

## Chapter 5

# Small Cities and Towns in Africa: Insights into Adaptation Challenges and Potentials

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**Abstract** This chapter is a counterpoint to those in the rest of this volume that treat Africa's large cities. As Simon (Int Dev Plann Rev 36(2):v–xi, 2014) has observed, most study of African urban climate change adaptation has focused on the challenges to large cities. So, by way of heuristic exercise, we attempt to approach a set of questions about small African cities and towns facing climate

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change. What climate-related hazards are faced by small cities in Africa today and will be confronted in the future? What kind of enabling capacities should be strengthened so that staff in small cities can take the initiative to adapt to climate change? What obstacles do the governments and residents of small cities face in adapting to climate change? What potential is there for risk reduction and improved livelihood security even in the face of climate change? Reviewing literature and using case studies from Eastern, Southern and Western Africa, we find that small cities have potential not only to protect their infrastructure and residents from climate related hazards, but also to serve as catalysts of climate-smart development in their hinterlands. However, governance problems and a lack of finance severely limit the ability of small African cities to realise this potential. More research is urgently needed to inform feasible solutions to bridge these governance and funding gaps.

**Keywords** Tertiary urbanisation • Climate change adaptation • Urban-rural synergy • Governance • Climate-smart development • Water and sanitation • Flood

## Introduction

‘Africa has a distribution of the urban population by size of urban settlement resembling that of Europe, with 57 % of urban dwellers living in smaller cities (those with fewer than half a million inhabitants) and barely 9 % living in cities with over five million inhabitants’ (UN 2012: 9). In terms of growth rate, the UNFPA (2008) concluded, ‘[w]hile mega-cities have captured much public attention, most of the new growth will occur in smaller towns and cities, which have fewer resources to respond to the magnitude of the change’. Climate change signals the need for public investment in Africa’s smaller cities. However, public investment of the wrong sort can also be part of the problem. Some cities have already been affected irreversibly by the combination of climate stress and mega-projects. An example is Gorgoram in northern Nigeria. Dams were built on the Hadejia River, diverting 80 % of the water from the Hadejia-Nguru wetlands and lowering the water table, with profound consequences:

... [O]nce a sizeable town in the heart of the wetland ... [i]t had a famous fishing festival to which teams of youths came from hundreds of miles around to net the biggest catches in the last pools as the flood retreated. Dignitaries from across northern Nigeria came too, awarding prizes and lobbying for votes. But now Gorgoram is an emptying village. The festival is failing because the floods are poor and there are no fish. All around, the landscape is littered with fallen trees, victims of the falling water table. (Pearce 2006: 100)

Most of Africa’s thousands of small cities are not so unfortunate. They still have a chance to adapt to climate change and also to stimulate support for ‘climate-smart development’ in their hinterlands (see Box 5.1).

**Box 5.1: Climate-Smart Development**

Mitchell (2010) suggests that stakeholders should work together in the following ways to create ‘climate-smart disaster risk reduction (DRR)’:

- Ensure good disaster risk assessments are conducted that factor in the best available climate, vulnerability and exposure information to work out future climate hazard risk. This will help to decide where best to site critical infrastructure or new settlements, for example, though such risk assessments will need to be updated as information is dynamic.
- Strengthen people’s access to information (through education, media or dedicated early warning systems) about these risks and about the potential impacts of climate change.
- Create agencies and systems that are well connected across scales, can easily learn from each other, have space to innovate and experiment with approaches and conduct scenario planning exercises with regularity.
- Find ways to increase people’s equitable access to markets and services, strengthen their ability to participate in decision-making and protect their rights.
- Initiate high standards of environmental protection in efforts to grow the economy and take advantage of international assistance to generate green jobs and, after disasters, to ‘building back greener’. [Minor adaptations by authors to generalise Mitchell’s points]

Note that these recommendations are also relevant to rural and urban development, livelihood enhancement (access to markets and services) and to investment strategies generally. Our question is whether small cities in Africa can catalyse such ‘climate-smart development’ which is simultaneously ‘climate-smart DRR.’

For examples see: <http://www.trust.org/spotlight/climate-smart-development/?tab=showcase>.

**Purpose of this Chapter**

We present a counterpoint to the rest of the cases discussed in this book dedicated to Africa’s large cities and climate change. Our purpose is to formulate questions about the future of small cities and towns facing climate change in Africa. We have fewer answers than questions, but we believe that clarifying and addressing such questions is an urgent task for Africa’s citizens, policy makers, civil servants, researchers and civil society workers.

The specific questions are the following:

1. What climate-related hazards are faced by small cities in Africa today and will be confronted in the future?
2. What kind of enabling capacities should be strengthened so that staff in small cities can take the initiative to adapt to climate change?

**Table 5.1** Example definitions for cities in Africa (Gough et al. 2013)

Country	Definition of “City”
Cameroon	Administrative headquarters with at least 2,000 inhabitants
Ghana	Settlements of at least 5,000 inhabitants
Rwanda	Those residents in the urban administrative units recognised as such by law
Tanzania	Regional and district headquarters; other areas where there is a concentration of houses and institutions [sic] police stations, post offices, health centres and streets

3. What obstacles do the governments and residents of small cities face in adapting to climate change and realising related opportunities?
4. What potential is there for risk reduction and improved livelihood security, even in the face of climate change?

By ‘small city’ we choose the range of population from 20,000 to 100,000 (Pelling and Wisner 2009). There is no universal definition of ‘city’ (see Table 5.1), so we have adopted what seems a reasonable one.<sup>1</sup> Towns are even smaller and sometimes are clustered with a small city in a municipal district, as in the South African case study that follows. There is considerable evidence that cities towards the bottom of the urban rank-size distribution may serve as organic parts of their hinterlands, providing valuable services for surrounding rural zones, if not acting as fully fledged ‘growth poles’ (Darwent 1969; Jacobs 1985; Parr 1999a, b; Ogunleye n.d.). Thus, an additional motivation for our team in contributing this chapter is to explore the potential developmental role of small African cities. We wish to understand the constraints on that developmental role due to climate change, as well as constraints due to the political and economic power of national and global systems. While managing their own growth and infrastructure in the face of climate change, can small cities in Africa also catalyse ‘climate-smart’ rural development?

## Methodology

How does one try to generate relevant questions about climate change and small cities and towns in Africa with little or no data available? We estimate that there are at least 5,000 cities and towns in Africa that function as the centre of local government areas (LGA).<sup>2</sup> A major empirical research project would be needed

<sup>1</sup>The minimum population defining ‘urban’ varies worldwide from 200 in Sweden, 500 in South Africa, 5,000 in Nigeria to 30,000 in Japan (Hartshorn 1991). This makes it impossible to define ‘city’ and ‘town’ universally. Population alone isn’t the only important criteria; others may include structure and function in the settled area.

<sup>2</sup>A crude estimate finds that cities and towns that are headquarters of local government areas in Tanzania, Uganda, Malawi, Ghana, Niger and Sudan number on average 120. Multiplying this by 46 Sub-Saharan African countries and adding the 1,000 local government areas’ (LGA) centres in South Africa and Nigeria, results in a total of nearly 6,500. Thus 5,000 seems a reasonable, but possibly low, estimate. (Numbers of sub-regional centres of LGAs were obtained from various Wikipedia sites.)

even merely to visit, gather available data and to interview key officials in 10 % of these. Unable to mount such a study, we have combined a review of literature on decentralisation, governance and local economic development with intensive study of three small cities and towns. Three small settlements – one in each of three regions: Eastern, Southern and Western Africa – were chosen to provide some regionally diverse perspectives. The actual choices depended on personal contacts of the author team.

In Tanzania, Adolfo Mascarenhas, retired Tanzanian professor of geography, and Ben Wisner had been based intermittently in Mwanga from 2008 to 2014 while implementing a research project on climate change based at Sokoini University of Agriculture in Tanzania and Ohio University in the USA. They gathered market and business data, mapped and photographed environmental degradation and discussed urban development challenges with officials. In South Africa, Ailsa Holloway, director of the Research Alliance for Disaster and Risk Reduction (RADAR) at Stellenbosch University, had studied Oudtshoorn's flood problems while David Simon had also visited this city on numerous occasions since 1980 in the course of his own separate research. Simon is a member of the steering committee of an international research project, Urbanisation and Global Environmental Change (<http://ugec.org/>). For Senegal, we relied on the direct, firsthand knowledge of Babacar N'dong, supplemented with background knowledge on Senegalese governance by Papa Faye. N'dong is a staff member of a Senegalese civil society organisation, Fondation du Secteur Privé pour l'Education and Faye is based at the Institute of Anthropology at Bern University, Switzerland. Unreferenced evidence presented in these three case studies comes from firsthand observations by these individuals, key informant interviews or grey literature to which they had access.

The literature review was conducted by Mark Pelling and Ben Wisner, building on their earlier work (Pelling and Wisner 2009), along with Jesse Ribot and David Simon.

## **Background on Tertiary Urbanisation in Africa**

The colonial administrative system left behind numerous primary outposts and garrisons that have become the district headquarter cities with administrative, service, market and transportation functions (Myers 2011). As third order cities – as opposed to national commercial/ political capitals and the regional headquarters – these central places link up primary settlements with the regional capitals and the national capital cities and national commercial-industrial hubs. These small cities usually feature secondary or even tertiary educational institutions and referral health facilities. They are strategic places in the networks that allow resources, people, information and investment to flow. Our argument is that any forces that undermine the vitality of these small cities will have systemic impacts on the urban and rural sectors. Yet they are also largely ignored.

We welcome the recent increase of empirical research on climate change affecting second order cities in Africa mentioned by Simon (2010, 2014). These include work in St. Louis, Senegal (Diagne and Ndiaye 2009; Silver et al. 2013) and Bobo-Dioulasso, Burkina Faso (Silver et al. 2013); however, these cities are larger – with populations of >300,000 and >500,000, respectively, and more important in regional governance than the third order cities that concern us.

## Challenges to Small Cities Facing Climate Change

The defining characteristics and challenges of small cities are these: they are deeply embedded in the rural economy so are hybrid; they are very local in resource profile. This may have some advantages for self-organisation and utilisation of local knowledge, short decision-making chains, etc., but these advantages are probably overwhelmed by major disadvantages – spatial isolation and neglect when it comes to funding.

However, before considering the challenge of climate change for small cities and towns in Africa, one has to be clear about the word ‘change’. Urbanites and rural dwellers alike deal with change in many forms. They experience change holistically as threats and opportunities in daily life (Wisner 1988, 1993; Smucker and Wisner 2008). Climate change is not the only change affecting small cities in Africa. Urban reality is punctuated by political, administrative, economic, social, technological, environmental, and demographic changes in addition to changes in the climate. At any given time, political leaders in small cities as well as civil servants, traders, bankers, artisans and all other residents will more easily recognise and emphasise one or another manifestation of these diverse, yet interconnected, kinds of change. Even farmers do not necessarily consider climate change to be the greatest threat they face (Mertz et al. 2009; Wangui et al. 2012). Disregarding these local perceptions and concerns, governments in Africa often echo former colonial/ metropolitan styles of top-down, technocratic planning (Scott 1998; Easterly 2014) and their current discourse of ‘risk’ and ‘the climate imperative’ (Pachauri 2009; Jasanoff 2012; Handmer and Dovers 2013; Smucker et al. 2015).

In addition to climate change, several other types of change preoccupy local people. World prices for exports and imports fluctuate, sometimes wildly – witness the grain price spike in 2008 and the price history of African export commodities, such as cocoa and coffee. Variable prices affect the trader’s, transporter’s and farmer’s profit margin. National and municipal policies and collusive strategies of intermediaries and merchants may also be responsible for low producer prices that keep people in poverty – and vulnerable to, among other things, the impacts of climate change. Also of concern to local people is the arrival of large numbers of people displaced from the countryside by conflicts that are sometimes overlaid on drought or flooding (Haysom 2013). National government policies of all kinds may be proclaimed and dominate the labour, time and attention of civil servants who are unable to give adequate attention to routine matters. For example, a routine

task of local government may be road maintenance. Intense rain – an increasing feature of the ‘new normal’ climate – more easily erodes poorly maintained roads away. Changes in the use of mobile phones (an example of technological change) may make it easier to sort out optimal marketing arrangements. However, annual changes in national government taxes on fuel and on mobile phone companies that take place during the ‘budget season’ may act as a further disruptive change. The complex, chaotically interacting array of changes that face residents, leaders and professionals in small African cities is suggested in Fig. 5.1, entitled ‘Spaghetti of Doom’.

It is impossible to disentangle the various kinds of changes that have been taking place in Africa. Each of these changes may interact with others, strongly or weakly (see also Chap. 1).

