Chapter 11
Urban Development Management in Light of the Risks and Disasters Caused by Climate Change

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Abstract This chapter proffers a prognosis of Zimbabwe's future in dealing with urban development management amid climate change. The tragic impacts and apparent enormity of risks and disasters induced by floods, drought and cyclones have caused many damages in most urban centres around the country. In effect, infrastructure and social systems as well as damage to the environment have been significant. The chapter deals with thematic content analysis, with particular reference to Zimbabwean urban hierarchy of city, municipality, and town growth points. The chapter acknowledges that the growing recognition of natural disaster risk as a development issue, calls for the need for conscious effort on development guidelines supporting greening of the environment. This chapter points to the broadening of urban planning practices and tools that effectively address mainstream disaster risk management in urban development. Undoubtedly, an integrated framework for urban development management in Zimbabwe ought to accommodate a wide range of concepts, strategies as well as models of climate change, together with the supporting policy implementation modalities.

Keywords Urban development · Risks · Disasters · Climate change · Zimbabwe

11.1 Introduction

Zimbabwean cities continuously face significant disaster risk. The existing trend of increasing disaster risks in several urban areas can be reduced, ceased and even reversed. This can be done through adopting urban land use management processes,

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provision of opportunities for better understanding of how natural hazards across cities interact with current as well as future urban growth patterns and the types of investments necessary to promote development in a risk-sensitive way (Asian Development Bank 2017). The urbanisation process must be associated with new planning strategies, and disaster mitigation approaches. In this way. cities will be less exposed to high and probably increasing, natural hazard risks.

The rising body of knowledge on risk governance recognises that only considering climate risk as measurable uncertainty is problematic when measuring dynamic and changing climate risk (Jones and Preston 2011). This is due to its failure in accounting for complication, vagueness as well as scientific uncertainty (Renn et al. 2011). Thus, improved urban management and planning is imperative to ensure a reduction in disaster risk and climate change impacts in cities. In order to reduce disaster risk, urban planners need sufficient aid from the government to ensure that effective legislation, strengthened institutions, leadership as well as enhanced capacities are available. Insufficient preparedness for climate-related risks has resulted in huge clean-up costs, and increased development costs in hazard-prone areas (World Bank 2010).

This chapter proffers a prognosis of Zimbabwe's future in dealing with the planning and management of urban development amid climate change. This chapter engages both a case study and a critical literature review approach to examine the experiences and practices on how planning and management of urban development is dealing with climate-induced risks and disasters. The goal is to expose the dynamics and intricacies of risk and disaster management in urban cities of Zimbabwe.

This chapter is organised as follows: The section following the introduction comprises a review of the theoretical perspectives underpinning the study. It explains urban management, risks and disaster management and urban resilience for climate change. This is followed by a review of published books, journal articles and case studies, as well as other publications linked to the study. It furthermore specifies the research methods and techniques used in this study. The next section deals with the results by giving a presentation and analysis of the research findings. The final section of the chapter is a summary of the work, and provides conclusions and recommendations for the way forward.

11.2 Theories Underpinning the Study

This section explains the various theoretical concepts underpinning the study, which include urban management, risks and disaster management, urban resilience for climate change and elements of resilience.

11.2.1 Urban Management

Urban management is the restructuring of urban areas 'administration, with the primary task of attaining a much-needed balance between the social and economic development of the city (Bačlija 2013). Mattingly (1994) pointed out that without a more theoretically rich and varied approach to urban management and aid from the research community around the world, the notion has a slight potential for survival within the fast and varying international marketplace of development ideas. Several authors have made efforts in presenting adequate definitions; however, convergence with urban management has not yet occurred (Bačlija 2013). As Stren (1993) noted, the elusiveness of the idea exists, despite systematic and comparative work on this sub-discipline. Davey (1993: 4) believed that 'urban management is concerned with the policies, plans, programmes, and practices that seek to ensure that population growth is matched by access to basic infrastructure, shelter and employment'. Bramezza (1996: 34) also defined urban management as 'the co-ordinated development and execution of comprehensive strategies with the participation and involvement of all relevant urban actors, to identify, create and exploit potentials for the sustainable development of the city'.

11.2.2 Risks and Disaster Management

Cities experience risk differently in scales and intensities. The continuous exposure and the perception of potential impacts as perceived by a community or settlement is risk (KARAKUŞ 2008). The interaction between an extreme natural event and a susceptible population, ecosystem or infrastructure can create risk. The extent of managing urban development and safeguard provision of the essential infrastructure in countries has a great effect on the magnitude and impact of disasters (Bull-Kamanga et al. 2003). There is growing occurrence of natural disasters with distressing effects on human settlements. Disaster propensity is increasing in relation to trends such as global warming, environmental degradation and the increasing rate of population growth in and around metropolitan areas. However, these risks need to be managed. 'Disaster risk management seeks to reduce a society's vulnerability to extreme natural events so that even if such events occur, they do not result in a disaster' (Federal Ministry for Economic Cooperation and Development 2015). Natural disasters cannot, generally, be avoided but their impact can be mitigated.

