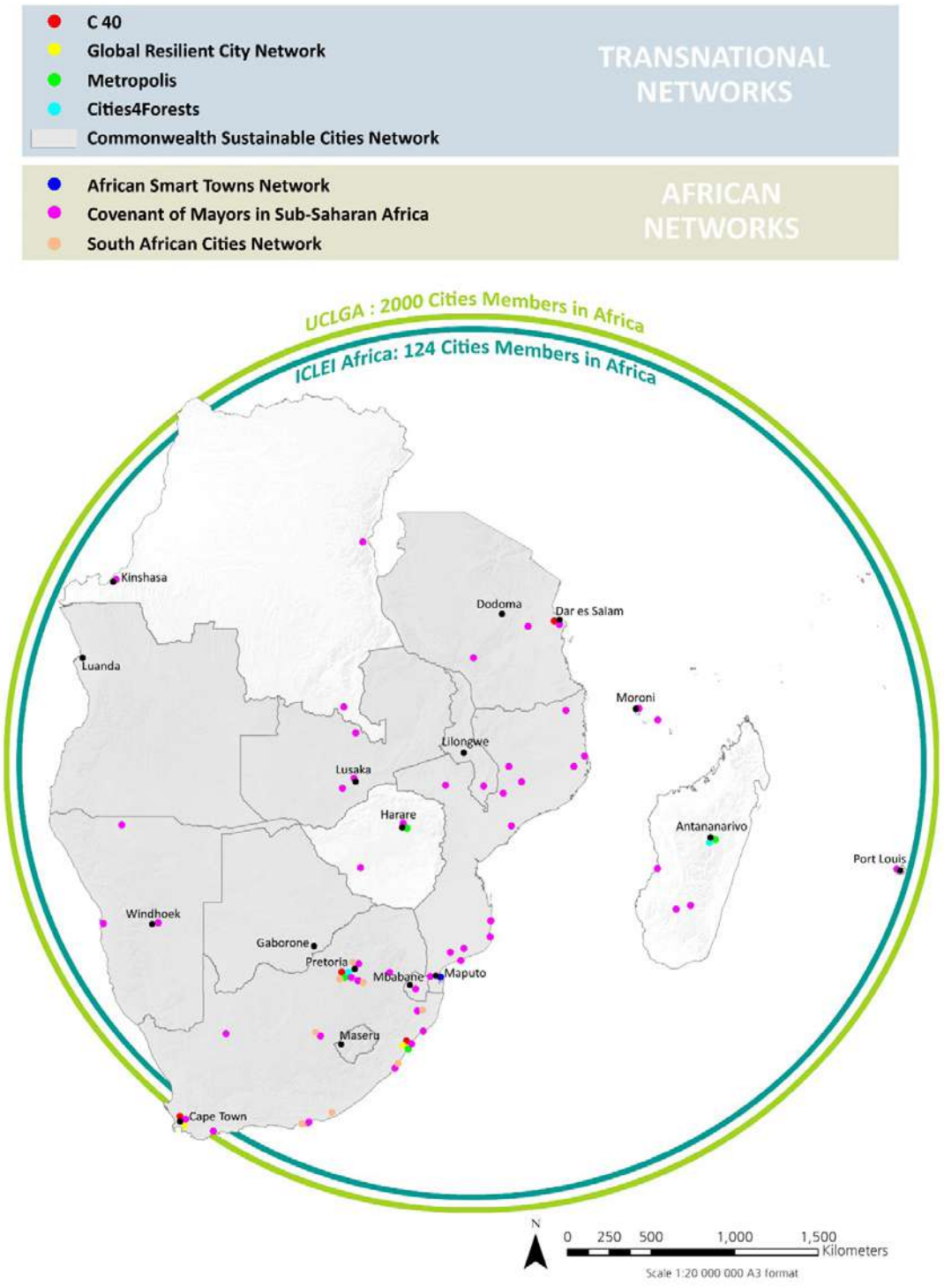


Figure 16: City networks in the SADC region and beyond

4.4 Private sector and academia

Private sector

For DRR in general and in urban areas in particular, the private sector is a critical stakeholder. Businesses have a lot to lose if a disaster strikes as it may severely impact profit and business continuity but they have a lot to gain by participating in disaster management and resilience building. It can also be the case that businesses themselves create the risk and must change their practices to address this. The private sector, usually through their Corporate Social Responsibility schemes, can make impactful contributions to DRR, CCA and resilience through investment, innovation, technology, awareness raising and collaboration with the public sector and communities. Currently in the SADC region, direct investments in DRR remains low and the involvement of the private sector is limited, despite the fact that the private sector is a development partner in the region. However, more and more companies are starting to move beyond development and are also investing in humanitarian and DRR related arenas.

“Private sector engagement in building urban resilience is particularly important as the need is vast while grant funding from governments and donors is limited. There are unmet market needs and consequently opportunities for private enterprise interventions exist.

“The resilience building activities of the United Nations are shaped by the Strategic Framework to Support Resilient Development in Africa of the Regional United Nations Development Group for Eastern and Southern Africa.

The Private Sector Alliance for Disaster Resilient Societies is a network of private sector entities led by the UNDRR. The private sector has been an important player in supporting DRR efforts among Member States. While their focus has mostly been on the provision of response at the level of Member States or at the regional level such as during Cyclone Idai, others have gone into mainstream resilience building. An example is the African Risk Capacity (ARC) who are providing catastrophe insurance to SADC Member States. Different aspects and possibilities to engage the private sector within urban dimensions such as micro-insurance, healthcare, waste and sanitation, water management, affordable housing, off-grid renewable energy, microfinance and information and communication technologies (ICT) should be further analysed by the Association of SADC Chambers of Commerce and Industry and the SADC Business Forum.

Private sector engagement in building urban resilience is particularly important as the need is vast while grant funding from governments and donors is limited. There are unmet market needs and consequently opportunities for private enterprise interventions exist. The needs are various including insurance, flood defence measures, innovations for early warning systems, new ways of enhancing disaster response and capacities for search and rescue, among others.

One interesting initiative in a SADC Member State is the Business Adopt a Municipality Project in South Africa which supports identified municipalities in fire services and DRM projects. Through this joint initiative and strategic engagement with the private sector, municipalities in South Africa receive guidance and advice on local structures as well as fire equipment to strengthen their capacity and improve their response time to fires. Another example comes from the beginning of the COVID-19 pandemic. Globally, telecommunication providers have become key players in the prevention, preparedness and response to the COVID-19 pandemic. As the virus started spreading in Africa it became clear to the African Telecommunications Union (ATU), a specialized arm of the African Union (AU), that ICTs had evolved from being a support tool to becoming a strategic asset against the pandemic and a pillar for socio-economic development. The ATU swiftly proposed recommendations and guidelines for telecommunications regulators and operators in AU Member States, including the activation of the Common Alerting Protocol and Collaborative Practical Measures. Subsequently the ATU announced a regional innovation challenge calling for solutions and ideas for how Africa can stay above the impact of COVID-19 through innovation.

Businesses, big or small, are part of the DRR value chain and must be creatively and actively engaged in urban disaster prevention, preparedness, response and resilience building. There are some emerging examples from throughout the SADC region but in general the urban angle of this issue is much less emphasized and studied then the rural dimension – in line with the general focus on rural areas in DRR in Africa. This focus, however, needs to shift as disasters are increasingly affecting cities where business interests and opportunities are diverse and intricate.

Academia

Academia also plays an important role in urban resilience building in the SADC region. Institutes of higher education, research institutions and academic networks in particular are in a unique position to provide the critical link between multiple private and public institutions with the aim of promoting cross learning that can identify risks and vulnerabilities and support the implementation of concrete innovative solutions. These include networks such as Periperi U as well as the Southern Africa Society for Disaster Reduction (SASDiR), a community of practice for DRR. SASDiR aims at establishing intra-regional linkages between national DRR units as well as bringing in non-traditional players in the DRR field. In addition, SASDiR publishes an annual scientific journal, Jàmbá, to act as a platform for knowledge sharing in order to inform local, national and regional level legislatives on effective policy making.

In a number of Member States, academic programmes on DRR or CCA have been introduced as a way of building regional capacity in resilience, including setting up centres of disaster and climate resilience at national and regional levels. The North-West University in South Africa, for instance, has established the Africa Centre for Disaster Studies "to provide internationally relevant academic courses, conduct world-class innovative research, outstanding consultancy services, community-based and locally relevant outreach programmes, and ground-breaking DRR projects for the African continent in order to encourage and stimulate sustainable development and social transformation." Similar initiatives have been established at two other South African universities: the University of Cape Town and the University of the Free State. The Disaster Mitigation for Sustainable Livelihoods Programme and the Disaster Management Training and Education Centre for Africa initiatives both aim at producing seminal research as well as informing and supporting governments on issues of DRR.

For better coordination of all stakeholders and initiatives, the SADC Regional Resilience Framework 2020–2030 proposes that the SADC Secretariat puts in place structures and mechanisms that will facilitate the coordination of resilience building and provide a central connecting point for resilience knowledge and information. To this end, the Framework proposes the establishment of a regional resilience hub for capacity development, research and knowledge management and cites established networks (such as Periperi U or DiMSUR) as possible locations to house such a hub. A number of academic and DRR institutions from within the region, as well as outside, are already included in either or both of the Periperi U and DiMSUR networks, giving them a solid base for facilitating the hub in addition to having the credibility to expand such networks. While efforts, by SASDiR for instance, have been made to bring actors together, the DRR field in Southern Africa remains woefully fragmented making it crucial to combine the different efforts under one body. A well-functioning and coherent DRR network consisting of local and international actors would enable improved South-South and triangular cooperation.

There seems to be impetus from several institutions of higher education in the region to develop a common regional DRR research agenda. The aim of this effort is to achieve linkages between academic institutions and governing bodies to better inform policy making. Under a common research agenda, academic programmes and research could be effectively designed to provide influential and in demand pieces of knowledge that can be actively exploited for improving DRR measures in the region. In order to identify synergies and avoid overlaps between different initiatives, a thorough mapping of all active players within the region is needed, as well as the setting up of an interactive database for knowledge sharing.

"Academia also plays an important role in urban resilience building in the SADC region. Institutes of higher education, research institutions and academic networks in particular are in a unique position to provide the critical link between multiple private and public institutions with the aim of promoting cross learning that can identify risks and vulnerabilities and support the implementation of concrete innovative solutions.

Tropical Cyclone Dineo destructions at the center of Maxixe city, Inhabane region, Mozambique
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5

Conclusions and recommendations

Southern Africa remains one of the regions most exposed to natural hazards in Africa. It frequently experiences multi-tiered hazards (as is the case today with the addition of the COVID-19 pandemic), which compound the impact of cyclones, seasonal floods and droughts. Some of these hazards have intensified in strength and recurrence over the last decades because of climate change. Simultaneously, the region is rapidly urbanizing, often in an uncontrolled manner, increasing the vulnerability of urban populations to these threats. In urban centres socio-economic tensions, mainly due to growing inequalities and lack of access to basic services and income opportunities, further aggravate the levels of vulnerability.

The needs of the Southern Africa region to build its urban resilience are immense. They require strategic thinking and partnership building as the issue is broad and cannot be tackled solely by a single government institution, community, company, organization or individual. It requires cooperation, coordination, sustained political will, sharing of knowledge, information and ideas as well as a concerted effort to jointly find innovative solutions to shared challenges. The answers to the region's needs are embedded in coordinated multi-country approaches that go beyond local, national and sectoral boundaries.

Although at the regional level the SADC Regional Resilience Framework 2020–2030 has been developed and clearly mentions sustainable urban centres as one of its priorities, it is still rare to find the urban dimension in frameworks and strategies at the national level. In general, SADC Member States are not yet able to establish and implement strategies that can promote urban development processes that ensure climate and disaster resilience and more balanced socio-economic dynamics. This aspect, paired with an urbanization pace which is so fast that it becomes highly difficult to manage, leads to SADC Member States still being far from fully prepared to prevent and manage urban crises. Urbanization in the region is still mainly driven by impoverished rural population groups migrating to cities in search for employment or income opportunities, access to basic services and better living conditions, but who often end up living in crowded and unplanned informal areas. Hence the prevailing trend is a poverty-driven urbanization that translates into growing informal settlements often located in high-risk areas. Meanwhile, larger investments in cities, including those from the private sector, are often not designed to withstand the impacts of climate change as clearly shown by Cyclones Idai and Kenneth in March and April 2019, respectively.

The following recommendations have emerged from this report:

1

Enhancing policy, legislation and institutional frameworks with a stronger urban focus

→ The institutional capacity of SADC, given the complexities and cross-cutting nature of DRM should be strengthened. Its DRR Unit is a good start in terms of strategy and policy coordination. However, as observed during this assessment, it does not have sufficient personnel and lacks room for action as it is embedded in one directorate only. The Unit is not able to influence policies, strategies and processes across the SADC Secretariat, which is much needed considering that urban resilience is an inter-sectoral agenda.

→ Overall, while most SADC Members States have initiated a policy shift from disaster response to a more proactive, holistic and integrated DRM approach, this needs to be accelerated and institutionalized with explicit emphasis on urban areas. In particular, it is essential to have enabling legal and policy frameworks such as improved building codes, to mainstream climate resilience in urban development processes.

→ Strengthened DRM coordination through better alignment of related strategies and plans at the different administrative levels (e.g. local, sub-national, national and regional) and targeted capacity building at the local (city/district) levels would benefit all SADC Member States. Regional coordination and knowledge management can facilitate this alignment, and standardized practices could reinforce it in its application.

→ To build urban resilience at the regional level, there is a need to further advance the emergency response-development nexus and to strengthen the integration of an urban perspective when defining DRM and CCA strategies. A step forward in this sense has been taken in the *SADC Regional Resilience Framework 2020*–2030 which lists Sustainable Urban Centres as a priority area. Additionally, the establishment of regional centres of excellence or operation which can closely collaborate with the SADC DRR Unit, such as DiMSUR, the proposed SADC SHOC, or academic networks such as Periperi U, are critical to the solution.

→ The first step towards accomplishing a successful integration between DRR and CCA should be acknowledging the need for this integration. In many SADC countries, national structures should be reviewed to allow for the merging of multi-sectoral technical advisory groups on DRR and CCA, as demonstrated by a few countries. This would not only combine the efforts made in each of the fields, but it will also bring together the different funding schemes and eliminate duplication of efforts as is the prevailing current situation in many cases.

→ Establishing and/or strengthening multi-jurisdictional coordination mechanisms is key in areas with high levels of urbanization. Critical infrastructure planning, such as the development and maintenance of transport, water and energy networks is more often better carried out by governing bodies that operate at regional or sub-regional levels contributing

to economies of scale, as well as facilitating the integration of DRR and CCA considerations into the design and operation of such networks. Such cooperation would be beneficial and could serve as a catalyst for developing or improving local/endogenous solutions or contributing to increased South-South exchange of capacity and knowledge.

2

Capacity building, knowledge and information management

→ Resilience building must start with improved coping capacity of local populations. This can be achieved through awareness raising and community involvement and empowerment. Improving disaster-risk education is essential by gradually integrating age-appropriate educational messages about disaster risk preparedness/responses and urban resilience into formal curricula. Similarly, disaster risk awareness should be integrated into non-formal educational and training initiatives, as well as by carrying out targeted public awareness-raising campaigns. Both academic institutions and the private sector can play an important role in supporting national and local governments in designing, targeting and executing creative and informative education and awareness programmes targeting urban areas. Although the number is growing, currently there are still few establishments offering courses on topics related to urbanization and DRM in the region. Curriculum reviews should be extended to critical sectors at the centre of urban governance including water resource management, solid waste management, transport, building, trade and industry so that there is integration of resilience.

→ The development of a regional body of knowledge and expertise to tackle urban risks and to identify and implement concrete solutions is urgently needed including an easily accessible, multi-lingual and user-friendly regional information management system. The involvement of academic and training institutions is key. Regional centres such as DiMSUR can also play an important role as repositories of data and knowledge, and be used as platforms for exchange.

→ In general in Southern African countries, there is a notable data gap when it comes to disaster risks in urban areas. This shortfall calls for improved data collection mechanisms, harmonization of methodologies between hazards and risks research institutions, and more data sharing across institutional and political boundaries for which sustained financial support and appropriate technical capacity are needed. Of critical importance is to revise existing data collection tools and processes for vulnerability and disaster loss and damage assessments, including those done by the food-security vulnerability assessment committees in the region, so that they incorporate indicators and parameters relevant to urban areas. Member States should have systems in place that will ensure timely updating of disaster databases and related datasets.

→ There is a need to undertake comprehensive multi-hazard risk assessments in urban areas and develop future risk scenarios of the potential impacts of climate variability and change on urban areas. These would contribute towards enhancing regional and national governments' understanding of their risk profiles and their capacity to integrate resilience-building considerations into their respective development planning processes.

3

Strengthening regional and national urban planning for building resilience

→ An urban system is a socio-ecological system and its underlying components exhibit multiple linkages across spatial and temporal scales (Wilkinson 2012a). Spatial planning efforts for enhancing urban resilience, therefore, should neither be restricted to city boundaries nor to current scenarios. This is particularly important for planning at a greater geographical scale for cities/towns falling within defined ecosystem boundaries such as river basins.

→ Agglomeration benefits of cities offer pathways to innovation and economic prosperity as well as providing access to basic services and social welfare for more people. Cities have the potential to accommodate the growing global population in compact structures, stopping the uncontrollable urban sprawl. Furthermore, a compact but well-balanced urban structure can reduce energy use and the resultant pollution from traffic and heating, while still providing ecosystem services to the population and promoting good health. What matters most is the need to grab the opportunity to reverse disaster trends triggered, accelerated and/or worsened by human actions and, more specifically, by environmentally and socially unsustainable urbanization patterns.

→ Considering the importance of the municipal/urban dimension in territorial management at the regional/national/sub-national level, better inclusion of local authorities in national/sub-national planning and budgeting processes is critical. In addition, establishing/reinforcing city-to-city cooperation and collaboration

mechanisms for exchange of DRM best practices, can lead to more integrated and effective responses, as well as a better use of natural resources.

→ It is important to reinforce the system of cities by delocalising some socio-economic functions of primary cities to secondary and tertiary cities so as to reduce migration of the rural youth towards the capital cities. In the SADC region, measures are needed to counteract the unsustainable trend of megacities. This entails strategic spatial planning at the regional/national level and a sound geographical distribution of investments to effectively prevent urban sprawl and slum/informal settlement development in primary cities through the development of alternative poles of attraction in selected secondary/tertiary cities. The secondary cities should be adequately prepared and equipped to meet the needs of their quickly growing populations. This development is essential to effectively reduce vulnerabilities in larger urban centres.

→ The mushrooming of megacities in Africa is a powerful force but it is a trend that needs to be controlled. One major challenge is that these cities are often over-spilling beyond their official administrative borders which weakens the city's ability to govern certain areas, usually informal in nature. Establishing metropolitan governments is key to ensuring that megacities can be better managed.

→ Cities of different sizes have differentiated needs, which must be kept in mind and attention has to be paid to all of them. Big or small, cities in Africa are responding to the challenge of climate change and coming up with innovative home-grown solutions from planting millions of trees to fight the UHI effect, to women farmers tending to urban micro gardens for improving urban food security. The ideas are there and more cross-country and city-to-city learning and exchange should be facilitated, coordinated and encouraged especially among those having similar features and sharing the same threats.

→ At the city scale, urban plans should systematically integrate environmental, ecosystem-based, risk reduction and resilience dimensions, and be implemented through effective compliance and enforcement mechanisms, e.g. no construction in areas classified as zones at risk, design of resilient infrastructure, etc. which are also key conditions in the event of the request for alternative financing mechanisms (see financing and socio-economic considerations below). For this to happen, urban plans need to be guided by relevant and high-quality data, be prepared in a participatory manner to harness local knowledge and ensure community ownership, while embracing a long-term vision of city development that takes into consideration the projected impacts of climate variability and change as well as mid- and long-term demographic projections, among other factors.

→ It is of critical importance that vulnerable groups such as women, children and youth, the elderly, migrants, ethnic minorities and persons with disabilities are actively involved in DRM planning and decision-making processes, and that their needs and aspirations are taken into consideration. In particular, gender integration during both the planning and implementation phase of an urban project, guarantees a much higher level of community resilience.

→ Adequate urban planning and proper guidance/control of urban development is key to attracting private investors to cities, and gradually shifting from the subsistence and informal economic dynamics towards increased participation into manufacturing, industrial production and service sector-related jobs.

4 Disaster risk financing and socio-economic considerations

→ While carrying out this assessment, it has been observed that there is a chronic funding dependency on external partners for supporting policy, institutional capacity and programme development and implementation in most of the SADC region. There is a need for establishing mechanisms that enable endogenous capacity development and institutional strengthening so that policies can be adequately contextualized and supported through a mix of regional and national funding sources, including for risk financing. From this perspective, the establishment of a Regional Resilience Fund which could pool donations from SADC Member States, the private sector, NGOs, international development partners and ordinary citizens for relief efforts, is certainly something to be pursued.

→ Multiple options exist to strengthen the region's preparedness and resilience through different financing mechanisms. Several countries have developed disaster risk financing strategies while others have different forms of financing mechanisms in their legislation or policies. Operationalization of these instruments is essential if the region

is to tackle the threats that climate change and disasters pose on the economy, development, ecosystem, lives and livelihoods.

→ While the ARC offers an opportunity for disaster risk insurance, very few countries have taken this path. What is even more worrying is that at country level, the extent to which the insurance industry considers catastrophic insurance related to disasters is very limited, and where it exists it is mainly driven by projects and not the industry. The ARC and broader private insurance industry will, therefore, need to do more sensitisation among Member States on the options available and benefits of the various risk transfer products.

→ To be sustainable, cities are supposed to provide decent job opportunities and/or regular sources of income especially targeting youth and the low-income class. Failure to do so will inevitably lead to further growing inequalities and socio-economic tensions that, in turn, will cause spiralling criminality, social unrest, riots and increased vulnerability. A city can become resilient when its citizens have acquired enough financial capacity to improve their dwellings and living conditions, are able to contribute to the city's revenues and have better access to education facilities and socio-economic services. Scaling up shock-sensitive social protection schemes to also target vulnerable urban populations will go a long way in enhancing the resilience of the urban population.

→ Addressing informality requires developing pro-poor urban policy frameworks (see the first set of recommendations) that enable not just physical upgrading but especially socio-economic upgrading by creating better income opportunities for low-income groups. However for that to happen, local governments need to develop/adhere to such enabling policies and have access, together with the private sector, to adequate investment financing and to an increasingly educated, healthy workforce to fill up the demand for qualified employees.

5 Promoting durable urban solutions

→ Resilient cities should follow greener development paths, creating jobs linked directly or indirectly to virtuous green economy cycles, as well as inclusive public and green spaces where people can mix and socialize. Shifting to a green economic model can provide a unique opportunity for SADC Member States to innovate, diversify and create employment while better adapting to climate change at the same time. Growing urban populations and development of secondary cities poses a threat to the greening of urban areas as their development tends to destroy the urban component of the city.

→ There is a need to promote nature-based solutions for urban climate adaptation and DRR such as leaving green buffer areas in flood-prone areas, planting trees to prevent erosion and facilitate retention and infiltration of rainwater, developing green infrastructure, etc. It should be appreciated that engineering approaches that seek to eliminate risk factors through physical planning interventions and applying technological fixes, such as the construction of coastal walls and embankments, may not be sustainable and sufficient in safeguarding communities.

→ There is also a need for the provision of different architectural and engineering climate-proof designs, options and solutions that fit a variety of requirements and local contexts, and the widespread dissemination of such options. Effective supervision of the re/construction process in a more resilient manner, including development control and inspection mechanisms, is essential.

→ Promoting urban and peri-urban agriculture is a strategy that can bring multiple benefits and help to build resilient urban food systems at the city level. Clearly, a major challenge at the intersection of the COVID-19 crisis and climate change in Africa relates to food security as the pandemic came at a time when underlying climate change impacts and recurring hazards were already compromising food and water security. COVID-19 has further ravaged food industries, especially staple foods, which are critical for livelihoods in Africa. A thorough examination is needed of food systems and food security in African cities to provide insights into understanding and addressing urban poverty and vulnerability to hazards. The upcoming Food Systems Summit will provide a platform for these discussions and can be an incubator for local innovations from the region.

→ Ensuring access to and continuity of infrastructure and basic services, even in times of disaster, is crucial to meeting the vital needs of urban populations and to allow a city to keep functioning; this requires climate-proofing existing infrastructure, designing new resilient infrastructure and strengthening urban management mechanisms by linking the city government with the end-user.

6

Strengthened inter-country and inter-city cooperation

→ SADC has developed inter-country cooperation to strengthen its weather forecast capabilities to help improve contingency planning ahead of the rainy and dry seasons, as well as reinforce early warning and information management systems. Increased collaboration among countries is absolutely essential to mitigate transboundary/common hazards.

→ Importantly, in the context of risk reduction and resilience building for urban areas, a number of city networks exist which include SADC countries. Cities can learn from each other on these important topics – since they are at the forefront of prevention, preparedness, response and recovery when disasters strike – sharing knowledge, lessons learned and best practices.

Volunteer action in solidarity with victims of a cyclone at the port of Maputo, Mozambique © Shutterstock/Victor Espadas Gonzalez

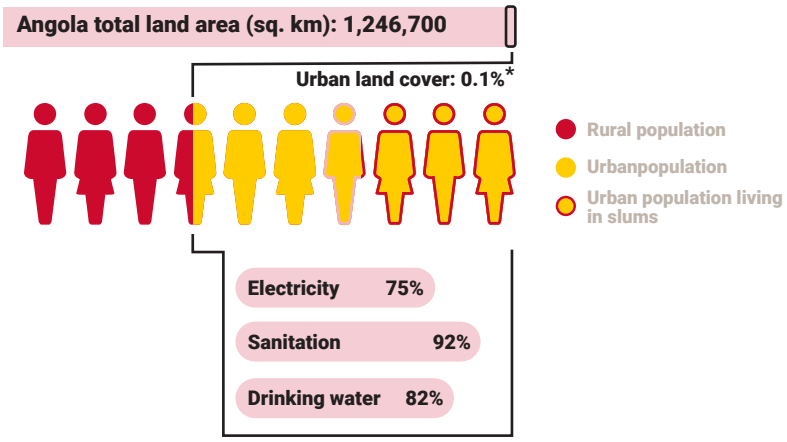
Volunteer action in solidarity with victims of a cyclone at the port of Maputo, Mozambique
© Shutterstock/Victor Espadas Gonzalez

A woman desperate for food at a feeding scheme in the aftermath of Cyclone Idai in Beira, Mozambique © Shutterstock/Charl W Folscher

ANNEX

Annex 1: Country profiles

Angola



* *Percentage drawn from World Bank data on total and urban land area in 2010. In absence of data for 2020, a slightincrease can be assumed.*

Figure 17: Angola urban infographic

Socio-economic context

With a total of 31,825,295 inhabitants (World Bank, UNDESA, 2019), Angola is one of the most populous countries of the SADC region although with a low population density, counting 25 people per square kilometre of land area (World Bank, 2018). Higher concentrations of people are found in the cities. Despite covering just a small part of the total land of the country, they host more than 60 per cent of the total population as shown in figure 17. According to UN-Habitat, in 2020 the urban population share in Angola was 66.8 per cent with an annual growth rate of 4.25 per cent (World Bank, 2019), which places Angola among the top three most urbanized countries in the region in 2020 and for years to come (see figure 4).

From 2012 onwards the country experienced a fairly constant GDP decrease matched by increased poverty levels. In fact, compared to 2008 when 34.4 per cent of the total population was living below the poverty line, in 2018 the number exceeded half of the population registering a percentage of 51.8 per cent (World Bank, headcount ratio at USD 1.90 a day).