Because such changes affect people’s incomes and assets as well as African governments’ ability to prepare and respond, they influence a city’s or town’s security, including its ability to address climate change. These changes increase or decrease the number and size of hazards, shocks and opportunities for different groups of people. The life and economy of small urban centres rely on bottom-up economic infusion from the rural sector in which they are embedded. Small cities

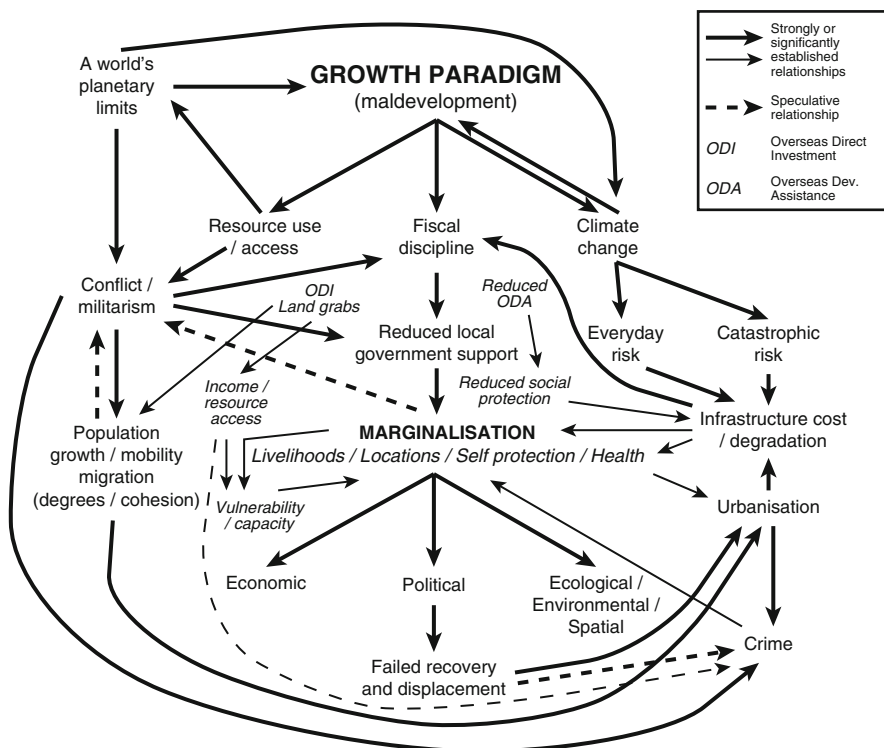


Fig. 5.1 Spaghetti of doom (Lopez-Carresi et al. 2014: 5, with permission)

are also dependent on top-down public sector investment over which they have little control. Managing and living with risk in such cities is a complicated hybrid of local action, often built on local social resources that extend into the surrounding countryside.

### *Administrative, Political and Organisational Challenges*

Many small cities will not have local self-government but rather be governed by regional centres. Small cities are in a unique predicament with low visibility and often as a pawn in political games played out elsewhere. Where local government exists it will likely be basic, with limited capacity for strategy or powers of investment and decision-making. Even where local government is more capable and better resourced, its freedom to innovate and to seek solutions to the many challenges facing it, including climate change, is limited by the competence or incompetence at other levels. As Charles Sampford puts it (2013: 25):

[M]any of the most intractable governance problems occur when inadequacies at one level of governance are reinforced and exacerbated by inadequacies at other levels... It is paradigmatically the case in the response to climate change. . .

The immediacy of local government, where it exists in small urban centres, provides an opportunity for direct accountability. Where there is will and collaboration among local government, businesses and civil society groups much can be done to reduce hazard exposure and enhance preparedness (GNDR 2009, 2011, 2013). As a hub for the surrounding rural economy, upon which much of the urban economy depends, the small city is positioned to help to protect upstream urban and downstream rural communities and economies from the impacts of climate change. The importance of this is the capacity to bring together information from rural producers and markets, as well as the national meteorology service. When weather and climate data are communicated in a context of trust and using appropriate metrics, its uptake and subsequent impact on agricultural yields can be startling. For example, the World Meteorology Organisation (WMO) is in the midst of a major campaign to help national governments push seasonal climate forecasts down to grassroots (Makoye 2013; WMO 2014a, b). In Africa, the small city will be a vital node in realising such penetration of climate science and its fine-tuning by discussion of local experts, including representatives of farmers and herders (Wisner 2010).

However, yields cannot come to market if rural roads are washed away or blocked by landslides. Small cities in Africa may not have jurisdiction over the building, maintenance and protection of transport infrastructure outside their boundaries. The ambiguous exception is where the small city is also a regional or district headquarters. As in nearly all matters, the small urban place must negotiate with higher order jurisdictions for attention and resources. Small cities in regions of a country that did not vote for the parliamentary majority in power



may find themselves less visible and low on the list of priorities for infrastructural investment. They may also be unable to access grants from development agencies that work through national government channels. Such politically disfavoured small cities will usually not have the legal or financial management capacity to engage with sources of private finance.

### *Economic and Resource Access Challenges*

The economy of small urban centres is typically based on two functions: (1) processing and marketing of agricultural produce generated from the surrounding countryside and sold to support local agriculture, and associated sectors such as transport; (2) public sector activity – schools, health centres, government agencies, and other public services. The balance of these two sectors will influence the vulnerability of the local economy to ‘external’ variables. Cities that are reliant on the agricultural economy will be exposed to market price fluctuations, government subsidies or guaranteed prices for agricultural produce and the impacts of climate variability on production. Cities that are overly dependent on public sector employment may experience some stability but are vulnerable to policy change, as many cities experienced from 1980 to 2010 in rounds of structural adjustment and public sector retrenchment. In these circumstances, there are few alternative employment opportunities in small urban centres, leading to out-migration and structural poverty.

Managing urban settlements depends on the ability of local government to derive rents and other income. This income can come from a variety of sources, including local property rates and taxes, central government subvention, private sector investment, public-private partnerships, and direct loans or grants from international financial institutions, non-governmental organisations or development donors. However, many of these potential sources of income are not available to smaller cities (IPCC 2014). One reason is the transaction cost of managing distributed projects with limited scale economies. Another reason is a legal barrier to such targeted external investments. Smaller cities rarely have the legal and management skills in house that are required to access significant funds or to manage any resulting projects. The result is that strategic funding is directed to higher order cities and regional centres, with only limited downstream investments, and even less opportunity to shape these investments. Similarly, the ability to enjoy international private sector investment requires strong human resource capacity and a population size large enough to attract these funds. Small cities rarely hold either. Opportunity may lie in networked approaches but there are only few examples of this (IPCC 2014). Simon (2014: ix) highlights successes in urban climate adaptation by the action of ‘[p]roactive local authorities – often driven by strategically placed climate/ environmental change “champions” in the political leadership ...’ However, he is writing about cities one or two orders of magnitude larger than those considered here (for further discussion on importance of “local champions”, see also Chaps. 9 and 10 of this volume).

The case studies in this research show the potential for a networked small urban development strategy. The South African case is an example of a District Municipality that embraces Oudtshoorn and six other local municipalities. In the Tanzanian case, we will show the possibility of developing a prosperous Greater Mwanga Urban Region, integrating the ribbon/ strip urbanisation between the two poles (sisal estate and ethanol factory) and seeing this urban growth as an opportunity and not as a problem. Most planners see strip urbanisation as 'sprawl'. However, any such spatial clustering would still exist at the bottom of the national budgetary food chain, and even networks of small cities and towns may not have the legal and managerial capacity to negotiate and supervise overseas investment. The danger is that they would be overwhelmed and unable to monitor and stop negative social or environmental impacts of such investments.

As regards national government grants and subventions, 'decentralisation' is a universal buzz word in Africa (Ribot 1999; Cohen and Peterson 1999; Bardhan and Mookherjee 2006); however, it is often a verbal exercise without corresponding devolution of financial, technological and professional resources or the transfer of authority over sectoral decisions, such as agricultural or natural resource management and use, and infrastructural investment. Decentralisation is often announced in laws and documents with no manifestation in practise (Ribot 2003; Ribot et al. 2008).

The widely legislated democratic decentralisations that have promised to increase the effectiveness and equity of local development policy, with few exceptions, have never materialised in practise. In their place have been many forms of privatisation and de-concentration of central government agents to local posts. When local governments are given powers, they are typically made to be accountable to higher levels of government, defeating the purpose of decentralisation. By contrast, when the local governments are accountable to the local population, they are systematically deprived of resources. In the end, few powers are transferred to local authorities that represent or are responsive to local people. The result is a form of local governance that is neither accountable nor responsive and a deep failure to improve local wellbeing (Ferguson 1994; Crook and Manor 1998; Harriss et al. 2004; Ribot et al. 2008; Poteete and Ribot 2011; Mascarenhas and Wisner 2012; Satterthwaite 2013; Smucker et al. 2015).

## **Potentials, Advantages and Opportunities of Small Cities Facing Climate Change**

### ***Political and Social Advantages***

Political will to address climate change may be easier to establish in smaller cities than in the megacity context, where conflicting political and economic interests are more varied and intense. The professional and political elite residing in small cities

and towns know each other and probably socialise. It is therefore easier for information to flow informally among key individuals, such as the water engineer, medical officer of health, agricultural officers, business owners, bankers, secondary school teachers, district councillors, religious leaders and senior staff of civil society organisations. Finally, small cities may be less anomic and anonymous than larger ones, the exceptions being those mentioned earlier where many traumatised people displaced by violence have settled or, in the case study from South Africa that follows, where strong racial fault lines or other sorts of discrimination persist. Residents may be easier to enlist in participatory planning than in the large informal settlements that characterise Africa's largest cities, and where less face-to-face interaction with leadership occurs.

### *Economic Advantages and Opportunities*

Smaller urban centres have an organic relationship with their rural hinterlands (Nel and Binns 2002; Robinson 2005; Nel and Rogerson 2005). This is the basis for a solid and growing small manufacturing sector to serve the surrounding countryside. In principle it could provide opportunities to serve the rural hinterland with many products necessary for climate change adaptation such as windmills, irrigation pumps and pipes, water tanks (African Rainwater Harvesting Network 2014), specialist seeds and veterinary products, etc. However, increased climate variability and price fluctuations may reduce the purchasing power in the countryside to buy such products. This is a vicious circle since such inputs are key to climate-smart rural development.

Many small cities are located along transportation networks that nourish local markets. This market function can be important in sharing lowland and highland products, spreading the risk of climate change impacts. The spread of mobile communications and relatively cheap motorcycles and motor rickshaws, and increases in local bus services, are linking up rural producers in different agro-climatic zones as well as with cities of various sizes. Diverse foodstuffs available in local markets are a sign of how the market function can provide a buffer against climate change impacts (see Table 5.3 on p. 172).

### **Three Case Studies**

Our three case studies certainly cannot claim to represent the great diversity of the thousands of small cities in Africa. However, in order to clarify and refine the questions we asked at the beginning, we look closely at these three small settlements, emphasising their physical site and exposure to hazards, governance, municipal finance and economic activity, as well as the challenges they face in planning for future climate impacts. There is little known about most small cities

and towns in Africa: their histories, sites, infrastructure, functions, governance, economies, and relations with their hinterlands. All of this bears on the challenge of climate change for small cities and their capacity to adapt.

### ***Case Study 1: Mwanga, Tanzania (Population 16,000 – Rounded)***

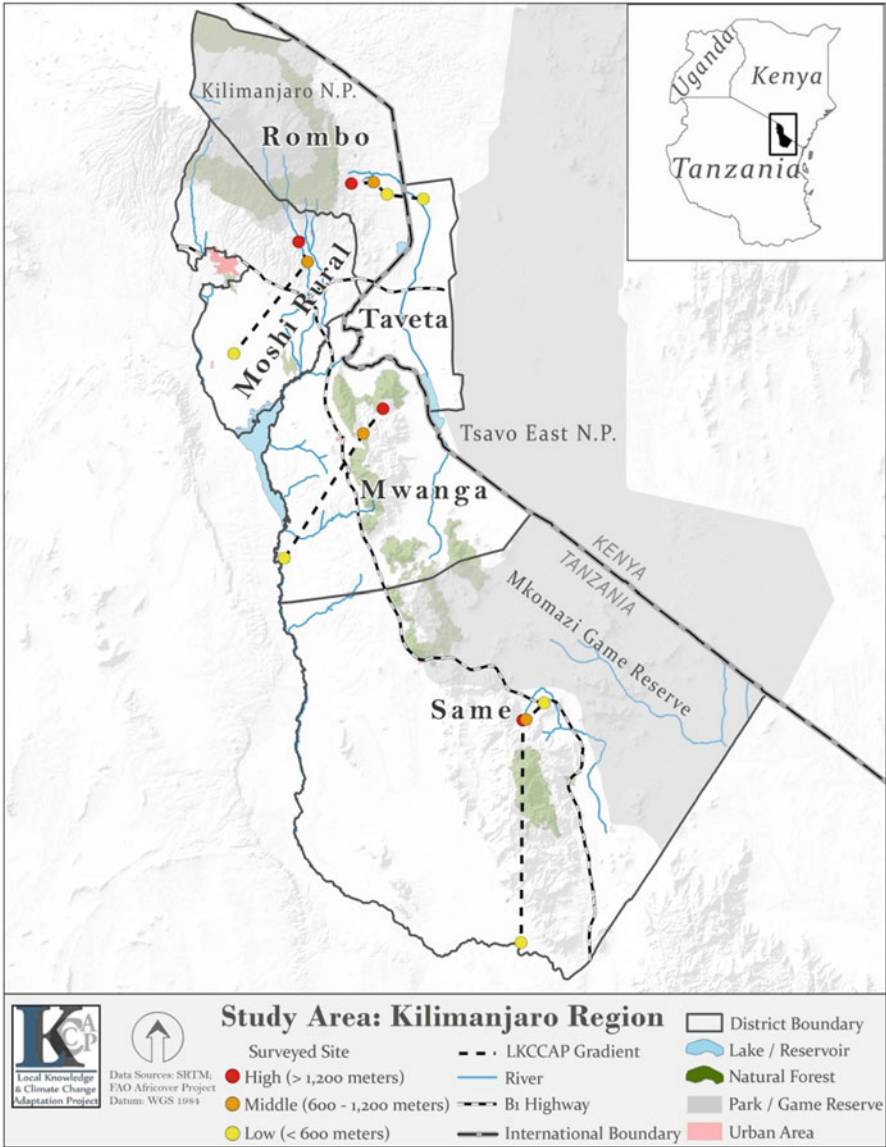
#### **Overview and History**

Mwanga town (population 15,783)<sup>3</sup> is the administrative centre for Mwanga district (population 131,442) in Kilimanjaro Region, northern Tanzania (Fig. 5.2). When Mwanga district was created by dividing the very large Same district in 1982, Mwanga town was laid out according to an as-yet unfulfilled 1982 *Master Plan*. It was set back from the main road that connects Arusha, Moshi and the border with Kenya with the Tanzanian sea port of Tanga and the old German-built railway line (now abandoned). Formerly, considerable informal trading and some permanent restaurants and other shops were found at this junction, and despite attempts by the Mwanga district council to shift trading to the new interior market centre, the ribbon of roadside commerce both northwards and to the south has continued to elongate. Therefore, for planning purposes, one should consider a greater Mwanga urban area and its satellite settlements. Two such nodes along the main road are of particular interest. The first is the sisal estate owned by Mohamed Enterprise Tanzania Limited (METL). To the north is the newly created Kilimanjaro Bio-chemical industrial alcohol plant. Between them, they provide employment for nearly 1,000 men and women (more on these industries below).