11.2.3 Urban Resilience for Climate Change

There is increasing prominence on the resilience concept across a varied set of literature on urban areas and climate change. It is noteworthy that resilience in city studies is grounded in a range of literature that can be generally organised into four categories: urban ecological resilience; urban hazards and disaster risk reduction; resilience of urban and regional economies; as well as promotion of resilience through urban governance and institutions (Leichenko 2011). The emphasis on urban hazards and disaster risk reduction needs to be positioned on enhancing the capacity of urban areas, infrastructure systems and urban populations and communities to rapidly and effectively recover from natural and man-made hazards.

However, various efforts that contribute to long-term urban sustainability and urban resilience through adaptation and mitigation approaches need to be associated with wider development policies and plans. The effectiveness of development policies may be limited, and sectoral susceptibility improved if climate change adaptation and mitigation are not considered (Halsnæs and Verhagen 2007).

> The unpacking of pathways to climate resilience in cities, however, is usually dualistic in nature, viewing the resourcefulness of local community actors as a downstream approach that is parallel to and sometimes conflicting with upstream interventions, which are influenced by municipal regulations, economic trends, technological advancements, geopolitics, and other global forces. (Kareem et al. 2020: 3).

Thus, the approach to urban resilience should be concentrated on a wide-ranging set of policy evaluation conditions that combine traditional economic and sectoral goals and broader social issues linked to health and income distribution.

11.2.4 Elements of Resilience

Basically, there are three resilience elements that are policy level, administrative level and implementation level.

Policy level Resilience should be taken into consideration at macro level, where a disaster mitigation map is organised on a national scale. The macro level produces a land use base map that identifies areas prone to natural disasters. It is crucial to prepare a macroscale spatial policy document (KARAKUŞ 2008). The document outlines national scale policies and approaches to mitigate the disasters. Urban development strategies and procedures are viewed as a valuable entry point for resilience planning processes (Bulkeley and Tuts 2013; Satterthwaite 2013; Wardekker et al. 2010). This could be either by revising provision of services and making changes to accommodate new risks, for instance safeguarding that health centres are prepared to deal with natural disasters that have become more recurrent, or by shaping land use, for example warranting that there are no new developments on exposed areas (Satterthwaite 2013).

Administrative level It is critical to observe that administration plays a pivotal role in promoting resilience. The administrative structure of any particular country and the institutional coordination and organisation chart, in the case of a natural disaster, should be clarified. Management of climate-related risks is dominated by distinguishing and different technical disciplines, each with a specific set of processes, standards and strategies that influence framing and responses developed on risk that, in turn, affect the decisions taken. Decision-making by local authorities on climate change effects is driven by planning that functions under a quasi-legal framework and struggles for certainty of outcome; engineering or hazards that, even though risk-based, is dominated by quantifiable risk and historical experience; and emergency management that focuses on immediate response and recovery from extreme events (Lawrence et al. 2013).

Implementation level The degree of execution of spatial plans is hinged on three key result areas that include legislation and control, the planning process, as well as institutional organisation and coordination. Building a disaster-resilient urban settlement requires effective urban planning. Disaster mitigation practices should be encompassed in the preparation process of a spatial plan for preparation of analysis maps, and preparation of a synthesis map by inserting data from the analysis maps and preparation of a spatial plan based on the synthesis map (KARAKUŞ 2008). The implementation level should consider resilience to be a process that facilitates better than outcomes in the face of adversity. In other words, there is need to better understand the extent to which resilience promoting resources are needed, by gaining a better understanding of the adversities confronting communities. By understanding the perspectives of individuals and their communities, policymakers and service providers can better identify, establish or provide relevant individual and contextual resilience resources that support positive mental health outcomes (Ungar et al. 2013).

The interdependence among stakeholders and their decisions for climate resilience is vital from a multi-actor viewpoint, where for instance, societies and intermunicipal collaborations take lead to build networks that catalyse efforts towards confronting extreme weather events (Bansard et al. 2017; Fünfgeld 2015; Giest and Howlett 2013). Given the existing inadequacies in technology and use of resource in less economically developed countries and the inherit institutional weaknesses, one of the main circumstances for climate change adaptation and mitigation strategies would be to understand how policy implementation can be integrated with local development efforts and partnerships (Halsnæs and Verhagen 2007). African cities are shaped by informality that is characterised by multiple ecologies and infrastructures that may be unique pathways to resilience in the face of climatic hazards (Fraser et al. 2017).

