

**CLIMATE CHANGE ADAPTATION AND CITY GOVERNANCE: A
CASE STUDY OF JOHANNESBURG**

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**A Dissertation submitted to the Faculty of Science, University of Witwatersrand,
Johannesburg, in fulfilment of the requirements for the degree of Master of Science.**

Cape Town, July 2013

DECLARATION

I declare that this dissertation is my own, unaided work except where acknowledged. It is submitted for the degree of Master of Science in the University of Witwatersrand, Johannesburg. It has not been submitted before for any degree of examination in any other University.

(Signature of candidate) Lisa McNamara

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_____ 20_____ in _____

ABSTRACT

This research explored the City of Johannesburg's response to floods in the lower-income settlement of Soweto in February 2009, through participant observation, interviews and examination of official documentation. The municipality's response indicates the governance forces that may shape adaptation to increasingly severe and frequent climate events in the context of development pressures and needs. It was found that the flood event provided a 'window of opportunity' for action and learning on flooding, but governance factors hindered an effective response. These included the framing of flood risk, limitations in the City of Johannesburg's municipal structure, institutional power dynamics, and the performance culture. The research demonstrated that networked governance is critical to adaptation in global South cities. In the case of Johannesburg city, conflicting governance paradigms constrained the realisation of networked governance modes. Resolving tensions amongst competing governance approaches is necessary to advance both the climate and development agenda in Johannesburg.

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ABBREVIATIONS AND ACRONYMS

ANC	African National Congress
AQCC	Air Quality and Climate Change Directorate
AR4	Intergovernmental Panel on Climate Change's Fourth Assessment Report
CBO	Community-Based Organisation
CCAP	Climate Change Adaptation Plan
CCCCP	Climate Change and Cleaner Production Sub-Directorate
CCI	Clinton Climate Initiative
CCP	Cities for Climate Protection programme
CERT	Community Emergency Response Teams
CMP	Catchment Management Policy
CoJ	City of Johannesburg
CRAI	Citizenship Rights in Africa Initiative
CSS	Corporate and Shared Services
DANIDA	International Danish Development Agency
DEA	Department of Environmental Affairs
DEAT	Department of Environment Affairs and Tourism
DM	Development Management
DMA	Disaster Management Act
DMAF	Disaster Management Advisory Forum
DMC	Disaster Management Centre
DMD	Disaster Management Directorate
DPF	Development Planning and Facilitation
DPUM	Development Planning and Urban Management
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
EMD	Environmental Management Department
EMS	Emergency Management Services
EMT	Executive Management Team
EH	Environmental Health
ERS	Environmental Regulatory Services
ESP	Environment Sector Plan

EWS	Early Warning System
FBO	Faith-Based Organisation
FPA	Flood Prone Areas
GDS	Growth and Development Strategy
GHG	Greenhouse Gas
GIS	Geographic Information Systems
GMS	Growth Management Strategy
GPG	Gauteng Provincial Government
ICLEI	International Council for Local Environmental Initiatives
ICT	Information and Communications Technology
IDP	Integrated Development Plans
IPCC	Intergovernmental Panel on Climate Change
ISMP	Integrated Storm Water Management Plan
JCCC	Johannesburg Climate Change Coordinating Committee
JCP	Johannesburg City Parks
JMOSS	Johannesburg Metropolitan Open Space System
JOC	Joint Operating Centre
JRA	Johannesburg Roads Agency
KPA	Key Performance Area
KPI	Key Performance Indicator
MC	Mayoral Committee
ME	Municipal-owned Entity
MMC	Member of the Mayoral Committee
MSCC	Mayoral Sub-Committee on Climate Change
NCCRP	National Climate Change Response Policy
NCCRS	National Climate Change Response Strategy
NDMC	National Disaster Management Centre
NDMPF	National Disaster Management Policy Framework
NGA	National Governor's Association
NGO	Non-Governmental Organisation
NPM	New Public Management
NRM	Natural Resource Management
NWA	National Water Act
PIER	Public Information, Education and Relations
PIMS	Policy Integration and Management Support

PMS	Performance Management System
PSSP	Public Safety Sector Plan
RSDF	Regional Spatial Development Frameworks
SACN	South African Cities Network
SAFFG	South African Flash Flood Guidance System
SALGA	South African Local Government Association
SAWS	South African Weather Service
SDCM	Service Delivery Compliance and Monitoring
SDF	Spatial Development Framework
SEA	Sustainable Energy Africa
SEED	Sustainable Energy for Environment and Development
SHU	Shareholder Unit
SoER	State of Environment Report
SoR	State of Rivers report
Stats SA	Statistics South Africa
SWFL	Major Drain System Capacity Analysis and Flood Line Study
TSP	Transport Sector Plan
UEMP	Urban Environmental Management Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNISDR	United Nations International Strategy for Disaster Reduction

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1 GOVERNING URBAN CLIMATE RISK

‘In any project we design, the absolute perfection of the concept... in practice... must coincide with its chronic dysfunction’ (Sebald 2001 in Schmidt 2008, p. 109).

‘From a disaster management point of view I think we must use the Soweto mini disaster that happened last year as a point of departure. That starts ringing alarm bells big time for us in disaster management, and that was just small fry I believe’ (DMD Official, JCCC meeting 31 July 2009).

1.1 Adaptation as a governance issue in cities of the global South

The role of cities in responding to climate change is increasingly being recognised. Adaptation plans are being developed by cities, but research reveals ‘limited’ implementation of adaptation actions, including those cities of the global South (Granberg and Elander 2007, Heinrichs *et al.* 2009, Birkmann *et al.* 2010; in Ziervogel and Parnell 2010, p. 1). Emerging literature on adaptation indicates that *governance structures and processes* may pose limits to the ability of human systems to adapt to climate change (Moser 2009).

Despite a growing urban adaptation research agenda, there is a lacuna in knowledge of how governance forces might constrain and enable responses to *existing* climate risk (such as flooding), as means to improve understanding the governance of adaptation to future climate change. Fatti and Vogel (2010, p. 57) argue that ‘enhanced understanding of both current and past climate phenomena... can be invaluable in enhancing the dialogues needed to improve adaptation to future climate change’.

This knowledge gap is evident with regards to cities of the global South, where there is limited insight on adaptive governance¹ in the context of urgent development needs. Urban disasters may reveal governance dynamics that may be hidden in every-day decision-making routines, challenging the governance framework and capturing ‘human behavior at its most open, realistic moments’ (Phillips 2002, p. 202). This research consequently explores how governance structures and processes shaped the City of Johannesburg (CoJ)’s response to a 2009 flooding disaster in the poorer Johannesburg

¹ The Intergovernmental Panel on Climate Change (IPCC) (2012, p. 563) defines ‘resilience’ as ‘the ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions’.

settlement of Soweto. The case of Soweto demonstrates the nature of governing a flood disaster in a low-income area of Johannesburg and the ways in which actors manoeuvred and responded within an established governance framework. This case serves as a signifier of how governance dynamics may play a role in effective urban adaptation in poorer cities.

As an inland city not situated near the coast or a large navigable river, localised flash flooding is the predominant climate risk impacting on Johannesburg (CoJ 2009a). Poorer residents living in informal and low-income settlements located within flood plains and near rivers are particularly worse-affected (CoJ 2009a). Rapid urbanisation and development over natural drainage areas resulting in increased runoff from hard surfaces, has further intensified flood risk and vulnerability (CoJ 2009a). Increasingly, intense heavy storm events from climate change are expected to worsen flooding in the city, mainly impacting on poorer communities (CoJ 2009a, Fatti and Vogel 2010). The study explores the dimensions of urban risk and vulnerability, where climate hazards may be one of many ‘multiple stressors’ in the urban environment contributing to and deepening poverty (Reid and Vogel 2006, p. 195).

1.2 Research objective and questions

The purpose of this research is to explore the extent to which governance structures and processes shape responses to existing climate risk (in this case flooding) in a city of the global South. This will be done in order to better understand the governance modes that might support adaptation to climate change in the context of significant development challenges. The following three questions guide the study:

- What is the role of the development context in shaping flood risk in Johannesburg?
- What is the extent to which governance structures and processes constrain and enable flood risk reduction, in the context of development pressures and needs?
- What are the implications for understanding adaptive governance in cities of the global South?

In this research the terms ‘global North’ and ‘global South’ refer respectively to industrialised, and low- and middle-income countries.

1.3 The case for understanding adaptive urban governance

Urban centres play a pivotal part in both building local climate resilience and managing greenhouse gas (GHG) emissions, given the concentration of populations at risk from current climate risk and future climate change, and the contribution of urban areas to global carbon emissions (Bulkeley and Betsill 2003, Bulkeley *et al.* 2009). Many cities in the global North and South are developing climate change adaptation plans (CCAPs), but implementation remains a challenge (Corburn 2009, Birkmann *et al.* 2010, Horton *et al.* 2010; in Ziervogel and Parnell 2010). This research attempts to investigate the extent to which governance factors may be contributing to this implementation gap. This will be done by assessing preparedness for, and response to, a flooding episode in Soweto.

Much of the literature on climate change has historically focussed on mitigation – efforts taken to reduce GHG emissions in order to prevent dangerous anthropogenic climate change – as well as the international climate change regime and national strategies. Parnell *et al.* (2007) note that research on adaptation² – adjusting to climate change impacts – has similarly concentrated on the global scale, national level response and the household or ‘community scale’ using vulnerability and livelihoods analysis. Ziervogel and Parnell (2010) highlight that early adaptation research tended to focus on sectors such as agriculture, food security, coasts, water and health, including in southern Africa. For example, Downing *et al.* (1997) explore adaptive responses in agriculture and the water sector in Africa, and Archer *et al.* (2007) assess the role of climate prediction in supporting agricultural production and food security in southern Africa.

This research aims to fill this gap by moving from a sectoral to cross-sectoral focus through the examining on a particular climate hazard³ (flooding), from the global / national scale to the local scale, and from a rural emphasis (particular in the case of Africa) to the urban arena. This will be done by examining the systems of governance supporting adaptation (in this case flooding) in the city context. This research is not focussed on a specific sector, but rather assesses preparedness and response related to a

² The IPCC’s (2007 (b), p. 21) definition of adaptation will be used in this research: ‘the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences’.

³ ‘Climate hazards’ fall under the United Nations International Strategy for Disaster Reduction (UNISDR) (2009) definition of ‘hydrometeorological hazards’ as a ‘process or phenomenon of atmospheric, hydrological or oceanographic nature that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage’. Climate hazards include flooding, landslides and cyclones, amongst others.

specific extreme climate event across sectoral divisions and the municipal governance system.

There has been a growing body of urban climate change research in recent years. Early city-scale research, however, predominantly related to mitigation and focussed on individual case studies in cities of the global North in the United States, Canada, Europe and Australia (Bulkeley 2000, Betsill 2001, Bulkeley and Betsill 2003, Kousky and Schneider 2003, Yarnal *et al.* 2003, Allman *et al.* 2004, Lindseth 2004, Davies 2005, Bulkeley and Kern 2006; in Bulkeley *et al.* 2009). Some of the initial findings from this research revealed ‘the multi-level nature of climate governance; the role of knowledge in local climate policy; and the stubborn gap between the rhetoric and reality of local climate policy’ (Betsill and Bulkeley 2007, p. 448).

An urban adaptation research agenda has been developing. This research has mainly been in the form of case studies of ‘early adapters’ in the global North such as New York (Rosenzweig and Solecki 2010), but has also included notable global South examples focussed on large coastal cities such as Dhaka (Alam and Rabbani 2007), Durban (Roberts 2008, 2010), Cape Town (Mukheibir and Ziervogel 2007) and Alexandria (El-Raey 1997), amongst others. Some of the urban adaptation research follows on from urban mitigation studies and climate change adaptation research in other contexts, tending to produce what Moser (2009, p. 328) identifies as ‘laundry lists’ of motivators / enablers and challenges / constraints for adaptation. For example, Sippel and Jenssen (2009) provide an analysis of the motivations and challenges, internal and external to municipalities, in developing local climate action plans.

Moser (2009, p. 328) argues that much adaptation research assumes that by nurturing the markers for ‘adaptation success’, including institutional capacity, leadership, technology, infrastructure, more finances and improved knowledge, adaptation action will take place on the ground. Moser (2009) further contends that adaptation research does not often explore the *underlying governance dynamics* that support these adaptation enablers and constraints. Authors argue that governance dynamics may be crucial enablers or barriers to climate change adaptation, and therefore might limit the extent to which human systems are able to adapt a changing climate (Moser 2009, Nicholson-Cole and O’Riordan 2009).

Ziervogel and Parnell (2010) note that a more nuanced social science research agenda on urban adaptation has been developing, evidenced by an emerging view of adaptation as a ‘*process*’ rather than a set of strategies and technical options (Pahl-Wostl *et al.* 2007, Armitage *et al.* 2008, Lonsdale *et al.* 2008, Inderberg and Eikeland 2009, O’Brien *et al.* 2009, Tschakert and Dietrich 2010; in Ziervogel and Parnell 2010, p. 3). Ziervogel and Parnell also highlight a recent focus on *governance* in the adaptation literature, which they argue ‘supports a focus on process; a process through which goals are defined and pursued collectively with government being one of the actors’ (Betsill and Bulkeley 2006, Van Zeijl-Rozema *et al.* 2008; in Ziervogel and Parnell 2010, p. 3).

This research is framed around the hypothesis that *governance structures and processes* to a large extent shape and influence adaptation to current and future climate risk in cities of the global South. Studies in both the cities of the global North (Naess *et al.* 2005, Burch 2010) and South (Romero-Lankao 2007, Ziervogel and Parnell 2010) reveal that governance structures and processes affect climate change decision-making. Local governments in Africa in particular are battling to alter their urban regulation and planning systems to respond to increasingly severe flooding problems in African cities and vulnerable communities (Douglas *et al.* 2008). Following on from Bulkeley and Betsill (2003), Moser (2009) and Ziervogel and Parnell (2010), this work argues for understanding adaptation through a governance lens to appreciate the range of actors and institutions involved in climate governance processes at the city scale, their interactions and relationships, as well as the macro socioeconomic structures, paradigms and norms influencing adaptive responses.

The governance approach appreciates that decision making is impacted in complex and multidimensional ways beyond the organisational context in which it occurs. A shift to a focus on governance has occurred to try to understand the diminishing role of the nation state and the fragmented and multilevel nature of contemporary policy processes involving public, private and civil society actors (O’Riordan *et al.* 1998, Bulkeley and Betsill 2003). This frame is particularly applicable to environmental and climate change governance given the complex and dispersed nature of this decision making (Bulkeley and Betsill 2003, Betsill and Bulkeley 2007). It is also useful to comprehend the complex nature of the urban governing environment, often characterised by conflicting mandates and interests and significant fragmentation (Winsvold *et al.* 2009).

Moser (2009, p. 17) argues that to adequately comprehend the influence of governance dynamics on decision-making it is necessary to study 'decision-making in action' to move beyond 'theoretical views of governance structures and processes' and understand 'the complex social dynamics that result in practical change' (Moser 2009, p. 17). This study consequently concentrates on governance responses to *existing* climate extremes. By examining flood risk reduction, preparedness and response to a specific flooding disaster as it unfolds, the role of governance forces in shaping outcomes in a real-life context may be revealed.

This study aims to address the lacuna in urban adaptation research regarding how average cities in the global South are managing existing climate risk in their day-to-day work (Fatti and Vogel 2010). In comparison to many coastal cities with large populations living in low-lying areas vulnerable to sea-level rise and coastal flooding, Johannesburg is not regarded as a high impact city in terms of climate change given its inland location (CoJ 2009a) and, therefore, could be regarded as an 'average' city. However, localised flooding is a significant and growing challenge (CoJ 2009a). This research explores the extent to which the municipality is adapting its strategy and policy instruments and disaster management systems to respond when the climate change threat is less immediate, and the potential day-to-day governance challenges in order to do so.

The globalised nature of climate change research additionally does not reveal contextual stories of the realities and experiences of how municipalities in the global South are articulating and making sense of the climate change agenda, particularly in circumstances of serious development pressures and needs and the wider societal context in which adaptation occurs. The settings and governance structures are often different in cities of the global South and more empirical work is needed to contribute to knowledge on how cities are responding to climate change in their developmental context (Romero-Lankao 2007, 2008).

In these cities, vulnerability to climate risk is unevenly distributed along income, gender and age lines, amongst others (Moser and Satterthwaite 2008). These poorer urban households, individuals and communities face 'multiple, interlinked' and 'growing' risks from 'climate hazards, resource scarcities and damage to vital ecosystems' (Atkins 2012, p. xii). Climate risks, therefore, 'cannot be looked at in isolation' (Atkins 2012, p. xii). Together with Asia, Africa has the highest rate of urbanisation in the world (United

Nations 2012) and much of this growth is unplanned with an ever-increasing slum population (UNFPA 2007). In Mombasa, socioeconomic factors, particularly unplanned settlements and structures, are contributing to the city's population's increased vulnerability to climate change impacts (Awuor *et al.* 2008). Climate risk exacerbates these already existing urban development challenges.

Governance systems (such as city regulatory, planning, service provision, infrastructure and disaster preparedness regimes, but also informal sector actors and networks) need to respond to the heterogeneous, complex and multidimensional nature of risk and vulnerability in poorer cities, in contexts where these governance systems are also often constrained. Risk and vulnerability is similarly unevenly distributed in Johannesburg, as it is a highly unequal city within significant differences in wealth and income (Beall *et al.* 2000). Communities in poorer areas of Soweto are vulnerable to climate risk due to their socioeconomic, environment and physical circumstances and often must contend with a range of stressors, including climate. This study allows for further exploration of the nexus between climate risk and the urban development challenge and the need for governance systems that respond to diverse communities and development contexts.

In these contexts it is argued that local governments need to enable poorer households and communities to protect themselves and develop their capacity to cope with the range of hazards to which they are exposed, including climate stress (Moser and Satterthwaite 2008). Satterthwaite *et al.* (2007, x) argue that this involves 'changing their relationship with those living in informal settlements' through strengthening and developing partnerships and building on the existing efforts of communities. The emergency relief literature has found that rather than people being 'helpless victims' during disaster events, they have many resources to protect themselves and be part of reconstruction efforts (Longhurst 1994, Asian Coalition for Housing Rights [ACHR] 2005; in Moser and Satterthwaite 2008, p. 6). In Lagos, Kampala, Accra, Maputo and Nairobi, residents have undertaken spontaneous, individual and short-term efforts to survive flooding (such as temporarily moving away) or protecting property (such as undertaking collective work to open up drainage channels) (Douglas *et al.* 2008). An enabling, networked governance mode is, therefore, arguably central to effective governance of climate risk. This research explores this premise by examining the governance modes that support effective action in the Soweto case.

Other spheres of government also have important roles to play in addressing climate change. National government in particular must take the lead in providing the policy and regulatory framework for climate response, and implementing market based mechanisms such as carbon taxes (DEA 2011a). Provincial government must also manage cross-municipal boundary issues outside of municipal competence and coordinate adaptation and mitigation actions between municipalities within the province (DEA 2011a). While this research recognises other government spheres are important actors in urban climate governance, the focus of this study is solely on local government given its prominent role in flood risk reduction and response.

1.4 Focus and methodological approach to the study

This research focusses on the influence of governance structures and processes on flood risk reduction, preparedness, and emergency and institutional responses related to a flooding disaster in the settlement of Soweto on 26 February 2009. The study is driven by the need to better understand the challenge of intensifying climate risk and increasing vulnerability in poor urban areas, and the governance modes that may potentially support increased capacity of the urban poor to adapt to current and future climate risk. The governance frame will assist in identifying the state and non-state actors involved, their strategies and interests, and how issues are framed ‘to understand what is debated and decided’ (Pieterse and van Donk 2008, p. 67) in flood risk reduction.

Focussing on responses to an existing climate risk issue (such as flooding) allows empirical study of governance structures and processes and the operation of these governance dynamics in a real-life situation, as opposed to making assumptions about the existence of adaptive capacity⁴ that has not yet been mobilised (Engle and Lemos 2010). This ‘analogue’ approach is described by Glantz (1989; in Naess *et al.* 2005, p. 126) and has been adopted, for example, by Naess *et al.* (2005) in their study of the interaction of institutional relations and power structures in the flood management regime at the municipal level in Norway.

Similarly in this study, the examination of the governance of the Soweto floods is used as a means to better understand adaptive governance in Johannesburg and the global South more widely, specifically in the context of urban poverty. Poorer areas such as Soweto

⁴ ‘Adaptive capacity’ refers broadly to the ability of a system to cope with climate impacts and undertake adaptations to climate change (Smit and Wandel, 2006).

are impacted in different ways by climate risk. The distinctiveness of the Soweto governance context, therefore, needs to be recognised, requiring alternate governance frameworks for addressing flooding.

While this study employs a governance framework to probe the role of non-state actors, a large part of the research examines the actions and strategies of *government* actors. As the main actors in flood preparedness and leading a response to the Soweto floods, state actions form the predominant focus of the research. Local government is also argued to be the most critical actor in urban governance (Pelling 2004; in Wisner and Pelling 2009). This study also assesses how local government interacts and supports non-state actors in flood risk reduction, preparedness and disaster response and recovery. The apparent dominance of state actors in the Soweto effort indicates the limited extent to which CoJ residents and organised civil society were engaged in flood risk governance efforts, which will be explored in later chapters.

A governance approach is also employed to appreciate the diverse nature of *state* actors involved in flood risk governance in Johannesburg. This approach recognises that the state is not necessarily a 'unitary actor' (Litfin 1993; in Bulkeley and Betsill 2003, p. 15). Accordingly, the role of varied government actors and institutional types involved in flood risk governance and the Soweto effort is also considered, from core departments and city officials to corporatised municipal agencies, and private engineers and consultants.

Disaster events are typically understood in terms of phases of a 'disaster cycle', i.e. preparedness, response, recovery and mitigation (as defined by the National Governor's Association [NGA] in a 1979 report that was important in professionalising the disaster management field [NGA 1979; in Neal 1997]). After recovery, the next round of risk reduction and preparedness then follows informed by learning from the previous disaster to reduce the likelihood and impact of future events (Pelling 2003). The phase of the disaster event itself must also be understood as part of the disaster cycle, but is often not explicitly included in definitions. This research will consider the Soweto flood event itself as part of the unfolding disaster cycle. This research adopts this phase approach as a means 'to systematise and codify research results' (Neal 1997, p. 239). This approach also supports the governance methodology and tracking of events and processes. Pieterse and van Donk (2008, p. 67) highlight the usefulness of following the governance following a particular 'episode' (such as a flooding disaster) to examine how it 'unfolds'

in the decision making context, as these episodes ‘tend to structure and move political attention’. Tracing outcomes through the disaster cycle assists in revealing the influence of governance structures and processes through the different phases. This study will employ this approach given its usefulness to generate and order research findings, while being cognisant of its many critiques. These include that these phases are often not distinct events but overlap (Haas, Kates and Bowden 1977; in Neal 1997), the approach presupposes a rational and linear approach to decision-making – which has been problematised by authors such as Lindblom (1979) – when in reality efforts may be more ad-hoc (Duram *et al.* 1993), and it assumes ‘disaster shocks’ themselves are ‘discrete phenomena with a well-marked beginning and end’ (Pelling 2003, p. 13). Pelling (2003, p. 13) highlights that in the urban context often ‘more than one disaster may be unfolding at any given time... discrete events overlap, forming a complex mix of hazard types and disaster events in any one place’. This work will remain sensitive to these critiques and the interconnected and multidimensional nature of urban disaster risk and vulnerability.

This research will consequently examine constraining and enabling governance forces through different phases of the ‘disaster cycle’ (Pelling 2003) to facilitate the study of unfolding governance processes in the Soweto case: from pre-disaster flood risk reduction and preparedness to post-disaster response and recovery. The analysis focusses on two different levels of the CoJ response: the emergency operations in Soweto and the short to medium-term institutional response to the end of 2009. It went beyond the scope of the research to probe longer-term policy learning and change related to flood risk governance in Johannesburg. The analysis concentrates on a very specific timeframe to the end of 2009 and subsequent learning from the Soweto floods and risk mitigation beyond this date has largely not been analysed. The three phases include:

- Pre-disaster flood risk reduction and preparedness from the start of the Mayoral Term in 2006 to the flood event in February 2009 (chapter five)
- The Soweto flood event and emergency response and recovery operations (chapter six)
- The CoJ’s institutional response to the end of 2009 (chapter seven)

The narrative of the unfolding governance response to the floods has been constructed from first-hand observation. This story was not deliberately recorded within the CoJ and, therefore, much of the data are primarily observational material drawn from participation in the institutional processes and events described. The narrative, therefore, is the primary

form of data in the study. As will be outlined in the methods chapter three, this is a key component of situational analysis: documenting this flow of events and processes. In addition, much of the observational analysis is supported and informed by evidence from focus groups and interviews held with CoJ officials in the months prior to the floods (November 2008 – January 2009), as well as documentary evidence such as Council reports on the Soweto floods and key policy documents, such as Integrated Development Plans (IDPs) described in section 3.3.3.

1.5 The study area and the Soweto flooding disaster

Figure 1 depicts the location of the study area, Soweto, within greater Johannesburg, the landlocked province of Gauteng and north-eastern South Africa. Soweto is located 15km south-west of Johannesburg's central business district and is home to almost half (43%) of the city's population (CoJ 2011a). As will be discussed further in chapter four, poverty rates are high in this area with significant differences in socioeconomic and access to basic services and infrastructure.



Figure 1: Soweto within greater Johannesburg, the Gauteng Province and South Africa.

Source: Adapted from Open Street Map Contributors, available under the Open Database licence

The floods in Soweto occurred following a heavy storm event in the late afternoon of 26 February 2009 and the bursting of the nearby Klipspruit River banks. Eleven areas across Soweto were affected (see Figure 10 in section 6.3) and the floods resulted in the loss of two lives, damage to infrastructure and homes, and costs to the municipality of some R350 million (or approximately \$42 million) (CoJ Report 2009a). After the floods, the CoJ mounted an emergency response and recovery operation in Soweto over a number of weeks until approximately April 2009 (CoJ Report 2009a) – although reconstruction efforts continued to take place after this period.

This response was led by the CoJ's Emergency Management Services (EMS) Department and involved numerous CoJ departments and entities (see Annexure C). Chapter six will demonstrate that this effort was supported by private volunteers, businesses, humanitarian organisations and community-based organisations and representatives (CoJ Report 2009a, b). This further supports the importance of governance approach, which recognises the role of both state and non-state actors in climate governance efforts (Bulkeley and Betsill 2003). In addition to the recovery operations in Soweto, CoJ actors responded at a different management level in the CoJ Council halls and offices. The EMD attempted to facilitate a coordinated institutional response to the Soweto floods and engage CoJ actors to take forward a greater integrated approach to the flooding issue. Chapter seven examines the extent to which governance structures and processes influenced the outcomes of these actions.

Prior to the flooding disaster, CoJ actors had begun to acknowledge the intensifying flood risk problem in Johannesburg. Some strategy policy responses had been initiated in an effort, amongst other things, to prevent and mitigate flooding, including the development of a Catchment Management Policy (CMP) (CoJ 2008a) and the drafting of Storm Water Management By-laws in 2008. In November 2008, a report on flooding issues in Johannesburg was submitted to the Mayoral Committee (MC). Plans were underway to develop a municipal Disaster Management Centre (DMC) and improve early warning systems (EWS) in communities (CoJ 2008b). Some work had also been done to consider the impact of climate change on the city. The CoJ municipality formally initiated a climate change programme in 2006, led by the Climate Change and Cleaner Production (CCCP) Sub-Directorate of the EMD. A Climate Change Vulnerability Assessment (CCVA) (2008c) identified flooding as a potential impact of climate change, and the

Climate Change Adaptation Plan (2009a) was developed in the months after the Soweto floods which highlighted urban flooding as a key priority risk in Johannesburg.

The study will further investigate these risk reduction and preparedness measures, the emergency response in Soweto and the institutional response in the weeks and months after the floods until the end of 2009. It will track the flood event as an episode in the life of the municipality and governance dynamics shaping the outcomes from this flood event.

1.6 Dissertation outline

Chapter one establishes the research problem, purpose and rationale. **Chapter two** outlines the conceptual framework for exploring the research questions. This includes a brief review of the literature related to urban governance of disaster risk and climate change as well as a critical assessment of previous adaptation research. It outlines the conceptual framework for the research exploring the modes of climate governance that might best facilitate adaptation in the global South, and potential constraints and enablers for realising adaptive governance in these urban contexts.

Chapter three outlines the methods employed to generate data in order to address the research questions. This is a qualitative study that employs case study analysis as the primary research method and triangulates a number of research techniques and data sources, in order to discover the different governance dimensions of a specific flooding episode. **Chapter four** addresses question one of the research by investigating the role of the development context in shaping flood risk in Johannesburg. The aim of this chapter is to better understand the interaction between the climate and development agenda in Johannesburg following arguments that development dynamics shape exposure and vulnerability of individuals, households and communities to climate risk (Satterthwaite *et al.* 2007, Atkins 2012). It also explores the CoJ's institutional context for climate change decisions.

Chapter five, six, seven and eight constitute the findings of the research. These chapters investigate three phases of the CoJ's response to the Soweto floods. The institutional response to the Soweto event will be analysed predominantly in terms of the EMD and its interactions with other key institutional role-players involved in flood risk governance at the CoJ. These chapters will contribute specifically to question two and three of the

research, exploring the extent to which governance structures and processes constrain and enable flood risk reduction in the context of development pressures and needs, and the implications for understanding adaptive governance in cities of the global South. **Chapter nine** discusses the broader conclusions of the study for how climate change is governed in countries of the global South, reflects on the utility of the governance approach, and identifies knowledge gaps and areas for further research.

1.7 Conclusion

This research aims to advance understanding of adaptive governance in cities of the global South by tracking the governance forces shaping the CoJ's response to existing climate risk in the low-income contexts. This chapter has established the case for understanding adaptation as governance issue. Governance arrangements provide a framework within which actors and institutions can manoeuvre. The emerging view is that governance structures and processes may play a significant role in successful adaptation, including in urban arenas, and that governance factors may be key limiting and enabling factors to climate change adaptation over the long term. This research investigates the degree to which underlying governance forces shape learning and action.

The study focusses on an existing disaster event following emerging thinking that 'adaptation to the shocks associated with climate change' is a 'subset of disaster risk reduction' (Pelling and Visner 2009, p. 3). It explores how an 'ordinary' inland city is managing climate risk when adaptation is not an urgent agenda and climate risk is characterised by slow and creeping localised flooding problems exacerbating other development pressures, as opposed to large dramatic climate events such as monsoons and tropical cyclones. The following chapter will further develop the governance approach as the conceptual framework for the research following a review of key literature related to urban risk and climate change.

2 CONCEPTUALISING URBAN CLIMATE RISK AND ADAPTIVE GOVERNANCE

This chapter first outlines key literature related to urban governance of climate risk and vulnerability and critically reviews prior climate change adaptation research. It then further develops the governance approach as the conceptual framework for the study. Different modes of climate governance in the urban context are explored as well as their appropriateness for supporting adaptive governance in global South cities. It is argued that networked modes of governance are required to effect the transition to a resilient and adaptive society, further empowering citizens to cope with and manage a changing climate, and facilitating learning and change in cities across networks of actors, institutions and domains of society to support climate change adaptation.

This argument will be developed in this research through examining governance forces influencing responses to the Soweto flood disaster. Some of the primary governance constraints and enablers related to adaptive governance emerging from the literature and relevant to this research include trigger events or external shocks (in this case a flood disaster) eliciting learning and / or action on climate change, institutional power dynamics and framing, municipal structure, and performance culture. It is hypothesised that interactions of these key governance structures and processes influenced the level of preparedness and effectiveness of the response to the Soweto flood disaster.

2.1 Climate risk, urbanisation and the role of local governments

During the period of research from August 2008 to the end of 2009, climate change was emerging on the international agenda. The origins of this growing focus arguably originated from a number of key developments. These included, amongst others, the Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report (AR4) (2007 (a), p. 30) concluding that 'warming of the climate system is unequivocal', the Stern Review of 2006 warning of high economic costs of climate change to the UK and world economy, and the first commitment period for the Kyoto Protocol (2008-2012) coming into effect. These events were debatably amplified by the global economic crisis, triggered by the sub-prime mortgage meltdown in the United States in 2007, which signalled the dangers of rampant consumerism and unregulated capital markets. These developments brought into sharp relief two global challenges, climate change and the

destabilisation of the international financial system, both requiring unprecedented international response and collaboration.

Chapter one outlined that international-level policy agenda and instruments established to respond to climate change have historically focused on mitigation, but support for the adaptation agenda has grown in recent years. Countries in the global South are increasingly advocating for adaptation to be taken more seriously, as they would bear the brunt of climate change due to their geographic characteristics (rainfall variability, warmer temperatures), poverty and income levels, dependence on climate sensitive economic sectors, poor service provision and limited public sector resources – all of which serve to increase their vulnerability profile (Stern 2006).

In addition to the focus on mitigation, responses have largely been concentrated at the international and national scale due to the global nature of the problem and the high degree of international cooperation required (Bulkeley and Betsill 2003). This has been facilitated through international agreements (United Nations Framework Convention on Climate Change or UNFCCC 1992), international policy instruments (Kyoto Protocol 1997 and the Clean Development Mechanism [CDM], amongst others) and global modelling of climate change impacts. All African countries, including South Africa, have ratified the UNFCCC and the Kyoto Protocol to the UNFCCC (Hope 2009).

Increasingly, however, arguments for supporting responses to climate change at the local scale are gaining traction. Ultimately, all agreements and strategies devised at the global and national level will need to be implemented locally (Bulkeley and Betsill 2003). Cities are responsible for a disproportionate amount of the world's GHGs (approximately 78% according to the Stern Review of 2006). Cities concentrate people, infrastructure and industries at risk from current climate variability and future climate change (UN-Habitat 2011), especially since approximately 80% of cities worldwide are situated near coasts and rivers (Bulkeley *et al.* 2009). This same concentration of people and business, however, can also be a source of innovation for reducing GHGs (Dodman 2009) and finding more effective ways to cope with climate variability and change (Alber and Kern 2008).

Currently, 'more than half the world's population lives in urban areas' and this is estimated to increase to 67% by 2050 (United Nations 2012, p1). Most of the population

growth in these urban areas is expected to be concentrated in less-developed regions (United Nations 2012). Rates of urbanisation in Africa and Asia are the highest in the world, although Africa is still the least-urbanised region globally (United Nations 2012). By 2050, it is projected that 58% of Africa's population will live in urban areas (United Nations 2012). Most of this urban growth in Africa is unplanned, concentrating poverty through population increases of already marginalised urban populations and in-migration of the poor and displaced from other areas (Pelling and Wisner 2009). The United Nations Population Fund (UNFPA 2007, p16) estimates that some 72% of sub-Saharan Africa's urban population 'lives under slum conditions compared to 56% in South Asia'. According to UNFPA (2007, p16) 'the slum population of the region almost doubled in 15 years, reaching nearly 200 million in 2005'.

These development dynamics increases people's exposure and vulnerability to hazards. The damage from disasters is exacerbated by poor levels of service, infrastructure and housing (Satterthwaite *et al.* 2007). It follows that urban areas in the global South all have the largest population at risk from climate-induced hazards including increased flooding, more intense and frequent storm events, landslides, heat waves, fresh water availability (Satterthwaite *et al.* 2007, Wilbanks *et al.* 2007). Poorer countries and households 'face greater loss of human life' from disasters, and a growing proportion of these deaths are in urban areas (UN-Habitat 2007, xxxi). According to UN-Habitat (2007, xxx) 'since 1975, the number of natural disasters recorded globally has increased dramatically (fourfold), especially in Africa'.

Adaptation scholars argue that the 'most obvious increased risk' from climate change in poorer cities is 'the likely increase in the number and intensity of extreme weather events such as heavy rainstorms' (Satterthwaite *et al.* 2007, p. 17). Huq *et al.* (2007) found floods are already impacting on cities. Urban flooding in African cities is an increasing problem, with the poor most vulnerable (Douglas *et al.* 2008). Floods in Mozambique displaced 4 000 people in Maputo (Christie and Hanlon 2001; in Wisner and Pelling 2009). Heavy rains in East Africa in 2002 'forced tens of thousands to leave homes in Rwanda, Kenya, Burundi, Tanzania and Uganda' from resultant floods and mudslides (Huq *et al.* 2007, p6).

Douglas *et al.* (2008, p. 188) argue that this flooding is not just a factor of more frequent and intense heavy rainfall and extreme climate events, but 'related to changes in the

built-up areas themselves', such as more settlements in flood plains, increased runoff from hard surfacing, poor drainage and waste management. Vulnerability and risk in these cities, therefore, is a 'convergence of the effects of urbanisation and climate change' (UN-Habitat 2011, p. 1). This study consequently explores the governance of climate risk and development in a poorer and densely-populated area of Johannesburg, Soweto, to better understand modes of governance supporting climate resilient development⁵ amongst the urban poor in the context of intensifying climate risk and vulnerability, rapid and poorly controlled urbanisation, rising urban population growth and growing informality and poverty in Africa's cities.

This is not the first time local governments have been seen as important actors in sustainability. Programmes such as Local Agenda 21 introduced in 1992 at the Rio Earth Summit established local governments as key role-players in leading sustainable patterns of development. For climate governance in particular, local governments often have influence and control over key urban planning areas, such as land use planning, DRR, building regulations, public transportation, energy supply and management, waste management, amongst others (Betsill and Bulkeley 2007, Dodman 2009; in Sippel and Jenssen 2009). Local authorities are also at the closest government level to citizens they serve and are therefore best suited to working with them to promote equitable and inclusive mitigation and adaptation approaches (Jones *et al.* 2000, Lutsey and Sperling 2008; in Sippel and Jenssen 2009). Governance at the local level is critical to ensure local climate plans articulate and reflect local needs, values, knowledge and expertise (Lutsey and Sperling 2008; in Sippel and Jenssen 2009).

Although the case has been made for the importance of local authorities in climate governance, less is known about the governance context in which they operate and are able to manoeuvre, and hence what limits and supports local action. This study aims to better appreciate everyday governance dynamics through assessing a real event around which actors and institutions mobilised. It explores a flooding disaster in a low-income community to further understand the governance arrangements that might support the most poor and vulnerable citizens to adapt to climate risk and hence advance climate resilient development in cities of the global South. The following section reviews previous adaptation research and further establishes the case for this governance

⁵ In this research 'climate resilient development' is understood as 'development processes that safeguard development from climate impacts' (Mitchell and Maxwell 2010).

approach, identifying a knowledge gap of how governance structures and processes influence effective adaptive governance.

2.2 Conceptual framework: modes of governance shaping urban risk reduction and adaptation

This research is framed around the hypothesis that *governance structures and processes* shape and influence adaptation to current and future climate risk in cities of the global South. The next section will provide the conceptual framework for exploring the main research question, namely the extent to which governance structures and processes constrain and enable flood risk reduction in Johannesburg, in the context of development pressures and needs.

The above hypothesis acknowledges Moser's assertion that 'perfect governance' and 'perfect adaptation' may not exist in diverse societies faced with such significant and complex challenges (Moser 2009, p. 329). However, as will be shown in the literature and in the research findings, 'governance "matters"' (Jordan 2008, p. 18). It is through governance that problems are defined and pursued, resources are allocated, power and authority are exercised, actors are mobilised (or not) and outcomes realised (Moser 2009). It is through existing governance structures and processes that adaptation actions will have to be 'embedded', and, therefore, full knowledge of this 'evolving context' is needed (Jordan 2008, p. 19). Pieterse and van Donk cite Healey (2004, p. 67) in arguing for the analysis of existing governance dynamics in order to 'evaluate actual governance situations and their dynamics, and explore the particular "balance" in any new governance initiative between constraining and enabling forces'.

This research, therefore, undertakes a detailed empirical investigation of a 'real-world' governance situation (the institutional response to the Soweto flooding disaster). This analysis is done with a view to identifying the constraints limiting the effective governance of flood risk on a day-to-day basis, as a signifier of governance barriers and limits to future adaptation to climate change. Although the governance lens probes the range of actors involved in the process of governing flooding given the wide range of stakeholders involved, the research is mainly concerned with the actions of the Johannesburg city government. This follows Wisner and Pelling's argument (2009, p. 43) that local or municipal government is the actor 'with the single greatest potential to contribute to urban disaster risk reduction'.

2.2.1 Defining governance

The term ‘governance’ is highly ‘contested’ in the social sciences (Jordan 2008). Much like sustainable development, it is loosely applied, ‘ambiguous’ and ‘used to explain a host of different things’ (Jordan 2008, p. 18). This complexity does not preclude its usefulness, however, but requires a clear use of the term (Jordan 2008). Despite many interpretations, it suggests a focus on the ‘systems of governing’ and the means for ‘authoritatively allocating resources and exercising control and co-ordination’ (Rhodes 1996; in Bulkeley and Betsill 2003, p. 9), ‘in which the state (or government) is not necessarily the only or most important actor’ (Bulkeley and Betsill 2003, p. 9).

In governance, the roles of private and civil society actors as well as ‘supranational’ and ‘sub-national state and non-state actors’ are recognised, as well as the ‘complex interactions between them, in the process of governing’ (Cowell and Murdoch 1999; in Betsill and Bulkeley 2006, p. 144). Bulkeley and Betsill (2003, p. 189) reflect that this shift from government to governance has also taken place in the climate change arena, dispersing governing authority ‘upwards, downwards and outwards’ to a range of international organisations, transnational networks, cities and regions, and to state and non-state actors.

In studying Johannesburg’s institutional response to the Soweto floods, a governance perspective helps to probe the diversity of networks of actors and institutions involved, and the governance arrangements, processes and decisions supporting or hindering flood risk planning and effective responses to the Soweto episode. Moser’s (2009, p. 315) definition of governance will be used in this research, ‘broadly conceived’ as ‘the set of decisions, actors, processes, institutional structures and mechanisms, including the division of authority and underlying norms, involved in determining a course of action’.

2.2.2 Governance versus institutional analysis

In this research, institutions are understood as being established and maintained through governance processes (Anguelovski and Carmin 2011). As with governance, definitions of institutions abound. North (1990, p. 3) defines institutions as the ‘rules of the game in society’, or ‘the humanly devised constraints that shape human interaction’, while Ostrom (2007) defines institutions as ‘shared concepts used by humans in repetitive situations organised by rules, norms and strategies’. Both North (1990) and Ostrom (2007) distinguish institutions from formal organisational entities, such as firms. North (1990)

further argues that organisations can be considered as groups of individuals bound by a common purpose to achieve a shared objective, where the institutional framework will influence the nature of the organisation and the way it evolves. North (1990) believes organisations can be understood as the actors or players in the game, while institutions the rules that structure actor behaviour. Contemporary institutional analysis recognises formal and informal institutions (North 1990, Ostrom 2007).

Governance analysis has been preferred over institutional analysis for two main reasons. Firstly, the institutional approach is limited in tracking processes. A governance frame allows one to ‘cover the whole range of institutions and relationships involved in the process of governing’ (Pierre and Peters 2000; in Jordan 2008, p. 21). This research is concerned with tracing the institutional response to the Soweto flood disaster over time to uncover the unfolding governance process. Governance analysis allows for more dynamic inquiry that follows these processes, decisions, actors and relationships. This frame assists in exploring the interactions and relationships amongst institutions, as opposed to studying institutions in isolation. These institutional relationships can be apprehended over time and institutions investigated through the governance processes in which they are embedded.

Secondly, governance allows for the study of actors and institutions in particular political, socioeconomic and normative contexts (Moser 2009). The governance approach, therefore, allows examination of wider macro-level structures and processes influencing outcomes in governance situations, such as global environmental change and economic globalisation. It allows appreciation of the influence of the macro-socioeconomic drivers of flood risk in Johannesburg and Soweto. This includes the extent to which global and national governance trends and paradigms influence Johannesburg’s governance approach – in the case of tackling flooding, urban development and climate change in general.

Institutions shape governance processes and are thus important in the assessment of the governance of flood risk in Johannesburg and the extent to which shared rules and norms influence actor behavior. In this study the institutional response of the CoJ to the floods is examined, as one dimension of understanding the governance of flooding in Johannesburg. However, a governance frame locates this institutional behavior in wider context.

2.2.3 Modes of climate governance

Climate governance has challenged accepted models of global environmental governance (Bulkeley and Betsill 2003). The ‘hybrid governing arrangements’ in climate governance (Bulkeley 2005, p. 876), involving networks of state and non-state actors operating at many levels with and between formal structures of government, has required a new conceptual apparatus for analysing climate governance. The concepts of ‘multilevel’ and ‘networked governance’ have been developed by scholars to account for new emerging modes of governance in the climate and other arenas of transnational networks of actors and institutions operating ‘simultaneously across multiple scales’ (Bulkeley 2005, p. 879). These different modes of ‘multilevel’ and ‘networked’ climate governance are discussed below.

Multilevel governance

International regime scholars have understood global environmental governance as collective action to address problems relating to common pool resources, tackled through the ‘interactions between nation states’ via international regimes (Bulkeley and Betsill 2003, p. 10). In this view, environmental governance takes place through ‘bounded’ hierarchies of governance at international, national and local scales (Bulkeley 2005, p. 879). Agreements once negotiated are ‘taken home to be implemented, or ignored’ through the adoption of policy and legislation and in this way ‘cascaded down’ from international, national and, implicitly, to sub-national levels (Bulkeley and Betsill 2003, p. 16). By implication, local governments are implementation arms of national interpretations of global agreements, rather than governance actors in their own right (Bulkeley and Betsill 2003, Bulkeley 2005).