The 2002 national population census showed that if one included Mwanga Urban and all the mixed ‘urban/ rural’ wards, they would account for about 50 % of the population of the district (see Table 5.2). The Agricultural Census completed the following year indicated that fewer than 40 % of the households listed agriculture, pastoralism or fishing as their core livelihood. Another study actually indicates that in rural Kirya Ward average household incomes are catching up with Mwanga Urban (Muzzini and Lindeboom 2008). Field work in Mwanga revealed that a large proportion of rural dwellers are in commercial activities, certainly not mere self-provisioning. This is more evidence that one should consider a greater Mwanga urban area as the operational unit for planning adaptation to climate change.

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<sup>3</sup> Whilst Mwanga is smaller than our minimum ‘small city’ population, it is a district headquarters and has the administrative, service, and market functions of a city. It also has core central business district (CBD), manufacturing and processing zones, as well as residential suburbs and a rural-urban periphery (rurban edge). Nevertheless, for the sake of consistency, we will call Mwanga a ‘town’.



**Fig. 5.2** Kilimanjaro Region, showing location of Mwanga District (Wangui et al. 2012, with permission)

Since its founding, Mwanga has grown steadily. A former Prime Minister, Cleopa Msuya, who lives in retirement in the North Pare Mountains above the town, was the moving force behind establishment of the new district and the new town. The early leadership of independent Tanzania agreed to ensure that growth

**Table 5.2** Population of Mwangi District and the emergence of new centres

District ward	Total population	Male	Female	HH size
Mwangi District	131,442	63,199	68,243	4.35
Mwangi Urban Ward	15,783	7,414	8,943	4.07
Kileo (Mixed)	13,645	6,702	6,943	4.07
Mgagao (Miji = 'Town' surrounding a livestock market)	6,011	2,879	3,132	4.65
Toloha	3,055	1,484	1,579	4.45
Kigonigoni	2,610	1,364	1,246	4.47
Kivisini	1,694	880	814	5.01

was not only confined to Dar es Salaam, but to seven other designated urban areas and that basic services, such as water, health, and education, were widely available in the rural areas. Largely because Msuya worked hard to obtain basic services for the town, the following services are presently available:

- Two banks, including the Mwangi Community Bank;
- Post office with all services;
- Market place with shops, warehouses and bus stand with modern toilets;
- Mains electricity in Mwangi town and also in several of the mountain villages;
- Water supply;
- Several public and private primary schools;
- Five secondary schools, including three earmarked for girls;
- District hospital and the well-equipped Neema Health Centre operated by the Roman Catholic Church;
- Police post.

Mwangi's considerable commercial activity includes trading, service provision and small scale manufacturing. The activities comprise a large number of wholesalers and retailers, pharmacies, restaurants, photocopy and computer service enterprises, as well as small scale enterprises specialising in carpentry, cement block production and welding. Two tree seedling nurseries exist. There are also two petrol stations and a number of automobile workshops.

In addition to being the administrative headquarters for district political governance and professional services, Mwangi also hosts a number of non-governmental organisations and training centres. Religious society is represented by an active mosque, as well as Lutheran, Catholic and other churches. The Lutheran diocese runs a school for the deaf while the Catholic dispensary (the Neema Health Centre) complements the services provided by the district hospital.

Four hotels and several guest houses offer accommodation for visitors and a Catholic convent that doubles as a rest house serves some visitors. At least one of the hotels, in collaboration with the Tanzania Tourist Board, is running a hands-on training for hotel staff.

## Administration

Founding president Julius Nyerere's administration transformed the colonial administration and also set up a parallel hierarchy of one-party influence. The old chiefdomship system was abolished, and by 1969 the party structure was found throughout the country. The *balози ya nyumba kumi*, leader for every ten households, was found from the city of Dar es Salaam to the most remote villages in the country. The conspicuous green TANU flag near the house of the leader was a symbol of authority and unity. The *balози* were never formally replaced. In urban areas this function has been taken over by ward government (*serikari ya mtaa*) and in rural areas by elected chairs of sub-villages (*vitongoji*). These are the most local administrative officials (Box 5.2).

### Box 5.2: Tanzania's Administrative Structure

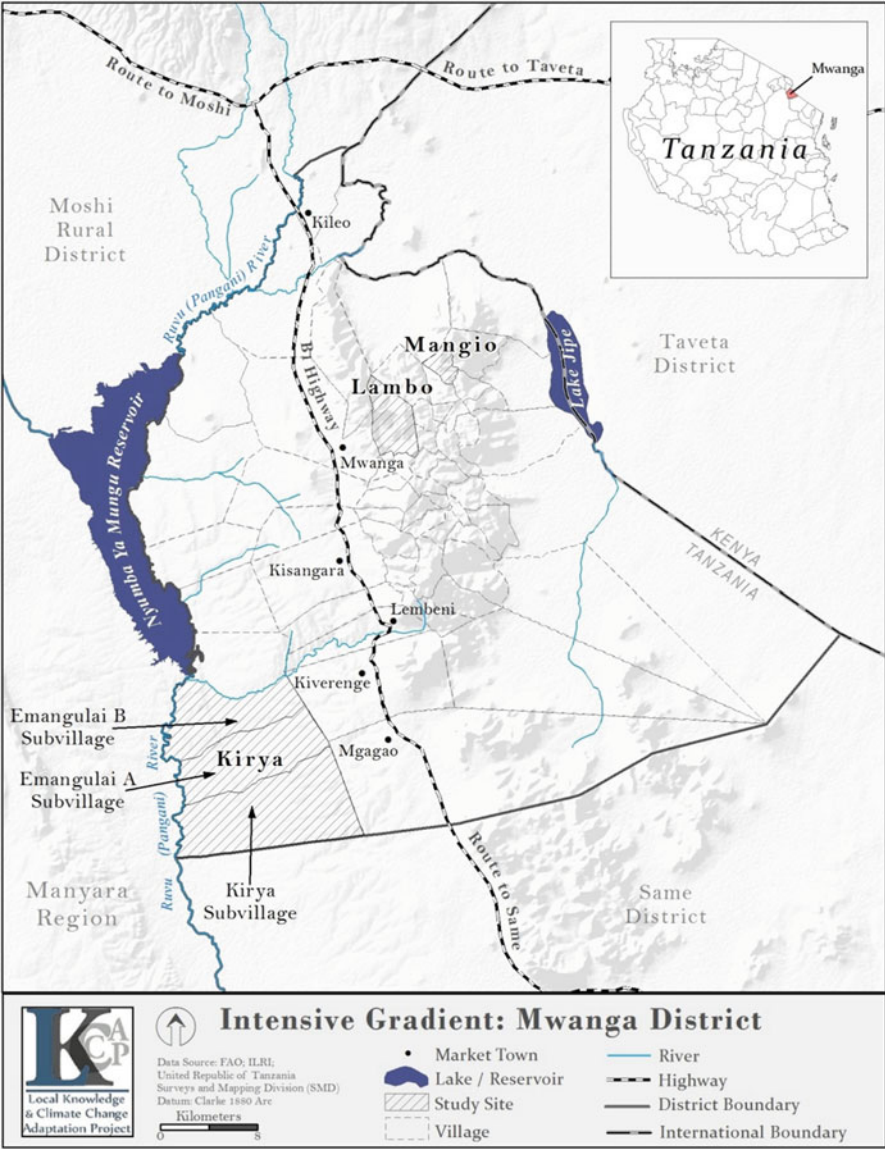
The administrative structure of Tanzania has many levels: nation (*taifa*), region (*mkoa*), district (*wilaya*), ward (*kata*), village (*kijiji*), sub-village (*kitongoji*) and clusters of rural homesteads known as *khaya*. At the ward and village level an executive officer who represents the government is appointed by the district administration. Elected representatives constitute a parallel set of institutions – elected councils, a committee structure, and chairs. At the sub-village scale representatives are elected to sit on the village council. Such parallel structure is replicated at each of the levels of governance. There are also gazetted cities and municipalities (see also Chaps. 9 and 10).

## Physical Site and Climate-Related Hazards

Mwanga is situated where semi-arid lowland meets the base of the North Pare Mountains (Fig. 5.3). It is set back approximately one km from the main road on a site that abuts the North Pare Mountains and includes a central town area between two water courses that run West in the direction of the main road. The town also rises in three directions from this central zone onto the lower slopes of the mountains and up onto two ridges.

Over the 40 years since its founding, Mwanga has witnessed extreme deforestation of the western escarpment of the North Pare Mountains. This and the inexorable expansion of the town has meant that the water courses from the mountains no longer flow permanently, and massive gullying endangers bridges, pipelines and also peri-urban gardens and potentially house plots (Fig. 5.4). Flooding is becoming more and more of a challenge and this is made worse by an increased intensity of rainfall, likely due to climate change.





**Fig. 5.3** Mwanga District (Wangui et al. 2012, with permission)

**Hazards to Mwanga’s Water Supply**

The two wells that provide the town with water are limited by an insufficient pumping capacity. People also pay water sellers by the 20 litre container; while some wealthier people and institutions, such as guest houses, pay drivers to bring





**Fig. 5.4** Gullying in Mwanga (Picture: Ben Wisner 2012, University College London)

5,000 litre containers that they then transfer to their own storage tanks. This highlights the precarious water supply situation that can only become more severe as deforestation and gullying reduce infiltration of seasonal rain into aquifers, as rainfall becomes more erratic, as the population of water users increases and, assuming a degree of economic growth, the water consumption per capita increases. An additional threat to the water supply is contamination. To date, no municipal planning has been undertaken for the disposal of solid and liquid waste. As population densities increase, the risk of contaminated sewerage water polluting domestic water will also increase.

## Flooding, Destructive Winds and Hail

Sited at the base of the North Pare Mountains, Mwanga is normally windy at dawn and at night due to differential heating of the plains below and mountains above. Convectional storms bring even windier conditions that can damage roofs and crops in peri-urban gardens and the surrounding countryside, as can hail storms. Seasonal floods are normally expected with damage to rural roads in the mountains leading to Mwanga town and even landslides. Changing climate is likely to exaggerate the extremes of drought and flooding and bring more severe thunderstorms, micro-bursts (known locally as dust devils) and hail (IPCC 2012).

## Piecemeal Planning in Mwanga and Its Hinterlands

To date, urban planning in Tanzania has been passive and uncoordinated. The 1982 *Master Plan* was never fully implemented. While Mwanga town is laid out with a grid of roads, these are unsealed and erode easily. Street lighting and solid waste collection are non-existent. Waste is burned alongside roads, contributing to poor air quality. Although abundant open space can be found in the central zone, unless creative efforts are made to raise financial resources, it will be hard to develop it into parks or recreational areas. Currently, livestock graze and thorny vegetation has colonised much of the open space. So far, the town's approach to climate change is 'piecemeal'. Even for critical issues, such as the town's water supply, a more comprehensive understanding is needed for effective planning and intervention.

People need public open spaces, and this means planning for playgrounds, parks and related amenities. Residents in Mwanga already suffer the health effects of smoke from burning of uncollected refuse (Nordhaus 2013: 91–99, citing McMichael et al. 2003) and dust from fallow open spaces trampled by livestock. Added to this will be the risk of heat waves exacerbated by the Urban Heat Island Effect. All these hazards can be reduced by the cooling and air filtering function of trees in open spaces and parks (Chap. 4).

## Capacity of Mwanga to Adapt to Climate Change

Despite legislation that, in principle, decentralises many governmental functions from the national level to regions and districts, funding does not necessarily follow. Mwanga town has very few sources of revenue – principally, a portion of the commercial licensing fees paid by business and a fee collected from people using the formal market on Thursdays. Even this small amount of revenue suffers from misappropriation.

The district administration is mandated to manage the whole territory of the district, not just the town. Thus the available work time of district professional staff, such as the water engineer, forestry officer, legal officer, etc., is not sufficient to

focus as a priority on the needs and problems of Mwanga town. These professionals are also transferred frequently and, as a result, vital local knowledge, contacts and institutional memory are lost. In addition, the office of the town manager is small and poorly funded and, in fact, relies heavily on donations via German and Swedish sister city relationships.

