CHAPTER 13

Disaster management and risk reduction in South Africa

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Introduction

The 2015 Global Assessment Report concludes that the mortality and economic loss associated with extensive risks (minor but recurrent disaster risks) in low and middle-income countries are trending up. In the last decade, losses due to extensive risk in 85 countries and territories were equivalent to a total of US$94 billion. Extensive risks are responsible for more deaths and displacement than major disasters, and represent an ongoing erosion of development assets such as houses, schools, health facilities, roads and local infrastructure. However, the cost of extensive risk is not visible and tends to be underestimated, as it is usually absorbed by low income households and communities as well as small businesses (UNISDR 2015).

1 National Disaster Management Centre

2 National Disaster Management Centre

3 CSIR Built Environment

4 CSIR Built Environment

These trends are evident in South Africa, too, where society is not only occasionally exposed to severe disasters, but also frequently exposed to a wide range of minor but recurrent natural hazards, including drought, floods, fires, cyclones and severe storms that can trigger widespread hardship and devastation for the most vulnerable. The negative impact of these extensive risks leaves the country to deal with issues such as a loss of lives, damage to infrastructure and the environment, and disruptions in livelihoods, schooling and social services. Furthermore, scarce resources are often diverted for disaster relief at the expense of long-term growth and development opportunities, resulting in the worsening of the plight of poverty-stricken communities (Collins 2009; Parnell et al. 2007; Wisner et al. 2004). Climate change, urbanisation and other socio-economic, demographic, physical and environmental global processes magnify existing vulnerabilities to disasters due to changing patterns of some hazards in specific regions (such as heat waves, droughts and increased precipitation), and due to increased population exposure and land-use changes (IPCC 2012; Scholes et al., 2008; FAO 2009; Collins 2009). As such, disaster risk poses an increasing threat to poverty reduction and sustainable development should the necessary disaster risk reduction measures not be actively applied.

This chapter reflects on disaster management and risk reduction in South Africa and analyses fire hazards as a case study. The number of lives lost and injuries sustained in South Africa due to fires, is alarming. Statistics South Africa, in its analysis of the cause of death in the country based on death certificate records, attributed 2 241 deaths to smoke, fire and flames in 2012 alone. Determining disaster risks, and understanding their potential impact on people and assets, are fundamental elements in guiding development that is more resilient and sustainable.

Terminology and definitions

The terminology on disaster management published by the United Nations International Strategy for Disaster Reduction (UNISDR 2009) defines a hazard as a dangerous phenomenon, substance, human activity or condition 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. In proposed amendment legislation that is currently being considered in the South African Parliament to align its definition better with the UNISDR, a disaster is defined as a serious disruption or a threatening disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceed the ability of the affected community or society to cope using its own resources. Risk, on the other hand, is the combination of the probability of an event and its negative consequences, while vulnerability *arises from various physical, social, economic, and environmental factors* (UNISDR 2009).

Disaster management and risk reduction in South Africa

The primary responsibility for disaster management and risk reduction in South Africa rests with Government as identified in the Constitution (RSA 1996). The Disaster Management Act (DMA) and the National Disaster Management Framework (NDMF) are the centrepiece legislation regulating the provision of disaster management services (RSA 2002; 2005). The aim of the DMA is to ensure a uniform and integrated approach to disaster management and disaster risk reduction in each and across all spheres of government involving all relevant stakeholders. The National Disaster Management Centre (NDMC) was established to promote this integrated and co-ordinated system of disaster management with the emphasis on prevention and mitigation (RSA 2002).

Essentially, the focus of the DMA is fourfold:

i. It establishes an elaborate institutional framework for disaster management, including the establishment of disaster management centres across the three spheres of government;
ii. It entrenches a detailed policy development and strategic planning framework for disaster management;
iii. It provides for the classification and declaration of disasters; and
iv. It deals provisionally with the funding of post-disaster recovery and rehabilitation.