Hazards and impacts in urban areas

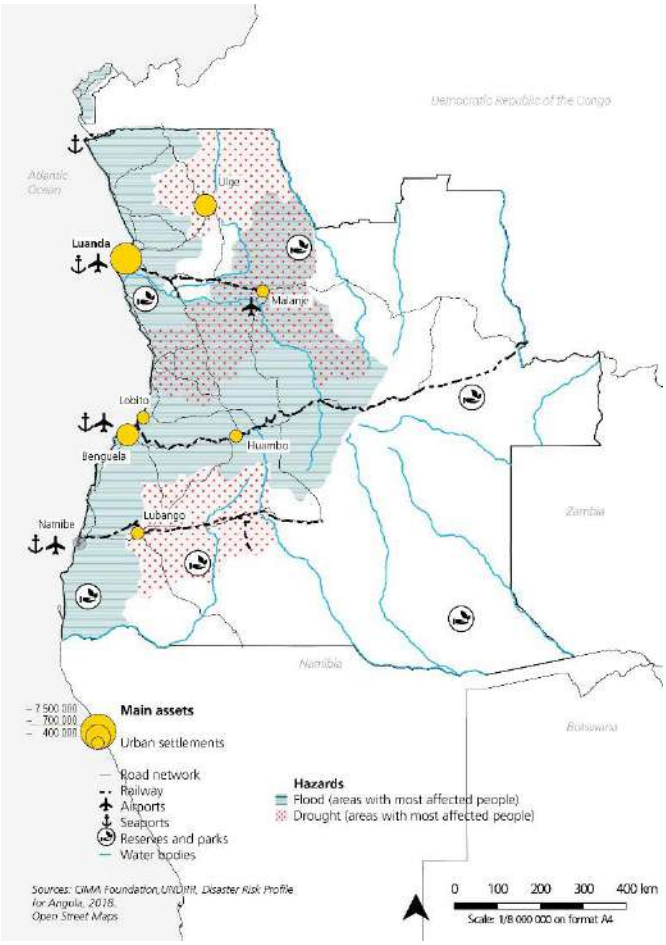
Angola, located in south-west Africa, faces a number of environmental and human-induced hazards. Recent major disasters include:

1. recurrent and increasingly more powerful and frequent urban and coastal flooding;
2. the *calemas*, a weather phenomenon that increases the sea level and, in 2019, destroyed coastal urban infrastructure in Cuanza Sul Province;
3. landslides due to heavy rains and lack of adequate drainage that, in 2019, affected informal settlements in Luanda;
4. heavy rains, particularly in the south of the country;
5. droughts, with 20 events in 100 years, resulting in severe food insecurity and displacement.

The impact of environmental disasters varies significantly amongst urban areas and depends on their geographical location, size, population density and topography.

In large urban centres such as Luanda and secondary cities like Benguela-Lobito and Huambo, floods and soil erosion affect the circulation of people, goods and urban economic activity. Other urban centres like Malanje are prone to both floods and droughts (see map 8).

Environmental disasters destroy municipal assets and essential infrastructure while increasing the number of deaths causing displacement and eviction of people. Such catastrophes also impact on agriculture and fishing and, by extension, nutrition and food security. This has varying social effects including increasingly high school dropout rates, human health vulnerability due to a lack of safe access to services and livelihood insecurity.



Map 8: Hazards in Angola

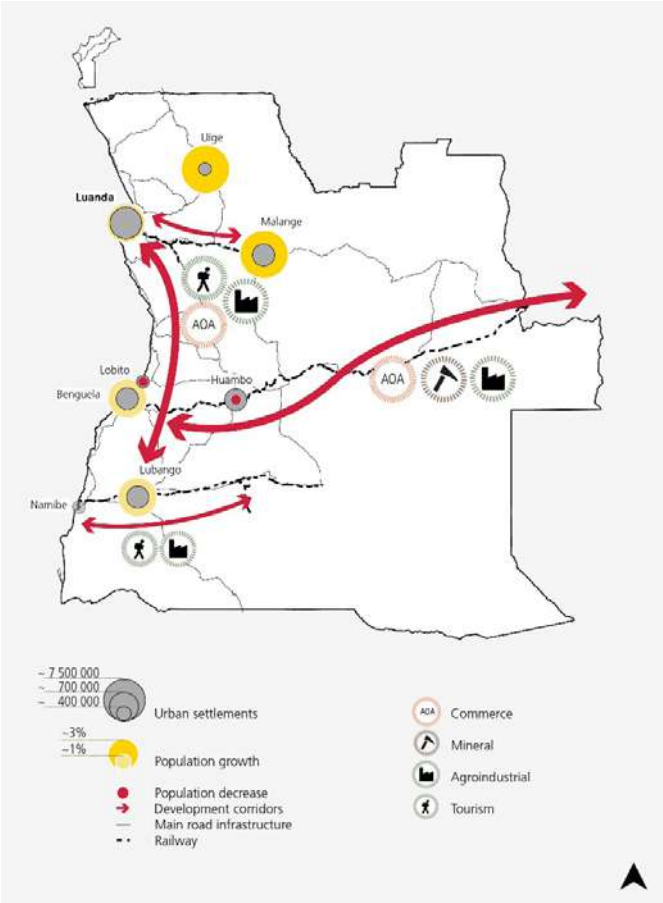
Urban vulnerability dynamics

As is shown in map 8, the major human settlements are located in the western part of the country in coastal and riverine areas very prone to floods.

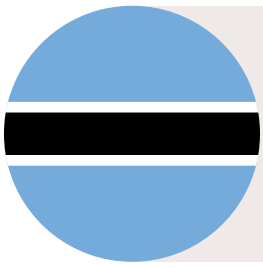
The country suffered a disastrous war from 1975 to 2002 which contributed to rapid displacement urbanization, particularly in the capital, Luanda. It exacerbated social, economic and environmental vulnerability both in the capital and secondary cities. Currently, Luanda appears to have decreased its growth in opposition to other cities such as Lubango, Benguela, Malanje and Uíge (see map 9), even though it is expected to become a megacity over the next 10 years.

Despite being quite exposed there is a lack of information about socio-environmental vulnerability and natural or human-induced disasters in Angolan cities, as well as a lack of coordination mechanisms among the institutions responsible for DRM. Concerns include extreme weather phenomena (flooding, storms and heat waves), water shortages, droughts, water and air pollution, vector-borne diseases and sea level rise. This is disconcerting since the economy is extremely reliant on sectors highly vulnerable to climate variability.

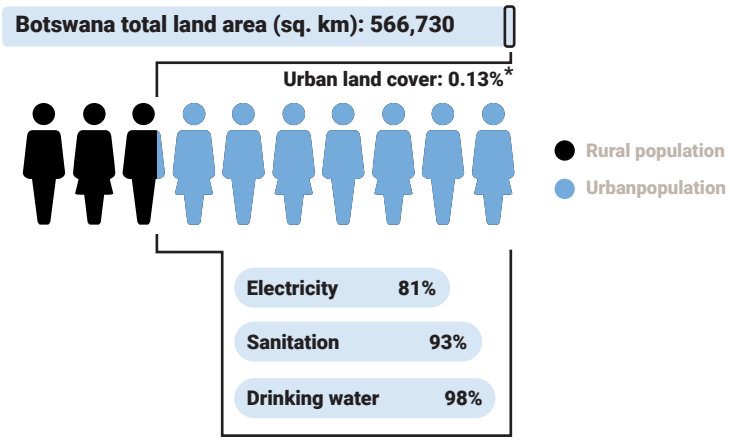
In general, an emphasis on emergency response rather than prevention, preparedness and adaptation measures can be observed, and local authorities have a very limited role in the field of DRM. Therefore, plans are not tailored to local realities through, for example, specific contingency plans in disaster prone areas. In this sense, the ongoing decentralization reforms present an opportunity to enhance the role of local authorities in coordination throughout the DRM value chain both with other levels of government and with additional stakeholders such as the private sector and civil society.



Map 9: Urban dynamics in Angola



Botswana



* *Data Source: OECD/SWAC, Africapolis, 2015.*
In absence of data for 2020, a slight increase can be assumed.

Figure 18: Botswana urban infographic

Socio-economic context

Botswana has a total of 2,303,697 inhabitants (World Bank, UNDESA, 2019) and the second lowest population density (preceded only by Namibia) in the SADC region of just four people per square kilometre of land area (World Bank, 2018). Most of the population live in urban settlements covering a little over 0.1 per cent of the total land in the country as shown in figure 18. In 2020 the urban population share was 70.9 per cent (UN-Habitat, 2020), making Botswana the most urbanized SADC country (see figure 4).

In past years GDP annual growth has shown a fluctuating trend reaching its lowest value in 2009 with a decrease of -7.7 per cent (IMF, 2020). In 2019 the value stands at 3 per cent (World Bank) but, as with other SADC Member States, it is expected to suffer from the impact of the COVID-19 pandemic with a projected value for 2020 of -9.6 per cent. Poverty levels seem to have maintained a certain rate of improvement; in fact, while in 1985 around 41 per cent of the population lived below the poverty line, by 2015 the percentage had decreased to 15 per cent (World Bank, headcount ratio at USD 1.90 a day).

Hazards and impacts in urban areas

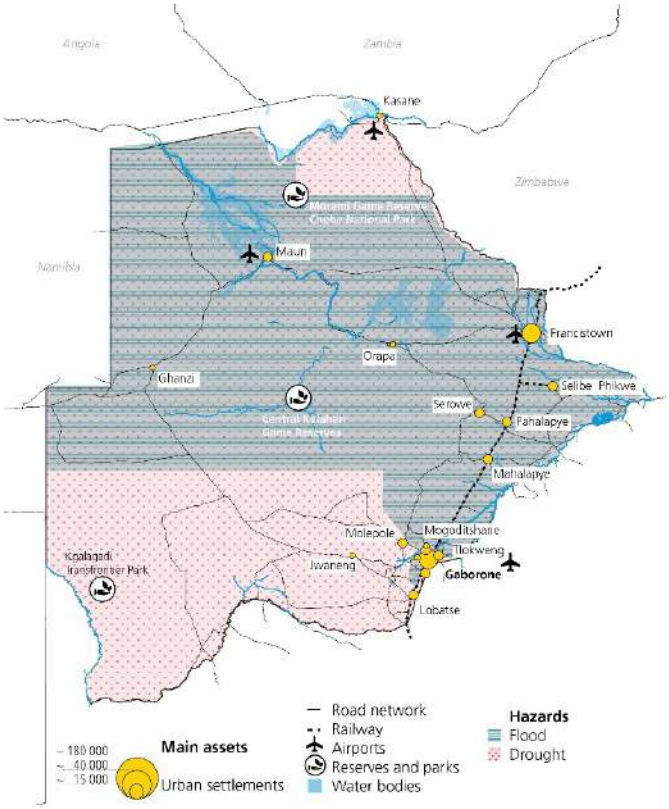
As mentioned in the risk analysis in Chapter 2, Botswana belongs to the semi-arid area of Southern Africa. Its lands are harsh environments characterized by high rainfall variability, frequent droughts, water scarcity and low soil moisture and poor fertility. Flash floods usually associated with cyclone activity, wildfires, epidemics (malaria), animal diseases, extreme weather events (notably heat waves) and widespread droughts due to climate change, are all increasing in frequency, magnitude and geographic distribution. Every year floods affect around 0.24 per cent of the total population (UNDRR, CIMA, 2019).

In 2017 Cyclone Dineo affected many urban and rural areas including Francistown, Gaborone, Jwaneng, Lobatse, Ramotswa, Selibe Phikwe and Tutume. Torrential rains damaged housing, transport infrastructure (roads, bridges and railway tracks), schools, hospitals and private businesses.

In 2015/16, Botswana experienced the worst drought in 34 years with severe water and hydropower shortages in several urban areas, including the capital Gaborone. Annually, around 37 per cent of the population is affected by droughts and the country could see this increase to 78 per cent in the future (UNDRR, CIMA, 2019). Along with Namibia, South Africa and Zimbabwe, Botswana is likely to experience the region's greatest warming in the next few years.

Urban vulnerability dynamics

In Botswana, increasing urbanization is mainly determined by rural to urban migration typically from the dry lands where livelihood opportunities are reducing due to water scarcity, and peri-urban migration since affordable urban land and housing is not available. In general, Botswana has seen

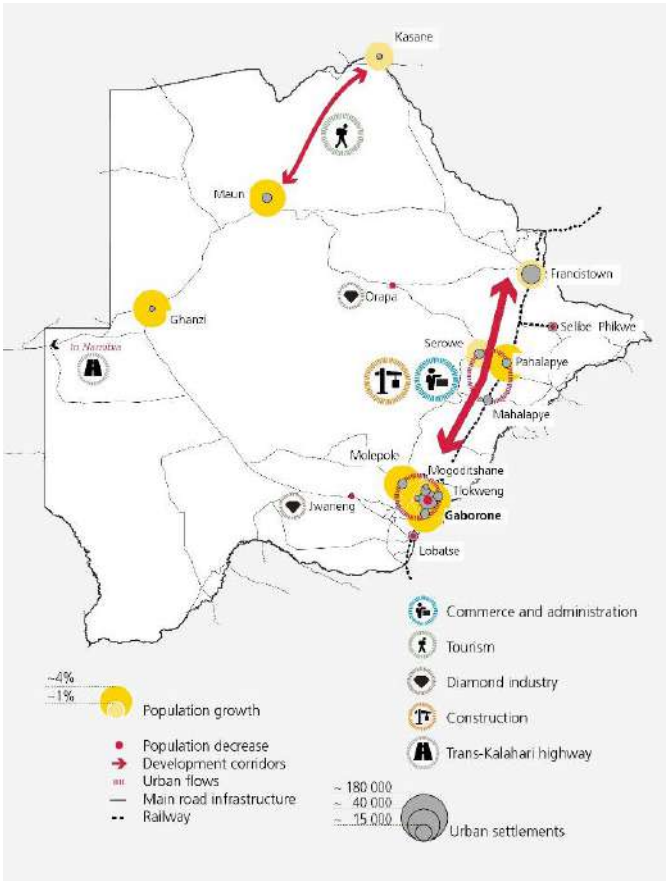


Map 10: Hazards in Botswana

its population concentrating in urban areas according to their vocation. Towns like Palapye and Serowe have been attracting in-migration because of employment opportunities in services and industries as they are located on the main development corridor in the south-east part of the country (see map 11). Kasane and Maun, the national tourism hubs, have seen urbanization driven by employment in the tourism sector, although they are likely to have suffered from decreased travel during the COVID-19 pandemic. The construction of the trans-Kalahari Highway and trade exchange at the gate with Namibia has contributed to the accelerated growth of Ghanzi.

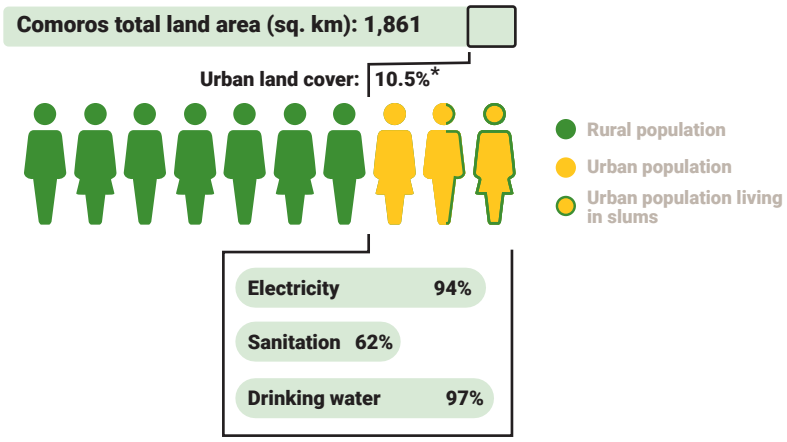
Gaborone's urban growth has been mainly characterized by migration to peri-urban areas. These play a vital role in urbanization by absorbing many of the rural migrants that cannot be accommodated in cities primarily because of shortages in affordable land and housing. Further drivers of peri-urbanization are industrial activities and public policy aimed at decongesting and improving the living conditions in the city centres by diverting new housing development to peri-urban areas such as Mogodisthane or Tlokweng (see map 11). In both 'vocational' migration and peri-urban migration, vulnerabilities are determined by the pressure of high concentrations of people in unplanned urban settlements whose services networks (e.g. health, education, water, electricity and transport) are mostly underdeveloped.

In Botswana, the limited number of employment and livelihood opportunities are mostly in agriculture and livestock farming; sectors that are very sensitive to the impacts of climate change. Poverty and Human Immunodeficiency Virus (HIV) incidence levels are high which, together with limited infrastructure and services, contribute to marginalization and a sense of remoteness and underdevelopment that make communities all the more vulnerable.



Map 11: Urban dynamics in Botswana

Comoros



* *Percentage drawn from World Bank data on total and urban land area in 2010. In absence of data for 2020, a slightincrease can be assumed.*

Figure 19: Comoros urban infographic

Socio-economic context

After Seychelles, the Comoros is the smallest SADC country hosting 850,886 inhabitants (World Bank, UNDESA, 2019). With 447 people per square kilometre of land area (World Bank, 2018), it has the second highest population density after Mauritius. Urban land area is around 10 per cent of the total, hosting almost 30 per cent of the population (see figure 19). Today the urban population share is 29 per cent and it is expected to reach 41 per cent by 2050 (UN-Habitat, 2020).

As shown by the projections of other SADC Member States, the Comoros has been experiencing a decline in GDP growth rate falling from 2.7 per cent to -1.8 per cent in 2019. Data on poverty levels indicated an increase in 2014 when 19 per cent of the population lived below the poverty line compared to 10 years earlier when the data was 15 per cent (World Bank, headcount ratio at USD 1.90 a day).

Hazards and impacts in urban areas

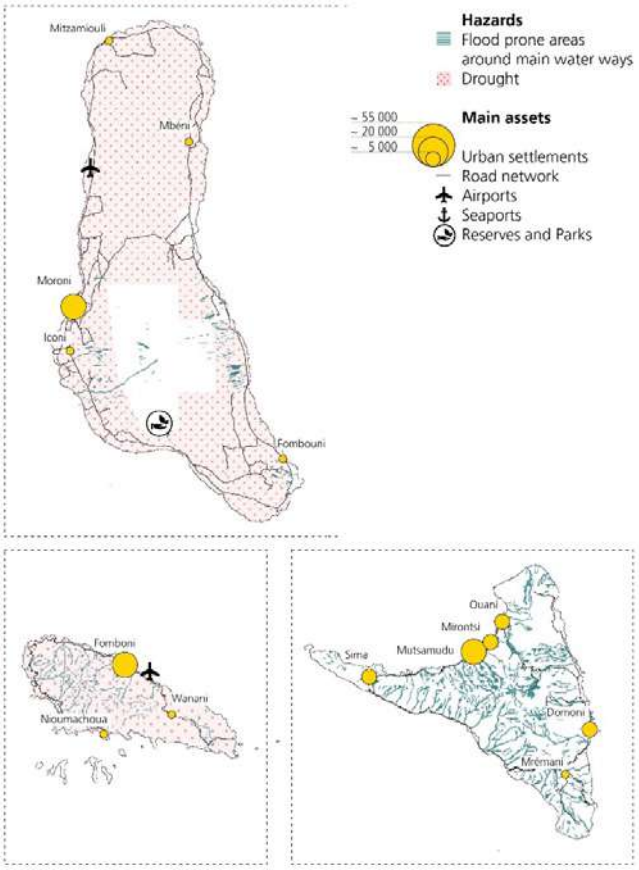
The Comoros is a volcanic archipelago with the Karthala volcano dominating Grand Comores, the main island. An eruption in 2005 affected 245,000 people. Flooding and landslides occur on a recurrent basis and can have a serious impact, especially as a result of cyclones.

In 2019, Cyclone Kenneth hit the Comoros, killing at least 7 people and injuring more than 200. Flooding occurred in high-risk areas on the entire archipelago, mainly the coastal lines. In many villages, water reservoirs were polluted by garbage blown in by the fierce winds or filled with sea water, increasing the risk of contracting water-borne diseases.

Other climate risk related hazards include seasonal and acute drought while sea level rise represents one of the largest threats since the main settlements are located along the coast and are not likely to be contained by dykes.

Urban vulnerability dynamics

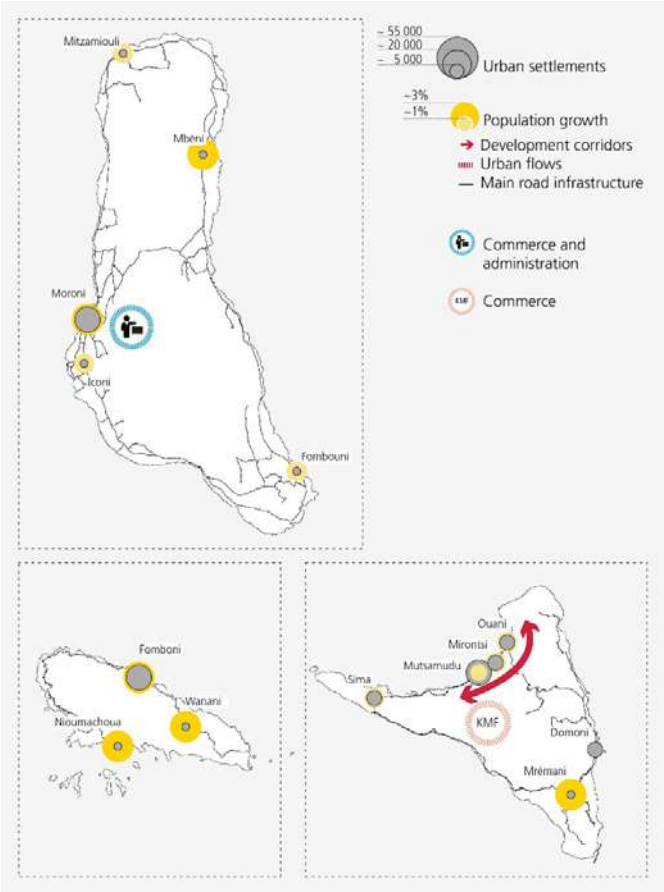
The Comoros, one of the SIDS, has unique biodiversity specific to each of its islands, however, the richness of its environment is threatened by (mainly unplanned) increasing population growth and urbanization, as almost 70 per cent of the population lives in informal settlements.



Map 12: Hazards in Comoros

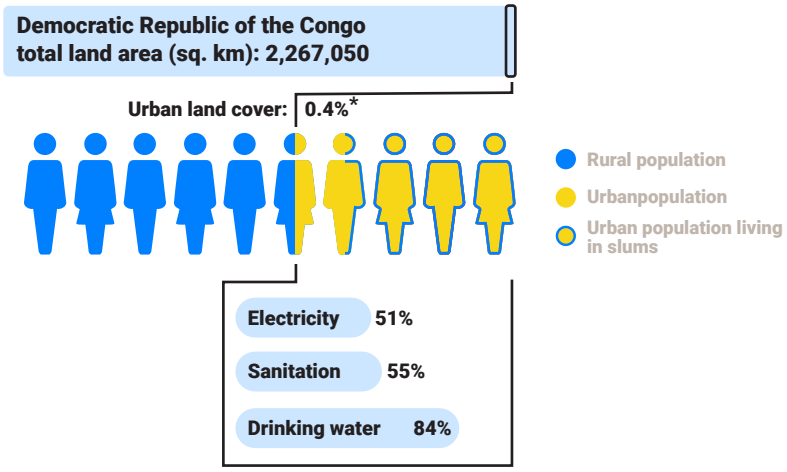
Major towns and cities are located along the coasts implying that they will be affected by sea level rise, potentially generating economic losses and affecting livelihoods. Informal settlements are often located in areas vulnerable to hazards such as landslides, flooding and sea level rise. This is due in part to lack of planning and non-adherence to DRM rules and regulations at the national and city level.

As the Comoros is located in the Indian Ocean cyclone belt it is recurrently hit by cyclones and floods mainly affecting the most vulnerable settlements as they are not built to withstand such events. On average, the Comoros experiences nearly USD 5.7 million in combined direct losses from earthquakes, floods and cyclones annually (GFDRR, 2016).



Map 13: Hazards in Comoros

Democratic Republic of the Congo



* *Percentage drawn from World Bank data on total and urban land area in 2010. In absence of data for 2020, a slightincrease can be assumed.*

Figure 20: Democratic Republic of the Congo urban infographic

Socio-economic context

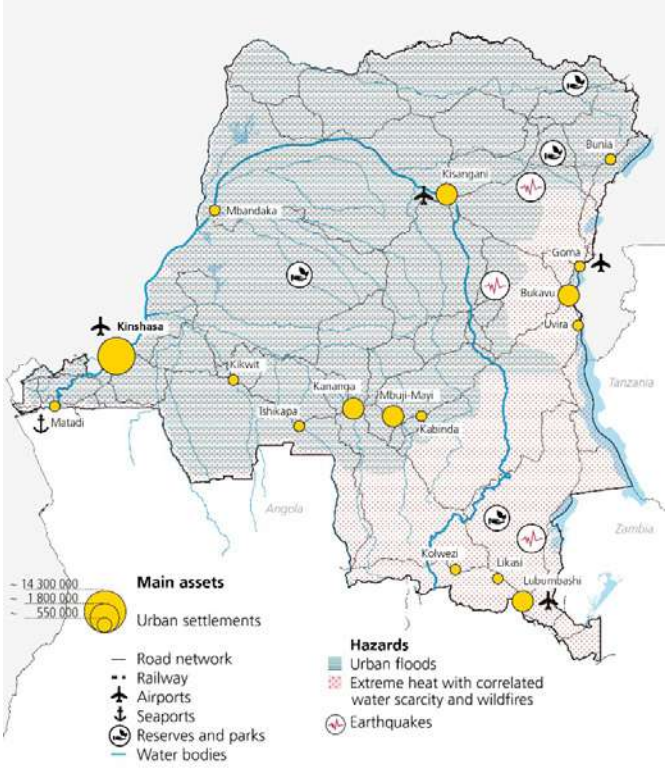
Hosting 86,790,567 people (World Bank, UNDESA, 2019), the Democratic Republic of the Congo is the most populous SADC country. Although it is by far the largest country in the region by landmass, its density is quite low counting 37 people per square kilometre of land area (World Bank, 2018). Urban areas cover just a small part of the national land (see figure 20) but host 45.6 per cent of the total population (UN-Habitat, 2020). The Democratic Republic of the Congo has an urban population annual growth rate of 4.5 per cent, the second highest rate in the region after the United Republic of Tanzania (World Bank, 2019).

Although it fluctuates, the GDP annual growth rate has remained positive since 2002 standing at 4.4 per cent in 2019 (World Bank), however the estimated value for 2020 is -2.15 per cent (IMF, 2020). Poverty levels in the country reveal a worrying picture with 77.2 per cent of the population living below the poverty line in 2012 (World Bank, headcount ratio at USD 1.90 a day). The Democratic Republic of the Congo has one of the highest poverty rates in the region.

Hazards and impacts on urban areas

The cities of the Democratic Republic of the Congo face a wide range of challenges, including recurrent floods and heavy precipitation during rainy seasons that cause flooding of the rivers along which many cities are located. Urban areas are also at risk of landslides. These particularly affect the urban poor who generally live on slopes and vulnerable soil.

The eastern part of the country has a complex seismic and volcanic structure, with several active volcanoes in the region (see map 14). The Goma region is particularly vulnerable with its two active volcanoes, Nyamulagira and Nyiragongo, threatening nearby urban and rural populations: cities such as Bukavu and Goma have been affected. The risk of cities being destroyed by eruptions and earthquakes remains high with much of the infrastructure unable to withstand the potential shocks. Scarce data also makes vulnerability assessments difficult.