### **The Untapped Potential of Mwanga**

Comparing Mwanga district to most of the other districts of Tanzania, the 2007/2008 *Agricultural Sample Survey* showed that fewer than 40 % of the households were engaged in subsistence farming, herding or fishing. So what does the 60 % majority do for a living? The Pare people, who are the majority ethnicity in Mwanga district, respect the value of education. Because of higher educational attainment, both young men and women from Mwanga district have migrated to jobs in many parts of Tanzania. Links to their homes have been maintained, and this explains why there is improved housing in many villages in the district. Remittance of income to homes in the countryside surrounding Mwanga town is a source of demand for products that are produced in Mwanga town, or could be produced with the existing manufacturing base, including the hardware necessary for climate-smart development (e.g. windmills, fuel-efficient cooking stoves, tree seedlings, etc.).

Purchasing power has also increased because of the entry of rural women into the formal labour market. An example is the transformation that has taken place at the Mohamed Enterprises sisal factory a few miles from Mwanga town. Until the 1970s the overwhelming majority of workers in a sisal estate were men. Currently, at the Mohamed Enterprises estate more than three-quarters of the workers, both in the sisal processing factory and in the field are women. Flexibility of working conditions and incentives, such as permission to grow beans or maize between sisal rows, means that women can have an income, be closer to their children and pay for education.

Mwanga town's economic vitality has stimulated economic activity up and down the gradient that leads up into the villages in the North Pare Mountains and down into the semi-arid plains that end eventually at the Ruvu River and the Nyumba ya Mungu hydro-electric dam and reservoir. The Thursday market is very large (Fig. 5.5), and market surveys have found a great variety of products from mountains and plains, including products made with the grasses and reeds that grow in the wetlands along the Ruvu River at nearby Kiboko. The diversity of foodstuffs available mirror the way the market integrates highlands and lowlands and enhances resilience to climate change (Table 5.3). A fleet of Chinese-built motor-cycles serve as taxis on market days, and buses and lorries piled high with produce come and go. In nearly every case, speaking to those involved, one detects a spirit of self-reliance. These new activities have added value to local produce, increased incomes, and attention has been paid to changes to make livelihoods more sustainable.



**Fig. 5.5** Mwanga's Thursday market (Picture: Ben Wisner 2012, University College London)

**Table 5.3** Food basket available in Mwanga market place

Staples: maize, cooking bananas, rice, wheat, millet, sweet potatoes, yams, cassava
Leafy Vegetables: cabbage, several varieties of traditional and modern spinach, chard, cassava leaves, pumpkins, squash, several varieties of wild leafy vegetables
Beans, pulses, lentils: several varieties of beans including pigeon peas, gram, groundnuts, bambara nuts
Fruits: oranges, mangoes, fruit bananas, avocado, baobab pods, jackfruit, oysternuts, pineapples, pawpaw, passionfruit, fruit bananas, various berries
Meat/milk: beef, lamb, goat, chicken, duck & milk and milk products
Fish: including catfish, tilapia, various types of fresh water sardines
Spices /medicinal plants: ginger, garlic, onions, pepper, chillies, cardamom, tamarind
Beverages: tea, coffee, cane juices

Mwanga's manufacturing and wholesaling provides its hinterland with materials for irrigation, construction, grain milling and other rural industries. Carpenters use local hardwoods; restaurants consume produce from mountains and plains.

If planned well, a Greater Mwanga Urban Area of up to 40–60,000 people could dramatically tap into and expand on the potential to catalyse climate-smart growth in the district. In this scenario the incipient satellite settlements, such as those near

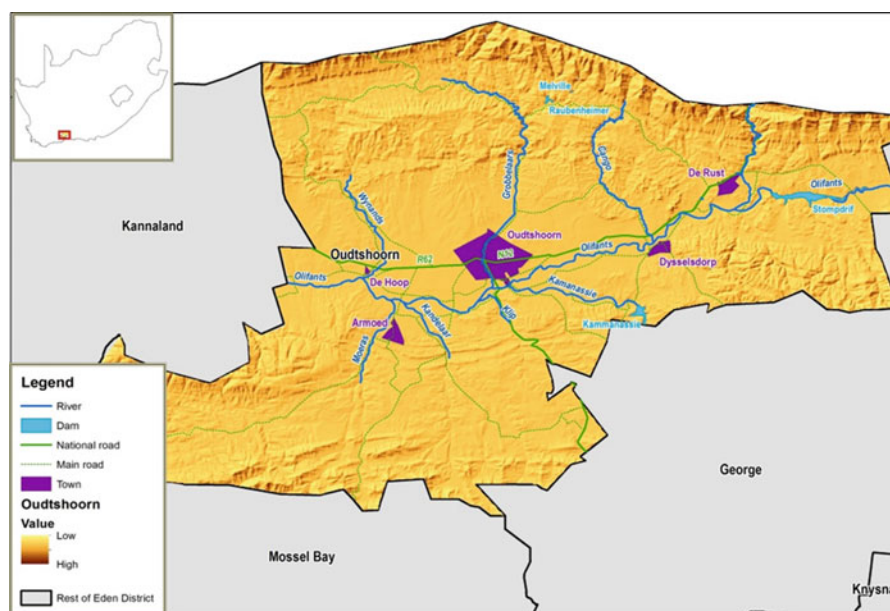
the sisal estate and a large scale alcohol distillery along the main road in the opposite direction, would grow in a coordinated and mutually beneficial manner. A new private vocational centre, which opened in 2012 at a site along the main road between Mwanga and the sisal estate, is an example of the tertiary activities that could support such economic growth and adaptation to climate change.

## ***Case Study 2: Oudtshoorn, South Africa (Population 29,000)***

### **Overview and History**

Oudtshoorn is an inland municipality (Greater Oudtshoorn Municipality), located approximately 55 km from South Africa's southern coast, covering an area of more than 3,500 km<sup>2</sup>, and with a population of 29,000 (Fig. 5.6). Since 2000, it has comprised the larger towns/small cities of Oudtshoorn, Dysselsdorp and De Rust, along with smaller settlements (Oudtshoorn Greater Municipality 2013). The city serves as the primary administrative and commercial centre for the Klein ('Little') Karoo, a semi-arid area bordered by the Langeberg, Outeniqua, Kammanassie and Swartberg Mountains.

Evidence of human settlement in Oudtshoorn by ancestral Hottentot herders can be traced as early as the second century A.D. The arrival of European settlers in the



**Fig. 5.6** Oudtshoorn Local Municipality, showing the location of cities, roads and major rivers (Design by Gillian Fortune 2013, RADAR, University of Stellenbosch, with permission)



early nineteenth century resulted in marked changes to vegetation and water courses. These were further accelerated from the 1870s onward, due to the expansion of the ostrich farming industry. In 2011, Oudtshoorn was reported to have the highest concentration of ostriches globally (with 450 registered ostrich farms within the greater municipality). The area is also a major eco-tourism destination, due to the area's proximity to the historic Boomplaas and Cango Caves and the Gamkaberg Nature Reserve. Reportedly, 184,290 tourists visited the Cango Caves in 2010 alone (Urban-Econ 2011: 158). Since 1994, Oudtshoorn has hosted the Klein Karoo Arts Festival annually in March/April – an event estimated to generate USD 11 million and 600 temporary jobs (Oudtshoorn Greater Municipality 2013). In addition, the municipality hosts four ostrich 'show farms,' dating back as far as the 1920s.

The city is the administrative centre for the Greater Oudtshoorn Municipality, containing a wide range of government, retail, tourism and commercial services. Numerous government services are provided, including five community clinics, a public hospital and a local office of the South African Social Security Agency (SASSA). A private medical clinic also operates within the city.

The 2011 national census recorded approximately 96,000 residents living in the Greater Oudtshoorn Municipality, of whom 29,000 lived within the actual city. Census findings also showed that 21,910 households resided in the greater municipality, with 34.3 % of all households headed by women and an average household size of 3.1 members (Oudtshoorn Greater Municipality 2013). In 2011, the municipality's demographic profile included 8,739 residents of Black African origin, 74,202 who were Coloured, 11,983 who were White and 317 of Indian/Asian descent (Statistics South Africa 2011) (Table 5.4).

A closer examination of Table 5.4 provides insight on the persisting effects of historic, racially-based relocations enforced by the previous government. It shows, for instance, that in 2011, 80 % of the white population resided in the original Oudtshoorn city (Fig. 5.7), constituting nearly a third (32 %) of the city's inhabitants. This contrasted with only 21 % of coloured residents who lived in the city,

**Table 5.4** Demographic composition, Oudtshoorn Greater Municipality as of 2011 (Statistics South Africa, Census 2011)

Town/city name	2011					
	Coloured	Black	Other	Asian	White	Total pop
Volmoed	424	31			17	472
Bongolethu	10,931	3,640	77	43	33	14,724
Bridgton	17,073	320	177	38	32	17,640
De Hoop	107		1		43	151
De Rust	3,115	88	29	17	317	3,566
Dysselsdorp	11,906	494	48	50	46	12,544
Oudtshoorn	15,609	3,699	338	161	9,336	29,143
Oudtshoorn (non-urban)	15,037	467	23	8	2,159	17,694
Total	74,202	8,739	693	317	11,983	95,934



**Fig. 5.7** High income inner suburb of Oudtshoorn (Picture: David Simon 2008, Royal Holloway, University of London)

with the majority dispersed across the settlements of Bongoletu, Bridgton, De Rust and Dysselsdorp. White settlement patterns also diverge from those of the municipality's black residents, of whom 82 % were living in either the original Oudtshoorn city or in Bongoletu, an under-served township established in 1966.

Such social-spatial divisions reflect the consequences of apartheid laws harshly applied in Oudtshoorn from the 1960s–1980s and that involved the removal of thousands of Africans and Coloureds from town (TRC 2001). Beginning in 1961, Oudtshoorn's coloured residents saw their homes demolished and their systematic removal to Bridgton, Dysselsdorp and De Rust. Similarly, the city's African inhabitants were forcibly resettled in Bongoletu.

The historical period that entrenched racial segregation in both Oudtshoorn city and its hinterlands was marked by government-sanctioned detentions, demolitions and deaths, as well as violent local resistance and protest action. This was especially evident in Bongoletu during the 1980s, reflected in 1985 alone in the arrests of 155 Fisihele high school students and shooting deaths of three teenagers by police (TRC, *ibid*). The widespread devastation of the black and coloured areas during this period bequeathed a legacy of difficult socio-economic and governance challenges that persist today. Oudtshoorn's 2013/2014 draft *Integrated Development Plan* acknowledged the persistence of both high unemployment and school drop-out

rates, while the SASSA reported that 20,460 social grant recipients were registered in the municipality. Protracted poverty was further signalled by a staggering tuberculosis prevalence rate of 1,085/100,000 (Oudtshoorn Greater Municipality 2013). This well exceeds South Africa's national rate of 857/100,000 and is more than six times higher than the global rate of 169/100,000 (World Health Organisation 2013). Rising concerns about drug and alcohol abuse have resulted in initiatives, such as the establishment in Dysselsdorp of a crèche for children with special needs and foetal alcohol syndrome (Oudtshoorn Municipality 2011).

These social challenges have prevailed in a climate of disabling local governance for much of the past decade, characterised by local council acrimony and contestation. Significantly, for six months in 2007, the municipality was placed 'under administration' by the provincial government (IOL News 2007), and in 2013, the Special Investigations Unit submitted a detailed report to the Office of the President on alleged malpractice and corruption within the municipality (Mtyala 2013). In July 2013, the Provincial Cabinet was required to intervene and directly authorise a temporary budget for Oudtshoorn, due to the local council's failure by 1 July to approve its 2013/2014 budget (IOL News 2007).

## Administration

Oudtshoorn constitutes one of seven local municipalities that comprise the Eden District Municipality, a district that sweeps across the southern band of South Africa's Western Cape Province. Its administrative arrangements illustrate the governance systems established to ensure alignment of services across multiple spheres: municipal, provincial and national. The municipal sphere specifically is differentiated into metropolitan, district and local municipalities with their associated councils constituted by elected representatives (Leck and Simon 2013). Municipalities are further subdivided into wards, South Africa's smallest geopolitical unit, with each ward represented on the local council by an elected councillor. Governance of local municipalities is further enabled by the election of an executive mayor and appointment of a municipal manager, as is the case in Oudtshoorn.

District Municipalities are an intermediate spatial and administrative unit between the Local Municipalities and South Africa's nine Provinces. These Provinces are sizeable and are largely self-governing. Of course, there are a host of other administrative entities that cut across these governance arrangements, such as river catchment management agencies, fire protection agencies, etc.