In the South African context, 'disaster management' is a comprehensive term defined in the DMA as "a continuous and integrated multi-sectoral, multi-disciplinary process of planning and implementation of measures aimed at:

- Preventing or reducing the risk of disasters;
- Mitigating the severity or consequences of disasters;
- Emergency preparedness;
- A rapid and effective response to disasters; and
- Post-disaster recovery and rehabilitation" (RSA 2002).

One of the key features of the DMA is that it recognises that the function of disaster management cannot be done by national government alone. It requires cooperation and collaboration on the part of all spheres of government, civil society, and the private sector. These include public awareness programmes, early warning systems, effective land use planning, conducting disaster risk assessments, and institutional arrangements to facilitate effective coordination. Furthermore, although disaster preparedness measures for more efficient rescue operations will always remain necessary, there is common agreement that much greater attention should be directed to the introduction of preventive strategies aimed at saving lives and protecting assets before they are lost. In line with international trends and national objectives of efficient and effective management of the nation's resources, South Africa's disaster management policy and legislation underscores the importance of preventing human, economic and property losses, and avoiding environmental degradation. The Act and Framework provide a well-developed legislative framework to guide and support disaster risk reduction, and to manage those disasters that do occur (RSA 2005; Van Niekerk 2007). Other sector legislation and policies also support disaster risk reduction. The National Climate Change Response White Paper (RSA 2011) outlines government's vision for building South Africa's resilience to climate change and promotes the mainstreaming of climate change considerations and responses into all relevant sector planning instruments. Amendments to the existing legislation also emphasise the importance of incorporating expected climate change impacts and risks as well as identifying and mapping risks, areas, ecosystems, communities and households that are exposed and vulnerable to physical and human-induced threats, into disaster management planning.

Determining current disaster risk

Historical data on hazards form the backbone to determine the risk of a given geographic area. It provides insight into the frequency of the hazard type, and, if coupled with data surrounding the magnitude of the historical incidences (hazard assessment) as well as data on vulnerability (vulnerability assessment), the risk for a disaster in a certain area can be determined (R = H x V) (UNISDR 2009).

To determine the disaster risk for South Africa, the NDMC sources cumulative historical data annually from EM-DAT[5], CAELUM[6] and SRS[7] in order to compile a combined hazard index. The CAELUM data are derived from historical weather-related events between 1647 and 2014, as kept by the South African Weather Service (SAWS). The EM-DAT data range from 1920 to 2014. Although this data provide insight into losses and severity, it only accounts for events of a major international magnitude, not capturing minor events. The SRS data (1990 to 2014) are compiled by Disaster Management Stakeholders engaging the NDMC Situation Reporting System8.

This index of historical events shows that South Africa is primarily exposed to natural hazards of a weather-related origin, and that the most frequently occurring events are related to flooding and fires (see Figure 1). Other frequently occurring hazard types are wind, hail, snow and storms – all sudden onset disasters. However, slow onset disasters such as drought, though not occurring as frequently, may cause greater financial losses due its extent, intensity and duration (García-Acosta 2002).

South Africa, as many other developing countries, suffers significant losses from natural and human-made hazards. Between April 2010 and 31 March 2012, the NDMC classified and recorded disasters which cost the national government more than R3 billion in contributions to post-disaster recovery and rehabilitation projects. This amount excludes expenditure on immediate relief. Disaster losses divert public spending away from development to disaster relief and reconstruction. This is set to increase exponentially in the future due to climatic changes – especially for weather-related hazards which pose major threats to various communities in South Africa.

5 Since 1988, the World Health Organisation (WHO) has been maintaining an Emergency Events Database (EM-DAT) through the Centre for Research on the Epidemiology of Disasters (CRED).

6 CAELUM is a database of extreme weather events sourced from the South African Weather Service (SAWS).

7 The Situation Reporting System (SRS) database is hosted by the NDMC and populated by disaster management stakeholders.

8 Attempts to minimise replication across agencies, rectification of reporting errors, and quality control have been made. However, these data constraints still need to be considered in the interpretation of findings as the construction of these datasets lies outside the influence of the NDMC.