It is important to be able to recognise and better comprehend these elements, so that management policies can be focused on maintaining or restoring communities to optimal conditions to maximise the survival of communities after stressful disturbances (Hughes et al. 2012). However, a key challenge for consultants lies in how to clearly inject standards and to navigate trade-offs in resilience between groups, locations as well as timescales. The inter-reliant nature of systems makes any changes in resilience, resulting from interventions in one sphere of activity, difficult to discern and thwarts attribution (Tanner et al. 2017). Thus, it is critical to coordinate and build networks across all sectors when dealing with climate resilience.

11.3 Literature Review

The literature review paid specific consideration to the experiences of global climate change in urban areas in both developed as well as developing countries. The main emphasis was on analysing how various countries have used different urban development techniques and processes in dealing with climate change-induced disasters and risks.

Global climate change presents extreme threats to development efforts as it poses risks to humans, the environment and the economy. Globally, urban areas are at risk of being affected by natural hazards. Prominently, cities in developing countries tend to be more vulnerable to natural disasters than those in developed countries (KARAKUŞ 2008). In the poorest countries in the world, the population growth continues to increase significantly and almost 90% of disaster-related deaths occur in these countries (UN 2019). In its 2020 Global Assessment Report, the UNISDR (2019) office identified that 7,348 major recorded disaster events claimed 1.23 million lives, affecting 4.2 billion people (many on more than one occasion), resulting in approximately US$2.97 trillion in global economic losses from 2000 to 2019. Thus, in these potential consequences of extreme natural events, disaster risk management not only needs to be incorporated into individual development cooperation projects but must also be mainstreamed as a cross-cutting issue in urban development and management.

Since the late 1990s, there has been growing acknowledgement by governments as well as donors of the necessity to mainstream disaster risk reduction into development (Benson 2009). For instance, the Philippines formulated disaster legislation dating back to 1978 which was primarily reactive to disasters. However, there has been a paradigm shift from a disaster management approach to a disaster risk management approach with much emphasis given to forecasts rather than actual results (Benson 2009). The significant changes of the disaster legislation from being reactive to ex ante strengthened the links between the needs of local communities in reducing risks and formal development of policies and strategies as well as providing a model for guiding disaster-resilient urban settlements in the Philippines.

The spatial, temporal and sustainability-related qualities of urbanisation are significant for considering the shifting, complex interactions between climate change and urban growth. Given the important and frequently rising levels of urbanisation, a growing proportion of the world's population is exposed to the direct impacts of climate change in urban areas (Revi 2008; UN-Habitat 2011). The hazard and risk increase as urban areas grow both geographically and demographically, exposing and altering local hydrologic characteristics (Muttarak and Lutz 2014). The rapid urbanisation gave birth to several processes that were initiated to assess the potential effects of climate change on cities and responses. These efforts included the 2004 New York City Regional Heat Island Initiative, sponsored by the New York State Energy Research and Development Authority, and the establishment of a climate change task force by the New York City Department of Environmental Protection. Both processes involved the development of collaboration between scientists and policymakers in the city, with the goal of downscaling models of climate change to assess potential impacts in the city and to identify potential solutions (Corburn 2009; Rosenzweig et al. 2007).

The international efforts and processes to consider climate change in urban development stimulated initiatives in different regions such as Asia, Latin America and Africa. Many cities in Africa and Asia feature on the list of highest risk cities to both large and small-scale disasters, especially with regard to climate change (World Bank Group 2016a). Millions of urban dwellers in Africa, Latin America and Asia are at greater risk from the direct and indirect impacts of current and projected climate change, such as an increase in floods, heat-waves, extreme events and food and water shortages; these add new and complex dimensions to how risk is understood and addressed (Dodman and Mitlin 2013). In addition, the report of the World Wide Fund for Nature (2009) noted that cities such as Manila, Dhaka and Jakarta are the most vulnerable, with the highest exposure and the lowest adaptive capacity.

In Africa, several climate change strategies and action plans have been drawn up by the government and its ministries. Significant trails to resilience are urban agriculture and forestry for alternative food and income sources (Lwasa et al. 2015) and household energy alternatives from wastes and plot-level technologies of retention for run-off, using, for example, vetiver grass for protection against erosion (Carlier et al. 2009). For instance, the plans that were reviewed include that of the City of Alexandria Energy and Climate Change Action Plan (North Africa); the Durban Climate Change Strategy (South Africa); the Kampala Climate Change Action Strategy (East Africa) and the Lagos State Climate Change Adaptation Strategy (West Africa) as shown in Table 11.1.

Case studies and regional reviews evaluating city susceptibilities to climate change have discovered varied physical and societal challenges and large variances in levels of adaptive capacity (Hunt and Watkiss 2011; Rosenzweig et al. 2011). Several studies have been carried out to estimate the scale of urban exposure to natural hazards and climate impacts. Nicholls et al. (2008) looked at the exposure of populations and assets of 136 port cities with more than one million people to one-in-100-year surge-induced flood events. The index showed that cities in Asia have the highest absolute population exposure now and, in the future, in addition to the highest asset exposure by the 2070s. Research on African cities (Castán Broto et al. 2015; Kithiia 2011; Simon and Leck 2010) has highlighted the lack of capacity and awareness of climate change and often extremely high levels of vulnerability among the continent's large and rapidly growing urban poor populations. Rodrigues (2019) also noted urban precarity due to several types of official incapacities when dealing with climate change, making alternative informal and do-it-yourself responses in cities of the developing global south.