The ‘dispersed nature of climate governance’ has challenged traditional notions of environmental governance (Betsill and Bulkeley 2007, p. 448). Following the 1992 Rio Earth Summit, there was a growth in transitional and sub-national networks sharing knowledge and experience on sustainability (Bulkeley and Betsill 2003). Rosenau argues (1997; in Bulkeley and Betsill 2003, p. 29) that transnational networks have increasingly emerged as new ‘spheres of authority’ within which climate governance is taking place. The ‘multilevel governance’ concept has been established to understand ‘multilevel’ systems of governance arising from the shifting role of the nation state and the growing influence of supra-national governments in policymaking, originally developed to analyse European Union (EU) policy development (Hooghe and Marks 2003; in Betsill and

Bulkeley 2007). This concept also recognises the role of formal governing authority. To account for both the hierarchical and networked governing modes, two types of multilevel governance have been identified: In Type I, ‘governments are the central governing authority’ and the emphasis is on the ‘multiple tiers’ of governance between ‘administrative units’ (such as cities, states / provinces, countries), and Type II is ‘dominated by networks between public and private actors across levels of social organization’ (Hooghe and Marks 2003; in Betsill and Bulkeley 2007, p. 449). This division recognises traditional hierarchical tiers of formal governance authority, which despite the changing nature of governance, scholars argue are still critical aspects of governing realities (Bulkeley and Betsill 2003). Bulkeley (2005, p. 877) contends that instead of viewing ‘government’ and ‘governance’ as ‘necessarily opposite’, the governance perspective ‘suggests a continuum of systems of governing, in which state and non-state actors play a variety of roles’.

Networked governance

In the climate governance arena, transnational networking is understood as important for sharing knowledge and experiences (Collier 1997; in Betsill and Bulkeley 2007), and, taken further, in certain circumstances influencing policy development (Bulkeley 2005). In a 10-year review of research in *Local Environment* in 2007, Betsill and Bulkeley, (2007) in their guest editorial, outline how the International Council for Local Environmental Initiatives’ (ICLEI) CCP network played a role in the development of local climate policy in Mexico (Romero-Lankao 2007), South Africa (Holgate 2007), Canada (Parker and Rowlands 2007) and Sweden (Granberg and Elander 2007).

As will be shown in this research, these networks can also help to catalyse political support for climate change at the local level, as well as shape global discourses and approaches to climate planning – both mitigation and adaptation oriented – and support the standardisation of planning responses and decision-making tools. In addition to networks, partnerships have also been found to be important in the local climate arena, for example, with local community organisations and structures in building the climate resilience of communities (Moser and Satterthwaite 2008). This study will explore the degree to which the local state works with civil society actors to build flood risk resilience amongst the most vulnerable communities.

Globally, little evidence exists of transnational networks influencing policy change. It has also been found that the thickness and density of the network affects its success in engendering change, where more connections from frequent interaction over time serve to institutionalise the network beyond a few individuals in local government (Bulkeley and Betsill 2003). Pelling *et al.* (2007) also identify networks as resources for building adaptive capacity through aiding organisational learning and facilitating institutional responses to high-impact disaster events. It will be shown in this research that the lack of dense networking across local institutions in flood risk management in Johannesburg, impeded by governance forces such as the municipal structure and performance culture, was one of the factors that contributed to a largely ineffective response to the Soweto floods.

In summary, modes of climate governance confront traditional separations between distinct governance tiers of international, national and local government, as well as the divisions between state and non-state actors (Bulkeley and Betsill 2003). This perspective does not deny the state as a crucial player in climate action, but argues for the state's role to be understood in relation to the many actors and institutions with varying influence on the decision-making process, including the nature and outcomes of this interaction (Bulkeley and Betsill 2003). The divisions between state and non-state actors can also be blurred (Bulkeley and Betsill 2003), for example with the growing number of semi-privatised and corporatised entities in municipal delivery.

This research will focus in particular on the continuum of state and non-state actors involved in service delivery and flood risk governance in Johannesburg. Networked governance can also be understood as a particular paradigm of governance that arose to account for the changing nature of governance outlined above, and which encourages certain governance principles including collaborative, participatory planning and partnerships with civil society to address increasingly complex challenges in society (Schmidt 2008), such as climate change. As will be shown in the next section, however, this paradigm competes with other influential paradigms of governance, including at the local level (Schmidt 2008). This research will show that conflicting paradigms of governance in Johannesburg influenced the adaptive governance of flooding.

Conflicting paradigms of governance: Bureaucratic and New Public Management modes

The networked governance mode discussed above competes with other paradigms of public administration paradigms that have arisen: the traditional public administration and New Public Management (NPM) paradigms (Schmidt 2008). Table 1 outlines the main features of the three different paradigms.

Table 1: Features of public administration paradigms.

	Traditional public administration	New Public Management	Network governance
Central features and concepts	Hierarchy, rules and procedures. Top-down alignment	Efficiency and private-sector mgmt principles (e.g. performance mgmt)	Partnerships with civil society, co-innovation, civil leadership
Context	Stable	Competitive	Continuous change
Needs / problems	Straight forward, defined by professionals	Wants, expressed through market	Complex, volatile, prone to risk
Strategy	State- / producer-centred	Customer-centred	Shaped by civil society
Governance through actors	Hierarchies, public servants	Markets, clients and contractors	Networks / partnerships and civic leadership
Improvement	Initial big-step change, but less continuous improvement	Improvements in processes and systems	Transformational and continuous improvement
Role of policy makers	Commanders	Announcers / commissioners	Leaders and interpreters
Role of public managers	‘Clerks and martyrs’	Efficiency / market maximisers	‘Explorers’
Role of population	Clients	Customers	Co-producers

Source: Adapted from Benington and Hartley 2001; in Schmidt 2008, p. 112 and p. 117 and Schmidt 2008

These two conflicting paradigms comprise traditional public administration approaches with their emphasis on hierarchy, rules and procedures (the 'bureaucratic' paradigm), and 'New Public Management' (NPM) which emerged in the 1970s and is associated with neoliberalism (Schmidt 2008). NPM is focussed on improving the efficiency of the public sector by introducing private-sector management principles to public administration, public-private partnerships and outsourcing, and performance-based management (Harrison 2006, Schmidt 2008). NPM lost appeal in the 1990s due to the negative impact on delivery, including fragmentation (Harrison 2006, Schmidt 2008). 'Third Way' governance approaches arising in the 1990s and associated with US President Bill Clinton's New Democrats and former UK Prime Minister Tony Blair's New Labour, were influential in South African local government reform (Harrison 2006). 'Third Way' administrations attempt to blend NPM managerialism with networked governance principles of participation, community building, and integration (Harrison 2006).

Scholars argue that networked, bureaucratic, and NPM paradigms of governance have not simply progressively replaced each other, but rather built upon each other and often competed in complex and often contradictory ways in governance situations in contemporary society (Schultz and Hatch 1996, Newman 2001; in Schmidt 2008, p. 116). Harrison (2006) offers an example of these competing rationalities in South African municipal planning systems, which restricts effective participatory governance. Harrison (2006, p. 192) argues that the performance management culture evident in South African local governments and associated with NPM governance approaches, places 'officials under enormous pressure to attain targets within specified time frames'. It also works against local participation (Harrison 2006).

These competing rationalities, such as the tension between collaborative governance and performance management in South African municipalities (Harrison 2006), have outcomes for urban risk reduction and climate governance. To respond to climate change, scholars argue that a networked approach is required to facilitate learning and action across disciplines, sectors, institutions and domains of society and between multiple scales (Winsvold *et al.* 2009). In the global South, successful adaptation is supported by the ability and willingness of local governments to work with, enable and empower vulnerable communities to cope with climate hazards (Satterthwaite *et al.* 2007, Moser and Satterthwaite 2008). Various studies have revealed that groups such as slum dwellers may have innovative solutions to urban problems, and as risk reduction affects a wide

range of local actors, ‘civil society is potentially an active and leading partner’ (Wisner and Pelling 2009, p. 45).

The participation of civil society actors in determining climate agendas and responses, especially those most vulnerable to climate change impacts, is also regarded as central to the achievement of equitable, just and legitimate climate policy (Aylett 2010). Robinson (2004; in Aylett 2010, p. 104) argues that the climate change challenge requires ‘creating methods of deliberation and decision making that actively engage the relevant interests and communities in thinking through and deciding upon the kind of future they want to try and create’. Competing rationalities emphasising bureaucratic control and efficiency, however, may restrain these networked approaches.

Following this discussion, a number of key governance questions can be posed that will be taken forward in this research, namely: 1) what are the dominant operational paradigms of governance in the CoJ and what are their consequences for flood risk governance, and 2) to what extent was a networked governance approach, as a mode of governance supporting local risk reduction and adaptation, applied in preparing for and responding to the Soweto floods?

2.2.4 The global South’s urban risk and adaptation challenge

The previous sections established the complex and multi-dimensional nature of climate and disaster risk governance. In cities of the global South particularly, local governments have to contend with a range of urgent problems in addition to climate risk and urban disasters as additional stressors in often already-stressed urban systems (Satterthwaite *et al.* 2007). It is argued that the weaker governance structures in the context of severe development pressures in these contexts detract from the ability of local governments to protect their citizens from the increasing climate risk (Moser and Satterthwaite 2008). As much development is underway in some of these urban areas, however, there is also an opportunity, for example, to climate-proof new infrastructure developments and promote sustainable and inclusive urban planning (Romero-Lankao and Dodman 2011).

This chapter first considers prior urban adaptation research, establishing a lacuna in understanding the climate governance challenge in cities of the global South. It then explores the challenge of governing urban risk and vulnerability in global South cities.

Prior adaptation research

Chapter one outlined that past adaptation research has tended to have a sectoral and rural focus, including in southern Africa. It has also concentrated on different technical adaptation response strategies and policy options (such as Smit *et al.* 1999) and the costs and benefits of adapting (such as Tol *et al.* 2004). Work has been done on analysing vulnerability and adaptive capacity to climate change, such as analysis of the social vulnerability of food insecurity (Bohle *et al.* 1994), identifying economic and social ‘indicators’ or preconditions of adaptive capacity (Yohe and Tol 2002) and diagnosing national-level adaptive capacity (Brooks *et al.* 2005). Disaster research has also primarily drawn on the examination of rural events, with a ‘lack of developed critical assessment of social aspects of urban disaster’ (Pelling 2003, p. 14). As a result urban areas have been neglected in adaptation and disaster research, including in Africa.

Generally the social science research agenda for adaptation is preoccupied with technical response options to climate change and identifying ‘generic determinants of adaptive capacity’ (such as financial and technical resources and knowledge) (Moser 2009, p. 328). This work has been criticised for not being sufficiently sensitive to the governance context in which adaptation takes place and how this context may limit adaptation (Adger *et al.* 2009, Moser 2009). Only in recent years has some attention been given to studying existing examples of societal adaptation in order to better explore this context and barriers to adaptation (Adger *et al.* 2007; in Moser 2009). It is increasingly argued that governance constraints may be a significant barrier to adaptation (Adger *et al.* 2009, Moser 2009). Accordingly, adaptation is increasingly understood as a governance issue (Adger *et al.* 2009, Moser 2009, Ziervogel and Parnell 2010).

Urban and local climate research began in the mid-1990s, but was focussed on mitigation. A predominant focus of this early research was on making the case for local-level response (Betsill and Bulkeley 2007) and the multilevel and ‘networked’ nature of climate governance (Bulkeley and Betsill 2003, Lindseth 2004). Early city research also tended to focus on individual case-studies or ‘leaders’ in climate change mitigation, mainly in cities in the global North (Bulkeley *et al.* 2009). This focus has hampered understandings of approaches taken by cities in the global South and ordinary cities which were not demonstrating leadership in mitigation.

Urban adaptation research has lagged behind studies on mitigation – although more recent research is emerging (Lindseth 2005, Næss *et al.* 2005, Granberg and Elander 2007, Zahran *et al.* 2008, Birkmann *et al.* 2010, Burch 2010). One particular focus of this work is on governance and institutional process barriers or enablers to adaptation, adaptive governance and learning (Ziervogel and Parnell 2010). While there is a growing body of urban adaptation research, rich empirical studies of the practical realities and experiences of governing existing climate risk and vulnerability in cities of the global South are limited. Romero-Lankao (2007) has undertaken one of only a few empirical studies that focusses on the governance of climate change mitigation in a city of the global South, namely Mexico City. In addition, important work has been done by Satterthwaite *et al.* (2007) on the possibilities and constraints of adapting to climate change in low- and middle-income countries. Moser and Satterthwaite (2008) also outline an asset-based framework for ‘pro-poor’ adaptation in low- and middle-income nations, focussed on households and community organisations.

Studies of inland as well as secondary and smaller cities in South Africa, allowing exploration of different climate risks and motivation for adaptation in lower-impact sites, remain limited. The present study aims to contribute new insights related to how climate risk is prioritised and addressed in a city when the case for adaptation has not been well-established through the existing or future threat of dramatic extreme climate events such as sea-level rise and large-scale flooding disasters, and when significant development priorities compete with climate response and DRR on the municipal agenda. It can also help to demonstrate that the governance of flood risk and vulnerability is not clearly a climate or emergency management issue on its own, but rather linked to and exacerbated by urban development dynamics, further complicating the appropriate response.

The nature of urban risk and vulnerability in poorer cities

It is widely accepted that the urban poor in cities of the global South are particularly vulnerable to existing climate risk and will be more affected than wealthy segments of society by the indirect and direct impacts of climate change, given that they are exacerbated by other drivers of urban change, existing development deficits, and service delivery and infrastructure backlogs (Satterthwaite *et al.* 2007). It is argued that the development and climate change agenda are inextricably interlinked and ‘good governance’ and poverty alleviation efforts will also be jointly needed to achieve enhanced climate resilience of the vulnerable populations and urban systems, including

adequate service delivery, adapting infrastructure and buildings, and good disaster preparedness (Satterthwaite *et al.* 2007).

When assessing climate and development in tandem, often the constraints in implementing adaptation and climate protection impose similar constraints on development – and these goals can be pursued together (Satterthwaite *et al.* 2007). In addition, climate change may exacerbate existing social and economic development challenges and represents a new challenge to development interventions (Adger *et al.* 2003, Satterthwaite *et al.* 2007). It is clear, therefore, that climate response and sustainable development are ‘two sides of the same coin’ (Najam *et al.* 2003; in Parnell *et al.* 2007, p. 365). This research will explore the nature of the links between climate change, urban risk reduction and development through the Soweto case.

The International Institute for Environment and Development (IIED) presents continuum of risk in African cities from large disasters, small disasters and everyday hazards, with the cumulative impact of everyday hazards considerably underestimated (Bull-Kamanga *et al.* 2003; in Wisner and Pelling 2009). Many large cities in the global South are low-lying, with climate vulnerability enhanced by large concentrations of their population in unsafe housing, constructed on unsafe sites and without adequate protective infrastructure from climate hazards (Satterthwaite *et al.* 2007, Moser and Satterthwaite 2008). Urban planning in Africa and South Africa still reflects colonial and apartheid ‘earlier spatial patterns of racial segregation transformed into economic privilege’ – maintaining a distinct ‘core’ and ‘periphery’ in urban areas (Wisner and Pelling 2009, p. 34). Johannesburg has also followed this pattern of development and Soweto developed from the gradual eviction of black Africans from the city by the state during the colonial and apartheid eras (CoJ 2011a).

Residents in these marginal areas have to contend with ‘multiple stressors’ in their environment which in turn are compounded by climate risk and deepen vulnerability (Reid and Vogel 2006). These forces impact on the overall health and wellbeing of residents and include environmental pollution, unemployment, psychological stress, experiences of exclusion, and inadequate access to services such as, sanitation, water, drainage, waste removal, health and energy provision, amongst others (Moser and Satterthwaite 2008). Increasing climate stress is likely to intensify mortality, illness and general hardship in these communities (Romero-Lankao and Dodman 2011).

Vulnerability to climate risk is often not evenly distributed in urban areas, and can vary widely according to income levels, racial and ethnic groups, gender and age (Moser and Satterthwaite, 2008). Households and communities also have different capacities to bounce back from hazards and stresses (Satterthwaite *et al.* 2007). Appreciating these different dimensions of urban vulnerability, the drivers of settlement patterns and the spatial and economic distribution of risk is important in designing responses, as opposed to a sole focus on climate impacts and exposure to hazards (Romero-Lankao and Qin 2011; in Romero-Lankao and Dodman 2011).

The urban poor also have far fewer assets to protect them from hazards in comparison to wealthier cities and residents (Moser and Satterthwaite 2008). Whole systems of support, including protective infrastructure, police, armed, health and fire services, and insurance protection largely insulate these wealthier segments of society from climate risk (Moser and Satterthwaite 2008). Reduced investment in the extension and maintenance of infrastructure in African cities from the wave of infrastructure privatisation put forward as the solution to African urban fiscal crises has contributed to risk accumulation and vulnerability (Wisner and Pelling 2009). This demonstrates the clear links between social and economic development and climate resilience. It is not extreme weather and climate events alone that lead to losses, but the underlying vulnerability of individuals, households and communities to climate hazards that results in serious impacts (Satterthwaite *et al.* 2007).

Urban change and risk accumulation

A complex set of factors contribute to the accumulation of climate, environmental and other risk in urban areas. Pelling (2003) highlights the difficulty in separating ‘natural’ and human causes of hazards and disaster events. Physical systems have been greatly influenced by human activity (IPCC 2001; in Pelling 2003). In understanding the interactions between development and climate, the complex drivers of urban change and stress also need to be explored, such as globalisation and its impacts, population and demographic change, the structures and processes of the state, changes to economic patterns, growing informality, spatial realities and land use change and development – affecting resilience to climate stress in different ways (Satterthwaite *et al.* 2007).

Research done on urban flooding in sub-Saharan Africa has shown that flooding is an increasingly urgent issue in African cities and demonstrates the contribution of urban

change to climate risk and vulnerability (Douglas *et al.* 2008). Development pressures and trends such as growing populations in floodplains, land-use change and increased hard surfacing affecting the speed and volume of runoff, inadequate storm water drainage, blocked drainage from silt and poor waste collection – are all contributing to worsening urban flooding problems, where only moderate increases in the frequency and intensity of storm events can lead to serious flooding impacts (Douglas *et al.* 2008).

These physical changes to urban form interact with economic drivers of change. These include high levels of informal sector employment in Africa cities, resource-poor local governments, and underinvestment in services and infrastructure through privatisation, amongst others (Wisner and Pelling 2009). Structural adjustment plans imposed by the World Bank and International Monetary Fund from the 1980s onwards has meant that urban managers are operating under tight financial conditions (Wisner and Pelling 2009). A report by the WB has shown that privatisation had not improved efficiency or equity in access to drinking water for African cities (Kirkpatrick *et al.* 2006; in Wisner and Pelling 2009). The middle and upper class, with access to global financial and trade markets, have a stronger voice in the growth of cities in the global South and their expectations of what constitutes ‘development’ for maintaining their living standards and consumption requirements, often have more power to drive the urban development agenda (Beall *et al.* 2000).

These processes have repercussions for climate resilience through creating and exacerbating the vulnerability of communities to climate stress through, for example, specific risks of informal housing located on more dangerous sites, greater vulnerability of the urban poor due to a lack of formal employment, poor services and a lack of social protection to allow them to bounce back from climate events. Climate risk in this context cannot be viewed in isolation, but rather one factor in the dynamic of cities as socio-ecological systems (economy, political regime, infrastructure, environmental conditions, etc.) with change patterns evolving together to produce new forms of risk (Worgaard 1994; in Pelling 2003). It is argued here that climate is one factor in the dynamic of urban change and cannot be decoupled from other drivers of risk accumulation in cities of the global South.

Adaptive governance in cities of the global South

Given these complex and interacting climate and development dynamics, much is required of local governments to protect the lives of their poorest and most vulnerable urban residents (Satterthwaite *et al.* 2007, Moser and Satterthwaite 2008). Moser and Satterthwaite (2008) argue that weaker local government structures in cities of the global South mean that it is all the more critical for local governments to create enabling environments for household and communities to protect themselves and assist in delivering their needs. As outlined in chapter one, research has found that communities are able to develop their own mechanisms to cope with climate risk and disaster events (Moser and Satterthwaite 2008). An enabling, networked governance mode is therefore arguably central to effective governance of climate risk.

Satterthwaite *et al.* (2007, p. x) argue that that in the cities of the global South community-level adaptation will require local governments ‘changing their relationship with those living in informal settlements and working in the informal economy’. Actively engaging with households and community-based organisations (CBOs) to find ways to work in partnership with these groups can assist governments to better understand their needs and to build on the success of existing community efforts. Research has shown that partnership with government agencies increases the CBOs’ ability to develop protective infrastructures (Hasan 2006; in Moser and Satterthwaite 2008). Partnerships amongst community actors, local NGOs (non-governmental organisations), international donors and municipal government have reduced vulnerability to flood and hurricane risk in Santo Domingo, the Dominican Republic (Pelling 2003; in Moser and Satterthwaite 2008).

Local governments still play a central role in risk reduction, as there is a limit to community action (Moser and Satterthwaite 2008). Pelling argues that ‘local or municipal government is perhaps the most critical actor’ (2004; in Wisner and Pelling 2009, p. 38), ‘through its unique positioning in the institutional architecture of urban governance’ (Wisner and Pelling 2009, p. 44). It is only local government that can act as a facilitator between local communities, civil society and the private sector, regulate civil society and private sector work, and represent and be directly accountable to diverse communities in the city through elections (Pelling 2004; in Visner and Pelling 2009). Wisner and Pelling (2009, p. 44) also emphasise that local government is in most cases ‘best placed to coordinate emergency response, relief and reconstruction’.

Pelling and Wisner (2009) identify four practice areas for risk reduction, and by extension climate change adaptation. These include development planning (including land use planning, transport planning, critical infrastructure and services), development regulation (building control, pollution control and traffic regulation), risk management (vulnerability and risk assessment and building local resilience) and emergency management (early warning, emergency response and reconstruction planning). Only one of these areas involves emergency services and disaster management coordinators, while the others involve those in the development community – drawing attention to DRR and adaptation as development issues (Pelling and Wisner 2009).

Local governments in the global South and particularly in Africa are severely constrained from realising their role in climate risk reduction. Although it is understood that climate protection and development are interlinked, local governments often perceive adaptation as an issue of lesser concern with far-off future consequence, in the face of more urgent and immediate short-term development needs, such as unemployment and response to HIV/Aids (Reid and Vogel 2006). Even in the case of existing disaster events, more pressing day-to-day concerns take precedence over building institutional capacity to respond to disasters (Wisner and Pelling 2009). Tying adaptation and DRR to existing development priorities has thus been identified as key to obtaining the political buy-in necessary for an adaptation programme (Roberts 2008, Bulkeley *et al.* 2009, Roberts 2010).

While large disaster events may attract the attention of local decision makers, insufficient attention is often given to every day smaller hazards, the cumulative impact of smaller events (Pelling 2003). Urban managers often also do not see DRR as part of urban development (Pelling 2003). DRR instead forms part of the less prestigious urban management functions and is limited to post-humanitarian relief and rehabilitation (Pelling 2003). This has been found in the case of eThekweni where the disaster management unit had limited resources and power in the municipal hierarchy (Roberts 2010).

Pelling (2003) argues that the sectoral approach to responding to risk and vulnerability is also deficient, because risks cross sectors and policy options must address a range of vulnerabilities. Urban fragmentation is a serious challenge to realising a cross-sectoral approach, including in Africa, where urban safety and adaptation falls under numerous

departments and entities (Wisner and Pelling 2009). Authors also argue that capacity and financial resources constrain implementation (Wisner and Pelling 2009).

Specific governance challenges for risk reduction in African cities have been identified, including weak formal institutional arrangements for risk assessment and reduction, limited links between academics and the state in the area, disinvestment in maintenance of infrastructure and services from the 1980s onwards, the wide continuum of urban risks, and mistrust of state apparatus by communities (Wisner and Pelling 2009). Despite these challenges, local government remains a crucial actor in urban risk reduction and climate change adaptation. Section 2.3.5 discusses primary challenges to adaptive governance in more depth.

Service delivery and infrastructure development plays a significant role in climate protection (Satterthwaite *et al.* 2007). This includes disaster preparedness services such as early warnings, healthcare, emergency and evacuation services (Satterthwaite *et al.* 2007). This aspect of local climate governance, however, is not politically neutral. With urban unemployment and inequality and growing informality and migration to cities of the global South, the number of households requiring services is increasing and local governments are struggling to address backlogs in service provision. The quality and means of delivery is also often masked when attempting to deliver ‘the basics’ (Pieterse *et al.* 2008, p. 18).

In South Africa, these preoccupations arguably hide differences in the quality of service and infrastructure in lower-, middle- and upper-income areas and do not interrogate the main beneficiaries of municipal policies and those who set the agenda for municipal action (Parnell 2004; in Pieterse *et al.* 2008). Delivery of basic water, electricity and sanitation becomes the focus, whereas less tangible aspects of social and economic upliftment (including quality of engagement with citizens in this delivery) are neglected, as these are more difficult to measure and assess (Schmidt, 2008). Sustainability concerns are also neglected while focusing on the ‘basics’ as opposed to a holistic consideration of all aspects of service delivery (Pieterse *et al.* 2008, Swilling 2008). Neoliberal principles of cost recovery and efficiency and trends of outsourcing and public private partnerships in service delivery (the NPM paradigm) have also had serious consequences for social and economic development of poorer groups – often leading to underinvestment in the

extension and maintenance of services to the poor (Smith and Morris 2008, Wisner and Pelling 2009).

This discussion raises some questions to be tackled in the research regarding the governance of climate and development in cities of the global South. How do local governments tackle a climate agenda in the context of other complex and pressing risks, or ‘multiple stressors’? Do the climate and development agendas truly intersect in cities of the global South, as the literature asserts? Whose development agenda is being asserted in the delivery of services and infrastructure and how is this affecting climate resilience of urban systems and vulnerable communities? How do the prevailing governance paradigms influence these development dynamics and climate resilience, and how do municipal managers approach development and climate challenges?

2.2.5 Constraints and enablers to adaptive governance

This section will outline some of the principal constraints and enablers to adaptive governance, following on from the argument above that adaptive governance is characterised by greater use of networked modes of governance. The discussion will uncover the predominant themes emerging from research on adaptation governance in cities, most relevant for this study. These themes have been identified to better understand the potential governance structures and processes that shaped preparedness and response to the Soweto flood event.

A number of these studies analyse urban adaptation in highly-developed cities in the global North, in countries such as Norway (Naess *et al.* 2005) and Canada (Burch 2010). These cities arguably have the resources to adapt to climate change, but the ‘municipal structure and function’ still presents a ‘host of barriers to action’ (Burch 2010, p. 288). The following factors will be explored in terms of their influence on adaptive governance: trigger events, power dynamics and framing, municipal structure and culture.

Trigger events

The importance of ‘triggers’ for learning and action is a recurrent theme in urban climate governance literature. These triggers serve to galvanise action and learning by increasing the motivation of decision makers (Bulkeley *et al.* 2009) and offering a ‘window of opportunity’ to institute climate change response measures enabled by focused political and administrative attention (Naess *et al.* 2005, p. 133). In cities high-impact disasters

including floods and storm events highlight climate risk to local actors and have in cases led to adaptation measures, such as the 2005 deluge flooding in Mumbai which led to strengthened disaster preparedness and planning (Bulkeley *et al.* 2009). In Durban, ‘a series of storms and high tides’ during 2007 ‘which resulted in extensive infrastructural damage due to flooding and coastal erosion’, increased local awareness of climate change, as well as ‘political and administrative support for climate change-related work’ (Roberts 2008, p536). The connection between climate stress and Durban’s development was made clearer through these events (Roberts 2008).

In Norway, a flood event in 1995 increased the ‘local manoeuvre for action’ of local actors despite a constraining institutional structure for local flood management (Naess *et al.* 2005, p. 133). It also resulted in the emergence of new perspectives on flood risk management (Naess *et al.* 2005). The outcome from this ‘window of opportunity’, however, was mediated by local established interests shaping the type of risk-reduction measures instituted after the floods (Naess *et al.* 2005, p. 133). Therefore, while trigger events may result in greater awareness of and attention to climate stress and an opportunity for more effective management of current and future climate risk, the literature is unclear about whether this heightened awareness inevitably translates to policy learning and change, or to improved approaches to managing climate risk over the long term.

This research assesses the Soweto disaster as a trigger event for learning and action on flood risk, and the degree to which institutional momentum is catalysed and maintained over time, and translated into shifts in the way the CoJ governs flooding. It examines the role of governance forces opening up or closing down efforts to tackle floods in the CoJ and in Soweto specifically.

Power dynamics and framing

Research has revealed the often conflicted nature of urban climate governance, characterised by multiple values, agendas and interests. Pieterse and van Donk (2008, p. 69) identify unplanned events that ‘pop up on the radar screen’ (such as the Soweto floods) or ‘episodes’ (p. 67) as also helpful for exploring power relations, including the way issues are framed and how this maintains a certain understanding and approach to an issue.

The powerful influence of framing the climate change problem within the municipal agenda is a recurrent theme in the literature. Research into mitigation governance in cities the UK, US and Australia found conflicting and competing interpretations of climate protection to exist, and reframing climate change in terms of local agendas a critical factor in gaining political support and attention for the issue (Bulkeley and Betsill 2003). This has also been found in cities in the global South, where political support is highly contingent on framing the climate agenda in terms of local development priorities (Roberts 2008, 2010).

For Hajer (1995, p. 43), the definition of a problem is inherently *political* as it involves hidden normative judgments of ‘which aspects of social reality are included and which are left undiscussed’. In this way, the defining of a particular ‘environmental problem’ is a process of *social construction* and the particular way in which an environmental problem is *constructed* determines to a large extent how it is approached and ‘organised into politics’ (Hajer 1995, p. 42), the selection of actors involved, the role of citizens in decision and policymaking, how science or technical knowledge is used and how the problems ‘evolves’ as an issue (Moser 2004). This research will investigate the dominant framing of the flooding problem by CoJ actors and the implications for flood governance. The work will track any shifts in understanding and interpreting the flooding issue with the occurrence of the Soweto episode.

The study will also probe the influence of power dynamics in flooding preparedness and the institutional response. In the Norwegian case study highlighted above local power structures largely inhibited social learning around flood management (Naess *et al.* 2005). Better integrated approaches to flood management advocated at the national level were ‘filtered by local power structures’ (Naess *et al.* 2005, p. 125). The study uncovered different types of power interactions at the local level, including actors without sufficient voice and access to power in the governance system who were unable to advance their particular interests (Dahl 1961; in Naess *et al.* 2005). ‘Non decision-making’ was also found to occur where politically and economically influential actors were able to keep unwanted issues off the policy agenda and shaped preferences and ideas around an issue to maintain the status quo and existing conceptions (Lukes 1974; in Naess *et al.* 2005), thereby affecting social learning and how flood risk measures are implemented. For example, old understandings of flood management can prevail at the expense of better integrated and environmentally sustainable approaches.

As outlined above, actors responsible for climate protection are often the least empowered in municipal hierarchies, such as environment departments (Alber and Kern 2008, Sippel and Jenssen 2009) or disaster management units (Roberts 2010). As such, municipal power relations and the relative power of different actors with climate protection responsibilities may affect the successful governance of climate risk at local levels. Differences in power and access to decision-making in the municipal governance system will be explored around the Soweto episode and the degree to which more prominent actors could manoeuvre and assert their interests.

Municipal structure

The discussion in section 2.3.3 highlighted the complex and dispersed nature of local climate governance, involving many state and non-state actors and institutions at a variety of scales and requiring coordination across disciplines and sectors. As such, fragmentation is highlighted in the literature as one of the primary constraints to effective urban climate governance (Winsvold *et al.* 2009).

In local authorities, coordination is required in the climate protection arena between line functions and across sectors (Satterthwaite *et al.* 2007). These include areas of health, planning, transportation, storm water management, water services, community and economic development, DRR, air quality, environmental protection, finance, amongst others. Similar coordination is needed vertically between national and regional levels of government (Type I multilevel), and horizontal coordination (or Type II multilevel governance) between private, academic and civil society actors, international organisations and donors, and transnational networks (Hooghe and Marks 2003; in Betsill and Bulkeley 2007).

It is argued that this coordination is required in urban contexts to enable learning and mediate different types of knowledge – both expert and local contextual knowledge – and across a variety of disciplines such as architecture, engineering, city planning, and business (Winsvold *et al.* 2009, Birkmann 2010). Given the multi-faceted character of adaptation, this knowledge is not held by one actor but must be shared and collective learning enabled (Pelling *et al.* 2007, Winsvold *et al.* 2009). It is argued that coordination around adaptation is likely to be more challenging than mitigation and the need for

contextually-driven responses across sectors and along different timescales (McEvoy *et al.* 2006; in Bulkeley *et al.* 2009).

The municipal structure of local authorities has been found to frequently work against cross-sectoral and coordinated climate governance (Betsill and Bulkeley 2007). Romero-Lankao (2007) argues there is a lack of ‘fit’ between Mexico City’s fragmented structures of government and the nature of the climate problem requiring holistic and integrated responses, which constrained progress. Local governments have attempted to resolve the coordination issue by establishing cross-sectoral or departmental coordinating committees and task forces, overarching climate functions in the offices of mayors and city managers, for example, intergovernmental committees (Alber and Kern 2008, Sippel and Jenssen 2009). Most often the climate agenda is led by a local environmental agency or department, although it may lack power in the municipal hierarchy (Alber and Kern 2008, Sippel and Jenssen 2009). This compromises the capacity to coordinate work, since the department does not have the authority to direct or influence other local government actors (Alber and Kern 2008, Sippel and Jenssen 2009).

Fragmentation of local governance has also been deepened by wider paradigms of governance. Neoliberal and NPM trends of outsourcing service delivery to private sector or corporatised agencies has increased fragmentation in urban governance in the global South (and global North) and compromised climate protection, with a diversity of entities delivering services that are often not in the direct control of local governments (Monstadt 2007; in Sippel and Jenssen 2009, Romero-Lankao 2008).

Key services for climate protection such as water and waste management, storm water management, public transport and energy supply are often carried out by utilities where local governments have ‘limited control’ ‘over the prices, investments and corporate policies’ (Monstadt 2007; in Sippel and Jenssen 2009, p33). The institutional landscape for service delivery has become increasingly diverse and fragmented as a result, requiring complex brokering between conflicting mandates and interests of a variety of actors.

In Johannesburg specifically, it was found that corporatising municipal service to be carried out by wholly-owned but separate municipal-owned entities (MEs) created a ‘silo effect whereby communication between different agencies, utilities and the city administration is fragmented’ (Holgate 2007, p. 481). In Mexico City, institutional

capacity for climate change response was constrained by decentralisation (including devolution of responsibility for environmental management), deregulation and the roll back of the state, which deepened administrative fragmentation (Romero-Lankao 2007). This study will examine the effect of municipal structure in supporting an integrated flooding response in Soweto and, subsequent to the flood disaster, enabling or constraining a collaborative and holistic approach to future flood risk governance efforts.

Culture

Some climate governance literature has identified the importance of the organisational culture, conventionally described as ‘the way things are done around here’, affecting the governing behaviour and outcomes linked to climate change adaptation at local levels. Schein (1999, p. 24) defines culture as ‘the learned, shared, tacit assumptions on which people base their daily behaviour’. The governing culture may arguably influence the degree to which social learning and collaboration is incentivised in the organisation, which has been identified by scholars such as Pelling *et al.* (2007) as an important feature of adaptive governance, in so far as it encourages networking and interaction between actors, experimentation and risk taking. Wheatley and Kellner-Rogers (1998) argue that allowing individuals the freedom to be creative and interpretive instead of carrying out routinised tasks and not questioning their applicability, improves their ability to respond to complexity. Burch (2010, p. 287) found in Canadian municipalities that facilitating climate response required ‘reworking...organizational culture...’ amongst other things. Burch (2010, p. 295) identifies the role of leadership in stimulating ‘an organisational culture of innovation and collaboration among municipal staff’ as ‘enabler of action’.

This literature highlights, therefore, the potential role played by organisational culture in constraining or enabling adaptive governance in the way it influences social learning, creativity and experimentation to respond to complex challenges such as climate change. An assessment of governing culture will be taken forward in the study and its role in enabling adaptive governance assessed. The CoJ’s performance culture associated with NPM governance approaches will be specifically investigated in terms of its influence on collaborative and participatory planning and, taken further, networked governance approaches. The investigation will examine the implications of the CoJ’s performance culture for managing complex governance issues such as flooding and adaptation and the degree to which the culture promotes innovation, learning and cross-disciplinary engagement across state and non-state actors and institutions.

2.3 Conclusion

This chapter has outlined the conceptual framework for examining the governance of climate change adaptation in Johannesburg. It was shown that there is limited research related to managing *existing* climate risk in cities of the global South, constraining a more in-depth understanding of the governance enablers and barriers in adapting to climate change in future. It was shown that the climate and development agenda are inextricably linked in cities of the global South.

It was also argued that climate is an additional stressor in an often already-stressed urban system, impacting on different communities, households and individuals according to their levels of development. In order to apprehend urban climate change vulnerability and risk, the complex drivers of urban change in cities of the global South need to be understood. It was argued that although service delivery and infrastructure development play a significant role in climate protection, the delivery of services is not politically neutral and neoliberal principles of cost recovery and efficiency in service delivery have had some negative consequences for climate and development efforts.

The review has shown how studies of climate governance at the urban level is facilitating appreciation of the multidimensional nature of climate governance and the shifting nature of ‘formal’ state functions, with increasingly blurred distinctions between state and non-state actors, and international, national and sub-national levels (Betsill and Bulkeley 2003). The review identified a number of governance forces that may impact the adaptive governance in cities of the global South. These factors embedded in the municipal governance approach, including power dynamics and framing, the municipal structure, and culture, will be evaluated in terms of how they shaped preparedness and the emergency and institutional response to the Soweto disaster as it unfolded.

Networked governance modes are increasingly being advocated at the local level (Schmidt 2008), especially for climate change governance (Bulkeley and Betsill 2003, Pelling *et al.* 2007). The networked governance paradigm, however, arguably conflicts with bureaucratic and NPM governance approaches in public sector decision-making environments (Schmidt 2008). It is anticipated this will have impacts on advancing inclusive and effective climate agendas and responses reflecting local issues and needs, which will be demonstrated in the Soweto case.

3 RESEARCH METHODS

The conceptual framework developed in chapter two provides the theoretical basis for examining the constraining and enabling forces shaping current climate risk at the CoJ as a means to deepen understanding of the nature of adaptive governance in cities of the global South. This chapter outlines how the methods developed have been adapted to allow for the generation of qualitative data related to governance structures and processes influencing flood risk reduction, preparedness and the response to the Soweto flooding disaster in Johannesburg. Qualitative methods triangulating data from of participant observation, focus groups, in-depth interviews, and analysis of official documents is employed to track the response.

3.1 A qualitative approach

Given the governance focus of the research, it was necessary to select data sources and methods that facilitated tracking a particular governance ‘episode’ (the Soweto flooding disaster) as it unfolds over time through various dynamic processes (Healey 2004; in Pieterse and van Donk 2008). The qualitative approach was selected over a quantitative approach, as the study was concerned with an *in-depth* exploration of a *specific* case to draw out the particular everyday governance *processes* shaping the CoJ’s response. This was done in order to draw conclusions about governance arrangements that may support current and future urban adaptation to climate change.

The qualitative method enables research of a particular *context* – through a disaster event – to reveal the complexity of a real-life situation. In disaster research the idea of context has supported qualitative disaster research for decades (Phillips 2002). Phillips (2002, p. 202) argues for the use of a qualitative approach in disaster research ‘because disasters challenge communities in unexpected ways and have unanticipated consequences, qualitative disaster research can capture human behavior at its most open, realistic moments... We get to see backstage behaviour’. The application of the qualitative method to analysing a disaster event can, therefore, assist in revealing actor behaviours and constraining and enabling governance forces that may not be perceptible through assessing more static every-day governance situations.

A quantitative or statistical approach would have been concerned with identifying macro patterns and structures, generalisable to a wider variety of situations and hence to a large

extent independent of context (Neuman 2006). In the quantitative approach the larger the number of cases in the study, the more applicable the results for other contexts (Neuman 2006). A quantitative study of urban flood risk governance and climate change adaptation may have attempted to identify the *general determinants* of effective responses to floods by assessing responses to a large number of flooding disasters in different cities, and from this identify common enablers and constraints to adaptation found across the cases.

By contrast, this research was concerned with in-depth investigation of the *specifics of a situation* to uncover the interplay of forces around flood risk decision making, with the aim of facilitating a deeper understanding of how governance structures and processes influenced institutional action and learning around one flooding episode – in order to explore adaptive governance arrangements. This study was concerned with understanding the governance context that gave rise to enablers and constraints to explore *change dynamics*, and the process undertaken from this *known state to unknown state* for meaningfully shaping an adaptive governance model that will work for city actors and their context. In this research rather than appreciating the ‘big picture’, the focus was on revealing deeper structures and processes at work in the case (Ragin 1994; in Neuman 2006, p. 14). Ragin contrasts research methods in terms of how they either ‘condense’ (quantitative methods) or ‘enhance’ (qualitative methods) the data (Ragin 1994; in Neuman 2006, p. 14). Investigating more case examples of city responses to flooding in South Africa and elsewhere would have restricted the thorough analysis necessary to address the research aims.

Finally, a qualitative approach was more suitable given that the governance of climate change adaptation in city contexts is a relatively new research area, as shown in chapter two. Therefore, research in this field is still concerned with identifying the primary significant variables in urban governance situations and generating new data, as opposed to statistically testing already identified variables and formal hypotheses.

Much of the evidence collected for this dissertation took the form of qualitative data reflecting on perceptions and behaviours of key actors engaged in the process of governing climate change in Johannesburg. This evidence typically has taken a variety of forms, including statements made in interviews and focus groups, statements in meetings, the content of presentations, and observation of actor behaviours. The overall dissertation will be developed seeking to identify confirming patterns in this evidence. The data

should be viewed collectively to substantiate the overall conclusions reached. In some cases only one statement would be made by a key actor but it would be indicative of broader framings and understandings. Where, for example, evidence was gathered in a specific meeting, it will be used as a starting point to explore similar factors evident elsewhere. The qualitative approach aids the researcher to arrive at conclusions through the accumulated weight of evidence to understand the complete picture.

3.2 Research background and context

In qualitative research, knowledge of the research context is principal in order to analyse critically how this research context and the researcher's position may affect observations, the data collected and the construction of the narrative. The research was carried out between August 2008 and the end of 2009. During this time I was employed by the CoJ in the Climate Change and Cleaner Production Sub-Directorate (CCCP) of the Environmental Management Department (EMD). I was first hired to complete a six-month internship, with the understanding from CCCP management that I would be undertaking research into climate change adaptation governance at the CoJ. Prior to being hired as an intern, discussions were held between the University of the Witwatersrand and CCCP officials about the research project. CCCP officials then suggested the internship as a way of carrying out the research, as this climate change unit was struggling with capacity problems. The CoJ was therefore initially selected as the research site due to connections between the University and the CCCP, and the consequent ability to gain access to CoJ decision making.

Once I had taken up the internship in August 2008, it became clearer through informal interactions with CoJ officials and observation of Council meetings and reports that localised flooding issues were a growing problem in Johannesburg. From October 2006 to January 2007 the JRA's standby emergency crews 'received and dealt with numerous calls for flooding incidents' (CoJ Internal Memo 2007). In November 2008 a report was submitted to the CoJ's Mayoral Committee highlighting the flooding issue to senior political CoJ actors, including the Mayor (CoJ Report 2008a).

By the time focus groups and interviews were conducted at the end of 2008, flood risk had become a key focus of this research. In February 2009 I took on a position as a climate change specialist where I managed various mitigation projects. In the first few months of my internship I did not access many different decision-making forums and

therefore did not take part in Council activities to a significant extent, particularly within formal arenas. As an employee, however, I had the opportunity to immerse myself in CoJ life and be an active participant in CoJ decision making, in both ‘formal and ‘informal’ domains.

When the Soweto floods occurred in February 2009, I had been employed by the CoJ for seven months. I was able retrospectively to assess readiness for responding to this disaster event, observe the ensuing institutional response immediately after the event and track this response – particularly of the EMD – up until the end of 2009. This enabled me to follow a specific issue and how it was defined and framed, examine how the Soweto floods focussed the attention of officials and politicians, the principal governance constraints to action and learning, and the extent to which this institutional momentum was sustained over time.

3.3 Research method and techniques

This research triangulated a range of qualitative research techniques and data sources in order to address the research questions. Case study analysis was used as the primary research method, employing the techniques of participant observation, focus groups, in-depth interviews and document examination. Below it is outlined why the research method and techniques were appropriate for meeting the aims and objectives of the study.

3.3.1 Case study analysis

The primary method of this research is case study analysis. Yin defines a case study as ‘an empirical inquiry that investigates a contemporary phenomenon within its real-life context, when the boundaries between the phenomenon and context are not clearly evident’ (Yin 1992; in Chima 2005, p. 5). Thus, the defining feature of a case study is the in-depth study of a phenomenon within its specific context. As outlined in the rationale for the qualitative approach, this method was employed in order to facilitate a detailed exploration of a particular governance context for flood risk management decisions in order to uncover the interacting dynamics at work in determining the institutional response to the floods and adaptive governance at the city level. The case study method also facilitated an investigation of the governance and political dynamics emerging from the CoJ’s response to an ‘episode’ (Pieterse and van Donk 2008, p. 67) – the Soweto floods.

The single case study method was selected as opposed to case-oriented comparative methods, where a number of cases are compared in order to identify patterns and causal relationships for limited generalisation beyond the cases (Ragin 1987). A comparative method was not utilised, as this research was concerned with generating new empirical data on everyday governance dynamics shaping a particular climate risk issue and thus required a focussed approach in order to do the level of analysis required.

This method assisted in investigating the multiple variables affecting the governance outcome in the case of the Soweto floods (Merriam 1998), allowing the researcher to draw from a variety of evidence in devising the narrative of the institutional response (Merriam 1998), and offering a ‘powerful example’ of a phenomenon (Payne and Payne 2004). Here the Soweto context, as a low-income settlement, could serve as a signifier of flood risk governance dynamics in situations of significant socioeconomic imbalances and development challenges, in order to inform current knowledge on the adaptive urban governance in the global South context.

A drawback of the case study is its lack of generalizability (Merriam 1998, Burton 2000, Yin 2002, Chima 2005). There is limited opportunity to conclude that similar governance dynamics will influence flood risk response and planning in *all* cities based on the Johannesburg case. The purpose of this research is to appreciate the *particular situation* of Johannesburg to develop a more nuanced understanding of adaptive governance. By relating the case study findings to theory, however, Yin (2002) argues it is possible to generalise ‘analytically’. Depending on whether or not the results are in line with the predictions of the guiding theory, the theory will be validated or reanalysed (Chima 2005). In this research for analytic generalisation, the findings will be compared against the themes emerging from the literature on governance modes facilitating urban adaptation and the enablers and barriers for this adaptive governance being realised.