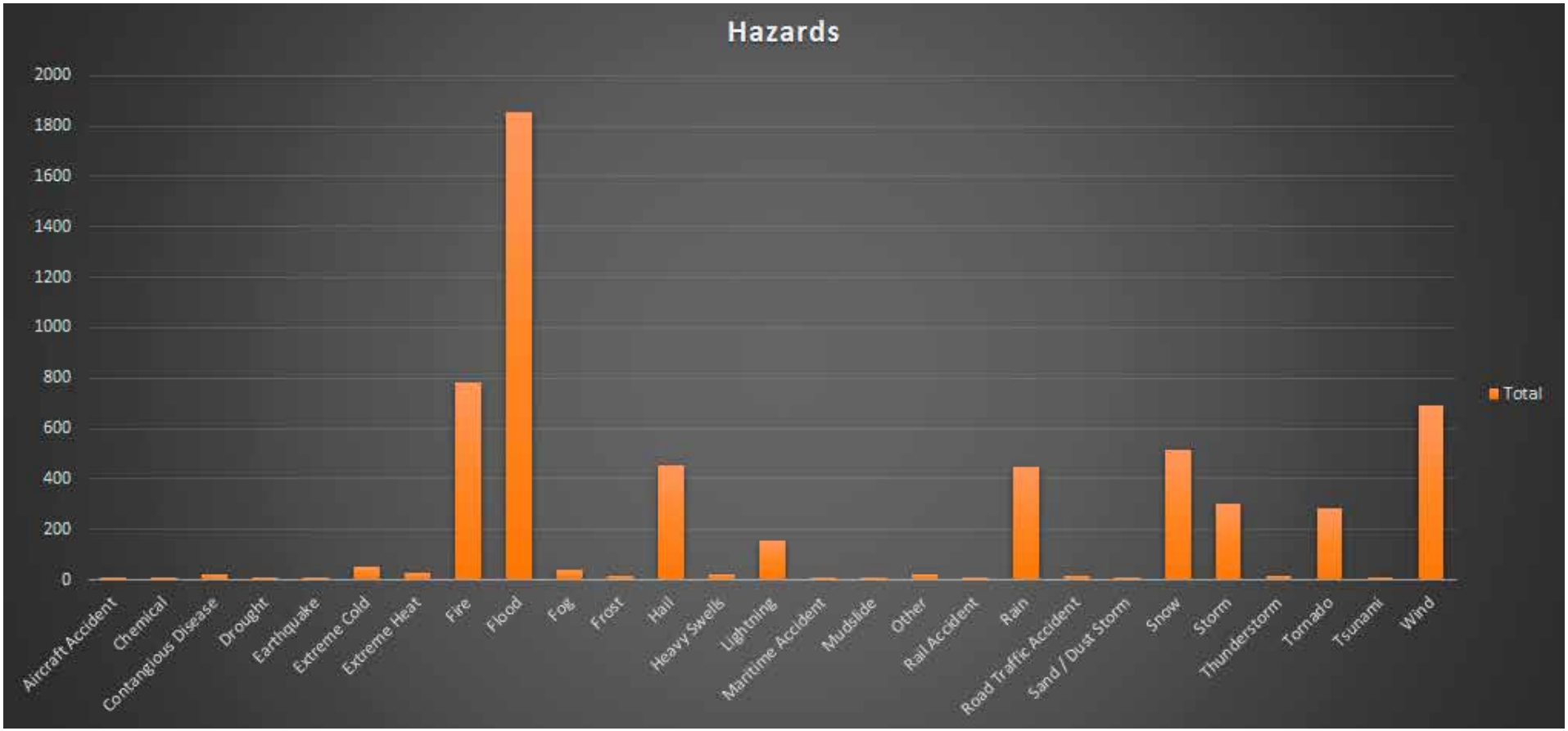

Figure 1. Cumulative number of captured historical events in South Africa (CAELLUM 2014; SRS 2014)