Map 14: Hazards in the Democratic Republic of the Congo

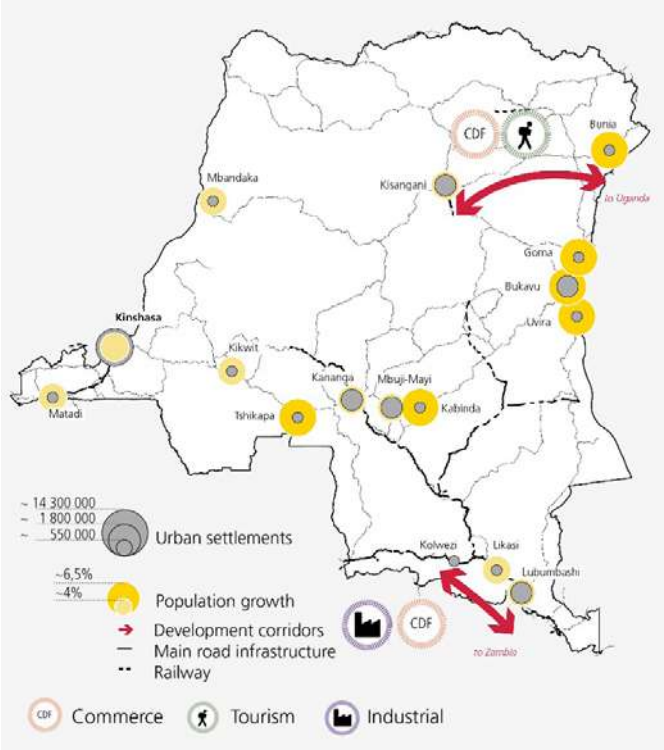
Urban vulnerability dynamics

A major threat to cities is the combination of rapid urban expansion and poor urban planning, zoning, land management and low local institutional capacity. Often, these exacerbate the vulnerability of urban dwellers.

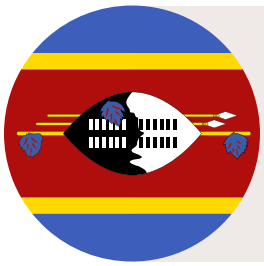
Between 2004 and 2015, the area of Kinshasa expanded from 363 to 472 square km. Approximately 30 per cent of this expansion occurred along and on erosion-prone sloping areas, and 50 per cent on other lands unsuitable for construction. Failures in land development and titling procedures push the poorest to flood- and erosion-prone areas or to the underserviced outskirts of the city, increasing their vulnerability.

Unsuitable settlement patterns create difficulties for supplying basic services in many neighbourhoods. Insecurity of tenure and natural hazards have led to a precarious housing situation that discourages people from investing in their dwellings.

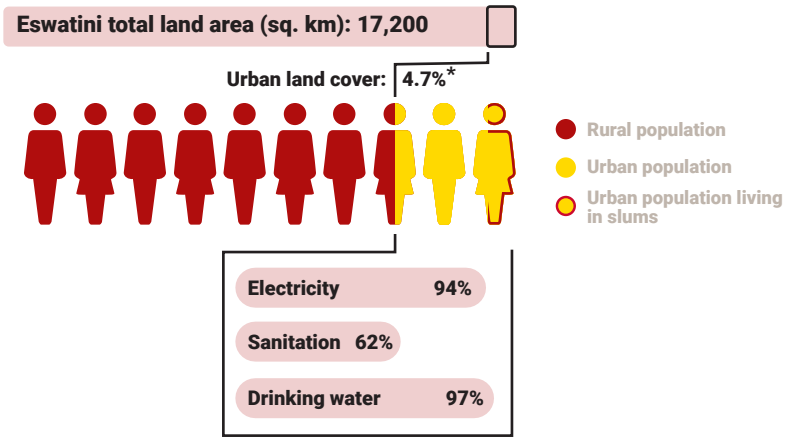
Kinshasa is characterized by a distinct topography which has a substantial influence on its exposure to hazards. Many areas are surrounded by hills and rapid precipitation run-off towards low-lying plains frequently leads to both soil erosion and flooding. Indeed, some neighbourhoods are regularly flooded, and heavy rains can lead to loss of life and property. In 2015, 31 people died and about 20,000 became homeless in the N'Djili neighbourhood due to heavy rains.



Map 15: Urban dynamics in the Democratic Republic of the Congo



Eswatini



* *Percentage drawn from World Bank data on total and urban land area in 2010. In absence of data for 2020, a slightincrease can be assumed.*

Figure 21: Eswatini urban infographic

Socio-economic context

With 1,148,130 inhabitants (World Bank, UNDESA, 2019) Eswatini is one of the least populated countries in the SADC region followed only by the Comoros and Seychelles. Although it has quite a small land area, just higher than that of the three SADC SIDS of the Comoros, Mauritius and Seychelles, the country has a medium–high population density counting 66 people per square kilometre of land area (World Bank, 2018). According to recent data on urban land coverage, cities covered around 4.7 per cent of the country's surface in 2010 hosting 22 per cent of the population (World Bank). Today the urban population share has increased to 24.2 per cent (UN-Habitat, 2020). The annual urban population growth rate had been decreasing fairly constantly up to 2004 when it registered a decrease of -0.25 per cent before slowly rising again. The annual urban population growth rate was recently measure at 1.8 per cent (World Bank, 2019), one of the lowest in the region.

From 1991, after experiencing a sharp drop from 21 per cent to 1.8 per cent in 1990, GDP annual growth rate has fluctuated between 0.8 per cent and 6 per cent registering a rate of 2 per cent in 2019 (World Bank). Similarly to other countries in the region, this trend will be interrupted in 2020 when a decreased rate of -3.46 per cent (IMF, 2020) is expected. In 1984, 82 per cent of the population was living below the poverty line. This rate has steadily decreased reaching 29.2 per cent in 2016 (World Bank, headcount ratio at USD 1.90 a day).

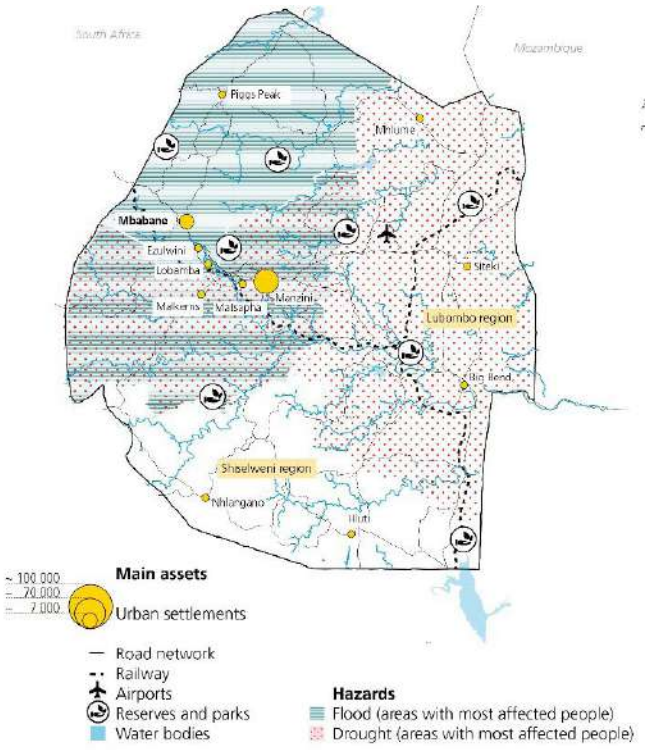
Hazards and impacts on urban areas

The climate conditions in Eswatini range from sub-humid and temperate in the Highveld to semi-arid in the Lowveld. The country's location on the eastern side of Southern Africa exposes it to moist maritime tropical air coming from the Indian Ocean for much of the year. Interactions between the atmosphere and the ocean can produce considerable variations in climate. Droughts, floods, fires and cyclones are the most common hazards.

During the 2015/16 rainy season, Eswatini experienced a severe and widespread drought that severely impacted the capital city leading to urban water shortages and widespread water rationing.

Meteorological observations indicate that Eswatini has experienced a considerable increase in temperature over recent years.

An analysis of climate data from 1970 to 2015 shows an average rise of 1° Centigrade accompanied by a rise in both the magnitude and frequency of extreme weather events.



Map 16: Hazards in Eswatini

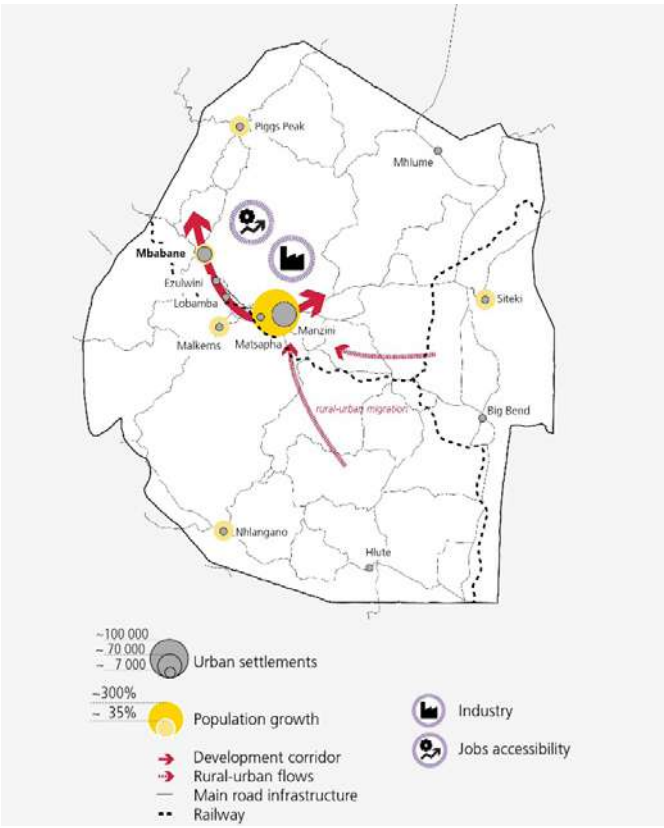
Urban vulnerability dynamics

Eswatini has a relatively low level of urbanization but it has been increasing rapidly in recent years partly due to a drought in 1992 and economic decline triggering rural to urban migration of people in search of work.

Manzini and Mbabane are two major urban areas which together with their hinterlands form dual growth poles around the Matsapha industrial estate in the west-central part of the country (see map 17). The industrial estate has been responsible for a large share of urbanization with approximately 70 per cent of the national urban population now residing nearby.

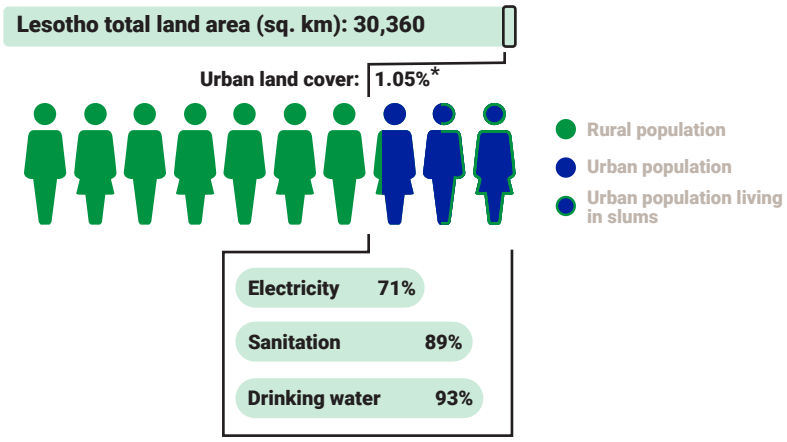
More than 60 per cent of the population in the Mbabane–Manzini corridor live in sub-standard housing in informal, unplanned communities without legal title.

This largely uncontrolled urban expansion is causing environmental degradation and pollution of natural water sources. Combined with the spread of HIV, poverty, hunger, extreme weather events and epidemics, this expansion has been a major urban vulnerability driver.



Map 17: Urban dynamics in Eswatini

Lesotho



* *Data Source: OECD/SWAC, Africapolis, 2015.*
In absence of data for 2020, a slight increase can be assumed.

Figure 22: Lesotho urban infographic

Socio-economic context

Lesotho, like Eswatini, has quite a small land area and a medium–high population density of 69 people per square kilometre of land area (World Bank, 2018), with a total of 2,125,268 inhabitants in 2019 (World Bank, UNDESA). Compared to the total land area, urban settlements cover 1.05 per cent (see figure 22) hosting nearly 30 per cent of the country's population. From 1987 the annual population growth rate has continued decreasing showing a few periods of growth in 2004–2006, 2007–2011, and from 2012 to date, with a rate of 2.3 per cent in 2019 (World Bank).

Between 1972 and 1980 the GDP annual growth rate fluctuated from very high (with the highest at 26.4 in 1973) to very low (with the lowest at -13.5 per cent in 1975). From 1981, the rate has fluctuated between -1.3 per cent and 8.6 per cent, registering a rate of 1.5 per cent in 2019 (World Bank). Projections show that the GDP annual growth rate in 2020 will be -4.8 per cent (IMF, 2020). Over recent decades, following a peak of 61.9 per cent in 2002, poverty levels decreased to 27.8 per cent in 2017 (World Bank, headcount ratio at USD 1.90 a day).

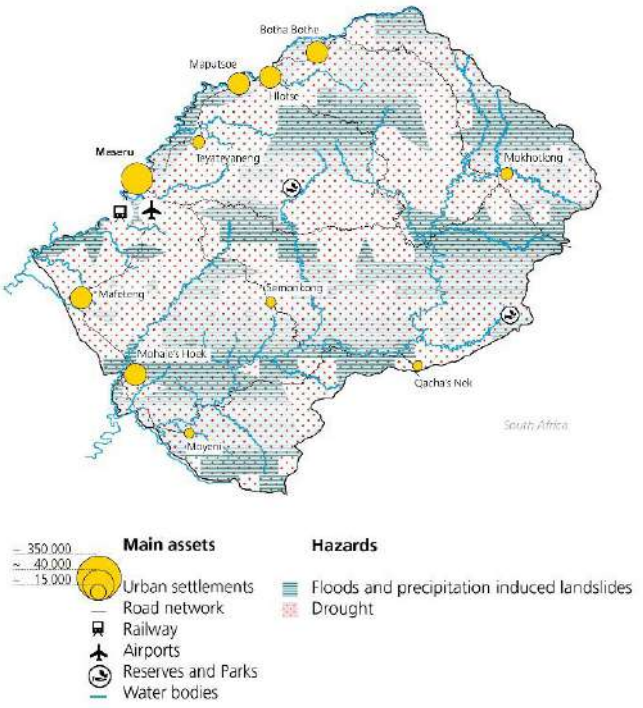
Hazards and impacts on urban areas

Lesotho is vulnerable to hazardous events associated with the climate. Between 1825 and 2012, livestock has been killed, crops destroyed, buildings and infrastructure damaged or destroyed by severe weather events and human lives occasionally lost. Heavy snowfall has been the most frequent hazard followed by severe frost, drought, floods and strong winds.

Droughts in the 2015/16 and 2018/19 seasons, mainly due to the El Niño events of 2015, have impacted on farming and the water supply to public facilities like hospitals and schools as well as to households. Urban areas were also indirectly affected by increased food prices due to lower crop production.

In 2016/17, over 600,000 people suffered from food insecurity mainly due to poor agricultural outputs and the consequential high food prices.

Soil erosion and desertification have been aggravated by recurrent droughts, rapid population growth and increasing pressure on natural resources, along with unsustainable land and natural resource management practices. Loss of ground cover on the highland rangelands due to over-stocking has resulted in excessive water runoff during mountain storms, causing flash floods and sheet and gully erosion. This, in turn, has led to a loss of already



Map 18: Hazards in Lesotho

limited agricultural land. It is estimated that 4.5 million tons of soil is lost annually through soil erosion reducing the productive capacity of the country's croplands and rangelands.

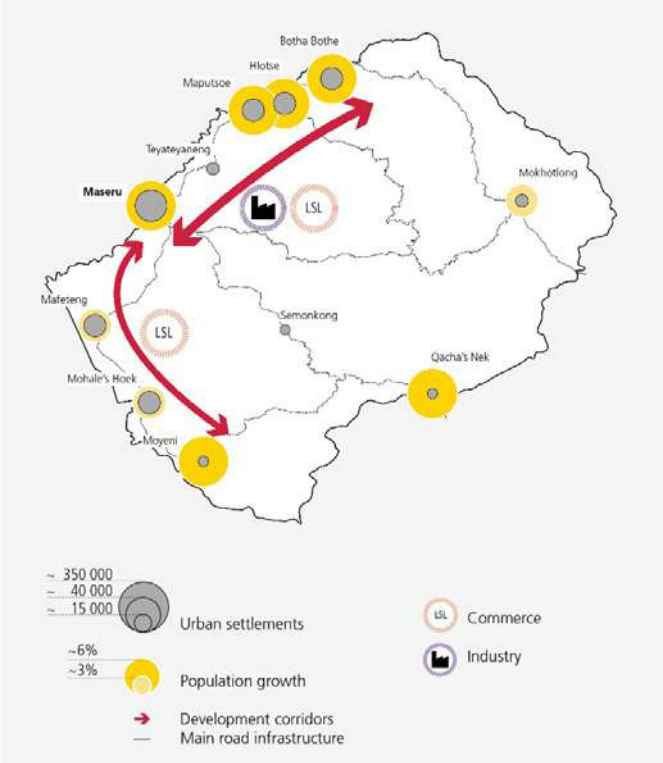
Urban vulnerability dynamics

The majority of people in Lesotho live in rural areas, mostly in small settlements.

The present settlement structure comprises a relatively large and rapidly growing primate city, nine small district towns growing at moderate paces and a small number of villages. The level of urbanization is low and relatively stable with 28.6 per cent of the population living in urban areas in 2019 compared to 20 per cent in 2000.

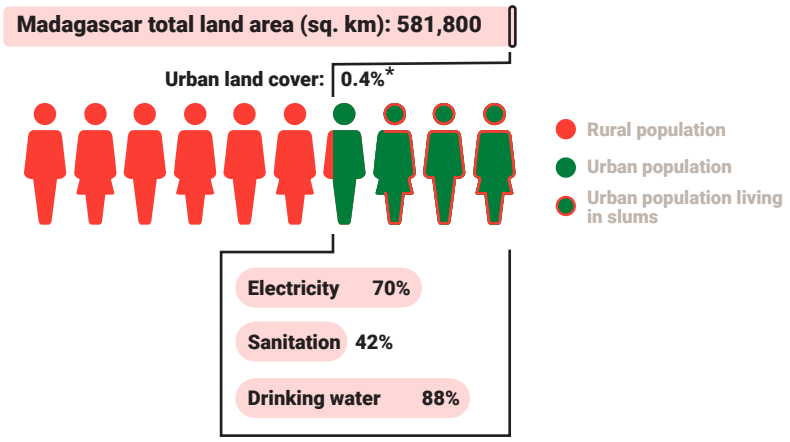
Because of the country's mountainous topography, economic activity is mostly confined to the lowlands (17 per cent of the total area) as the mountainous regions (59 per cent of the total area) are only suitable for grazing and hydropower generation.

Historically, Lesotho's urban planning focused on the former colonial administrative centres while traditional villages grew without any formal planning. After independence, Lesotho continued this practice and a culture of spontaneous urban growth continues to this day. Consequently informal settlements are growing much faster than planning authorities can influence.



Map 19: Urban dynamics in Lesotho

Madagascar



* *Percentage drawn from World Bank data on total and urban land area in 2010. In absence of data for 2020, a slightincrease can be assumed.*

Figure 23: Madagascar urban infographic

Socio-economic context

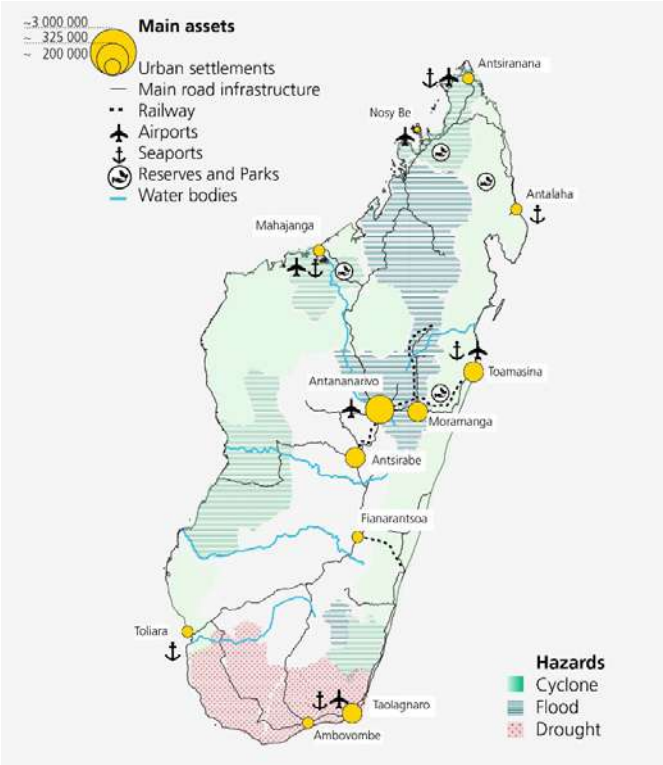
Madagascar has a total of 26,969,307 inhabitants (World Bank, UNDESA, 2019) and a population density of 45 people per square kilometre (World Bank, 2018). Not including the SIDS that have a considerably higher density, this is under the average of the region. Data from 2010 shows that urban settlements cover just 0.4 per cent of the total land area but host around 32 per cent of the population (according to UN-Habitat, in 2020 the percentage of people living in cities was 38.5 per cent). Since 2005 the annual urban population growth rate has been slightly decreasing, however, Madagascar has one of the highest rates of the region registering 4.4 per cent in 2019 (World Bank, 2019).

From 2009 when the GDP annual growth rate was -4 per cent, GDP has fairly steadily improved registering a value of 4.8 per cent in 2019 (World Bank, 2019), one of the highest in the region. Even including 2020 when the whole SADC region suffered a significant GDP decrease, at -3.2 per cent Madagascar is still above the regional average (IMF, 2020). Poverty levels are particularly worrying in Madagascar with around 77 per cent of people living below the poverty line (World Bank, headcount ratio at USD 1.90 a day, 2012), amongst the highest in the region.

Hazards and their impacts

Madagascar is highly vulnerable to a range of natural hazards including cyclones, droughts, earthquakes, floods and locust invasion. The country experiences about USD 100 million in economic losses annually from cyclones, earthquakes and floods. Tropical cyclones combined with wind, rain and storm surge, cause about 85 per cent of total annual losses. Almost 73 per cent of the cyclone losses concern the residential sector (GFDRR, 2016). As of January 2021, Madagascar's southern area is facing its worst drought in a decade after three straight years of drought and deep recession stemming from the COVID-19 pandemic.

Between 1980 and 2010, Madagascar was affected by 35 cyclones and floods, five periods of severe drought, five earthquakes and six epidemics. These events are becoming more frequent and intense affecting food security, drinking water supplies, public health systems, environmental management and lifestyle, all linked to the urban sector and infrastructure.



Map 20: Hazards in Madagascar

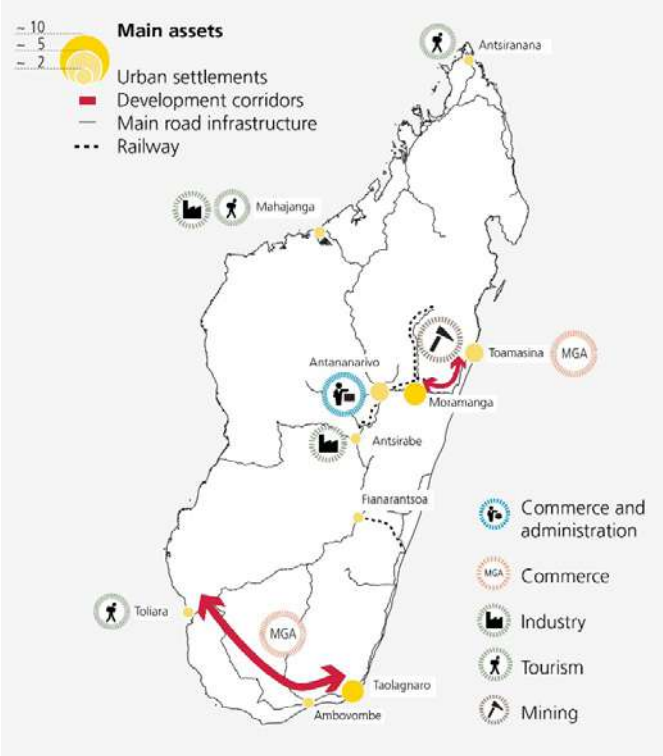
Being a structurally arid area, as shown in map 20, the south of the country is particularly prone to droughts experiencing high losses of production and a decline in living conditions. Here the worse effects of El Niño can be felt such as the dry spells in 2015–2017 which caused high rates of food insecurity recording more than 1 million food insecure people at the beginning of 2016, worsening the incidence of malnutrition.

An additional hazard of concern in Madagascar is the increase of conflict events since 2017, a phenomenon that is contributing to growing insecurity in the country. Paired with other vulnerabilities, this makes the situation highly worrying. The southern areas are particularly affected by attacks on rural villages perpetrated by gangs commonly referred to as Dahalo, which means 'bandits' in Malagasy.

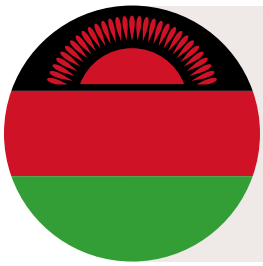
Urban vulnerability dynamics

Urban vulnerability is multidimensional and includes food insecurity, unemployment, precarious welfare, slum environments with poor access to basic social services, as well as vulnerable children. The consumption of alcohol and tobacco is considered problematic in Madagascar, as are the impact of food insecurity on education and the large number of school dropouts.

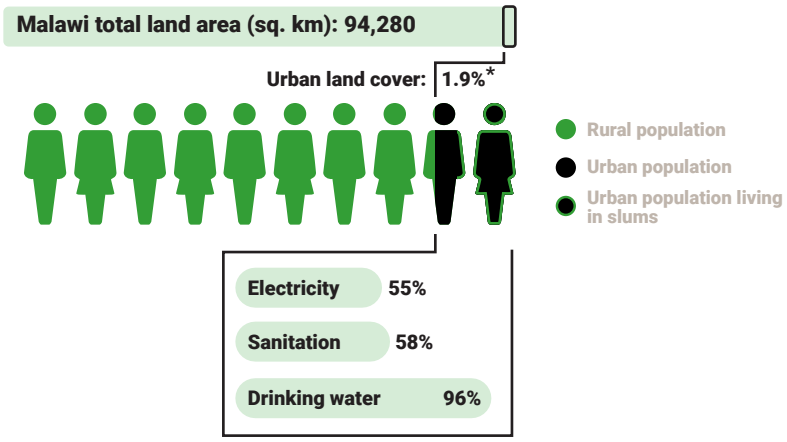
Furthermore, there is significant rural-urban migration, especially to the capital, Antananarivo, but also to rapidly growing secondary cities and emerging new urban centres. Migration flows exceed the capacity of municipalities already struggling to cope with existing vulnerabilities caused by years of political crisis and widespread poverty.