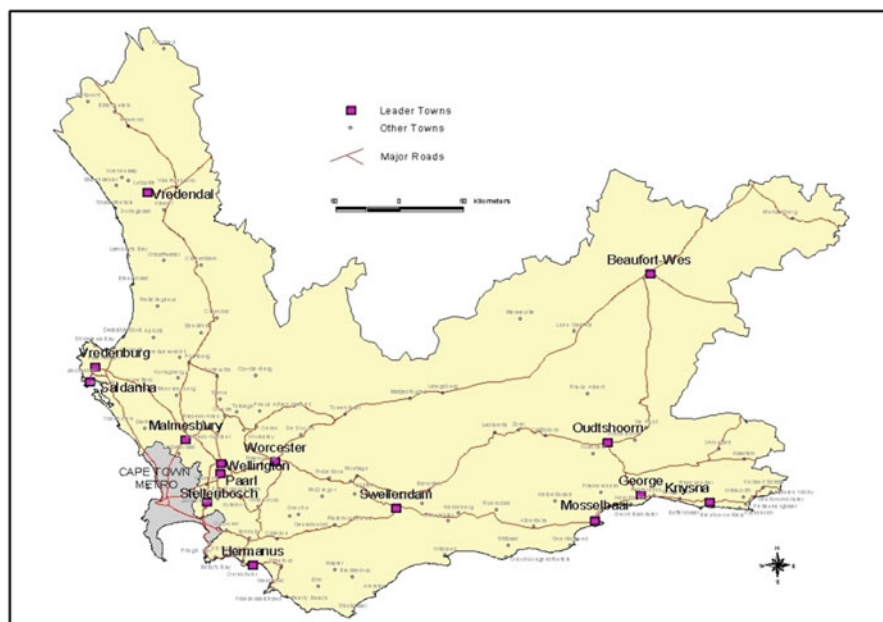
## Physical Site and Climate Related Hazards

Oudtshoorn is located in the Klein ('Little') Karoo valley, ringed by the Langeberg, Outeniqua, Kammanassie and Swartberg Mountains. Although mountain rainfall can range as high as 900–1,600 mm annually, the Klein Karoo is situated in a rain



shadow, so that Oudtshoorn's annual average rainfall is between 600 and 800 mm. It is supplied by 20 perennial rivers. The river names 'Olifants River' ('elephants') and 'Moeras' River ('marsh') indicate that these once supported fertile wetlands, inhabited by buffalo, elephant and hippopotamus. The Greater Oudtshoorn Municipality is also served by three storage dams, with two of these dedicated to irrigation agriculture. The smallest (Koos Raubenheimer Dam) supplies water primarily for city consumption (Oudtshoorn Greater Municipality 2013).

The Klein Karoo faces recurrent hydro-meteorological hazards, due to climate, topography and land use patterns. Within the past decade, Oudtshoorn has borne the brunt of severe floods in 2006, 2007 and 2012. In addition, it is recurrently drought exposed (most recently in 2009–2010), and it faces wildfire hazards. The local economy is also exposed to the recurrent threat of livestock disease, particularly avian influenza. In the most recent outbreak (2011–2012), more than 38,000 ostriches were culled (Urban-Econ 2012), with export bans on raw meat to crucial markets (such as the European Union) imposed and sustained through 2013 (Erasmus 2013). The municipality's recent flood and drought experience also illustrates the 'see-saw' and highly variable character of the weather conditions that face many small and medium-sized cities in the Western Cape – and that pose serious challenges to local development (Fig. 5.8).



**Fig. 5.8** Western Cape Province, showing 'leader towns' including Oudtshoorn (Centre for Geographical Analysis 2004: 138; Oudtshoorn Greater Municipality 2013: 35; Courtesy of Adriaan van Niekerk, Centre for Geographical Analysis, University of Stellenbosch, with permission)

**Table 5.5** Oudtshoorn Municipality: budget for civil and technical services 2006/07 and flood-related losses for August 2006 (in USD) (DiMP 2007)

Planned expenditure budget 2006/07 USD	Maintenance & repair budget 2006/07 USD	Maintenance & repair as % of planned expenditure 2006/07	Total flood damage costs August 2006 USD	Flood damage as % planned expenditure	Flood damage as % of maintenance & repair budget
1,330,532	56,022	4.21 %	976,751	73.4 %	1,743.5 %

In 2006 and then again in 2007, Oudtshoorn sustained direct losses of around USD 1.2 million due to flash flooding associated with three intense weather systems. The economic impact of the 2006 rainfall events alone is illustrated in Table 5.5. It shows that Oudtshoorn's planned budget for civil and technical services (municipal engineering) for 2006/2007 was projected at USD 1.33 million. Of this, a mere USD 56,022 (4.21 %) was earmarked for maintenance and repairs (DiMP 2007). Yet, in August that year, USD 976,751 in damage was sustained by municipal bridges, roads and storm-water services due to two 'back-to-back' storm systems. These flood-related repair costs represented 73.4 % of the municipality's entire annual planned budget for civil and technical services (DiMP *ibid*). Just over a year later, in November 2007, flooding attributed to yet another intense storm led to around USD 261,000 in direct damage to municipal infrastructure (Holloway et al. 2010). For smaller cities like Oudtshoorn, the fiscal shock of one million USD damage to infrastructure means a major development set-back, especially when it is followed by similar shocks in following years.

These losses, while significant for a small inland municipality, still under-represent the directly recorded flood impacts sustained by non-municipal entities within the greater Oudtshoorn area, including those that offer essential services. A detailed study of the 2006 storms indicated that as much as USD 14.9 million in losses were borne by farmers as well as public entities operating within the local municipality's jurisdiction (Holloway et al. 2010). Provincial roads alone sustained damage approximating USD 11 million; whilst local farmers reported impacts greater than USD 3.5 million (*ibid*). In 2011, and then again in 2012, storm-related flood damage was also reported. In 2012, this exceeded USD 44.6 million in agricultural losses alone.

In rural administrative nodes such as Oudtshoorn, complementary governmental services beyond the local authority, such as Provincial Roads and the National Department of Water Affairs, play crucial protective roles in ensuring business continuity in times of duress. When these essential non-municipal services are disrupted or operate inefficiently, this has serious knock-on consequences for residents and businesses living in the cities they serve.

## Other Hazards and Environmental Challenges

From 2009 to 2010, Oudtshoorn successfully withstood a major drought, only to be confronted by a far more complex emergency due to an outbreak of avian influenza

in its ostrich population. This has had profound consequences for the livelihoods of residents within the city and beyond, largely due to the forced discontinuation of raw ostrich exports to key markets, including the European Union. Since flooding has been implicated in the spread of the H7N7 bird flu virus from farm to farm, this animal health and economic disaster is also climate-related.

The outbreak was first reported in April 2011, resulting in the culling of more than 38,000 ostriches by December (Urban-Econ 2012) and the loss of a further 12,000 birds during 2012 (Awetu Traders 2012). This had direct consequences for farmers and their workers, and despite government-supported efforts to retain farm labourers, thousands were laid off. The imposition of import bans, particularly by the European Union, also exacted industry-wide implications, including effects on abattoirs and tanneries. For instance, the Klein Karoo International abattoir group anticipated retrenchment of up to 500 of its 950 general labourers from the poorer settlements of Bridgton and Bongoletu by December 2012, if the EU import ban remained in effect (Urban-Econ *ibid*).

The scale of the economic impact also extended well beyond Oudtshoorn's boundaries. For example, one social accounting estimation of the avian influenza's direct and indirect impacts projected that from 2011 to 2014, the ostrich industry's annual contribution to the broader Western Cape economy would drop from USD 115.6 million to USD 30.5 million (Urban-Econ *ibid*). As late as December 2013, the European Union ostrich meat import bans were still in effect, with a reported case detected as recently as October of that year (The Poultry Site 2013).

### Capacity of Oudtshoorn to Adapt to Climate Change

The avian influenza outbreak in Oudtshoorn and the resultant 2011–2013 export ban coincided with an intense drought and two severe weather events. These shocks took place under conditions of protracted local government turmoil. This 'perfect storm' illustrates the interaction between different hazards, and the complexity of managing multiple risks under constrained resources.

Widespread transmission of avian influenza across Oudtshoorn's ostrich population was attributed to flooding associated with the severe weather events of 2006 and 2007 which destroyed agricultural water impoundment structures (as well as farm canals). As financial resources were not released to repair the damaged structures, flood-waters during the 2011 and 2012 storms flowed into natural water courses. This allowed contaminated excreta and other secretions from infected ostriches and wild fowl to move unimpeded across catchments and farms (Awetu Traders 2012) and to increase the scale of ostrich exposure to the avian influenza virus. Failure to release government funds to assist farmers' repair of impoundment structures and canals exacerbated the situation.

The complexities illustrated by these recent events in Oudtshoorn illustrate the real challenges this specific local municipality faces in adapting to future climate risks. They show how climate variability is only one of many concurrent hazards

the city must address. Encouragingly, the draft *Integrated Development Plan* (IDP) gives explicit priority to addressing poverty, underlining that ‘our future depends on how we deal with the poor and disadvantaged citizens in our areas and that our interventions must be pro-poor’ (Oudtshoorn Greater Municipality 2013: 36). The IDP describes a wide range of interventions that would address social development needs as well as longer-term climate adaptation requirements. An example of a local adaptation measure is planned upgrading of local infrastructure to improve storm water drainage capacity as well as reduce leaks and urban water losses. Introduction of drip irrigation onto farms is also planned as an initiative to relieve pressure on constrained urban water supplies. Awareness is growing of the importance of diversifying beyond ostrich meat exports, and there is an explicit emphasis on rural economic development, especially in the outlying and historically disadvantaged settlements.

Despite such measures, the sheer complexity and interactions among climate-related, veterinary and economic shocks (and their social consequences) in recent years underline the urgent need for coherent and stable local governance. This implies the engagement of a committed, functional local government, whose attention is not diverted by continuing internal dissent (Meyer 2013; Botha 2013).

### **The Untapped Potential of Oudtshoorn**

The Greater Oudtshoorn Municipality has well established facilities for adding value and exporting livestock and livestock products. It also is the gateway to considerable eco-tourism resources at a time when that is a rapidly growing type of tourism. Furthermore, even a small city in the Republic of South Africa has a great deal of technical expertise available. If political dissent subsides and Oudtshoorn’s *Integrated Development Plan* is implemented, some of the tensions underlying political conflict could also ease – a benign circle. Technical engineering capacity and other technical skills exist for diversifying the economy of Oudtshoorn’s hinterland through a variety of climate-smart initiatives, including the recently approved Oudtshoorn Water Project that will provide piped groundwater from the Blossoms well-field (Oudtshoorn Municipality 2014); however, local retention of skilled technical personnel may be more difficult under conditions of sustained political turmoil and disruptive leadership.

### ***Case Study 3: Tambacounda, Senegal (Population 88,000)***

#### **Overview and History**

The city was founded by a Bamana hunter named Tamba Waly. He first established the village of Tamba Soce around 1900, a village located five km from the current site of Tambacounda. During the French colonial period, Tambacounda rapidly

became a trade centre because of the Dakar-Bamako railway connecting Tambacounda to the coast and to neighbouring Mali in 1923. The railway infrastructure was the first modern infrastructure, and officials who worked for the state-owned railways were the first professionals to live there. With the railway came more intensive cultivation of grains and cotton by Wolof and Sereer peoples seeking arable land.

Tambacounda became capital of the *cercle* of Niani-Ouly in 1920 and later a mixed urban/ rural jurisdiction (*commune mixte*) in 1952. After independence in 1960, Tambacounda became the capital of the region of Eastern Senegal (*Senegal Oriental*), and in 1984, when regions began officially to take their names from their capital cities, Eastern Senegal became known as the region of Tambacounda. Currently, Tambacounda refers to three levels of administrative entities: the capital of the administrative region of Tambacounda, the capital of one of the three departments of that region, and the municipality (*commune*) of Tambacounda (Fig. 5.9). The city has grown from 41,885 inhabitants in 1988, 67,543 in 2002 to an estimated at 78,800 in 2007. Currently (2013), the municipal population is estimated at 87,938 inhabitants, made up of Pular (46 %), Sereer (19 %), Manding (17 %), Wolof (14 %), Bambana (13 %), Soninke (9 %) as well as smaller numbers of Diola, Bassari, Diakhanké and Moors (NRC 1995).



**Fig. 5.9** Location of Tambacounda Region in Senegal ([http://fr.wikipedia.org/wiki/Tambacounda\\_region](http://fr.wikipedia.org/wiki/Tambacounda_region)), accessed 28 Jul 2014)



**Fig. 5.10** Map of Tambacounda Region in 2010, also showing location of Tambacounda City (<http://www.au-senegal.com/carte-administrative-de-la-region-de-tambacounda,039>, accessed 28 Jul 2014)

Tambacounda city is an entrepot as well as administrative and service centre (Fig. 5.10). The region administered from the city borders Mali, Gambia and Guinea Bissau. The location of the city on the rail line and secondary roads leading to these other countries shapes its role as a crossroads. This position provides commercial opportunities, and the city has a daily central market.

Agriculture and agro-industrial activity are the most important sectors of the regional economy. The availability of arable lands has made it a destination for in-migration of farmers who cultivate cotton, groundnuts (peanuts), maize and sorghum. Together with Kolda region to the Southwest of Tambacounda region, Tambacounda city is host to units of the major textile company, SODEFITEX (*Société nationale de développement des fibres textiles*). SODEFITEX encourages cotton farmers with subsidies and offers temporary employment to people in the city and surrounding villages during the dry season. Livestock herding remains mostly traditional, with only a few young people interested in improved breeds. Three small dairies are operating in Tambacounda, but milk yields are low – no more than two litres per day. Some feed cotton seed cake from the textile mill to their animals. Despite tensions between farmers and herders (subject of a new pastoral law under consideration), negotiation allows herders to graze crop residue after the harvest. Despite abundant rivers, the local population does not have a taste for fresh water fish, and the fishery resource remains largely untapped. The wealth of diverse tree species in nearby forest on all sides of the city and a longstanding

craft tradition have made Tambacounda a magnet for carpenters and cabinetmakers from all over Senegal. Thirty timber mills have been established in and around Tambacounda.

Today the city of Tambacounda has several facilities in the areas of health, education, worship and business and commerce (see Box 5.3).