Continued growth of urban areas into marginal areas such as flood plains, water catchments and steep hillsides increases vulnerability to disasters. Informality in African cities harbour diverse pathways for resilience to climate change. This is worsened by poor urban planning and management. However, land use planning at city scale is crucial to consider for the location of new developments (World Bank 2016b). Zimbabwe is one of the most urbanising countries of the region today.

Table 11.1 Climate change plans and strategies by city authorities in Africa (Adapted from Kareem et al. 2020: 13)

Name of plan/strategy	Objectives	Main stakeholders	Targets and object(s) to be made resilient	Key implementation programmes
City of Alexandria Energy and Climate Change Action Plan (2012–2020) (North Africa)	1. Adopt targets and establish an implementation framework for reducing greenhouse gas (GHG) emission reductions for 2012, 2020 and 2050	Office of Environmental Quality Department of Transportation and Environmental Services	1. By 2030: All new buildings will be carbon-neutral	City's Green Building Policy
	2. Institutionalise the consideration of the effects of possible climate changes into long-term planning	Alexandria City Council	2. By 2050: Reduce greenhouse gas emissions by 80% below the 2005 levels	City's recycling programme and the Covanta energy from waste facility
	3. Prepare and educate city residents and business owners for a carbon-constrained economy and other climate change impacts	Alexandria Sanitation Authority	3. By 2050: 80% of the city's energy will be from clean, renewable sources	$1.37 million under the federal Energy Efficiency and Conservation Block Grant
	4. Increase the city's preparedness to respond to the possible effects of climate change and environmental emergencies	Metropolitan Washington Council of Governments National Academy of Science		Eco-city challenge on the city's website for citizen engagement Alternative forms of transportation for city employees Land use planning (for example Urban Forestry Master Plan)

(continued)

Table 11.1 (continued)

Name of plan/strategy	Objectives	Main stakeholders	Targets and object(s) to be made resilient	Key implementation programmes
The Durban Climate Change Strategy, approved in 2015 (South Africa)	To convert Durban into a low carbon, green economy that prioritises the sustainable use of ecosystem services, while still overcoming the development challenges faced by the majority of Durban residents	Fire department & metro police	Waste management	KwaZulu-Natal sustainable energy forum
		eThekwini Municipality climate protection branch	Transport and renewable energy	Shisa solar programme
		City planning commission	Water conservation and demand management	Durban solar financial model
		City manager and executive management team	Energy efficiency and energy demand	
			Ecosystem services	
The Kampala Climate Change Action Strategy, 2016 (East Africa)	Increase renewable energy use	Kampala Capital City Authority	50 Megawatts of renewable energy produced on the territory (solar, waste to energy)	Communication with and engaging local stakeholders to participate
	Reduce congestion and travel times	Ministry of Works and Transport	50% of motorists using mass public transport (buses and trains)	Landscaping a more climate resilient and low carbon Kampala
	Improved construction practices	National Water and Sewerage Cooperation	50% of city roads tarmacked 25 km of NMT (cycle/pedestrian) lane length constructed	Developing smart utilities and community services
		Ministry of Water and Environment	30% of waste recycled	Supporting the green economy
		National Environment Management Authority	60% of newly approved buildings with water	Integrated waste management in the city

(continued)

Table 11.1 (continued)

Name of plan/strategy	Objectives	Main stakeholders	Targets and object(s) to be made resilient	Key implementation programmes
			New buildings certified as green buildings	
			Water harvesting units installed	
			500,000 new trees grown (street, park and household)	
Lagos State Climate Change Adaptation Strategy, 2012 (West Africa)	To provide an integrated and systematic approach to reducing vulnerabilities to climate change and increase the resilience and sustainable well-being of the people of Lagos State	Lagos State Emergency Management Authority	Integrated coastal zone management in the State	Launching a public awareness and sensitization programme to educate Lagosians
	To provide a framework for building informed responses and enhancing capacities at individual, community and state levels to implement effective climate change adaptation policies and measures	Ministry of the Environment	Sustainable management of upland wetlands and floodplains	A tree planting campaign and criminalisation of indis-criminate tree felling
		Governor of Lagos State	Improved quality of information about the State’s wetlands and freshwater ecosystems	Landscaping of virtually all open spaces
		Nigerian Meteorological Agency	A new drainage network in built-up areas taking into account projected sea level rise	Introduction of a mass transportation system, including the Bus Rapid Transit scheme
		Nigerian Institute for Oceanography and Marine Research		
		Ministry of Local Government and Chieftaincy Affairs		