The triangulation of a range of research techniques and data sources can also be a disadvantage in case studies (Hamel *et al.* 1993). This is because of the challenge in collating the data in a meaningful way, drawing connections and making conclusions. For this reason case studies have been criticised as ‘sloppy’ and ‘lacking in rigour’, resulting in ‘long unreadable documents’ (Yin 2002, p. 10). Much is left up to the researcher’s ability to construct logical causal arguments and coherent narratives (George and McKeown in Chima 2005). Researchers also have to be proficient in many different types

of methods because the case study uses a wider range (Burton 2000). Therefore, the validity of a case study is to a large extent reliant on the researcher's competence. Although the same can be said about any research (Burton 2000).

The case study method is best employed within the framework of 'situational analysis', which has been described as the 'study of norms in conflict' (Van Velsen 1967, p. 146). Situational analysis makes it possible to understand how the given formal structure of rules and policies impacts on actual behaviour. In most social and organisational settings, the norms and rules of the governing structure are not always consistent and are sometimes contradictory (Van Velsen 1967). For instance, a municipal entity may be expected to achieve service delivery for all citizens, but it is also expected to operate on business lines prioritising cost recovering which may hamper extending and / or improving infrastructure and services in poorer areas if this does not make economic sense. In the case of flooding, this may be a factor in inadequate protective storm water infrastructure in lower-income areas due to the high costs of providing this infrastructure. By analysing situations in some detail as they unfold and evolve, such as the Soweto floods, it is possible to assess the extent to which the governing rules and policies of the CoJ may be contradictory, or force choices between conflicting options, with important implications for the effective governance of climate change adaptation in the future of the CoJ.

The effective use of situational analysis requires that the unit of such analysis be carefully drawn (Burton 2000). Burton (2000) highlights that it is important to specify who or what is included and why. At first glance the boundaries of this case are clear – the CoJ. However, local decision making, flood risk framing and governance approaches were affected, for example, by wider paradigms of governance influential internationally and in South Africa, global climate change governance, the national policy environment, transnational and sub-national networks, the socioeconomic and development context of South Africa and Johannesburg, amongst other things. A governance approach in combination with an examination of an unfolding situation allows for the appreciation of the external and internal dynamics of a particular governance response to floods, as it allows for the study of these macro processes and structures. While the CoJ is the primary unit of analysis, the governance approach facilitates the examination of this wider context. In addition, the study of the institutional response is undertaken at two levels: in Soweto and within CoJ decision-making processes and structures. It also considers the

continuum of state and non-state actors involved in the case. In this way, the investigation is widened beyond the unit of analysis, and considers different levels of decision-making and institutional action.

Accordingly, the boundary of observation for the study was limited to the CoJ as a formally defined institution, made up of a number of entities and departments. To assess this context the 'external' environment was considered. Therefore the focus extended beyond the CoJ in order to further understand the case under investigation. However, although the analysis was multilevel and considered forces operating at multiple scales (local, national and global) as well as the influence of both state and non-state actors and institutions, the primary focus was the CoJ given the importance of the local government actor in urban governance.

3.3.2 Participant observation

Participant observation is a technique of social research employed mainly by anthropologists, and essentially entails a 'deep immersion into the life of a people' over an extended time period (Keesing 1981, p. 5-6). The method is inductive, in that the observer uses these observations as the starting point in the formulation and testing of theories or hypotheses (Waddington 1994). The observational data so obtained, therefore, have the status of a primary source, which is usually attributed as a personal observation or description of events and actions.

Burgess (in Waddington 1994) categorises the role of the observer / participant into four types. First, the complete participant where the researcher does not reveal his research role in the milieu in which he is operating. Second, the participant-as-observer is where the researcher forms relationships and participates in the activities, but is open about his or her role as the researcher. Third, the observer-as-participant makes minimal contact with the people in the research environment. Finally the complete observer tries to be unobtrusive and takes no active part in proceedings.

As an employee of the CoJ, my role fell into the second category, namely participant-as-observer. As a CoJ employee I participated fully in the activities of the CoJ and formed relationships with my colleagues in the process of working together. My role as researcher was known, however, to many of those in the EMD, including senior management and officials in other departments (through their participation in the focus

group and in-depth interviews). This ‘deep immersion’ in the on-going proceedings and routines of the CoJ facilitated situational analysis of the norms and rules of the governing structures, and the influence of these through the unfolding Soweto response. It allowed the construction of a narrative around the floods, drawing together key events and processes. In-depth institutional analysis through the Soweto episode was made possible through observing the framing of the flood event by actors, conflicts and collaborations between actors around the appropriate response, and how flooding was taken forward as an issue over time. Through constructing this story, it was possible to apprehend how governance structures and processes impacted on behaviour and outcomes.

Participant observation was also useful for identifying the most significant structures and processes influencing learning and action in the CoJ, as I myself had to work within these constraints to undertake my work. Observation was particularly important for probing the culture, value systems and tacit assumptions driving behaviour in the CoJ, evident in daily, monthly and annual routines, and often not fully apprehendable to outsiders. Through consistent observation, I was also able to be part of three annual planning cycles at the CoJ, and could track the uptake of the flooding agenda over time.

Given my substantial immersion in the research context, it was important to be aware of the influence of my own biases on how knowledge was collected and interpreted, as well as what I revealed in the research or my degree of transparency. Contemporary social sciences have challenged the more traditional notion of the ‘objective observer’ in ethnographic research and questioned whether it is possible to maintain a non-biased view and a clear separation from the observer and observed (Angrosino and Mays de Pérez 2000). It is important, however, for researchers to acknowledge and interrogate their role in the social setting, i.e. the influence of their race, gender and age, and the effects of their position on what and how observation takes place (Angrosino and Mays de Pérez 2000).

As I was based in the EMD and close to the Department’s work – and hence daily challenges experienced by EMD officials – I may have been more critical of EMD work when tracking its role in responding to the Soweto floods. As much as I had to be aware of being too negative in my interpretations, at times I could have been overly sympathetic to the challenges to implementation and decision making communicated by CoJ officials in focus groups, given that I was struggling with similar issues. In terms of

race and culture, as the dominant culture and race in the CoJ was Black African and I am a white female, access to the social and cultural context as well as its accurate interpretations, was more challenging. Over time, however, I became more familiar with this context and the hidden cultural meanings and socially-sanctioned behaviour.

Observation was affected to a certain extent by my level of seniority. As I was initially an intern and then a junior specialist, I did not occupy a position of authority in a hierarchical organisation, which meant that certain forums were largely closed to me where important decisions were taken and problems framed, such as the high-level Mayoral Committee (MC) or Executive Management Team (EMT). In the case of the Soweto floods I was unable to access these forums to assess decisions taken at this level and apprehend possible conflict and the jostling of interests between influential actors around the Soweto flood event. In addition, it was less likely that senior management in the EMD would take me into their confidence regarding some issues. Despite this, I was able to investigate the underlying dynamics to a certain extent, predominantly through informal discussions with management, but this may have been more successful had I been in a more senior position with access to ‘what goes on behind closed doors’. In addition, I attended all key meetings within the EMD held following the floods and which form a part of the focus of this research probing the institutional response to the Soweto floods. My observational analysis was also bolstered by interviews and focus groups with senior-level officials (such as the executive director of the Development Planning and Urban Management Department and the director of the Air Quality and Climate Change Directorate), as well as a high-level political representative (the Member of the Mayoral Committee for environment).

3.3.3 Documents

Document examination was used to fulfil a variety of objectives in this study. These included providing the necessary climate, development and governance context for decision making in the CoJ, assessing Johannesburg’s preparedness for the floods through noting key achievements reported in IDPs, tracking key decisions prior to and after the Soweto floods through the analysis of Council reports, and helping to analyse the success of the response and recovery operations in Soweto.

Climate trends for Johannesburg were garnered from the CCAP as well as a key study by Fatti and Vogel (2010) on trends of the increase of the frequency and intensity of thunderstorms in Johannesburg from 1960 to 2009. The predominant drivers and pressures for climate change vulnerability in Johannesburg were also ascertained from the CCAP, including related to urban flood risk. An analysis of the CCAP also helped to reveal the approach to preparing the CCAP and risk assessment process, the nature of urban flood risk in the city and the degree to which community experiences of flood risk were being articulated in the main strategies of the CoJ.

Key strategy documents for the CoJ were analysed to determine climate and development patterns and pressures in Johannesburg, the governance context for flood risk management and climate change adaptation, the main principles driving the CoJ's overall development paradigm, pre-Soweto risk reduction and preparedness, and to a limited extent the evolution of the delivery agenda related to flood risk management over time, including shifts after the floods. These documents included the Growth and Development Strategy (GDS) (CoJ 2006a) which set out the CoJ's vision and long-term strategic development paradigm, End of Term Reports for the 2001-2005 (CoJ 2006b) and 2006-11 Mayoral Terms (CoJ 2011a), and the IDP. The IDP is the chief planning instrument used by all municipalities in South Africa which helps coordinate and integrate local development initiatives. It sets out principal projects and programmes for five-year and one-year cycles in line respectively with new Mayoral terms and financial years. The IDP flows from the GDS strategy.

The IDP was also examined to delineate the boundaries of the study and target the main departments and individuals for focus groups and interviews. This analysis also revealed influential governance processes in decision making and how these operated, such as the performance management and participatory planning systems. The IDPs and End of Term Reports provided background on institutional structural changes that had taken place since the establishment of the CoJ metropolitan municipality in 2000 and how developmental local government was interpreted by the CoJ in its governing and operating model. The business plans of the EMD provided further contextual background to the environmental and climate change programme in the CoJ, including its history, structure and function.

In addition to examining the development agenda and context for decision making, the IDP was assessed to establish the pre-disaster risk reduction and preparedness efforts prior to the Soweto floods. This included a broad identification of the institutional structures and actors for flood risk management. This was done by investigating IDP objectives and programmes for the 2006-11 Mayoral Term and subsequent annual revisions prior to the floods in 2009. An analysis of the IDP revisions from 2009/10 to 2011/12 also allowed for a limited assessment of changes to policy goals and interventions for flooding after the Soweto floods. Finally, the outcomes of the annual community consultations undertaken as part of the IDP revision for 2009/10 was published in the 2009/10 IDP, which provided some data on the main issues raised in these sessions, some service delivery dynamics in communities, and the CoJ interaction with residents in responding to these problems.

Policy documents linked to flood risk management in particular, included the Catchment Management Policy (CMP) (CoJ 2008a) and Integrated Storm Water Management Plan (ISMP) (CoJ 2007). These were both used as background documents to assess framing of the flood risk issue in the CoJ and the approach to flood risk reduction. The CoJ State of Rivers (SoR) (CoJ 2010a) report and CMP provided data on flood risk drivers and pressures in Johannesburg. National climate change strategy and policy documents were also studied to assess the national context for local climate change and DRR, the focus of these policy frameworks on urban climate change governance and local-level responsibility for climate change and disaster management response. These included the National Climate Change Response Strategy (NCCRS) (2004), the National Climate Change Response Policy (NCCRP) (2011) and the Disaster Management Act (DMA) (Act no 57 of 2002) and Framework (2005).

Council reports were key documents for tracking important decisions in flood risk management as well as the nature and challenges related to the Soweto response and recovery operations. The primary mechanisms for decision making in the CoJ were reports, submitted to the MC and the Council for approval. MC reports linked to flooding were analysed to identify key decisions taken prior and post the Soweto floods related mainly to flood line assessments, as these decisions were made by the highest level of authority of the CoJ. The documents were also examined to determine dominant framings of the flood risk issue. Council reports on the Soweto operations were useful in apprehending the chronology of incidents in the emergency response, the state and non-

state actors involved in recovery work, the flow of resources to recovery efforts and the extent of the disaster losses.

Other documents such as customer satisfaction surveys and media reports were also analysed to obtain data about community experiences of flood risk, and public perceptions of the CoJ's governance of flood risk and storm water management issues. Media reports on the Soweto floods assisted in piecing together key events in the emergency response efforts, the role-players involved, as well as the extent of the flood damage.

3.3.4 Interviews

An interview is a conversation between two or more people that is controlled and structured by the interviewer to a greater or lesser extent (Gillham 2000). The degree of control by the researcher is a key element of this definition and forms the basis for the way in which many researchers categorise interviewing techniques (Gillham 2000). The main factor in distinguishing different types of interviewing techniques is the degree to which they are structured (Gillham 2000). Gillham (2000, p. 6) provides the following continuum as a means of categorising different types of interviews, becoming increasingly more structured as one moves along the continuum: listening to the interviewee's conversations without making any contribution to the conversation, using natural conversations to pose research questions, posing a few key open questions (open-ended interview), open and closed questions (semi-structured interview), verbally administered questionnaires, semi-structured questionnaires with for example multiple choice items and open questions, and finally structured questionnaires with simple, specific closed questions.

In this research I primarily positioned the data collection midway on the above continuum, in that I posed a few open questions either to single individuals or to small groups. In both of the before-mentioned cases, the goal was to explore the main governance variables shaping decision making, including decisions related to flood risk. A more open-ended approach was taken because many of these governance areas are yet to be identified through primary research. The sections that follow outline the types of interviews conducted, the individuals or groups targeted and why, and the examination of the data.

Focus group interviews

Morgan (1988, p. 12) defines focus group interviews as ‘the explicit use of interaction to produce data and insights which would be less accessible without the interactions found in a group’. Focus groups in the context of qualitative research are constituted to collect data from a relatively homogenous group (Patton 1987). The term ‘focus group’ has become confused with other types of group activities used to solve problems or to reach consensus, such as groups formed for team building, brainstorming exercises or therapeutic interventions (Krueger 1994).

Focus groups allow the researcher to identify a range of perspectives fairly quickly and explore more complex issues (Powell and Single 1996). Matters one did not expect may arise due to the ‘energy’ of the group communication (Macun and Posel 1998, p. 116). Another advantage of a focus group is that one is able to observe group dynamics and verbal and non-verbal interaction (Macun and Posel 1998). Focus groups are also not time consuming or costly to run (Macun and Posel 1998).

The focus group interview was the principal technique, other than participant observation, that allowed me to uncover perceptions of the principal governance dynamics at the CoJ impacting on decision making and outcomes. Through the interaction of the group, participants revealed a nuance of the governance forces influencing their daily activities. In addition, through the focus groups I was able to explore the understanding of flooding issues and the role of different CoJ actors in response. The focus group data were key for assessing pre-disaster preparedness for Soweto, including institutional relations linked to flood risk management, disaster management structures in place for effective emergency response (particularly the focus group with the DMD) and proactive planning for flood risk management. The informative nature of focus group discussion cannot be overstated, however, as participants may feel constrained due to confidentiality and intimidation issues. Despite this potential disadvantage, group discussion did allow me to engage with a fairly large number of employees over a short period of time, as opposed to individual interviews.

Macun and Posel (1998) argue that focus groups work well in combination with other research techniques. In this research, the data gathered from the focus groups often informed other data collection. For example, the focus groups were held early on in my internship, but only after I had had a few months to orientate myself and, therefore, knew

more of what to ask and observe in the groups. I subsequently had the opportunity to test and refine issues and ideas arising in the groups through subsequent observation and interviews (Macun and Posel 1998).

There are also drawbacks to the focus group method. One potential problem area is around confidentiality (Macun and Posel 1998). It is important to agree with participants not to mention participant names in relation to what was said in the group, highlight that names will be kept confidential in the research and be transparent about research interests upfront. In addition, I needed to be aware that the group might offer socially desirable answers because they are cautious to give their views in the presence of colleagues (Macun and Posel 1998). The discussion itself may also influence individual views on the topics, so that the focus group itself is a site of the production of meaning (Macun and Posel 1998). Reactivity of the focus groups is fairly high given that participants are aware of the study and may alter their answers due to this awareness. Group dynamics and the dominant discourse may also shape answers. Data collected from other sources, however, for example through documents and observation, may have gone some way towards compensating for this effect.

In terms of generalising results, it is important to hold as many focus groups as possible. If certain themes keep arising, the validity of the findings is enhanced (Powell and Single 1996). The focus groups were run with departments with an important role in climate change adaptation response and flood risk management. In my proposal I anticipated conducting seven to nine focus groups with nine departments, selected as they played some role in flood risk governance. I managed to exceed the anticipated number of focus groups by conducting a total of 13, reaching 123 Council employees. I only conducted focus group discussions with four departments, however. These four departments were the top four departments critical to my study given their role in development planning (the Development Planning and Urban Management (DPUM), climate planning (the EMD), emergency response to flood disasters (Disaster Management Directorate (DMD) and, providing protective infrastructure and services (Infrastructure and Services), which mitigated the effects of not engaging with more departments. DPUM was a significantly large department and included Development Planning and Facilitation (DPF) (overall city planning), Development Management (DM) (management and approval of new development applications, building control and land use management), Corporate Geo-Informatics (CGIS) (Geographic Information Systems [GIS] management for the CoJ)

and all regional offices. Focus groups were run with all these functions, including four out of the seven regional offices.

The broad spectrum of participants included planners, environmental practitioners, disaster managers, infrastructure managers, GIS specialists, and officials based in the regional offices of the city and hence closest to on-the-ground service delivery issues in different areas of Johannesburg. Attempts made to run focus groups with MEs and departments of Housing and Health were unsuccessful due to a lack of response from senior managers. Through participant observation, however, I engaged with many entities and departments outside of the four departments in meetings, workshops, and one-on-one informal conversations. Although I was not able to conduct a focus group with the JRA, I attended meetings involving JRA relating to flooding and was able through these discussions to understand their broad perspectives and interests related to flood risk management. This JRA was a key role-player in flood risk governance given their responsibilities in storm water planning and management.

My approach was explorative for the focus groups. I allowed participants to direct the conversations for the most part, bringing in another question when the discussion was digressing. I used this approach to probe the daily experiences of participants and allow them to identify the important variables in scoping their situation. That way, if certain themes came up a number of times independently, it became clear that that theme was important.

The questions for the focus group were fairly broad and open ended in order to encourage discussion and debate amongst participants. The principal objective was to explore the main variables at work in governance situations – surfacing issues such as the effects of the organisational structure and processes, organisational culture, capacity, leadership, the impacts of external factors such legislation, perceptions of climate change, including the role participants believed their department should play in responding to flood risk and long-term climate change, amongst others. As more focus groups were performed, certain common themes emerged about the principal governance barriers and enablers for effective planning and action. It became clear that many of the barriers and enablers influencing flood risk governance and adaptation planning were the same factors influencing decision-making in other areas as well.

Individual in-depth interviews

Ten in-depth interviews consisting of open questions were also conducted with key personnel in the CoJ, including the Member of the Mayoral Committee (MMC) for environment, senior officials in DPUM, EMD, CCCP and the Central Strategy Unit (CSU), the director for Air Quality and Climate Change (AQCC), the programme manager for adaptation, and the operations manager for the DMD. For a full list of interviewees, please refer to Annexure A.

The rationale for employing open-ended interviews was much the same for using an overall qualitative research method. I wanted to obtain specific and historical knowledge and develop an understanding of CoJ actors' attitudes and values rather than getting general opinions and superficial understanding. Furthermore, this method gave me greater flexibility with respect to the sequence in which questions were posed and enabled me to explore other relevant issues as they arose. Open-ended questions seemed to be more appropriate to use for senior officials as they may have resented narrow specific questions which may not have tapped their varied and broad knowledge base adequately.

The purpose of the interviews was to investigate the same issues explored in the focus groups, but in a more focussed and in-depth way to get a better understanding of the governance context and how it impacted on climate risk management and planning, probe issues uncovered in the focus groups further, as well as test various ideas being formulated as part of the participant observation process. Reactivity was high in interviews, as respondents were often senior and therefore careful to answer questions in a way that portrayed CoJ in a more positive light or which defended their positions and work in the CoJ. To minimise reactivity, it was possible to cross check these responses with those given in focus groups and information gathered during observation.

3.4 Confidentiality and ethics

This project raises a few ethical issues given my deep involvement in the study site, my access to confidential Council information as well as being privy to personal feelings and reflections about the working environment revealed to me on the basis of my relationship with my colleagues, and not as a researcher. Personal communication on sensitive matters to do with the institution and its politics could jeopardise certain individuals' employment or position within the CoJ. The research may also have policy ramifications and therefore is a matter of public interest. Doing applied research on a participant observation basis

within an organisation, I was confronted with challenge of accessibility to documents and personal communication that would not ordinarily be available to me. Here I had to weigh the advantages of access to insights not available to outsiders with the fact that I could not quote confidential or sensitive documentation or divulge the identity of individuals with whom I communicated personally. My primary goal was to attempt to gain access to and uncover the governance fabric and documents have proved to be valuable resources for additional insights and knowledge. Therefore, while I name these documents, a convention will be adopted of not revealing authorship.

First and foremost the confidentiality, rights and interests of my sources must be protected, particularly in a working environment where people's livelihoods are at stake. Therefore, interpersonal communication is referred to without naming the individual, but only the department or directorate in which they work and their level of seniority, such as 'EMD senior official, pers. comm.'. Focus groups participants gave their informed consent to take part in the study. They were aware of the purpose of the study, their right to decline to participate and the nature and extent of the commitment. Only the details of their department / directorate, their level of seniority of the official and the nature of their position is provided, as participants were assured of the confidentiality of the discussions. The identity of interviewees will also not be revealed, only their position at the CoJ.

3.5 Limitations

Several limitations are identified with this research. While the governance lens was used, it went beyond the scope of the study to focus in-depth on the participatory aspects of CoJ's climate risk governance and the quality of the engagement of the municipality with civil society. This aspect of governance deserved a separate study given the scope of the subject and its multidimensional nature. Detailed analysis of the CoJ's interactions with other levels of government, transnational and sub-national networks and non-state actors involved in flood risk management was also not possible given the ambit of the work and the need for an in-depth focus on the CoJ. Rather, the focus was primarily on the CoJ as the main decision-making unit and its planning, operational and management work.

In addition, while I had access to many decision-making forums in the CoJ, I was not able to observe certain high-level strategic governance arenas, such as the MC and EMT. Therefore, these high-level debates and interactions related to the Soweto floods were not revealed. I was also not present in Soweto or involved in the emergency response

operation. I compensated for this lack of observational data of disaster management response in my assessment of the Soweto operations by examining key Council reports on the Soweto event and presentations and verbal reports by disaster managers and other officials at various meetings and workshops in 2009, as well as conducting an interview with the operations manager of the DMD in July 2010 who managed the emergency response operations in Soweto.

In addition, the Soweto response was only actively researched until the end of 2009 and it went beyond the scope of the work to analyse institutional and policy change in the years after the floods. The primary aim of the research was to probe governance forces related to a specific episode in the life of the CoJ and not to probe policy learning related to flooding over time. Having said this, some limited analysis of institutional and policy change in the years after the floods (until end 2011) was sourced primarily from a desktop analysis of key CoJ strategic planning documents such as IDPs from 2009-2012, interviews with officials from the DMD and CCCP, and observation.

Finally, the main focus of this research was on adaptation and not mitigation, despite authors contending that these climate change response strategies should be viewed as ‘complementary’ (Verheyen 2002; in Bulkeley *et al.* 2009, p33). It was found in order to focus the study and achieve the research aims of assessing response to current climate risk as a signifier to future climate change adaptation, the research needed to concentrate on adaptation and even further on a specific climate hazard: flooding. This facilitated detailed exploration of decision-making in a defined arena and around a specific episode.

3.6 Conclusion

This chapter has outlined the many data sources and methods employed to address the primary goals and questions of the study, using a qualitative approach. It was shown that a qualitative method triangulating a wide variety of data sources was used to reveal an in-depth picture of the institutional life of the CoJ and the primary governance factors impacting on response to the Soweto event as it unfolded. This chapter also established the importance of context for interpreting qualitative findings (Phillips 2002). The next discussion explores Johannesburg’s development and governance background to provide the framework from which to contextualise the governance of the Soweto flooding disaster.

4 JOHANNESBURG'S DEVELOPMENT AND GOVERNANCE CONTEXT

This chapter outlines the development context in which the Soweto floods occurred and explores how urban development and change processes shape the nature of flood risk in Johannesburg and Soweto. It aims to provide the basis to explore interactions between climate and development in urban contexts in the global South through better understanding the nature of flood risk in Johannesburg and Soweto.

This investigation follows on from the view that a number of urban development factors influence urban risk and affect people's exposure and ability to cope with climate and other hazards and disasters within African and other global South cities (Satterthwaite *et al.* 2007, Wisner and Pelling 2009). These include rapid and unplanned urbanisation, service and infrastructure provision, socioeconomic challenges and environmental degradation (Satterthwaite *et al.* 2007, Wisner and Pelling 2009).

The literature shows that climate risk is often one of multiple, interconnected risks (Atkins 2012), and is unevenly distributed, with the urban poor most affected (Satterthwaite *et al.* 2007). Poorer communities face on-going 'multiple stressors' (Reid and Vogel 2007) contributing to their vulnerability to climate and undermining their development. These findings will be explored in relation to Johannesburg and Soweto in order to appreciate the role of climate as a dynamic in urban change and risk accumulation in cities, and to contextualise later discussions on the modes of governance supporting risk reduction and adaptation within poorer cities – based on findings from the Soweto experience.

The CoJ's formal governance context for climate decision-making is also explored as a basis for investigating the extent to which this governance framework influences preparedness and responses to the Soweto disaster. The chapter begins with a brief analysis of the national climate governance and disaster risk context and regional climate trends. It outlines the legislative framework for climate change and DRR to identify enabling national policy for local responses. Finally, the CoJ governance structure for the environment and climate change functions is briefly outlined in order to understand the formal governance architecture in which flood risk decisions are made.

4.1 National climate governance context

South Africa has been through a period of significant legislative reform, and institutional and societal change since the dismantling of apartheid government in 1994, the transition to democracy and a non-racial governance system. The South African government faces significant challenges of bringing about societal and economic transformation. Unemployment has been a persistent problem in the economy since 1994, as well as wide-scale poverty and inequality. The country is governed by a three-level governance structure comprising national, provincial and local spheres. South Africa's local government is mandated to be a developmental agent and the key actor in achieving the aims of developmental local government, going beyond traditional responsibilities of providing services (Beall, *et al.* 2000).

4.1.1 National flood risk and precipitation trends

Although South Africa is not affected by many large-scale disasters, periodic droughts, floods, storms and fires cause social and economic losses, with the poorest in society most affected (South African Cities Network [SACN] 2009). These disaster events aggravate infrastructure backlogs and constrain future development (SACN 2009). A severe disaster can cost South Africa up to 16 % of its Gross Domestic Product (GDP) (the Department for Cooperative Governance and Traditional Affairs [CoGTA] in SACN 2009). Flooding is the most frequent occurring disaster in South Africa, followed by storms (PreventionWeb 1920-2011, accessed 24 June 2012). From 1920 to 2011, floods also resulted in the highest number of people killed (PreventionWeb 1920-2011, accessed 24 June 2012). Floods also carry the highest economic costs, while the number of people affected is highest for droughts (PreventionWeb 1920-2011, accessed 24 June 2012).

General circulation models (GCMs) run by computers show that the frequency and intensity of heavy rainfall events are likely to increase with climate change (Mason *et al.* 1999, Meehl *et al.* 2007, CSSP 2008a; in Fatti and Vogel 2010). The IPCC's special report on 'Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation' (SREX) (2012) reports that based on data from the 1950s, the magnitude and frequency of extreme hot days and heavy precipitation events have increased in some regions of the world already. For southern Africa, there is low confidence in observed changes in heavy precipitation since the 1950s due to a lack of consistent patterns in existing studies, and high uncertainty in precipitation trends from climate change in the coming decades (IPCC SREX 2012). Some studies for South Africa

show, however, that the rainfall season is likely to shorten and rainfall events to intensify (Mason *et al.* 1999, Engelbrecht *et al.* 2009; in Fatti and Vogel 2010). For Johannesburg, projections indicate an increase in heavy rainfall events (CoJ 2009a), which is likely to increase the severity of flood risk in the city and Soweto.

4.1.2 National and provincial climate change response and the role of South African local government

In South Africa, the national response to climate change is governed by UNFCCC commitments (Department of Environmental Affairs and Tourism [DEAT] 2004). The South African Government ratified the UNFCCC in August 1997 and its Kyoto Protocol in 2002 (DEAT 2004). As a developing country under the Convention (Annex 11), South Africa has not been obliged to reduce GHGs but must agree to fulfil specific commitments in terms of Articles, 4, 5, 6 and 12, including formulating and implementing mitigation and adaptation programmes (DEAT 2004).

The initial national response to the UNFCCC commitments is captured in South Africa's NCCRS (2004). In response to the strategy, various national and provincial government departments had taken steps to develop adaptation and mitigation strategies and measures, particularly in the water and agriculture sectors (DEA 2011b). Prior to the floods, however, there was no evidence of an overarching strategic adaptation framework for Gauteng. Although the strategy recognises a role for local government to respond to climate change, it does not provide guidance for local adaptation. Urban adaptation is also, for the most part, not considered.

In 2005, South Africa's Cabinet began the process of developing a national climate change framework for the country (DEA 2011c), culminating in the approval of South Africa's NCCRP in 2011 (DEA 2011a). This NCCRP (DEA 2011a) provides a policy framework for climate change in South Africa for the first time, relatively balanced between adaptation and mitigation. It provides for the inclusion of climate change in the national, provincial and local planning regime, including provincial growth and development plans and municipal Integrated Development Plans (IDPs) (DEA 2011a). When the Soweto floods occurred in February 2009, no policy framework existed for climate change adaptation, as the NCCRP had not yet been adopted. Therefore, there were few guidelines for local authorities to facilitate urban adaptation.

4.1.3 National disaster management policy frameworks

The DMA (Act no 57 of 2002, came into force in 2003) and the National Disaster Management Policy Framework (NDMPF) (2005) provide a legislative framework for local governments to prevent and reduce disasters. The Act aims to move away from a predominant focus on disaster management⁶ in terms of reactive response and recovery, to a more holistic approach focusing on risk reduction and mitigation (Reid 2005, Van Niekerk 2005, Van Niekerk 2006, Reid and Van Niekerk 2008; in Van Niekerk 2011). Through this legislation, 'South Africa established itself as a nation at the forefront of covering disaster risk reduction within its public sector framework' (Pelling and Holloway; in Van Niekerk 2011, p. 1), and was one of the first African countries to 'comprehensively legislate' disaster risk management (DRM)⁷ (Vermaak and Van Niekerk 2004; in Van Niekerk 2011, p. 1).

The Act and Framework provide one of the first legislative frameworks in the global South that emphasises the decentralisation of DRR⁸ activities (Pelling and Holloway 2006; in Van Niekerk 2011), and the involvement of civil society in DRR (Van Niekerk 2011). Rather than identified as a line function, DRM is required to be the responsibility of all spheres and sectors of government, and should be integrated into all aspects of development planning (Botha *et al.* 2011). For this reason, it forms part of the IDP (Botha *et al.* 2011). Despite this framework and legislation, however, DRM in South Africa, including at the local level, has historically focused on response and relief as opposed to risk reduction (Botha *et al.* 2011). A study commissioned by SALGA in 2011 on progress

⁶ Disaster management will be used to refer to the specific activities undertaken by the unit responsible for disaster risk management (DRM) in the CoJ, named the Disaster Management and PIER (Public Information, Education and Relations) Directorate (referred to as the DMD in this study). South Africa's Disaster Management Act (DMA) was passed just prior to significant international emphasis on referring to disaster management as disaster risk management (DRM) in 2003/4 (United Nations 2004, Boshier and Dainty 2011 in Van Niekerk 2011). This was to move beyond the emphasis of disaster management on post-disaster activities, as opposed to proactive disaster risk management (Van Niekerk 2011). At the CoJ, however, the term 'disaster management' was still used to refer to DRM-related work during the research period.

⁷ Disaster Risk Management (DRM) refers to the process of *managing* disaster risk, defined by the United Nations International Strategy for Disaster Reduction (UNISDR) (2009) as 'the systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster'.

⁸ Disaster Risk Reduction (DRR) (also called "disaster reduction") refers to 'the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters' (UNISDR 2009).

in implementing the Act at the municipal level demonstrated that most district and local municipalities had inadequate DRR measures in place (Botha *et al.* 2011).

4.1.4 Municipal action on climate change

During the research period from 2008 to the end of 2009, limited enabling national and provincial frameworks existed for assisting local governments to tackle climate change. Despite this, urban adaptation planning in South African cities such as Durban (Roberts 2008, 2010) and Cape Town (Mukheibir and Ziervogel 2007) was relatively well-progressed in comparison to other African cities, and identified as a ‘model’ for other African countries to follow (Hope 2009, p. 655). Durban, in particular, has received significant attention and research interest in its adaption programme, and has been identified as an ‘early adapter’ (Carmin *et al.* 2009).

Johannesburg’s adaptation programme had lagged behind these South African cities, although a CCVA (2008c) and CCAP (2009a) were developed. Holgate (2007) ascribes the poorly-developed mitigation programme in Johannesburg to a lack of institutional capacity and a fragmented structure from the creation of ‘semi-privatised’ utilities, which reduced ‘Johannesburg’s control over possible climate change programmes’ (Holgate 2007, p. 482). In comparison to Cape Town, Johannesburg was also not able to make ‘the same progress in creating partnerships with outside bodies’ (Holgate 2007, p. 482). Holgate (2007, p. 482) contends that the CoJ had ‘little communication with the provincial or national government’ and ICLEI was the ‘sole driving force’ behind its climate change programme.

4.2 Johannesburg development and governance context

4.2.1 Johannesburg profile

Johannesburg is the largest city in South Africa in terms of surface area and population, covering 1 644 square kilometres (CoJ 2006b) with 4 397 282 people (SuperCROSS 1993-2013). The city’s population is predominantly African at 77.8%, with 12.4% White, 5.6% Coloured and 4.9% Asian or Indian (SuperCROSS 1993-2013). Johannesburg has the highest population density in the country, at some 2 363.6 people per square kilometre in 2007 (Stats SA 2007). Johannesburg is divided into seven administrative areas, with Soweto making up Region D (Figure 2).

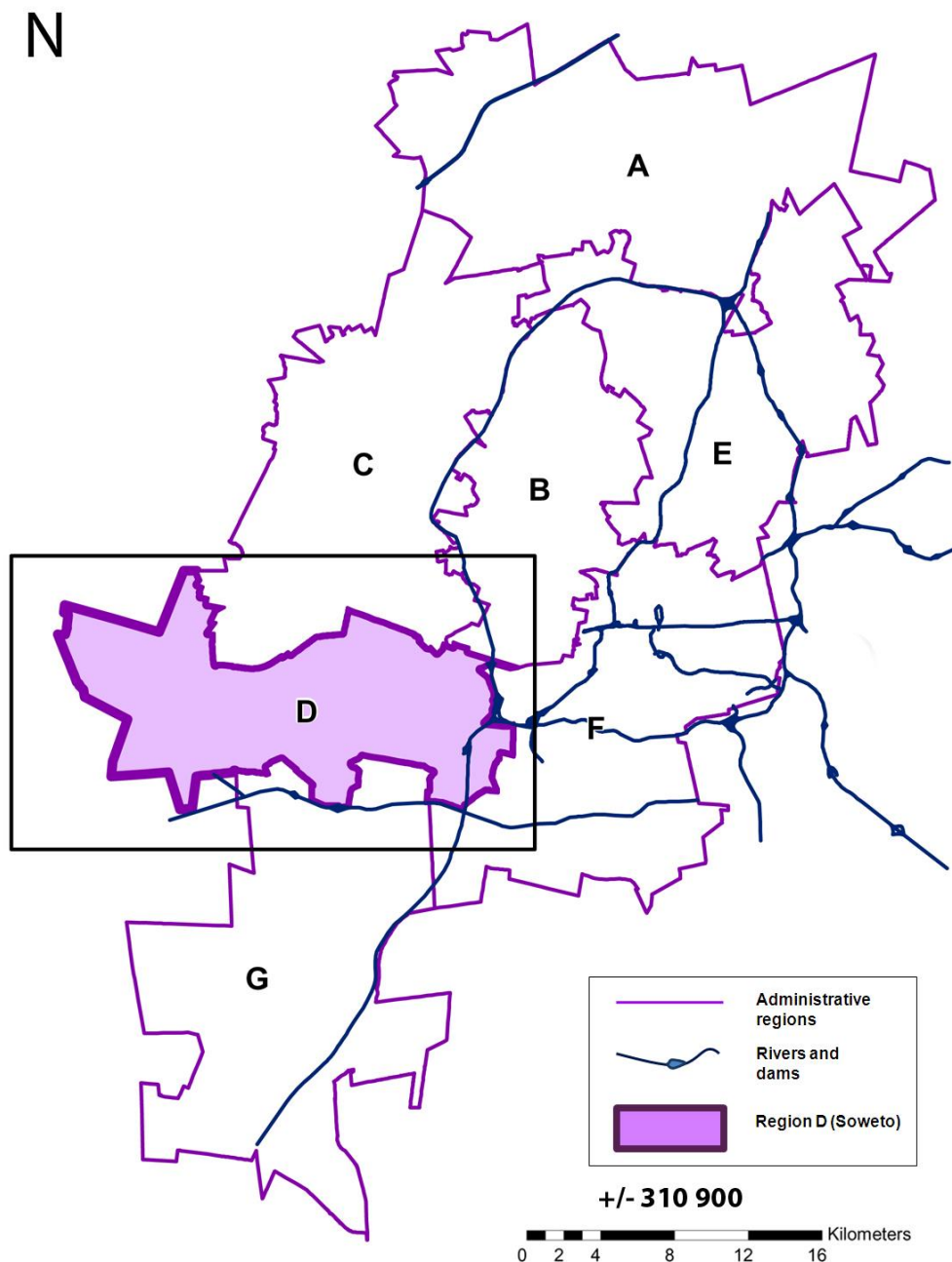


Figure 2: The seven administrative regions of Johannesburg and location of Soweto.

Source: CoJ 2010b, p. 38

Johannesburg is situated within Gauteng, the most populous (12 272 263 people) and economically prosperous province in South Africa (Stats SA 2012). The city is the financial and economic capital of the country. It is the largest metropolitan economy in South Africa and in 2009 contributed about 48% and 17% to provincial and national economic outputs respectively (CoJ Annual Economic Review 2009). Despite Johannesburg's strong economic position, it had a high unemployment rate of 23.1% in

2010 (Global Insight 2010; in CoJ 2012). In 2012, Soweto was the most densely populated region in Johannesburg (CoJ 2012) and had the highest level of unemployment in Johannesburg at 42.7% (Malikane *et al.* 2012; in CoJ 2012). Significant differences in socioeconomic development exist across a city, characterised by high inequality levels and spatial differences in poverty levels (CoJ 2012). Soweto has particularly high concentrations of poorer households (CoJ 2011a). This region, therefore, needs to be understood as distinct from Johannesburg in terms of its socioeconomic challenges and vulnerability to flood risk.

Geographic characteristics

Johannesburg is one of the few cities in the world that is not situated near a lake, coast or navigable river (CoJ 2003a, CoJ 2008d), and therefore is often not regarded as a high-impact site for climate change (CoJ 2009a). However, localised flash flooding is expected to intensify with a changing climate from increasingly heavy storm events (CoJ 2009a, Fatti and Vogel 2010) and urban development pressures (CoJ 2009a). Johannesburg is located on the interior highveld plateau of South Africa, approximately 1740 metres above sea level (CoJ 2003a).

Johannesburg is on a continental watershed (the Witwatersrand), consisting of a line of ridges with rain water draining north and south of the ridge into two of Africa's largest rivers, and then into the Atlantic and Indian oceans (CoJ 2003a, CoJ 2008a, CoJ 2008d). The two major river systems in Johannesburg are the Klip River draining to the south of the watershed (Upper-Vaal catchment area, flowing westwards to the Atlantic Ocean), and the Jukskei River draining to the north (Crocodile-Marico Catchment area, flowing eastwards into the Indian Ocean) (CoJ 2008a, CoJ 2008d).

Climate trends

Johannesburg's climate is mild, sunny and fairly dry (CoJ 2009a). The average maximum daytime temperature is 25°C in summer and 17 °C in winter (CoJ 2009a). Rainfall occurs predominantly in summer, in the form of late afternoon downpours associated with thunderstorms from October to April, but only infrequently occurs in winter (CoJ 2009a). The average annual rainfall is 713 millimetres (CoJ 2009a). The majority of precipitation in the highveld region is a product of convective thunderstorms (Fatti and Vogel 2010). Most flooding and heavy rainfall events affecting Johannesburg are a result of these storms (Tyson and Preston Whyte 2000; in Fatti and Vogel 2010).

Assessments of climate change projections indicate that thunderstorms in Gauteng may decrease in frequency, but increase in intensity (CoJ 2009a, Engelbrecht *et al.* 2009; in Fatti and Vogel 2010). As average storm intensity increases, heavier storms are also likely to increase (Fatti and Vogel 2010). In line with these initial projections, a study of past precipitation and storm trends in Johannesburg found a ‘highly significant’ decrease in the total number of storms over the study period from 1960 to 2008, but a ‘highly significant increase in average rainfall per storm’ (Fatti and Vogel 2010, p. 59). A heavy storm event was classified in this study as more than 10mm of rainfall (Fatti and Vogel 2010). From this study, some tentative conclusions could be drawn; namely for an increasing intensity of thunder storms in Johannesburg for the period 1960-2008 (Fatti and Vogel 2010).

4.2.2 Soweto: background to the study area

‘Soweto’s image ranges from a township that is poverty-stricken and sprawling to one that is vibrant and cosmopolitan. It is an area with huge buying power, yet historically, it has been removed from economic developments’ (CoJ 2011a, p. 2).

Soweto, or Region D, is short for ‘South-western townships’. It is located 15km south-west of Johannesburg’s central business district (CoJ 2011a). The township covers approximately 150 km², just over 9% of the Johannesburg area (CoJ 2011a). Figure 3 shows the main areas of Soweto. It is the largest ‘township’ in South Africa and where about 43% of Johannesburg’s population resides (CoJ 2011a). Soweto developed gradually out of a number of African townships established by colonial and apartheid governments over more than five decades (CoJ 2011a).



Figure 3: Map of Soweto.

Source: Adapted from Open Street Map Contributors, available under the Open Database Licence

Johannesburg is characterised by stark geographical differences in poverty levels (CoJ 2012). As with all other South African cities, Johannesburg was affected by the legacy of apartheid's 'separate development' where many black residents live in poor quality housing without adequate access to services, many in former 'black townships' and informal settlements on the outskirts of the city and away from the economically active centres (Beall *et al.* 2000, p. 107). This pattern of development has by and large continued. The CoJ estimated in 2009 that there were 180 informal settlements, predominantly located in the southern areas and along the urban peripheries, often far removed from and job opportunities in the central and northern parts (CoJ 2008e, CoJ 2009b, p. 13).

Soweto has been identified as one of six 'deprivation clusters' in the city (CoJ 2012). The CoJ defines deprivation clusters as dense areas of concentrated poverty with low measures related to income, employment, education, health and living environment (CoJ 2012). Region G (including Orange Farm) has the highest number of people living in

poverty, followed by Region D (Soweto) (Malikane *et al.* 2012; in CoJ 2012). Within Soweto, there are high-, middle- and low-income areas and infrastructure development differs markedly. Approximately 200 000 households live in informal settlements (CoJ 2011a). Between 600 000 and one million Sowetans live in ‘abject poverty’ (CoJ 2011a, p. 2). Soweto has been the significant focus of many of the CoJ’s social and economic upliftment efforts in Johannesburg. Despite noteworthy achievements in the development of Soweto, these socioeconomic challenges remained during the study period.

Flooding in Soweto

Prior to the 2009 flood disaster in Soweto, localised flooding had become a growing concern in the area, aggravated by poor storm water infrastructure. Media reports were found covering flash floods in Soweto during the summer months of 2005 (Russouw 11 January 2005), 2006 (South African Press Association [SAPA] 24 December 2006) and 2007 (SAPA 10 December 2007). The CoJ’s 2008 Growth Management Strategy (CoJ 2008e, p. 12) reported that Soweto’s ‘most significant infrastructure constraints relate to storm water, street lighting and road infrastructure’. Dirt roads and a lack of vegetated payments also contributed to the siltation of the Klip River, reducing the retention capacity of the river during storm events (CoJ 2010a). The Klip and Klipspruit Rivers had been severely degraded in recent decades, including changes to flow patterns (CoJ 2010a).

Bram Fischerville was one of the areas most affected by the Soweto floods in 2009 (see Figure 3). A 2011 newspaper article in the Mail & Guardian highlighted the challenges of storm water drainage systems in this area, particularly in extension 13 (De Klerk 15 April 2011). Households were reportedly experiencing flooding, sewerage overflows and impassable roads from heavy rains every year, and water logged conditions during and outside of the summer rainy season (De Klerk 15 April 2011).

A senior CoJ planning official highlighted at a workshop in September 2009 that Bram Fischerville is a ‘classic example’ of a development ‘approved long ago’ under older legislation. This old legislation (Water Act, No 54 of 1956 and Town Planning and Township Ordinance of 1986) required lesser flood lines be taken into account until 1998, when new water legislation (National Water Act, No 36 of 1998) required developments to be built outside of 1:100 year flood lines (CoJ Report 2008a). Land use change from intense development had also altered flood lines and meant new areas were at risk,

including areas such as Bram Fischerville where more conservative flood line assessments were not applied (CoJ Report 2008b).

Flood risk in Bram Fischerville was intensified by a range of other development challenges – illustrating the interconnected nature of climate and development challenges in shaping risk. Reports from Bram Fischerville communities in the annual CoJ planning processes in the 2009/10 financial year revealed multiple risks facing residents (Table 2). These included health problems such as HIV / Aids, storm water drainage issues, crime, as well as a lack of electricity, health facilities, recreational amenities and green spaces. This demonstrates the ‘multiple stressors’ impacting on low-income communities in Soweto, with the potential of climate stress to ‘further undermine development efforts’ (Reid and Vogel 2006, p. 195).