### Box 5.3: Facilities Found in Tambacounda Town

Health	Education	Business and Commerce
1 regional hospital	3 preschools	5 banks
1 health centre	21 primary schools	4 savings and loan facilities
2 clinics	4 high schools	2 post offices
5 health posts	8 colleges	
5 infirmaries		1 central market
3 private clinics		6 neighborhood markets
8 pharmacies		2 bus stations
		1 railway station
		1 airport (weekly to Dakar)
<b>Worship</b>		1 craft village
		1 slaughter house
>20 mosques		1 fairground
4 Christian churches		8 petrol stations
2 Muslim cemeteries		5 hotels
2 Christian cemeteries		3 hostels
		2 radio stations
		5 national press branches

## Administration

Senegal has two overlapping governance structures – the administrative/territorial and the political. The administrative/territorial is composed of *regions*, *departments* and *arrondissements*. Administrators are appointed civil servants who represent the ministries and the President of the Republic. A hierarchy of democratic and decentralised authority is organised along political lines. Organisational units are the *region*, the *communes* (municipalities), and rural communities (smaller local governments) made up of groups of villages sharing common geographical and socio-cultural patterns. At each level is a council whose members are politically appointed as candidates by political parties but elected democratically. There are no independent candidates although this has become a strong social demand. In addition a central government administrator is appointed at the level of the region (the *Préfet*) and of the *arrondissement* (between region and rural community/municipality), who is the *Sous-Préfet*. They play the role of ‘legal control,’ ensuring that national laws are being followed. Thus the region has a double status:



it is an administrative and territorial entity led by a Governor (*Gouverneur de région*) and political jurisdiction led by a President of the Regional Council and its council members, composed of the representatives of the communes and rural communities within the territory of the region.

The complexity and overlap of this administrative and governance system leads to delays, inefficiency and also invites informal shortcuts in access to state resources and permits (see Chaps. 9 and 10).

### **Physical Site and Climate-Related Hazards**

Tambacounda lies on a low altitude plateau, between 25 and 60 m above sea level. The city covers an area of 7,755 ha, of which, 2,670 ha is occupied. Its density is nine inhabitants per km<sup>2</sup>. The city has 28 neighbourhoods, of which ten are older, historic districts, together with 18 newer, outlying districts. The housing and settlement patterns in Tambacounda are a mixture of informal settlements (62 %), modern villas (21 %), and the village-like peri-urban settlements (9 %).

Agriculture provides almost 70 % of the employment in the surrounding region and contributes about 40 % of regional GDP. The city is surrounded by fields and peri-urban market gardens. While there is some small scale irrigation, principally for vegetables and bananas, most farmers depend on rainfall. Cycles of drought and flooding constitute a persistent threat to livelihoods and the regional economy. The city itself is crossed by a branch of the Mamacounda River, and some settlement has taken place in and near the flood plain of this river, creating conditions exposed to flooding. Faced with problems related to the disposal of solid waste (see below), people dump garbage in the Mamacounda River and along the main road (entrance and exit of the city). Solid waste from the saw mills is also dumped into the river. Flooding is therefore exacerbated by this added solid waste that comes on top of soil erosion, depositing clay and sand in the river. Very intense convectional rainstorms (thunderstorms) and lack of a plan for dredging the Mamacounda add to the flooding hazard. Thus, each year the city faces flooding due to narrowing of the riverbed.

### **Other Hazards and Environmental Challenges**

Tambacounda faces a serious sanitation problem. The city produces about 1,650 tonnes of solid waste per month and does not have an efficient system of garbage collection. Odd as it may sound, the proliferation of plastic bags constitutes a serious veterinary problem because animals that graze in peri-urban and other parts of the city eat them and suffer intestinal blockage that may lead to death (Simpkin 2005: 167; Bashir 2013: S9).

In Tambacounda city only 45 % of households have access to drinking water provided by the National Water Company. Many people use surface waters (the river, creeks and ponds) for drinking, bathing and laundry, thus exposing





**Fig. 5.11** Woman bathing a child in Tambacounda (Picture: Water Charity, with permission)

themselves to serious diseases (Fig. 5.11). Added to this is the lack of sanitation facilities, with only 52 % of households having pit latrines. The city also faces the challenge of solid waste management. Medical waste from the regional hospital constitutes a special hazard because this hospital is not only the referral facility for its region, but also receives patients from neighboring countries. The hospital does not have an incinerator and has only a pit for disposal of all of its medical waste. As the patient load increases, this problem is becoming urgent.

The forests surrounding Tambacounda are robust, despite half a century of discourses about deforestation. While they are cut for charcoal and firewood, as well as some timber, these forests regenerate. It is difficult to call the woodcutting in this region ‘deforestation’ (Ribot 1999). Wurster (2010) found no biodiversity declines in cut areas, and species are not yet disappearing. Woodcutting is nevertheless a contentious social issue. Forest villagers do not like the woodcutting, which is organised by the national Forest Service against their will. They are unhappy with this system which denies them any share in profits, forces them to go further for woodfuel and leads to women being chased and abused by migrant woodcutters who work in their forests. Wood is harvested for the production of charcoal for use as fuel in the capital city Dakar, and more recently in Tambacounda. Ribot’s 1986–1987, 1989, and 1994 studies show that charcoal consumption in Dakar is double the amount the Forest Service claims is harvested each year. Nevertheless, regeneration is sufficient for continued harvest. Ribot (1998) describes a commodity chain in which charcoal merchants pay migrant woodcutters low wages to cut forests. The merchants gain access through illegal arrangements with the Forest Service. The merchants draw large profits through

price-fixing made possible by government supported licenses and permits. Until recently, rural dwellers in the region did not benefit from employment as woodcutters.

### **Capacity of Tambacounda to Adapt to Climate Change**

The region surrounding the city has a large untapped agricultural and pastoral potential, as well as potential as a centre of carpentry and craft work. However, as in many other countries, investors from the national elite and overseas are buying land for speculation, money laundering and agri-business (World Bank 2010). Tambacounda's hinterland is not immune to land grabbing (Pearce 2012). In order to tap this potential and catalyse economic activity, the city and region of Tambacounda need a comprehensive land use and natural resource management plan that divides benefits among all stakeholders equitably and sustainably while also addressing climate change. It cannot simply be an elegant paper plan but something that will actually be implemented and whose regulations over various kinds of forest use and outside investment in land are enforceable and enforced.

As shown earlier, the city and region find themselves in a complex centralist system of national administration in which political and economic power (e.g. the influence of the charcoal merchants) may trump the planning process and laws. An example of the problems faced by administrators and professionals at city and regional scale who want to plan and take action to reduce the impacts of climate change is the taxation system. Located in the middle of an area rich in natural forest resources, the city does not benefit enough because the tax system (including taxes on marketing of charcoal) excludes cities, in favour of the national state and rural communities (communes – clusters of villages that are located closer to the forests). Some reassessment and redistribution/sharing of tax revenues are necessary to allow the city and region of Tambacounda to plan for and adapt to climate change and other challenges. In the end, rural dwellers would also benefit.

Without comprehensive planning and decisive action, the well-established flow of poor rural migrants to Dakar and abroad to find work will accelerate, driving Tambacounda region further into a spiral of economic and environmental decline. However, one hint of optimism is the recent interest in regional development expressed by a new government of Senegal at the national level. Could a major change in policy overcome decades of centralism, client-patron relations and corruption in order to reverse the declining trend? A hint that this might occur is the plan to build a University of Natural Resources in the city of Tambacounda. Such was a political promise of the former President in 2004. The new president has also promised that the university will be functioning in January 2015, and the Ministry of Higher Education and Research has confirmed that the university will open on schedule.

## Untapped Potential of Tambacounda

After agriculture and livestock husbandry, crafts work is the second largest employer in the city. Tambacounda has access to natural capital in the form of biodiverse forests that contain some of the trees most desired for craft work such as *venn* (*pterocarpus erinaceus*), *dimb* (*cordyla pinnata*), *nere* (*parkia biglobosa*), *caïlcédrat* (*khaya senegalensis*), *kapokier* (*ceiba pentandra*) and *rônier* (*borassus aethiupum*). However, deforestation as part of the highly organised and well-established charcoal trade may threaten the craft industry, as may smuggling of wood to neighbouring countries. Currently, much rosewood is being exported via Gambia to China. Nevertheless, the Chamber of Crafts attempts to organise the craft sector and help professionals to overcome a number of other constraints. These include poor access to credit, lack of a well organised market, limited upgrading of craft skills and little organisation among the artisans themselves.

Regarding the charcoal trade, an effort is being made to engage villagers themselves in sustainable, non-destructive charcoal production and marketing as a way of countering the non-sustainable extraction of biomass by powerful urban charcoal merchants whose activities threaten the interests in farmers and herders as well as craftspeople. The USAID-Wula Nafaa project has generated forest management plans for communities surrounding Tambacounda city. The project aims to produce alternative energy, alleviate poverty and maintain forest cover allowing regrowth of trees after cutting, returning to that section only when the forest has grown. However, the project's access to the urban market, the most lucrative, is still insignificant when compared to that of private urban charcoal merchants.

## Discussion

Visions of Africa's urban future take extreme forms. On the dark, even apocalyptic side, there is *Planet of Slums* (Davis 2006). On the optimistic, UN-Habitat (2013: x) invites us to 're-think urban prosperity'.

The fostering of prosperity has been one of the main reasons that explain the existence of cities. They are the places where humankind fulfils ambitions, aspirations and dreams, fulfils yearning needs . . . .

A more likely future lies between pessimistic and such optimistic extremes. Returning to Mitchell's exposition of the principles of 'climate-smart development' (Box 5.1), the challenge for Africa's small cities and towns could be large indeed. Mitchell emphasises five pillars.

1. *Ensure good disaster risk assessments are conducted that factor in the best available climate, vulnerability and exposure information to work out future climate hazard risk.* All three case study settlements had public works

departments and other civil servants aware of the flood chronology over years and other specific climate-related hazards such as land slide and potential water shortage. However, this information and knowledge was not systematised and not updated.

2. *Strengthen people's access to information (through education, media or dedicated early warning systems) about these risks and about the potential impacts of climate change.* Little public outreach about climate-related hazards was evident in Mwanga, Oudtshoorn and Tambacounda. Shortage of municipal finance and human resources seem to be the reason.
3. *Create agencies and systems that are well connected across scales, can easily learn from each other, have space to innovate and experiment with approaches and conduct scenario planning exercises with regularity.* Such a 'networked' approach is incipient in the South African case, at least to the extent that so-called 'district municipalities' are structurally linked to higher order and lower order administrative units. Legally municipalities are required to conduct disaster risk assessment and reduction. Implementation is the challenge.
4. *Find ways to increase people's equitable access to markets and services, strengthen their ability to participate in decision-making and protect their rights.* At best, one could observe some modest efforts by local government to provide access to expanded livelihood options and municipal services. The problem one sees in all three cases, however, is that national and regional political economy impinges on and limits these local efforts.
5. *Initiate high standards of environmental protection in efforts to grow the economy and take advantage of international assistance to generate green jobs and, after disasters, to 'building back greener'.* The three local government centres that served as our case examples are nowhere near even beginning to consider 'high standards of environmental protection'. Water pollution, lack of solid waste management, erosion, and in the case of Mwanga, serious deforestation, are all evident.

While Mitchell's principles are based on much experience and research, they are nonetheless normative, even exhortatory in the case of small African cities. The situation in our three case study settlements, as just noted, are far from the ideal Mitchell advocates. In Tanzania, Mwanga currently appears to be stimulating rural livelihoods and development. Yet shifting national policies, cross-cutting use of power by elites and the threat of land grabs do not provide the incubating environment in which this town can solve its own climate change challenges and take its positive influence over the hinterland a step further. Senegal's Tambacounda seems to show the other face of the city. Rural producers are exploited until nearly every drop of their surplus income is taken. Local producers cannot get decent prices for their goods because there are fixed prices for grains. In Senegal, as elsewhere, urban-rural systems include legal means of extraction, such as permits and licences for trade that go to merchants, a practise that keeps small producers out of all of the significant markets. In addition, the police force, forest service and other groups extort and tax all local enterprises, leaving them at a

subsistence level. Oudtshoorn in South Africa's Western Cape Province demonstrates the importance of local governance. Whatever the role as economic catalyst for its greater region the city might have, the dysfunction of the local council in Oudtshoorn and persistent social impact of the former apartheid regime thoroughly block it.

Our case studies hint at a variety of urban futures. The three case studies can help guide the formulation of the questions that need to be asked about small African cities facing climate change, among other changes. They cannot answer such questions.

***What climate-related hazards are faced by small cities in Africa today and confronted in the future?***

Flooding emerges in all three case studies as a major climate-related hazard. However, the knock-on effects are complex and different. In Mwanga, there have been flood-related landslides in the surrounding mountains and severe gulying in the city itself. In Oudtshoorn, severe flooding has had a heavy financial impact by destroying infrastructure and an even heavier cost to the local ostrich industry due to the role flood played in transmitting avian influenza. Tambacounda also experiences flooding and this combines with poor water and sanitation infrastructure to undermine human health.

***What kind of enabling capacities should be strengthened so that staff in small cities can take the initiative to adapt to climate change?***

***What obstacles do the governments and residents of small cities face in adapting to climate change and realising related opportunities?***

All three case studies show that local officials and professional staff require two things: clear coordination of their efforts and decentralisation of finance. The former is required because of the complex administrative structures documented in the three cases. Governance takes dual forms. National and sub-national (regional) actors interfere with local decision making. There is confusion and even paralysis to be seen in the case studies. In the absence of the power to raise local revenue or to share all but a meagre portion of national budgetary resources, small cities simply do not have the funds required to partner with innovative residents in the city and its hinterland or with entrepreneurs for starting on climate-smart development.