Map 21: Urban dynamics in Madagascar



Malawi



* *Percentage drawn from World Bank data on total and urban land area in 2010. In absence of data for 2020, a slightincrease can be assumed.*

Figure 24: Malawi urban infographic

Socio-economic context

Malawi is one of the smallest countries in the SADC region with a total of 18,628,747 inhabitants (World Bank, UNDESA, 2019). The country counts 192 people per square kilometre (World Bank, 2018), one of the highest population densities in the region preceded only by the Comoros, Mauritius and Seychelles. Urban land area covers around 2 per cent of the total (see figure 24) hosting less than 20 per cent of the population. In 2020 the share of urban population was 17.4 per cent, which puts Malawi in the lowest position of the region's urbanization ranking and where, according to projections for 2030 and 2050, it is expected to stay in years to come (see figure 4). On the other hand, with a value of 4 per cent, the urban population growth rate is above average in the region.

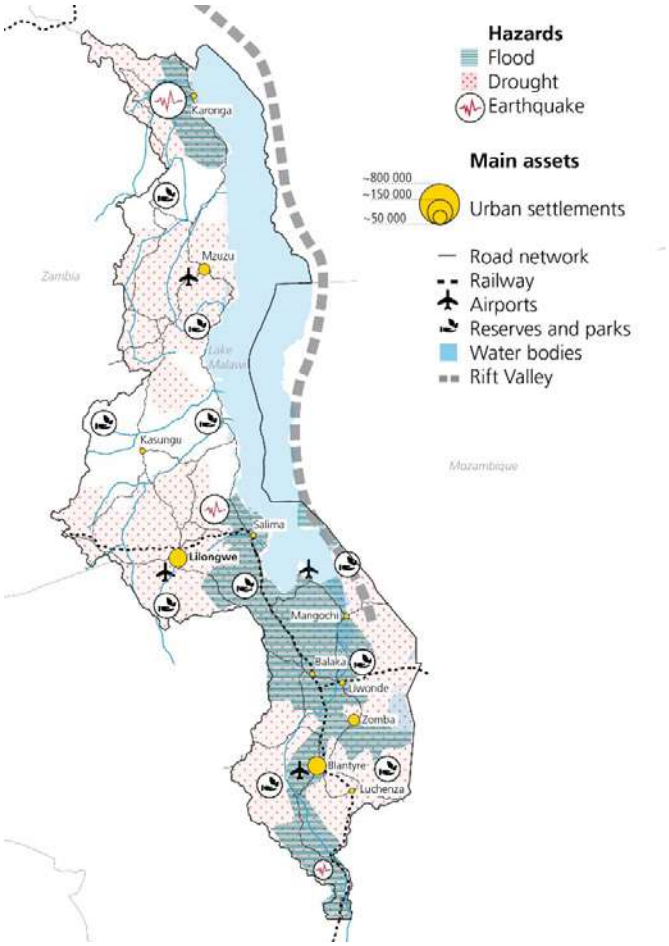
A challenge in Malawi is that urban population growth is happening with very low levels of per capita GDP (see figure 4) while the annual GDP growth rate was not only one of the highest of the region in 2019 (4.4 per cent, World Bank) and 2020 (0.60 percent, IMF), but also registered the lowest losses after the impact of COVID-19 (see figure 3). Although slightly decreasing, poverty is very high in Malawi with a total of 71 per cent of the population living below the poverty line in 2016 (World Bank, headcount ratio at USD 1.90 a day).

Hazards and impacts on urban areas

Over the past 50 years, Malawi has experienced more than 19 major floods and seven droughts of increasing frequency and magnitude. The worst floods occurred in 2015 and 2019.

The major cities of Blantyre, Lilongwe, Mzuzu and Zomba have suffered flooding and drought (particularly in 1984, 1992, 2001, 2008, 2014 and 2016). Malawi has also suffered fires in households, markets and forest reserves and has experienced urban cholera epidemics, especially in the informal settlements.

Due to Malawi's location along the Great Rift Valley, the towns of Dedza, Karonga (2009), Nsanje, Salima (1989), and Zomba are prone to earthquake and tremor hazards. Localized, annually recurrent storms also damage housing and institutional buildings such as churches, clinics and schools.



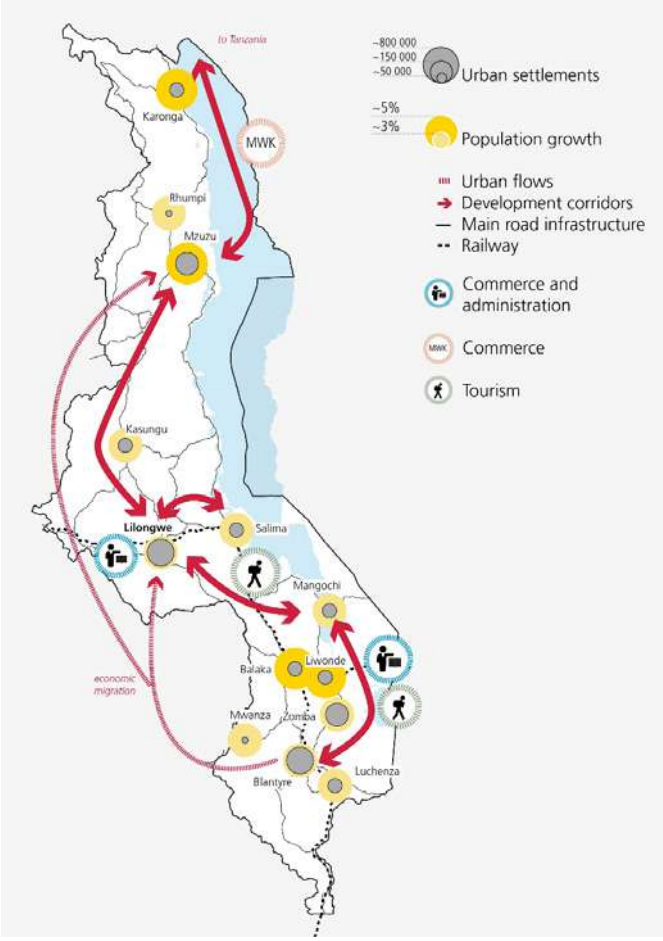
Map 22: Hazards in Malawi

Urban vulnerability dynamics

In Malawi about 65 per cent of the urban population live in informal settlements (see figure 24), which are often located in areas vulnerable to hazards. Hazard and disaster triggers in urban areas are due to deforestation and encroachment onto environmentally sensitive land, both for building and agricultural activities. Poor construction standards, low quality building materials, lack of access to affordable serviced land, lack of effective spatial planning, inefficient development control, political interference, weak infrastructure and poor basic services delivery all contribute to urban vulnerabilities.

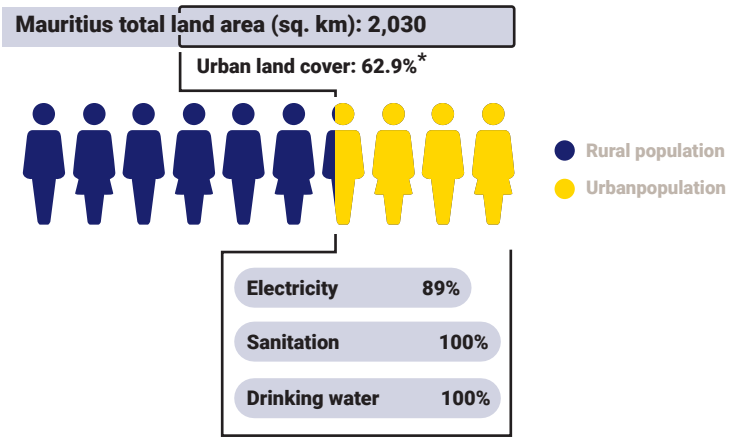
The design and planning of urban areas in Malawi is variable and differs among public institutions. Harmonization would enable better conceived urbanization while reducing the intensity and geographic extent of the impacts of urban disasters.

The urban corridors emerging in Malawi (see map 23) are likely to better spread socio-economic development and to reduce both its urban primacy and the vulnerability to disasters of the larger cities. Forward looking urban development strategies for emerging towns and cities reflect national priorities and the National Urban Policy 2019, and offer opportunities to build resilience and ameliorate the impact of disasters.



Map 23: Urban dynamics in Malawi

Mauritius



* *Percentage drawn from World Bank data on total and urban land area in 2010. In absence of data for 2020, a slightincrease can be assumed.*

Figure 25: Mauritius urban infographic

Socio-economic context

From a socio-economic point of view Mauritius is a country of many distinctions. With a total of 1,265,711 inhabitants (World Bank, 2019) it is one of the least populous countries of the region but it also has the highest population density counting 623 people per square kilometre of land area (World Bank, 2018). A second distinction regards the urban land cover which is above 60 per cent of the total land area (see figure 25). Today the urban population share in Mauritius is 40.8 per cent (UN-Habitat, 2020) and it is expected to grow at the slowest pace in the region in years to come (see figure 1). Mauritius is also the only SADC country to register a decrease in urban population in 2019 with a value of -0.034 per cent (World Bank).

In the last decade the GDP annual growth rate in Mauritius has been quite stable fluctuating between 4.4 and 3.4 per cent until 2020 when projections show a sharp decline from 3.55 per cent to -14.2 per cent (IMF, 2020), the lowest value in the region (see figure 3). Poverty levels are quite low standing at 0.2 per cent of people living below the poverty line in 2017 (World Bank, headcount ratio at USD 1.90 a day), although the effects of COVID-19, which are clear from the GDP projection for 2020, are expected to have an impact on this value.

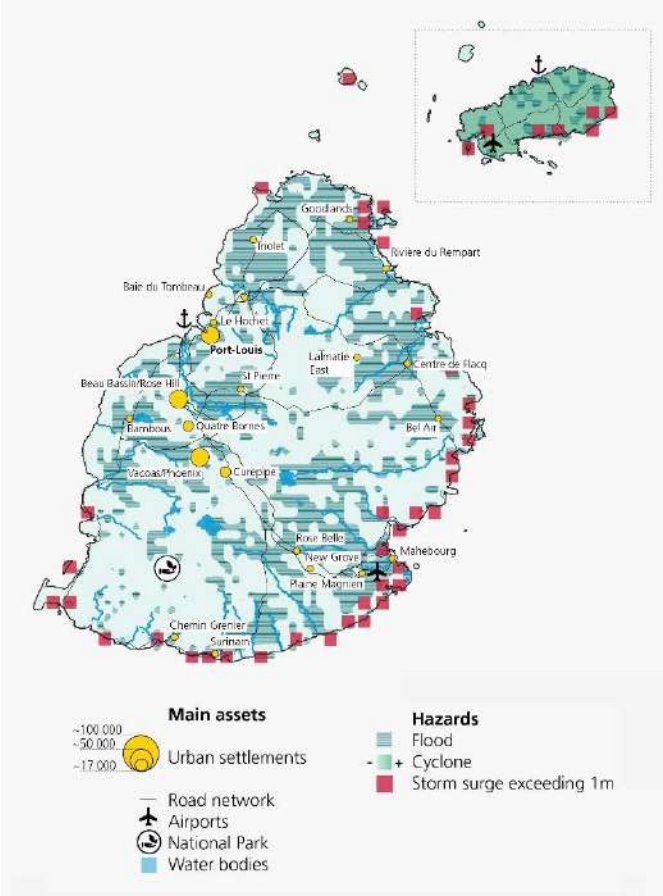
Hazards and impacts on urban areas

Mauritius, one of the SIDS, is affected by natural hazards such as recurrent cyclones and related events (strong winds, rains and storm surges), floods, landslides and droughts.

It is particularly vulnerable to the impacts of climate change and has already experienced increases in the average temperature, frequent floods and severe droughts.

According to the *Intergovernmental Panel on Climate Change 4th Assessment Report*, one of the most significant impacts of climate change for SIDS is sea level rise which is expected to exacerbate all their coastal hazards. This is particularly important when it comes to the urban areas of SIDS because a majority of settlements, infrastructure and other assets are located in low-lying coastal zones. Every natural hazardous event would therefore jeopardize the lives and livelihoods of the inhabitants.

In June 2020 the MV Wakashio oil spill occurred offshore of Pointe d'Esny, south of Mauritius, severely impacting the sensitive marine ecosystem and affecting livelihoods.



Map 24: Hazards in Mauritius

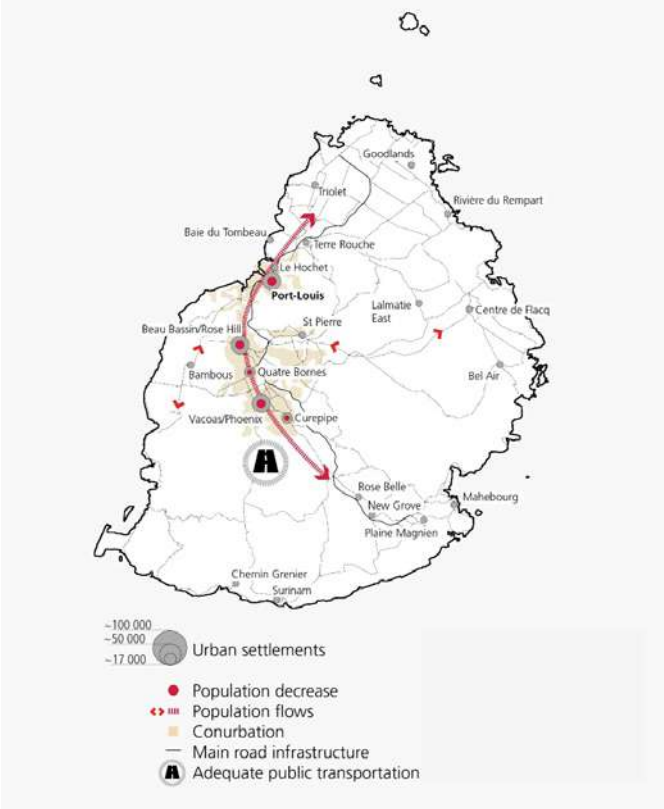
Urban vulnerability dynamics

The majority of the urban area is concentrated on the main island, Mauritius Island. The capital, Port Louis, is the largest city situated along the west coast. Its location makes it vulnerable to the impact of sea level rise and flooding, as this area has one of the greatest flood depths on the island.

The capital, with its five municipal areas and four additional towns, forms a conurbation strip along the main road that connects Port Louis with Plaine Magnien along the south-east coast where the airport is located (see map 25). Most of the economic activities of the country are concentrated in this conurbation.

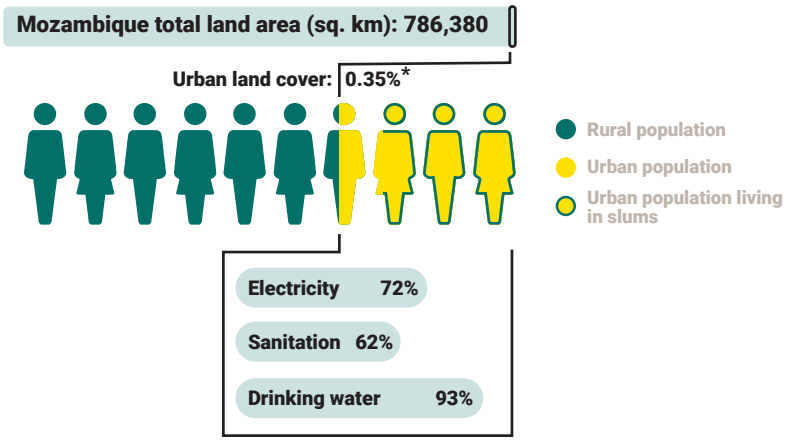
In 2019 the urban population of Mauritius was approximately 41 per cent of the national population. Against the general trend, the country is experiencing a slight decrease in urban population growth; in 2019 the rate was -0.034 per cent.

This phenomenon is partly due to the fact that the population is quite stable with a growth rate in 2018 of 0.03 per cent. On the other hand it is also due to a low rate of rural-urban migration. This can be explained by the increase in price of properties and the lack of space for housing in the major towns, combined with the fact that they are easily accessible by public transport which encourages people to stay in secondary towns and villages. This has helped to avoid increased pollution in the city and living in a cleaner environment.



Map 25: Urban Dynamics in Mauritius

Mozambique



* *Percentage drawn from World Bank data on total and urban land area in 2010. In absence of data for 2020, a slightincrease can be assumed.*

Figure 26: Mozambique urban infographic

Socio-economic context

With a total of 30,366,036 inhabitants (World Bank, UNDESA, 2019) Mozambique is one of the most populous countries of the SADC region although it has a relatively low population density with 38 people per square kilometre of land area (World Bank, 2018). As shown in figure 26, cities cover only a small part of the total land in the country hosting more than 30 per cent of the total population, nevertheless. The urban population share in 2020 was registered to be 37 per cent of the total population (UN-Habitat, 2020) and is predicted to increase rapidly making Mozambique one of the fastest urbanizing SADC countries in coming years (see figure 1).

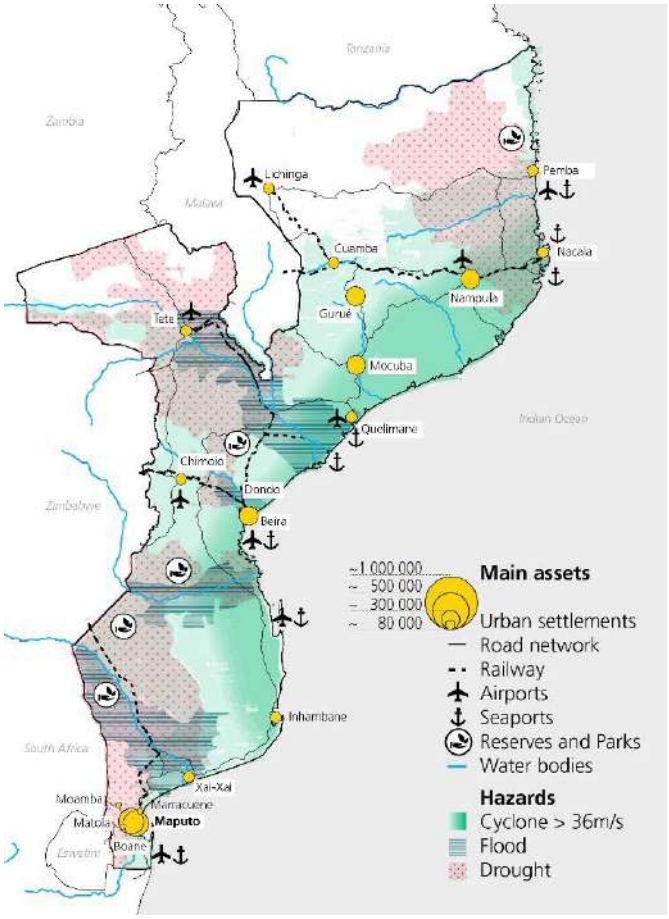
From 2001, when it registered a value of 12.1 per cent GDP, Mozambique, with a few exceptions, has had a fairly constant GDP decrease reaching 2.2 per cent in 2019. In 2020, although it registered a further decrease like all other SADC Member States, projections for Mozambique show that the country has one of the highest values (-0.5 per cent, IMF, 2020) and the second lowest decrease in terms of percentage point (see figure 3). Despite the recent data, poverty levels are still worrying with 63.7 per cent of the population registered as living below the poverty line in 2014.

Hazards and impacts in urban areas

Due to its morphology and location Mozambique ranks third among the African countries most exposed to multiple weather-related hazards, suffering from recurrent cyclones, droughts, floods and related epidemics.

About 60 per cent of the population live in the coastal areas in the major urban zones resulting in considerable risk exposure. Between 1980 and 2015, 13 drought events, 25 floods, 14 cyclones and 23 epidemics were recorded in Mozambique. The impacts of climate change are exacerbating these events as shown by Cyclones Idai and Kenneth in March and April 2019, and Cyclone Eloise in January 2021.

In the cities of Beira and Dondo, 530,000 and 150,000 people respectively were affected by Cyclone Idai causing major losses in lives, livelihoods and assets, and it heavily compromised most of the urban infrastructure in Beira. The city of Pemba was struck by Cyclone Kenneth. Droughts occur primarily in the southern region with approximately seven droughts in every 10 years causing water shortages in both rural and urban areas.



Map 26: Hazards in Mozambique

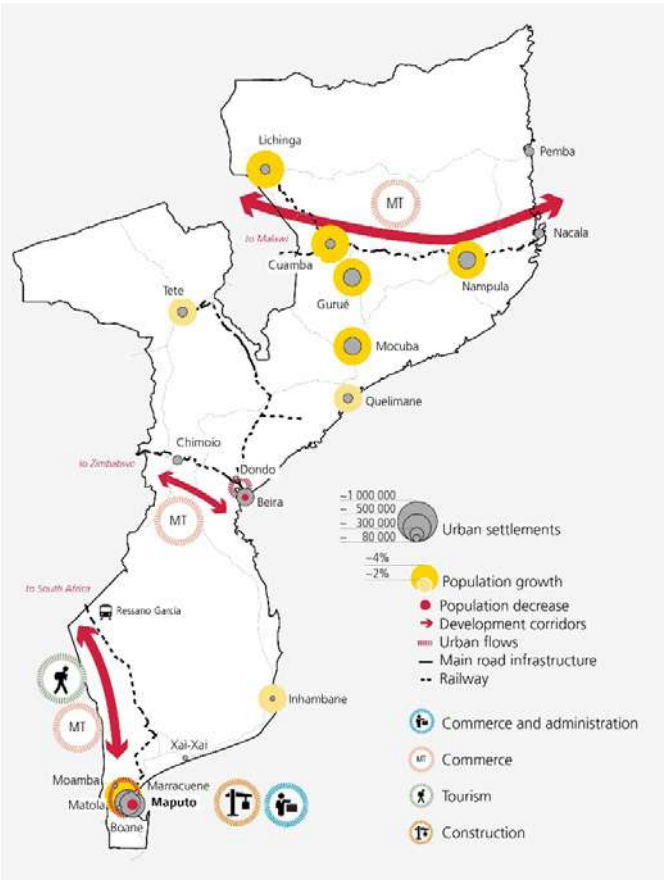
Urban vulnerability dynamics

An estimated 36.5 per cent of Mozambique's population is estimated to be urban with three quarters of the urban population surviving on subsistence agriculture or temporary (casual) work.

The major cities and most of the population are located along the 2,470 km long coastline very exposed, therefore, to a range of natural and climate change-related hazards such as cyclones, floods and sea level rise.

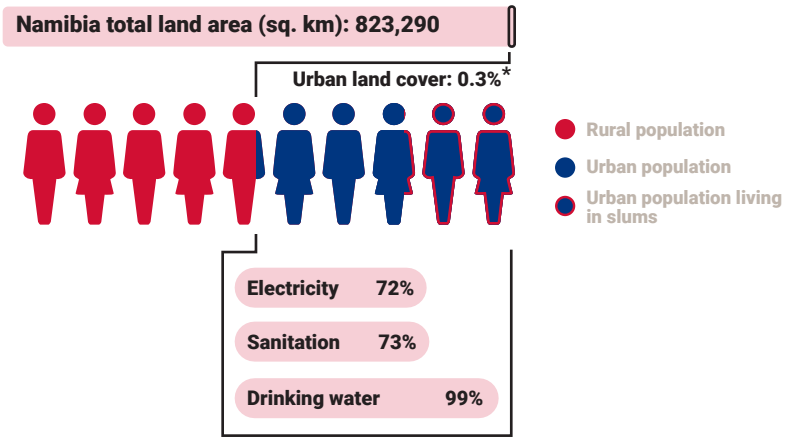
Basic urban services are beyond the reach of most of the population. AFD stated that coverage rates for basic waste collection services reach only approximately 30 per cent of urban residents.

Climate events impact a range of sectors from water supply to food and health systems. They disproportionately affect low-income households and other vulnerable groups, especially women and girls, youth, the elderly, persons with disabilities, seasonal migrants and other marginalized persons. The majority of people in urban areas live in informal settlements, usually in areas prone to hazards thus exacerbating their vulnerability.



Map 27: Urban dynamics in Mozambique

Namibia



* *Percentage drawn from World Bank data on total and urban land area in 2010. In absence of data for 2020, a slightincrease can be assumed.*

Figure 27: Namibia urban infographic

Socio-economic context

Namibia is the SADC Member State with the lowest population density counting only three people per square kilometre of land area (World Bank, 2018). This is due to the fact that, with a total of 2,494,53 inhabitants (World Bank, UNDESA, 2019), Namibia is one of the least populous countries in the region although one of the largest by land mass. Although the urban land cover is quite small (see figure 27), the urban population share is fairly large registering 52 per cent of the population residing in urban areas in 2020. Projections show that in 2050 cities will host around 72 per cent of the population experiencing one of the fastest growths in the region.

From 2004 when GDP annual growth was 12.3 per cent, the country has registered a significant decrease reaching -1.1 per cent in 2019. Projections for 2020 show a further decrease to -5.6 per cent. From data collected in 2015, poverty levels are below the average of the region with only 13.5 per cent of the population living below the poverty line (World Bank, headcount ratio at USD 1.90 a day).

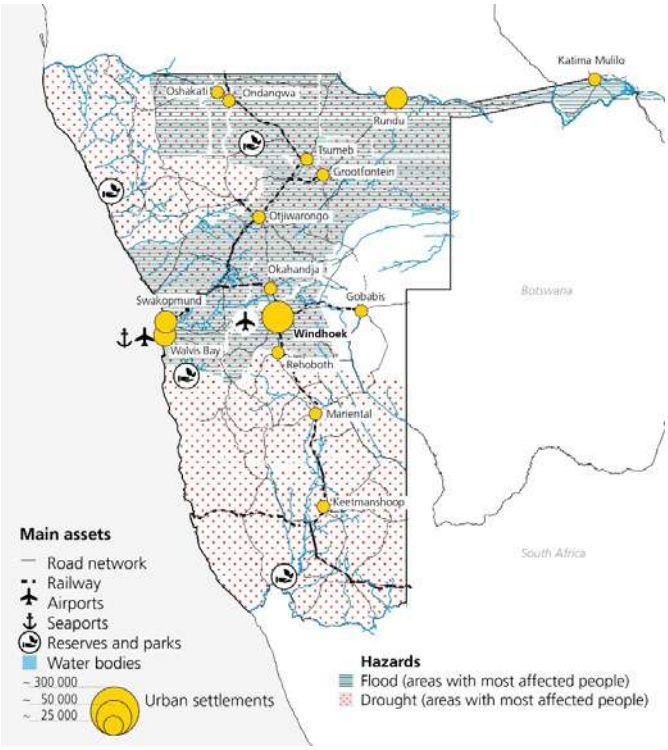
Hazards and impacts in urban areas

The main challenges faced by the national institutions trying to provide adequate and effective social services are floods, droughts, and wild and veld fires.

The most recurrent hazards are floods affecting on average about 4,000 people annually. Those affected are concentrated in the central, northern and north-eastern parts of Namibia.

Due to low rainfall rates, Namibia is also prone to droughts. In 2013, a national emergency was declared due to widespread drought which impacted 13 regions in Namibia. From October 2018 through March 2019, Namibia experienced its driest rainfall season in 38 years affecting 1 million people and resulting into a loss of more than 100,000 livestock, reducing incomes of livestock farmers to almost nothing.

Wild and veld fires are estimated to destroy between 3 to 7 million hectares of land annually.