Johannesburg’s inequality and high levels of informality meant that the vulnerability to flood risk was not evenly distributed across the city, with the poorest residents most severely impacted. Soweto was particularly vulnerable due to high poverty rates, a lack of protective infrastructure against flooding such as storm water drainage, river degradation, a large number of informal and low-income housing settlements within low-lying and flood-prone areas, and the build-up of silt and waste in storm water drains from dirt roads and infrequent waste collection services. These communities had limited assets, including household insurance and reliable income, to enable them to recover from flood events. Flood risk presented an additional stressor to these households already managing a range of problems, thus decreasing the overall resilience of communities.

Flooding in Soweto also needs to be understood in the context of changes to the city’s whole drainage system. Land use change from intense development, including the loss of open space, encroachment or infilling of wetlands, interference with springs and aquifers, and increased hard surfacing, had resulted in increased runoff and reduced infiltration of water into the ground (CoJ 2008a). Encroachment into floodplains affected the natural ability for the landscape to dissipate floods and reduced the area for water to disperse, thus increasing the runoff rate and flooding downstream, as well as cutting away and eroding river banks (CoJ 2008a). The CoJ’s urban densification policies had also served to increase flood risk, contributing to more hard surfacing (Davie 2006, CoJ 2008a).

Table 2: Issues raised by Bram Fischerville residents in the 2009/10 IDP consultation process.

Resident comment	CoJ response
Ward 44: Help us with a mobile clinic as we go to Dobsonville (another area of Soweto). Teach us about HIV because young people are dying.	R8 million has been allocated by Gauteng Health Department for upgrading in the 2009/10. The local NGOs will be utilised to spread information on HIV and AIDS. Jozi Hlomile volunteers educate communities.
We need street lights because people are being killed in the dark.	To be investigated and the necessary steps taken, including discussions with Eskom ⁹ .
I would like to ask Eskom that if they can stop fixing electricity for at least a week, because in Bram Fischer electricity is a problem. We live a week or two weeks without electricity and when you call they don't come.	To be investigated and the necessary steps taken, including discussions with Eskom.
We are having free spaces which can be used for parks, libraries, community halls. These spaces are no good for us because criminals use them. We do not have places for kids to play. We do not have speed humps.	To be referred to Community Development, Johannesburg Roads Agency (JRA) and Johannesburg City Parks (JCP).
The status of their request for the City to buy that empty land for business developments. Storm water drainage is also a problem.	The City requested to develop an area map for Bram Fischerville.

Source: Adapted from CoJ 2009b, p. 40-78

Overburdened storm water infrastructure was unable to divert increased volumes of storm water entering the system (CoJ 2009a). In the CoJ Customer Satisfaction Survey (CoJ 2009c) conducted during the year of the Soweto floods (2009), storm water received the third lowest score (31.5% households dissatisfied) when measuring the proportional dissatisfaction with core household services (Figure 4). Lack of drainage (77.4 % of the dissatisfied) was given as the major reason for dissatisfaction with storm water systems

⁹ South Africa's national electricity utility

(CoJ 2009c). It was found that ‘exceptionally low satisfaction ratings were recorded’ for Greater Soweto (CoJ 2009c, p. 51).

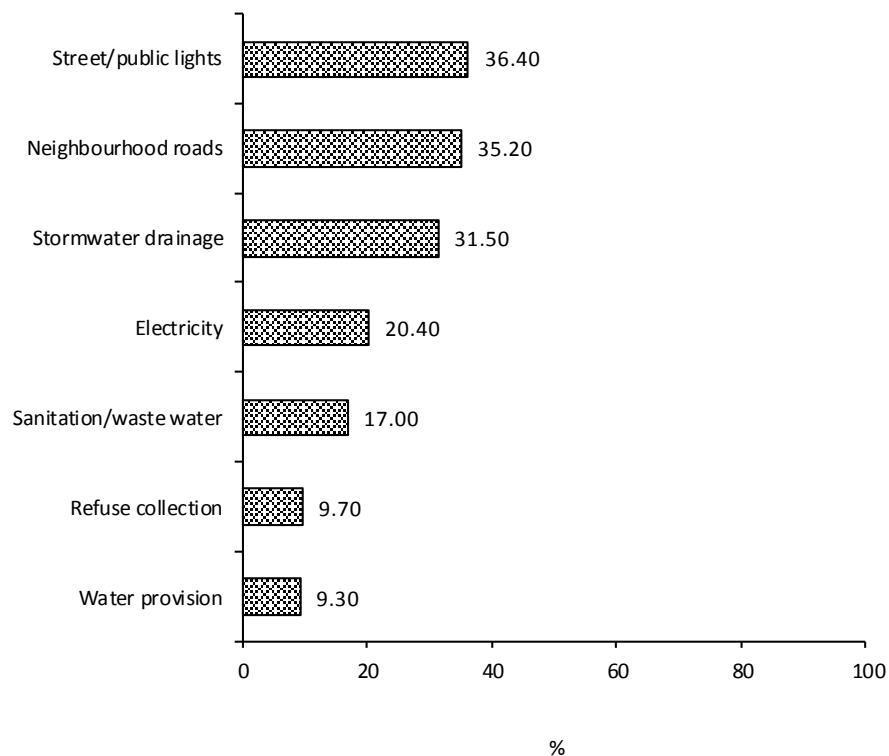


Figure 4: Proportion of houses dissatisfied with core services.

Source: CoJ 2009c, p. 11

Although poorer areas were particularly vulnerable to flash floods, middle and higher income areas were also at risk due to increased densification and hard surfacing (CoJ Report 2008b). Figure 5 shows the areas of storm water distress and potential flooding points, as reported in 2008. An DPUM assistant director reported in the focus group that ‘map absolutely mirrored what we heard in public meetings’ and warned that if nothing was done the distress points can become flooding points, leading to ‘a real nightmare scenario beyond what it is already showing us’.

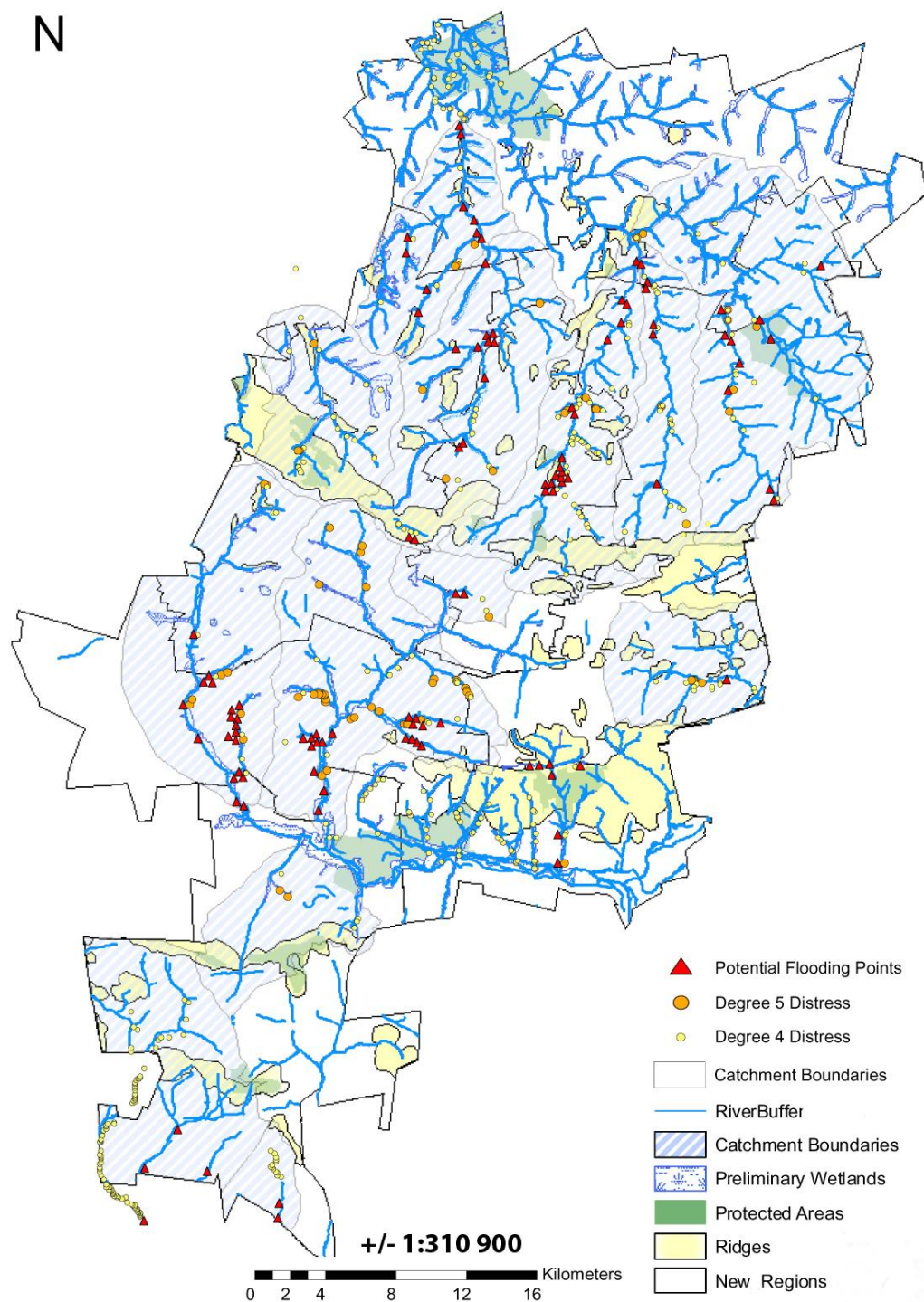


Figure 5: Storm water ‘hot spots’ and potential flood points across Johannesburg.

Source: CoJ 2008e

Flooding was therefore not a climate issue alone, but arose as a result of complex interactions between urbanisation, an apparent increase in the intensity of storm events, and patterns of risk and vulnerability within communities. Certain governance practices

of densification, and poorly located and serviced housing settlements had increased the vulnerability of residents, particularly poorer individuals and households, to climate risk. The CoJ had to govern vastly different settlements and local economies. The CoJ was also pressurised by national government to reach economic growth rates of 9% per year by 2014, above national GDP figures (CoJ 2008e). New infrastructure and services had to be extended to cater for the significant backlog in poorer areas and new developments arising from a recent property boom. At the same time, existing infrastructure had to be maintained and upgraded at high costs. This infrastructure was primarily located in wealthier areas, or the ‘first economy’, where stronger and more demanding resident associations were better able to participate and access local government participation forums (Pieterse *et al.* 2008). This was while the demand for municipal services continued to grow as a result of migration to the city and population growth (CoJ 2008b).

Johannesburg highlighted the central tension in the post-apartheid South African city between improving economic viability in an increasingly competitive and globalising world, versus the state’s ‘developmental’ mandate to alleviate poverty (Beall *et al.* 2000). The CoJ was simultaneously attempting to balance its commitments for attracting investments and becoming a ‘World Class African City’ – the vision driving Johannesburg’s growth and development – while catering for the majority black urban population previously denied a secure base in urban areas (Beall *et al.* 2000). It can be deduced that these tensions may have outcomes for how flood risk was experienced and governed in Johannesburg and Soweto.

4.2.3 Local government transition in South Africa

Local government in South Africa has been through a period of major transition since the advent of democracy in 1994 – both in terms of policy ambition and institutional change. In 1996, the Constitution established ‘local government as an autonomous sphere’ and the White Paper on Local Government gave content to this new system and ‘developmental local government’ (van Donk and Pieterse 2006, p51). Developmental local government is defined in the White Paper on Local Government (1998, no page reference) as ‘local government committed to working with citizens and groups within the community to find sustainable ways to meet their social, economic, and material needs and improve the quality of their lives’.

This new local government system established municipalities as a central agent of post-apartheid transformation. South African cities have been sites of major change having to create ‘one city government’ and tax base involving amalgamating many almost-bankrupt black authorities, wealthy white authorities and management committees for Indian and Coloured areas (van Donk and Pieterse 2006). Adaptive governance in Johannesburg needs to be understood in the context of this significant institutional change. In Johannesburg and elsewhere, these transitions had to a large extent created an uncertain operational and political environment. The introduction of new planning instruments such as IDPs and performance management systems (PMS), in line with international public administration trends at the time, also meant personnel had to learn how to use these mechanisms effectively over time. These features of a changing governance regime could be expected to have outcomes for any governance initiative, including flood risk reduction.

4.2.4 City of Johannesburg governance structure and systems

In 2009, approximately 25 000 people were employed by the CoJ in central and regional offices, and about 14 800 in core departments (CoJ 2009b). The CoJ government system consisted of a legislature and executive. The executive comprised the office of the executive mayor and city manager (CoJ 2011a). The CoJ was led by the ruling party in South Africa, the African National Congress (ANC), after winning municipal elections in 2000 and 2006. The executive mayor was assisted by the MC and led the executive arm of the CoJ (CoJ 2011a). All executive powers were vested in the mayor who was responsible for the strategic direction of the CoJ, taking political responsibility as directed by the Council and assigned by legislation (CoJ 2011a). Councillors appointed to the MC (known as Members of the Mayoral Committee or MMCs) took charge of different portfolios (CoJ 2011a).

The CoJ had thirteen departments – structured into 13 sectors – as well as seven departments in the office of the executive mayor (CoJ 2009b). The executive directors of these departments formed the Executive Management Team (EMT) and reported to the city manager. Fifteen city-owned Municipal Entities (MEs) established as separate companies as per the Companies Act (No 61 of 1973) and were responsible for service delivery in the city (CoJ 2011a). The core departments had oversight over the MEs *in their sector*. For example, the EMD had oversight only over the JCP and the

Johannesburg Zoo. Figure 6 depicts the CoJ structure and relationship between central departments and MEs.

Planning and performance management systems

The GDS set the overall strategic direction for Johannesburg, including the development vision and paradigm. From the GDS, the five-year IDP was created to operationalise this development vision over the medium-term and was updated annually (see further detail on the IDP in section 3.3.3). The Spatial Development Framework (SDF) is also an important element of the IDP (Municipal Systems Act, No 32 of 2000, Section 26 (e)). The SDF provides guidelines for land use management in a municipality (Municipal Systems Act 2000). Regional Spatial Development Frameworks (RSDFs) guide land use for the seven different regions of Johannesburg.

From the annual IDP revisions, annual business plans, Key Performance Areas (KPAs), Key Performance Indicators (KPIs) and targets were set for department and municipal entities in the form of scorecards as part of the CoJ's Performance Management System (PMS) (CoJ 2009b). Based on these departmental and organisational scorecards, individual scorecards were finalised to achieve 'alignment between organisational and individual performance' (CoJ 2009b, p. 124). The PMS was one of the mechanisms through which the CoJ aimed 'to improve organisational and individual performance to enhance service delivery' (CoJ 2009b, p. 124). The PMS is informed by a number of pieces of legislation, the most significant being the Municipal System Act (2000, Chapter six, section 38 (b), emphasis added), which requires all municipalities to 'promote a *culture* of performance management' through the establishment of a PMS and outlines the framework for PMS within municipalities. The outcomes of the CoJ's performance culture for flood risk governance will be examined in chapter seven through tracking the institutional response to the Soweto flood disaster.

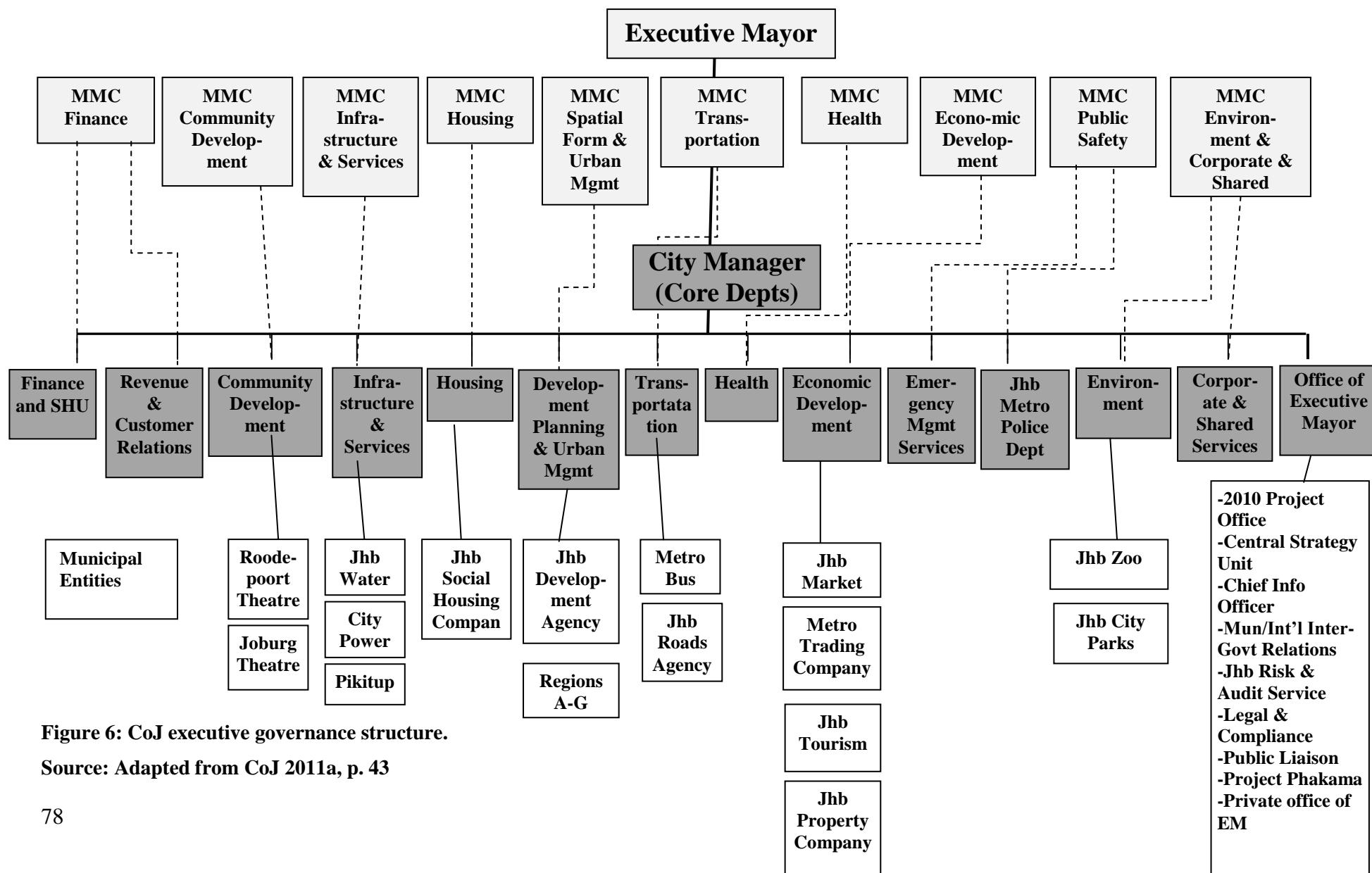


Figure 6: CoJ executive governance structure.

Source: Adapted from CoJ 2011a, p. 43

4.3 The City of Johannesburg environment and climate change function

The EMD was responsible for the environmental management and climate change functions in the CoJ. The EMD was established as a fully-fledged department in 2006 (CoJ 2010c). Prior to 2006, it was part of the Department of Development Planning, Transportation and Environment. Since established, the staff complement had grown from 20 officials in 2006 to some 80 officials in 2010 (CoJ 2010c). The EMD was established as a separate department in order to attempt to raise the status of the environment function in the institution (senior EMD official, pers.comm. October 2010). As its own department, it had its own business plan/scorecard, budget, and political and executive head. This ensured representation at higher levels in the CoJ (DPUM executive director, interview 16 January 2009), and the ability of the EMD to set its own strategic and programme direction.

There were a number of negative outcomes of this institutional change, however, including a distancing of environment and planning functions. A senior EMD official (pers.comm. October 2010) argued this had made it more challenging to integrate sustainability principles into spatial planning and land use management. The official also claimed this meant the EMD had less influence in the CoJ, as the planning function was more powerful in the institution. The official claimed that by separating itself from the planning function, the EMD had less authority over other CoJ actors.

4.3.1 Vision and mandate of the environment and climate functions

The GDS identified climate change as one of the most significant long-term risks to the city (2006a, p. 79). It also set the vision of the environment sector programme led by the EMD. Johannesburg was envisioned in the future to be:

‘An environmentally sustainable city, that anticipates, manages and reduces its vulnerability to potential global and local environmental shocks, and works consistently to reduce the impact of its own built environment and urban processes on the broader envelope of natural resources’ (CoJ 2006a, p. 79).

In its first few years of its existence, the EMD concentrated on developing frameworks, strategies and policies to guide its work (CoJ 2010c). Two separate objectives for mitigation and adaptation were established in the 2006-11 Environment Sector Plan (ESP) to:

- Improve City's resilience to climate change impacts
 - Achieve a 2% reduction in GHG emissions through flagship projects
- (CoJ 2006c)

No separate flooding programme existed under the ESP, nor was flood risk management identified as a separate goal or formal responsibility of any directorates of the EMD (CoJ 2006c). Flood risk management-related interventions, however, were being undertaken by different EMD directorates even if these did not fall under an established flood risk management programme. These interventions will be discussed in section 5.4.

4.3.2 Structure of the environment and climate functions

The EMD was divided into six functional areas, or 'directorates': Air Quality and Climate Change (AQCC), Natural Resource Management (NRM), Environmental Regulatory Services (ERS), Policy Integration and Management Support (PIMS), Waste Policy and Regulation (WPR) and Municipal Entity Service Delivery Compliance and Monitoring (SDCM). The SDCM monitored the work of JCP and the Johannesburg Zoo. Despite intensive recruitment and an increase in staff complement from 2006, the Department maintained it did not have adequate human resources and as a result had to outsource much of its work to external service providers (CoJ 2010c). It attracted a limited proportion of the total city budget – approximately 4% of the total (CoJ 2010c). The Department was expected to supplement its budget with external donor funding and command resources through influencing other departments and entities to integrate environmental work into their activities (CoJ 2010c, EMD focus group 25 January 2009).

4.3.3 The climate change programme

The climate change function was established in 2006 and was led by the CCCP Sub-Directorate of AQCC. Prior to the floods, only four officials were working on the climate change programme, as well as a few interns and the Clinton Climate Initiative (CCI) city director providing additional technical assistance for mitigation-related work. The director for AQCC characterised the Directorate's role as predominantly a facilitator of climate work by other departments and municipal entities, as well as guiding internal actors within the EMD (AQCC director, interview 22 September 2010). The director highlighted that many responses to climate change adaptation were being undertaken by other EMD directorates, such as NRM in terms of open space planning and storm water and catchment management, and ERS in terms of integrating climate protection into

development planning through assessing development applications (AQCC director, interview 22 September 2010). Section 5.3 and 5.4 will also demonstrate that a number of other CoJ actors were also involved to varying extents in flood risk management-related work.

The director identified the adaptation programme as more challenging than mitigation response due to its more ‘abstract’ nature. The director argued that because Johannesburg is not a coastal city, climate change is perceived as less of a threat: ‘the case is less urgent in Johannesburg’. Therefore, prior to the floods, senior management of the AQCC saw a role for the Directorate in influencing the work of other CoJ actors in the adaptation arena, as opposed to devising and leading its own programmes. This leadership appeared to be struggling to understand and justify the adaptation agenda in Johannesburg where climate impacts are less visible and dramatic compared to coastal cities. It is deduced that mitigation response was more incentivised due to a range of factors including pressures from national government for municipalities to reduce energy demand following an energy crisis in 2007, and the potential financial gains from mitigation including raising carbon revenue and achieving energy efficiency.

4.3.4 Institutional climate change decision-making mechanisms

The primary institutional structures established to facilitate both political and operational climate change decision were the Mayoral Sub-Committee on Climate Change (MSCC) and the Johannesburg Climate Change Coordinating Committee (JCCC). Mayoral Sub-Committees were ‘established to facilitate working relationships between the political leadership of the MC and the senior management of the city manager’s team’ (CoJ website (no author), accessed 21 July 2012). The creation of the MSCC indicated strong political buy-in to climate change as a top city issue (DPUM executive director, interview 16 January 2009). Its purpose was to ‘ensure coordination of the climate change programme for the city in respect of mitigation and adaptation’ (CoJ Report 2007a, p. 1.3). Figure 7 depicts the governance structure for climate change adaptation at the CoJ during the research period.

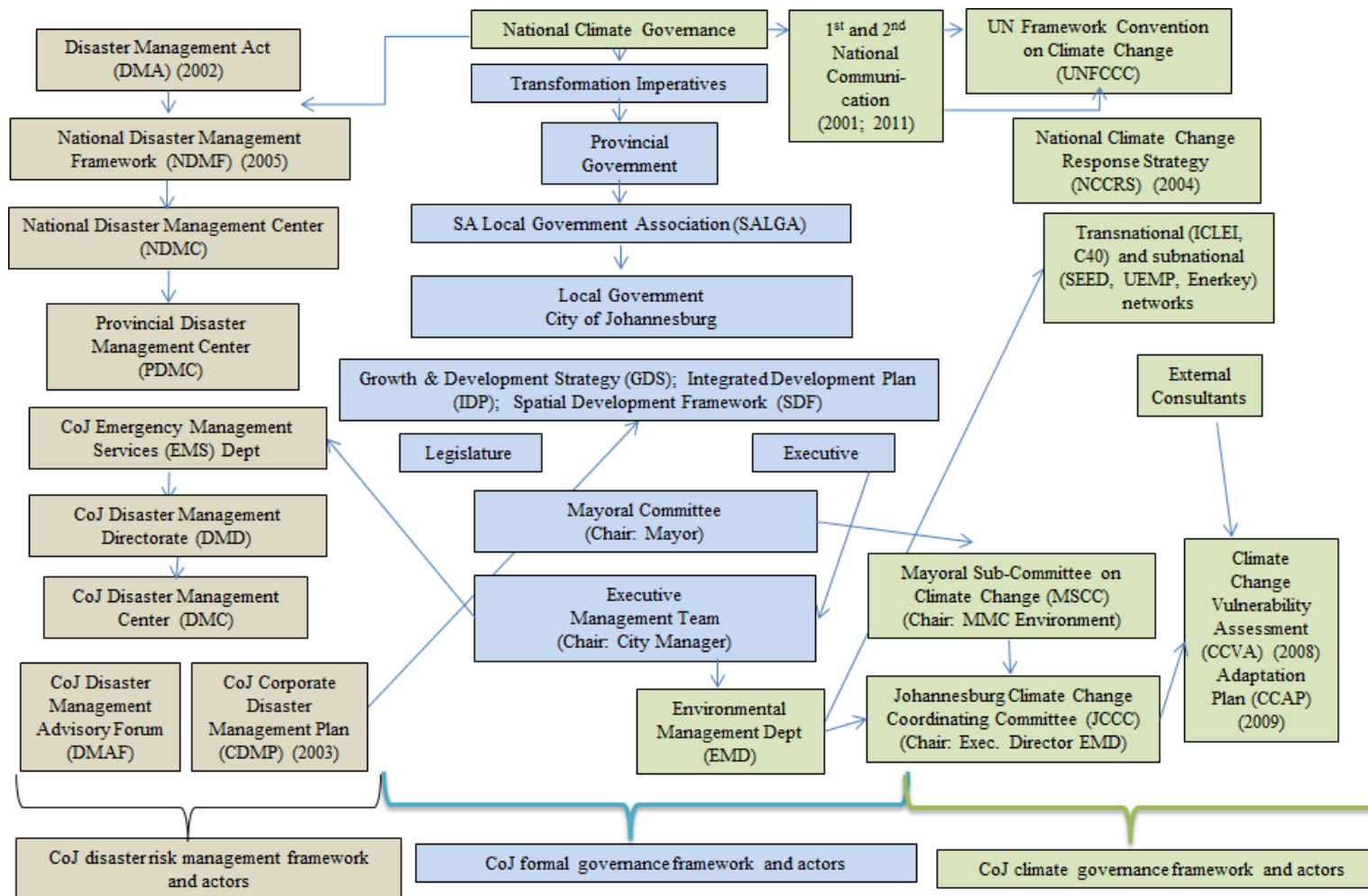


Figure 7: CoJ climate change and DRR governance structure.

The quarterly meetings of the MSCC were chaired by the MMC for environment and attended by both senior administrative officials and MMCs of departments identified as having strong links to climate change issues. Members of the committee included: Environment, Infrastructure and Services, Corporate and Shared Services (CSS), Finance and Economic Development, Transportation and DPUM. MEs in these departments' sectoral groupings were also members (CoJ Report 2007a, p. 1.3). MEs were often not in attendance, however, including the JRA and Joburg Water (JW). Most representatives on the committee had stronger links to mitigation rather than adaptation work. Key adaptation-related stakeholders such as the departments of Emergency Management Services (EMS) (including the Disaster Management Directorate) and Health (including Environmental Health [EH]) were not members and did not attend meetings during the period under review.

The JCCC was the operational arm of the MSCC. It was set up to integrate and align climate change activities across CoJ entities and departments, strategise and gain input on projects and gain for support from other local entities for climate change programmes (CoJ Report 2007a, AQCC director, interview 22 September 2010). The CCCP organised and facilitated the JCCC, which was meant to meet quarterly with its work feeding into MSCC meetings. The following actors were members: Environment, Infrastructure and Services, DPUM, Housing, Transport, as well as the MEs JW, City Power, Pikitup, JCP and the JRA (CoJ Report 2007a). It was originally intended for the JCCC to comprise of senior officials, or those officials with full delegated authority to make decisions on behalf of the Department or ME (CoJ Report 2007a).

It was observed that all JCCC members did not attend meetings regularly, with ME representation particularly poor. As with the MSCC, adaptation role-players did not attend prior to the Soweto floods. It will be shown, however, that more adaptation stakeholders participated in 2009, through the development of the CCAP and heightened awareness of climate risk issues from the Soweto floods. Rather than enabling collaboration and knowledge sharing around particular programmes, the JCCC predominantly served as a forum in which actors could report on work done, with collaboration and learning taking place outside the forum on specific initiatives. Most of the progress on mitigation programmes had been achieved predominantly *outside* of the JCCC forum.

National and provincial engagement

Few mechanisms appeared to be in place for enabling decision making across the local, provincial and national spheres of government – despite the NCCRS (2004) establishing intergovernmental collaboration as a principle of state response (DEAT 2004, p. 29). The links between the CoJ and national were reported to be weak and formalised communication channels limited (AQCC director, interview 22 September 2010). The CCCP's main interaction with the national level was through occasionally attending meetings of the National Committee on Climate Change (NCCC), and DEAT (from 2009 known as the 'Department of Environmental Affairs' or DEA) summits such as the National Climate Change Summit held in March 2009 (AQCC director, interview 22 September 2010).

National government primarily engaged with local government through SALGA. SALGA organised one-day working sessions in 2009 in most of the provinces of South Africa for municipalities to give input into the municipal components of the NCCRP. It was perceived by some CoJ officials, however, that the CoJ was brought into the national policy-making process to a sufficient extent with consultation and participation occurring 'end of pipe' (Hajer 2003, p. 92), once the main directions and principles of the policy were already laid down (AQCC director, interview 22 September 2010). Provincial-local coordination in the area of climate change was observed to be limited during the period under review, with no evidence found of a forum for provincial-local coordination on climate change adaptation.

Sub-national and transnational networks

The EMD and AQCC were connected to a variety of sub-national and transnational networks. Engagement with change issues in the CoJ ostensibly began with its participation in ICLEI's CCP Programme in the late 1990s, although this did not result in any concrete mitigation actions (Holgate 2007). The CoJ was not actively engaged in this network during the research period.

Another influential transnational network in Johannesburg was the C40 Cities Climate Leadership Group. The C40 was a group of the world's largest cities which had pledged to take action on climate change and share knowledge and resources on their programmes and plans. The CCI, as partner to the C40, assisted the CoJ on municipal building retrofits, transport-oriented mitigation projects and waste management projects. The CCI

and C40 continued to advance the mitigation agenda at the CoJ, although an adaptation focus was growing within this network. The C40 Summit in Tokyo in October 2008, where cities met to share best practices, focussed solely on adaptation and included knowledge exchange on urban flooding and disasters, water management, food security and temperature rise in cities (CoJ Report 2009c). The CoJ signed up to a variety of adaptation ‘joint actions’ where cities undertook to exchange technical knowledge, including the promotion of flood risk management measures to enable adaptation and establishing evacuation and information delivery systems for disasters (CoJ Report 2009c). No technical exchanges took place during the research period related to any of these actions after agreeing to this cooperation in 2008.

Sub-national networks also had influence in Johannesburg. In about 2007, the CoJ began participating in phase 3 of the Sustainable Energy for Environment and Development (SEED) Programme, funded by the International Danish Development Agency (DANIDA) and led by the South African NGO Sustainable Energy Africa (SEA) (CoJ Report 2007b). The SEED programme, however, did not lead directly to the implementation of energy efficiency and renewable energy programmes in Johannesburg. Through the DANIDA-funded Urban Environmental Management Programme (UEMP) in South Africa, the CoJ was one of a number of municipalities that received funding for sustainable urban interventions for five years, including climate change related projects (CoJ Report 2008c). It is beyond the scope of this research to track the reasons for the implementation challenge surrounding work initiated through network membership, save to highlight that this form of networked governance may be limited in promoting concrete action. This reflects research by Bulkeley and Betsill (2003) on the influence of the CCP Programme in global North cities where transnational network membership failed to result in concrete policy learning and change.

4.4 Conclusion

This chapter has outlined the development and governance context for flood risk governance in Johannesburg. The Soweto floods occurred in the context of a complex climate governance reality shaped by political, societal and institutional change, as well as significant development challenges on the ground. It has shown that flood risk was a result of an interaction of a number of drivers related to urban development, socioeconomic and governance dynamics, and not a climate issue alone. Significant land use change, river degradation and increased hard surfacing from rapid and intense

development had altered the drainage systems of the city, leading to flood prone areas across Johannesburg. Governance factors also played a prominent role. The most notable were inadequate service delivery and infrastructure provision – particularly storm water drainage systems – the location of low-income housing within flood-prone areas and densification practices.

In Soweto, flood risk exposure was worsened by poor storm water drainage infrastructure combined with reduced retention capacity of the Klip River due to siltation from a lack of tarred roads and vegetated pavements (CoJ 2010a, CoJ 2010b). This demonstrates the importance of service delivery for climate protection. It validates arguments by a number of authors that climate change and urban risk reduction are development concerns (Satterthwaite *et al.* 2007, Wisner and Pelling 2009) and ‘good governance’ is central to adaptation (Satterthwaite *et al.* 2007).

The findings also confirmed arguments that vulnerability to climate risk is not evenly distributed across urban systems in cities of the global South (Satterthwaite *et al.* 2007, Moser and Satterthwaite 2008). In Johannesburg, risk distribution had a spatial element where communities located within ‘deprivation clusters’ of concentrated poverty (CoJ 2012), including Soweto and Alexandra, were most at vulnerable to flooding impacts. Wisner and Pelling (2009) note that the distinct urban form of African and spatial distribution of economic privilege inherited by colonial planning approaches have often led to the greatest accumulation of risk in peripheral areas of the African city. This was also evident in the case of Soweto – a previously marginal area located away from the urban core that developed during colonial and apartheid periods. High rates of poverty and low measures related to income, employment, education, health and living environment (CoJ 2012), meant that this settlement was an area of concentrated risk.

Marginalised and poorer communities located in these areas of risk accumulation – including in Soweto – were affected by multiple and interacting risks (Atkins 2012). In Bram Fischer vulnerability to flooding could not only be understood through the impact of a once-off flooding event, but the erosion of climate resilience through the cumulative effect of multiple overlapping and ‘slow onset’ every-day risks (Pelling 2003). These included health issues such as HIV / Aids, risks associated with inadequate service delivery including poor drainage infrastructure, a lack of health and recreational facilities, and high levels of crime. This risk profile increased people’s exposure and

vulnerability to flooding. The finding demonstrates the importance of holistic efforts and solid development processes to address vulnerability across a wide range of stressors (Schipper 2009).

It was shown that an enabling national policy framework for climate change adaptation, and flooding in particular, was absent prior to the Soweto floods. Minimal guidance from national and provincial levels existed on how to respond to climate change at the local level and in cities. Although a progressive national framework for DRR existed, municipalities were struggling with moving beyond reactive response and recovery efforts for disasters (Botha *et al.* 2011). It was found that Johannesburg prioritised mitigation over adaptation. Prior to the Soweto floods, flood risk management was not established as a formal programme nor identified as a strategic goal in the ESP, although a number of interventions related to flood risk management were being pursued under separate EMD programmes.

Some evidence revealed attempts to engender a more collaborative approach to managing climate change, providing some early evidence of a networked governance mode developing at the CoJ related to climate change decision-making. However, mechanisms to enable cross-functional collaboration for climate change, such as the MSCC and JCCC, were partly successful. These institutional mechanisms also concentrated on mitigation-related work as opposed to adaptation and flooding in particular. Vertical engagement with other levels of government appeared to be minimal.

It was shown that the CoJ was emerging from a period of significant institutional post-apartheid reform and change. The separation of the EMD from the planning function was argued by some officials to have reduced the Department's influence over municipal planning efforts, which might have implications of integrating climate protection into planning. An understanding of adaptive governance would need to be sensitive to this shifting development and governance context.

5 PRE-FLOOD RISK REDUCTION AND PREPAREDNESS

Practitioners and researchers in the disaster field commonly understand disaster events in terms of phases of the ‘disaster cycle’ from pre-disaster mitigation and preparedness to response and recovery (NGA 1979; in Neal 1997). This approach is reflected in South Africa’s legislative and policy framework for DRR, which emphasises DRR as a continuous process of long-term risk reduction through the various stages of the cycle (NDMPF 2005).

This study uses this approach to order the research results as well as track events and processes through the disaster cycle to reveal constraining and enabling forces. This chapter examines flood risk reduction measures and the level of preparedness for the Soweto floods. This assessment is undertaken in order to effectively examine the Soweto event in the context of the disaster cycle and prior work to mitigate and prepare for floods, as well as probe the extent to which governance factors shaped preparedness and response efforts. This will be done by exploring the framing of the flood risk issue, significant pre-Soweto flood risk management policy and decision-making, and the effectiveness of disaster management systems.

This chapter also identifies the range of state, semi-state and non-state actors involved and their role in flood risk governance. This is done to reveal the governance landscape for flooding and later explore the degree to which these actors influence the Soweto response and are mobilised in a coordinated effort. Figure 8 provides a timeline outlining key developments in the pre-, during and post-disaster periods.

Pre-Disaster Preparedness 2006-2009	Disaster event 26 Feb 2009	Post-Disaster Response and Recovery 2009-2012
<p>KEY DECISIONS Nov 2008: First flooding report approved by Mayoral Committee; JRA and EMD mandated to investigate causes and response measures; new JRA SWFL Project initiated</p>	<p>26 Feb 16h00 to 18h00: 96mm of rain; Klipspruit River bursts banks</p>	<p>KEY DECISIONS Aug 2009: Second flooding report approved by Mayoral Committee; CCAP approved 2012/16 IDP/TSP: R32 mill Capex allocated to SWFL Study</p>
<p>POLICY AND STRATEGY INTERVENTIONS 2007: Integrated Storm Water Mgmt Plan 2008: Catchment Mgmt Policy and Storm Water Mgmt By-Laws drafted 2008: Climate Change Vulnerability Assessment</p>	<p>26 Feb 18h00: Joint Operating Centre (JOC) established</p>	<p>KEY INSTITUTIONAL EVENTS FOLLOWING SOWETO FLOODS 12 March 2009: Meeting with EMD, JRA, and others on flooding April 2009: EMD reports to EMT on flooding April-July 2009: JCCC meetings Sept 2009: Adaptation Workshop; flooding task team set up Oct 2009: Task teams abandoned</p>
<p>DISASTER RISK MANAGEMENT 2003: Corporate Disaster Mgmt Plan devised 2005: Disaster Mgmt Advisory Forum established 2006: Planning initiated for a Disaster Mgmt Centre 2008: Volunteer database for Soweto and other regions</p>	<p>26 Feb: Flooded houses, evacuations, search for missing persons</p> <p>27 Feb: Executive Mayor (EM) declares a disaster. EM, Pres. Zuma and senior officials visit affected sites</p>	<p>POLICY AND STRATEGY INTERVENTIONS 2009: CCAP developed and FPA study finalised 2010: JRA and EMD work on SWFL project 2010-12: No budget allocated to adaptation, no implementation of CCAP 2010-2012: JRA remains main institutional actor in flood risk reduction; JRA 5-yr target for implementing SUDS (2012/16 IDP/TSP) 2012: No flooding initiatives led by EMD, no adaptation programme in IDP 2012/16 IDP</p>

Figure 8: Timeline of the CoJ's institutional response to the Soweto floods.

5.1 Framing the flood risk issue

Prior to the Soweto floods, the CoJ largely framed flooding as a storm water engineering issue. This had repercussions for the institutional role-players involved and the types of solutions selected to address flooding. The JRA, the municipal entity responsible for roads and storm water in Johannesburg, was consequently one of the more influential role-player in flood risk management. In addition, flood control measures had historically focused predominantly on physical or structural measures appropriate to the situation (CoJ 2007, CoJ 2008a). These included attenuation ponds and swales (to detain runoff), berms (to deflect floodwaters), weirs (to reduce energy), and bank stabilisation (to improve structural integrity of river banks) (CoJ 2007, CoJ 2008a). There was a move, however, to more proactive and sustainable approaches to flood risk management at the regulatory and policy level with the ISMP (2007), CMP (2008a) and Storm Water Management By-laws (drafted in 2008), which will be outlined further in section 5.4. It was too premature, however, to assess the success of the application of these tools as they were being finalised during the study period.

Structural engineering measures were needed, particularly for retrofitting and increasing storm water infrastructure capacity for existing developments where it was too late to remediate through more sustainable means (assistant director, DPF focus group 8 December 2008). In addition, a lack of storm water infrastructure and inadequate storm water maintenance, particularly in informal and low-income housing settlements, played a significant role in contributing to flooding problems. Understanding flooding mainly through the language and lens of storm water management, however, may have been a contributing factor towards constraining more integrated approaches to flood risk management.

A wider approach may have sought to focus on proactively embedding flood risk reduction into urban planning and regulatory systems, improving disaster management systems and enabling community resilience building, amongst others. Pelling and Wisner (2009) highlight four practice areas relevant to urban risk reduction, including development planning (including land use planning, transport planning, critical infrastructure and services), development regulation (building control, pollution control and traffic regulation), risk management (vulnerability and risk assessment and building local resilience) and emergency management (early warning, emergency response and reconstruction planning). Prior to the Soweto floods, some work was being done in these

various areas (as will be explored in section 5.4) but had not yet been drawn together into a comprehensive programme to address flooding in the city.

The tendency towards a technocratic flood risk management approach was also evident through the focus on large-scale and costly technical flood risk reduction measures, such as city-wide flood line assessments. Accurate and up-to-date flood line assessments that considered changes to drainage patterns from urbanisation, were necessary to inform development planning to ensure housing settlements and other developments were not located within floodplains. These assessments were expensive, however; the CoJ would ‘have to throw millions at it’ (director, DPF focus group 8 December 2008). It was questionable whether such funds should be directed at these assessments when disaster management systems were poorly functioning, as shown below.

Evidence of this framing was found through broad analysis of focus groups, documents and observation. In focus groups with DPUM and EMD officials, a number of participants tended to refer predominantly to storm water engineering measures for addressing current flood risk. While these may have been necessary in some cases, this indicated the general propensity towards technocratic approaches and a particular discourse around flood risk management amongst CoJ officials. A senior EMD official remarked in a focus group:

‘Already there are houses within flood lines, so how do we engineer storm water solutions with JRA?’ (senior EMD official, EMD focus group 25 January 2009).

This statement demonstrated the general focus on storm water engineering solutions to manage flood risk. In some cases, however, DPUM officials argued that engineering solutions and retrofitting existing developments were the only option because of past development and the inability of the environment to deal with the excess water:

‘Take the areas just outside the city in Westbury. We have areas where there is a big open space with some sort of a retention pond to deal with excess water going into the area but because of increase in rainfall the pipes, the culverts are too narrow. It is not just your natural spaces you need, but engineering or technology because your environment cannot handle it’ (planning specialist, DPF focus group 8 December 2008).

Although focus group conversations with EMD and DPUM tended towards discussions of technical solutions and storm water management, there was an awareness of more integrated flood risk reduction principles. A senior EMD official highlighted the importance of an integrated approach:

‘There are not integrated plans. Flood management is a planning and land use issue. As long as we talk about catchment, wetlands – that is the tail end for me. How do you plan and roll out processes?’ (senior EMD official, EMD focus group 25 January 2009).

This statement also demonstrates the importance of the tools that were being instituted by the CoJ at policy and regulatory level for flood risk management, and the remaining challenge of their implementation. On 25 November 2008, the MC also approved, in principal, a Major Drain System Capacity Analysis and Flood Line Study (hereafter referred to as ‘SWFL Study’) through a report highlighting flooding issues in Johannesburg, submitted by DPUM (CoJ Report 2008a). The report was submitted by DPUM, with input from EMD. It highlighted the seriousness of flooding in Johannesburg to senior political and administrative leadership, including the executive mayor. It was presented with a preliminary study indicating flooding hot spots across Johannesburg. The report framed flooding in terms of the flood line study.

It identified costly city-wide flood line assessments as a principal response measure to flooding. It highlighted that no comprehensive and up-to-date flood lines existed for the whole city that reflected changes to runoff patterns from urbanisation. This made it difficult to flood-proof future development. Past national water legislation (Water Act No 54 of 1956) and town planning ordinances (Town Planning and Township Ordinance of 1986) required lesser flood lines to be taken into account, or no flood line assessment at all (prior to 1976). This meant that developments constructed during this period may have been located within flood prone areas, as was highlighted in chapter four in the case of Bram Fischerville in Soweto.

While flood line assessments are an important planning tool, the report did not refer to the need to improve or resource existing disaster management systems, integrate flood risk reduction into development planning, or enhance community resilience to cope with

floods. It highlighted the need for ‘engineering responses’ in a number of instances ‘to solve flooding problems’ arising from poor past urban management practices.

In addition to focusing on storm water drainage structures to manage current flood risk, the CoJ’s response to climate change was also positioned in terms of storm water management. An increase in storm water runoff was identified as ‘the most significant impact’ of climate change in Johannesburg, and storm water management planning and design central to responding (CoJ Report 2008a, p.29.2). This evidence and the evidence below, suggested that the storm water management programme was one of the CoJ’s central responses to current and future climate risk.