***What potential is there for risk reduction and improved livelihood security even in the face of climate change?***

The case studies show the potential for these three small cities to engage further with their hinterlands as catalysts of smart development. Each of these urban-rural zones has agro-industrial and other economic potential. Two of the cities, Mwanga and Tambacounda, are entrepôts, and the market/ transportation functions produce employment and help to circulate ideas and aspirations. The wood working industry in Tambacounda could grow, as well as irrigated farming and livestock production. Mwanga, too, has a wide spectrum of under-utilised potentials to service its

hinterland with inputs and innovations in agriculture, herding, fishing, planting orchards and horticulture. Oudtshoorn could further develop its tourist industry and high prized ostrich meat export. However, we have also seen that these economic activities are the very ones that are most threatened by climate change. The cities at the centres of these economic zones need to help rural people protect their livelihoods from climate change so that there is surplus production for the cities to tax. With powers of taxation and a robust, climate-smart development taking place nearby, these cities would have revenue to work on their own climate adaptation programmes, especially urban water supply, drainage and sanitation.

## Conclusion

Small cities in Africa have a chance to respond to the challenge of climate change because they are capable of stimulating climate-smart resource management, land use, production, processing and consumption in their hinterlands. The small urban place has the administrative, service and market functions necessary. The small city may also not yet suffer from grossly over-burdened lifeline infrastructure, and the complex of climate-related hazards they face may still be within the range of magnitude that thoughtful planning and intervention can address. In addition, small size means that members of the local intelligentsia know one another and socialise together – district water engineer, agricultural officer, medical officer, business owners, district councillors, etc. Therefore, comprehensive solutions have a base in social networks and informal sharing of ideas. Above all, it means that bureaucrats and the private sector are responsible and accountable for decision making and use of funds and resource utilisation.

However, some large obstacles have been identified that prevent small African cities from achieving this potential. The greatest obstacle is failure of decentralisation of decision making and resources to small cities. This is not merely a matter of party political manipulation and regionalism, but built into an economic system that extracts surplus from the countryside via hierarchies of cities without leaving much at all for development (climate-smart or otherwise) in either countryside or small city.

Another uncomfortable issue that most researchers and policy advisors do not mention in polite company is whether the development vision of ruling elites in Africa is compatible at all with a bottom-up strategy that would empower local authorities properly to serve urban residents and to support rural livelihoods. The framing of ‘the urban question’ in the context of climate change in Africa needs to be wider in scope than ‘urban’, ‘Africa’ and ‘climate change’ (Wisner et al. 2004; Shipper and Burton 2009; Bicknell et al. 2010; Baker 2012; Wisner et al. 2012a; Sygna et al. 2013; O’Brien and O’Keefe 2014; Smucker et al. 2015). Firstly, it is clear that many interlinked changes are occurring, not just climate change. Secondly, many of the drivers of change are global – climate obviously, but also geo-political and economic – and they are national as well. In addition, the small

African city cannot be considered without reference to its hinterland, the countryside, or, one might say, the greater municipal region of these small urban centres. The process of extraction of surplus from periphery to centre established in the pre-colonial period, further developed in colonial Africa and today perfected by national elites seems to be the foremost obstacle to any rural or small urban development, climate-smart or otherwise. There is a real danger that the call for climate-smart development will orient climate change adaptation to ring fencing existing development visions and trajectories even when these are manifestly part of the root causes of risk (UNISDR 2015). This would be a retrograde step given existing risk management's growing focus on leveraging risk and adaptation as opportunities for critical reflection on development and consideration of transformative change (Paavola 2006; Pelling 2011; Mascarenhas and Wisner 2012; IPCC 2012, 2014; Smucker et al. 2015).

From below, opposition politics is at play as well, as demonstrated by rising discontent with the limited access to resources the majority of African citizens have in the face of monopoly by a small elite. Quoting *The State of the World's Cities* (UN-Habitat 2013: x):

[W]hen prosperity is absent or confined to some groups, when it is only enjoyed in some parts of the city, when it is used to pursue vested interests, or when it is a justification for financial gains for the few in detriment of the majority, the city becomes the arena where the right for a shared prosperity is fought for.

An open question is whether this discontent will converge on transformative changes in government and the allocation of resources. Without such transformation the political, economic and administrative preconditions for climate change adaptation will not be met. At the moment, African national elites are adept at using climate discourse to excuse development failures, blaming nature or the 'feckless, ignorant peasant' who wantonly cuts down trees, etc. (Wisner 2010; Smucker et al. 2015). The elite also use climate as the reason why they must exercise eminent domain to allocate land to overseas direct investors who will 'modernise' farming and 'save' the nation from famine created by climate change impact on crop yields grown on small farmers' fields. The reallocation of arable land and displacement of small farmers can also be viewed as land grabs (Pearce 2012; Wisner et al. 2012a, b).

Mitchell's framework, with which we began this exploration and to which we returned in the discussion section, highlights the considerable structural and resource barriers to climate-smart development, and indeed to wider sustainable and equitable development aspirations in small cities. Despite the potential advantages offered by the proximity of decision-making and breadth of livelihood which reaches into rural hinterland and wider urban systems, this study provides a reality check. Not only are small cities at the forefront of combined social and environmental change but their capacity to cope with resultant risks, let alone to achieve climate-smart development in the context of national development trajectories that are unsustainable and inequitable, is very constrained. Climate change, when seen in this context offers scope to highlight and raise the profile of small cities and the inadequacies of piecemeal, contradictory and centralised governance regimes as revealed in Mwanga, Oudtshoorn and Tambacounda. A considerable research and



policy agenda lies ahead to assist local residents to navigate and to challenge maldevelopment and to realise the opportunity transformative adaptation offers to confront structural and resource barriers.

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## References

- African Rainwater Harvesting Network (2014) Available via <http://whater.eu/mod/book/view.php?id=49&chapterid=20>. Accessed 4 Apr 2014
- Awetu Traders (2012) Impact of animal diseases in the agricultural sector, with a focus on avian influenza. Draft, unpublished report for the Western Cape Disaster Management Centre, Cape Town
- Baker J (ed) (2012) Climate change, disaster risk, and the urban poor: cities building resilience for a changing world. The World Bank, Washington, DC
- Bardhan P, Mookherjee D (2006) Decentralization and local governance in developing countries: a comparative perspective. MIT Press, Cambridge
- Bashir N (2013) The plastic problem in Africa. *Jpn J Vet Res* 61(Supplement):S1–S11. Available via [http://eprints.lib.hokudai.ac.jp/dspace/bitstream/2115/52347/1/JJVR61-S\\_REVIEW\\_01.pdf](http://eprints.lib.hokudai.ac.jp/dspace/bitstream/2115/52347/1/JJVR61-S_REVIEW_01.pdf). Accessed 6 Apr 2014
- Bicknell J, Dodman D, Satterthwaite D (eds) (2010) Adapting cities to climate change. Earthscan, London
- Botha T (2013) ANC won't be able to cling to power for too much longer. The Gremlin, 14 November. Available via <http://thegremlin.co.za/oudtshoorn-news/wordpress/2013/11/14/anc-wont-be-able-to-cling-to-power-in-oudtshoorn-for-too-much-longer/>. Accessed 29 Apr 2014
- Centre for Geographical Analysis (2004) Growth potential of towns in the Western Cape. A research study undertaken for the Department of Environmental Affairs and Development Planning of the Western Cape Provincial Government. Available via [http://www.westerncape.gov.za/text/2005/12/growth\\_potential\\_findec05.pdf](http://www.westerncape.gov.za/text/2005/12/growth_potential_findec05.pdf). Accessed 14 Apr 2014
- Cohen J, Peterson S (1999) Administrative decentralization: strategies for developing countries. United Nations, New York
- Crook R, Manor J (1998) Democracy and decentralization in Southeast Asia and West Africa: participation, accountability, and performance. Cambridge University Press, Cambridge
- Darwent D (1969) Growth poles and growth centers in regional planning – a review. *Environ Plann* 1:5–32
- Davis M (2006) Planet of slums. Verso, London
- Diagne K, Ndiaye A (2009) History, governance and the millennium development goals: flood risk reduction in Saint-Louis, Senegal. In: Pelling M, Wisner B (eds) Disaster risk reduction: cases from urban Africa. Earthscan, London, pp 147–168
- DiMP (2007) Severe weather compound disaster: August 2006 cut-off lows and their consequences in the Southern Cape, South Africa. Unpublished report for the Western Cape Disaster Management Centre and Provincial Department of Public Works, Cape Town. Available via <http://riskreductionafrica.org/en/trr-a-docs-docs>. Accessed 16 Apr 2014

- Easterly W (2014) *The tyranny of experts: the forgotten rights of the poor*. Basic Books, New York
- Erasmus D (2013) Ostrich industry produces new products, new hope. *Farmers Weekly*, 30 August. Available via <http://www.farmersweekly.co.za/article.aspx?id=45142&h=Ostrich--industry--new-products,-new-hope>. Accessed 12 Apr 2014
- Ferguson J (1994) *The anti-politics machine: development, depoliticization, and bureaucratic power in Lesotho*. University of Minnesota Press, Minneapolis
- GNDR (Global Network of Civil Society Organisations for Disaster Reduction) (2009) *Clouds but little rain ... —views from the frontline: a local perspective of progress towards implementation of the Hyogo Framework for Action*. Global Network of Civil Society Organisations for Disaster Reduction, Teddington. Online [www.globalnetwork-dr.org/reports/VFLfullreport0609.pdf](http://www.globalnetwork-dr.org/reports/VFLfullreport0609.pdf). Accessed 4 Sept 2014
- GNDR (Global Network of Civil Society Organisations for Disaster Reduction) (2011) *'If we do not join hands...'—views from the frontline: a local perspective of progress towards implementation of the Hyogo Framework for Action*. Global Network of Civil Society Organisations for Disaster Reduction, Teddington. Online [http://www.globalnetwork-dr.org/images/documents/vfl2011\\_report/VFL2011\\_Core\\_Report\\_en.pdf](http://www.globalnetwork-dr.org/images/documents/vfl2011_report/VFL2011_Core_Report_en.pdf). Accessed 4 Sept 2014
- GNDR (Global Network of Civil Society Organisations for Disaster Reduction) (2013) *Views from the frontline— beyond 2015: a local perspective of progress towards implementation of the Hyogo Framework for Action*. Global Network of Civil Society Organisations for Disaster Reduction, Teddington. Online <http://www.globalnetwork-dr.org/images/documents/VFL2013/vfl2013%20reports/GNFULL%2013%20ENGLISH%20FINAL.pdf>. Accessed 4 Sept 2014
- Gough K, Esson V, Andreassen J, Singirankabo A, Yankson P, Yemmafouo A with Mainet H, Ninot O (2013) *City dynamics. RurbanAfrica briefing no. 3*. University of Copenhagen, Copenhagen. Available via <http://rurbanafrika.ku.dk/outreach/briefings/2013/RurbanAfrica-Briefing-Paper-3.pdf>. Accessed 7 Apr 2014
- Handmer J, Dovers S (2013) *Handbook of disaster policies and institutions: improving emergency management and climate change adaptation*, 2nd edn. Earthscan, London
- Harriss J, Stokke K, Törnquist O (eds) (2004) *Politicising democracy: the new local politics of democratisation*. Palgrave Macmillan, New York
- Hartshorn T (1991) *Interpreting the city: an urban geography*, 2nd edn. Wiley, New York
- Haysom S (2013) *Santuary in the city? Overseas Development Institute (ODI)*, London. Available via [www.odi.org.uk/resources/docs/8444.pdf](http://www.odi.org.uk/resources/docs/8444.pdf). Accessed 2 Apr 2014
- Holloway A, Fortune G with Chasi V (2010) *Risk and development annual review*. Research Alliance for Disaster and Risk Reduction (RADAR). Western Cape and Peripheri Publications, Cape Town. Available via <http://riskreductionafrica.org/en/rra-pubs-pubs>. Accessed 14 Apr 2014
- IOL News (2007) *Oudtshoorn municipality to function again*. IOL News, 18 September. Available via <http://www.iol.co.za/news/politics/oudtshoorn-municipality-to-function-again-1.371220#.U1qP0KKoGSq>. Accessed 2 May 2014
- IPCC (Intergovernmental Panel on Climate Change) (2012) *Managing the risks of extreme events and disasters to advance climate change adaptation. A special report of working groups I and II of the IPCC*. Cambridge University Press, Cambridge
- IPCC (Intergovernmental Panel on Climate Change) (2014) *Urban issues*. In: IPCC working group II, impacts adaptation and vulnerability. Fifth assessment report. Cambridge University Press, Cambridge
- Jacobs J (1985) *Cities and the wealth of nations*. Vintage, New York
- Jasanoff S (2012) *The songlines of risk*. In: Jasanoff S (ed) *Science and public reason*. Earthscan, London, pp 133–149
- Leck H, Simon D (2013) *Fostering multiscale collaboration and co-operation for effective governance of climate change adaptation*. *Urban Stud* 50(6):1221–1238
- Lopez-Carresi A, Fordham M, Wisner B, Kelman I, Gaillard JC (2014) *Introduction: who, what and why*. In: Lopez-Carresi A, Fordham M, Wisner B, Kelman I, Gaillard JC (eds) *Disaster management: international lessons in risk reduction, response and recovery*. Earthscan, London, pp 1–9