Map 28: Hazards in Namibia

Urban vulnerability dynamics

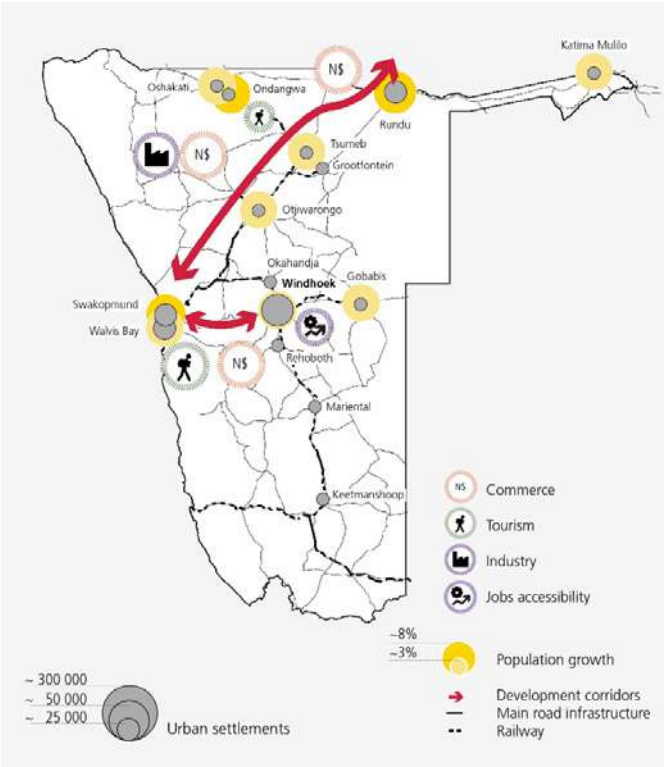
Almost half of the population of Namibia resides in rural areas. However, due to the lack of livelihood opportunities, rural to urban migration is an increasingly common feature.

In the capital Windhoek, there are serious concerns about meeting future water demands and providing adequate housing and sufficient services for the growing urban population. Windhoek has a current population of 330,000, 35 per cent of which are rural in-migrants. This number is expected to grow as droughts and floods become more frequent and intense.

Namibia's urban areas are not well equipped for a large influx of people. Food insecurity and water scarcity are common, especially in migrants' areas.

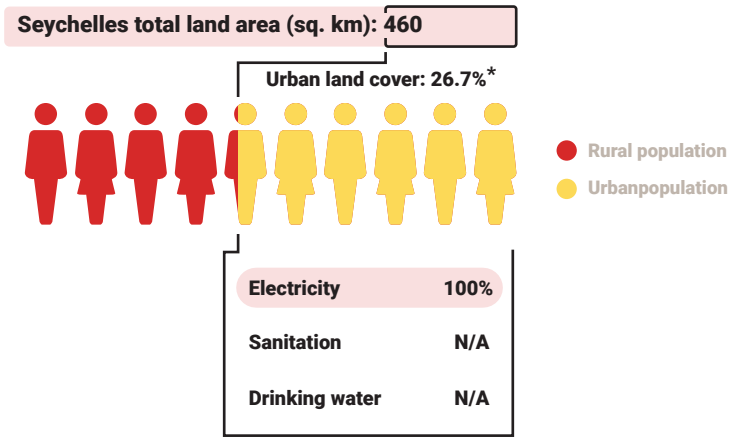
Migration to smaller urban areas such as Oshakati, the capital of the Oshana region, is also taking place in the north-central region where the towns suffer slightly different climate-related challenges. In Oshakati, with a population of about 37,000 people, flooding of the Cuvelai river basin is a common hazard.

In general across Namibia there is a lack of infrastructure, resources, planning and know-how to capture riverine water for productive uses. As a consequence, rather than being a valuable resource, the rivers impact negatively on the lives of vulnerable people who frequently have to be evacuated from flood-prone regions.



Map 29: Urban dynamics in Namibia

Seychelles



* *Percentage drawn from World Bank data on total and urban land area in 2010. In absence of data for 2020, a slightincrease can be assumed.*

Figure 28: Seychelles urban infographic

Socio-economic context

With a total of 97,625 inhabitants (World Bank, UNDESA, 2019) and just 460 square kilometres of land area, Seychelles is by far the least populous and smallest SADC country. Nevertheless, along with the two other SADC SIDS, Seychelles has one of the highest population densities in the region counting 210 people per square kilometre of land area (World Bank, 2018). Density is almost doubled in urban centres which host more than half of the population and cover around one fourth of the land area (see figure 28). Today, the urban population share is 58 per cent, expected to increase up to 70 per cent in 2050.

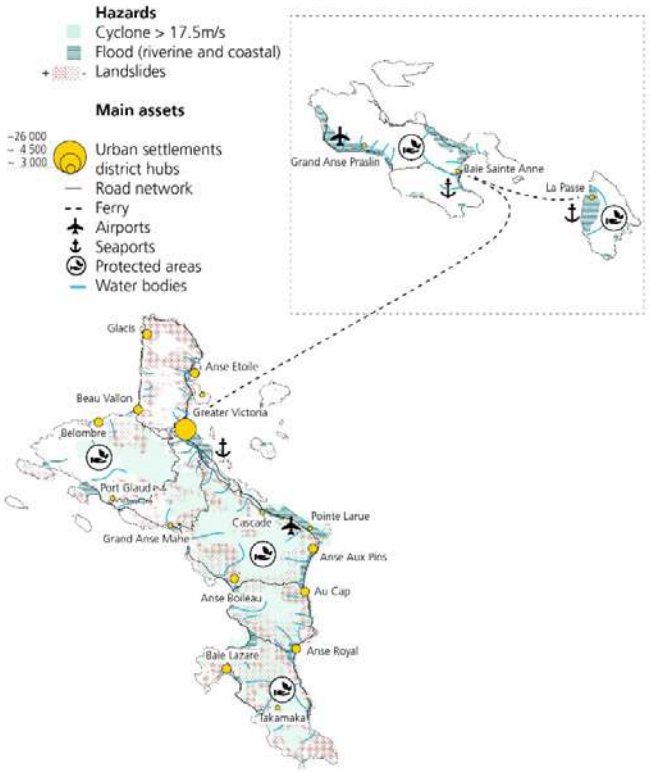
GDP growth has fluctuated in previous decades but since 2014 it appears to have stabilized registering an annual growth rate of 4.7 per cent in 2019. Projections for 2020 show that this value will suffer a significant decline mostly due to COVID-19 pandemic related impacts reaching -13.8 per cent and registering the biggest decrease in the region with a loss of 18.5 per cent over just one year (see figure 3). Compared to other SADC countries, Seychelles has quite low poverty levels with 1.2 per cent of people living below the poverty line in 2013 (World Bank, headcount ratio at USD 1.90 a day).

Hazards and impacts in urban areas

Seychelles is an island state in the western Indian Ocean with 115 low-lying islands. Most of the population live on three islands: La Digue, Mahé and Praslin. Due to their location and exposure to hazards, the islands are highly vulnerable to cyclones, floods, landslides, storm surges and tsunamis. These risks are exacerbated by climate change and sea-level rise.

Coastal erosion and sea-level rise are growing issues exposing about 80 per cent of the nation's economic development and livelihood concentrated along the narrow coastal zones to serious threats.

Following recurrent cyclones and heavy flooding, the Government of the Seychelles renewed its efforts to increase resilience to natural disasters. In fact, after tropical Cyclone Felleng battered the country with heavy rains in January 2013, the government assessed the damage and ensured recovery efforts and mitigation of the impacts of future natural hazards.

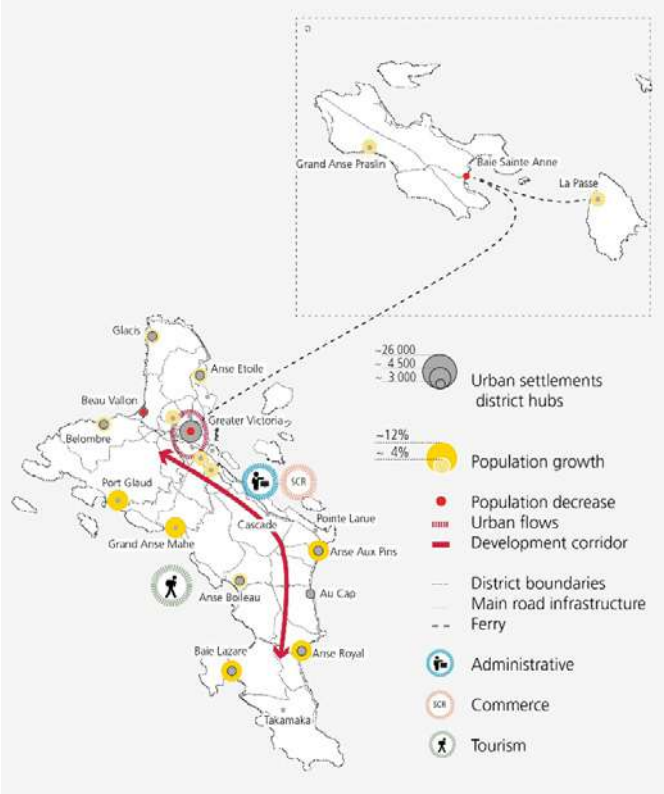


Map 30: Hazards in Seychelles

Urban vulnerability dynamics

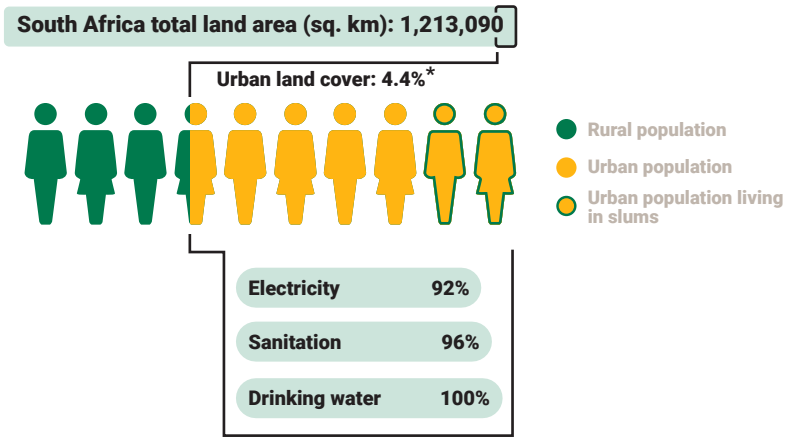
The share of the urban population is projected to increase to 70 per cent by 2050 putting pressure on the coastal zones through increasing demand for housing, industrial development and intensive agricultural practices.

Victoria, the capital of Seychelles, is located on Mahé island and hosts more than 25 per cent of the total population. Some properties in the city lack the necessary setback distance from the high-water line. Much of the new housing construction occurs on reclaimed land. Severe projected climate change impacts will affect the urban areas through damage to infrastructure on the coastal plains or reclaimed land, eroding shorelines and beaches, inundating wet- and lowlands, and threatening important natural buffers like coastal and marine ecosystems.



Map 31: Urban dynamics in Seychelles

South Africa



* *Percentage drawn from World Bank data on total and urban land area in 2010. In absence of data for 2020, a slightincrease can be assumed.*

Figure 29: South Africa urban infographic

Socio-economic context

With a total of 58,558,270 inhabitants (World Bank, UNDESA, 2019), South Africa is the second most populous SADC country after the Democratic Republic of the Congo. Although one of the largest countries in the region, its population density is not very high counting 48 people per square kilometre of land area (World Bank, 2018). Density increases in urban settlements which, despite covering a relatively small portion of the total land area, host more than 60 per cent of the population (see figure 29). South Africa is one of the most urbanized countries in the region and, according to future projections, will continue to be so in coming years increasing its urban population share from 67 per cent in 2020 to 80 per cent in 2050 (see figure 1).

In 2020 South Africa is expected to register one of the lowest GDP growth rates among SADC Member States decreasing from 0.15 per cent in 2019 to -8 per cent. Poverty levels in the country registered a slight increase between 2010 and 2014 when 18.7 per cent of the population appeared to live below the poverty line (World Bank, headcount ratio at USD 1.90 a day).

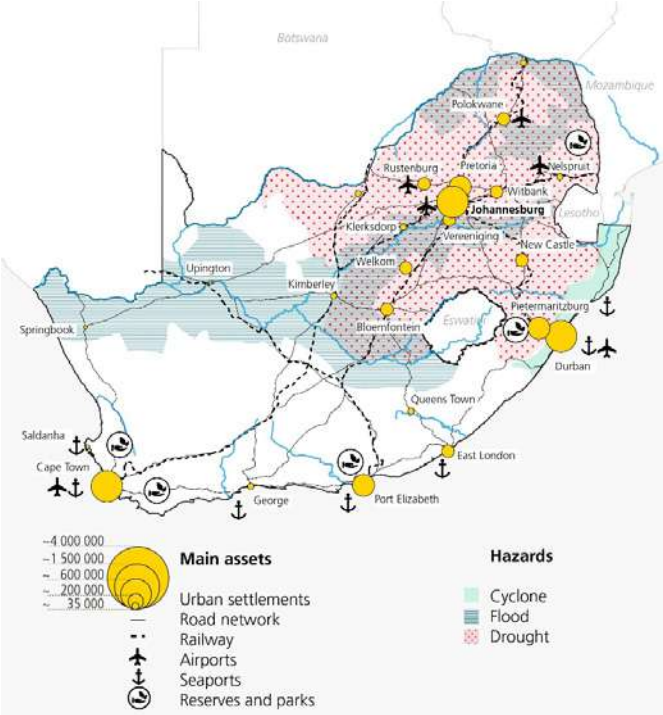
Hazards and impacts in urban areas

Over the past 40 years, South Africa has faced more than 80 hydro-meteorological hazards including droughts, floods and wildfires affecting the lives of millions of people. Both the intensity and frequency of these events are increasing continuously while average temperatures are also on the rise.

With the country's rapid rate of urbanization, the number of exposed cities and towns and their inhabitants is growing.

The most recent notable event was a flooding in the coastal city of Durban (2019) that was declared a provincial disaster, resulting in 71 casualties and more than 1,000 people displaced.

A major storm in June 2017 affected the whole of the Western Cape resulting in eight casualties and damaging more than 135 schools. Widespread fires in Knysna, the worst fires in the history of South Africa, resulted in seven casualties, displacing around 10,000 people and destroying some 600 structures.



Map 32: Hazards in South Africa

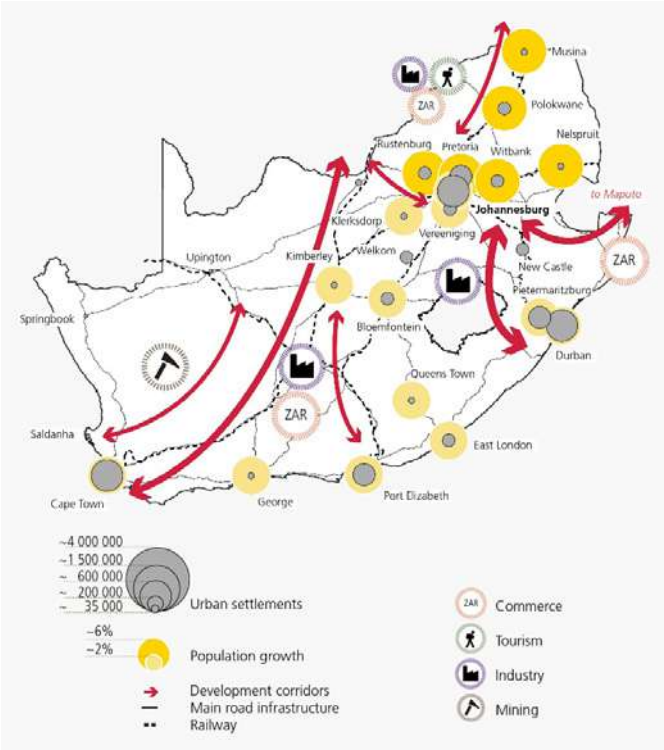
Urban vulnerability dynamics

South Africa is part of a number of trans-African transport corridors (e.g. the Cairo–Gaborone and North–South corridors) that, along with national development corridors, influence the urban growth pattern across the country. The north-eastern part of the country is currently witnessing the highest urban growth rates due to the regional and national development corridors that connect with the South African seaports of Durban and Cape Town through Johannesburg and Pretoria (see map 33).

Socio-economic and political residues of Apartheid still have deep roots in the urban system resulting in an increasingly more fragmented social fabric and urban landscape, and a growing gap between rural and urban areas fuelling massive migration pressures.

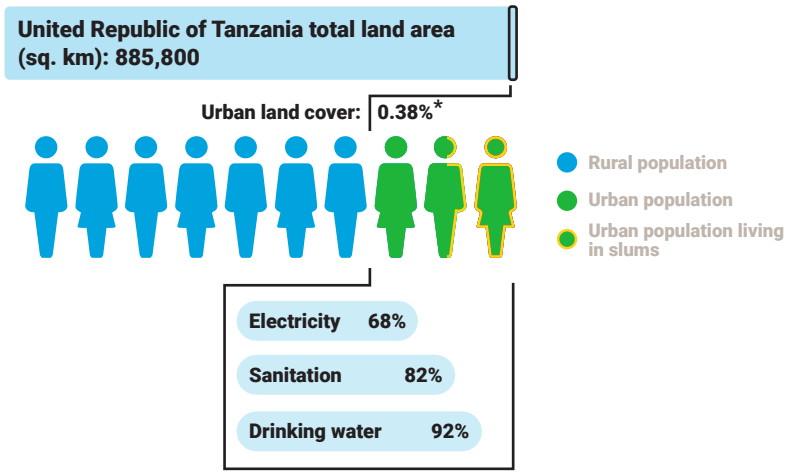
The outflow of people from rural to urban areas has many implications causing imbalanced development, loss of skills, proliferation of informal settlements, overpopulation and increasing unemployment and crime. The problems generated by imbalanced development and rural-urban migration are major challenges – more balanced development and social equality across the whole country are national priorities.

Building regulations in South Africa are quite strict and well-developed but only applied in formal townships. In informal settlements those regulations are neither applied nor enforced creating real vulnerability in the urban space. Where regulations do exist, structures are built to cater for 'reasonable' hazard events, rather than extreme ones.



Map 33: Urban dynamics in South Africa

United Republic of Tanzania



* *Percentage drawn from World Bank data on total and urban land area in 2010. In absence of data for 2020, a slightincrease can be assumed.*

Figure 30: United Republic of Tanzania urban infographic

Socio-economic context

With 58,005,463 inhabitants (World Bank, UNDESA, 2019) the United Republic of Tanzania is one of the most populous countries in the SADC region preceded only by South Africa and the Democratic Republic of the Congo. The country is also one of the largest with a population density of 64 people per square kilometre of land area (World Bank, 2018). Since 2006, urban population growth in the United Republic of Tanzania has been the highest in the region with an annual growth rate consistently above 5 per cent. Hosting around one third of the population in a very small urban land cover (see figure 30), the United Republic of Tanzania has one of the highest urban population densities. Today cities in the country host around 35 per cent of the total population but by 2050 this is expected to rise to up to 55 per cent making the United Republic of Tanzania the country with the most rapid urban growth in the region (see figure 1).

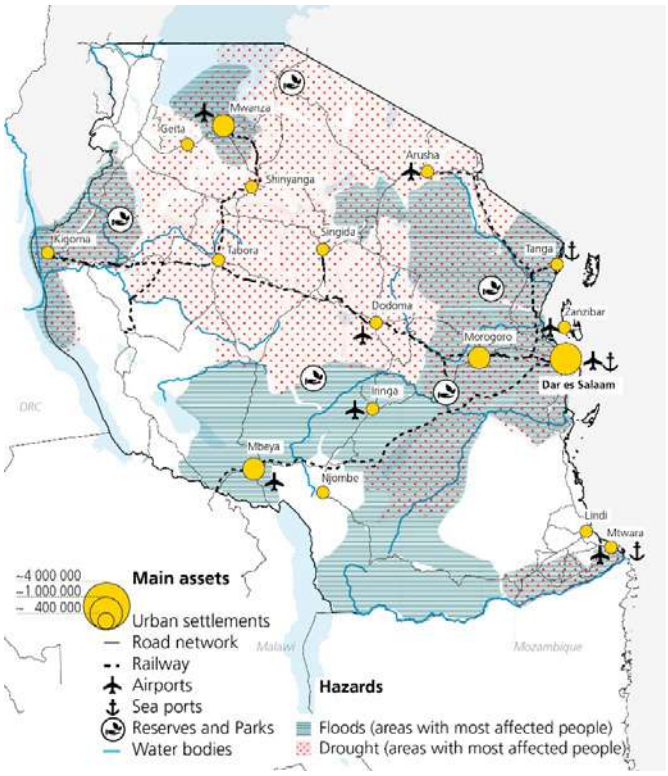
The United Republic of Tanzania is one of the few countries in the region expected to keep its GDP annual growth rate for 2020 above zero, falling from 5.8 per cent in 2019 – the highest value among SADC Member States – to 1.9 per cent (see figure 3). Poverty levels, however, remain quite high with 49 per cent of people living below the poverty line in 2017 (World Bank, headcount ratio at USD 1.90 a day).

Hazards and impacts in urban areas

Recurrent droughts (especially in 2008/09), cyclones and strong winds are hazardous events in the United Republic of Tanzania affecting rural and urban areas alike and increasing in magnitude. Flooding is becoming more frequent (with disasters occurring in 2010, 2011 and 2018) with the largest city, Dar es Salaam, and Mwanza especially impacted by riverine floods. Coastal municipalities like Kigoma and Tanga are potentially vulnerable to sea level rise and coastal flooding.

The United Republic of Tanzania's location along the Great Rift Valley makes it prone to earthquakes and tremors (e.g. the Kagera region in 2016 with about 117,000 affected). Arusha, Mbeya, and Mwanza have hilly terrain and steep slopes and are susceptible to landslides.

Other urban hazards are epidemics (e.g. cholera, rift valley fever, bird flu), as well as fires, road and transport accidents, building collapse and industrial accidents. Dar es Salaam's MV Nyerere ferry, for instance, became tragically well-known worldwide after an accident in September 2018 which led to 227 deaths.



Map 34: Hazards in United Republic of Tanzania

Urban vulnerability dynamics

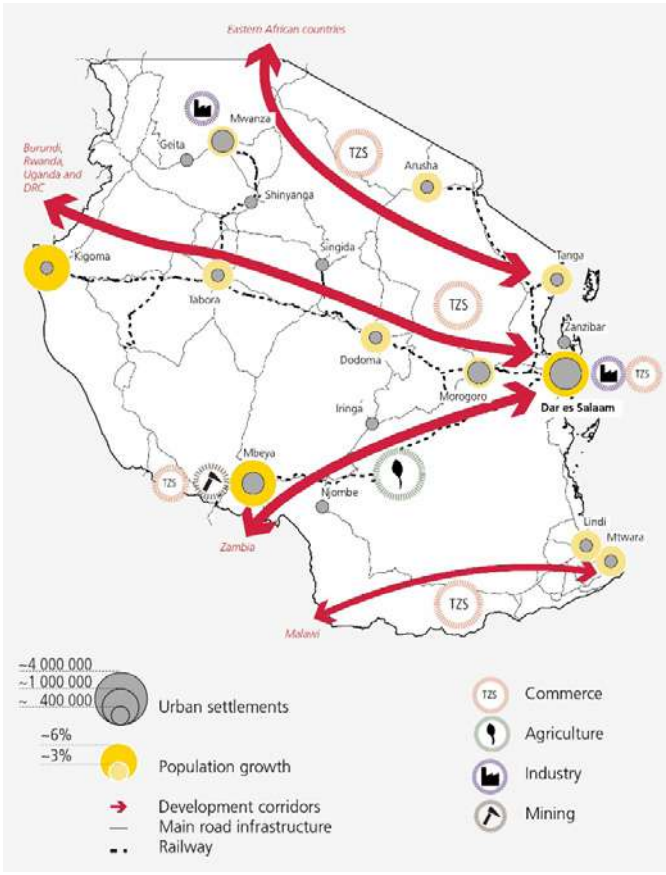
The United Republic of Tanzania is still predominantly rural (about 65.5 per cent) but is urbanizing rapidly with an annual urban growth of 5.1 per cent. Dar es Salaam is projected to become a megacity by 2030 when its population will exceed 10 million (United Nations, 2018). New urban settlements and urban corridors are also emerging, while existing cities and towns are rapidly developing (see map 35).

On average, 40.1 per cent of the urban population live in informal settlements (see figure 26), which are often located in areas vulnerable to hazards. The situation is more serious in Arusha, Dar es Salaam, Mbeya and Mwanza, as these cities are currently witnessing rapid population growth.

Urban floods are increasing in number, exacerbated by deforestation and land degradation in urban and peri-urban areas. 79 per cent of urban households use charcoal as their main source of energy, combined with insufficient urban drainage, frequently clogged by solid waste.

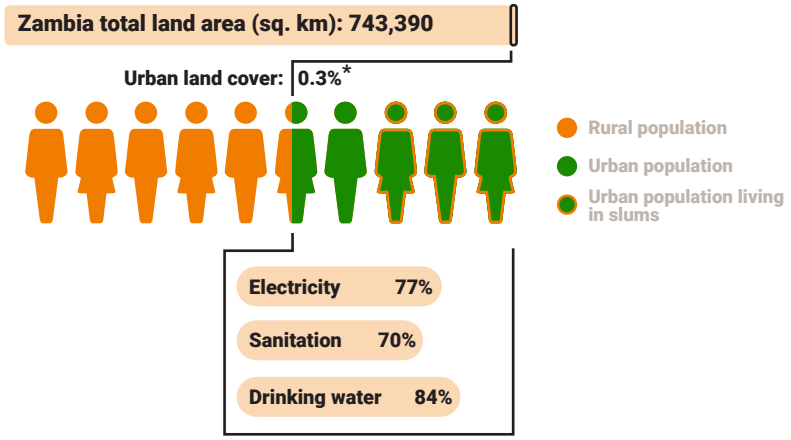
Cities in the United Republic of Tanzania are also not comprehensively planned and managing urban drainage systems, especially in secondary cities, is a challenge. In unplanned areas, households use on-site sanitation such as pit latrines and septic tanks that tend to overflow during heavy rains.

Continued encroachment on hazard prone areas exacerbates the impact of recurrent floods for vulnerable households. Development in flood-prone areas such as river valleys and wetlands (e.g. the Msimbazi River Valley in Dar es Salaam) is widespread.



Map 35: Urban dynamics in United Republic of Tanzania

Zambia



* *Data Source: OECD/SWAC, Africapolis, 2015.*
In absence of data for 2020, a slight increase can be assumed.

Figure 31: Zambia urban infographic

Socio-economic context

With 17,861,030 inhabitants (World Bank, UNDESA, 2019) distributed in an area of over 700,000 square kilometres, Zambia has one of the lowest population densities counting 23 people per square kilometre of land area (World Bank, 2018). A higher concentration of people can be found in cities which, covering just a small part of the total land, host over 40 per cent of the population (see figure 31). Zambia's annual urban growth rate currently stands at 4.15 per cent compared to an average of 6.7 per cent during the early post-independence period between 1964 to 1980 (World Bank, 2019). Nevertheless, Zambian cities are expected to grow rapidly over the next 30 years reaching an urban population share of 62.4 per cent (UN-Habitat, 2020).

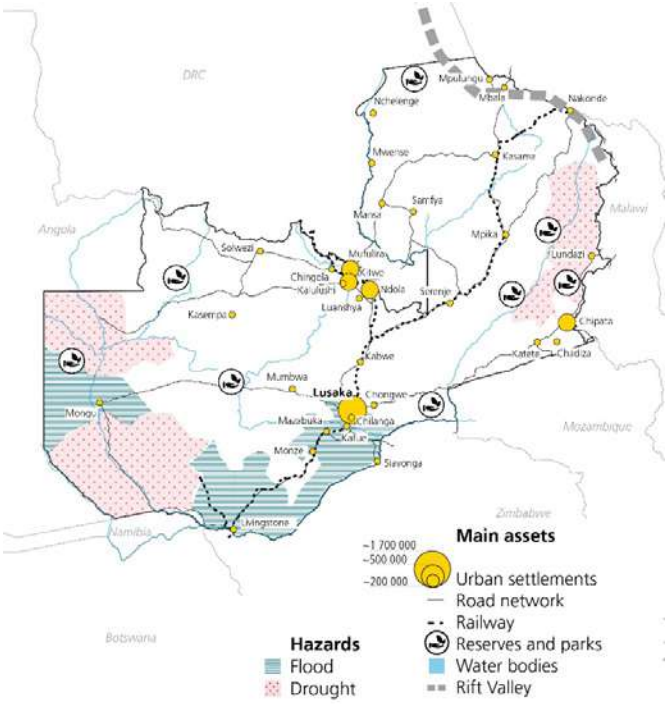
In the last decade the country's GDP experienced a general decrease going from 10.3 per cent annual growth in 2010 to 1.7 per cent in 2019 (World Bank). 2020 projections show a further decline down to -4.8 per cent (IMF, 2020). Poverty levels are of concern: in 2015 it was registered that 60 per cent of the population were living below the poverty line (World Bank, headcount ratio at USD 1.90 a day).

