

FATHUM POLICY BRIEF

Langeberg Municipality Flood Risk Context – Improving Early Warning

June 2020

Executive Summary

1. The LM (Langeberg Municipality) faces many inter-related hazard factors that increase flood risk. These include its mountainous location, exposure to cut-off low weather systems and excessive (alien) vegetation in rivers.
2. Socio-economic factors and settlement trends also increase the LM's flood **vulnerability and exposure**. These include population growth and urban settlement near rivers, chronic poverty and seasonal employment surges. There are clear language differences across the settlements.
3. Local flood risk management still faces many institutional challenges, as it involves complex legislation and cooperation across different government departments as well as within the LM.
4. SAWS¹ and the WCDMC's² **impact-based forecasts** currently focus on the local municipal level, and are too general to capture and reflect important "fine-scale" information on flood risk.
5. Formal EW (Early Warning) strategies are unable to prioritise the LM's socially marginalised communities or its exposed, remote at-risk areas. They have yet to incorporate and optimise local/indigenous knowledge on flood risk and the diverse range of local languages spoken.

Recommendations:

The LM, Cape Winelands and Western Cape Disaster Management Centres should:

1. Urgently clarify the functions, roles and responsibilities both for **managing alien vegetation clearance** within the LM and for **effective forecasting, early warning and risk communication**.
2. Work with SAWS to improve impact-based early warning, by incorporating **local/indigenous forecasting knowledge**, as well as the **local languages** spoken in flood-prone towns/areas.
3. Strengthen the SAWS and WCDMC's flood early warning capability in high-risk municipalities by conducting a **flood risk context and profile assessment** to improve **impact-based forecasting**.

Introduction

In South Africa, the effective management of severe weather events calls for accurate and timely flood forecasting and early warning systems, in addition to long term investment in DRR. For the Western Cape Province, this especially applies to rural areas that are exposed to flash-flooding, and that may become suddenly cut-off and isolated.

Because the Western Cape has many towns, settlements and communities spread across inland, coastal and mountainous environments, it means that flood forecasting and warning systems need to be tailored for local conditions.

This policy brief summarises findings from a 2018-2019 flood risk context study of the Langeberg Municipality (LM) in the Cape Winelands District. It presents the interlinked mix of factors that shape flash flood risk for the local municipality, as well as the effectiveness of current warning systems in this mountainous terrain.

The brief also highlights the benefits of such risk context studies. These include important insights to improve impact-based forecasting. The findings are also relevant for local development planning as well as disaster risk assessment, disaster preparedness, response and recovery.

It shows how detailed risk context studies can inform development, humanitarian action and resilience-building, as well as support early warning efforts.

¹ South African Weather Service

² Western Cape Disaster Management Centre

Why the Langeberg Municipality?

The LM, is located inland, approximately 170 kilometres from Cape Town, with an estimated population of 103 389 in 2017. It is one of five local municipalities within the Cape Winelands District Municipality.³

The LM's topography is dominated by the Langeberg Mountain chain that separates Montagu from Ashton, Robertson, Bonnievale and McGregor (Fig.1). The Keisie and Kingna Rivers flow through Montagu, becoming the Kogmans River that then runs through the narrow Kogmanskloof Pass to Ashton (the only road access between Montagu and Ashton).

The municipality has a diverse socio-demographic-economic profile. This includes informal/low-cost housing settlements of Nkqubela in Robertson and Zolani in Ashton, along with Ashbury in Montagu. IsiXhosa is mainly spoken in Nkqubele and Zolani, with Afrikaans in the remaining areas.

From 2003 – 2014, the LM was affected by six flood disasters which resulted in almost **USD 22 million in damage**, one fatality and **6 424 people displaced** (Pharoah et al. 2016). March 2019 saw the last heavy rain with some localised small-scale flooding.

The LM served as an instructive case study to explore a diverse flood risk context to better inform early warning forecasting, planning and preparedness in a rural setting.