- Makoye K (2013) Weather info project helps farmers to adapt, Thompson-Reuters AlertNet. Available via <http://www.trust.org/item/20131213115309-u2rxt/>. Accessed 2 May 2014
- Mascarenhas A, Wisner B (2012) Politics: power and disaster. In: Wisner B, Gaillard JC, Kelman I (eds) *The Routledge handbook of hazards and disaster risk reduction*. Routledge, London, pp 48–60
- McMichael A, Campbell-Lendrum H, Corvalán C, Ebi K, Githeko A, Scheraga J, Woodward A (2003) *Climate change and human health*. World Health Organisation, Geneva
- Mertz O, Mbow C, Reenberg A, Diouf A (2009) Farmers' perceptions of climate change and agricultural adaptation strategies in rural Sahel. *Environ Manag* 43:804–816
- Meyer W (2013) Infighting behind Oudtshoorn violence. *IOL News*, 4 May. Available via <http://www.iol.co.za/news/politics/infighting-behind-oudtshoorn-violence-1.1510392#>. UpDyttJmisE. Accessed 12 Apr 2014
- Mitchell T (2010) Climate-smart disaster risk reduction. Overseas Development Institute Opinion, 12 October. Available via <http://www.odi.org.uk/opinion/5076-climate-smart-disaster-risk-reduction>. Accessed 13 Mar 2014
- Mtyala Q (2013) Cape town's face being taken over. *Times Live*, 22 February. Available via <http://m.timeslive.co.za/?articleId=8191187>. Accessed 2 Apr 2014
- Muzzini E, Lindeboom W (2008) *The urban transition in Tanzania: building the empirical base for policy dialogue*. World Bank, Washington, DC. Available via [http://siteresources.worldbank.org/CMUDLP/Resources/tanzania\\_wp.pdf](http://siteresources.worldbank.org/CMUDLP/Resources/tanzania_wp.pdf). Accessed 11 Apr 2014
- Myers G (2011) *African cities: alternative visions of urban theory and practice*. Zed, London
- Nel E, Binns T (2002) Putting developmental local government into practice: the experience of South Africa's towns and cities. *Urban Forum* 14(2.3):165–184
- Nel E, Rogerson C (2005) *Local economic development in the developing world: the experience of southern Africa*. Transaction, New Brunswick
- Nordhaus W (2013) *The climate casino: risk, uncertainty and economics for a warming world*. Yale University Press, New Haven
- NRC (National Research Council) (1995) *Population dynamics of Senegal*. NRC, Washington, DC
- O'Brien G, O'Keefe P (2014) *Managing adaptation to climate risk: beyond fragmented responses*. Routledge, London
- Ogunleye E (nd) *Transformation through development of growth poles in SSA*. UN Economic Commission for Africa, Addis Ababa. Available via [http://www.uneca.org/sites/default/files/page\\_attachments/ogunleye-ssa\\_economic\\_transformation\\_through\\_growth\\_poles\\_1.pdf](http://www.uneca.org/sites/default/files/page_attachments/ogunleye-ssa_economic_transformation_through_growth_poles_1.pdf). Accessed 2 Apr 2014
- Oudtshoorn Greater Municipality (2013) *Draft integrated development plan 2013*. Oudtshoorn Greater Municipality, Oudtshoorn. Available via [http://www.westerncape.gov.za/assets/departments/local-government/oudtshoorn-draft-idp-2013\\_-\\_2014.pdf](http://www.westerncape.gov.za/assets/departments/local-government/oudtshoorn-draft-idp-2013_-_2014.pdf). Accessed 11 Mar 2014
- Oudtshoorn Municipality (2011) *Construction of a creche for children with special needs commences in Dysselsdorp*. Oudtshoorn Municipality, Oudtshoorn. Available via [www.oudtmun.gov.za/](http://www.oudtmun.gov.za/). Accessed 11 Mar 2014
- Oudtshoorn Municipality (2014) *Oudtshoorn water project wins design accolade*. Oudtshoorn Municipality, Oudtshoorn. Available via [http://www.oudtmun.gov.za/index.php?option=com\\_content&view=article&id=409:oudtshoorn-water-project-wins-design](http://www.oudtmun.gov.za/index.php?option=com_content&view=article&id=409:oudtshoorn-water-project-wins-design). Accessed 15 Apr 2014
- Paavola J (2006) Justice in adaptation to climate change in Tanzania. In: Adger N, Paavola J, Huq S, Mace M (eds) *Fairness in adaptation to climate change*. MIT Press, Cambridge, pp 201–222
- Pachauri R (2009) *The climate imperative*. Project Syndicate, 28 April. Accessible via <http://www.project-syndicate.org/commentary/the-climate-imperative>. Accessed 13 Mar 2014
- Parr J (1999a) Growth-pole strategies in regional economic planning: a retrospective view (Part 1: Origins and advocacy). *Urban Stud* 36:1247–1268
- Parr J (1999b) Growth-pole strategies in regional economic planning: a retrospective view (Part 2: Implementation and outcome). *Urban Stud* 36:1195–1215

- Pearce F (2006) *When the rivers run dry: what happens when our water runs out?* Transworld/Eden Project Books, London
- Pearce F (2012) *The landgrabbers: the new fight over who owns the Earth.* Transworld/Eden Project Books, London
- Pelling M (2011) *Adaptation to climate change: from resilience to transformation.* Earthscan, London
- Pelling M, Wisner B (eds) (2009) *Disaster risk reduction: cases from urban Africa.* Earthscan, London
- Poteete A, Ribot J (2011) Repertoires of domination: decentralization as process in Botswana and Senegal. *World Dev* 39(3):439–449
- Ribot J (1998) Theorizing access: forest profits along Senegal's charcoal commodity chain. *Dev Chang* 29(2):307–338
- Ribot J (1999) Decentralization and participation in Sahelian forestry: legal instruments of central political-administrative control. *Africa* 69(1):23–43
- Ribot J (2003) Democratic decentralization of natural resources: institutional choice and discretionary power transfers in Sub-Saharan Africa. *Public Adm Dev* 23(1):53–65
- Ribot J, Chhatre A, Lankina T (eds) (2008) Special issue introduction: the politics of choice and recognition in democratic decentralization. *Conserv Soc* 6(1):1–11
- Robinson P (2005) From rural service centres to systems of rural service delivery. *Int Dev Plann Rev* 27(3):359–384
- Sampford C (2013) Sovereignty: changing conceptions and challenges. In: Cooper A, Kirton J, Lisk F, Besada H (eds) *Africa's health challenges.* Ashgate, Surrey, pp 9–40
- Satterthwaite D (2013) The political underpinnings of cities' accumulated resilience to climate change. *Environ Urban* 25(2):381–393
- Scott J (1998) *Seeing like a state: how certain schemes to improve the human condition have failed.* Yale University Press, New Haven
- Shipper L, Burton I (eds) (2009) *Adaptation to climate change.* Earthscan, London
- Silver J, McEwan C, Petrella L, Bagueian H (2013) Climate change, urban vulnerability and development in Saint-Louis and Bobo-Dioulasso: learning from across two West African cities. *Local Environ* 18(6):663–677
- Simon D (2010) The challenges of global environmental change for urban Africa. *Urban Forum* 21(3):235–248
- Simon D (2014) New thinking on urban environmental change challenges. *Int Dev Plann Rev* 36(2):v–xi
- Simpkin S (2005) *ICRC livestock in the Greater Horn of Africa.* International Committee of the Red Cross, Nairobi. Available via <http://www.icrc.org/eng/assets/files/other/regional-livestock-study-book.pdf>. Accessed 6 Apr 2014
- Smucker T, Wisner B (2008) Changing household responses to drought in Tharaka, Kenya: persistence, change, and challenge. *Disasters* 32(2):190–215
- Smucker T, Wisner B, Mascarenhas A, Munishi P, Wangui E, Sinha G, Weiner D, Bwenge C, Lovell E (2015) Differentiated livelihoods, local institutions, and the adaptation imperative: assessing climate change adaptation policy in Tanzania. *Geoforum* 59:39–50
- Statistics South Africa (2011) *Population census data from South Africa National Census 2011.* Available via <http://beta2.statssa.gov.za/>. Accessed 11 Mar 2014
- Sygna L, O'Brien K, Wolf J (eds) (2013) *A changing environment for human security: transformative approaches to research, policy and action.* Routledge, London
- The Poultry Site (2013) H7N7 bird flu virus found on South African farm. The Poultry Site, 23 December. Available via <http://www.thepoultrysite.com/poultrynews/31010/h7n7-bird-flu-virus-found-on-south-african-ostrich-farm>. Accessed 11 Mar 2014
- TRC (Truth and Reconciliation Commission) (2001) *Oudtshoorn post hearing community programme.* Available via <http://www.justice.gov.za/trc/reparations/oudtshoo.htm>. Accessed 5 Mar 2014
- UN (United Nations Department of Economic and Social Affairs/Population Division) (2012) *World urbanization prospects: the 2011 revision.* United Nations, New York. Available via [http://esa.un.org/unup/pdf/WUP2011\\_Highlights.pdf](http://esa.un.org/unup/pdf/WUP2011_Highlights.pdf). Accessed 11 Apr 2014

- UNFPA (United Nations Fund for Population Activities) (2008) Linking population, poverty and development. UNFPA Population Issues. Available via <https://www.unfpa.org/pds/urbanization.htm>. Accessed 13 Mar 2014
- UN-Habitat (2013) State of the world's cities 2014. UN-Habitat, Nairobi
- UNISDR (United Nations International Strategy for Disaster Reduction) (2015) Global assessment of disaster risk reduction 2015. UNISDR, Geneva (in press)
- Urban-Econ (2011) Eden district municipality: regional economic development strategy (draft). Urban-Econ, Cape Town. Available via [http://www.edendm.co.za/index.php?option=com\\_remository&func=select&id=29](http://www.edendm.co.za/index.php?option=com_remository&func=select&id=29). Accessed 13 Mar 2014
- Urban-Econ (2012) Economic impact assessment of the impact of the avian influenza virus on the ostrich industry in the Western Cape. Final draft report for the Department of Economic Development and Tourism. Urban-Econ, Cape Town
- Wangui E, Smucker T, Wisner B, Lovell E, Mascarenhas A, Solomon M, Weiner D, Munna A, Sinha G, Bwenge C, Meena H, Munishi P (2012) Integrated development, risk management and community-based climate change adaptation in a mountain-plains system in Northern Tanzania. *J Alp Res* 100(1). Available via <http://rga.revues.org/1701>. Accessed 1 Mar 2014
- Wisner B (1988) Power and need in Africa. Earthscan, London
- Wisner B (1993) Disaster vulnerability: scale, power, and daily life. *GeoJournal* 30(2):127–140
- Wisner B (2010) Climate change and cultural diversity. *Int Soc Sci J* 61:131–140
- Wisner B, Blaikie P, Cannon T, Davis I (2004) At risk: natural hazards, people's vulnerability and disasters, 2nd edn. Routledge, London
- Wisner B, Gaillard JC, Kelman I (2012a) Framing disaster: theories and stories seeking to understand hazards, vulnerability and risk. In: Wisner B, Gaillard JC, Kelman I (eds) *The Routledge handbook of hazards and disaster risk reduction*. Routledge, London, pp 18–34
- Wisner B, Mascarenhas A, Bwenge C, Smucker T, Wangui E, Weiner D, Munishi P (2012b) Let them eat (maize) cake: climate change discourse, misinformation and land grabbing in Tanzania. Contested global landscapes. A multidisciplinary initiative of the Cornell Institute for the Social Sciences. Cornell University, Ithaca. Available via <http://www.cornell-landproject.org/download/landgrab2012papers/wisner.pdf>. Accessed 14 Mar 2014
- WHO (World Health Organisation) (2013) Global tuberculosis report. WHO, Geneva. Available via [http://apps.who.int/iris/bitstream/10665/91355/1/9789241564656\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/91355/1/9789241564656_eng.pdf). Accessed 10 Mar 2014
- WMO (World Meteorology Organisation) (2014a) Global framework for climate services. WMO, Geneva. Available via <http://www.gfcs-climate.org/>. Accessed 2 May 2014
- WMO (World Meteorology Organisation) (2014b) Roving seminars – West Africa (METAGRI Project). WMO, Geneva. Available via [http://www.wmo.int/pages/prog/wcp/agm/roving\\_seminars/west\\_africa\\_en.php#background](http://www.wmo.int/pages/prog/wcp/agm/roving_seminars/west_africa_en.php#background). Accessed 2 May 2014
- World Bank (2010) Rising global interest in farmland: can it yield sustainable and equitable benefits? World Bank, Washington, DC. Available via [http://siteresources.worldbank.org/INTARD/Resources/ESW\\_Sept7\\_final\\_final.pdf](http://siteresources.worldbank.org/INTARD/Resources/ESW_Sept7_final_final.pdf). Accessed 9 Apr 2014
- Wurster K (2010) Management matter? Effects of charcoal production management on woodland regeneration in Senegal. Dissertation. University of Maryland. Available via [http://drum.lib.umd.edu/bitstream/1903/10307/1/Wurster\\_umd\\_0117E\\_11139.pdf](http://drum.lib.umd.edu/bitstream/1903/10307/1/Wurster_umd_0117E_11139.pdf). Accessed 13 Apr 2014