Much of the urban growth in the country is occurring spontaneously, and is not following official planning frameworks, even should they exist (UN-Habitat 2018). Despite many land use management processes such as land use planning, development control instruments, greenfield development and urban redevelopment, there remain large gaps in implementation. However, the current trend of growing disaster risk in Zimbabwean cities could be reduced, halted and even reversed by adopting resilient urban land use management processes. In a way to reduce disasters and risks, disaster risk considerations should be taken into account when designing and implementing development control instruments. These processes include zoning, land subdivision, land acquisition, purchase or transfer of development rights, and building controls, as summarised in Table 11.2.

Regulating development in hazard-prone cities can be possible through effective zoning, thus limiting exposure of people and property to hazards. An example of effectively using zoning is restricting development on unstable slopes. Klein et al. (2005) suggested that the integration of mitigation and adaptation measures into climate and development policies is crucial for fighting against climate-related disasters. Considering city vulnerability under changes in climatic conditions is thus not only a matter of enhancing knowledge about the latent risks, as well as impacts posed by climate change, but appealing with the often historically complex and politically argumentative factors that structure susceptibility more broadly and with the complex development trajectories. There is a need for an updated citywide disaster risk assessment which largely depends on the need and availability of information.

11.4 Results

This section embarks on the presentation, analysis and discussion of the research findings. It makes comparisons between crucial perceptions on city resilience with empirical findings obtained from current practices across Zimbabwean cities and Africa at large.

The urban landscape of Zimbabwe includes the capital city, Harare, and Bulawayo the second-largest city, other large cities, towns and growth points. The UN-Habitat (2011) noted that the urbanisation rate was increasing at 4.3% per annum in Zimbabwe. However, smaller centres had slow urban growth with the total population in cities growing slowly at 0.6% per annum from 4,029,707 to 4,284,145, compared to the 4.2% average across sub-Saharan Africa (Infrastructure and Cities for Economic Development 2017). Table 11.3 shows the urban settlement changes between 2002 and 2012 in Zimbabwe.

It should be noted that demographic dynamics and their interactions with other mediating factors in urban areas pose environmental threats. Urban growth often refers to the attainment of good agricultural land in the peri-urban areas for further urban development. This results in conflict over urban and agricultural demands on natural resources or arable land, water and forests (Patel 1988). Thus, a growing

Table 11.2 Disaster risk consideration in urban development (Asian Development Bank 2017)

Development control instruments	Actions to integrate disaster risk considerations	Outcomes
Zoning	Zoning maps indicating hazard-prone areas	Zoning ordinances evidently integrate hazard information (along with hazard maps) and requires specific standards to be followed for development in hazard-prone areas Definite zoning instruments, for example setbacks adopted for high-risk areas
	Feature hazard data into density calculations	
	Introduce hindrances or buffers in hazard-prone areas	
Land subdivision	Identify land that is prone to hazards and land use activities that can exacerbate existing levels of risks	Land parcels and associated development are safe from risks from hazards
	Require hazard-related studies (for example, geotechnical studies in seismic-prone areas, hydrology and hydraulic studies for flood-prone areas) and disclosure of studies finding and integrating hazard-resilient standards in the design of utilities	
Land acquisition	Densify high hazard-prone areas, publicly acquire land (where feasible) and restrict development	Development in hazard-prone areas restricted or limited
Purchase or transfer of development rights	Densify hazard-prone areas and either purchase or transfer the right to development from these areas to less hazardous areas	Development in hazard-prone areas restricted or limited
Building control	Integrate locally relevant hazard-resilient design standards into building codes and enforce implementation	Culture of compliance strengthened where all stakeholders are knowledgeable about the current and future risks from hazards and how such risks interact with building location and construction practices
	Provide specifications for retrofitting of buildings in high-risk areas	
	Build the capacity of the private sector to identify and initiate hazard-resilient designs and construction measures	

Table 11.3 Analysis of urban settlement changes between 2002 and 2012 (Zimbabwe National Statistics Agency 2012)

	Urban settlement population cohorts				Total (from province data)
	Small	Meso	Large	Very large	
Urban population (2012)	962,856	970,688	653,337	1,485,231	4,284,145
Number of settlements (2012)	23	5	1	1	
Urban population (2002)	831,557	748,599	676,650	1,435,784	4,029,707
Number of settlements (2002)	24	4	1	1	
Urban population growth	131,299	222,089	−23,313	49,447	254,438
Urban population growth (%)	16	30	−3	3	6
Urban population growth (% per annum)	1.5	2.6	−0.3	0.3	0.6
Urban population growth as a proportion of total (%)	35	59	−6	13	

Note Small: $P < 100{,}000$; Meso: 100,001 < 500,000; Large: 500,001 < 1,000,000; Very large: $P >$ 1,000,001

population with an increasing number of households unavoidably exert pressure on rural and peri-urban land for housing, schooling and health services.