5.2 Role-players in flood risk governance

Annexure B outlines the diversity of state, semi-state¹⁰ and non-state actors and institutions involved to some extent in flood risk governance. The most significant of these are highlighted in Figure 9. Annexure B and Figure 9 reveal a complex governing reality for flooding. It demonstrates the need for a coordinated, multilevel and cross-sectoral approach to flood risk reduction at the city level. Annexure B includes role-players directly involved in flood risk governance, including emergency operations and risk reduction and preparedness, as well as actors involved indirectly in building community climate resilience through supporting sustainable human settlements, providing services, and addressing poverty, vulnerability and economic growth.

¹⁰ The CoJ’s Municipal Entities (MEs) will also be referred to as ‘semi-state actors’ given that they cannot be classified as purely state or non-state actors. MEs operated as separate companies with managerial practices akin to the private sector, but are wholly owned by the CoJ.

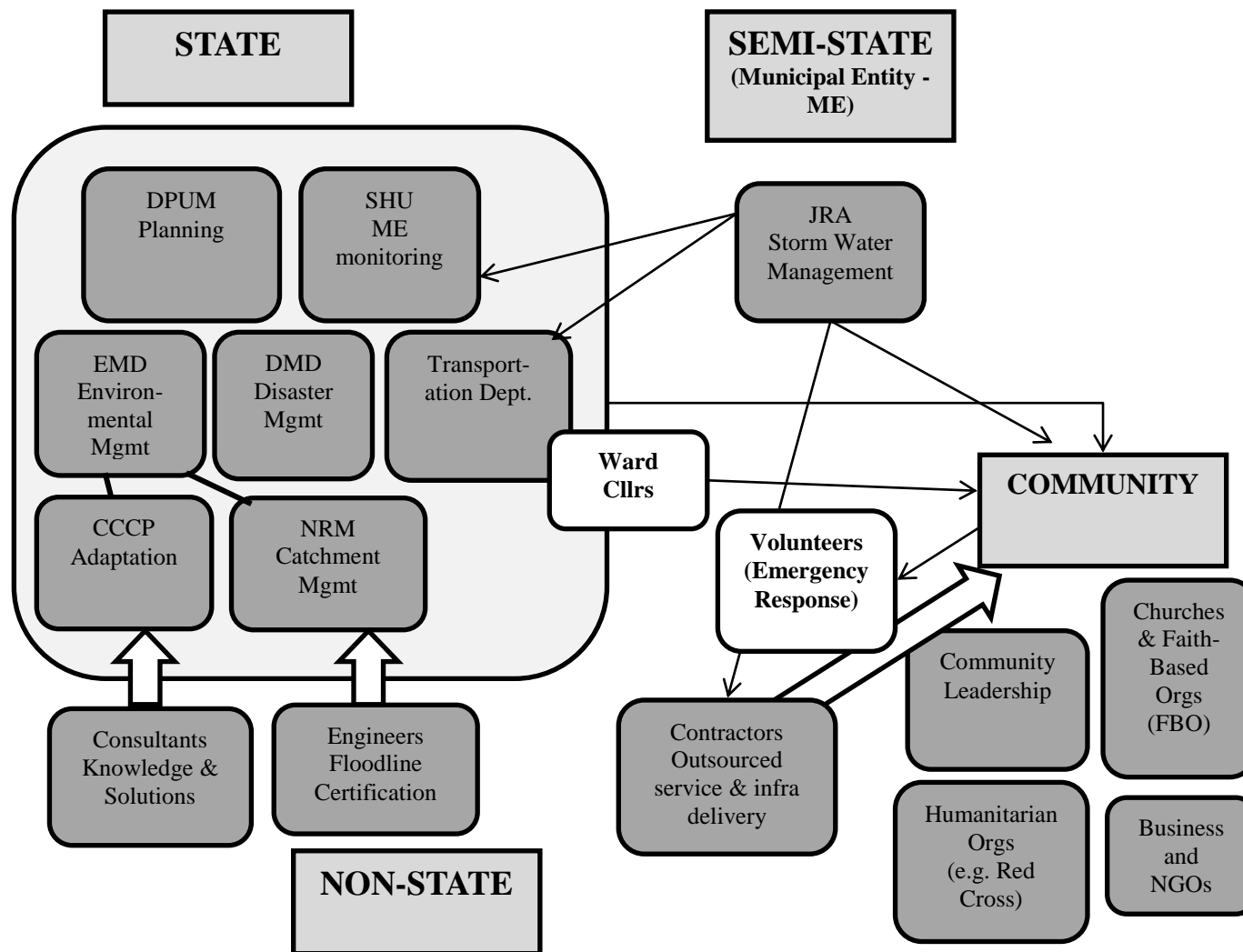


Figure 9: Role-players in flood risk governance.

State actors included approximately ten CoJ departments, seven CoJ regional offices, three provincial actors and three national actors including the National Disaster Management Centre (NDMC). Semi-state actors included seven CoJ MEs and four State-Owned Enterprises (SEOs) such as the South African Weather Services (SAWS) which is the official meteorology office for South Africa. Non-state actors included private consultants providing services to the CoJ, private engineers certifying flood lines, third party sub-contractors hired by MEs for service delivery, community organisations and representatives (such as community leaders, ward councillors, CBOs, NGOs and Faith-Based Organisations [FBOs]), churches, independent volunteers, humanitarian relief organisations, businesses providing donations, amongst others.

From this high-level initial identification of stakeholders, it can be deduced that fragmentation may have proved to be a significant issue in formulating an effective and coordinated response to flooding. In addition, given the cross-sectoral nature of flood risk governance, layers of interdependencies existed with actors reliant on each other to achieve outcomes. The diversity of state and non-state actors might also indicate the resources within society and communities that may be mobilised in tackling flooding. The research will argue a networked governance approach that facilitates relationship building across scales and networks of state, semi-state and non-state actors is central to effective flood risk governance in Johannesburg.

5.2.1 State and semi-state actors

Although there were numerous CoJ actors involved to some degree in flood risk governance, three main role-players could be identified: the JRA, EMD and DMD. Framing flooding as a storm water issue to a large extent, determined the most influential actors involved in flood risk governance and their responsibilities. Prior to the Soweto floods, there appeared to be no institutional actor formally mandated in the five-year 2006-11 IDP to lead a cross-sectoral institutional response to flooding at the CoJ. Flood risk management was not established as a separate long-term goal, objective or programme in the Transportation, Public Safety or Environment Sector Plans, as well as other Sector Plans, including their annual revisions (CoJ 2006d, CoJ 2008b).

It appeared commonly accepted, however, that flood control was mainly in the JRA's remit because of its storm water management mandate. The long-term strategic IDP objective driving JRA's flooding response was linked to protecting the safety of

Johannesburg residents through an effective storm water management infrastructure (CoJ 2006d, CoJ 2006e, p. 97), under the Mayoral Priority of 'housing and services' (CoJ 2006d, p. 121). A semi-state actor, therefore, was the main participant in flood risk management. The EMD was also another important role-player, predominantly in the remit of storm water management regarding progressing Sustainable Urban Drainage Systems (SUDS), as well as catchment, biodiversity and open space management (CoJ 2006c, p. 157-164). In addition, the EMD was increasingly perceived as a key actor in flood risk governance due to its responsibility to advance the climate change adaptation agenda in Johannesburg.

There were a number of instances where the JRA and EMD were formally required to collaborate on flood risk management. The 2006/11 IDP (2006d, p. 179) required the JRA and EMD to work together on a Storm Water Development Plan that was linked to the CoJ's CMP. The CoJ Report (2008a) also formally mandated the JRA and EMD to investigate flooding causes and response measures. This allocation of institutional responsibility for flood risk management to the JRA and EMD was also validated in focus groups. A DPUM deputy director argued that it was the JRA and to a lesser extent the EMD's responsibility to undertake flood line assessments and create a framework against which to assess development applications and embed flood risk reduction into development (deputy director, DM focus group 2 December 2008). The official expressed frustration at a lack of leadership ('no one takes responsibility') from these actors in flood risk management, specifically the determination of flood lines. The official argued further that the ME model had resulted in 'fragmentation' and hampered a decisive institutional response to flooding. The official reported that DPUM had waited five years for JRA to undertake a flood line study and finally had used a report to the MC to compel action (DM focus group 2 December 2008).

Framing the flooding issue predominantly in terms of storm water management also may have been a contributing factor in drawing attention away from the key roles played by the DMD and DPUM. DMD was mandated to lead on response and recovery efforts for disaster events and undertake proactive DRR (CoJ 2006d, CoJ 2006f). It will be shown, however, that the DMD was seriously constrained to fulfil this role due to limited resources and power in the institution to drive forward a proactive DRR approach.

A similarly constrained disaster management function has been found with the municipality of eThekweni (Roberts 2010) and other local governments throughout the country (Botha *et al.* 2011).

The dominant framing also appeared to draw attention away from pre-emptive efforts to embed flood risk management into city-wide spatial and land use planning and management, beyond applying technical standards on individual development applications (such as ensuring buffer zones within riparian areas or adhering to flood lines). Although some work was being done in this area through a variety of initiatives outlined in section 5.4, this was limited. High-level awareness was found amongst planning officials in focus groups with DPUM, however, regarding their role in flood risk management. An assistant director highlighted in a focus group the potential for city-wide flood risk management planning:

‘From that overall planning point of view, the starting point for me is if we help our good colleagues (EMD), but we see it in any case as a *planning function* to really protect the crucial open space system in the city and really not compromise on its development. This is not just when you deal with an application going for the buffer zone required. But really on a *city-wide scale* looking at the network, making sure there are good connections and enforcing it in RSDFs and precinct plans on that level so even when you deal with on a more technical level with applications it does not really matter if it is this line or that line’ (emphasis added) (assistant director, DPF focus group 2 December 2008).

This evidence suggests that the framing of flood risk management was to a degree hampering more holistic and comprehensive flood risk management efforts involving a wider range of actors involved in emergency response and DRR, as well as embedding flood risk management into city-wide planning systems.

5.2.2 Semi-state actors, service delivery and flood risk governance

Previous sections have established the importance of good urban development for flood risk protection, particularly effective land use planning and service and infrastructure delivery. In Johannesburg, services were provided by corporatised entities, or MEs. The practice of ‘corporatisation’ can also be linked to the influence of the NPM paradigm of

governance on Johannesburg local government reform, which emphasises public-private partnerships and outsourcing in service delivery (Schmidt 2008, Smith and Morris 2008). Wisner and Pelling (2009) highlight that reduced investment in the extension and maintenance of infrastructure in African cities from the wave of infrastructure privatisation from the 1980s has in cases served to undermine urban risk reduction efforts. This research argues that introducing cost recovery, outsourcing and financial viability practices into service delivery may have played a role in undermining CoJ's efforts to support development in the city. It appeared to be a contributing factor towards different levels of service in different income areas, as well as improper recourse for marginalised groups for poor service levels. This was primarily due a lack of accountability of MEs to the public, especially non-paying customers. Improving service levels according to the ability of residents to pay and rates income levels is highlighted in the 2009/10 IDP (CoJ 2009b, p. 39-40).

This approach is arguably at odds with the developmental local government agenda to alleviate poverty through, amongst other things, improved levels and quality of services (Smith and Morris 2008). Smith and Morris (2008), former CoJ officials, analyse the CoJ's experience in monitoring outsourced services. They argue that although the ME model resulted in greater operational efficiencies, it was largely not positive for poverty alleviation and increasing the quality of service delivery in Johannesburg. The authors contend that outsourcing requires strong oversight and regulation, which South African municipalities are often not well placed to provide, even in a comparatively well-resourced municipality such as Johannesburg.

Smith and Morris (2008) argue that the model supported accountability to shareholders, rather than broader accountabilities to the public and the aims of developmental local government. They contend that the regulatory body of MEs in the CoJ, the Shareholder Unit (SHU), was to a large degree not able to assess performance effectively through the poor reporting requirements, which were 'structured to highlight where compliance occurs, rather than identifying where the weaknesses in the company are and what are the implications are for service delivery to the poor' (Smith and Morris 2008, p. 437). The monitoring tended to focus on the achievements of often poorly and narrowly defined targets as opposed to critical evaluation of the reported information. MEs were often monitored on financial performance and *quantity* of service delivered ('what' services are delivered), as opposed to quality ('how' services are delivered) (Smith and Morris 2008,

p. 432). This will be discussed further in section 7.5 on the performance culture of the CoJ.

Standards existed for turn-around times for responding and resolving customer complaints, and providing free basic services in cases above national requirements, such as the provision of free basic electricity by City Power (Smith and Morris 2008). These standards to a large degree served paying, registered customers, however, and not the unserved public (Smith and Morris, 2008). Smith and Morris (2008, p. 433) also highlight that this approach focused on the individual customer, as opposed to making ‘space for engaging with the collective through organised civil society mechanisms’.

Third party contractors

MEs also tended to engage third party contractors for certain activities from their own restricted capacity to deliver services (Smith and Morris 2008). This also appeared to play a role in further complicating the service delivery governance arena and exacerbating problems of accountability to customers. This required an additional level of monitoring to hold sub-contractors to account for the quality of services and what they billed for (Smith and Morris 2008). Smith and Morris argue this further diminished CoJ accountability for the delivery of quality services, as these contractors were even more at an arm’s length from the CoJ administration as primary delivery agents and interfacing with communities. Table 3 includes some of the comments received during the 2009/10 IDP stakeholder consultation sessions related to MEs, sub-contractors and service delivery.

The table demonstrates the perceptions of communities of the apparent inaccessibility of service delivery entities, the lack of proper channels for poorer communities to report service issues (outside of faxes and telephone calls) and accountability problems arising from third party contracting of services where residents are unsure of mechanisms for holding contractors to account for service delivery, including issues such as poor labour practices by contractors. The CoJ responded in these participatory forums primarily by referring comments to other parties, revealing the complicated maze of actors and diversity of institutions involved in local governance and insufficient mechanisms for the residents to engage directly with the right actors in the local administration.

Table 3: Issues raised in 2009/10 IDP participation process related to MEs and third party contractors.

Issues raised	CoJ sector response
Ward 24 (Kea Bridge): Concern over service delivery standards and follow-up on reported issues by CoJ, e.g. storm water drains, clean ups, clinics etc.	This will form part of the region-specific environmental awareness and clean up campaigns in 2009/10.
Deep South: There is continued exploitation by contractors of established companies in hourly rates paid to sub-contractors. CoJ must monitor this trend.	The MMC for Finance reminded the audience that a CK number [meaning the contractor is a registered CoJ supplier] does not make you one an entrepreneur, rather the requisite skills and capacity is needed. The City needs to provide skills development and access to opportunities.
Ward 71: Pikitup use monthly, short-term contractors to clean informal settlement. Why not long-term contracts?	Pikitup is finalising long-term contracts with a number of third party contractors. This will bring an end to monthly, short-term contracts.
Ward 49 (Bram Fischerville): Pikitup workers break refuse bins. When you report it, you are then requested to fax. Isn't there a better way that we can do this because we do not have money for faxes?	Pikitup is looking at various ways of bring service closer to the people and these initiatives include third party contractors visiting various wards on pre-announced dates. During these visits members of public may obtain new bins (first timers) or replacement bins if lost, damaged or stolen.

Source: CoJ 2009b, p. 40-78

As outlined earlier, the urban climate governance literature identifies the effective delivery of services and infrastructure as well as the ability and willingness of local governments to engage with vulnerable communities, as critical to building climate resilience in cities (Satterthwaite *et al.* 2007, Moser and Satterthwaite 2008). It can be inferred, therefore, that institutional constraints for achieving developmental local government and pro-poor development, including sustained and meaningful engagement with civil society around the quality of services delivered, might play a role in

constraining the climate and development agenda in cities of the global South. This theme will be explored in subsequent chapters.

Holgate (2007) also draws conclusions about the negative effects of the ME structure in the climate change mitigation arena. The author argued that the ME model played a role in fragmentation and restricted the ability of core departments to direct and influence climate change responses. Holgate argues this created a ‘silo effect’ that hindered communication between the city administration and MEs. The author’s primary example was the JRA and the EMD’s lack of control over JRA’s existing programme of installing light-emitting diode (LED) traffic lights. Although JRA was proceeding with this work, the silo structure limited engagement with this programme and alignment with the climate change agenda (Smith 2004; in Holgate 2007).

5.2.3 Non-state actors

A variety of non-state actors also had influence in the governance of flood risk in Johannesburg. Private consultants and engineers certifying that flood lines appeared to play a prominent role. A common outsourcing practice appeared to arise from human resource constraint at the CoJ as well as the influence of NPM paradigm approach to governance (Schmidt 2008). Outsourcing is a common feature of NPM (Schmidt 2008, see Table 1 in section 2.3.3).

The widespread practice of outsourcing at the CoJ meant consultants played a significant role in defining the flood risk and climate change adaptation issue, as well as identifying the range of possible solutions. A number of consultants were undertaking flood risk and climate change adaptation studies for the CoJ during the research period. These included a Flood Prone Areas (FPA) study by consultant A and the Climate Change Adaptation Plan (CCAP) by consultant C for the Climate Change and Cleaner Production Sub-Directorate (CCCP), as well as the SWFL Study by consultant B for the JRA. An assistant director from DPUM highlighted in a focus group, the negative impact of relying on the integrity and quality of knowledge and data interpreted by non-state actors on the ability for the city to make sound, evidence-based decisions. The official referred specifically to a map developed by a consultant highlighting flood prone areas in Johannesburg (see Figure 5):

‘This is a consultant’s interpretation of flood hot spots. Where is the city’s interpretation? If we cannot spell it out, then who the hell who can. There is a real issue in quality of data. It inhibits our ability to interpret’ (assistant director, DPF focus group 2 December 2008).

The use of consultants was a contributing factor in hampering the ability of city officials to develop internal knowledge on flooding, interpret this knowledge and set a strategy and policy based on a sound understanding of the issues. The CoJ also required developers to have qualified engineers certify flood lines, as part of the development application process. This meant the CoJ was reliant on the accuracy of the engineer’s determination. Although the engineer was bound by professional ethics, DPUM officials reported in focus groups that in some cases the engineer may not apply the most conservative assessment taking into account changing patterns of development of flood lines. This was because they were hired by developers with interests in their plans being approved. Flood line determinations were also complex; many different methods could be used and informed by differing assumptions, with the result that ‘a slightly different assessment can draw up a different flood line’ (director, DM focus group 2 December 2008). Flood line data for Johannesburg were, therefore, ad-hoc and inconsistent (CoJ Report 2008a). Few proper mechanisms existed, however, to monitor these risk decisions that took place predominantly outside of state and public scrutiny.

Other non-state actors involved in flood risk management included community representatives and organisations, although there was limited evidence of the engagement of communities and their representatives in flood risk governance outside of awareness-raising and volunteer campaigns. Some evidence was found, however, of mobilising communities in DRR. In preparations for the Fifa 2010 Football World Cup™, private volunteers were being trained in disaster management as well as first aid and basic fire fighting (CoJ 2008b, Visser 9 April 2008). Community response teams were also reportedly being constituted (CoJ 2008b, Visser 9 April 2008). This will be explored further in section 5.5.2 on community engagement assessing the preparedness of disaster management systems prior to the Soweto floods.

Prior to the Soweto floods, there was evidence of humanitarian organisations, churches, CSOs, FBOs and local businesses playing a role in disaster relief assistance and humanitarian efforts. This was particularly evident during xenophobic attacks where

foreign migrants were the victims of a wave of violence across South Africa, including Johannesburg (Citizenship Rights in Africa Initiative [CRAI] 2009). However, although these non-state actors were involved in humanitarian assistance, CRAI (2009, p. 14) reports there was less evidence of their participation ‘in government’s reintegration programme’. Similarly, there was little evidence of these non-state actors involved in more proactive DRR and community preparedness efforts.

These findings validate arguments by scholars analysing local climate change governance that ‘state actors are not necessarily the only or most significant participants’ (Bulkeley 2005, p. 877). Semi-state and non-state actors were prominent in providing storm water infrastructure and other services for building community climate resilience, the production of knowledge to support decision-making on flooding, flood-proofing development through flood line determination, and emergency relief. In addition, the notion of the state as a single actor motivated by common interests is problematised. Actors (MEs) at arm’s length from the state were providing services on the CoJ’s behalf, arguably primarily motivated by the need to show profit, which sometimes misaligned with the developmental local government agenda.

5.3 Flood risk reduction interventions

Section 5.3.1 shows that the CoJ did not have an integrated flooding programme during the research period to draw together all the many actors with a role in flood risk governance. Despite this, a variety of flood risk reduction-related interventions were being undertaken prior to the Soweto floods. Five main programmes were led by the JRA, EMD and DMD according to their separate mandates, reflecting the fragmented institutional arrangements for flood risk governance and actors involved. These included programmes on storm water management (JRA), catchment management (EMD), open space management (EMD), climate change adaptation (EMD) and disaster management (DMD). Other measures could be identified beyond these programmes, reflected in the many actors involved to some extent in flood risk reduction. These were the main programmes, however, and will be tracked in this study.

The five programmes were mainly pursued in isolation with some integration and municipal actors collaborating – particularly the JRA and EMD on storm water management and flood line assessments. Despite the formal mandate to collaborate, as already outlined, a fairly good relationship existed between two officials in each of these

respective entities. A senior NRM official reported that this collaboration had led to some learning and a cross-fertilisation of catchment and storm water management principles and ideas (senior NRM official, pers.comm. September 2008).

Few other initiatives involved partnerships between the main flood risk role-players identified, and few partnerships with non-state actors, such as NGOs, CBOs, etc. were evident. Most interventions involved one, or in some cases two, actors. There was limited evidence to suggest the DMD worked with the main institutional actors involved in flood risk governance in its disaster preparedness and planning work. The CCCP did not actively involve many CoJ role-players in their FPA study, leading to duplication with the JRA's SWFL Study, which will be explored later in section 7.2. The CCAP was similarly only led by the CCCP, although a number of stakeholder engagements took place with city actors (section 7.4). Four of the flood risk management programmes are discussed briefly, with the disaster management programme discussed in more detail in section 5.5.

5.3.1 Storm water and catchment management

Although the historic approach to flood risk reduction had been focussed on structural remediation measures to address flooding problems in the short-term and reactive responses to flood events, the CoJ had increasingly been moving to ensure prevention and mitigation through policy and regulatory instruments. These included the CMP (CoJ 2008a) (for stricter development controls alongside floodplains) and Storm Water Management By-laws drafted in 2008 (to ensure on-site attenuation of storm water).

The JRA had also been attempting to integrate environmental sustainability principles into storm water management through the development of the ISMP (CoJ 2007) which aimed at providing an integrated framework for the management of storm water incorporating both structural and non-structural measures, as well as environmental protection (protection of water courses, wetlands, water pollution prevention, river protection) public safety and system interventions, upgrades and maintenance (CoJ 2007). The CoJ was working to create frameworks for more sustainable and proactive approaches to storm water and catchment management.

5.3.2 Climate change adaptation

Under the climate change adaptation programme, some efforts were identified to introduce a climate risk management approach through undertaking climate vulnerability

and risk assessments, including flooding. During the research period, the main initiatives under the CCCP-led climate change adaptation programme were the CCAP and FPA studies. Procurement for these two projects was underway when the Soweto floods occurred, and projects due to begin in March 2009.

The objective of the FPA Study was to delineate indicative flood lines for major 'hot spot' areas as well as assess flooding in terms of climate change. The CCAP would build on the vulnerability assessment (CCVA) conducted in 2008. The CCVA identified flash flooding and storm water management issues as a risk for sectors such as human health, transportation, buildings and mines and industries in Johannesburg from the increase in severity and frequency of extreme rainfall events. The 2008 draft of the Johannesburg Climate Change Strategy and Action Plan (CoJ 2008f, p. 9) (since revised and not yet adopted at the time of writing), drew from this CCVA to highlight flooding as one of the expected impacts of climate change in Johannesburg.

5.3.3 Open space and land use management

Some integration of flood risk reduction into spatial planning and land use management was evident over and above on-site storm water attenuation. This involved the protection of natural open spaces and natural drainage features. The EMD had finalised a Johannesburg Metropolitan Open Space System (JMOSS), which provided an inventory of different open space types and was spatially referenced and loaded onto the CoJ's GIS system to inform the revision of RSDFs and protect important open spaces including those that performed a drainage function (CoJ 2008g, senior NRM official, pers.comm. September 2008, EMD focus group 25 January 2009). It was reported by officials in focus groups (DM focus group 2 December 2008, DPF focus group 8 December 2008) and conversations with the researcher (senior NRM official, pers.comm. September 2008) that JMOSS was not sufficiently comprehensive or ground-truthed (confirmed in reality).

A Wetland Audit completed in 2008 also provided spatial information to indicate the presence of wetlands to inform planning and protect these key natural drainage areas for flood risk reduction (CoJ Report 2008d). Full wetland delineations would still be required (CoJ Report 2008d). The JRA SWFL Study would also be a planning tool by providing flood line data against which to assess development applications and ensure developments were not located in FPAs.

5.4 Preparedness of disaster management systems

‘The biggest impact on Johannesburg is likely to be more intense weather-related events so it is important to get disaster management systems ready to operate more effectively’ (DPUM executive director, interview 16 January 2009).

This section briefly explores the readiness of the CoJ’s disaster management systems to respond to a flooding event. This research uncovered largely poorly functioning institutional structures for DRR prior to the Soweto floods in 2009. Evidence for assessing DRM systems was drawn from a focus group with disaster managers in November 2008, attendance at a number of Disaster Management Advisory Forums (DMAF) and Sub-Fora in 2008, numerous one-on-one conversations with disaster managers, presentations by disaster managers in CoJ forums, and visits to the planned Disaster Management Centre (DMC) in Martindale, Johannesburg.

This discussion will centre on the DRM structures and processes in place in Johannesburg required by the DRM legislative framework in South Africa. As outlined in Chapter four, South Africa’s NDMPF and legislation has been identified as one of the most progressive globally (Vermaak and Van Niekerk 2004; in Van Niekerk 2011). Successful implementation of this framework, therefore, offers a useful basis to assess disaster preparedness.

5.4.1 Governance structures for disaster risk reduction

South African DRM legislation emphasises the necessity of establishing the right institutional structures to support DRM activities (Van Niekerk 2011). It requires local municipalities to establish local DRM structures, including a Disaster Management Plan (DMP) integrated into the IDP as well as a DMC. This municipal centre has the same powers as the NDMC, but to the extent that these powers and duties apply to the local sphere (Botha *et al.* 2011). The legislation advises local governments to establish DMAFs and Interdepartmental Disaster Management Committees (IDMCs) to facilitate the integration of DRM into planning (Botha *et al.* 2011). These two structures are not mandatory, however (Botha *et al.* 2011). Implementation of the legislative provisions in South African municipalities has been challenging (Botha *et al.*, 2011). A study of the Disaster Management Act implementation, commissioned by SALGA in 2011 (Botha *et al.* 2011), found that many district and local municipalities had not yet established or had adequately functioning disaster management structures.

In this research, it was found that Johannesburg had largely poorly functioning DRM systems prior to the floods. No permanent centre had been established to facilitate DRM planning and operations at the CoJ. The national DRM policy framework recommends this centre is 'located closest to the highest level of decision making and should be able to cut across departments involved with disaster risk management' (NDMPF 2005, p. 9). DMD officials reported in a focus group on 13 November 2008 that 'The DMC is not there, it is only the shell'.

A level one DMP was reportedly in place (CoJ 2006f), despite level three plans being required within four years of the Disaster Management Act commencing (DMA 2002, NDMPF 2005). DMA legislation requires municipalities to complete a DMP, integrated as part of the IDP to ensure municipalities have adequate contingency plans in place and disaster risk management is incorporated into all municipal activities (Botha *et al.* 2011). Despite a number of attempts by the researcher, however, it was not possible to access this level 1 plan, or the contingency plans for priority risks. Although these may have been in existence, the only plan available to the researcher was a CoJ Corporate Disaster Management Plan (CDMP) devised in 2003 (CoJ 2003b). The CoJ CDMP highlights flooding as a risk, but it does not outline any specific emergency preparedness measures for flooding. It can be inferred, therefore, that prior to the floods, although floods and storms had been identified as a risk for the CoJ, contingency plans and proactive preparedness for emergency flooding response were largely not in place.

A poorly functioning Advisory Forum had been established since 2005. Botha *et al.* (2011) argue that little guidance exists in the DMA of how forums should be established, and found a very low level of functioning of these structures in municipalities. Very few forums were used for 'engaging stakeholders (e.g. providing and obtaining "advice")' as per the intention of the DMA, but rather to 'inform stakeholders on very superficial disaster risk management issues' (such as the occurrence of past events) (Botha *et al.*, 2011, p30). Similarly, in Johannesburg, it was found that representation and active engagement from civil society and external stakeholders was limited mainly to larger corporates and state owned entities (SoEs). In addition, CoJ entities and departments were under-represented. From observation, the DMAF also appeared to operate without a clear purpose or objective and existed as a loose engagement of ad-hoc groupings of mainly CoJ stakeholders. The majority of the agenda for both CoJ climate change committees – the MSCC and JCCC – was devoted to mitigation work although adaptation-related items

were sometimes covered, such as Johannesburg's CCVA concluded in 2008. Therefore, there was limited evidence of a cross-sectoral or cross-functional entity enabling integrated disaster or flood risk reduction efforts in Johannesburg, as well as engaging civil society in DRM.

Basic systems for disseminating the SAWS's flash flood warnings to affected communities were in place, with plans for upgrade and improvement of these reflected in IDPs from 2006/7 to 2008/9 financial years. Early warning systems (EWS) have been identified as a crucial aspect of disaster preparedness (UNISDR 2010). According to the NDMF 'National, provincial and municipal DMCs have established and documented clear procedures for accessing, interpreting and disseminating early warnings of both rapid- and slow-onset hazards' (NDMPF 2005, p. 37). As outlined, the main type of flood experienced in Johannesburg is flash flooding from heavy storm events (Fatti and Vogel 2010). Given the very short time scales and difficulty in identifying the exact basin that will be flooded, flash floods are difficult to forecast (Poolman, n.d.). Effective flash flood warning systems are rare internationally and in Africa (Poolman, n.d.).

Prior to the Soweto floods, the SAWS was only able to issue a general warning for flash floods: 'heavy rain with potential for flash floods' (Poolman, no date). The SAWS recognised this was 'too general' without adequate information on the exact area that may be in danger of flooding (Poolman, no date). Prior to the flood, the SAWS had been working on a South African Flash Flood Guidance System (SAFFG) with the NDMC for an integrated rainfall and hydrology-based EWS for South Africa to determine basins in danger of flash flooding (Poolman, n.d.). This EWS was not in place before the Soweto floods.

Another crucial aspect of EWS is disseminating warnings to affected communities. DM officials reported in the focus group and in personal communications that prior to the floods a basic EWS was in place for disseminating SAWS warnings to communities. This involved an SMS warning of flash floods from SAWS (as outlined above) to key Johannesburg disaster management personnel such as the operations manager (OM), following which the OM would advise other teams (DMD operations manager, interview 27 July 2010). The Control Centre Proton House – which received and dispatched all emergency calls (a call centre and not to be confused as a DMC) – would then notify the nearest fire station in the area to monitor river levels (DMD focus group 13 November

2008, DMD operations manager, interview 27 July 2010). If there was danger of flooding, the remaining network was notified, including ward councillors and communities at risk through community volunteers (DMD operations manager, interview 27 July 2010). A senior official in the focus group reported:

‘The floods in Alexandra (an informal settlement prone to floods) do not have to happen. Our early warning system consists of sending a SMS to the station commander telling him to climb into his fire engine to see how high the river is. This is not enough’ (senior disaster management officer, DMD focus group 13 November 2008).

Prior to the Soweto event, the CoJ was investigating other EWS options for flooding, reported in the 2008/9 IDP. The ‘100% implementation of the Early Warning System’ was identified as an objective for the 2008/9 year, indicating that a fully functional system was not yet in place (CoJ 2008b, p. 222). A number of EWS initiatives were reported as implemented in the 2008/9 IDP. These included telemetric systems for monitoring river water levels and systems using SMSes to notify volunteers in vulnerable communities to evacuate. This programme was focussed on Alexandra and the Jukskei River, a hotspot for fires, floods and drownings. It was also reported in CoJ 2008/9 IDP (CoJ 2008b, p224) that ‘Community Emergency Response Teams (CERT) had been established in all the regions to improve emergency response and community involvement’.

DMD officers argued that these initiatives were not in operation. Telemetric systems had reportedly been functioning in previous years but were vandalised for their valuable parts in informal areas (DMD officer, pers.comm. September 2008). In addition, DMD officers reported these had not been adequately maintained following the amalgamation of metropolitan local councils in the new local government system in Johannesburg, which they contended had resulted in a lack of financial resources for servicing the systems, with the result that ‘everything collapsed’ (disaster management officer, DMD focus group 13 November 2008). The SMS pilot, named the ‘SOS-like speed dialing pilot’ (CoJ 2008b, p. 224), was also reportedly not implemented due to changes in leadership in EMS:

‘We started it. I still have the quotations for the work. The new management that took over did not have a clue. The early warning was supposed to be linked to the Sandton fire station. If the river level rose, it would ring a bell, the vehicles would be dispatched and SMSes sent out to trained volunteers in Alexandra who would get together teams to evacuate. I am sure the resident volunteers have forgotten it all now. If it worked, we planned to roll out to other areas’ (disaster management officer, DMD focus group 13 November 2008).

Therefore, while the 2008/9 IDP reported progress in instituting EWS, this evidence was refuted by disaster management officials. It went beyond the scope of the study to verify this information on the ground. It can be concluded, however, that a fully functional system for disseminating early warnings of flash floods to communities in Soweto was predominantly not in place.

5.4.2 Community engagement

Johannesburg’s engagement with communities was primarily structured around planning and budgeting processes focussed mainly on processes and procedures of participation, as opposed to the active mobilisation of civil society and enabling of more agonistic and confrontational participatory forums. This is similar to Aylett’s (2010) findings for eThekweni. Outside of formal planning routines, the DMD was engaged with communities through a variety of channels and activities, demonstrating some attempts to meaningfully interact with vulnerable communities. This engagement centred mainly on education and awareness raising campaigns as opposed to working in partnership with communities to build their resilience to floods, identified in the climate change adaptation and DRM literature as a crucial aspect of effective local DRM (Pelling 2003, Hasan 2006; in Moser and Satterthwaite 2008, Satterthwaite *et al.* 2007, Pelling and Wisner 2009).

Limited evidence was found of community participation in risk assessment processes (including the CCAP and CCVA) in order for these to be informed by local knowledge of hazards. From the focus group with disaster managers, it appeared that communities mainly participated in the final stages of with risk profiling exercises, as recipients of awareness raising campaigns on the already pre-determined risk (senior disaster management officer, DMD focus group 13 November 2008).

In addition to education and outreach, volunteers were being recruited to assist in emergency operations in preparations for the Fifa 2010 Football World Cup™ (CoJ 2008b, Visser 9 April 2008). The establishment of a volunteer unit is also encouraged by the DMA, although not legally enforceable. Botha *et al.* (2011) argue that this is a concrete way in which to connect local communities to municipalities in DRM. It was reported in the 2008/9 IDP that some councillor training had also taken place on basic disaster management, for example. ‘Be Safe’ centres had also been established across the city to have more direct contact with communities around safety education and as ‘sources that provide information to children and youth; addressing hazards such as fires, man holes, unprotected rivers and bad buildings’ (CoJ 2006f, p. 190).

In conclusion, while there was evidence of community engagement related to DRR, this was primarily related to interaction with communities and their representatives (such as ward councillors) as passive recipients of awareness-raising and safety training campaigns. This was opposed to active engagement of communities in assessing risks to reflect local experiences and approaching communities as architects of their own solutions and strategies for increasing their capacity to cope with floods.

5.4.3 Institutional challenges for disaster management

The DMD generally lacked the financial, technological and knowledge resources to carry out its mandate effectively, as well as institutional power to drive proactive flood risk reduction at the CoJ. DMD officials argued that institutional arrangements for disaster management need to be altered in order to advance more proactive DRM at the CoJ. This suggested that disaster management function was largely under-prioritised and under-resourced, and required more political and administrative support for DRM work. A DMD officer stated in a focus group that ‘disaster management is not getting the attention it deserves’ (DMD officer, DMD focus group 13 November 2008). The NDMPF (2005) is clear that the disaster management function and centre must have sufficient autonomy and authority to ensure DRM is integrated into all areas and enable effective coordination, and should not be housed within a line function (NDMPF 2005, p. 8).

In Johannesburg, the disaster management function was established within a line department, the EMS. This placement appeared to have a number of repercussions. Firstly, without having its own department, the DMD did not have a political and administrative head solely in charge of DRM and able to lead DRM issues at high levels

in the CoJ. Secondly, being aligned with EMS was a contributing factor to DRM being predominantly run as a ‘response and recovery’ unit, operating on a reactive basis to disaster events in the city (DMD officer, DMD focus group 13 November 2008). This was opposed to focussing on proactive risk management and risk prevention, with response and recovery as a last resort. EMS leadership was criticised for not sufficiently understanding DRM, particularly the need for proactive risk reduction efforts given the Department’s main function was to respond to medical and fire emergencies. A DMD officer stated:

‘We are seen as the blanket and biscuit brigade and are reactive when the custard hits the fan’ (DMD officer, DMD focus group 13 November 2008).

Thirdly, this institutional arrangement indicated that the disaster management function’s autonomy and power was hampered in the CoJ (DMD focus group 13 November 2008, DMD operations manager, interview 27 July 2010, JCCC meeting 31 July 2009). DMD officials argued that disaster management should work directly under the city manager to integrate DRM into all aspects of planning and work across departments and entities, as required by the NDMPF. At the time of the Soweto floods, it appeared disaster management tended to work in isolation on DRM activities, with the placement of disaster management within EMS as a strong contributing factor. A DMD official outlined the role of the function in terms of coordination and facilitation as opposed to executing line function responsibilities, explaining that not being able to ‘work outside our scorecard’ and a lack of leadership (‘institutional vacuum’) hindered managing disasters (adaptation workshop 30 September 2009).

Many changes to senior leadership of disaster management occurred prior to the period under review (DMD focus group 13 November 2008, DMD operations manager, interview 27 July 2010). This included an apparent lack of leadership by the head of the DMC to lead a particular vision to DRM (DMD focus group 13 November 2008). This had created an unstable and uncertain institutional environment. A lack of leadership was mentioned throughout the focus group with disaster management officers as a serious constraint.

Prior to the floods, institutional constraints were found to be hampering effective DRM in Johannesburg. Knowledge, technological and financial resources for DRM were also

found to be restricted prior to the floods. This included a poor knowledge and understanding of the risks facing Johannesburg communities due to a lack of community engagement, in-depth research, knowledge sharing systems and systematic investigation (DMD focus group 13 November 2008). Technological resources for enabling communication and risk assessment were also found to be lacking (DMD focus group 13 November 2008). Officials reported a lack of resources to undertake their duties. In addition, funds after a disaster event were reportedly not easily available (DMD focus group 13 November 2008).

In a workshop after the floods, a DMD officer argued that a poor communications system was one of the municipality's 'biggest challenges' for effective response and recovery. (DMD officer, adaptation workshop 30 September 2009). This included a lack of information and communications technology (ICT), such as cell phones, personal computers and laptops. A number of DMD officers reported they did not have PCs which restricted email communication, access to GIS information such as hazard maps, research capabilities, amongst other things. This confirms findings by Botha *et al.* (2011) that 67.9% of municipalities lacked the necessary equipment to carry out the DRM function, including vehicles, emergency response equipment, recovery equipment, technical devices and administrative equipment. A DMD officer highlighted the fast degradation of DMD capacity:

'We have no ability to communicate with staff. There are no phones or emails...
Yes we are doing stuff, but is that real capacity? We are just window dressing'
(DMD officer, DMD focus group 25 November 2008).

A lack of financial resources appeared to be a serious constraint to effective operations. DMD officers in the focus group reported that they did not have sufficient budget to carry out their duties. Disaster management officers were also particularly concerned about the lack of an emergency relief fund during disaster events. They reported that a relief fund that was immediately available to the municipality during a disaster was not in place, although a requirement of the DMA (DMD focus group 25 November 2008). It can be deduced, therefore, that prior to the Soweto floods the disaster management function was being hampered by institutional and resource challenges.

5.5 Conclusion and implications

This chapter explored flood risk preparedness and risk reduction prior to the Soweto floods through a governance framework. It has revealed potential constraining and enabling governance forces that may be contributing factors in the degree of preparedness and effective risk reduction for flooding. This assessment of the pre-Soweto governance forces provides a basis to track the governance response as it unfolds through the disaster cycle.

It was found that the CoJ was largely underprepared for the Soweto floods. Prior to the floods, some work had been done in proactive flood risk reduction and the MC had been formally alerted to the seriousness of the issue. The Storm Water By-laws, CMP and SWFL Study were all programmes attempting to begin to alter the patterns of development in Johannesburg over the longer-term. The approval of the flooding report (CoJ Report 2008a) had created some momentum for the JRA and EMD to begin to lead on flooding. Despite these interventions, the overall response to flooding appeared largely fragmented, principally biased towards storm water management, and some evidence of limited political and administrative buy-in for the DRM agenda. The CoJ took a technocratic management approach to flooding with limited engagement of vulnerable communities in flood risk governance.

This chapter uncovered a complex governance context of multiple actors and types of institutions involved to some extent in flood risk governance along the continuum of purely public and purely private actors (Litfin 1993; in Bulkeley and Betsill 2003, p. 15), with varying degrees of influence. It appeared that there was often the need for better public scrutiny of some non-state or semi-state actors, for example in monitoring flood line determinations for new developments by outside engineers, given that these decisions may impact exposure of communities to flood risk. In the realm of service and infrastructure delivery, strengthened mechanisms were required to hold MEs and their sub-contractors to account for poor standards to ensure better service and infrastructure provision for building climate resilience in poorer communities.

Participation of civil society in local climate governance has been argued as critical for effective, legitimate and just climate decisions (Aylett 2010). Various non-state actors played a role in assisting in humanitarian relief during disaster response operations (including private volunteers, local businesses, FBOs and humanitarian organisations).

Little evidence was found, however, of non-state actors being engaged by the CoJ to support proactive efforts to mitigate disaster impacts and build community resilience. Limited stakeholder and community engagement also appeared to be occurring in devising flood risk reduction measures. This suggested that the CoJ's flood risk management approach did not sufficiently reflect or respond to local needs and risk experiences. As with the CoJ climate governance explored in chapter four, national and provincial government was also found to have restricted involvement in flooding work – although the development of the SAFFG by the SAWS and NDMC was notable – and vertical engagement with other levels of government was also limited. A predominantly inward-looking and technocratic approach to flood risk management appeared to prevail prior to the floods. It will be argued as the discussion progresses that this approach to flood risk management was influenced by the wider paradigms of governance, namely the bureaucratic and NPM modes of governance.

Certain governance structures and processes were found to constrain preparedness and risk reduction efforts, including framing of the flooding issue, the municipal structure for flood risk governance, and institutional power dynamics. Flooding was primarily *framed* as a storm water management problem. The JRA was therefore an influential role-player in flood risk management at the CoJ, and structural remediation measures often identified as solutions – as opposed to more community- and environmentally-centred approaches focussed on enhancing community coping methods, improved disaster management systems and integration of risk reduction in development planning and regulation. Having said this, the CoJ did appear to be moving towards long-term flood risk reduction through catchment management and protection of natural flood attenuation features such as wetlands. The research validates arguments that the framing of environmental and climate change problems is an inherently political act and determines to a large extent how the problem is approached and ‘organised into politics’ (Hajer 1995, p. 42), the actors involved, the role of citizens in decision and policymaking, and how the problem evolves as an issue (Moser 2004). This will be explored further in the institutional response to the Soweto floods.

Barriers inherent in the CoJ *municipal structure* itself also appeared to shape and in many cases constrain pre-disaster preparedness. Burch (2010) found the municipal structure to similarly hamper adaptation efforts in Canadian municipalities. The complex governing structure for flooding appeared to create a fragmented response, as well as a lack of

accountability in flood risk governance and service delivery. CoJ's flood risk management was characterised by multiple role-players, often insufficient collaboration, and inadequate engagement of communities most affected by flooding.

Institutional mechanisms for enabling cross-functional collaboration such as the MSCC and JCCC at that stage did not dedicate much of the agenda to flooding or adaptation-related issues, and most actors in these committees were primarily responsible for mitigation-linked activities. The DMAF was largely unsuccessful in terms of supporting consistent cross-sectoral or departmental cooperation and engagement of civil society in DRM. It was discovered that a number of planning and environment officials regarded it as problematic for an outside agency, the JRA, to have the most influence related to flood risk management in Johannesburg. In line with Holgate 2007 and Monstadt (2007; in Sippel and Jenssen 2009) corporatisation of storm water management and other key services in climate protection at times meant that CoJ officials were less able to influence JRA policies (to be explored in section 7.2). It was observed that the NRM attempted to overcome this barrier through forging closer relationships with key JRA officials.

The literature emphasises the importance of collaboration and 'joined-up-thinking between different departments' in adaptation governance because of the cross-sectoral nature of climate change adaptation (Satterthwaite *et al.* 2007, p. ix), the need for learning and action across functions and knowledge domains (Winsvold *et al.* 2009), as well as the importance of formal and informal networks to respond to high impact, unforeseen climate events (Pelling *et al.* 2007). In the case of Johannesburg, there was limited evidence of a cross-sectoral or functional flooding programme in Johannesburg or clear allocation of responsibility for flood risk management in order for a CoJ actor to lead a response and enable collaboration and communication of these diverse actors. This suggested a lack of leadership and accountability for the flooding issue in the CoJ and a largely ad-hoc, disjointed response, which will be shown as the discussion progresses. The fragmented nature of Johannesburg's flood risk governance often did not 'fit' with the holistic response required (Romero-Lankao 2007, p. 519).