Case Study: Indicative risk profile hazard analysis for fire

Since 2011, the NDMC has undertaken a number of risk-profiling activities at national scale. The outputs of these indicative risk profiles aim at providing insights into the nature of the various hazards being analysed. Additionally, vulnerability and capacities assessments augment the hazard assessment and culminate into a risk profile specific to individual hazards. Indicative risk profiles have been conducted for the most prevalent hazards in South Africa. They include fires, floods, drought, windstorms and snow. Recent partnerships with strategic entities with intrinsic hazard and risk knowledge, has resulted in the NDMC gaining valuable support from local scientific and research institutions, leading to a more scientific and robust national product.

Since fire hazards frequently contribute to significant losses in lives, property and the economy, it was selected to illustrate risk profiling in this chapter. Like many other countries, South Africa is exposed to significant fire risks that are slightly above the international norm in terms of fire deaths per 100 fires (Department of Cooperative Governance 2013). Outputs from the updated indicative risk profile hazard analysis for fires (2015) can be observed below. This desktop exercise using Geographic

Information Systems (GIS) characterises fire hazards in terms of frequency, magnitude, predictability and likelihood. The red and orange areas on the maps depict areas with a high and elevated hazard scoring, thus indicating a high risk profile. Yellow represents areas with a medium hazard scoring, and light and dark green illustrate those areas with a below average and low hazard scoring (i.e. areas with a low risk profile). Due to the nature of fires and its dependency on weather, a seasonal aspect has been used.

In the summer months (December to end February), the hazard rating for fires is nationally at its lowest. However, the south-western parts of the country experience an increase in hazard scores.

Autumn (March to end May) hazard scores increase further in the south-western parts of the country, with some interior increase in Gauteng and the Free State.

Winter (June to end August) hazard scores reach their peak in the north-eastern parts of the country (Mpumalanga and KwaZulu-Natal).

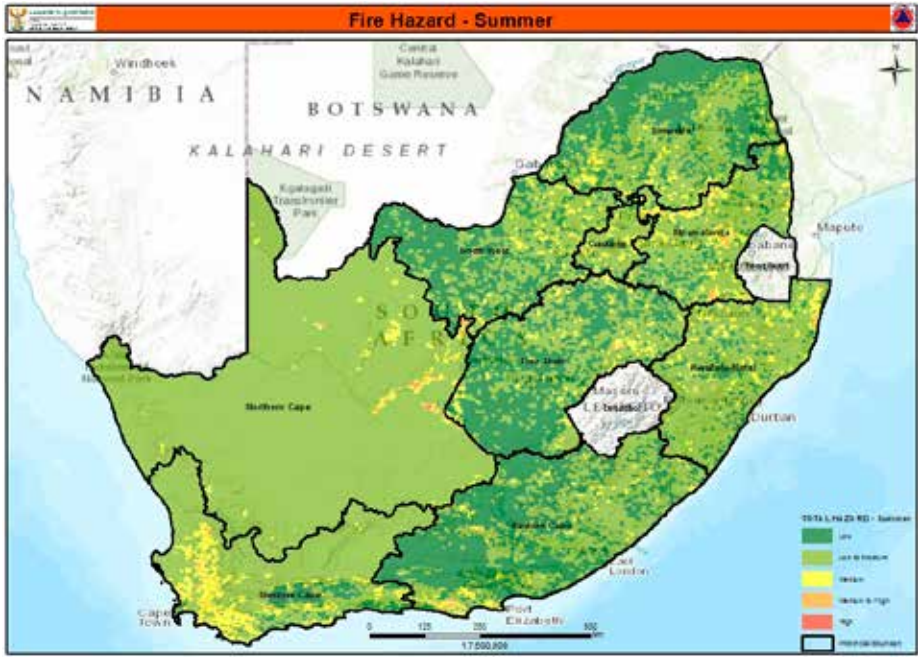

Figure 2. Indicative risk profile hazard analysis for fires during summer (NDMC 2015)

High scores remain in spring (September to end October) over the eastern parts of South Africa.