The spatial plans such as master and local plans which define the jurisdictions of most urban areas in Zimbabwe have remained static and failed to incorporate rural villages, despite urban sprawl expanding into rural jurisdictions (Mbiba 2017). Delineating boundaries, either rural or urban in areas such as Caledonia, Victoria Ranch and Clip sham, has showed a significant variety from efforts to firmly demarcate differences between the rural and the urban; and thus, to exactly map rural and urban space, is complex (Mbiba 2017). Understanding and quantifying the spatiotemporal dynamics of urban land use and land cover changes and its driving factors are vital to put forward the right policies and monitoring mechanisms on urban growth for decision-making. Most settlements such as cities and towns in Zimbabwe are confronted with rapid population growth and increasing rural–urban migration (Potts 2013).

The rapid increase in urban population presents several challenges that contribute to changes in climatic conditions as a number of climate parameters change due to replacement of vegetation by urban settlements (Patra et al. 2018). Land use as well as land cover changes have noteworthy costs on climate change, hydrology, air pollution and biodiversity. Figure 11.1 reveals an increase in the high-density

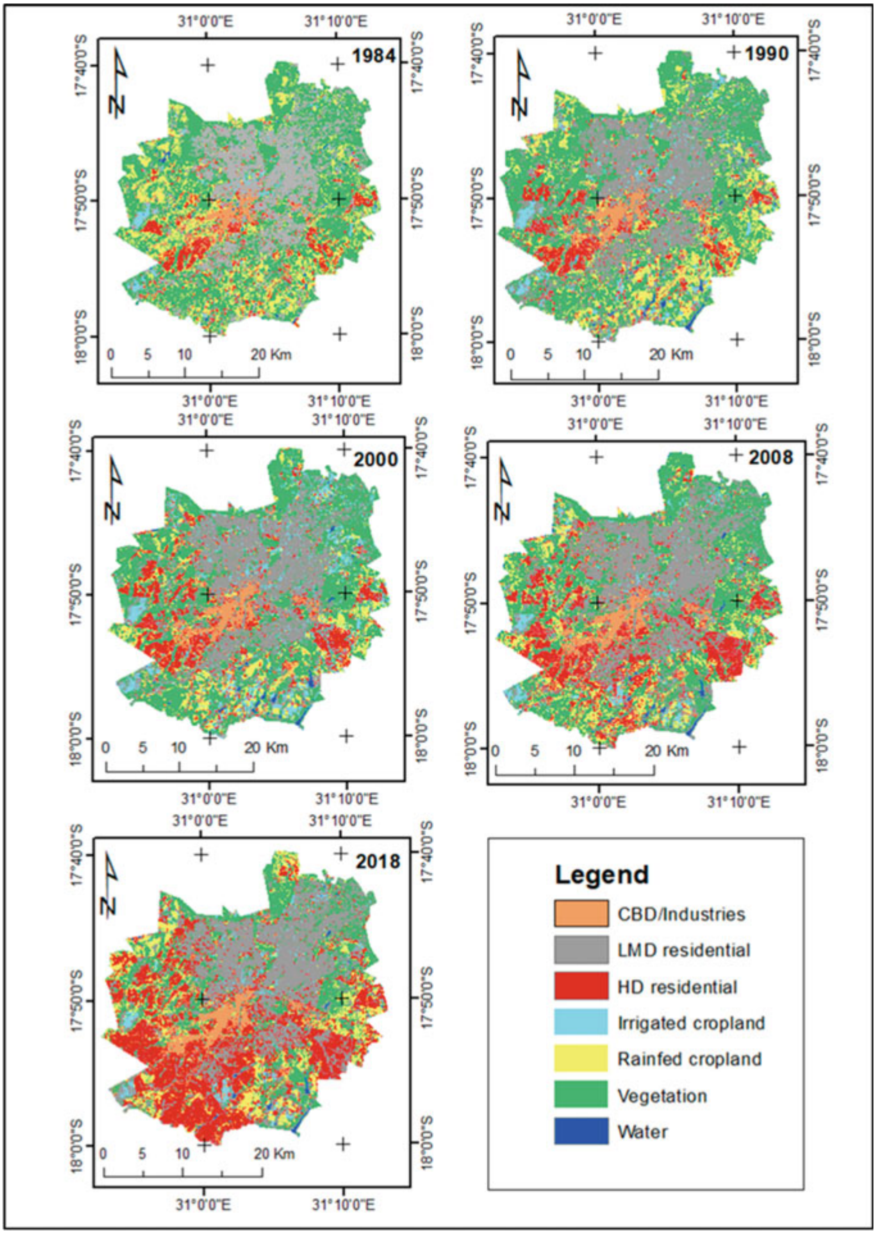

Fig. 11.1 Land use and land cover in the Harare Metropolitan Province for the years 1984, 1990, 2000, 2008 and 2018 (Marondedze and Schütt 2019: 8)

residential areas and, consequently, a decrease in the area covered by vegetation all over the Harare Metropolitan Province. High-density residential areas cover 5.81% of the total Harare Metropolitan Province. However, by the year 2018, high-density residential areas "had more than quadrupled reaching 218.35 km^2, covering almost a quarter of the Harare Metropolitan Province area" (Marondedze and Schütt 2019:9).