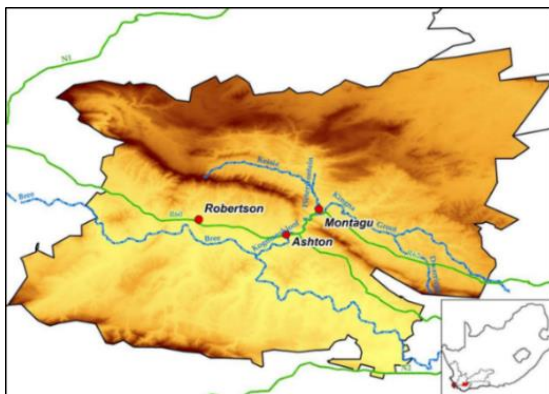


Fig. 1: Topography/location of the LM



Fig. 2: Flooding at the entrance of Montagu in 2003

What was the Research Approach?

The Langeberg flood risk profile research was one of three studies carried out as part of the *Forecasts for Anticipatory Humanitarian Action* (FATHUM) project led by the U.K-based University of Reading. Researchers from RADAR⁴ at Stellenbosch University carried out both field research as well as secondary data gathering to build a detailed risk context report for the Langeberg Municipality.⁵

The Langeberg research was streamlined with similar studies carried out in Mozambique by the Technical University of Mozambique (UDM) and in Uganda by Makerere University.

What did the Results Show?

The Langeberg Municipality is affected by many flood risk drivers

1. The LM faces many inter-related hazard factors that increase flood risk. These include its mountainous location, exposure to cut-off low weather systems and excessive (alien) vegetation in rivers that increases sediment/debris loads.

³ <http://www.capewinelands.gov.za/Pages/Cape%20Winelands%20District%20Municipality.aspx>

⁴ <http://www.radar.org.za/team-base-1.html>

⁵ http://www.riskreductionafrica.org/assets/files/South%20Africa_Risk%20Profile%20Report_19%20Aug%202019_Final.pdf

2. Its steep mountain slopes also produce intense storm run-off that shortens the response time for isolated communities like Baden, Koo, Noree, Dwariga and Agterkliphoogte.
3. The LM is exposed to other recurrent flood-exacerbating hazards like drought and veld fire.
4. Socio-economic factors and settlement trends also increase flood **vulnerability and exposure**. These include population growth and urban settlement near rivers, chronic poverty and seasonal employment. These are most evident in Mandela City and Ashbury (in Montagu), as well as Zolani (Ashton) and Nkqubela (Robertson).
5. There are striking language differences in the LM's settlements. In 2011, 83% of Zolani residents spoke IsiXhosa, while 96% of those in Ashbury spoke Afrikaans (Stats SA 2011). These language differences have clear implications for flood early warning communication, with many receiving warnings only in English while others not receiving warnings at all.

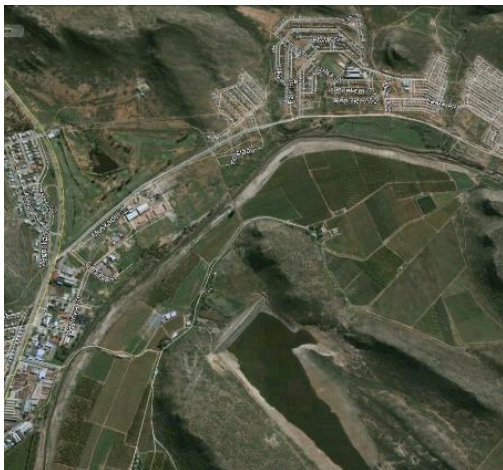


Fig. 3: Montagu East in proximity of the Kingna River in 2003
(Source: DigitalGlobe 2019)



Fig. 4: Expansion of infrastructure and Asbury closer to the Kingna River by 2018
(Source: DigitalGlobe 2019)

Local flood risk management still faces many institutional challenges

1. Flood risk management involves complex legislation and cooperation across different government departments as well as within the LM. It was unclear which government department(s) were responsible for pro-active and effective **clearing of (alien) vegetation** from the Kinga, Keisie and Kogmans rivers, to decrease fire fuel and flood debris loads.
2. There was uneven enforcement and updating of **flood set-back lines** to decrease **exposure** in the LM. This was despite almost annual flooding within the municipality.