The indicative risk profile, when combined with medium-term weather forecasts, aims to provide disaster management stakeholders with information for operational, tactical and strategic planning related to future hazards and risks. Furthermore, it attempts to highlight areas where disaster risk reduction may be targeted in terms of addressing social, economic or environmental vulnerabilities and/or limited capacities. Finally, the product aims to become a blueprint for the future standardisation of risk profiling in South Africa.

Conclusion

Fire hazards pose a significant threat to many parts of South Africa. These hazards often result in the loss of lives and livelihoods, and cause great devastation as well as financial losses. A number of processes contribute to increase this hazard risk, including climate change that results in changing rainfall patterns, urbanisation that

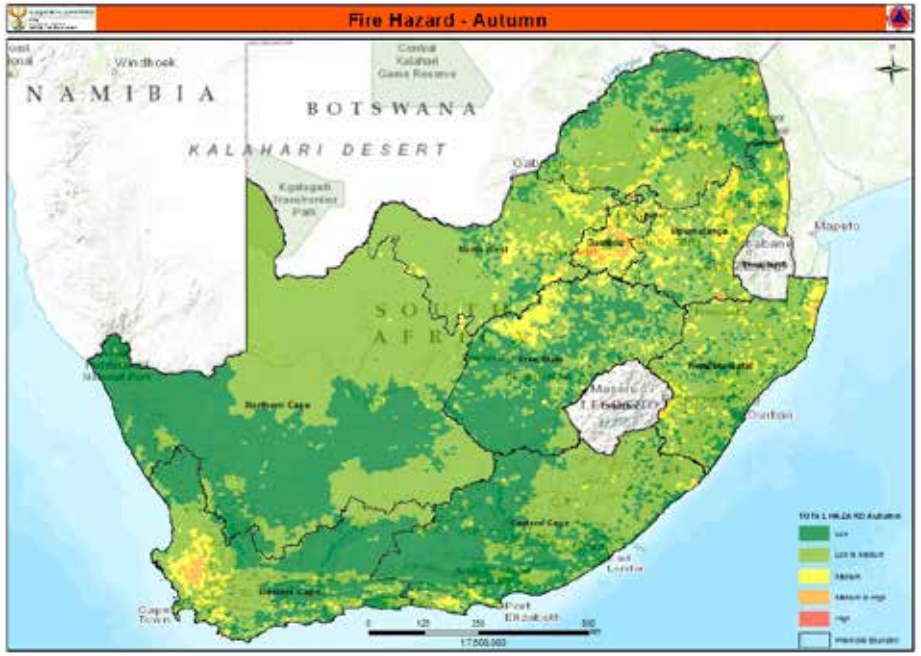

Figure 3. Indicative risk profile hazard analysis for fires during autumn (NDMC 2015)