Institutional power dynamics were also found to influence pre-DRR and preparedness. In this case the relative lack of power and 'institutional muscle' (Roberts 2010, p. 43) of the disaster management function within the CoJ was a constraint to effective DRM systems. This finding is in line with Roberts' (2010) analysis of the disaster management function

in eThekweni municipality where it was found to be similarly under-capacitated and weak. There appeared to be a lack of clear allocation of responsibility and ownership for DRM at senior political and administrative levels. The function had low visibility in the institution and occupied a less powerful position in the municipal hierarchy. Financial resources were limited – in particular an emergency relief fund – which meant the CoJ was often reliant on donations from the public in emergency relief. Pelling (2003) shows that undervaluing DRM occurs in both cities of the global North and South. DRM is often not understood as an element of urban development and neglected in urban planning – as well as often limited to relief and rehabilitation efforts after large disaster events (Pelling 2003).

It is argued that inadequate political support for DRM was a factor contributing to often poorly functioning DRM governance structures and limited resources available for DRM work. Prior to the floods, most of the institutional structures for DRM legally required or encouraged by the DMA were either not in place or functioning inadequately. The disaster management function was also struggling with limited knowledge, technological and financial resources to achieve its mandate. Although a basic EWS existed for flash floods, these warnings had to be issued by the SAWS within short timescales and there were difficulties in identifying the exact basins that would be flooded (Poolman, n.d.). In addition, mechanisms to disseminate these warnings effectively to communities were largely not in place. Pelling and Wisner (2009) highlight that proper EWS are difficult to find outside of highly developed cities. The authors note UNISDR's (2005; in Pelling and Wisner 2009) finding that the weakest elements of early warnings relate to warning dissemination and preparedness to act. The CoJ's under-preparedness in this area is not surprising, particularly given the many other competing development priorities in the city.

Prior to the floods, therefore, it can be said that the CoJ was insufficiently prepared for a significant flooding disaster event. An interaction of factors appeared to constrain flood risk reduction efforts, including how the flooding issue was framed and approached, fragmented governance structures constraining collaborative flood risk governance along the continuum of state and non-state actors, and limited political and administrative buy-in to the DRM agenda.

This chapter has outlined the governance framework prior to the floods, and the potential constraining and enabling forces that may have impact in subsequent phases of the disaster cycle. The following two findings' chapters will explore these and other forces further through tracking the response to the flood event, the state and non-state actors involved and their strategies and interests, the framing of issues, and how outcomes are realised. This will include analysis of the emergency relief and recovery efforts by disaster management teams in Soweto, as well as reactions in Council halls as relief and reconstruction efforts were underway and CoJ actors framed and interpreted the flood event and formulated an institutional response.

6 THE SOWETO FLOOD EVENT: RESPONSE AND RECOVERY

This chapter examines the next phase in the disaster cycle – the emergency response to the disaster event and recovery operations (NGA 1979; in Neal 1997). It builds on from the preparedness assessment to analyse the degree to which the disaster management systems were effective in the Soweto operations and the extent to which governance factors shaped the nature of the response. It identifies the actors involved and their contributions in recovery efforts to explore adaptive governance relationships and systems. The chapter also further examines the interactions between climate risk and development in urban contexts through the Soweto case and investigates the nature and extent of the impact of the floods on Soweto's individuals, households and communities.

6.1 Description of the Soweto flood event

In the early evening of 26 February 2009, flash floods took place in Soweto following heavy downpours of rain across Johannesburg. The Klipspruit River burst its banks between the areas of Dube and Orlando (*Mail & Guardian* 27 February 2009). Weather radar analysis revealed that convective storms reaching 60 dBZ¹¹ from 16h00 to 18h00 were observed over the Soweto area and approximately 96.5 millimetres of rainfall fell within an hour, measured at 17h15 (SAWS Radar Report 2 March 2009). The SAWS Radar Report (2 March 2009, p. 1) concluded 'from radar analysis that a storm with a potential for producing thunder, lightning and rainfall accompanied by hail occurred over the Soweto area on 26 February 2009 between 16h00 and 18h00 South African Standard Time (SAST)'.

6.2 Early warning and immediate disaster response

This research was unable to determine the exact timing of a flash flood warning from SAWS to Johannesburg disaster managers. It is inferred that the warning was issued late from evidence from media reports and personal communication with a SAWS Senior Technologist. The difficulties of issuing warnings for flash floods are outlined in section 5.5.1, namely the rapid nature of the floods (normally within six hours of heavy rainfall) and challenges identifying affected areas without river sensors monitoring water levels (Poolman, n.d., SAWS Senior Technologist 2 September 2009).

¹¹ A measure of the reflectivity of a group of clouds to radar from weather satellites in order to estimate rainfall.

A SAWS forecaster, Lulama Menze, commented in the media that the SAWS were unable to issue a warning on time, ‘as slow-moving thunderstorms were difficult to track’. Menze stated that ‘we will only know as it happens’ (*Mail & Guardian* 27 February 2009). A SAWS Senior Technologist also stated in a meeting between CoJ and SAWS on flash flood prediction that the SAWS warning was issued ‘late’ for the Soweto floods (SAWS Senior Technologist 2 September 2009). This Senior Technologist said that SAWS operations ‘take strain’ when there is a lot of rain occurring at similar times.

From a CoJ report on the floods, it can be deduced that city officials were alerted to the flood event following a call to the CoJ’s emergency call centre at approximately 17h00 from someone at a flooded area within Soweto (CoJ Report 2009b). The caller said there were heavy rains in Soweto and a bus was stuck in a collapsed bridge on Ncube Drive with about 40 passengers trapped inside (CoJ Report 2009b). Following this call, the CoJ’s disaster management teams were mobilised and travelled to the affected areas (CoJ Report 2009b). They established a Joint Operating Centre (JOC) at Jabulani Fire Station by 18h18 (see Figure 10 for the location of the JOC) (CoJ Report 2009b). No evidence could be found of any other form of early warning, such as SMS alerts to community representatives.

The media reported that due to a slow emergency response, bystanders were forced to undertake rescues of people (*Times Live* 27 February 2009). The operations manager (interview 27 July 2010) said that the teams battled to get to affected areas due to road damage and poor road infrastructure. The main road into Bram Fischerville was heavily flooded, restricting access.

A ‘Situation Report’ (Table 4) recorded the main incidents and actions taken by disaster management teams in the hours immediately after the floods (in CoJ Report 2009b, p. 1.2). Table 4 is taken directly from the CoJ Report. In the report, no actions are listed next to some incidents (also see below). It is not clear from the report whether these gaps indicate that no actions were taken related to certain incidents, although this can be presumed.

Table 4: Situation report: the main incidents and actions in the emergency response operation.

Time	Incident	Action
17h13	Floods all over Soweto	
18h18	JOC established at Jabulani Fire Station	
19h17	<ul style="list-style-type: none"> • Bus – Kinini Street, Mofolo Central • Putco Bus washed away • Taxi stuck in the river in Dube, Mncube Road 	<ul style="list-style-type: none"> • EMS, SAPS diving unit and three helicopters deployed • 24 passengers rescued (total of 42 passengers accounted for) • Injured transported to hospital – treated for shock and minor injuries and discharged
	Zulu / Mahalefele Street, Mofolo Central three cars swept away (one with four passengers trapped – family)	<ul style="list-style-type: none"> • All passengers rescued • No injuries reported
	Houses flooded in Meadowlands	
	Dlamini / Kliptown shacks flooded	
	Bram Fischerville houses flooded	
	Mofolo North Bridge washed away	
	13 year old girl, 20 day old baby and taxi driver reported drowned	
23h30	Community evacuated from flooded shacks in Dlamini informal settlement	<ul style="list-style-type: none"> • Approx. 80 people evacuated from high risk flooding • No injuries reported • Residents reluctant to be moved to a shelter. Once water had subsided they returned to their homes
23h38	Mmessi Park houses and cars flooded	Disaster management and EMS dispatched to the area
23h59	Search for missing baby and taxi driver stopped	
00h20	JOC officially closed	

Source: CoJ Report 2009b, p. 1.2

The Situation Report indicates that although the emergency call centre received a call of a bus trapped in a collapsed bridge at about 17h00, passenger rescues were only recorded two hours later, at 19h17. It documents searches for missing persons, rescues of bus and car passengers, evacuations of residents from flooded shacks, and site inspections where houses had been flooded, including Meadowlands and Bram Fischerville. At 23h30, 80 people were evacuated from flooded shacks in Dlamini. The search for the missing baby and taxi driver ended at 23h59. The JOC was officially closed at 00h20 on 27 February 2009.

Table 4 shows that disaster management and emergency teams had to respond to flooding incidences in a number of different areas of Soweto and coordinate rescues and evacuations by short notice. Informal settlements appeared particularly badly affected, with 80 people evacuated from informal dwellings in the Dlamini informal settlement. Low-income government housing units were also flooded areas such as Bram Fischerville.

The above evidence suggests that the immediate emergency response to the floods was not effective as it could have been, hampered by inadequate early flash flood warning by the SAWS. This indicates that teams were constrained from reaching affected areas in the first few hours after the floods. Little evidence was found of early warnings reaching communities to enable evacuation.

6.3 Areas affected

Heavy rains also affected other parts of Johannesburg, including North Riding in the north of Johannesburg, and the low-income settlements of Ivory Park and Orange Farm (CoJ Report 2009b). In North Riding, a dam burst its banks, flooding two low-lying crossings (*Times Live* 27 February 2009). Hyperion Drive and Blandford Road in North Riding were also damaged by the rains, where sections of the road were washed away (*Times Live* 27 February 2009). No loss of life occurred in these areas, however (CoJ Report 2009b). Soweto was the worst affected due to a complex interaction of factors explored further below. Figure 10 highlights all the worst-impacted areas.

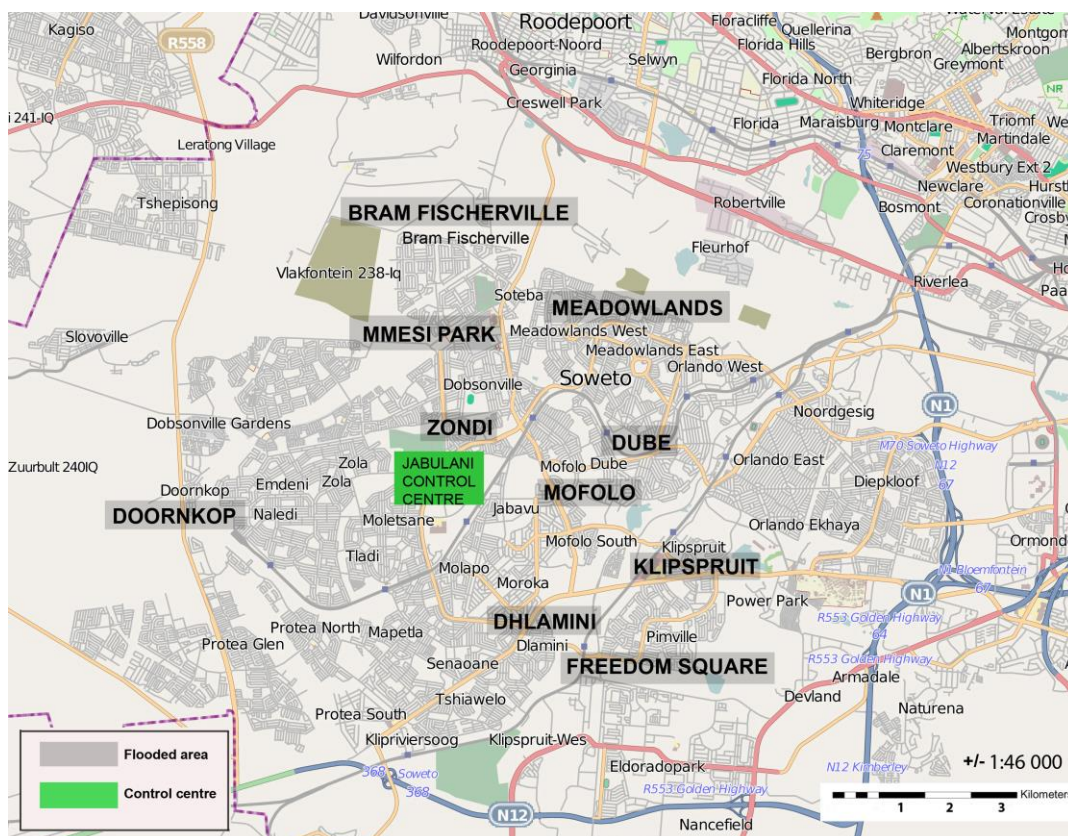


Figure 10: Map of Soweto areas affected by the floods and location of control centre.

Source: Adapted from Open Street Map Contributors, available under the Open Database Licence

These areas were Bram Fischerville, Mofolo (North, Central and South), Dobsonville, Dube, Doornkop, Meadowlands, Mmesipark, Zondi, Klipspruit, and Freedom Charter Square (CoJ Report 2009a, b). Dlamini and Bram Fischerville were particularly badly affected (CoJ Report 2009a, b). Chapter four outlines the factors giving rise to flood risk in Bram Fischerville, including a lack of storm water drainage.

6.4 The impacts of the floods

The combination of an unusually heavy rainfall event together with the following urban development drivers, resulted in the flooding impacts experienced in Soweto:

- Significant modifications to the retention capacity and flow of the Klip River from increased siltation, reed growth and increased urban runoff flowing into rivers (due to increased hard surfacing and urban development, etc.).
- A lack of storm water drainage in the area.

- Irregular storm water maintenance and clearing of storm water drains to remove accumulated litter, silt and vegetation growth which hampered proper functioning of existing system.
- A large concentration of poorer communities, informal settlements and lesser quality low-income government houses in low-lying areas.

(CoJ Report 2009d; Region C regional director, pers.comm. April 2009, CoJ SoR 2010a)

The Klip River is one of the two major river systems in Johannesburg. It drains to the south of the watershed, flowing into the Upper-Vaal catchment area, and westwards to the Atlantic Ocean (CoJ 2008a, CoJ 2008d). The Klip River and its tributary the Klipspruit run through Soweto and drain southern Gauteng (CoJ 2010a). The Klip and Klipspruit Rivers flow through mining areas, informal agriculture, informal settlements, residential suburbs, parks and open spaces (CoJ 2010a).

In urban areas, very strong water flows experienced during storm events lead to unnaturally large flood peaks (CoJ 2010a). Rivers struggle to support water flows from storms and significant erosion often results, which in turn leads to further modifications to the river bed and channel (CoJ 2010a). The Klip and Klipspruit Rivers have been severely degraded in the past few decades, including changes to flow patterns (CoJ 2010a).

Chapter four outlined that flooding in Soweto had been occurring almost every summer rainy season in recent years (Russouw 11 January 2005, SAPA 24 December 2006 and SAPA 10 December 2007). The flood event was particularly serious in 2009, however, due to the extreme nature of the storm and the volume of water that fell over a short period (SAWS Radar Report 2 March 2009). It is posited that this overwhelmed the much-reduced retention capacity of the Klip River and the already strained, and in some places non-existent, storm water drainage system to channel the water away safely. Another factor exacerbating the severity of the floods reportedly included blockages of the storm water systems by litter, vegetation and silt (CoJ Report 2009d).

An interaction of meteorological, hydrological, urban development and socioeconomic factors, therefore, worsened the impact of the floods in Soweto. The Soweto event is a signifier for how increasingly severe and frequent extreme weather events from climate change may exacerbate poor development conditions in urban areas of the global South.

In addition to the loss of lives, the floods resulted in significant damage to infrastructure, such as bridges, roads and water pipes, household contents and structures, schools, parks, and recreation sites and businesses (CoJ Report 2009a, b).

The final estimate of the costs of the flood damage was R350 million (or approximately \$42 million), including humanitarian aid, disaster management and emergency response, household reconstruction, a relief grant, park repair, infrastructure repair and appointment of a technical team (CoJ Report 2009a). Initially it was estimated that 215 families were affected, but this escalated to 678 families, as ‘constant reassessments were done to ensure that all requests were attended to and no household was left unassisted’ (CoJ Report 2009a, p. 1-2).

Despite flooding also occurring in the middle income suburbs of North Riding on the same day, similar displacement of people and damage to homes did not occur. Poorer residents were often less protected from floods as they lived in informal dwellings (‘shacks’) or low-income government housing units located within flood plains, as in the case of Dlamini and Bram Fischerville (CoJ Report 2009b, p. 1.2). Multiple stressors impacting on Soweto’s residents, such as HIV/Aids, crime, unemployment, poor services, etc., served to erode individual, household and community capacity to cope with larger flood events as well as the cumulative impacts of smaller, every-day hazards, which Pelling (2003) argues often goes unnoticed in understanding urban risk patterns.

When the flood took place in 2009, Bram Fischerville was one of the worst affected areas due to these underlying vulnerability factors explored in chapter four. These and other poorer families in Soweto did not have insurance to cover the damage to their homes and household contents as well as the ‘web of institutions, infrastructure, services and regulations’ that assist wealthier communities to recover from events (Moser and Satterthwaite 2008, p. 14). Subsequent CoJ website media reports showed that residents from Chris Hani (in Ivory Park) and Klipspruit informal settlements were battling to recover from the floods a few months after they had occurred (Mungoshi 19 May 2009). The DM operations manager reported in the article that the DM unit found in a survey conducted in these areas after the floods that ‘the damages to the informal settlements were catastrophic and left many in need of support’ (DM operations manager in Mungoshi 19 May 2009). The nature of the damages and particular support needed could not be ascertained from the article. However, this suggests that poorer Sowetan residents

living within informal and low-income areas may have taken a longer period to recover from the floods than wealthier households.

This evidence indicates that Soweto's socioeconomic profile exacerbated the severity of the impact of the floods on residents. This demonstrates the influence of how broader patterns of socioeconomic development in South Africa have outcomes for the local patterns of flood risk vulnerability across the city. Apartheid policies of separate development had resulted in uneven development patterns across the city, and flood risk vulnerability. The state had also appeared to have contributed to the flooding problem through poor urban planning and the construction of government housing for poorer residents in flood-prone sites. The case further demonstrates how vulnerability is a factor of development, proper urban management as well as governance policies and, taken further, how development efforts can play a central role in climate change resilience building. It also demonstrates the importance of a governance lens to understand the wider socioeconomic and development forces giving rise to climate risk in urban settings.

6.5 Governance constraints and enablers in response and recovery

This section examines the post-disaster recovery efforts by the CoJ disaster management teams and other state and non-state actors. It aims to reveal some of the governance forces shaping the nature of the emergency response in Soweto.

6.5.1 Leadership

To enable high-level decision making during the post-Soweto response, an executive JOC was also established and chaired by the ED of EMS with representatives of all departments and MEs, and other spheres of government (CoJ Report 2009b). The Chair was meant to account to the city manager on all decisions and interventions (CoJ Report 2009b). This executive JOC was intended to ensure the operational JOC could work efficiently by making decisions and facilitating coordination on the ground (CoJ Report 2009b). The team met daily in the CoJ buildings in central Johannesburg (CoJ Report 2009b). The executive mayor was expected to have overall oversight of all operations (CoJ Report 2009b).

Executive leadership was displayed through the fairly swift declaration of an emergency by the executive mayor. It was reported by a DMD officer that once this declaration was made 'things started moving' (presentation at adaptation workshop 30 September 2009).

High-level political and administrative officials also visited affected areas, including President Jacob Zuma, accompanied by the executive mayor. This provided visible support to the emergency response activities and signalled that the response operations were a priority. Despite this, it was reported that leadership was lacking in a few areas. It was reported that limited emergency funds were made available by the CoJ or other levels of government outside of private donations (CoJ Report 2009a, DMD officer 30 September 2009). In addition, coordination at an operational level on the ground in Soweto was reportedly poor (CoJ Report 2009a), suggesting inadequate leadership emerging to coordinate actors, potentially exacerbated by a lack of a DMC to enable better communication and response.

A DMD officer reported that the disaster management team did not get the support they required to lead a coordinated effort from departmental heads, as well as the city manager as the senior disaster manager of the CoJ (DMD officer, pers.comm. July 2009). The DMD officer highlighted the need for a coordinating institutional structure operating at high levels within the CoJ with the authority to take independent decisions. DMD officers frequently referred to the importance of this structure, identified in the DMAF as an interdepartmental coordinating committee, to overcome institutional divisions and fragmentation. These comments suggested that the disaster management function may have been struggling with insufficient autonomy and power to coordinate the many actors involved for an efficient and effective emergency response operation.

6.5.2 Recovery operations underway: Effectiveness of disaster management structures

Recovery operations took place over the next few weeks and months. Some homes were reconstructed, debris removed and infrastructure repaired (CoJ Report 2009a, b). Disaster loss inventories were recorded and disease outbreaks monitored (CoJ Report 2009a, b). Private sector donations of food and blankets were given to families in temporary shelters and bereaved families were counselled (CoJ Report 2009a, b). The South African Red Cross Society handed out relief parcels sponsored by the insurance company Mutual & Federal to 150 families in Bram Fischer's Thabong Section (Mutual & Federal website, accessed 6 March 2012). Instances such as this highlight the role played by private sector actors in sponsoring the relief effort.

The effectiveness of these operations is assessed below, particularly in terms of the functioning of the disaster management structures and flood risk governance context outlined in chapter five. As shown above, the phased approach to assessing the Soweto response allows for examination of the emergency response in light of prior preparedness and risk reduction efforts. The main disaster management structures examined are the DMC and other mechanisms for coordinating CoJ efforts, including the DMAF, the volunteer database and CoJ Corporate Disaster Management Plan. In addition, the analysis briefly explores the role of different actors in the emergency operations and the extent to which non-state actors were engaged in the relief effort.

One of the most serious challenges reported to the relief effort was the lack of a properly functioning DMC, which was said to hamper coordination and facilitation of teams in Soweto (CoJ Report 2009a; DMD operations manager, interview 27 July 2010). The DMD operations manager (interview 27 July 2010) argued that the benefits of the DMC may have included better leadership, as there would have been a dedicated person in charge of response efforts, facilities for training personnel, a mechanism to facilitate high-level and strategic decision making through the executive JOC, access to the necessary data (such as GIS maps of affected areas), data verification such as household damage assessments, back-up administrative support to field operations, better reporting to provincial government on the status of the relief efforts as required by the DMA, general management of the field operations from a central point including making arrangements for special supplies such as tents to temporarily house people, amongst others. The operations manager highlighted the importance of the DMC during response and recovery operations:

‘If we had a centre it would have been better in that would have a dedicated person in charge. We could have trained people and delegated. Instead we established a temporary JOC at Jabulani as this was central. This centre should communicate back to main the main Disaster Management Centre’ (DMD operations manager, interview 27 July 2010).

The operations manager argued that a DMC equipped with the necessary equipment was critical for enabling communication with the JOC at the disaster site. The operations manager reported challenges with establishing communications at the JOC:

‘We had to set up wireless phones and bring in PCs (personal computers). We had no emails for three or four weeks. We had no money for wireless calls and we could not transfer information to province every hour as required’ (DMD operations manager, interview 27 July 2010).

The DMD operations manager believed that a DMC may have enabled training of emergency volunteers. Without a DMC opportunities for further engaging city stakeholders in relief efforts were lost. A CoJ actor interested in volunteering during recovery efforts reported that:

‘I wanted to get my hands dirty in Soweto but could not because they did not have training. The disaster management spokesperson did not have information’ (senior EMD official, JCCC meeting 31 July 2009).

Although the executive JOC was in place, it can be deduced that an interdepartmental coordinating committee represented by senior decision-making levels may have been able to support the JOC in the coordination of recovery efforts, including the mobilisation and disbursement of funds. This would have created a more permanent mechanism for coordination, in place prior to the floods, operating on a proactive basis through identified networks and channels. The operations manager reported that networks established as part of the DMAF were not much use during the recovery efforts. Most civil society volunteers and organisations as well as CoJ actors supporting disaster management officers were from outside of the Forum (DMD operations manager, interview 27 July 2010). These were entirely new contacts for the DMD, or drawn from the volunteer database (DMD operations manager, interview 27 July 2010). This assisted the DMD to revitalise its networks internal and external to the CoJ. The operations manager highlighted that after contacting one JRA staff member ‘everything flowed from there’, even though larger role-players may not have participated as expected (interview 27 July 2010).

The volunteer database which the disaster management had been developing was reportedly also a useful resource (DMD operations manager, interview 27 July 2010). These volunteers trained in disaster management and basic first aid assisted with operations, although their exact role could not be deduced from the evidence. These volunteers consisted of young or inexperienced individuals interested in starting a career

in disaster management, as well as professionals such as doctors and engineers, NGOs, businesses, etc. (DMD operations manager, interview 27 July 2010).

Finally, the lack of level 2 and 3 Disaster Management Plans in place and hence clear contingency plans for disaster events, appeared to hamper a coherent response to the floods. The final report on the Soweto response highlighted the lack of coordination of teams on the ground and the need to update Disaster Management Plans for more coordinated operations (CoJ Report 2009a). A DMD officer emphasised the importance of updating the Disaster Management Plan and clear standards and procedures for response in a presentation on the Soweto efforts at an adaptation workshop after the floods:

‘We need to review and update the City’s Disaster Management Plan. We could look at ourselves and benchmark how we will set standards. We need a clearer picture on how we will do it with operational Standard Operating Procedures’ (DMD officer, presentation to the adaptation workshop 30 September 2009).

The evidence presented suggests that the CoJ’s disaster management systems were tested during the Soweto event and at times these were not as effective as they could have been. The Soweto experience demonstrated the need for a DMC and clearer standard procedures for response operations, as well as bolstered communication systems. The Soweto operations also highlighted the opportunities in engaging non-state actors in responding to flood events, in this case private volunteers. The engagement and coordination of non-state actors will be further explored.

6.5.3 Engagement and coordination of state and non-state actors

State and semi-state actors

As outlined, coordination and clarity of roles was lacking in operations and resulted in an insufficient alignment of effort (DMD officer, presentation to the adaptation workshop 30 September 2009). This was aggravated by a lack of DMC, a cross-functional coordinating committee, and properly devised contingency plans for flood events. This arguably reflected the fragmented and silo approach to decision making in the CoJ, which was carried through into this emergency situation. A DMD officer highlighted this coordination challenge:

‘The post-disaster project teams in Soweto worked well, but departments worked in isolation. What came out is that we cannot work in isolation. For us to be able to facilitate and coordinate at very short notice a response and recovery operation is a big challenge’ (DMD officer, presentation to the adaptation workshop 30 September 2009).

This statement also revealed the impact of disjointed operations on mobilising an effective response at short notice. The presence of provincial and national government also appeared to be minimal, including the DMCs at these levels (CoJ Report 2009a, b). It was unclear whether this was due to a lack of engagement by the CoJ, or a failure of the provincial and national DMCs to assist. From an analysis of reports there was evidence of officials from the Gauteng Departments of Local Government and Social Services volunteering their time in relief efforts, the Department of Water Affairs and Forestry DWAF undertaking water testing and sampling and Home Affairs assisting with lost documentation (CoJ Report 2009a, b) (Annexure C). From the evidence it appeared that no funds were received from provincial or national government (Annexure D), except cleaning materials from Gauteng Provincial Government (GPG) provided as part of a public clean-up operations of homes undertaken by the MEC (Member of Executive Council of provincial government) for Local Government and MMC (Member of the MC of the CoJ) for Community Development (CoJ Report 2009a).

Annexure C shows the multiple stakeholders involved in relief efforts with their own respective mandates and agendas, including a variety of MEs and city departments as well as numerous non-state actors. The Soweto case further verifies arguments of the dispersed and hybrid nature of disaster management at city level in the post-flooding response recovery and recovery phase. This raises questions of the respective roles and relationships and the best way to position the city for managing flood risk in the future. Annexure C also shows the range of work done in the restoration efforts as well as the very discrete tasks assigned to different MEs. In addition, a private contractor was hired by the JRA to do this initial clean-up work, demonstrating a degree of complexity in the contracting and governance arrangements for service delivery at the local level highlighted in chapter five.

Non-state actors

The DMD operations manager reported that there were an overwhelming number of volunteers and organisations that assisted in the relief effort (interview 27 July 2010). The nature of this involvement primarily centred on mobilising short-term resources and support for flood victims, providing food parcels, blankets, clothing, etc. as well as larger monetary donations and assisting with disaster management operations through the volunteer programme described above (CoJ Report 2009a, b). The OM stated in the interview that the ‘buy in and good will was unbelievable’.

Non-state actors included professionals such as doctors and engineers, NGOs, business, FBOs and churches, community leaders, ward councillors, humanitarian organisations such as the South African Red Cross Society, individuals, etc. Many networks with civil society were reported to have developed spontaneously during operations (CoJ Report 2009a; DMD operations manager, interview 27 July 2010). For example, churches played a role in counselling flood victims and providing temporary housing within church buildings (CoJ Report 2009a, b). Charity and humanitarian organisations assisted with donations and providing relief parcels of blankets, food parcels and clothing (CoJ Report 2009b) (see Annexure D). Community leaders and ward councillors liaised with affected households (CoJ Report 2009a). Annexure C and Annexure D outline more details on the different non-state actors involved and how they supported relief efforts.

Disaster management engaged affected communities through established structures such as ward councillors and community leaders as well as directly (CoJ Report 2009b). The main activity involved distributing relief and undertaking household damage assessments and then attempting to obtain relief material to meet needs (CoJ Report 2009b; DMD operations manager, interview 27 July 2010). A dedicated phone line was established which was also used to verify data from damage assessment to ensure residents were not claiming for damages twice given the limited resources available (CoJ Report 2009b; DMD operations manager, interview 27 July 2010). This process reportedly took place for three months (DMD operations manager, interview 27 July 2010). Help desks were also established at the JOC, as well as Diepkloof and Dobsonville fire stations, staffed by representatives from CoJ Departments for Human Development, Disaster Management and Home Affairs, with the aim of issues arising to be fed into Operational and Executive JOCs (CoJ Report 2009b). It was not possible to gather evidence on the functioning of these help desks or the extent to which they were used. No evidence was found for any

engagement channels to communicate and receive input from residents outside of these activities.

The floods also demonstrated that although the CoJ was trying to nurture networks in formal spaces such as the DMAF, independent and informal voluntary groups reportedly added the most value during the disaster recovery efforts (DMD operations manager, interview 27 July 2010). Work on nurturing and sustaining these relationships would be key for future efforts. The Soweto floods demonstrated the potential resources within civil society that can be harnessed for improved disaster risk reduction. As explored in chapter five, prior to the floods a network governance approach was largely not visible in the CoJ's DRM efforts in terms of active engagement with civil society in building the resilience of communities to flooding. The findings from the Soweto floods support that this is a key aspect of effective proactive DRM and may prove to be a crucial aspect for the future governance of flooding and climate change adaptation in Johannesburg.

6.5.4 Knowledge, technological, human and financial resources

Resources were limited during for post-recovery work. This included a shortage of disaster management officers to cover all affected areas on time (CoJ Report 2009a). The operation was managed by a small number of full-time personnel (20) who were also drawn into other administrative and political/public liaison tasks that took them away from the relief efforts (DMD operations manager, interview 27 July 2010). Physical resource challenges were also experienced including a lack of adequate storage facilities and unsuitable vehicles to access disaster areas (CoJ Report 2009a). ICTs were inadequate as outlined above (DMD operations manager, interview 27 July 2010).

Finally, no financial resources from the CoJ as well as provincial and national government for the relief effort to assist flood victims existed, and as a result the CoJ had to rely largely on external donations (CoJ Report 2009a; DMD operations manager, interview 27 July 2010). Annexure D outlines all the donations received. It shows that thirty three non-state actors made donations, including businesses, private individuals, charities and humanitarian organisations such as the Red Cross. In comparison, only three state actors made donations, with the largest amount (R300 000 or approximately \$36 232) from the Development Bank of Southern Africa (DBSA) (CoJ Report 2009a).

This indicates the potential role played by non-state actors in mobilising additional financial resources to support emergency flood relief, as well as the importance of a governance approach to understand the response to widen the lens beyond the role played by government actors. These funds from non-state actors were received through an account opened by the CoJ for disaster relief funds (Madumo 10 March 2009).

6.6 Conclusions and implications

6.6.1 Dynamics of flooding impacts in Soweto

The Soweto case illustrates how wider socio-economic and urban development processes influenced the patterns of flood risk vulnerability in Johannesburg. A governance frame uncovered the complex drivers of flood risk in the Soweto, arising from interactions between urban development pressures and growth, poor urban planning and management by the CoJ and provincial government, ecological degradation of water courses (in this case the Klip and Klipspruit Rivers) and poor storm water management infrastructure and maintenance. In this context, a heavy rainfall event led to serious impacts on people and assets. The Soweto example confirms findings on flood risk dynamics in other African cities, where a combination of urbanisation, development pressures, land use change, and poor storm water drainage and maintenance, etc. has led to worsening flood problems (Douglas *et al.* 2008). In many African cities only a moderate increase in the frequency and intensity of storm events can lead to serious impacts, with the poor most at risk (Douglas *et al.* 2008). More extreme events from climate change may worsen the impacts of flooding in Johannesburg. This demonstrates that effective urban development is central to climate resilience.

Flooding vulnerability patterns reflected and reinforced the wider inequalities and wealth divisions within Johannesburg and South Africa, with the poorest Sowetan citizens worse affected by the heavy rains that took place across Johannesburg on 26 February 2009. Many Sowetans lived in informal and low-income housing without the requisite assets to bounce back from flooding events, and settled in some of the most FPAs of Soweto, next to the Klip and Klipspruit Rivers and within flood plains. Unlike in wealthier areas of Soweto and Johannesburg, these communities resided in poor housing structures with lower levels of service, including poor storm water drainage, informal housing structures and poorly built government housing. They had to contend with many stressors such as crime, HIV/Aids, poor service delivery in addition to the climate, which exacerbated

existing vulnerabilities. The construction of government housing in low-lying areas was an example of ‘maladaptation’ by the state, where policy decisions increase climate vulnerability (Satterthwaite *et al.* 2007; in Romero-Lankao and Dodman 2011, p 117). This highlights the need for long-term planning beyond typical policy cycles as well as holistic development efforts that target the multi-dimensional nature of poverty and recognise the many aspects of sustainable urban communities and settlements beyond basic services and housing structures.

The Soweto case highlights the importance of providing the full range of *quality* services and infrastructure needed in sustainable urban communities for addressing varied development needs and widening the choices and opportunities of poor residents. This includes tangible services such as quality water and sanitation, electricity and safe housing, storm water drainage and roads; as well as intangibles such as the ability to engage and influence local decision making, good schools and clinics, libraries and recreational services, safe and efficient public transport, employment opportunities, and green and recreational spaces, amongst others. In flood risk governance the provision of effective disaster management services including EWSs and effective emergency response is also crucial.

The shift to the sustainable human settlements paradigm in South Africa recognises the need for a holistic approach to building communities considering all these aspects of sustainable living (Pieterse *et al.* 2008). It is argued that the achievement of this policy ambition in Johannesburg will be central to adaptive governance and fostering resilience of groups, households and individual to existing and future climate risk. This case reinforces the literature on climate risk governance in cities of the global South that argues that ‘good governance’ primarily centred on poverty alleviation efforts, service delivery, infrastructure provision and disaster preparedness forms the basis of climate change adaptation in cities (Satterthwaite *et al.* 2007).

The Soweto case revealed the importance of strengthening emergency management structures for urban DRR in Johannesburg. Emergency management is identified by Pelling and Wisner (2009) as one of four main practice areas for urban DRR in cities of the global South. This study also supports the emerging view that climate change adaptation can be considered a component of DRR (Pelling and Wisner 2009). It follows that bolstering emergency management systems is a critical component in adaptation of

urban populations to climate change and creating more resilient cities. The Soweto case also demonstrated that networked governance approaches may support inclusive and effective emergency management and risk reduction in cities in developing countries. The discussion below will consider the networked governance approach in the context of the Soweto findings, as well as the governance structures and processes enabling and constraining emergency management systems.

6.6.2 Enabling municipal structures

Municipal structures for enabling emergency preparedness and response were found to be important in the Soweto case. The flooding disaster demonstrated the importance of developing fully-functioning disaster management structures for proactive and effective emergency operations. The disaster management operations were predominantly reactive, uncoordinated and under-funded. In the Soweto operations it was found that dissemination of early warning systems, a Disaster Management Centre, communications infrastructure, and mechanisms for institutional coordination and engagement with communities were some of the most important governance structures and processes for enabling adequate preparedness.

The pre-disaster chapter found that these systems were predominantly not in place. This meant that communities in Soweto did not receive a timely warning of the floods to enable response and evacuation, a fully-functioning centre with communications infrastructure was not available to coordinate and manage operations, and there were few existing institutional mechanisms to integrate the actions of actors on-the-ground. Although temporary coordinating mechanisms such as the JOC and executive JOC were established, the effort may have been further supported by more established structures. This suggested that emergency operations may have been more integrated, efficient and responsive if these enabling structures were in place prior to the floods. Finally, without an immediately accessible disaster relief fund, the CoJ had to rely on private donations to provide emergency relief to households.

The fragmented nature of flood risk governance in Johannesburg and the wider tendency for CoJ actors (state and semi state) to work in isolation according to their narrow objectives appeared to be carried through to the emergency response. Leadership during the response and recovery operations was found to be important for crossing the functional divisions and silos of the CoJ, and coordinating the many actors on the ground.

Leadership challenges found in DRM prior to the floods, however, appeared to persist in the emergency situation. This research validates the finding of Botha *et al.* (2011) and the guidance of the NDMPF (2005) that political responsibility for disaster management needs to be clearly established at local levels. It is argued that cross-sectoral or functional decision making structures such as interdepartmental committees supported by a DMC empowered with senior decision making authority are required for ensuring DRM is proactively integrated into all planning and decision making, by overcoming structural divisions and fragmentation.

The Soweto case revealed once again that rather than the state being a ‘unitary actor’ (Litfin 1993; in Bulkeley and Betsill, 2003 p15), local flood risk and service delivery governance involved many actors and a diversity of institutions along a continuum of purely public and purely private governance. A number of MEs were involved in recovery efforts. For example, the JRA was involved in the repairing of roads, storm water/drainage system, Pikitup involved in waste management and debris removal and Joburg Water involved in restoration of water supply, clearing sewer systems blockages and providing water tankers to affected areas (CoJ Report 2009b). The JRA outsourced storm water clean-up operations to sub-contractors, further complicating the governance terrain (CoJ Report 2009b). The Soweto case further revealed the complex nature of service delivery and disaster recovery at the local level.

6.6.3 Prioritising disaster risk reduction at city levels

Chapter five highlighted the institutional challenges and power dynamics influencing disaster management at the CoJ. These challenges were somewhat evident in the nature of the Soweto response. It is argued that insufficient prioritising and understanding of DRR in the CoJ was a factor contributing to a fairly weak disaster management function in the city, which in turn played a role in constraining effective emergency preparedness and the response to the Soweto flood disaster. By implication, prioritising DRR in municipalities is an important aspect of climate change adaptation at the local level. This undervaluing of DRM is evident internationally (Pelling 2003) and in South Africa (Roberts 2010, Botha *et al.* 2011). This research supports Roberts’ (2010) call for a reorientation to a more proactive, ‘strategic’ and ‘cross sectoral’ approach to DRM in order to tackle current and future climate risk and that ‘ghettoizing of the function is a “fatal flaw” in any attempt to create a more resilient city’ (Roberts 2010, p. 402).

In Johannesburg, this would involve moving beyond being a ‘blanket and biscuit brigade’ (DMD officer, DMD focus group 13 November 2008) to proactively plan for disasters ‘to be predicted and responded to in a cross-sectoral manner’ (Roberts 2010, p. 402). This includes enhancing EWSs, as well as embedding DRR into urban development and planning, for example through land use and spatial planning which includes ensuring housing developments are not situated in FPAs, ‘flood proofing’ building construction, amongst others (Roberts 2010, p. 402).

A paradigm shift is needed in Johannesburg to understand DRR in terms of proactive risk reduction and then ensure *institutional arrangements support* this DRR approach, as discussed, including DRM decision making authorities and structures placed at high levels within the municipal hierarchy. A wider *framing* of the flooding issue is required to consider the multiple dimensions of flood risk governance along different timescales, from emergency response and working with communities to cope with floods, integrating flood risk resilience into short-, medium- and long-term urban development, planning and investment decisions (McEvoy *et al.* 2006; in Bulkeley *et al.* 2009). This echoes Pelling and Wisner’s (2009) four practice areas as highlighted, encompassing longer-term planning, regulation, risk management as well as short-term emergency response.

The themes discussed will be carried through and explored in later discussions, all under the overall key theme of governance. This governance lens has been selected as it allows for the explorations of all the above dynamics and because it was found to be one of the most important actors in understanding the CoJ’s flood risk response, with many other factors predicated on governance issues. The shaping of climate governance by CoJ’s municipal structure and power dynamics, as well as the influence of framing and performance culture, will be explored throughout the remainder of the study in relation to the institutional response to the floods in the Council halls, as well as in terms of long-term risk reduction and climate resilience building.

6.6.4 Transitioning to networked governance approaches

The Soweto floods also demonstrated the importance of the formal involvement of local civil society and private actors in emergency and risk management. The findings support a shift to a networked governance approach in Johannesburg to develop leadership within civil society in flood risk reduction. It is argued this mode of governance will enable DRR and climate change adaptation in cities of the global South.

Non-state actors, including private disaster management volunteers, churches, FBOs and businesses, played an important role in supporting operations. These actors showed ‘unbelievable’ ‘buy-in and good will’ in the recovery effort (operations manager, interview 27 July 2010). They primarily provided short-term relief (either monetary or relief parcels of food, blankets, etc.) and operational support (in the case of volunteers) as opposed to engaging in wider flood risk reduction or preparedness efforts. The Soweto case demonstrated the value that non-state actors can bring to bolster and support state disaster management systems and risk reduction efforts.

Pelling and Wisner (2009, p. 45) argue that ‘civil society is potentially an active and leading partner’ in emergency management, but also other areas of practice the authors identify development planning, development regulation and risk management. However, in the Soweto case it was found that CoJ disaster management teams appeared to engage with communities primarily as passive recipients of relief as opposed to involving community structures in operations. It was evident that limited work had been done in the affected areas previously to engender community flooding response mechanisms. Few organised community structures for response and recovery efforts appeared to exist, including the CERTs reported in the 2008/9 IDP (CoJ 2008b). Building on the coping strategies of communities prior to disaster events, and thereby taking a more proactive risk reduction approach, is argued to be essential part of adaptive governance in a changing climate. An opportunity exists in Johannesburg and Soweto to support ‘leadership roles’ for ‘local actors’ to contribute ‘to plans and to regulation and management’, in addition to their involvement in emergency management (Pelling and Wisner 2009, p. 46).

Networks linking CoJ actors were found to also be important in terms of activating CoJ responses, such as the JRA official who once he was called by the operations manager ensured that ‘everything flowed from there’ (DMD operations manager, interview 27 July 2010). Existing networks forged with private volunteers through the volunteer programme were also beneficial in increasing resource capacity of the disaster management teams. By contrast, the DRM structures established to build formal networks and partnerships, such as the DMAF, were less successful in the Soweto case. In contrast, networks with national and provincial disaster management counterparts were also found to be lacking in the floods. Cooperation with these different government levels is argued to be crucial for effective DRM (Botha *et al.* 2011). Support of local level DRM by

provincial and national actors also appeared to be wanting, both in terms of finances and operational support on the ground from the provincial and NDMCs.

Networked governance emphasises the state's engagement of society in addressing society's challenges, through partnerships and enabling 'civic leadership' to shape strategic responses and 'co-produce' solutions with the state (Schmidt 2008, p. 112). This approach also emphasises innovation and experimentation to address society's complex problems. In climate governance specifically, networks of state and non-state actors operating at multiple levels have been found to influence climate decision making in urban and local arenas (Betsill and Bulkeley *et al.* 2003). Research by Pelling *et al.* (2007) has also shown the importance of networks as a resource in responding to unforeseen disaster events, such as the foot-and-mouth outbreak in Wales 2001 (Pelling *et al.* 2007). In this outbreak, informal networks were found often to work more effectively than the legitimate system to facilitate the transfer of information (Pelling *et al.* 2007).

Following from this literature, the evidence from the Soweto case also suggests the value of networks and societal empowerment and engagement in DRR, given the resources these networks provided across state and non-state actors in the relief operations. This research suggests a key feature of adaptive governance involves nurturing horizontal and vertical networks with both state and non-state actors, and creating an enabling environment where civil society can lead on formulating locally-appropriate responses to flood risk and future climate change adaptation.

This research revealed that the networked governance mode is crucial for effective disaster response and recovery operations and, by implication, adaptive governance. This is in terms of both working communities in devising solutions to flood risk, and leveraging resources from civil society for recovery efforts – particularly given the evidence that there were limited CoJ resources for DRM. It will be argued in chapter seven, however, that constraints inherent in the *municipal structure and organisational culture* of the CoJ impeded a more networked approach to governance. The pre-disaster preparedness section briefly touched on the CoJ hierarchical, top down, technocratic and closed approach to decision making, which will be explored more fully in later sections. It is argued that the dominant bureaucratic and NPM paradigms of governance assisted in restricting more flexible, engaging and networked governance approaches.

7 THE INSTITUTIONAL RESPONSE TO THE SOWETO FLOODS

The institutional response and recovery to the floods over the short- and medium-term to the end of 2009 is also another dimension of the response and recovery phase. The operational response to the floods was centred on Soweto, but within the COJ institutional actors were also responding at a different level of management.

Chapter two provided the rationale for the study of institutions within a governance framework. While the following analysis centres on the CoJ's institutional response to the floods, this is done within a governance frame, as it allows for the recognition of wider macro-level processes impacting on institutional behaviour, as well as 'the whole range of institutions and relationships involved in the process of governing' (Pierre and Peters 2000; in Jordan 2008, p. 21). It is within governance processes that institutions are established and maintained (Anguelovski and Carmin 2011).

Chapter two establishes the significant role local government institutions play in urban risk reduction and climate change adaptation, argued to be 'the most critical actor' (2004; in Wisner and Pelling 2009, p. 38), 'through its unique positioning in the institutional architecture of urban governance' (Wisner and Pelling 2009, p. 44). This next chapter, therefore, focusses on the every-day governance forces that shape government action through tracking the CoJ's response to a real-life governance episode as it unfolds over time. Disaster events have proven useful in revealing 'backstage behaviour' 'at its most open realistic moments' (Phillips 2002, p. 202).