Weather monitoring, forecasting and local preparedness are flood risk priorities

1. Across the LM, there is limited weather radar coverage and flash-flood forecasting capability. There are too few weather monitoring instruments like automatic rainfall stations and river flow gauges to inform accurate flash-flood warning.
2. SAWS and the WCDMC's (Poolman et al. 2018) **impact-based forecasts** focus on the municipal level. However, these are too general to capture and reflect important "fine-scale" information on flood risk. The differences include the meteorological variability between areas within the LM, changing hazard exposures and differing 'on-the-ground' community vulnerabilities.
3. There are challenges in risk communication between the informal and formal EW systems of SAWS and the DM Centres. The formal EW (Early Warning) strategies are unable to prioritise the LM's socially marginalised communities or its exposed (often remote) **at-risk areas**.

4. Current approaches have yet to incorporate and optimise local/indigenous knowledge on flood risk and the range of local languages spoken, not just English.

Recommendations

1. Policy and legislation implications (for District, Provincial and National action)

The Cape Winelands District Disaster Management Centre should seek clarity on:

- a) the functions, roles and responsibilities for managing alien vegetation clearance within local municipalities (that considers legislation including NEMA, Water Resources Act and the role of the Department of Environmental Affairs and Development Planning).
- b) the functions, roles and responsibilities for effective forecasting, early warning and risk communication (that consider Disaster Management and SAWS legislation), to better situate impact-based forecasting within long-term resilience building and short-term response.
- c) how the Integrated Development Planning and Spatial Development Planning processes might better incorporate population growth and seasonal employment surges that amplify flood and other risk conditions.
- d) how the Finance-related Appropriation Act, Division of Revenue Act, Intergovernmental Relations Framework Act, Intergovernmental Fiscal Relations Act, along with DM and SAWS Acts might better enable investment in flash-flood forecasting and warning (e.g. radar coverage, river flow gauges).

2. Operational and institutional implications (for SAWS, LM, District and Provincial action)

The Cape Winelands District Disaster Management Centre should support efforts by the LM and other municipalities to:

- a) work with SAWS to incorporate ‘on the ground’ informal **local disaster risk/forecasting knowledge** (e.g. nature of weather systems, most vulnerable) and **systems** (e.g. via WhatsApp, Facebook); and **local languages** spoken in flood-prone towns/areas – to improve early warning.
- b) strengthen the SAWS and WCDMC’s flood early warning capability in high-risk municipalities by conducting a **flood risk context and profile assessment** to inform **impact-based forecasting**. In the case of the Langeberg Municipality, this applies to:
 - Geo-physically high-risk areas like Montagu.
 - Socio-economically at-risk settlements, like Nkqubela, Zolani, Ashbury and Mandela City.
 - Isolated and remote localities, like Baden, Koo, Noree, Dwariga and Agterkliphoogte.

References and useful resources

- Langeberg Municipality 2017. Langeberg Municipality Integrated Development Plan: 2017 – 2022
- Pharoah R, Holloway A, Fortune G, Chapman A, Schaber E & Zweig P 2016. OFF the RADAR: Synthesis Report. High Impact Weather Events in the Western Cape, South Africa 2003 – 2014. RADAR (Research Alliance for Disaster and Risk Reduction), Peripheri, Stellenbosch University.
- Poolman E, Webster E, Sebegu E, Rae K, Pillay D & Staden M 2018. Project on Developing and Implementing an Impact-based Severe Weather Warning System (SWWS).
- SAWS. Stats SA 2011. National Census 2011.

FATHUM is a study led by the UK’s Reading University to strengthen forecasting and early warning systems in Uganda, Mozambique and South Africa. It aims to improve forecast predictability, investigate complex disaster risk drivers, and implement Forecast-based Financing mechanisms (FbF) that enable effective, appropriate and impactful action before a disaster. This work examines the flood risk drivers in the Langeberg, EWS, DRM capacity and institutional arrangements – how FbF fits into local/national DRR goals.

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<http://www.radar.org.za/>; <https://www.riskreductionafrica.org/>

<https://www0.sun.ac.za/international/centre-for-collaboration-in-africa-cca.html>