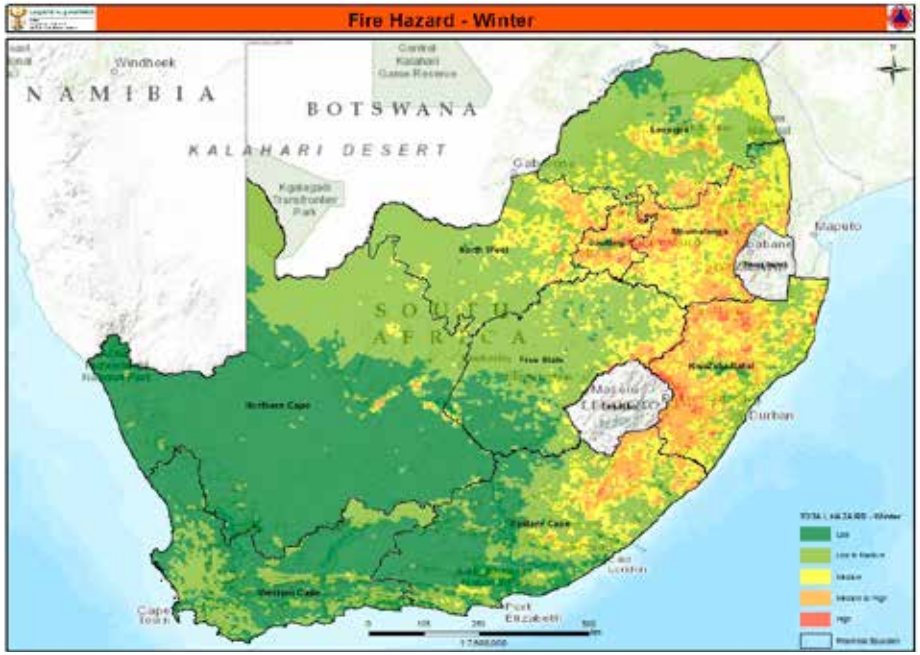

Figure 4. Indicative risk profile hazard analysis for fires during winter (NDMC 2015)

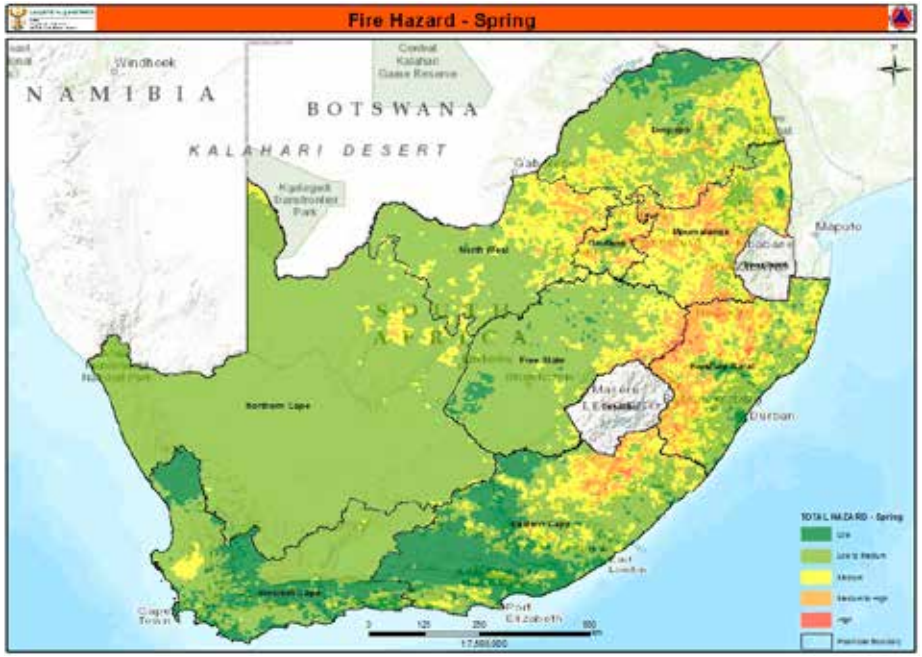

Figure 5. Indicative risk profile hazard analysis for fires during spring (NDMC 2015)

leads to more people living in informal settlements, and a loss in biodiversity that changes the veld fire ecology. There is a lot more that can be done to help reduce the risk of fire hazards in South Africa, and efforts are underway to manage the risk. The DMA has a distinct disaster risk reduction focus which addresses the need for greater investment in prevention as well as mitigation actions that will avoid the need for expensive, and often repeated, assistance. In order to make a meaningful impact on reducing the physical, social and environmental costs of disasters in the country, rigorous planning needs to be done, ensuring that disaster management principles are incorporated in all planning and implementation efforts. Evidence and information on hazard zones, as was presented in this chapter, can assist in identifying the specific areas that ought to be targeted for disaster risk reduction measures.

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