Hazards and impacts on urban areas

In Zambia, floods and droughts occur annually. The most flood-affected populations are in the cities around the Copperbelt and the northern, north-western and Muchinga Provinces (ZVAC, 2007; CIMA & UNISDR, 2018). Drought mostly affects people in the cities of the central, eastern and southern parts of Zambia (World Bank, 2018).

Beyond 2050, the northern part of the country is expected to become more flood prone while the larger share of central, western and southern Zambia is said to become more drought prone. In 2006/07, Zambia experienced one of its worst floods affecting 43 of the 72 urban centres (ZVAC, 2007). Consequently, Zambia regularly struggles with water borne diseases (e.g. cholera) which, in most cases, also affects the capital Lusaka (UNICEF, 2008; IFRC, 2014).

The 2004/05 drought was among the worst ever impacting over 11 per cent of the population in central, western and southern Zambia (GRZ, 2007).



Map 36: Hazards in Zambia

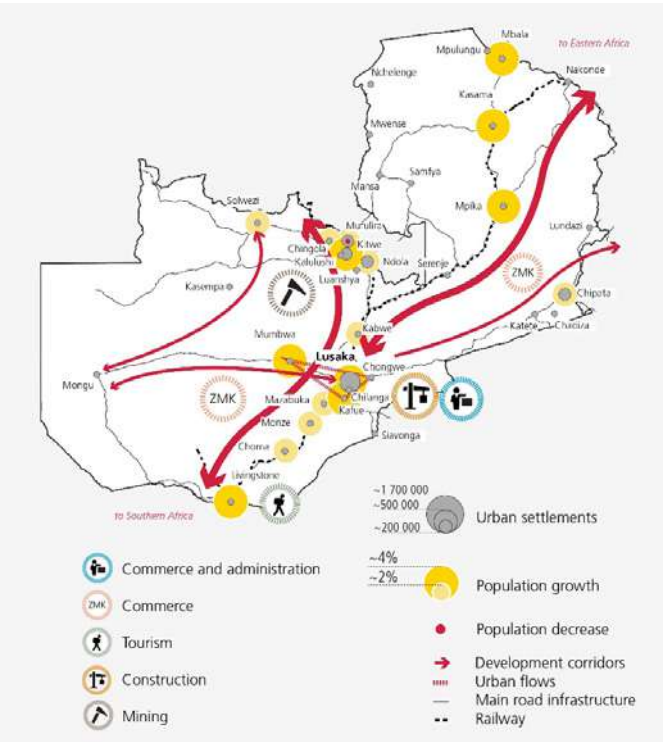
Urban vulnerability dynamics

On average, over 63.3 per cent of the urban population resides in informal settlements (UN-Habitat, 2020) usually located in areas unsuitable for human habitation.

Primary causes of disasters in urban areas are deforestation, encroachment of human habitation on protected and environmentally sensitive areas, inadequate enforcement of building codes and standards, inadequate development control, political interference, poor infrastructure maintenance and poor basic services delivery (FAO, 2011; GRZ, 2015). These weaknesses have greatly magnified the vulnerability of the urban population and significantly reduced their coping capacity during floods, droughts or outbreaks of water- and sanitation-related diseases.

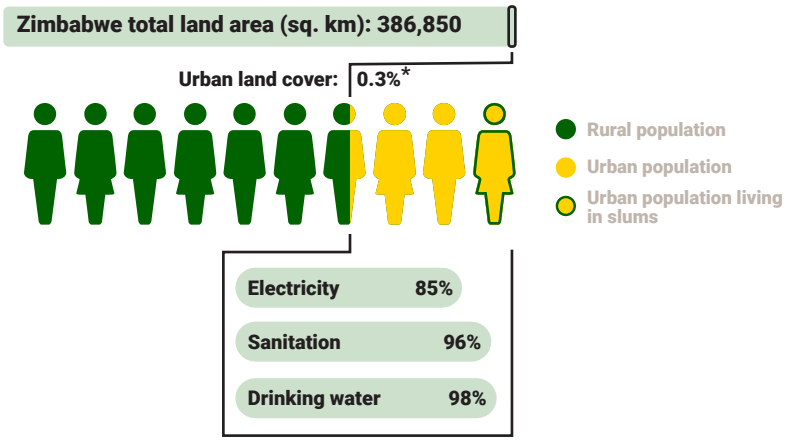
Increased investment (especially in community engagement) that would support enforcement of building codes and standards, and improvements in capacity development for city officials could assist in reducing current vulnerabilities.

Over past years the Zambian government has embarked on the review and enactment of new laws and policies such as the Urban and Regional Planning Act, No 3 of 2015 that emphasises community engagement and participation at different levels. This is certainly a step in the right direction as far as building urban resilience is concerned.



Map 37: Urban dynamics in Zambia

Zimbabwe



* *Data Source: OECD/SWAC, Africapolis, 2015.*
In absence of data for 2020, a slight increase can be assumed.

Figure 32: Zimbabwe urban infographic

Socio-economic context

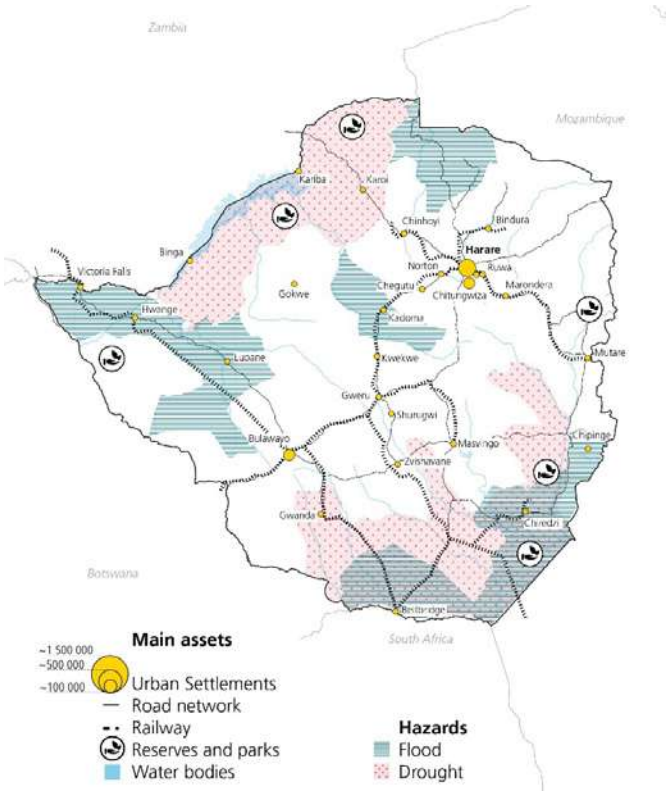
Zimbabwe has a total population of 14,645,468 inhabitants (World Bank, UNDESA, 2019) in quite a low density, counting 37 people per square kilometre of land area (World Bank, 2018). Cities have the highest concentration of people covering a very small portion of the total land area. As shown in figure 28, cities host 32 per cent of the total population. With an annual rate of 1.42 per cent, Zimbabwe has the second lowest urban population growth in the region after Mauritius.

From 2002 onwards, Zimbabwe went through seven years of recession and hyperinflation. In 2019 the country registered the lowest GDP annual growth rate of the region at -8.1 per cent (World Bank) and the situation is expected to worsen since the projected figure for 2020 is -10.38 per cent (IMF, 2020). Poverty levels are also increasing with 40 per cent of the population living below the poverty line in 2017 (World Bank).

Hazards and impacts on urban areas

Zimbabwe faces multiple recurrent natural hazards including cyclones, droughts, floods and heavy rains. Drought affects both rural and urban food security, water supply and livelihoods. Recurring floods damage property and infrastructure and disrupt lives (World Bank, 2020). According to the World Bank, there is a likelihood that by 2040, Zimbabwe may begin encountering an increase in drought experiences, compared to the period between 1966 and 2005, mostly likely affecting western Zimbabwe (World Bank, 2020).

This will have significant economic implications as about 80 per cent of the population depends on rain-fed agriculture, the sector which employs most of the population and the majority of which is female (World Bank, 2020). A 2016 regional Southern African drought, made worse by El Niño, affected over 2.4 million people in Zimbabwe. This was followed by severe flooding in 2017 affecting multiple cities in the country (CRS, 2016; UNFPA, 2017).



Map 38: Hazards in Zimbabwe

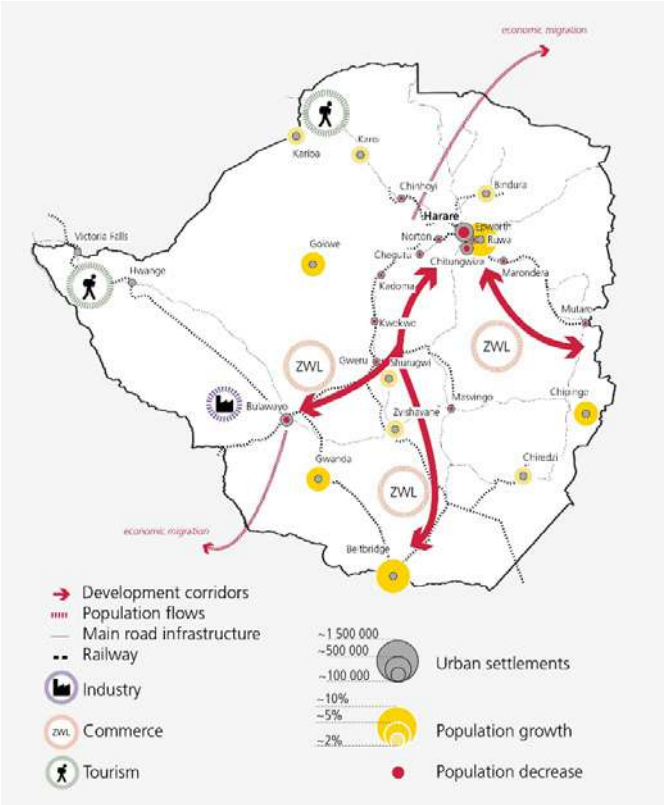
Urban vulnerability dynamics

The main contribution to Zimbabwe's annual urban growth rate comes from smaller urban centres. Most of the larger cities register significant population declines due to the country's severe economic challenges. The economic situation has contributed to a growing number of people living in informal settlements – 29 per cent of the urban population in 2018 (UN-Habitat, 2020) – as people struggle to make livelihoods.

From 2000 onwards, smaller towns near rural districts where the costs of living are lower experienced rapid growth in response to the unstable political and economic conditions and structural changes in Zimbabwe's economy. Peri-urban settlements near the capital Harare have also experienced rapid growth.

The difficult economic situation of the last few years has made conditions challenging for private sector investment and job creation, the outcome of which has been high levels of unemployment (World Bank, 2013).

These weaknesses have increased the vulnerabilities of the population in urban areas significantly reducing their capacity to cope during floods, droughts or outbreaks of water and sanitation related diseases. Although the disaster management institutional framework is well articulated on paper there are almost no resources to effectively operationalize the framework in the event of a disaster in the cities.



Map 39: Urban dynamics in Zimbabwe

Flooding in Dar es salaam, Tanzania
© Shutterstock/Moiz Husein Storyteller

ANNEX

Annex 2:
City Profiles

A vendor carrying bananas to a market in Lusaka, Zambia - © Shutterstock/Bernard Mwape

Lusaka, Zambia

The city of Lusaka is not only Zambia's largest city but the capital, administrative and commercial centre of the country. Lusaka, which became the capital in 1931 (of what was then Northern Rhodesia), is located in the southern part of Zambia's central plateau. Lusaka connects the four main highways to the rest of the country and continues to benefit from rapid growth in the construction, transportation and service sectors fuelled by domestic and foreign investment and by the relatively large presence of the public sector.[127]

Lusaka contributes over 26 per cent to Zambia's gross domestic product[128] and although the city registered a decline in the number people living below the poverty line between 2006 and 2010 (from 30 per cent to 18 per cent[129]), over 55 per cent of its youth population remains unemployed.[130]

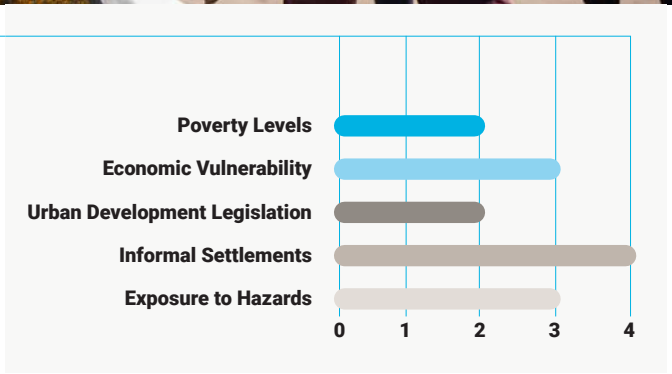
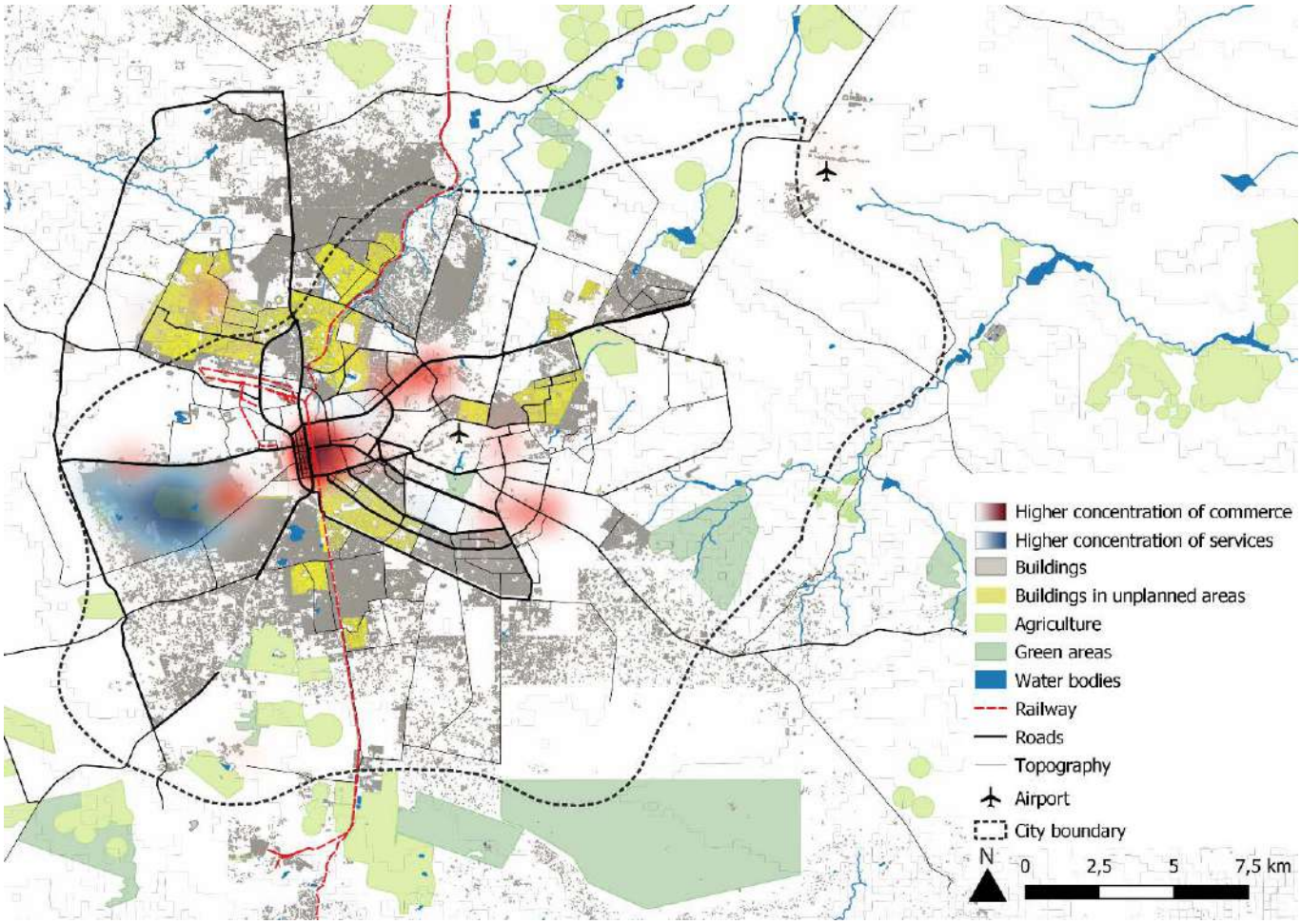


Figure 33: Vulnerability ranking of Lusaka

127 World Bank, 2012, Zambia Poverty Assessment Stagnant Poverty and Inequality in a Natural Resource-Based Economy
128 Central Statistics Office, 2016
129 IGC, 2017, Economic Growth, Inequality and Poverty: Estimating the Growth Elasticity of Poverty in Zambia, 2006–2015
130 Central Statistics Office, 2019 Labour Force Survey



Map 40: Overview map of Lusaka

The population of Lusaka, which is expected to double in the next 20 years, has grown rapidly in the last five decades, from 123,146 people in 1963 to an estimated 3.3 million people today.[131] Between 1963 and 1974, Lusaka's annual population growth rate was over 10 per cent.

The city of Lusaka dominates Zambia's urban system and accounts for over 32 per cent of the total urban population. Although, Lusaka is yet to match the populations of major regional metropolitan centres, the demographic movement towards it poses considerable socio-economic and environmental challenges.

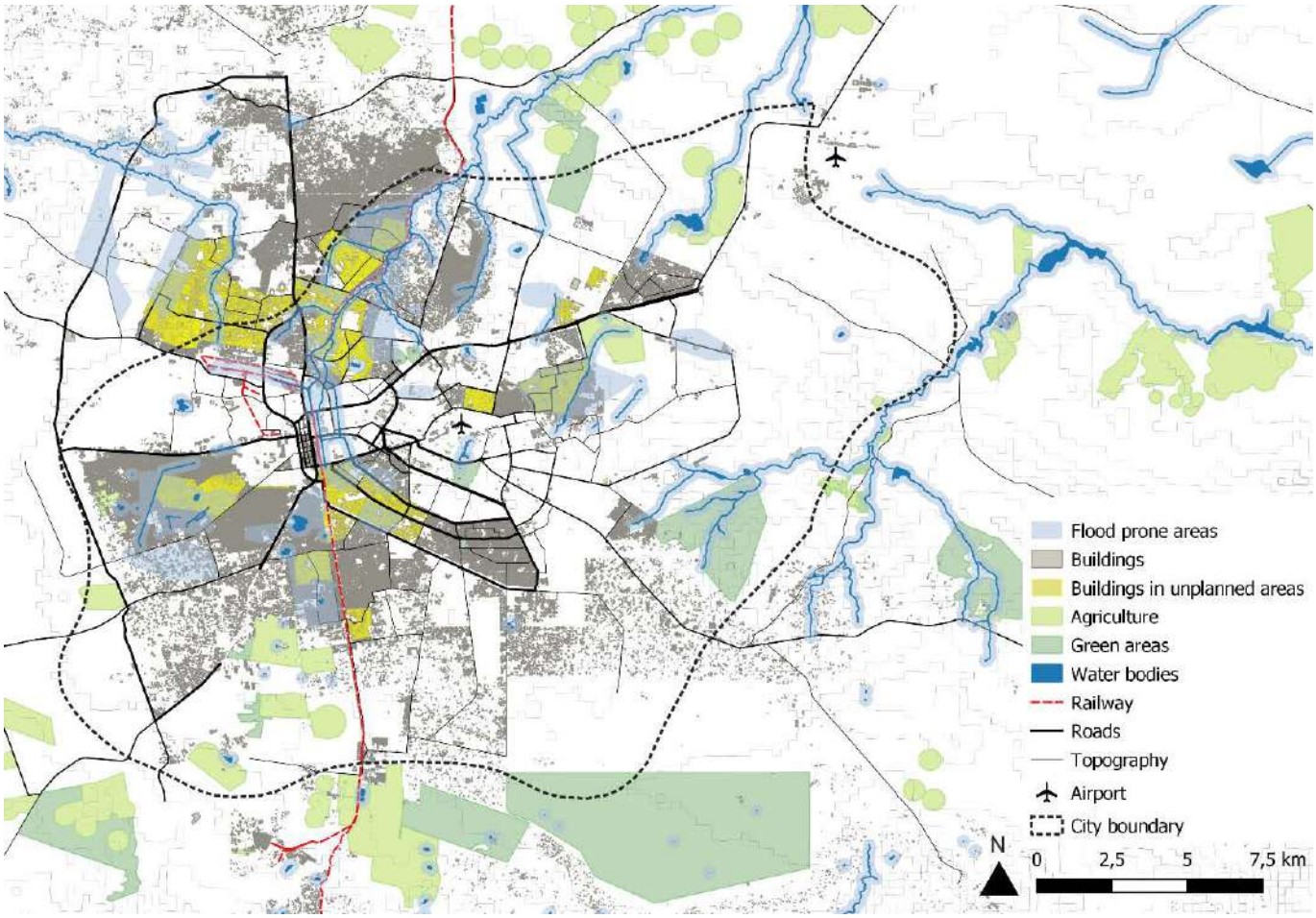
The rapid growth of Lusaka has led to a proliferation of informal settlements. Currently the city is surrounded by over 30 informal settlements in which an estimated 70 per cent of its residents live compared to 15 per cent in 1968. Informal settlements in Lusaka, most of which are located in low-lying flood prone highly permeable limestone areas (sitting on impermeable bedrock), is a legacy of Zambia's inadequate land delivery systems for the poor.[132]

Most of the urban growth has taken place in these informal settlements over many years. For example, from 1969 to 1973, while the formal planned part of the city grew by 8.9 per cent per annum, the informal settlements

> **"Because of its rapidly growing population, the city has not been able to meet the escalating demand for water, sanitation and basic infrastructure.**

131 Central Statistics Office, 2010, Census of Population and Housing, Republic of Zambia

132 Nchito SW, 2007, *Flood risk in unplanned settlements in Lusaka, Environment & Urbanization International Institute for Environment and Development* (IIED), Vol 19(2): pp. 539–551. DOI: 10.1177/0956247807082835



Map 41: Disaster risk in Lusaka

"The city has faced a deficit in the housing stock since independence and this has resulted in people finding their own solutions. Squatting or illegal settlement has been the easiest and most affordable solution for many.

grew by almost double at 14.5 per cent.[133] According to the Central Statistics Office (CSO, 2010),[134] between 1990 and 2010 informal settlements contributed over 900,000 residents to the city. Lusaka has had two UDPs but their requirements have scarcely been followed[135] mainly due to high levels of central control which are largely steeped in political economy dynamics.[136]

Because of its rapidly growing population, the city has not been able to meet the escalating demand for water, sanitation and basic infrastructure. Although 89.2 per cent of Lusaka's population has access to water, most informal settlements receive less than five hours of a consistent water supply (CSO, 2010). Access to sanitation facilities is perhaps of even greater concern: only 23 per cent of Lusaka's population use flush toilets while 73 per cent use pit latrines. By 2015, the number of people with access to sanitation facilities had dropped to 20 per cent.[137]

The city has faced a deficit in the housing stock since independence[138] and this has resulted in people finding their own solutions. Squatting or illegal settlement has been the easiest and most affordable solution for many.

133 Central Statistics Office, 1994, 2001, 2010, Census of Population and Housing, Republic of Zambia
134 Central Statistics Office, 2010, Census of Population and Housing, Republic of Zambia
135 Rakodi C, 1987, *Urban plan preparation in Lusaka*, Habitat International, 11(4), 95–111. doi:10.1016/0197-3975(87)90012-9
136 Resnick D, 2019, The politics of strengthening local government: Lessons from Zambia, IGC, https://www.theigc.org/blog/the-politics-of-strengthening-local-government/, 4 May 2021
137 Walker-Kennedy Ruth et al, 2015, *The role of power, politics and history in achieving sanitation service provision in informal urban environments: a case study of Lusaka, Zambia, Environment and Urbanisation*, International Institute for Environment and Development (IIED)
138 National Housing Policy, 1996, Ministry of Local Government and Housing, Government of the Republic of Zambia, p. 1

Urban resilience initiatives in Lusaka

Lusaka Sanitation Programme – climate resilient sustainable infrastructure: This is a project that will be undertaken by the Lusaka Water and Sewage Company (LWSC) with potential financial assistance from the African Development Bank, World Bank, German Development Bank and European Investment Bank. The project is derived from the Lusaka Sanitation Programme (LSP) that was conceived from the Lusaka Sanitation Master Plan. The objectives of the LSP are to increase access to sustainable sanitation services to Lusaka's 2 million residents, especially the urban poor, and strengthen LWSC's capacity to manage sanitation services. The project will consist of three components:

(i) Sewerage Infrastructure Development;

(ii) Decentralized Sanitation and Hygiene Education and;
(iii) Institutional Support and Capacity Building.

Lusaka Water Security Initiative: The Lusaka Water Security Initiative (LuWSI) is a multi-stakeholder collaboration system established in 2017, inspired by and working towards the vision of water security for the residents and businesses of Lusaka. At its core, it is a multi-stakeholder partnership between public sector, private sector, civil society and international actors that creates a platform for dialogue and governance structure for joint decision making. Currently LuWSI has 16 partners from the different sectors who engage in dialogue, analysis and knowledge generation, advocacy and awareness-raising and resource mobilization for climate and environmental related projects.

National Urbanization Policy: This is a deliberate government-led process, supported by UN-Habitat, of coordinating and rallying various actors for establishing a shared vision for the desired urbanization within 20–30 years or more, that intends to support poverty reduction, spatial planning, land management, housing, basic and social services, infrastructural development and coordination of large-scale investments. The National Urbanization Policy for Zambia has recently been completed and submitted to Cabinet for approval.

In 2005, only 10 per cent of the city's housing was considered formal, the remaining 90 per cent consisted of informal housing units accommodating the majority of the city's population on less than 20 per cent of its residential land.[139] Informal settlements in Lusaka are characteristic of poor or non-existing infrastructure.

Lusaka, whose rainy season lasts from late November to early April, is prone to stormy weather and flash storms which contribute to over 70 per cent of the total rainfall.

In the years when Lusaka receives normal and above normal rainfall, there is serious flooding in many of the informal settlements and other poorly planned locations in the city. The floods are also compounded by indiscriminate disposal of waste, poor drainage design and poor solid waste management which contribute to blocked/silted drains.