There was also an increase in industrial areas from 3.7% in 1984 to 7.17% in 2018 (Marondedze and Schütt 2019). It should be noted that rapid urbanisation with a considerable increase in built-up areas has caused severe losses of land under agriculture, vegetation and water bodies. 'Apparently, in 1984, vegetation covered almost half of the area (448.67 km) of the total Harare Metropolitan Province but decreased by nearly 50% to 223.45 km (25.08%) by the year 2018' (Marondedze and Schütt 2019: 7). While such expansion is attributed to an increasing urban population with greater non-farming activities, significant changes in climatic conditions from land surface to the atmosphere are very likely (Patra et al. 2018). The rise of surface temperature in Harare is associated with deforestation through changes in land use. This, in turn, caused a strong warming in urban environment called an urban heat island.

The increasing frequency and intensity of shocks and stresses due to climate change have been disrupting livelihoods in cities such as Mutare, Masvingo and Bulawayo. Tropical cyclones such as Cyclone Eline, Japhet and Idai destroyed communication systems and infrastructure such as dwellings and roads. Growth points in Zimbabwe have also experienced urban expansion into once rural and farm lands, destroying the ecology. For example, Gokwe Centre Mpandawana, Nyika, has experienced expansion into farm lands which destroyed the ecology, resulting in environmental degradation and climate change. Gokwe Centre that was granted town status in 2013, has been expanding so much that it has exhausted all the land within its gazetted boundaries; hence, the need to expand beyond its boundaries. This has seen the Gokwe Rural District Council designing a layout for residential expansion in respective areas where farming (orchards) and grazing lands are located.

In addition to Gokwe Centre that has sprawled into communal lands, the Mpandawana growth point has also been expanding into communal land that is occupied by local communities. According to the Zimbabwe national census of 2012, Mpandawana had a population of 30,000 people, which later led the government to grant town status in 2014. Land available for development in the Mpandawana town area is approximately 10.500 ha. The Town Council has the mandate to allocate land in the Town Board area. The town centre is expanding on the western side and is located at the Gutu junction area. The Mpandawana town consists of Wards 33 and 34 with a population of 30,000 people, according to the 2012 census.

> Among the most significant risk drivers are: the growing urban populations and increased density, which put pressure on land and services, increasing settlements … along unstable slopes and in hazard-prone areas … [and] [t]he decline of ecosystems, due to human activities such as road construction, pollution, wetland reclamation and unsustainable resource extraction, that threatens the ability to provide essential services such as flood regulation and protection. (UNISDR 2013)

Cities are concentrated with people, poverty and disaster risk. ‘The growing rate of urbanisation [in Zimbabwean cities] and the increase in population density (in cities) can lead to creation of risk, especially when urbanization is rapid, poorly planned and occurring in a context of widespread poverty’ (Prevention Web nd). Settlements such as Hopley, Epworth and Killarney that lack sufficient infrastructure and services. It is characterised by unsafe housing, inadequate as well as poor health services, which creates new risks that can turn natural hazards into a disaster. Spontaneous residential expansion in wetlands in urban areas such Chitungwiza, Southlands Park, and infills on open spaces in Mabelreign, have exposed the settlements into high risks of flooding and water-borne diseases such as cholera, typhoid and malaria. Understanding climate change risks associated with investment decisions is a critical first step in reducing them as it is difficult to develop strategies to overcome the negative impacts of climate change without measuring adaptation risks and understanding them (Alavian et al. 2009).

11.5 Discussion

This study revealed that cities around the world continue to suffer significantly from climate change that is aggravated from a pool of factors that include poor planning policies, lack of coordination from the policy level, administrative level and implementation level. Bulkeley and Tuts (2013) observed that urban development policies and processes are seen as a valuable entry point for the resilience planning process as it ‘helps to put a long-term developmental lens on disaster preparedness and response efforts’. However, in Zimbabwe, there is a logjam between the policy level and the implementation level in dealing with urban development policies with the aim of reducing disasters from climate change. By turning a blind eye to various practices and techniques, such as land use planning, zoning and building control in urban development, there are higher chances of increasing the rate at that disaster risk posing a threat to cities, instead of actually decreasing the climate change risks through proper implementation of planning policies and techniques.