Literature highlights that governance structures and processes may pose limits to the ability of human systems to adapt to climate change (Moser 2009). It is also contended that these constraints may be 'embedded' within the 'municipal structure and function' (Burch 2010, p. 288). This chapter examines constraining and enabling structure and process factors influencing the CoJ's institutional response. This is done by tracking the ways in which CoJ actors manoeuvred within the established governance framework to respond to the Soweto floods.

The chapter aims to reveal the governance forces that may affect the adaptation of institutions to climate change, and hence shape the extent to which local governments can support climate resilient development at local levels in cities of the global South. These

factors include trigger events, the framing of the flooding issue, municipal structure, institutional power dynamics, and the performance culture. It explores the governance modes that may enable more adaptive forms of governance at local levels in developing country contexts.

The analysis will focus exclusively on the actions of the EMD, given that this Department played a facilitator role immediately after the floods by engaging CoJ actors around the issue and strategising responses. In addition, while the EMD did not have chief responsibility for flood risk reduction, it could be expected to play a role going forward, given to its mandate to reduce the impacts of climate change in Johannesburg.

7.1 Soweto floods a ‘trigger event’ and stimulus for action

Chapter five highlighted that prior to the Soweto floods, actors from the DPUM and EMD came together in an attempt to escalate the severity of the flooding issues to high-level political leadership, by routing a report to the MC (CoJ Report 2008a) and initiating some work to plan for flood risk protection over the longer term. Following this MC meeting, JRA initiated the SWFL Study for high priority areas and allocated R10 million (or approximately \$1.2 million) to the study, with this first phase of work planned to take 18 months to complete (CoJ Report 2009d). At the time of the floods, the NRM and JRA were also in the process of investigating flood causes and response measures as per the requirement of the MC, and undertaking a full costing for up scaling the SWFL Study to include flood line determinations and storm water drainage capacity studies for the whole city. The EMD and JRA were required to report back to the MC in May 2009 (CoJ Report 2008a). There was no further evidence of work undertaken in response to the first flooding report submitted in November 2008, or of any steps to prepare a more comprehensive response to flooding.

After the floods, however, there was renewed momentum and motivation, and in the days and weeks thereafter flooding became elevated on the municipal agenda. CoJ officials and politicians visited the flood sites in Soweto, reports were submitted to Council on the state of damage and disaster management operations, teams were sent out to undertake relief and recovery efforts, the EMD presented to the EMT of the CoJ on flooding, and meetings between the main CoJ actors involved in flood risk governance (EMD, JRA, DM, and consultants, amongst others) were held in CoJ offices about the implications of the floods and how the CoJ should respond. Flooding was discussed at JCCC meetings in

2009 to obtain stakeholder input on the development of the CoJ's CCAP. Finally, an adaptation workshop took place in September 2009 where flood risk was the main focus. Annexure E outlines the main details from these key meetings, including the participants and outcomes.

The event also 'triggered' the EMD into attempting to lead a response to the floods in the CoJ. It will be shown that the flooding episode provided an opportunity for institutional change and learning by temporarily relaxing institutional barriers to integration, reviving existing institutional mechanisms for promoting integrated and coordinated climate change decision making (namely the JCCC) as well as stimulating learning and collaboration on projects through greater interaction of institutional role-players and open sharing of different perspectives. It will be demonstrated that although the Soweto trigger event provided an opportunity for change, the management of this process was important for allowing more permanent institutional change – without which old relationships, functions and practices would reorganise and reestablish. This institutional momentum could largely not be sustained and did not result in concrete action or an integrated flood risk governance programme.

This initial institutional reaction to the floods provides further weight to claims in climate governance literature that 'trigger events' play a role in mobilising institutional action and learning on climate risk (Naess *et al.* 2005, Bulkeley *et al.* 2009). Naess *et al.* (2005, p. 133) also argue that flood events can expand local actors' 'room for manoeuvre even within an institutional structure which generally acts as a disincentive to local action'. In other words, floods can create an impetus that overcomes constraints to action and learning within governance structures and processes. As with the case of Norwegian municipalities, however, this focus could not be maintained at the local level. Further evidence of the catalysing effect of trigger events will be provided below.

7.1.1 The EMD leads on flooding in terms of the climate change agenda

On Friday 27 February, the executive director (ED) of the Environmental Management Department (EMD) visited the affected areas in Soweto. Following the site visit, the ED emailed all EMD staff on the floods on that same day about the role of the Department in responding. The email stated that the Department should lead on the flooding issue in the CoJ, and allocated responsibility to the CCCP specifically to act on the Department's behalf and guide a flooding response in terms of the climate change agenda – feeding

‘into the adaptation plan and disaster response’ (EMD executive director, Email communication 27 February 2009).

It was not clear whether the ED was prioritising flooding as a result of pressure from more senior levels of the CoJ, or whether the Department was proactively positioning itself in this way, given its climate change mandate. The email mentioned that it was ‘critical’ for the CCCP to lead the Department ‘in rising to this challenge’ and to ‘deliver especially on this one’, ensuring that flooding fed into the Adaptation Plan (CCAP) (which was to be devised in the coming months). It also stated that the CCCP needed to familiarise itself with the CoJ’s Disaster Management Plan in order to understand ‘how the work links with what we are doing on climate change’. The email also noted that Flooding Report Two was required by the MC in May 2009 to report back on the flooding issue. By allocating responsibility for flooding to CCCP, current flood risk was being understood and prioritised as a climate change issue. The senior directive, therefore, could be interpreted as the need to push the response to the floods in terms of the climate change agenda. The CCCP was tasked as the lead agent, despite all the work done by NRM on flooding outlined in section 5.3 and 5.4. It could not be established exactly why the CCCP was mandated to lead on flooding within the EMD.

In the weeks and months after the Soweto event, the EMD attempted to provide institutional leadership on flooding by convening a meeting of CoJ stakeholders in March 2009, linking the flooding agenda to climate change through the development of the CCAP, and attempting to use the JCCC as a forum for CoJ stakeholders to collaborate on flood risk planning. The EMD also wrote and submitted a second report on flooding to the MC in August 2009 (CoJ Report 2009d). The key events convened by the EMD in this post-flooding period are outlined in Annexure E, including the stakeholders involved and the main outcomes. Figure 8 also provides the chronology of important developments after the floods. The governance structures and processes that shaped these strategies and institutional response will be explored in this chapter.

7.1.2 The power of framing

The flood event ‘triggered’ different interpretations and understandings of the flooding problem. This allowed for alternatives to arise to the existing storm water management framing. As actors convened around the flooding issue, two major framings emerged in the EMD to make sense of the Soweto floods: a focus on *climate* and a focus on *urban*

development. These two framings were manifest in the different weightings given to extreme weather (and by implication climate change) and inadequate infrastructure/poor urban planning as causes of the Soweto floods. From the Soweto case it can be deduced that trigger events also provide an opportunity for reframing and redefining an issue and bringing new understandings into established institutional discourses. Naess *et al.* (2005) found that new perspectives emerged following the 1995 floods. These were better integrated, however, at national levels than local levels where these were filtered by local interests (Naess *et al.* 2005).

This framing struggle between the *climate* and *urban development* emphasis was first evident at a meeting the EMD convened two weeks after the floods on 12 March 2009 (see number 1 in Annexure E). The purpose of the meeting was to discuss floods in Johannesburg and devise a strategy for response. This meeting brought together the main stakeholders involved in current flood risk management, including the JRA, NRM and the CCCP. Non-state actors were notably absent.

At the meeting, a senior NRM official emphasised that flooding in Johannesburg was a result of both *infrastructure* and *extreme weather*, and was cautious about linking current flooding directly to climate change in case it drew attention away from the need to upgrade infrastructure. The NRM official's concern was that 'if you get too climate orientated, then you go back to the approach that everything is an Act of God' (senior NRM official, CoJ flooding meeting 12 March 2009). Flooding would become an unanticipated occurrence of extreme weather outside the CoJ's control and planning, as opposed to being concerned with the way Johannesburg's infrastructure was maintained, houses built and rivers protected. The senior NRM official argued further that:

'High risk (to flooding) relates to weather and infrastructure. Some areas are at risk regardless of the rain event because of things like hard surfacing. A lot of the damage in Soweto was related to backlogs of underfunded work. So the R350 million (assessed damage of the Soweto Floods) is not just water damage, but from previous work not done' (senior NRM official, CoJ flooding meeting 12 March 2009).

In the media, a member of the ANC's Youth League, Julius Malema, stated that the government could not be 'blamed' for the Soweto floods as this was a 'natural disaster'

(Mail & Guardian 3 March 2009). Julius Malema was a politician known for his controversial statements in the media, however, and this view could not be generalised to the view of the state or the CoJ. Malema's statement drew attention to the possible dangers of linking flood events to climate change, and the risk that the state may avoid responsibility by classifying these occurrences as 'natural'. In this vein and in contrast to the NRM official linking the damage in Soweto to infrastructure backlogs and development patterns, senior leadership of the EMD tended to emphasise the meteorological aspects of the Soweto event.

In a presentation to the EMT in April 2009, the EMD executive director included the slide below to explain the causes of the floods in the presentation. This information was primarily taken from the SAWS Radar Report referred to above in chapter six. The slide focussed on the meteorological aspects of the heavy rainfall event and no other slide covered the Soweto floods, or linked the flood damage to Soweto's inadequate storm water and catchment management. Therefore, the Soweto floods were predominantly *framed as an extreme weather issue* without noting underlying vulnerability factors that intensified the impacts.

What happened on 26th February 2009

- There was a trough or low pressure system caused by the air mass from the tropics
- The system scattered around Johannesburg and other cities / provinces
- Convective storms were observed over the Soweto area between 16h00 and 18h00 SAST
- The storms reached a maximum reflectivity of 60 dBZ with hailstorms
- The radar 1 hour precipitation accumulation estimation images shows a maximum of 96.5mm rainfall at 17h15 SAST
- From the weather radar a thunderstorm with lightning and rainfall accompanied by hail occurred over the Soweto area

(EMD presentation to the EMT 7 April 2009)

Another framing conflict emerged when submitting the second flooding report to the MC in August 2009. Prior to its submission, the EMD executive director requested the CCCP

to submit a report on the recently finalised CCAP and *include the second flooding report as a sub-section of a CCAP report*. NRM was dissatisfied with this approach. The flooding report was required by the MC; by incorporating the two reports flooding would be treated as a climate change adaptation issue as opposed to a problem in its own right.

This struggle was identified from personal communication with a CCCP official (15 July 2009) and an email sent between CCCP and NRM, where the NRM official wrote to the CCCP and ED: ‘I am confused. I thought we would be submitting the flooding report separately, and not subsuming this report in a report about the adaptation plan. The MC have specifically requested a flooding report and this is what we must provide’ (NRM official, email communication 15 July 2009). This created additional friction amongst municipal actors over how to treat the flooding issue and whether to link it to the climate change agenda. It was not clear how this internal framing conflict was remedied, but eventually two separate reports were submitted to the MC: a flooding report (CoJ Report 2009d) and a separate report on the CCAP (CoJ Report 2009e). In the flooding report mention was made of extreme weather aspects of the Soweto floods, but only reference to the role played by inadequate storm water maintenance:

‘An analysis of the February 2009 Soweto floods highlighted the importance of regular maintenance and clearing of storm water drains, culverts etc. to remove accumulated litter, silt and vegetation growth that impede the proper functioning of the system’ (CoJ Report 2009d, p. 47.2).

The Soweto floods demonstrated the complex inter-linkages between climate and development factors. Framing the Soweto floods in terms of either urban development or climate risk did not adequately reflect the complex development dynamics intensifying the impact of flooding. The next section discusses the consequences of alternative framing of the flooding issue by EMD actors.

Flooding as an urban development issue

It is clear that conflict emerged over how to frame the Soweto flood event, perhaps as officials were to some extent aware that whatever framing perspective became dominant would affect how the issue was defined and approached in the institution. Communicating the causes of the Soweto floods in terms of development backlogs and poor urban planning, as opposed to extreme weather events and climate, would lead to

different conclusions about the CoJ's level of responsibility for proactive flood risk reduction outside of improving emergency management systems, and how it should be tackled in future. By framing the issue as an infrastructure and urban planning issue, the NRM official was attempting to highlight the role of the CoJ in flood protection through medium and long-term risk reduction measures, such as land use and infrastructure planning and management, as well as mitigating the effects of poor urban planning practices of the past, such as the construction of government houses within flood prone areas. This framing gave MEs as service delivery entities, DPUM as the CoJ's planners and land use managers, and Housing as the providers of low-income housing, prominent roles in response.

This framing, however, neglected the need to ensure that flood risk protection measures reflected the range of climate change projections for different timescales over the short-, medium- and long-term. Disregarding climate change in flood risk governance would potentially have serious consequences, since the frequency and severity of extreme precipitation events and disaster losses increase, outside of the range of previous experience. Whereas progressive urban development provides the basis for building climate resilience, it is argued that it is not enough to concentrate solely on current climate extreme and risks, and base decisions on current climate variability as a proxy for the future.

Framing flooding only in terms of urban development, therefore, will mean decision makers do not recognise the real changes required to avoid the worst impacts from climate change in the future. Bulkeley *et al.* (2009, p. 9) found in their analysis of a number of case studies that climate change adaptation was often a 'side benefit' to addressing other issues such as water pollution, urban development, etc., or only addressed in a 'piecemeal' manner (Bulkeley *et al.* 2009, p. 9). It is important, therefore, to recognise the role of climate change in exacerbating flood risk in defining the flooding issue.

Flooding as a climate issue

By contrast, senior leadership of the EMD primarily framed the flood event in terms of extreme weather, as evidenced by the EMD executive director's presentation to the EMT. As outlined, the presentation referenced the meteorological aspects of the heavy rainfall event in terms of exploring the causes and impacts of the floods. It is deduced that this

was the case in order to push the climate change adaptation agenda, which up until then had not received as much attention as mitigation, as well as draw attention to the CCAP that was being developed. Whereas mitigation issues had received a substantial amount of political attention due to South Africa's electricity and load shedding crisis and the consequent requirement for municipalities to reduce their energy demand, adaptation was not a priority for Johannesburg. This was the case particularly since it represented a relatively low impact site for climate change, given that Johannesburg is not located on the coast or next to a large river. Under this framing, the main actors involved would be the CCCP as the unit responsible for climate change adaptation, meteorological agencies such as the SAWS and climate scientists for improved EWS and climate change projections, and disaster management for responding to emergency events.

Although it has been established that climate change framing is important, solely understanding flood risk in terms of climate change could also potentially lead to negative outcomes. Framed *exclusively* in terms of climate change may underemphasise the importance of urban planning in climate resilience. There was also the danger of viewing climate risk as by and large out of the control of the CoJ (hence an 'Act of God' as the NRM official commented), consequently limiting the emphasis on ensuring better emergency response.

These conflicts over framing demonstrated that city governments may use climate change as a convenient tool for abdicating responsibility for flood management. This danger was highlighted in the Malema statements in the media (*Mail & Guardian* 3 March 2009). In the case of the Soweto floods, however, it was the poor planning decisions of the CoJ and provincial housing departments that led to the location of low-income housing in vulnerable sites. Climate change can serve the interests of those wishing to hide government failure or 'maladaptation' (Satterthwaite *et al.* in Romero-Lankao and Dodman 2011). Although this did not occur in this case at the CoJ, it highlights the opportunity the climate change issue may present to cities to manipulate the issue to service their narrower interests.

This framing conflict also illustrated the sensitivities and complexities in communicating the climate agenda in a city of the global South and in the context of serious development needs. This research has revealed that in developing country contexts, linking adaptation to local agendas may not always have positive results for addressing current and future

climate risk. The climate change agenda can be used to shift the focus from urban planning for flood protection and lead to unbalanced prioritisation of measures for tackling flooding risk. Concentrating on urban development alone, however, will also leave cities vulnerable to increasingly dramatic climate events in the future. Both these framings also neglect a focus on human security, poverty alleviation and the needs of vulnerable communities.

This research found that the framing of flooding events is a sensitive issue, and a fine balance needs to be achieved in highlighting urban development, poverty alleviation and climate change aspects. Integrating climate change into urban planning, regulation, development and poverty alleviation efforts for protection over different timescales and a range of climate projections, as well as adequate attention to emergency response measures for unavoidable impacts remains key aspects in terms of framing, planning and response to addressing climate and development in cities of the global South.

7.2 The influence of the municipal structure

This section will consider the influence of municipal structure on the institutional response to flooding and the implications for adaptive governance at the CoJ. A primarily disjointed and fragmented response to flooding in the CoJ was found prior to the Soweto floods in exploring pre-disaster preparedness and the same somewhat incoherent response was evident in the disaster response in Soweto when the floods occurred. Similarly, in exploring the institutional response and the main institutional events (the flooding meeting, JCCC meetings, and adaptation workshop – see Annexure E) led by the EMD around which CoJ actors were mobilised, it will be shown that the same fragmentation re-emerged.

In the flooding meeting (12 March 2009) discussed already, it was brought to the attention of Natural Resource Management (NRM) and the Johannesburg Roads Agency (JRA) that another flood line study was being led by the Climate Change and Cleaner Production (CCCP) Sub-Directorate (the FPA study). This was despite the other JRA SWFL study being undertaken. The floods, therefore, revealed some duplication in planning efforts as it forced actors to interact around flooding issues. The purpose and scope of the FPA study is discussed in section 5.4.2.

Based on observations from the meeting, it appeared that the CCCP had largely been unaware of the details of the first flooding report (CoJ Report 2008a) and the approval of the SWFL study, and had instituted the FPA study with little consultation with other EMD actors from other directorates including NRM, despite the fact that NRM was taking the lead on catchment, water and open space management. The flood event, however, provided an opportunity for alignment of the work. This alignment was mainly led by the consultants, and not CoJ actors. Section 7.4 discusses how this outsourcing of knowledge production to consultants hampered the development of internal strategic understanding of climate change adaptation and the flooding issue. At the meeting, the ED of the EMD requested the consultants working together to integrate the two initiatives:

‘Consultant B must meet with consultant A to integrate what you are doing. I need to do a presentation to the EMT. I must be able to say consultant A is doing x and this is how it relates to consultant B’ (EMD executive director, flooding meeting 12 March 2009).

The Soweto floods, therefore, showed that actors were not coordinating some of their efforts related to flood risk management. The floods consequently provided the opportunity to better coordinate existing initiatives by forcing actors to interact. The silo-approach to decision making was temporarily dismantled. Had the floods not occurred, it is possible that these two projects may have been undertaken in isolation. The institutional response also revealed the influence of non-state actors (consultants) in knowledge production for flood risk governance. This episode demonstrated the potential difficulties in coordinating efforts by multiple external service providers producing work for the CoJ. The next section explores the extent to which the municipal structure of the CoJ disincentivised integrated and multi-sectoral planning.

7.2.1 Factors contributing to fragmentation

The fragmented planning outlined above may be influenced by a number of factors. These include a degree of a lack of accountability and leadership for flood risk management, insufficient efforts to collaborate from individual officials, as well as the organisational culture of the CoJ (which will be discussed in subsequent sections). It is argued, however, that the municipal structure and process also played a significant role in constraining integration and hampering adaptive governance. The inflexible and

bureaucratic structure of the CoJ and the establishment of MEs as the service delivery arms of the CoJ contributed to institutional divisions.

Bureaucratic paradigm

It was found that the traditional public administration or bureaucratic paradigm of governance was influential in the CoJ. This was evident in the emphasis on rules, hierarchies and procedures. The inflexible municipal structure with fixed vertical reporting lines to a degree restricted municipal actors from working in an integrated way across hierarchies, local agencies and outside of their formal job role. The institutional arrangement further fragmented and complicated decision making, with many different functional areas (separated into departments), deep hierarchies (the executive leadership as well as up to four ranks of management within each directorate of every department), levels of decision making (core and regional offices), divisions into political and municipal governance and the outsourcing of operations through the creation of the MEs. As a result, CoJ officials tended to work within their silo and functional cluster due to the vertical reporting lines to political and administrative heads. A DPF assistant director in a focus group explained:

‘It is not just the fact that there are more departments to deal with. It is the fact that it is a big organisation with many departments and entities and those each report to their own political head. To get all of those aligned and working in same direction is a huge thing. A lot of what our department (DPUM) does is aligning and coordinating with implementation agents and despite a lot of effort from a lot of people across the city you do find gaps or duplication of work’ (DPF assistant director, DPF focus group 8 December 2008).

This comment highlights how the reporting structure required alignments at a *political* and *administrative* level. This meant conflicting mandates or political objectives of MMCs may have also further complicated the brokering required to integrate work. Vertical reporting relationships and hierarchies were also deep *within departments*. Departments were split up further into directorates, with departments having between three and nine internal directorates (IDP). These directorates were then sometimes split further into sub-directorates, as was the case with the climate change function, which was a sub-directorate of the AQCC Directorate within the EMD. Three to four levels of

management existed for *each directorate within a department*. This demonstrates the vertical nature of reporting relationships.

The implication was that the CCCP may have been to an extent disincentivised from engaging *across* directorates (horizontally) on the design of the FPA study. Rather, the tendency was to engage *upwards* with line managers and the ED of departments, rather than with other directorates and departments or entities in the CoJ. The performance model also tended to promote this vertical reporting as KPIs were *generally* shared vertically by different management levels rather than horizontally across functions. This will be explored further in section 7.4. Both the ED and the director of the AQCC were aware of the FPA study as they were the direct managers of the FPA project manager, the deputy director of the CCCP.

These structural impediments within the administration presented a challenge to adaptive governance in Johannesburg. They contributed towards restricted horizontal networking across the institution, which has been found to be an important aspect of local climate governance (Pelling and High *et al.* 2007; Bulkeley *et al.* 2009). They also hampered learning across disciplines and sectors that Winsvold *et al.* (2009) argue is central to effective governance for mediating the many types of knowledge applicable to urban adaptation.

In a focus group discussion with Development Management, one senior official explained how the ‘inflexible organisational structure, with very fixed reporting lines’ undermined adaptive and flexible working across disciplines which needed to respond to ‘modern challenges we face as a city’, of which climate change is arguably one (strategic support specialist, DM focus group 2 December 2008). Multi-disciplinary working was constrained, the official contended, primarily because individuals were not able to work *across* the organisation with a number of different actors. The official argued that ‘if you want to work with some other discipline you get seconded there and I mean that is just crazy. You cannot just cross and work with a number of different departments on a project’ (strategic support specialist, DM focus Group 2 December 2008).

Working in a public sector environment also meant that there were numerous regulations that officials had to adhere to when taking decisions. It is beyond the scope of this research to list the many regulations, but they included local government legislation

including the Municipal Systems Act (Act No. 32 of 2000 and amended 2003, regulating the internal functioning of municipalities) and the Municipal Finance Management Act (MFMA) (Act 56 of 2003 requiring strict financial management and procurement processes), regulatory planning frameworks, systems such as performance management (see section 7.5) and numerous reporting requirements. Participants in focus groups frequently named the bureaucratic nature of the CoJ institution as a constraint to achieving their mandates. The same senior official expressed frustration with the bureaucratic processes and procedures:

‘This is a bureaucratic institution and there are a lot of the processes and procedures that are completely unsympathetic towards the kind of technical and professional work we need to do’ (strategic support specialist, DM focus group 2 December 2008).

This statement highlights the potential barrier the bureaucratic approach may present to ‘technical and professional work’ because of the time absorbed by fulfilling process requirements. Therefore, many of the processes of the CoJ were found to hamper flexibility. The bureaucratic administrative structure of the CoJ, therefore, often did not appear to ‘fit’ with the nature of the wide-ranging and diverse nature of the climate change problem (Romero-Lankao 2007).

Municipal Entity (ME) model

It has been argued that Johannesburg’s ME model, while introducing certain operational efficiencies, was a contributing factor towards a lack of accountability and civil society engagement in service delivery (Smith and Morris 2008). This has been discussed in detail in chapter five. As highlighted, the model can be associated with the NPM paradigm of governance (Smith and Morris 2008). This section explores the ME model, mainly in terms of its effects on municipal fragmentation and managerial competency.

Holgate (2007) has assessed the ME models specifically in relation to climate change mitigation governance and argues that it created a ‘silo effect’ between the administration and entities and hindered communication. This research has validated Holgate’s findings and found the ME model also contributed to a disjointed approach to flood risk governance, and made it challenging for the EMD to have influence over MEs with key responsibilities in climate protection.

Fragmentation and profit vs. strategic objectives

The chapter on pre-disaster preparedness highlighted the fact that city planners found it challenging to have an ME (JRA) as the main lead agent on flood risk management. One senior official argued:

‘The only problem is it is not within our (Development Management) sole preserve to order attenuation. This is managed by JRA, based on their technical expertise and their data. If we had sole discipline-making in terms of storm water attenuation and storm water management, it would have been very different, but we are very much guided by a municipal entity that sits outside of Council’ (assistant director, DM focus group 2 December 2008).

This highlights a number of the drawbacks to the ME model. Firstly, MEs were separate organisations, with separate offices, performance scorecards, different senior management (CEOs and MDs as opposed to the city manager or executive mayor) and different organisational cultures run according to profit objectives. CoJ officials working with an organisation that ‘sits outside of Council’, despite it being wholly-owned by the city, presented a logistical and practical challenge for co-ordination as a separate entity. Secondly, by outsourcing service delivery, central departments had lost access to valuable data and technical expertise in these areas. This helped to create an uneven power balance, given that central departments were reliant on MEs for achieving their delivery objectives but often lacked the knowledge to monitor their performance, or to use this knowledge to make strategic decisions.

Thirdly, MEs were arguably motivated by narrow profit objectives which were given priority over the more progressive strategic objectives of the CoJ, creating a misalignment of overall objectives. In many instances MEs would have greater accountability to their boards than the citizens of Johannesburg, more accountability to financial viability and efficiency rather than accountable to the developmental objectives of the CoJ, including sustainability and climate protection. This in certain instances could create a ‘misalignment’ between objectives (DPUM executive director, interview 16 January 2009). For example, the Johannesburg Property Company as an outside agency was the main custodian of municipal owned land, but its separate ME status made it difficult to implement a coordinated land strategy in line with the development vision of

the CoJ. The property company is incentivised to sell off often valuable open space, which runs counter to the need to preserve open spaces for natural flood attenuation.

‘So there are sometimes questions of alignment. The strategic objective of boards also determined to some extent by the need to show operating profit and sometimes profit objective might be misalignment between the profit objective and strategic objective of the City. For example, in the sale of land, development planning or housing may want to hold onto piece of land for strategic objectives, but JPC may see an opportunity in disposal of portion of land. This does not mean there are not mechanisms to ensure this is dealt with. The City has a land strategy and DPUM works closely with JPC, but it emerges from time to time’ (DPUM executive director, interview 16 January 2009).

Fourthly, the pressure for MEs to be run as self-sustaining business units appeared in some cases to lead to an underinvestment in services, including storm water maintenance and infrastructure development. The JRA had historically always been run at a loss (NRM official, pers.comm. September 2010). This was due to the intensive capital costs of building and maintaining road and storm water infrastructure and because the JRA could not generate its own revenues through payments from residents (CoJ 2006b). The requirement for JRA to be self-sustaining appeared to be taking its toll on storm water extension and maintenance particularly in poorer areas such as Soweto, as has been demonstrated in the flooding case.

A JRA operations manager claimed in November 2008 (pers. comm.) that insufficient funds were available for proactive maintenance, particularly during very rainy seasons when resources were stretched to the limit, and in the context of oil price and electricity increases and inflation. This reduction in long-term proactive maintenance meant more resources had to be spent on short-term reactive maintenance. The operations manager reported that the JRA anticipated a budget shortfall of approximately R 34 million (approximately \$4 million) in the 2008/9 financial year. In addition, JRA budgeted R4 million (approximately \$470 000) for emergencies in 2008/9 and this amount had supposedly already been spent by November 2008, a few months into the financial year (JRA operations manager, pers.comm. November 2008).

Sectoral alignment

The alignment of MEs to departments along sectoral lines was also a contributing factor towards fragmentation within the CoJ's governance system. Departments could only hold MEs in their sector to account, and accordingly the EMD could only monitor the work of JCP and the Zoo, when it was also expected to engage across departments and entities to achieve its mandate. To influence other entities it was necessary to lobby the oversight manager in another department who was not obliged to take up the issue, such as through the Transportation Department to access JRA. This model to a degree disempowered the administration from influencing MEs to undertake proactive flood risk reduction, as well as mitigation related measures such as energy reduction and recycling. The director of AQCC mentioned MEs as one of the most significant constraints to achieving climate change objectives in Johannesburg:

‘MEs are one of the biggest constraints for us in climate change. Pikitup is not interested in composting and promoting recycling. City Power could do so much more on the energy side. It is difficult to influence what they do. They are a business running on their own. The ED of Transportation is in charge of JRA directly and she could say they must implement energy efficient traffic lights and they will do it. MEs do things on their own’ (AQCC director, interview 22 September 2010).

This sectoral alignment would always be a challenge for issues such as climate change adaptation and flood risk management in particular, which required multi-sectoral engagement and the EMD to compel and work with actors across the CoJ. The DMD was also hampered further by the ME model as it had no oversight responsibilities for any ME despite urban risk reduction relevant to many CoJ departments and entities.

Operational focus

Although the ME model has been shown to have negative impacts for flood risk protection, the DPUM executive director highlighted that it had helped to create a strong ‘operational focus’ (interview 16 January 2009). This strong delivery emphasis was important in the first years following apartheid when millions of urban dwellers in Johannesburg lacked the most basic level of services. The former CEO of Johannesburg Development Agency also argues that it is not the model at fault for fragmentation, but how the administration engages with MEs, inadequate use of tools available for

integration such as scorecards, and restrictions in place that do not allow for the MEs to work independently to achieve their mandate:

‘The ME model works well but the City is ambivalent about it. So the system has been set up where we had room to manoeuvre but over the years the City takes back more and more powers and we do not get the space to work. We can work with tools like scorecards like putting renewable energy targets on scorecards of MEs. By nature a large institution like this has coordination problems. The Mayoral Committee could play a bigger role in coordination and have more discussion with MEs. I have never attended an EMT and have very little access to the City Manager. The city treats MEs like a janitor that should do x, y and z for them’ (JDA chief executive officer, interview 16 January 2009).

It is beyond the scope of this study to undertake a full analysis of the ME model and recommend alternative approaches. Instead, this study can only reveal the complex implications of corporatising services and the involvement of the private sector in service delivery. It is argued that the structuring of service delivery is a key debate for climate change governance in cities of the South, given the pivotal role of services in preparing for a changing climate, the lack of capacity of the local state in these cities, and the increasing role of the private sector in delivery.

In conclusion, the research suggests municipal structures played a significant role in promoting a largely silo-based and technocratic response to flooding that did not support a networked governance approach. The Soweto floods revealed the previous lack of collaboration on flooding, but it did also create a limited opportunity to align initiatives by catalysing some interaction amongst actors across decision-making silos and boundaries. By implication, changes to institutional structures that promote the fostering of networks, multi-sectoral and multi-disciplinary collaboration and communication are clearly necessary for achieving adaptive governance in Johannesburg.

The fragmented organisational response is attributed here to wider paradigms of governance shaping South African local government agendas, as well as CoJ decision-making which is simultaneously attempting to advance the contradictory objectives of centralised bureaucratic control, maintain efficiency in the case of NPM, and remain responsive to its citizens. From the evidence, it appeared that the CoJ was battling to

reconcile these tensions and more centralised and inward-looking approach to governance was prevailing. It is argued that this constrained the CoJ from harnessing the innovative potential of civil society through partnerships and engagement in the case of networked governance. These different mandates need to be resolved for the developmental local government agenda to be realised and for the CoJ to change its relationship with communities so that they can participate meaningfully in their developmental and climate change governance. Satterthwaite *et al.* (2007, p. x) argue that in the cities of the global South community-level adaptation will require local governments ‘changing their relationship with those living in informal settlements and working in the informal economy’.

This research has also revealed the need for the CoJ to alter the way it engages with poorer residents as passive recipients of services and awareness-raising programmes (shown in chapter five) to ensuring that citizens can ‘participate meaningfully in establishing more sustainable modes of urban development’ and are provided with ‘the political and technical skills to respond to a changing climate and by creating structured opportunities for a more fundamental discussion of the lifestyles and modes of development which we as a population will pursue’ (Aylett 2010, p. 111). To do so, enabling governance structures promoting networking and relationships across state and non-state boundaries needed to be developed.

7.3 Institutional power relations

This section analyses the effects of municipal power relations in shaping responses to floods. A study of responses to floods in Norwegian municipalities by Naess *et al.* (2005 p. 133) provides evidence that flood events expanded the ‘room for manoeuvre’ and flexibility for local actors, despite barriers inherent in institutional structures for proactive flood management. However, flood response was mediated by local interests and the type of measures applied reflected local power structures (Naess *et al.* 2005). More ‘expensive, large-scale technical measures’ were favoured, ‘often at the expense of environmental or other concerns without a strong political voice in the current power structure’ (Naess *et al.* 2005, p. 134). In the urgency of the post-flooding situation more ‘event-driven’ responses were implemented without full consideration of options, where ‘strong local political and economic interests coincided with state-level willingness to pay and provide support’ (Naess *et al.* 2005, p. 135). These technical responses were

implemented without sufficient consultation at the local level and despite opposition from environmental NGOs (Naess *et al.* 2005).

A similar tendency towards technocratic solutions to flooding (including storm water management) was identified at the CoJ, as outlined in chapter five. After the floods it was observed that the JRA and EMD attempted to capitalise on the political attention on flooding issues by submitting the second flooding report to the MC in August 2009 (CoJ Report 2009d) and motivating for an amount of R30-R50 million for a city-wide flood line determination and storm water drainage capacity study. This was in addition to the R10 million that had been allocated by the JRA to take the work forward:

‘Past funding has been limited to R200 000 per annum due to limited budget and JRA estimates that only 30% of the work has been completed to date. It is estimated that an amount of some R30 to R50 million is required in order to produce up to date and reliable flood line data for the whole City. Such data is critical in order to inform development patterns and decision making in regard to new developments, and to enable more accurate identification of flood risk areas (CoJ Report 2009d, p. 47.3).

The JRA and EMD were in a position to structure a response to the Soweto floods as the most established role-players in flood risk management, and with the mandate to lead on flooding from the first flooding report in November 2008. In the 2011/16 IDP an operating budget of R6 million was allocated to the SWFL study for every year until 2015, together with an overall capital budget of R32 million. From the 2011/16 IDP it appears that the storm water management programme was given high priority in terms of budgetary support in the new mayoral term. It is deduced that the floods may have provided some rationale for approving this significant budgetary commitment to the flood line and storm water infrastructure study. In the first meeting convened by the EMD after the floods (12 March 2009, no. 1 of Annexure E), an NRM official highlighted the opportunity for using the floods to motivate for the SWFL project:

‘We need to decide what we recommend to (the) Mayoral (Committee). We need to pitch for the R50 million study’ (NRM senior official, flooding meeting 12 March 2009).

In subsequent meetings, other EMD actors highlighted the need to ‘make a case’ for the flood line study. At a JCCC meeting in April 2009 (no. 3 of Annexure E), the EMD executive director drew attention to the SWFL study as one of the mechanisms for building climate change resilience as part of the CCAP:

‘This is a very important project (Adaptation Plan), especially in light of the Soweto Floods. We have to start to build resilience in what is done across the city. The plan is critical for decision-making. The case needs to be made for a comprehensive flood line for the city... The floods were a learning experience for the City and we were found wanting in our response. We need a comprehensive flood management plan of what must be done, how and when’ (EMD executive director, CCAP consultation session at JCCC meeting 16 April 2009).

It is clear, therefore that the SWFL study was one of the main components of the CoJ institutional response in the months after the floods and during the ‘window of opportunity’ for action (Naess *et al.* 2005, p. 133). The approval of a substantial budget for the flood line study is somewhat akin to the ‘event driven’ response identified by Naess *et al.* (2005, p. 134). The Soweto floods had created a sense of urgency and provided the opportunity for established interests (in this case JRA and EMD) in flood risk management to obtain approval for an expensive project, due to the MC’s heightened concern about flooding and greater willingness to allocate finances to flooding in this post-Soweto period.

This is not to say the SWFL study was not important; flood line delineations would be a key aspect of instituting flood protection in the approval of new developments outside of flood prone areas and critical to flood protection in vulnerable low-income settlements most affected by flooding. As in the case of Norway, however, this process did not allow for considering the full range of needs and solutions to flooding in a holistic way and budgeting and prioritising accordingly. Based on the challenges encountered with response and recovery operations in Soweto, equal attention and resources could have been allocated to the under-resourced disaster management function, setting up a disaster relief fund, establishing a DMC, and bolstering community efforts for flood protection, amongst others. Through this report, the flood line assessments became the main focus of Johannesburg’s flood response, with little widespread consultation outside of the CoJ

with non-state actors on the appropriateness of these costly interventions. This was arguably at the cost of short-term protection of communities vulnerable to flood risk to avoid loss of life and assets.

Naess *et al.* (2005) cite Lukes (1974) to explain the operation of power in the decision-making process where politically or economically influential actors are able to shape preferences and ideas around an issue to the status quo and existing conceptions. In the Johannesburg case, it did not appear that the JRA was pursuing a strategy to advance its own storm water management agenda at the exclusion of other approaches. The framing and understanding of flooding in the CoJ by a wide range of actors, however, and the allocation of responsibility for flood risk management to a roads and storm water management agency, was contributing factor to maintaining the status quo and old understandings of flood management, at the expense of more integrated and environmentally-sustainable approaches.

As noted, it is posited that the floods helped provide the political attention to drive through an increased budget for the SWFL study, but they also offered an opportunity for the EMD to demonstrate leadership on the issue and attempt to formulate a cross-functional flooding programme under the banner of climate change adaptation. The EMD's 'room for manoeuvre' appeared to have been expanded after the floods because of the ability to gain the interest and attention of a wider range of municipal actors (through the JCCC meetings and adaptation workshop) and political support when lobbying for flood risk reduction measures (the SWFL study) (Naess *et al.* 2005, p. 133). The Soweto event seemed to offer a potential opportunity to elevate the position of the Department, improve its visibility in the organisation and show its competence and ability to play an active role on a high priority issue, one which senior management appeared to recognise. This was evident in the first email circulated to the Department by the ED of the EMD requesting that the CCCP lead the Department 'in rising to the challenge' (see section 7.1.1 above).

It has been briefly argued that the EMD occupied a relatively less powerful place in the institutional hierarchy due to its separation from the planning function (chapter four) and its limited authority to influence ME activities across sectoral divisions (section 7.2.1). It is recognised, however, that as a stand-alone Department, the EMD was represented at higher levels within the institution and could devise its own business plan and maintain

control over its own budget. After the floods, its ability to mobilise a cross-section of actors on the flooding issue, through the meetings and the workshop outlined in Annexure E, demonstrated the opportunities for the EMD to show leadership and wield some influence.

Whereas prior to the floods, JCCC meetings were dominated by mitigation-linked CoJ actors, more adaptation stakeholders consistently attended the three meetings held between April and July 2009, including the DMD and JRA. The meetings were also attended by more DPUM representatives who had not previously sat on the JCCC, and the NRM attended the first meeting in April 2009.

There was evidence of more city actors engaging with the adaptation issue in comparison to previous meetings. This was facilitated by the development of the CCAP, with these meetings serving as stakeholder consultation sessions. This provided a concrete project around which actors could engage. Whereas the main purpose of the JCCC meeting was to obtain stakeholder input on the CCAP, the flooding event arguably provided further impetus and urgency for engagement around climate risk, and hence led to more regular attendance by a wider range of stakeholders at the JCCC. A similar shift in greater adaptation stakeholder representation in the MSCC was not observed, however. It is presumed this was because changes to membership had to go through formal channels, suggesting that formal networking and collaborative institutional structures were less amenable to change following disaster events.

Following the floods, the EMD also used the JCCC as the main institutional structure for flood management in Johannesburg, and to link this response to the CCAP implementation. In the July 2009 JCCC meeting, the ED outlined to participants a road map for structuring a response to the floods through the JCCC (see no. 3 of Annexure E). Stages in this road map included reviewing institutional structures and policy related to flood risk management, reviewing the CoJ's disaster management framework, creating a protocol framework for assisting vulnerable communities and communicating climate change, and creating clear timeframes for action by the JCCC and assigning responsibility (EMD executive director, CCAP consultation session at JCCC meeting 31 July 2009).

With political and administrative attention on the flooding issue, the EMD leadership appeared to try to devise a coordinated institutional response to flooding as well as implement the CCAP in terms of climate change adaptation agenda. Increased interest in the flooding and adaptation agenda was also observed outside of the JCCC meetings. The Adaptation Workshop held in September 2009 was attended by over 50 participants. The EMD connected to a cross-section of CoJ actors around the flooding and adaptation issue for the first time at this workshop (see Annexure E). Flooding made up about two-thirds of the agenda – providing further evidence that the EMD was attempting to articulate the flooding problem through the lens of climate change adaptation, as well as to understand climate change adaptation mainly in terms of flood risk.

It will be shown in section 7.4 how the attempts by the EMD for leading on flooding and advancing CCA were nonetheless largely unsuccessful. By 2011, flood-related plans (including related to storm water management) and climate change adaptation programmes were not reflected in the 2011-16 Environment Sector Plan of the five-year IDP. From IDP analysis it appeared that by 2011 a coherent cross-institutional response to floods had not been devised and the JRA was still the predominant municipal actor in flood protection (CoJ 2011b). This was evidenced by no formal cross-cutting flooding programme reflected in the IDP, including in the Environment Sector Plan or under a climate change adaptation programme (CoJ 2011b). Without an adaptation programme in the 2011-16 Environment Sector Plan, it is deduced that few adaptation objectives may be established for the 2011-16 Mayoral Term. It could not be ascertained whether this adaptation programme still progressed after 2012 despite not being captured in the IDP. Therefore, despite interest around the CCAP process immediately after the floods, limited implementation of this plan occurred. The AQCC director highlighted the lack of implementation as a result of the adaptation planning exercise:

‘The adaptation exercise was very useful to set the scene for what is needed. Now we need some projects. How do we take the findings forward? So what if we have a plan. We have not been making much progress. It does not have to be big projects’ (AQCC director, interview 22 September 2010).

As was the case prior to the floods, flood risk governance was not identified as a separate goal or formal responsibility of any directorates of the EMD, nor any other CoJ department (CoJ 2011b). Conversely, the JRA was responsible for a number of flood risk

reduction interventions under the storm water management programme, including completing storm water master plans and flood lines, and the development of a Sustainable Urban Drainage Systems (SUDs) Manual to address the five-year target of 'implementation of innovative and environmentally friendly urban drainage systems' (CoJ 2011b, p. 258). In addition, a new programme was added to the storm water management programme in the 2011/12 Transport Sector Plan related to 'Emergency and disaster management (including but not limited to respect of critical repairs in the event of flooding' (CoJ 2011b, p. 259). Therefore, some degree of policy learning under the storm water management programme could be discerned with this shift to increased attention on SUDS and bolstering emergency management systems for storm water repair and maintenance.

These power relations were not the only factor contributing towards the closing down of efforts. Flooding response was also influenced by the overarching municipal structure which promoted fragmented and silo-based delivery, and was driven and impeded by the performance culture – which will be further explored. Despite these institutional constraints, it was also observed that the EMD's lack of sustained leadership and ability to capitalise on the momentum over the longer term was also a constraint. It will be shown later how most efforts that were initiated by the EMD were not carried through by the Department. From observation, it appeared the EMD had not yet managed to show the required leadership to enjoy more influence in the municipality.

This research confirms findings in the literature that having the climate agenda led by an environment department often without power in the municipal hierarchy may compromise the development of coherent and coordinated responses to CCA, as these departments do not have the authority to direct or influence other local government actors (Alber and Kern 2008, Sippel and Jenssen 2009). In this environment of fragmentation and complex relationship brokering, high-level administrative leadership is important for overcoming institutional barriers. A case can be made for placing climate protection at high levels in city manager or mayoral offices to overcome this fragmentation, work across institutional silos, and compel various actors to make climate protection a priority in their work. The study also lends further weight to the conclusions of Naess *et al.* (2005) that flood events do give actors more institutional space to drive through changes and overcome governance constraints, but that governance constraints often overwhelmed these efforts.

7.4 Performance culture

‘Government must work faster, harder and smarter. We will expect the executive and the public service to comply with this vision. We are building a performance-oriented state, by improving planning as well as performance monitoring and evaluation’ (South African President Jacob Zuma, State of the Nation Address, 2010).

The discussion now turns to the final governance factor found to influence the institutional response to the Soweto floods in the CoJ: the performance culture. This research found that the CoJ’s organisational culture, in particular the performance culture, worked against integrated, collaborative planning and action, and served as a barrier to social learning. Assessing the underlying culture of local government organisations is an important aspect of understanding adaptive governance. The focus on performance monitoring in South Africa’s local government reform can largely be traced to NPM governance approaches (Schmidt 2008).

7.4.1 Taking the Adaptation Plan forward: formation of task teams

The performance culture appeared to be a significant factor in the failure to sustain the momentum for collaborative engagement around flood risk that the EMD attempted to initiate. The failure to integrate a cross-sectoral flooding programme and CCAP’s adaptation measures related to flood risk reduction into the existing scorecard-based performance management system and supporting business plans, was one of the key factors contributing to the loss of momentum around the initiative, as will be described.

At the adaptation workshop, four task teams were established by the EMD to begin to implement the CCAP: Flood risk, information management, finance and infrastructure. It was initially envisaged that CCCP officials would lead each of these teams. These task teams emanated partly from the core ‘strategic level’ adaptations identified in the CCAP ‘to address a broad number of risks across sectors’, and were regarded as ‘fundamental for the CoJ’s effort to effectively adapt to the evolving threat of climate change’ (CoJ 2009a, p. 85). These strategic adaptations included exploring financing options, and developing an information management system. Infrastructure and flood risk task teams were identified by the EMD senior management as important.

At the workshop, it was agreed that each team would meet within two weeks thereafter to refine their programme and activities, allocate responsibilities and deadlines, and write this programme up in a report. It was then planned for reports on the task teams to be reviewed at the next JCCC meeting in October 2009 (no. 5 of Annexure E). At the end of October a report on the teams and their programmes would be submitted to the MC for approval. Following this political approval, these programmes could be initiated.