Floods have damaged and destroyed structures (including houses, shops and roads) and crops, and increased the incidence of waterborne diseases such as cholera, diarrhoea and dysentery.[140] The city experiences perennial cholera cases and fatalities, particularly in informal settlements which have poor living conditions and are prone to flooding.[141]

According to the African Development Bank, Zambia loses 1.3 per cent of GDP due to the public health impacts of poor sanitation and it is the urban poor living in these informal settlements who are most vulnerable.[142]

The shallow wells used as sources of drinking water in most informal settlements of Lusaka, easily get contaminated by the pit latrines when flooding occurs exponentially increasing the risk of waterborne diseases such as cholera, diarrhoea and dysentery.[143]

Floods have been part of the city since it evolved in the 1900s and indications from the latest climate projections suggest that future heavy rains will occur more often or be more intense.[144]

"In the years when Lusaka receives normal and above normal rainfall, there is serious flooding in many of the informal settlements and other poorly planned locations in the city.

139 Banda P, 2005, *Causes for the Growth of Unplanned Land Settlement in Zambia*, Thesis, School of Law University of Zambia
140 FRACTAL and LuWSI, 2019, *Preparing for Increased Flooding*, Policy Brief – Lusaka, Future Resilience for African Cities and Lands (FRACTAL) and Lusaka Water Security Initiative (LuWSI)
141 FRACTAL and LuWSI, 2019, *Preparing for Increased Flooding*, Policy Brief – Lusaka, Future Resilience for African Cities and Lands (FRACTAL) and Lusaka Water Security Initiative (LuWSI)
142 African Development Bank, 2015, *Lusaka Sanitation Programme – Climate Resilient Sustainable Infrastructure*
143 Ibid
144 Ibid

A popular market in Maputo, Mozambique © Shutterstock/Fedor Selivanov

Maputo, Mozambique

The city of Maputo, the capital of Mozambique, occupies a central position in the country in terms of infrastructure, economic activity and education and health services. The city contains most of the services and corporate headquarters of main economic groups and companies (public and private). Despite containing only 5.4 per cent of the country's population, Maputo is responsible for 20.2 per cent of Mozambique's GDP. The Metropolitan Area is composed of Boane, Maputo and Matola Municipalities and Marracuene District.

With an estimated population of 2 million hosting 40 per cent of the entire country's urban population (UN-Habitat, 2010), poverty rates in the Maputo Metropolitan Area are now lower than the national average (36 per cent compared to 54 per cent). Levels of service provision, GDP per capita and minimum wage are also considerably better than in other parts of the country (Tvedten, 2013; World Bank, 2015). For example, about 87.1 per cent of the population in Maputo has access to safe water and 70.1 per cent has access to and use of improved sanitation (UNICEF, 2017).

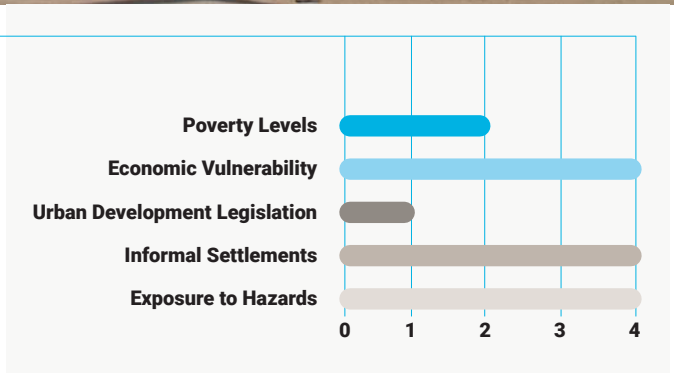
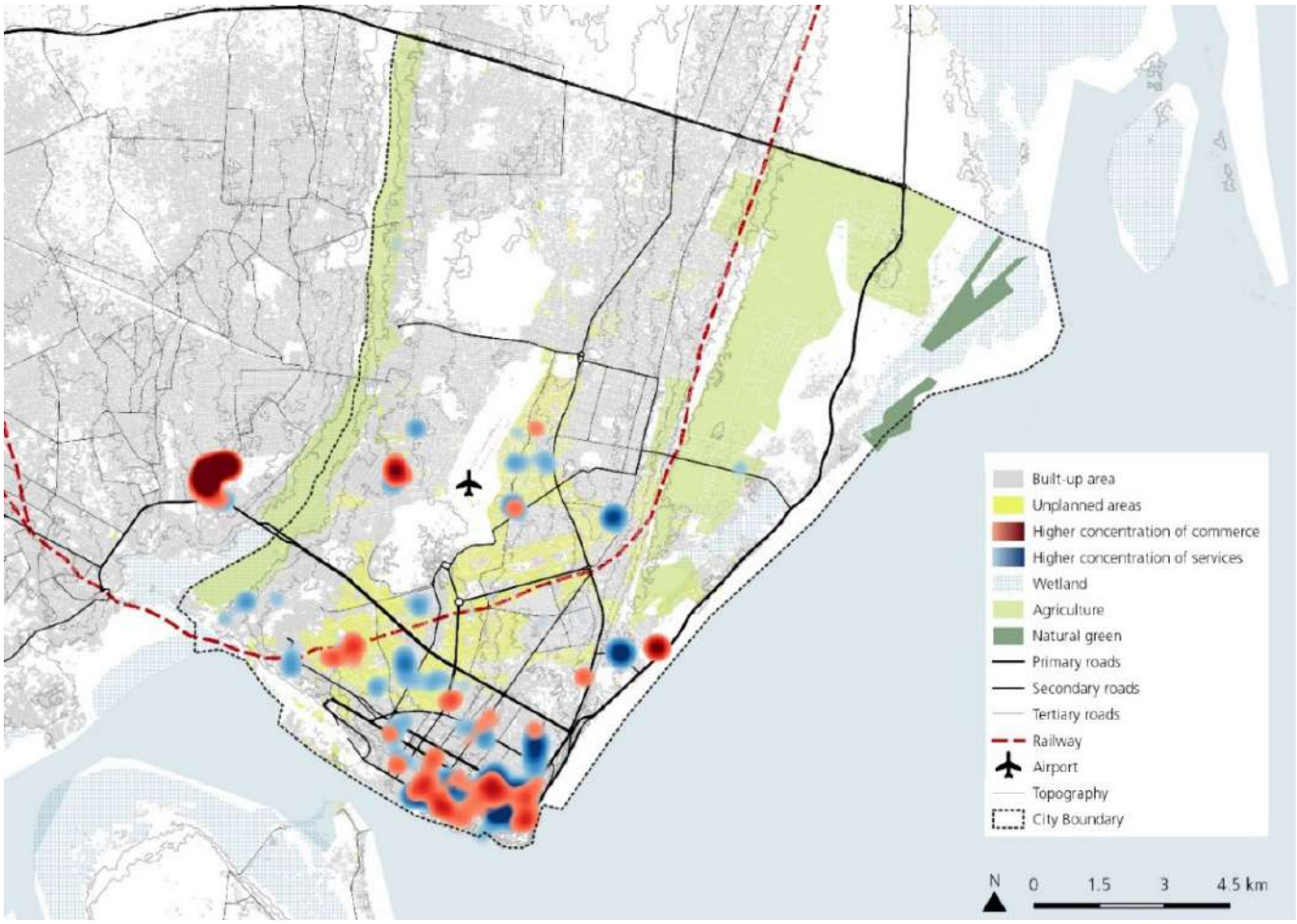


Figure 34: Vulnerability ranking of Maputo

The World Bank reports that basic solid waste collection reaches only 30 per cent of Maputo's residents, with a similar percentage for drainage – and a road network that is not maintained. This is reflected in low municipal spending where the total budget of Maputo city amounts to only USD 5 per capita. This equates to a third of the average in sub-Saharan Africa and one fiftieth of the average in Asia and South America.



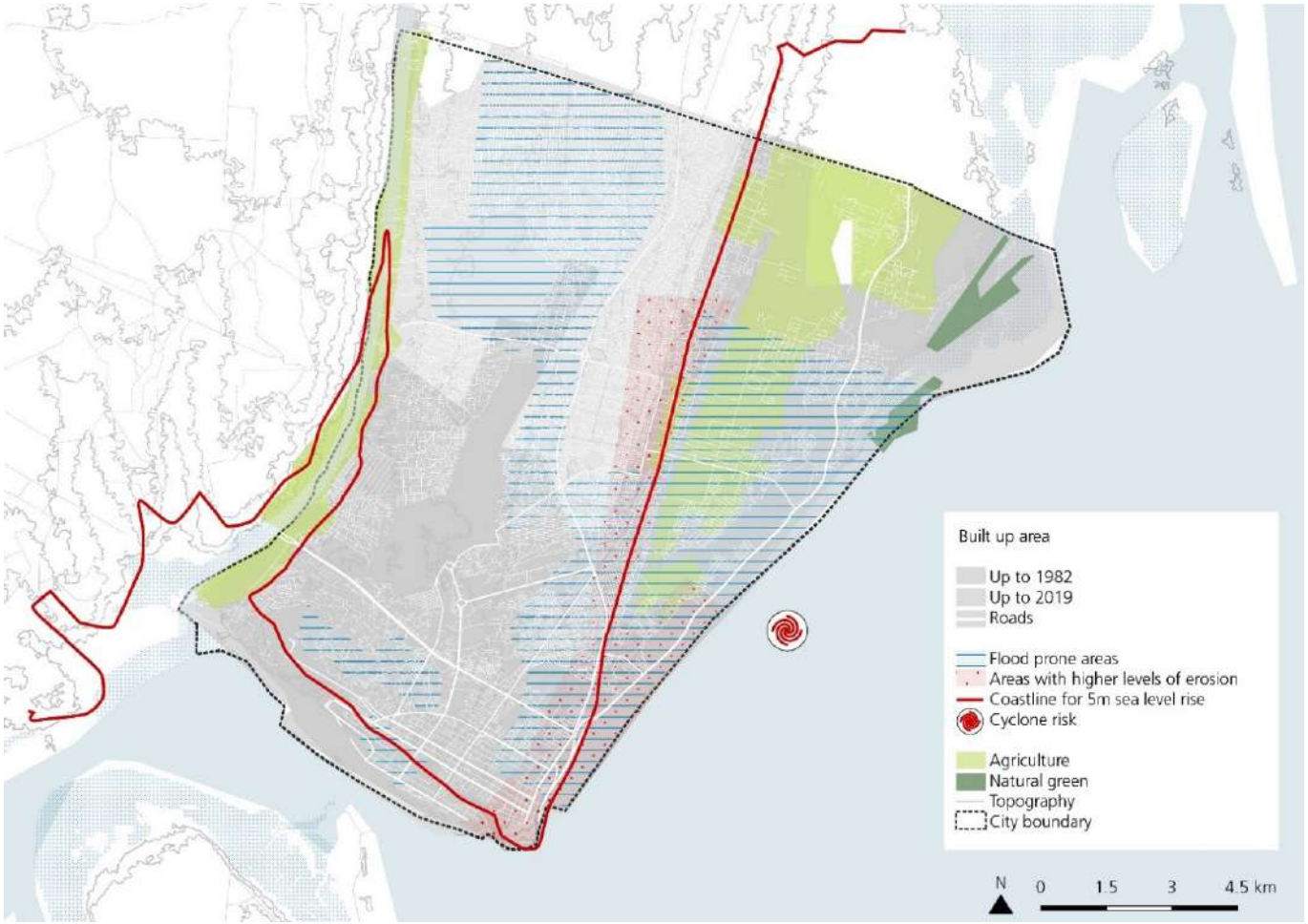
Map 42: Overview map of Maputo

Maputo is vulnerable to the impacts of climate change where the incidence of high temperatures, internal flooding, pluvial erosion due to rainwater runoff and coastal erosion due to the process of sea wave dynamics are currently observed.

Maputo Municipality was identified as being one of the most risk-prone locations to climate change in Mozambique by the World Bank and National Institute of Disaster Management of Mozambique in 2010, ranking among the cities with the highest scores on exposure in the overview of the 20 cities. Maputo has been affected by major coastal and inland flooding episodes in 2000, 2012, 2013 and 2014 which have caused death and destruction. Sea level rise is also projecting a worrying scenario for the city which would be largely submerged should a consistent water level rise occur (see the scenario at 5 m sea level rise in map 43).

Exacerbated by the rapid urbanization in hazard-prone areas, climate change has affected 720,000 people and has put 7 per cent of the city's assets at risk with informal settlements and areas of key economic activity (e.g. port and coastal real estate developments) being the most affected (INGC, 2009; INGC, 2012). The current economic losses due to climate-related risks/threats in Maputo Municipality in 2016 were estimated at USD 50 million per year and are expected to increase in the future if appropriate adaptation measures are not implemented (UN-Habitat 2018).

“Maputo is vulnerable to the impacts of climate change where the incidence of high temperatures, internal flooding, pluvial erosion due to rainwater runoff and coastal erosion due to the process of sea wave dynamics are currently observed.



Map 43: Disaster risk in Maputo

Urban resilience initiatives in Maputo

Maputo Climate Change Adaptation Plan: There has been improvement in localizing natural hazard mitigation measures over the past decade. A number of local plans have been developed and are now under implementation. The Climate Change Adaptation Plan of 2017 was established to protect and revitalize mangrove areas in the coastal zone to help protect against floods and erosion. River dams are planned to mitigate drought risk in the Maputo Metropolitan Area. Building codes and regulations are being reviewed, especially for informal settlements typically found in risk-prone areas.

Resilience Unit: The recent establishment of a Resilience Unit in Maputo is commendable. It resides under the Environmental Management Departments and is mandated to generate better understanding of exposure and vulnerability to the impacts of climate change on the population and assets, as well as to strengthen skills for integrated planning.

Aerial view of Independance Square in Maputo, Mozambique © Shutterstock/Sopotnicki

A street in Moroni, Comoros © Shutterstock/Rostasedlacek

Moroni, Comoros

The city of Moroni is located on Ngazidja Island (also called Grande Comore Island), one of the four islands of the Comoros Archipelago. It is the largest urban centre of the country and has been the capital city since 1958. The population of Moroni grew rapidly from 37,800 in 1991 to over 55,000 in 2016 (a 2.1 per cent annual growth rate) with much of the urban growth through informal settlement. The city's expansion has not been controlled by the authorities and no development plan exists, although an urban development plan (UDP) of the city of Moroni was conducted by the Ministry of Territory Planning in 1997. These weaknesses are also clearly visible in the vulnerability overview of 20 SADC cities where urban development legislation and informal settlements indicators are the lowest rated. This situation has influenced the increase of the urban population living in the city's slums over the years where the housing stock currently comprises only 10 per cent of dwellings complying with regulations against 60 per cent of buildings made of precarious construction. 75 per cent of the population live in houses with two rooms whose area does not exceed 20 square metres.

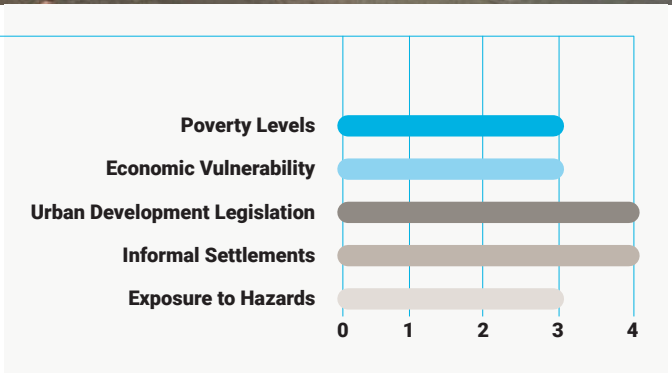
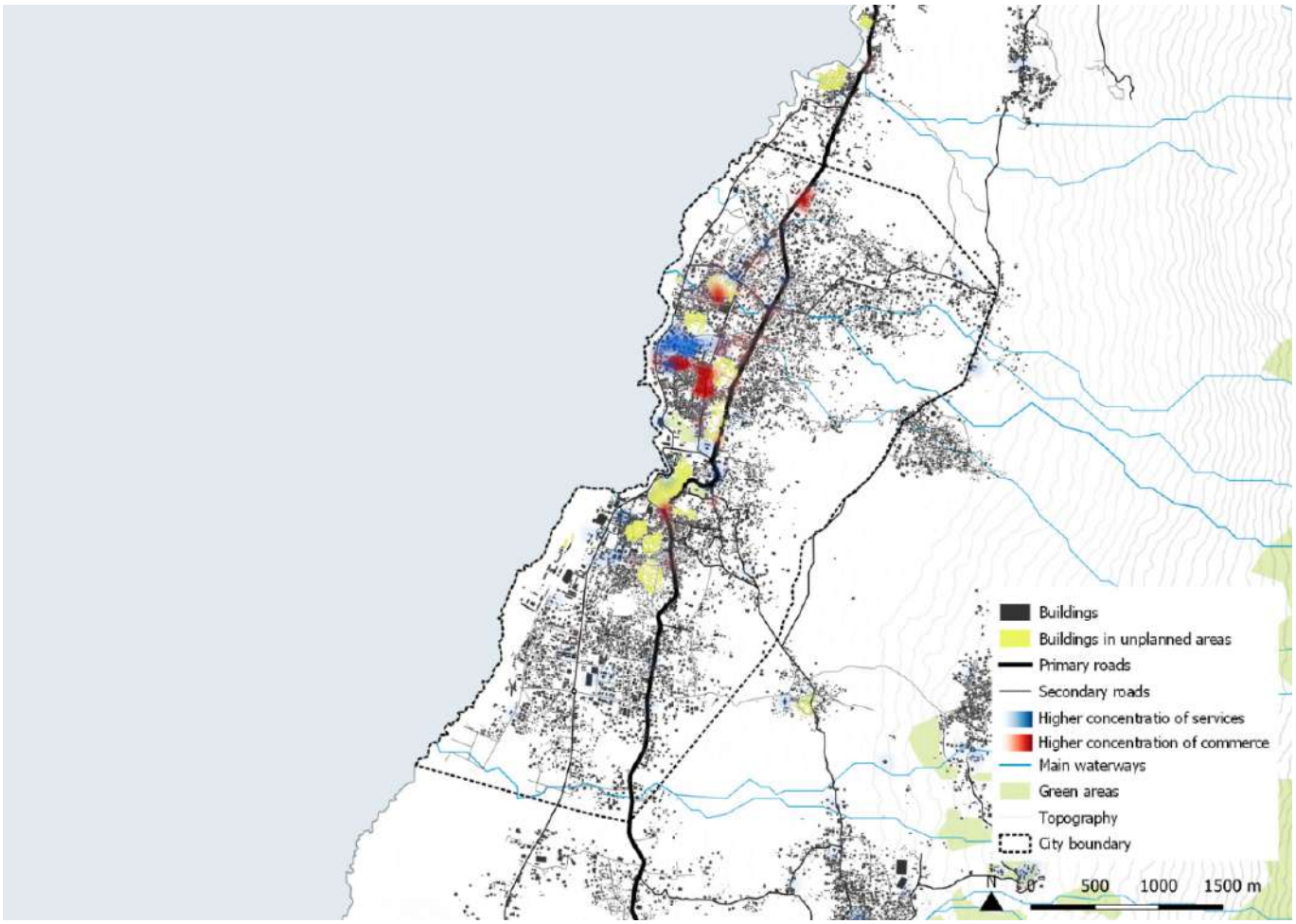


Figure 35: Vulnerability ranking of Moroni

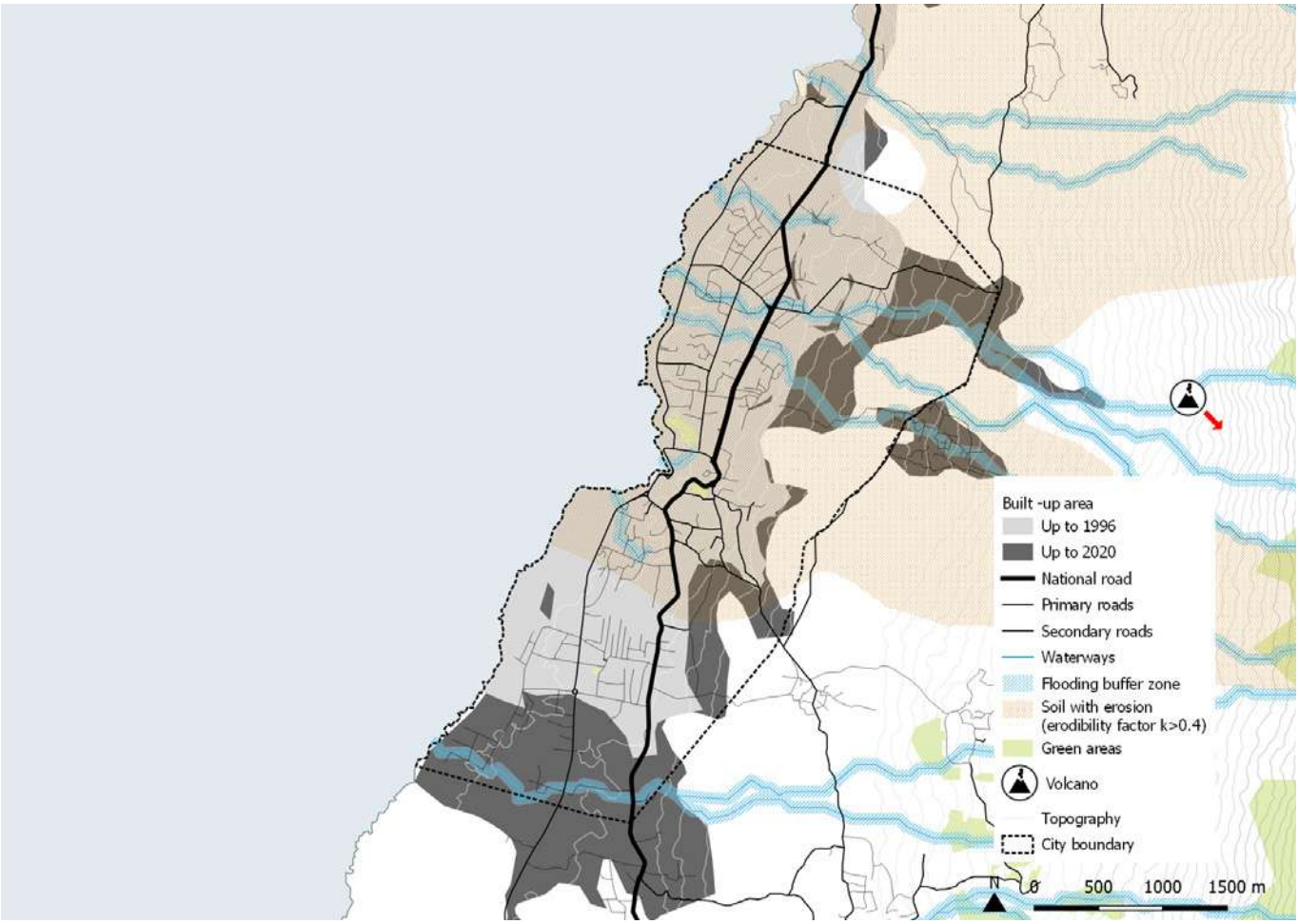


Map 44: Overview map of Moroni

Moroni is built on lava stone at the foot of Mount Karthala, a 2,361 m high volcano which erupted four times between 2005 and 2007. Some relatively new neighbourhoods, such as Coulee-Sahara, are built on the lava flows from a 1958 eruption. Although the city is at risk of future eruptions, it is unlikely that lava flows will follow the same path as before.

Sea level rise and subsequent coastal erosion are the main climate change-related threats to the city. The recurrent natural hazards are cyclones and floods resulting in damage and casualties. Heavy rains often provoke flash floods in the city. The long steep slope of the Karthala volcano, combined with a large catchment area above Moroni and heavy rains (up to 500 mm in a day) can result in large amounts of runoff water even during short rainfalls. A lack of drainage infrastructure to channel the water flows aggravates flooding risk.

> **“75 per cent of the population live in houses with two rooms whose area does not exceed 20 square metres.**



Map 45: Disaster risk in Moroni

Urban resilience initiatives in Moroni

Plan for the Greater Moroni area: The elaboration of a preliminary urban plan for the Greater Moroni area as requested by the Ministry of Urban Planning and Housing and validated in 2017. The plan aims at establishing a strategic urban development plan with guiding principles and technical support for sustainable development of the Greater Moroni area taking into consideration the risks affecting Moroni and its surroundings.

Disaster Risk Reduction and Disaster Risk Management National Platform: The National Platform for DRR and DRM is under review to promote and stimulate the links between national, regional and local level actions.

Well-developed community structures around neighbourhoods and villages: These structures organized in the form of Development Associations have been established to intervene in both DRR and adaptation activities at city level. The structures are mainly based on community solidarity.

Comoros © Shutterstock/Altrendo Images

A group of colorfully dressed African women and babies in Malawi © Shutterstock/Hecke61

Zomba, Malawi

After serving as the capital of Malawi under British colonial rule until 1975, Zomba currently ranks as the fourth largest city in Malawi according to population density. The overall population count is more than 110,000 people, of which 60 per cent reside in informal settlements (in yellow in map 40) growing at a pace of 2.5 per cent per year.

Economic activities in Zomba include trade, agriculture and industry, and the informal sector is vibrant. Unemployment (59 per cent), rapid population growth and an economy largely dependent on small and medium enterprises are the major factors that contribute to high levels of poverty in the city (20 per cent).