Urban expansion into peri-urban areas has exacerbated climate change risks in towns and cities of Zimbabwe. Stein et al. (2005) observed that rural and exurban forests in the vicinity of urban lands are considerably affected by population growth and associated urban expansion. From a climate change perspective, it is estimated that a significant portion of the eight million hectares of land distributed and cleared for cropping and other forms of land use, has led to the reduction of forests and woodlands that act as carbon sinks (Government of Zimbabwe 2014). It has been reported that the rate of clearance of woodlands in both the commercial and resettlement areas has increased markedly following the changes in land tenure associated with the Fast Track Land Resettlement Programme (Cliffe et al. 2011). This has led to decreased groundwater absorption by the land and more heat absorption as the built environment expands. Zwiers et al. (2013) observed that increased storm frequency and intensity related to increased variability and climate change, have been exacerbated by local factors, particularly in urban settings such as the increased run-off from hard surfaces, inadequate waste management and silted up drainage. The high density of population and economic activities in urban areas leads to intense anthropogenic heat releases within small spatial scales. These include building heating and cooling systems, mass transportation systems and vehicular traffic, and commercial and residential energy use. Therefore, land use change and urbanisation have influenced the climate in Zimbabwe through changes in surface albedo and hydrological patterns.

Disaster risk experiences in cities of Zimbabwe require an integrated way of tackling climate change. The integration of urban development and climate change has the potential to reduce the cost of emissions that influence urban climates and adaptation that help cities prepare for both slow-onset and extreme events of climate change. It is critical to have an 'integration of information, policies and measures to address climate change into ongoing development planning and decision-making' (Ayers et al. 2014: 293). By integrating climate risk into development programmes and policies cross-sectoral resilience should be promoted; hence, addressing aspects of cities' vulnerability to disasters. However, the effectiveness of climate change specific plans requires strong institutions which are implementing vehicles of ideas (Ayers et al. 2014).

It should also be noted that urban design plays a pivotal role in reducing climate risks. This could be done through paying proper attention to climate-safe siting, energy-conserving building characteristics, and low transportation requirements, which would both limit energy use and also reduce exposure to the possible negative consequences of climate change in low-lying coastal areas or areas prone to flooding (Zhao et al. 2018). Cities need systematic greenhouse gas emissions inventories and emission reduction pathways to prepare mitigation actions. However, diagnosis of climate risks and the vulnerabilities of urban populations and territory is essential.

This chapter also revealed that urban development is a web of systems that require a good understanding of the land's natural, socio-economic and political dimensions. Risk and vulnerability in Zimbabwean cities emanate from a combination of intrinsically linked socio-economic, environmental and political factors. For example, the decline in economic performance in Zimbabwe has had a knock-on effect on all aspects of life and well-being. Instead of weaning populations from overreliance on natural resource-based economies, the rate of exploiting natural resources has increased as a result of the economic decline. The cost of weak natural resource management in Zimbabwe is high, disproportionately affecting the poor who are more likely to depend directly upon resources for their livelihoods. It is of great importance to observe that the boundaries between urban areas and rural areas are porous and there are no distinct lines that separate them. This entails that there are no one-size-fits-all strategies to deal with climate change in urban areas. It should be noted that new spatial and sectoral patterns have emerged along the rural–urban continuum as a consequence of migration, information and production flows. Therefore, the existence of a web of interrelationships, and networks that connect both urban and rural spaces, blurs the distinction between rural and urban spaces.

However, the existing trend of increasing disaster risk in urban areas of Zimbabwe could be limited through adoption of urban land use management processes that offer opportunities to better understand how natural hazards in and around urban areas interrelate with current and future urban growth patterns. It should be noted that reducing disaster risk through urban land use management processes needs long-term systemic thinking that involves inputs from several disciplines as well as across different stakeholders. This chapter has produced rich perceptions on how elements of resilience are central to the manner in which disasters induced by climate change can be managed. For example, it was noted that urban development can manage disasters in cities from policy level, administrative level to implementation level. It is significant to recognise that diverse stakeholders observe risk in different ways and play different roles in shaping risk. This points to the importance of adopting a participatory approach, where various stakeholders are involved in identifying information collected for hazards, exposure and vulnerabilities, and through a process of dialogue, come to a conclusion about risk.

11.6 Conclusion and Way Forward

This chapter has demonstrated that climate change-induced risks and disasters remain an elephant in the room for Zimbabwean cities, towns and growth points. Climate change disasters, such as floods and water-borne diseases, have emanated from poor planning processes and practices amid the spontaneous expansion of cities. It is therefore necessary to integrate a web of systems from policy level, administrative level to implementation level as a way of dealing with climate change risks. The current trend of the increase in disaster risks in cities in Zimbabwe can be reduced by adopting land use management processes for cities, which offer occasions to better understand the natural hazards in cities. In a way to reduce disaster and risks, disaster risk deliberations must be factored into design and execution of instruments for development control.

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