After the adaptation workshop, however, the task team exercise lost momentum. This was partly due to personnel reasons, as it was observed there was insufficient staff available in the CCCP to drive the task teams. No CCCP officials championed the exercise and coordinated the follow-up meetings. Attendance at the October JCCC was poor and none of the task teams met prior to the JCCC. Following this poor JCCC attendance, the task team concept was abandoned including the flood risk task team, despite the urgent need to respond to the Soweto floods and the clear political support for action.

The JCCC itself also lost momentum as an institutional mechanism following the fairly well-attended sessions in 2009, when the committee facilitated stakeholder engagement on the CCAP. The JCCC did not meet again for the remainder of the research period up until February 2011. Without champions for the task teams, a natural leader would have had to emerge from the groups without being formally assigned. Municipal officials in other departments could not be expected to take on a mandate that was not theirs, without a climate change background.

It was stated by a number of officials, some of whom had tried similar exercises before, that the best way to facilitate interaction and real collaboration across departments and entities was through the business planning and performance scorecard system (NRM official, pers.comm September 2009). In order to ensure the task teams delivered, this would have had to be included as a project or programme on the department or entity's business plan for the year, added to the scorecards of the relevant officials and allocated the necessary budget.

For an issue such as flooding, which requires an integrated response across multiple levels and involves many municipal actors, its inclusion in the performance management system (PMS) would have required careful orchestration, political manoeuvring and forward planning. Even with these in place, it would have been a challenge to ensure all

the relevant players were involved and had similarly prioritised flooding on their own municipal agendas – particularly with many other competing and urgent development objectives. The Soweto floods could also not be anticipated and planned for – an immediate and coherent response was required. By the time the next planning opportunity for integrating flood risk reduction arose in the next annual financial year in 2009/10 and targets for flood risk reduction could be included on scorecards, the focussed political and administrative attention on flooding had largely been reduced.

7.4.2 The ‘way things were done’

It is argued here that the PMS encouraged a short-term, individually-focused, rigid approach to governance, reducing the progressive aims of the developmental local government agenda to a set of narrowly-defined targets. This system arguably penetrated and embedded itself in the organisational culture, or the ‘way things were done’, fostering a fragmented, target-driven culture over collaborative, holistic and accountable governance. Organisational theorists have argued that the heart of culture is what gets measured and rewarded, an embedded set of responses supported and reinforced by the rules of the game and the core values (Schein 1999). What was not measured at the CoJ, namely cross-functional co-operation, was also largely not done.

Officials in *all 13 focus groups* reported that the scorecard system was a constraint on their work at the CoJ. One official stated that the system had resulted in changes to the *culture* of the organisation, introducing a widespread practice where ‘if something is not on their (officials’) scorecard, then they simply do not do it’ (official, Region B focus group 27 November 2008). The system clearly promoted a shift away from cooperative to individually-focussed organisational practice.

The pressure to deliver on individual performance scorecard objectives meant officials devoted a substantial amount of their efforts to achieving performance targets and collecting evidence to prove their success for each individual KPA and KPI. When the Soweto floods took place, a proper short- to medium-term response was inhibited by the PMS. This was because the EMD was not (yet) able to lead a collaborative and integrated effort across departments and entities without flood management being an already-established work programme on the business plan, together with resources and time commitments, and importantly located on individual scorecards. The absence of collaborative performance goals would not have restricted officials from other

departments from attending a few JCCC meetings or workshops, but this commitment did not extend to the collective delivering of a particular task, project or programme. An EMD senior official from one focus group highlighted the individual approach of the PMS model, as opposed to measuring collective success:

‘Another negative is the performance model. Planning and administration almost takes integrated approach but the performance model is very much in isolation of that department and individual only. The performance model is restrictive regarding measuring success that we realise collectively, and instead focuses on individual outputs’ (senior EMD official, EMD focus group 25 January 2009).

The PMS, in the eyes of senior staff, was therefore a serious constraint to integrated planning, despite the fact that integration was a core aspect of the developmental local government agenda. It was also observed that a planning-via-email practice appeared to dominate. Although face-to-face planning and brainstorming sessions took place, email exchanges often appeared to be the dominant form of day-to-day interaction. An EMD official speculated that the change in planning culture was linked in part to the PMS, which had taken away the culture of public service, collective achievement and ‘professional creativity’ (EMD official, pers. comm. October 2010). In addition, applying the PMS system in a predominantly bureaucratic institution with an emphasis on hierarchy, rules and procedures meant that this system was ‘bureaucratised’ (EMD official, pers. comm. October 2010). Harrison (2006, p. 203) shows how the performance culture results in most efforts being focussed on ‘preparing and meeting targets’, instead of the end goals for achieving developmental local government objectives.

It was observed that the PMS largely became one of many processes with which officials must comply, as opposed to creating a performance-oriented environment as intended. Paperwork and bureaucratic systems were introduced around these tools, which contributed towards hampering efficiencies in decision making and ‘consumed time that could go into delivery’ (EMD official, pers. comm. October 2010). Target achievement had to be demonstrated through evidence, such as meetings of minutes, reports, letters from other parties verifying outputs, photographs, etc. At the end of the financial year officials submitted ‘evidence files’ consisting of paperwork to demonstrate achievements for each KPI, which would be scrutinised by the administration to decide on performance bonus awards.

The PMS system was also a contributing factor towards a focus on short-term and achievable gains. The delivery mandate was converted to measurable, discrete objectives to be achieved over a one-year planning cycle. A senior EMD official in a focus group emphasized the focus on ‘short-term gains’ of the PMS (EMD focus group 25 January 2009). Smith and Morris (2008, p. 437) draw attention to the deficiencies of the performance monitoring system for MEs and ‘progressive’ mandates were ‘narrowed’ to a set of ‘often ill-conceived’ targets, and ‘structured to highlight where compliance occurs, rather than identifying where the weaknesses in the company are and what are the implications are for service delivery to the poor’. They argue that this performance monitoring approach reduces accountability in governance. Evidence from the present research confirms this argument. One EMD official stated in personal communication:

‘The scorecard can mask things. You can make something sound good on a scorecard and doctor a KPI to suit your agenda. The real dialogue of what should go on a scorecard does not happen. It talks to the most obvious elements of the mandate, such as x number of households with access to sanitation and x houses built. These are just numbers’ (EMD official, pers.comm. October 2010).

This statement reveals the lack of dialogue or debate about what should be captured in a scorecard. It also draws attention to the serious impacts of this approach for monitoring service delivery in poorer areas. The PMS inevitably rewards achievement of the basic levels of service, and the ‘most obvious elements of the mandate’ (EMD official, pers.comm. October 2010), as opposed to focussing on *how* those services are delivered, the integrated delivery of services in areas, broader concepts such as ‘sustainability’, service maintenance and improvement over the longer term, which households benefit and how communities are engaged in the delivery process.

ME mandates were most often restricted to achieving certain efficiencies and turnaround times for service delivery or raising revenues, rather than on the holistic and integrated delivery of wider policy mandates. According to the EMD official above, the result was that ‘policy may aspire to a certain delivery mandate but in effect it was a negotiated mandate between what was included in the policy, what was included on the scorecard and what was possible with the available budget’ (EMD official, pers.comm. October 2010). The EMD official argued that the performance scorecard often became a public-relations exercise, particularly for higher-level officials with more publicised scorecards,

where the scorecard becomes a carefully selected group of ‘highly visible targets’ or ‘PR-type KPIs’ ‘cooked’ to suit an agenda (EMD official, pers.comm. October 2010).

The tension between a performance-oriented culture and participatory, collaborative governance has been noted (Harrison 2006). This research supports Harrison’s argument that in South African municipalities the performance-based delivery approach associated with NPM governance approaches to a large degree conflicted with the participatory aims of networked governance and collaboration, which Third Way administrations attempt to reconcile. The Johannesburg case demonstrates that the performance culture had contributed to a technocratic governance approach, reducing time for and disincentivising collaboration and participation through strong pressures to attain targets within annual planning cycles.

Harrison argues further that this performance culture does not fit with ‘the often “messy”, unpredictable and time-consuming processes of public participation’ (Harrison 2006, p. 202). Pieterse *et al.* (2008, p. 18) links the trends towards performance management culture in public service in South Africa with increasing ‘technocratic managerialism’ in the face of growing uncertainty and complexity of South Africa’s delivery challenge. Officials ‘fall back on’ PMS to simplify and give structure to the developmental local government agenda because they struggle with the immensity of the task at hand and battle with ‘complexity and uncertainty’ (Pieterse *et al.* 2008, p. 18).

By implication, the PMS was a strong hindrance to achieving the networked governance approach advocated throughout this research as being essential for effective flood risk governance and climate change adaptation. Climate change adaptation will clearly test the ability of cities of the global South to tackle climate challenges on a coordinated and holistic basis and learn as they go, allowing a cross-pollination of ideas. In a new governance issue such as climate change, Winsvold *et al.* (2009) note that no one city actor holds all the knowledge, and hence a broad process of collective learning must take place over time between state and non-state actors.

The performance culture reduced the strategic development goals of the CoJ to a set of measurable and discreet targets, introducing a strong ‘technical rationalism’ into the CoJ’s way of operating (Harrison 2006, p. 200). Unless a culture of collaboration, experimentation and creativity can be fostered for promoting holistic planning efforts,

climate protection efforts will always be fragmented, partially successful, possibly conflict ridden and lacking in accountability.

In the case of the Soweto floods, in line with the literature (Satterthwaite *et al.* 2007, Moser and Satterthwaite 2008) *governing through enabling* was found to be crucial for mitigating the effects of disasters on vulnerable communities, both in terms of engendering better planning efforts by DRM structures, crucially empowering citizens and groups and their representative bodies to develop their own flood management interventions, as well as accessing the resources within the civil society to assist in post-disaster recovery and reconstruction efforts. The CoJ's performance culture and technocratic approach to governance was decisive in constraining participatory, accountable and networked forms of governance and a key governance constraint in pre-disaster planning, the emergency response operations, and the institutional response.

7.5 Conclusion and implications

This research is framed around the hypothesis that *governance structures and processes* shape and influence adaptation to current and future climate risk in cities of the global South. The CoJ's institutional response to the Soweto disaster revealed a number of constraining governance forces that may act as limits to climate change adaptation in Johannesburg and the cities of the South more broadly.

The Johannesburg case shares many features of the institutional responses to flooding in Norway following the 1995 floods. Similar to the case of Norwegian municipalities (Naess *et al.* 2005), the Soweto flood was a trigger event for increased institutional momentum and motivation of CoJ actors, which temporarily overcame governance constraints to action and learning. Naess *et al.* (2005) also found that floods in Norway resulted in new perspectives being introduced into flood risk management, although more evident at the national level.

Similarly, in Johannesburg, the floods also provided the opportunity to move beyond understanding flooding as a storm water issue and reframe flooding in terms of the climate change and urban development agendas. This reframing was facilitated by forcing CoJ actors into conflict over different ideas and perceptions of the problem as they jostled to take advantage of increased political and administrative attention. It was also shown that the act of framing to a degree determined the way the flooding issue was governed.

Framing the issue solely as a climate change issue implied a shift away from the state's role in reducing flood risk through sustainable urban development. Understanding climate change in terms of a 'natural disaster' also offered a convenient tool for abdicating responsibility for flood risk management. Focussing solely on urban development in flood risk governance would, however, mean Johannesburg would be ill-prepared for an increase in the intensity and frequency of heavy rainfall events over the medium and longer term, increasing disaster losses.

As in the case of Norway, the Soweto flood event expanded the 'room for manoeuvre' of local actors (Naess *et al.* 2005, p. 133). This allowed the EMD to overcome its less-powerful status and lead an institutional response to flooding tied to the climate change adaptation agenda, and convene CoJ stakeholders across functional boundaries around flooding and climate change issues. This research suggests that this increased space for action may have been a contributing factor in facilitating high-level political approval of more funds for an expensive SWFL study, motivated by the EMD and JRA. The floods, therefore, may have assisted entrenched interests in flood risk management to obtain additional resources for existing programmes, as opposed to expanding the range of flooding interventions. Similarly in Norway, the flooding measures adopted reflected local power structures.

This 'change moment' was to an extent improperly managed by the EMD, however, and the increased motivation and institutional collaboration did not result in a cross-sectoral flooding programme. The research suggests constraints inherent in the institutional structure and processes of the CoJ may have also played a decisive role in closing down the EMD's efforts. It is also contended that these barriers were to a large extent influenced by wider paradigms of governance shaping CoJ governance approaches, namely the bureaucratic paradigm with its emphasis on rules, hierarchical structures and process and the NPM paradigm focussed on efficiency and performance-oriented management. This had contributed towards a technocratic, rigid, silo-based, fragmented decision-making approach rewarding individual as opposed to collective achievements, reduced accountability to citizens particularly in service delivery, and narrowing of the progressive developmental local government agenda to a set of discrete performance targets.

These governance forces were factors in flood risk management being largely a collection of isolated and ad-hoc initiatives led by different CoJ actors according to their separate scorecard mandates, lacking in strong leadership, accountability and integration. The ‘outsourcing’ of flood risk management to an ME meant that there was a robust technical approach to the CoJ’s management approach with regards to flooding in the city. However, it played a role in restricting a holistic and cross-functional programme, as this outside entity did not have the mandate and expertise to work outside of storm water management delivery and join up the city’s flood risk management efforts.

The Soweto floods provided an opportunity for the EMD to take on this facilitating and coordinating role, but the Department proved largely unable to rise to the challenge. To overcome governance barriers the EMD would have to obtain the high-level political and administrative buy-in to integrate flood risk management objectives and targets into all the scorecards of the many departments and entities whose work is related to flooding risk, and play a convening role to facilitate collaboration over a sustained period. In the face of other priorities and pressures to deliver, limited ‘institutional muscle’ (Roberts 2010, p. 43) and a lack of champions to lead the process, this proved to be challenging. Monstadt (Monstadt 2007; in Sippel and Jenssen 2009) argues that the privatisation and corporatisation of key services in climate protection such as storm water has meant that process, investments and corporate policies of utilities are often not within the local government sphere of influence. In Johannesburg by locating responsibility for flood risk management in a corporatised entity, this disadvantaged the response further.

A paradigm shift to introduce a broader framing and understanding of flooding risk was required to support a more holistic and integrated flooding programme. From the complex dynamics of flood risk in Johannesburg, this problem needed to be defined as a DRR, climate change adaptation, poverty alleviation, and planning and urban development issue. Validating Roberts’ finding in Durban (2010), central to the agenda is prioritising DRR, including bolstering the effectiveness of emergency response and recovery operations and undertaking a more proactive risk reduction approach. Pelling and Wisner (2009) show that urban risk reduction spans a wide ambit from development planning, regulation, risk management and emergency management areas and should be led by both development and disaster management actors. It was found that framing the issue to encompass these different areas was a crucial prerequisite to integrated methods.

The floods appeared to provide some opportunity to widen the framing of flood risk. Old understandings and framings appeared to re-establish after the floods, however.

The findings of this research indicate the need for building a greater a cross-functional networked approach to governance in Johannesburg and a reorientation of the relationship between the state and citizens, both to tackle flood risk and climate change adaptation, as well as achieve the aims of developmental local government. This would assist in facilitating meaningful and active participation of state and non-state actors in local climate decisions, ensure local risk assessments, plans and agendas are determined by needs and experiences of communities, and enable partnerships with community structures (such as community leadership, local businesses, CBOs, FBOs and NGOs, which were all found to play a role in the Soweto emergency response) for building local climate resilience. This echoes the adaptation literature that calls for active engagement with poorer and more vulnerable residents and working with them to build resilience (Satterthwaite *et al.* 2007, Wisner and Pelling 2009) to ensure of equitable, just and legitimate climate policy and action (Aylett 2010).

Central to this is introducing accountability into service delivery, including effective disaster management services, and engaging with individual residents and civil society representatives as citizens active in their own development and climate resilience building, as opposed to passive recipients of services and disaster management relief. It was shown that the climate resilience of poorer communities was being eroded through the cumulative effect of multiple overlapping and 'slow onset' every-day risks (Pelling 2003) exacerbated by poor service delivery, a lack of protective infrastructure for flooding as well as socioeconomic vulnerability. Realising the 'sustainable human settlements' policy ambition, underpinned by effective and sustainable poverty alleviation and urban development processes, will remain central to addressing climate change adaptation in cities of the South.

Networked modes would also assist in a collaborative and coordinated state effort in the different phases of responding to flooding including in recovery efforts, with learning and action facilitated across multiple sectors, disciplines and the diversity of institutions involved. Pelling (2003) highlights that hazards such as flooding cannot be addressed at sectoral levels because risks cross sectors. Networked modes can facilitate the 'joined-up-thinking between different departments' (Satterthwaite *et al.* 2007, p. ix), learning and

action across functions and knowledge domains (Winsvold *et al.* 2009) and effective responses to disaster events (Pelling *et al.* 2007) required in addressing climate change adaptation.

To develop a networked governance approach, however, it is argued that the inherent contradictions between the bureaucratic, NPM and networked paradigms of governance need to be reconciled. An example of this tension is the CoJ's target-driven performance management culture reflective of the NPM approach, which conflicts with the networked governance emphasis on public participation – an 'often "messy", unpredictable and time-consuming' process that did not mix well with a focus on the achievement of targets in short planning cycles (Harrison 2006, p. 202). Another result was that mechanisms introduced to increase efficiency such as the performance management system, would often be bureaucratised and transformed into procedure without achieving the improved performance for which it was intended. These three paradigms created what appeared to be irreconcilable tensions in the CoJ approach between centralisation and decentralisation, performance and participation, stability and flexibility, top-down and bottom-up approaches, privatisation and integration, short-term and long-term planning, understanding the public as citizens or as customers, collaboration versus performance, amongst others.

8 CONCLUSIONS

The study follows from the understanding that ‘the implementation of adaptation is essentially a governance issue’ (Adger *et al.* 2009, p. 5). Moser (2009) argues governance structure and process play a decisive role in impeding or encouraging adaptation. This study aimed to address a lacuna in research of the every-day practical realities of governing climate risk and vulnerability in cities of the global South facing urgent development challenges. This research explored the climate challenge in an ‘ordinary’ city that is a relatively low impact for climate change, and where climate hazards and disasters are one of multiple, interconnected risks.

It has been shown that studying past or current climate events may improve understandings of the constraints and enablers to future climate change adaptation (Naess *et al.* 2005, Fatti and Vogel 2010). A response to a current flood event was used as a signifier of the governance forces that may shape the CoJ’s adaptation to increasingly intense extreme flood events in the future, with the onset of climate change. To reveal governance dynamics as they unfolded in the day-to-day functioning of city governance, the study tracked an ‘actual governance situation’ – the response to the Soweto floods – and its ‘dynamics... (to) explore the particular “balance” in any new governance initiative between constraining and enabling forces’ (Healey 2004; in Pieterse and van Donk 2008, p. 67). The case study research was employed within a framework of ‘situational analysis’ involving documenting the flow of events and processes as they evolved (Van Velsen 1967). Disaster events in particular, have proved useful in revealing hidden dynamics and human behaviour (Phillips 2002). Through examining this unfolding governance process, this research aimed to better understand governance constraints ‘in action’ and the modes of governance that may support adaptation in poorer cities.

A governance approach was employed, which assisted in identifying the continuum of state and non-state actors, decisions, norms and institutional structures and processes involved in determining the nature of preparedness for, and response to, the Soweto floods (Moser 2009). It allowed for the analysis to take a wider view beyond the CoJ institutional field and cover the range of actors and institutions outside of the CoJ ‘involved in the process of governing’, including consultants, engineers and civil society actors such as FBOs and humanitarian organisations (Pierre and Peters 2000; in Jordan 2008, p. 21). It provided a conceptual tool to understand the diverse nature of contemporary local government comprised of state and ‘semi state’ (MEs) actors with

sometimes differing strategic agendas of local development and demonstrating profit, respectively. The governance approach, most importantly, assisted in exploring the broader paradigms driving governance approaches. This was as opposed to analysing institutional action without consideration of macro norms influencing institutional and actor behaviour.

While this method facilitated an analysis of macro structures and processes and the complex nature of urban governance, it was necessary to centre the research on a primary unit of analysis, in this case the CoJ, and explore these governance processes through the CoJ lens. It was found that analysis was limited in how far it could extend beyond the CoJ experience without making the scope unmanageable and detracting from in-depth consideration of the governance response to the Soweto floods. In order undertake detailed treatment and properly track the governance situation, the research needed to carefully delineate the primary unit of analysis (Burton 2000). The CoJ institution was hence the main unit of study, following on from the view that local governments are the most critical actors in urban governance (Pelling 2004; in Wisner and Pelling 2009).

The research demonstrated that *governance structure and processes* were decisive in shaping and influencing flood risk reduction, preparedness and response and recovery. Although the Soweto floods triggered a ‘window of opportunity’ for local action and learning by generating increased motivation and institutional momentum around the flooding issue and the emergence of new perspectives (Naess *et al.* 2005, p. 133), the interaction of various governance factors constrained an integrated, proactive and effective institutional response.

Established approaches to flood risk management prioritising technocratic responses primarily related to storm water management largely prevailed following the floods. As the analysis was limited to the end of 2009, strides may have been made subsequently in flood risk governance that cannot be examined here. From IDP analysis, it appeared that by 2012 the JRA remained the predominant municipal actor in flood risk governance and no formal flooding or climate change adaptation programme was reflected in the IDP (CoJ 2011b).

This research challenges that a lack of financial resources is the primary barrier to climate change action in cities of the global South, both for mitigation and adaptation (Sippel and

Jenssen 2009). It is also conventionally assumed that in resource-scarce cities of the global South, financial resources are important for enabling adaptation action, as well as adequate capacity and improved knowledge. It was demonstrated that an enabling overarching governance structure and process plays a significant role for the enhancement and realisation of adaptive governance. International trends have demonstrated that countries with vast resources still struggle with the governance aspect, with empirical work in Canada and Norway revealing that governance constraints play a significant part in influencing adaptation decision making, and increasing access to finance and technology may make little difference without enabling governance structures and processes (Naess *et al.* 2005, Inderberg and Eikeland 2009, Burch 2010). However, there are limits of the applicability of the research conclusions for other cities in Africa and the global South, as Johannesburg has a comparatively fairly large resource base and consequently the financial aspect may be more of a limit in these poorer cities.

In the Johannesburg case, the municipal structure, institutional power dynamics and performance culture, assisted in creating a fragmented, silo-based governance reality, lacking in creative professionalism and accountability to citizens, characterised by conflicting mandates and interests, and incentivising individually-focussed, short-term and target-based results achieved through discrete and often disconnected projects. These factors played a role in constraining the development of a cross-functional flooding programme.

The flood issue was also primarily narrowly framed as a storm water engineering issue emphasising physical or structural measures, with the municipal entity the JRA the primary role-player in flood risk management. This is in line with arguments that framing of an issue largely determines how it is approached (Hajer 1995). It appeared to play a role in hampering comprehensive flood risk reduction and management approaches focussed on development planning, development regulation, risk management and emergency management across different timescales (Pelling and Wisner 2009). These structure, power, culture and framing factors, therefore, worked against integrated and holistic flood risk reduction, preparedness and response, as well as the broader developmental agenda of the CoJ.

It follows, therefore, that more research is needed, related to the appropriate forms of governance of climate change adaptation in cities of the global South. Given the close

relationship between the climate and development agenda in these cities, governance forms that nurture developmental local government will in all likelihood lead to improved climate resilience (Satterthwaite *et al.* 2007, Schipper 2009). In the Soweto case it was found that flood risk was shaped by interactions of socioeconomic, urban development, meteorological and governance factors, and that climate hazards were just one of multiple and interconnected risks facing vulnerable poor urban communities. The case revealed that providing a full range of quality services and infrastructure for addressing multiple development needs is central to adaptive governance. This research is in line with Satterthwaite *et al.*'s (2007) arguments that 'good governance', primarily centred on poverty alleviation efforts, service delivery, infrastructure provision, disaster preparedness and climate resilient land-use planning and management, forms the basis of climate change adaptation in cities.

Further research on governance forms for supporting climate resilience in a developmental context is therefore imperative. In this research, it was found that networked governance modes were important for proactive flood risk reduction, effective emergency response and coordinated action following the Soweto floods to mitigate future impacts. This included governance that encouraged partnerships with civil society around climate resilience building and active participation by citizens (Satterthwaite *et al.* 2007, Moser and Satterthwaite 2008), and incentivised networks and relationships across local government institutions (Pelling *et al.* 2007, Bulkeley *et al.* 2009) and across sectors and disciplines (Winsvold *et al.* 2009). Additional studies on the extent to which climate change truly intersects and builds local developmental efforts in different decision making scenarios, will assist in developing a better understanding of the relationship between climate and development in the global South context.

Schmidt (2008, p. 117) argues that the rigid and centralised nature of South Africa's government institutions as partly responsible for the 'implementation failure' following apartheid. Schmidt outlines what reconciling these tensions may look like in practice for local government balancing strong managerial and bureaucratic capacity with 'an enhanced ability to 'network, to experiment and to influence'. This research supports Schmidt's (2008, p. 117) argument that contemporary governmental institutions need a balance of both 'sound bureaucratic and managerial capacity' as well as 'an enhanced ability to network, to experiment and to influence' in order to bring about resilient and adaptive societies.

In Johannesburg, it was found that building adaptive governance in developing city contexts would involve getting the basic municipal structures and performance monitoring right for effective delivery on-the-ground. The research findings are line with Schmidt (2008) regarding the importance sound managerial capacity and adequate structures and incentive systems to support decision making. However, the study found that an institutional culture of innovation and collaboration needs to be fostered within these structures to avoid bureaucratic and centralising tendencies. Finally, this administrative competency characterised by flexible and adaptive management needs also to ensure accountability of government actors to the people they serve, as well as ways to engage meaningfully with civil society and the poorest, most vulnerable citizens to build their adaptive capacity.

This research found that competing bureaucratic and NPM governance paradigms were hindering the realisation of networked governance in the Johannesburg context given the inherent contradictions in these approaches simultaneously promoting centralised control, efficiency, and inclusion and participation. Settling these tensions is required within Johannesburg to pursue the climate and development agenda. The NPM model was found to be particularly constraining manifesting in the CoJ through the formation of decentralised business units (or MEs) and a target-driven performance culture working against participatory, collaborative and accountable governance forms. Other principles found to be important for adaptive governance included:

- Cross functional overarching structures creating mutual accountabilities for common challenges, such as flood risk management and climate change adaptation
- Developing jointly accountable measures and standards for the collective good
- A governing structure pulling together city actors for joint objectives for which they are collectively accountable and which encourage holistic and integrated planning and action

It is not possible to identify the characteristics of perfect adaptive governance modes in this research beyond the principles explored. This work calls, however, for further empirical research on the appropriate forms of governance for managing development and climate change in the cities of the global South, based on investigations of '*actual governance*' realities (Healey 2004; in Pieterse and van Donk 2008, p. 67, emphasis added by Pieterse and van Donk). Through the examination of the governance of an existing flood event in Soweto, some of the important factors influencing decisions and

outcomes were revealed. This research suggests that the approach of researching existing climate risk governance situations may assist in better understanding the different practical dimensions of adaptation in cities of the global South.

The Johannesburg case has shown that governance is almost inseparable from culture. Laundry lists extracted from the governance context and culture of enablers and constraints for adaptation planning and action may largely be unhelpful. They are isolated from the *process* that gives rise to them, as the governance structures and processes influential in particular decision-making situation are all produced uniquely, and the 'laundry list' approach fails to reveal how key success elements of adaptive governance emerge through *change processes* (Moser 2009). These factors are simply an alienated set of characteristics not embedded in context. More empirical work on real-life decisions and the context that give rise to them is critical, therefore, for better understanding adaptive governance and the limits to adaptation of cities and human systems to climate change.

It was found that integrating climate protection into land use and spatial planning is critical for translating strategic adaptation plans into the spatial physical realities of cities. Pelling and Wisner (2009, p. 48) argue that land-use planning is a 'fundamental tool for integrating disaster risk reduction into urban planning'. More research on the specific mechanisms for translating climate protection at a spatial level and in terms of how land is used and managed is another area of fruitful research.

These findings have implications for how adaptation is approached in the global South. The established approach of developing separate, high-level and often generic plans with lists of adaptation measures and actions is misguided given this often fragmented governance context. It has been found in Durban that developing multi-sectoral, integrated adaptation plans has been less successful than working within silos on sectoral-based plans with separate departments, and tied to their existing plans and budgets (Roberts 2010). From this research, a more effective approach would be to take an incremental, stage-by-stage, highly-focussed approach centred on embedding adaptation into local routine operational and planning instruments and procedures, and slowly building contextual knowledge of adaptation and its local relevance through understanding *existing* climate risk. This finding echoes Pelling and Wisner (2009, p. 51)

who argue that DRR integration ‘work (s) best when built into existing institutional relationships that are in use every day’.

Finally, it was found that to adequately govern existing and future climate risk a paradigm shift and new and innovative planning approaches are needed that move beyond static conceptions of risk within limited time horizons, but the ability to plan and govern for risk manifesting decades from now in evolving ways that cannot be anticipated. Central to this paradigm shift is framing climate risk in terms of links to urban development and poverty alleviation efforts, as well as undertaking planning and investment decisions that deliver development benefits now, while protecting cities from a changing climate in the future.

Achieving this balance in the framing of climate risk and defining the problem in terms of urban development, poverty alleviation and climate change, will be crucial for the development and climate agenda to intersect and be realised in the urban and local arena. The research has shown that this framing process is not politically neutral and overemphasis of either urban development or climate change objectives could have negative outcomes, including the climate change problem being used to mask governance failures. City actors need to be vigilant to this potential manipulation, particularly in situations when local contextual knowledge is limited on the impacts of climate change in a city, and the interactions of these impacts with planning and development. Further research on the impacts of different framings of the climate agenda in the context of local development is needed.

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ANNEXURE A: LIST OF INTERVIEWEES

Interviewee	Date
The MMC for Environment	31 October 2008
Director of the Climate Change and Air Quality Directorate	22 September 2010
Programme manager for adaptation	23 August 2010
Operations manager for the Disaster Management Directorate	27 July 2010
Lead consultant for the development of the CCAP, WSP Environmental	16 July 2010
Executive director of Development Planning and Urban Management	16 January 2009
Director of the Central Strategy Unit	11 December 2008
Managing director of the Johannesburg Development Agency	16 January 2009
Senior official at the Johannesburg Information and Knowledge Exchange Unit (JIKE)	20 November 2008

ANNEXURE B: ROLE-PLAYERS IN FLOOD RISK MANAGEMENT

	Actor	Roles and responsibilities	Type
CoJ actors: State			
1	Environmental Management	Addressing climate change adaptation, managing Johannesburg's open space system and catchments, and ensuring water quality and river health.	State
2	EMS, Disaster Management Directorate	Providing response and recovery services following a disaster event and proactive DRR (such as flooding).	State
3	Development Planning and Urban Management	Integrating flood risk protection into city-wide spatial planning as well as individual developments through the assessment of development applications.	State
4	Housing	<ul style="list-style-type: none"> • Preventing and mitigating flood risk in new and existing government housing. • Allocating temporary shelter to displaced households following flood events. 	State
5	Infrastructure and Services	Managing energy, water and waste services delivered in the city, and hence overseeing the work of Pikitup and Joburg Water related to flood risk protection outlined below.	State
6	Johannesburg Risk and Audit Services	Mainstreaming risk management into CoJ processes.	State
7	Media Liaison	Media liaison on risk reduction, response and recovery, and information sharing with the general public.	State

	Actor	Roles and responsibilities	Type
8	Community Development	<ul style="list-style-type: none"> • Building general community resilience through poverty alleviation and social upliftment programmes. • Counselling and social needs following flood events. 	State
9	Health	<ul style="list-style-type: none"> • Building general community resilience through effective health care, HIV/Aids programmes, etc. • Monitoring possible disease outbreaks and primary health provision following flood events. 	State
10	Economic Development	Building general community resilience through economic development, job creation and enterprise development programme.	State
CoJ actors: Semi-state			
11	JRA	<ul style="list-style-type: none"> • Managing the entire storm water system from source to exit across the city. Responsible for extending and maintaining all storm water reticulation systems, and ordering storm water attenuation on new developments. • Emergency storm water management, road and bridge repairs during post-flooding recovery operations. 	Semi-state
12	Johannesburg Property Company	<ul style="list-style-type: none"> • Managing and selling all Council-owned land. • Important role-player in protecting Johannesburg's remaining open space assets for natural flood attenuation and other uses. 	Semi-state

	Actor	Roles and responsibilities	Type
13	JCP	<ul style="list-style-type: none"> Managing green space in the city, including parks, nature reserves, water courses, including controlling vegetation in water courses. Reconstruction of parks and general environmental management during post-flooding recovery operations. 	Semi-state
14	Johannesburg Water	<ul style="list-style-type: none"> Managing quality and quantity of treated effluent, ingress of storm water into sewers and sewer overflows and leaks. Restoring water supply clearing sewer systems blockages and providing water tankers to affected areas during post-flooding recovery operations. 	Semi-state
15	Pikitup	<ul style="list-style-type: none"> Ensuring the entire storm water system from source to exit across municipal boundaries is clear of waste to ensure the system is not clogged. Waste management and debris removal during post-flooding recovery operations. 	Semi-state
16	City Power	‘Flood proofing’ electrical infrastructure and repairing this infrastructure during post-flooding recovery operations.	Semi-state
17	Johannesburg Metro Police	By-law enforcement and traffic control during post-flooding recovery operations.	Semi-state
Provincial actors			
18	Gauteng Department of Agriculture and	Lead authority for Environmental Impacts Assessments (EIAs) and therefore	State

	Actor	Roles and responsibilities	Type
	Rural Development (GDARD) (formerly Gauteng Department of Agriculture, Conservation and Environment (GDACE))	played a role in requiring integrated storm water management for new developments and adherence to flood line and water course buffer requirements, wetland delineation and studies, etc.	
19	Gauteng Department of Local Government and Housing (GDLGH)	Implemented large-scale government housing projects. Important role-player for ensuring settlements had adequate storm water infrastructure and were not built on wetlands and sensitive sites.	State
20	Gauteng DMC	<ul style="list-style-type: none"> • Providing support to the NDMC and the metropolitan and district DMCs in the Gauteng province (National Disaster Management Policy Framework 2005, p. 12). • Providing the link between national objectives and provincial and municipal disaster risk management activities and priorities (National Disaster Management Policy Framework 2005, p. 12). • Providing support and guidance to municipal Disaster Management Centre (Johannesburg) during disaster events and mobilising provincial infrastructure and resources to support municipal disaster risk management resources (National Disaster Management Policy Framework 2005, p. 12). 	State
National actors			
21	NDMC	<ul style="list-style-type: none"> • Guiding and developing frameworks for government's disaster risk 	State

	Actor	Roles and responsibilities	Type
		<p>management policy and legislation and facilitating and monitoring their implementation (National Disaster Management Policy Framework 2005, p. 9).</p> <ul style="list-style-type: none"> • Providing support to provincial and municipal Disaster Management Centres to implement awareness programmes for reducing disaster risk in communities exposed to specific hazards (National Disaster Management Policy Framework 2005, p. 10). 	
22	Department of Water Affairs (DWA) (prior to May 2009 the Department of Water Affairs and Forestry (DWAF))	<ul style="list-style-type: none"> • Overall responsibility for the sustainable management of South Africa's water resources. • Plays primary role in flooding disaster events and all other departments will play secondary, supportive roles, unless DWAF or NDMC delegate these powers or duties to them, in accordance with the National Water Act (NWA) or DMA (Weinmann 2002). • As per the NWA responsible for the safety of dams (Section 117-123), providing information on flood lines, floods and droughts (section 144-145) and providing national information systems for water resources including atmospheric conditions for ensuring public safety amongst other things (NWA in Weinmann 2002). 	State

	Actor	Roles and responsibilities	Type
23	Water Research Commission	Commissions flood research in terms of the Water Research Act (Act 34 of 1971) to support water research and sustainable water management in South Africa.	State
State-owned enterprises (SoEs) and government agencies			
24	South African Weather Services (SoE)	<ul style="list-style-type: none"> Forecasting flash floods. Channeling warnings to local metropolitan and district disaster managers for severe weather and flash floods. 	Semi-state
25	South African National Defence Force	Providing humanitarian assistance to flood victims.	Semi-state
26	South African Police Services	Providing humanitarian assistance/crime prevention services during flood relief operations.	Semi-state
27	Eskom (SoE)	Flooding proofing electrical infrastructure and restoring power supply following flood events.	Semi-state
Non-state actors			
28	Consultants	Undertaking research and strategy/policy development for the CoJ related to flood risk reduction and climate change adaptation.	Non-state
29	Professional engineers	Certifying flood lines on behalf of developers and indicating these on township plans submitted for approval.	Non-state
30	Third-party contractors	Hired by CoJ municipal entities for a variety of activities related to service	

	Actor	Roles and responsibilities	Type
		delivery, including flood risk reduction interventions and flood relief undertaken by MEs and outlined above.	
31	Community representatives and organisations (including community leaders, political representatives (ward councillors) and FBO, NGO and CBO)	Supporting community preparedness to flood events, dissemination of early warnings, flood relief assistance, amongst others.	Non-state
32	Independent volunteers	Assistance with flood relief operations.	Non-state
33	Humanitarian and relief organisations	Providing flood relief and recovery services to communities.	Non-state

ANNEXURE C: INVOLVEMENT OF STATE, SEMI-STATE AND NON-STATE ACTORS

	Actor	Roles and responsibilities
State and semi-state actors		
	Central CoJ departments	
1	Disaster Management Directorate	Overall coordination and facilitation
2	Command and Control (Proton)	Handling all emergency calls
3	EMS	<ul style="list-style-type: none"> Emergency response and recovery, search and rescue, swift water rescue, safety inspections and By-law enforcement Clearing water from houses
4	Community Development	<ul style="list-style-type: none"> Counselling and social needs Approx. 50 Community Development Workers available
5	Housing	<ul style="list-style-type: none"> Allocation of suitable facilities for temporary shelter Assembling a team with Community Development to assist with house restoration process, including a Quality Assurance team
6	Health	Monitoring possible disease outbreaks, administering primary health
7	Media Liaison	Media liaison on risk reduction, response and recovery, information sharing and updating
8	Development Planning and Urban Management	Coordination of MEs and By-Law Enforcement
	CoJ Municipal Entities (MEs): semi-state actors	

	Actor	Roles and responsibilities
9	Johannesburg Metro Police	By-law enforcement and traffic control
10	JRA	<ul style="list-style-type: none"> • Repairing of roads, storm water/drainage system cleaning and repairing, repairs and reconstruction of bridges, roads, traffic lights and signage restoration • Sub-contractor appointed
11	Pikitup	Waste management and debris removal
12	City Power	Restoration, repairs and replacement of lighting infrastructure
13	JPC	Environmental planning and restoration
14	Joburg Water	<ul style="list-style-type: none"> • Restoration of water supply, clearing sewer systems blockages • Providing water tankers to affected areas
	GPG	
15	<ul style="list-style-type: none"> • Gauteng Department of Local Government • Gauteng Department of Social Services 	<ul style="list-style-type: none"> • GPG officials volunteering their time to help where needed, including relief distribution and identifying household needs • Exact number of volunteers unknown
	National government	
16	DWAF (became the DWA in May 2009)	Water testing and sampling
17	Department of Home Affairs	Assisting with lost documentation
	State-owned enterprises outside of CoJ and state services department	

	Actor	Roles and responsibilities
18	Eskom	Restoration of power supply
19	South African Police Services	Crime prevention
Non-state actors		
	Community representatives and organisations	
20	Churches within the greater Soweto area	Standby for assistance and allocation of suitable sites for relocation of affected households
21	Churches and chaplaincy	Counselling and bereavement
22	Ward councillors	<ul style="list-style-type: none"> • Coordination in regions and political support • Working with officials to identify specific needs and household damage
23	NGOs and CBOs	NGOs and CBOs assist with disaster response and relief operations
24	Community leaders	Community liaison
25	Charity and humanitarian organisations	Donations and relief provision
26	Private sector	Donations and relief provision
27	Independent volunteers	<ul style="list-style-type: none"> • Assistance with disaster management functions • Approx. 20 volunteers

Source: CoJ Report 2009a, 2009b

ANNEXURE D: RELIEF PROVISION

	Organisation/business	Relief provided
State actors		
1	Provincial Disaster Management	Cleaning material
2	Ekurhuleni municipality	Food parcels Blankets
3	DBSA	R350 000
Non-state actors		
	Private sector	
4	Pick & Pay	Soup, food hampers and vouchers
5	Nandos	50 food packs per day
6	Kentucky	30 food packs
7	Carnival City	Fridges
8	Fresh Produce Market	Vegetable packs
9	YFM	Food parcels, clothing, two-plate stoves
10	Standard Bank	R200 000
11	Jad Doors	Doors
12	SASOL	<ul style="list-style-type: none"> • Blankets • Clothes

	Organisation/business	Relief provided
		<ul style="list-style-type: none"> • Stationery packs
13	Jabulani Mall Standard Bank	Food parcels, tin food, mealie meal & clothes
14	Lesedi Private Hospital	Blankets, clothes, empty biscuit tins and linen
15	The Citizen	Blankets and food
16	Standard Bank	Tinned food and clothes
17	OUTsurance	R15 000 worth of blankets
18	C.A.S.A	10 cooking plates
19	Ackermans (Vaal Triangle)	20 bags of clothing
20	Spar Norwood	Mealie meal, biscuits
21	Aurora Private School	Clothing
	Charity, humanitarian organisations, churches and private individuals	
22	Red Cross	Clothing, blankets, stoves
23	Al-Imdaad Foundation	500 blankets, 500 food parcels and 400 hot meals
24	Gift of the Givers	300 blankets and 50 food parcels
25	Southern Suburbs Sathya SAI Organisation	Tea, coffee and sandwiches
26	Islamic Relief South Africa	Dinner set, blankets, curtains clothing, toys, shoes

	Organisation/business	Relief provided
27	Zakah Fund	Blankets, clothing, shoes, plastic bags
28	SAI Centre	Shoes
29	Umsobomvu Youth Fund	(Service) cleaning of houses
30	Grace Bible Church	Carpets and clothing
31	Various individuals from community (private)	Clothing
32	Phindy Gwala (private)	Clothing
33	Southern Suburb Woman's Forum	5x bags and boxes of clothes
34	Majantja Community Club Molapo	3 plastic bags of clothes and shoes
35	Southern Suburbs Muslim Women Forum	6 plastic bags, 1 bag, 1 box of clothing
36	Soweto Rotary Club	20 packs mince meat 10 boxes of biscuits
	Total funds received:	R550 000
	Total state donors	3
	Total non-state donors	33

Source: CoJ Report 2009a

ANNEXURE E: KEY POST-DISASTER INSTITUTIONAL EVENTS

	Date	Chair/lead	Meeting/workshop	Participants	Outcome
1	12 March 2009	Chair: executive director of the EMD. Lead actor: EMD	Flooding meeting Meeting called by EMD to discuss the flood risk issue in Johannesburg and how to manage flooding in light of the Soweto floods	NRM (EMD), CCCP (EMD), JRA, consultant B (SWFL Studies), EMS Spokesperson; Transportation, Housing, Land Use Management	<ul style="list-style-type: none"> • NRM to lead on submitting second flooding report to the MC • The two consultants carrying out the SWFL study and FPA study to work together to align initiatives
2	April 2009	City manager	Presentation to EMT Executive director of the EMD presents to the EMT on the flood risk issue in Johannesburg, the Soweto floods, and efforts being made to manage flooding.	Represented by all EDs of CoJ departments	Unknown
3	April to July 2009	Chair: ED of EMD Lead: CCCP	JCCC meetings <ul style="list-style-type: none"> • Three meetings of the JCCC used as stakeholder engagement sessions for the 	CCCP (EMD), NRM (EMD) (April meeting), consultant A and C, DPUM, JRA, DMD, Transportation, Regional offices	<ul style="list-style-type: none"> • CCAP devised by August 2009 • Decision to hold a workshop on the CCAP and flooding

	Date	Chair/lead	Meeting/workshop	Participants	Outcome
			CCAP led by Consultant C. <ul style="list-style-type: none"> Flooding is on the agenda for these three meetings. 		<ul style="list-style-type: none"> Decision to structure implementation of the CCAP and flood risk management in general through the JCCC institutional mechanism
4	5 August 2009	Executive mayor	Mayoral Committee reports <ul style="list-style-type: none"> Second flooding report submitted to Mayoral Committee (led by NRM) (CoJ Report 2009d) Report on CCAP submitted to Mayoral Committee (led by CCCP) (CoJ Report 2009e) 	<ul style="list-style-type: none"> MMCs of all portfolios EDs of all departments 	<ul style="list-style-type: none"> Second flooding report approved, with the recommendations that consideration be given to mobilise external source of funding grants for the SWFL study (estimated at costing R30-50 million) (CoJ Report 2009d, p. 47.11). CCAP approved (CoJ Report 2009e).
	September 2009	Chair: ED of the EMD Lead: CCCP	Adaptation Workshop <ul style="list-style-type: none"> CCAP presented to CoJ stakeholders from a number of 	Approx. 50 CoJ and non-CoJ stakeholders attended, including: CoJ stakeholders: JRA, Joburg	Four task teams established: flooding, infrastructure, finance and information management.

	Date	Chair/lead	Meeting/workshop	Participants	Outcome
			departments and entities <ul style="list-style-type: none"> Flooding on three quarters of the agenda 	Water, Infrastructure and Services (Waste, Water), DPUM, EH, DMD, Finance, regional offices, Central Strategy Unit, Johannesburg Risk Assurance Services, Transportation, NRM (EMD), CCCP (EMD), Policy Integration and Management Support (EMD) Non-CoJ actors: Consultant A, B and C; hydrology and environmental consultants; South African Weather Services	Decision for: <ul style="list-style-type: none"> each team to meet within two weeks after the workshop to write a report for their task team outlining activities, responsibilities and deadlines task team reports to be reviewed at the next JCCC meeting in October 2009 task team reports submitted to the Mayoral Committee for approval after the October JCCC meeting
5	October 2009	Chair: ED of the EMD Lead: CCCP	JCCC meeting: October Meeting of task team members to review task team reports and devise way forward for task teams	CCCP; JRA; Transportation	<ul style="list-style-type: none"> No evidence of an outcome Task teams abandoned