Zomba is situated at the foot of the Zomba plateau in a mountainous area with ground elevations varying between 790 m and 1,265 m. The area has two rivers and numerous streams and the most recurrent natural hazard in Zomba is flooding. The 2015 floods damaged 1,883 houses (mainly those made of non-permanent materials) and displaced 8,713 people. Along with floods, the main urban disaster risks facing the city include landslides, windstorms, environmental degradation, high incidences of road accidents and disease epidemics. Due to its location in the Great Rift Valley, Zomba is also prone to earthquakes and tremors. Landslides have become increasingly common and are an effect of environmental

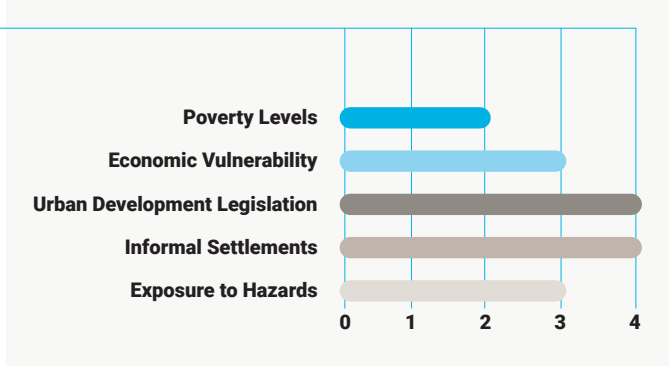
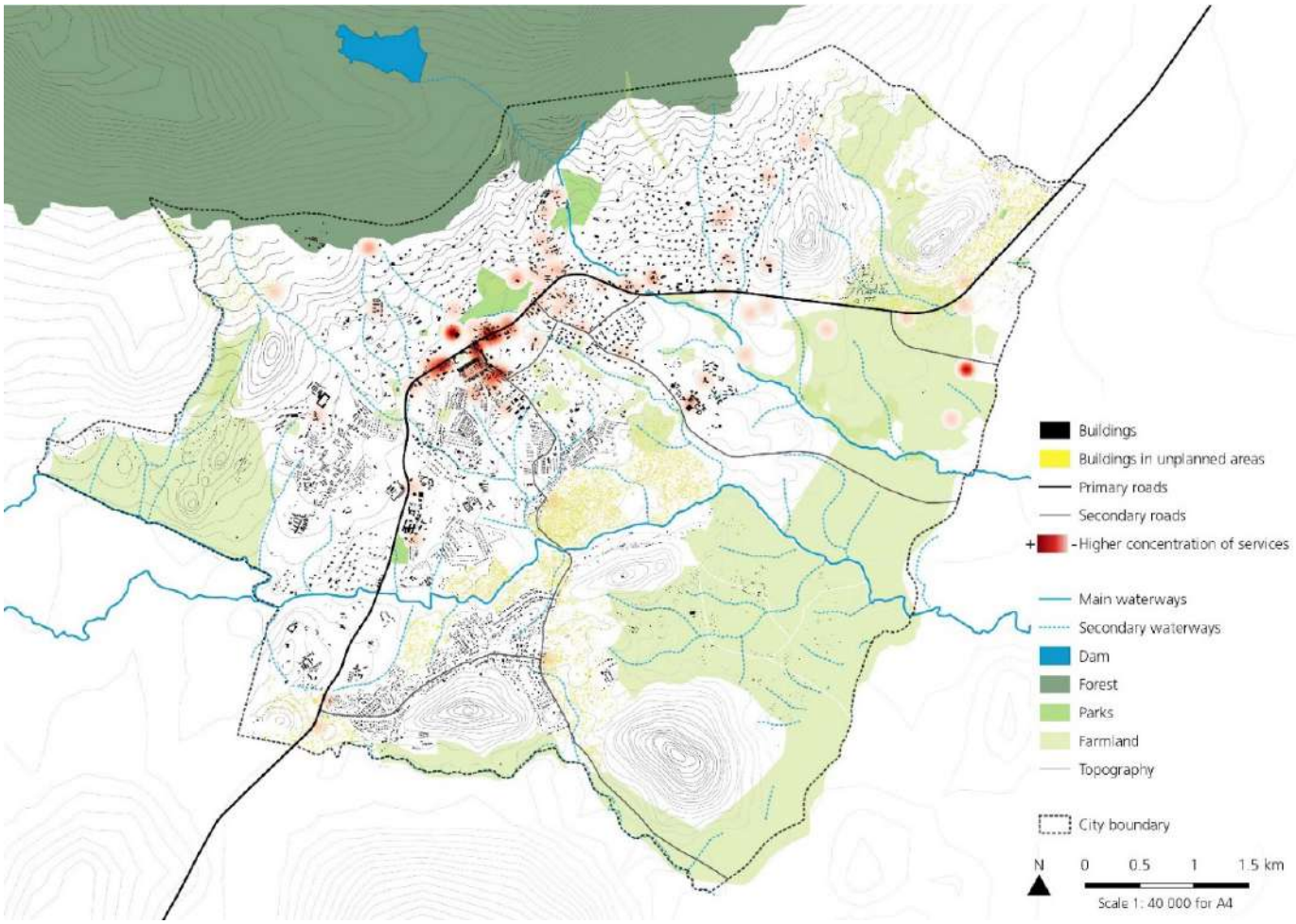


Figure 36: Vulnerability ranking of Zomba



Map 46: Overview map of Zomba

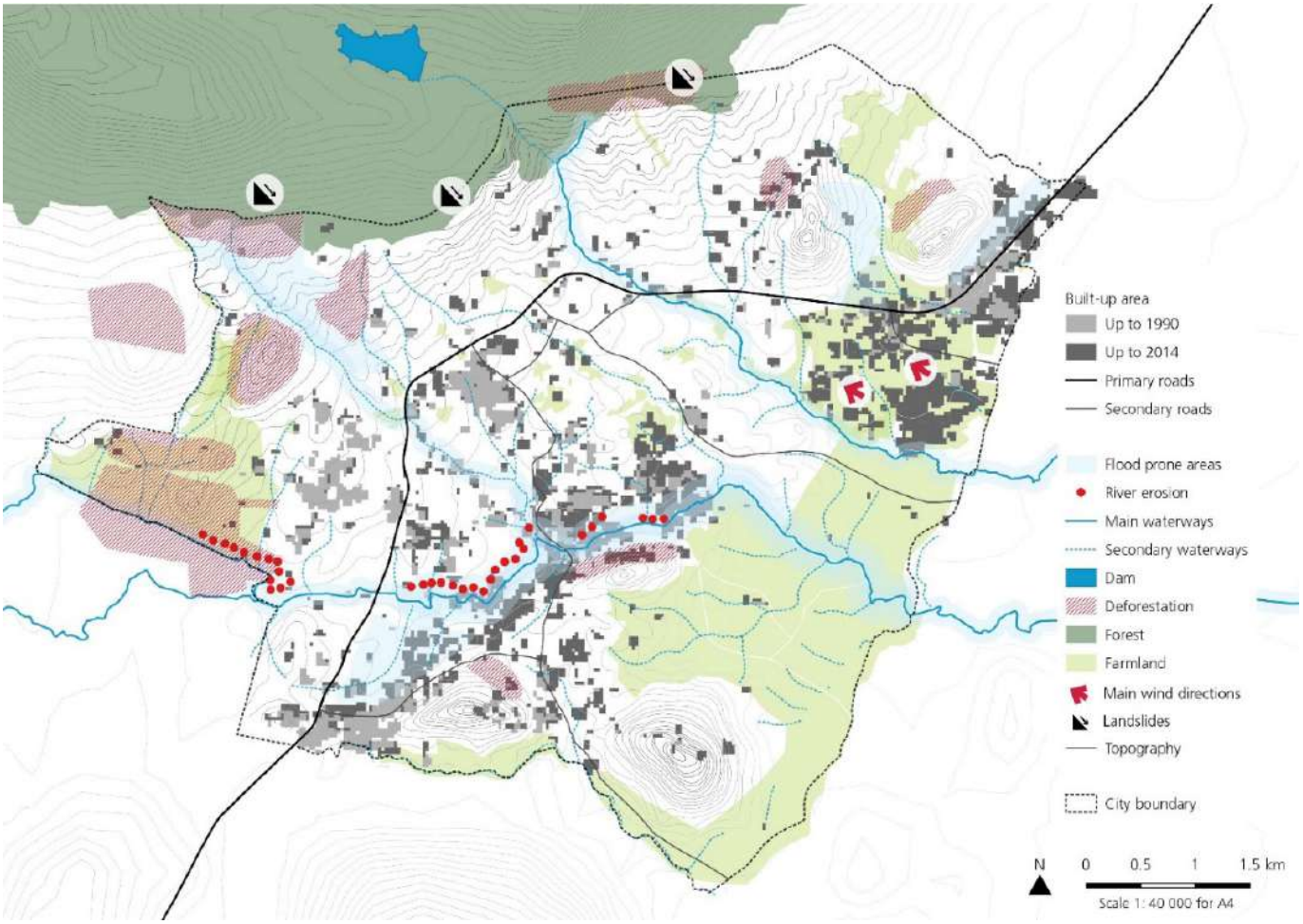
degradation and illegal developments on fragile land. Indeed, deforestation of hill slopes is a current practice in the city which can be seen in map 41 as pink shaded areas.

In-line with what can be observed in the overview of vulnerability in the 20 SADC cities, urban development legislation is a weakness in Zomba. The city lacks a City Development Strategy, an Urban Master Plan and an Economic Development Plan to ensure guided development. Although some legal urban planning frameworks are in place such as an Urban Structure Plan which dates back to 1989, they are outdated and enforcement is a challenge.

With regards to access to essential basic services such as water and sanitation there is an uneven distribution. The formal areas of Zomba have adequate access to a water supply (62 per cent) while the poorer informal settlements, where the majority of the population live, have little or no access to water. Residents of informal settlements mainly rely on communal water points (26 per cent) or boreholes (5.9 per cent) and are sometimes forced to acquire water from unprotected water sources when the communal water points run dry. Sanitation and waste removal services are poor in Zomba. While high-income areas have their waste collected at regular intervals, residents of informal settlement are forced to find their own ways to dispose of waste because the city council does not provide any services for them. Most of their waste therefore ends up in pit latrines, rubbish pits, on the roadsides, on riverbanks and in other available open spaces.

The Zomba city council lacks the financial and technical capacity for providing adequate basic

> **Along with floods, the main urban disaster risks facing the city include landslides, windstorms, environmental degradation, high incidences of road accidents and disease epidemics.**



Map 47: Disaster risk in Zomba

urban services to all its citizens with direct impact on disaster risk. Shortfalls in drainage coupled with inadequate maintenance in most parts of the city causes uncontrolled water run-off. The vulnerability of the population to hazards is further compounded by illegal urban development along the riverbanks, soil mining in the riverbed and low enforcement capacity by the city council.

Urban resilience initiatives in Zomba

Zomba Disaster Risk Management Programme 2018–2025: The programme outlines the coordination arrangements between all departments and stakeholders, while providing a clear DRM governance structure and assigns responsibilities at the city level. A desk officer for DRM is foreseen but the recruitment hinges upon financial resources. A line item for disasters in the municipal budget (from locally generated revenues) is foreseen in the programme. This would make Zomba self-reliant rather than depending on central government resources through DoDMA.

Community level initiatives: The Sadzi community, aware of the risks associated with environmental degradation, reforested Sadzi Hill and implemented community by-laws preventing tree cutting with its enforcement monitored by youths of the area. Such initiatives can inform new strategies for better enforcement of zoning laws (e.g. settlement on flood-prone river buffer zones).

Traffic and people in a streets of Lilongwe in Malawi © Shutterstock/Hecke61

People watching a forest on fire in Stellenbosch, Western Cape, South Africa © Shutterstock/PhotoSky

G

Glossary

Adaptation

Initiatives and measures to reduce the vulnerability of natural and human systems to actual or expected climate change effects. Examples of adaptation include more resilient infrastructure, housing and transport; reforestation and eco-systems restoration; and integrated city adaptation plans and strategies.

Adaptive capacity

The combination of all the strengths, attributes and resources available within a community or society that can be used to withstand and recover from any current or future disturbances. Capacity may include infrastructure, institutions, human knowledge and skills, or collective attributes such as social relationships, leadership and management.

Coping capacity

The ability of people, organizations and systems using skills and resources to manage adverse conditions, risks or disasters. The capacity to cope requires continuing awareness, resources and good management both in normal times and during disasters or adverse conditions. Coping capacities contribute to the reduction of disaster risks (UNDRR, Online glossary, 2020. https://www.undrr.org/terminology/capacity).

Disaster

A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts (UNDRR, Online glossary, 2020 https://www.undrr.org/terminology/disaster).

Disaster risk (or risk)

The potential loss of life, injury or destroyed or damaged assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity (UNDRR, Online glossary, 2020. https://www.undrr.org/terminology/disaster-risk).

Disaster Risk Reduction

The aim of preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development (UNDRR, Online glossary, 2020 https://www.undrr.org/terminology/disaster-risk-reduction).

Disaster Risk Management

The application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses (UNDRR, Online glossary, 2020 https://www.undrr.org/terminology/disaster-risk-management).

Exposure

The location, attributes and value of important community assets that are exposed to a hazard such as people, buildings, agricultural land and infrastructure. Population growth, urbanization and socio-economic development drive the evolution of exposure, and have been the primary driver of disaster losses in recent decades (The making of a riskier future: How our decisions are shaping future disaster risk, GFDRR, 2016).

Hazard

A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation (UNDRR, Online glossary, 2020. https://www.undrr.org/terminology/hazard). There are different types of hazard; some are natural (e.g. earthquakes, volcanic eruptions, cyclones) and others are human-induced (e.g. wars, epidemics). Some hazards can be combinations of natural and human (e.g. urban floods due to heavy rains and poor drainage).

Hazard probability

The likelihood that a particular hazard will occur.

Informality

Informality characterizes many individuals' and communities' relationship with the law – informal being in some way not in compliance with recognized law. Informality is frequently the result of inadequate, inappropriate or ineffective policies or legal frameworks that regulate activities based on assumptions about the socio-economic environment that do not reflect reality. Because of informality in many cities, the laws, institutions and policies governing economic, social and political affairs deny a large part of society the chance to participate on equal terms. Informality does not mean that there is no system, merely that what exists is not formally recognized. Informal local norms and institutions, including those of a traditional or customary nature, govern lives and livelihoods (UN-Habitat, UN DESA, Habitat III, Issue Paper 5. https://uploads.habitat3.org/hb3/Habitat-III-Issue-Papers-report.pdf).

Mitigation

Efforts to reduce or prevent the impact of a disaster, e.g. efforts to reduce or prevent emission of greenhouse gases. Mitigation can imply using new technologies and renewable energies, making older equipment more energy efficient or changing management practices or consumer behaviour.

Shock

Sudden, acute threatening event, e.g. earthquake, flood, volcanic eruption, tornado, hurricane, health pandemic, terrorist attacks, conflict, etc.

Transboundary

Elements that cross or are located on boundaries between two or more countries.

Urban stress

Chronic event that weakens the fabric of a city on a day-to-day or cyclical basis such as unemployment, inefficient public transportation, endemic criminality, food or water shortages, etc.

Vulnerability

The potential extent to which physical, social, economic and environmental assets may become damaged or disrupted when exposed to a hazard event (The making of a riskier future: How our decisions are shaping future disaster risk, GFDRR, 2016).

A wildfire on the Cape Peninsula in South Africa © Shutterstock/Cathy Withers-Clarke

Catastrophic flooding and mudflow in Manyara, Tanzania © Shutterstock/Vadim Petrakov

References

1. AfDB, 2013, *IRMA Needs Assessment for Risk Mitigation in Africa: Demands and Solutions*
2. African Food Security Urban Network (AFSUN)
3. Ahern J, (2011), *From fail-safe to safe-to-fail: sustainability and resilience in the new urban world,* Landscape Architecture & Regional Planning Studio and Student Research and Creative Activity. 8
4. Ahern J, (2012), *Urban landscape sustainability and resilience: The promise and challenges of integrating ecology with urban planning and design*, Landscape Ecology, 28. 10.1007/s10980-012-9799-z
5. Albala-Bertrand JM, (2003), *Urban Disasters and Globalization,* The World Bank Disaster Management Facility
6. Bailey E PhD and Tushiminine MM, (2014), *Ongoing Informal Settlements in Democratic Republic of Congo: Implementing New Urban Policy for Creating Sustainable Neighbourhoods*, Journal of Sustainable Development
7. Baruah NG, Henderson JV and Peng C, (2017), *Colonial legacies: Shaping African cities*, London School of Economics
8. Bigio AG, (2003), *Cities and Climate Change,* Building Safer Cities: The Future of Disaster Risk, Alcira Kreimer and others, eds, Washington, DC, World Bank
9. Cain A, (2012), *Luanda's Post-war Land Markets: Reducing Poverty by Promoting Inclusion*, Urban Forum
10. Cambridge Centre for Risk Studies, (2015), World Cities Risk 2015–2025, Cambridge UK
11. Cariolle J, (2010), *The Economic Vulnerability Index – 2010 Update*, FERDI
12. Chen, M with Harvey J, Kihato CW and Skinner C, 2018, *Inclusive Public Spaces for Informal Livelihoods: A Discussion Paper for Urban Planners and Policy Makers*. Prepared by WIEGO for the Cities Alliance Joint Work Programme for Equitable Economic Growth in Cities, Manchester, UK: WIEG
13. City of Cape Town, 2019, Cape Town Resilience Strategy. https://resource.capetown.gov.za/documentcentre/Documents/City%20strategies%2C%20plans%20and%20frameworks/Resilience_Strategy.pdf
14. City of Windhoek, (2017), *TRANSFORMATIONAL STRATEGIC PLAN (2017–2022)*
15. Cohen-Shacham E, Walters G, Janzen C and Maginnis S (eds.), (2016), *Nature-based Solutions to address global societal challenges*, Gland, Switzerland: IUCN
16. Davis-Reddy CL and Vincent K, (2017), *Climate, Risk and Vulnerability, a handbook for southern Africa* (Second Edition), CSIR, Pretoria, South Africa
17. Economist Intelligence Unit, (2011), *African Green City Index: Assessing the environmental performance of Africa's major cities*, Siemens AG Corporate Communications and Government Affairs, München

18. Elmqvist T, (2019), *Sustainability and resilience for transformation in the urban century*, Nature Research Journal, NatSustain Vol. 2. https://www.nature.com/articles/s41893-019-0250-1

19. eThekwini Municipality Council, 2017, *Resilience Strategy 2017*. http://www.durban.gov.za/City_Services/development_planning_management/environmental_planning_climate_protection/About%20Durban%E2%80%99s%20Resilience%20Programm/100RC%20Resources/Documents/Durban%27s%20Resilience%20Strategy%20%28long%20version%29.pdf

20. European Commission, (2015), *Towards an EU research and innovation policy agenda for nature-based solutions & renaturing cities*

21. Facknath S, (2014), *CC projections and impacts in SADC – with focus on Mauritius*, University of Mauritius, PPT

22. FAO, IFAD, UNICEF, WFP and WHO, 2019, *The State of Food Security and Nutrition in the World 2019*, (SOFI 2019)

23. Folke C and Gunderson L, (2010), *Resilience and global sustainability,* Ecology and Society, VOL. 15, NO. 4, ART. 43. http://www.ecologyandsociety.org/vol15/iss4/art43/

24. Füssel HM, (2007), *Adaptation planning for climate change: Concepts, assessment approaches, and key lessons*, Sustainability Science Journal, Vol 2 (2). https://tools.niehs.nih.gov/cchhl/index.cfm/download/pdf/referenceids/810

25. Geneletti D and Zardo L, (2016), *Ecosystem-based adaptation in cities: an analysis of European climate adaptation plans*, Land Use Policy

26. GFDRR, (2016), *Disaster Risk Profile: Comoros*. https://www.gfdrr.org/en/publication/disaster-risk-profile-comoros

27. GFDRR, (2016), *Disaster Risk Profile: Madagascar*. https://www.gfdrr.org/en/publication/disaster-risk-profile-madagascar.

28. *Global Report on Food Insecurity*, Food Security Information Network Secretariat, FSIN 2020

29. He X, Estes L, Konar M, Tian D, Anghileri D, Baylis K and Sheffield J, (2019). *Integrated approaches to understanding and reducing drought impact on food security across scales*, Current Opinion in Environmental Sustainability, 40, pp. 43–54

30. Independent Evaluation Group, The World Bank (2017), *A Thirst for Change, The World Bank Group's Support for Water Supply and Sanitation, with Focus on the Poor, An Independent Evaluation*

31. Index for Risk Management (2015), Results 2015

32. International Bank for Reconstruction and Development, The World Bank, (2011), *Africa's water and sanitation infrastructure: access, affordability and alternatives*, Washington, DC

33. International Bank for Reconstruction and Development, The World Bank, (2012), *The Future of Water in African Cities: Why Waste Water*, Washington, DC

34. International Monetary Fund, (2007), *Democratic Republic of the Congo: Poverty Reduction Strategy Paper*, Washington, DC

35. International Monetary Fund, 2020, *World Economic Outlook: A Long and Difficult Ascent*, Washington, DC, October

36. International Organization for Migration, (2017), *Spaces of vulnerability and areas prone to natural disaster and crisis in six SADC countries*, Geneva, Switzerland

37. International Telecommunication Union, (2018), *Measuring the information Society Report*, Geneva, Switzerland

38. Jeeva ZI and Dr. Cilliers EJ, 2014, *Great African Places: Approach to Spatial Form and Green Spaces*, North West University South Africa

39. Kabisch N, Korn H, Stadler J and Bonn A, (2017), *Nature-based solutions to Climate Change Adaptation in Urban Areas, Theory and Practice of Urban Sustainability Transitions*, DOI 10.1007/978-3-319-56091-5_1

40. Kamara JK and others, (2018), *Resilience to Climate-Induced Disasters and Its Overall Relationship to Well-Being in Southern Africa: A Mixed-Methods Systematic Review*, International Journal of Environmental Research and Public Health

41. Kundishora P, (2009), *An overview of decentralization and local governance in Eastern and Southern Africa*

42. Lall, SV, Henderson JV and Venables AJ, 2017, *Africa's Cities: Opening Doors to the World*. World Bank, Washington, DC

43. Leduka R, Crush J, Frayne B, McCordic C, Matobo T, Makoa T, Mphale M, Phaila M and Letsie M, (2015), *The State of Poverty and Food Insecurity in Maseru, Lesotho*, AFSUN Food Security Series

44. Lesolle D, (2012), *SADC Policy Paper on Climate Change – Assessing the Policy Options for SDAC Member States*

45. Liu J and others, (2007), *Complexity of Coupled Human and Natural Systems*, Science 14 Sep 2007: Vol. 317, Issue 5844

46. Hopewell MR and Graham JP, (2014), *Trends in access to water supply and sanitation in 31 major sub-Saharan African cities: an analysis of DHS data from 2000 to 2012*, BMC Public Health

47. Maes J and Jacobs S, (2016), *Nature-Based Solutions for Europe's Sustainable Development*, Conservation Letters 2016

48. Maher B and Baskaran G, (2020), *Southern Africa: Why risk financing is critically important during COVID-19 recovery*

49. Marivoet W, De Herdt T and Ulimwengu J, (2019) *Reviewing Democratic Republic of the Congo's poverty estimates, 2005–2012: Unprecedented GDP growth without trickle down*, London UK

50. McKenna L, 2019. *Integration and Spatial Transformation of South African Cities. Paper 4: Case studies from Cape Town, eThekwini and Johannesburg*. Centre for Affordable Housing Finance in Africa

51. McPhearson T and others, (2016), *Scientists must have a say in the future of cities*, Nature Research Journal, Nature Vol. 538. https://www.nature.com/articles/538165a

52. Ministry of Local Government and Chieftainship Affairs, (2015), *Lesotho Country Report*, Third United Nations Conference on Housing and Sustainable Urban Development (HABITAT III)

53. Munang R, Thiaw I, Alverson K, Mumba M, Liu J and Rivington M, (2013), *Climate change and Ecosystem-based Adaptation: a new pragmatic approach to buffering climate change impacts*, Current Opinion in Environmental Sustainability

54. Namibia National Planning Commission (2018), *Namibia Poverty Mapping*, Windhoek

55. Nhamo L and others, (2019), *Cereal Production Trends under Climate Change: Impacts and Adaptation Strategies in Southern Africa*

56. OCHA, 2019, Global Humanitarian Overview, December 2019

57. Pauw K and others (2010), *Droughts and Floods in Malawi – Assessing the Economy-wide Effects*, IFPRI

58. Petern LL and Yang Y, (2019), *Urban planning historical review of master plans and the way towards a sustainable city: Dar es Salaam, United Republic of Tanzania*, Frontiers of Architectural Research

59. Picketts IM, (2012), *Learning with practitioners: climate change adaptation priorities in a Canadian community*, Climatic Change Journal, Volume 118, Issue 2. https://rdcu.be/bZj79

60. Poole L, 2014, *A Calculated Risk: How Donors Should Engage with Risk Financing and Transfer Mechanisms*, OECD Development Cooperation Working Paper 17

61. Pourazar E and others (2017), *Spaces of vulnerability and areas prone to natural disaster and crisis in six SADC countries Disaster risks and disaster risk management capacity in Botswana, Malawi, Mozambique, South Africa, Zambia and Zimbabwe*, International Organization for Migration, Geneva, Switzerland

62. Rasmussen MI, (2012), *The power of Informal Settlements: The case of Dar es Salaam, United Republic of Tanzania*, HDM Lund University, Sweden

63. *Report on Disaster Risk Reduction 2015–2018*, SADC

64. Republique Democratique Du Congo Ministere De L'amenagement Du Territoire, Urbanisme Et Habitat, (2015), HABITAT III R.D.CONGO – RAPPORT FINAL, Kinshasa

65. Rochell K, Xie L, Fisher R, Griffin K, Williams S, (forthcoming), *Transformative governance for local action: Efficacy of policy champions for sustainable urban nature*

66. SADC (2010), Southern Africa Sub-Regional Framework of Climate Change Programmes Adaptation and Mitigation Actions, Supported by Enabling Measures of Implementation.

67. SADC (2012), Regional Infrastructure Development Master Plan

68. SADC (2013), *Report on the review of the twenty years of implementation of the international conference on population and development programme of in the southern Africa development community region*

69. SADC (2016), SADC Selected Social and Economic Indicators

70. SADC (2017), *SADC Regional Vulnerability Assessment and Analysis: Synthesis Report 2017*

71. SADC (2018), *Regional Vulnerability Assessment and Analysis: Synthesis Report on the State of Food and Nutrition Security and Vulnerability in Southern Africa, Maseru, Lesotho*

72. SADC (2019), *Regional Vulnerability Assessment and Analysis: Synthesis Report on the State of Food and Nutrition Security and Vulnerability in Southern Africa*

73. SADC (2019), SADC Regional Infrastructure Development: Short Term Action Plan Assessment 2019

74. SADC (2019), SADC Regional Resilience Framework (version 1.1, March 2019) – Draft

75. SADC, 2020, SADC Regional Resilience Framework 2020–2030

76. Solomon S and others eds. (2007), *Climate Change 2007 The Physical Science Basis*, IPCC WG1 Fourth Assessment Report

77. State Ministry, (2015), *Madagascar National Report, Third United Nations Conference on Housing and Sustainable Urban Development* (HABITAT III)

78. Tvedten I, Lázaro G, Jul-Larsen E and Agostinho M, (2018), *Urban poverty in Luanda, Angola*, CMI

79. United Nations Department of Economic and Social Affairs, Population Division (2019), *World Population Prospects 2019*

80. UN Department of Economic and Social Affairs, (2018), *World Urbanization Prospects, The 2018 Revision*, New York

81. UNAIDS, (2003), Fact Sheet – *HIV/AIDS and Conflict*

82. UNDP, (2018), *United Republic of Tanzania Human Development Report 2017: Social Policy in the Context of Economic Transformation, Economic and Social Research Foundation*, Dar es Salaam

83. UNDRR and CIMA, (2019), *Botswana Disaster Risk Profile – Floods & Droughts (2019).* http://riskprofilesundrr.org/documents/1512

84. UN-HABITAT, (2005), *Land Tenure, Housing Rights and Gender in Lesotho*

85. UN-HABITAT, (2011), *Malawi: Blantyre Urban Profile,* Nairobi

86. UN-HABITAT, (2011), *Mauritius: Port Louis Urban Profile,* Nairobi

87. United Nations Economic Commission for Africa and the United Nations Office for Disaster Risk Reduction, (2015), *Assessment report on mainstreaming and implementing disaster risk reduction and management in Africa,* Addis Ababa, Ethiopia

88. United Nations Department of Economic and Social Affairs, (2014), *World Urbanization Prospects: The 2014 Revision*, Population Division, New York

89. Venagoal S and Terpstra P, 2013, *Q&A with African Risk Capacity: How Innovative Financing Models Can Build Climate Change Resilience*, World Resources Institute

90. Weber B and Mendelsohn J, (2017), *Informal Settlements in Namibia: their nature and growth Exploring ways to make Namibian urban development more socially just and inclusive,* Development Workshop Namibia, Windhoek

91. World Bank, 2012, *Disaster Risk Financing and Insurance in Sub-Saharan Africa – Review and Options for Consideration*

92. World Bank, (2005), *The Role of Water in the Mozambique Economy – Identifying Vulnerability and Constraints to Growth*, MEMORANDUM

93. World Bank, (2012), *Zambia Poverty Assessment*, Poverty Reduction and Economic Management Africa Region

94. World Bank, (2018), *Strong but not Broadly Shared Growth Mozambique – Poverty Assessment*

95. World Bank, (2018), *Report on Nature-based Solution for Disaster Risk Management*. http://documents1.worldbank.org/curated/en/253401551126252092/pdf/134847-NBS-for-DRM-booklet.pdf

96. World Bank (2019), *LESOTHO POVERTY ASSESSMENT: Progress and challenges in reducing poverty*, Washington, DC

97. World Bank, (2019), *United Republic of Tanzania Urban Resilience Programme 2019 Annual Report*, Washington, DC, World Bank

98. World Bank, (2013), *A Global Urban Risk Index*, East Asia and Pacific Region Development Research Group Urban and Disaster Risk Management Department

99. Young T and others, (2010), *Climate change and health in SADC region: Review of the current state of knowledge*

100. ZimStat, (2013), *Poverty and Poverty Datum Line Analysis in Zimbabwe 2011/12*, Harare

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