



cooperative  
governance

Department:  
Cooperative Governance  
REPUBLIC OF SOUTH AFRICA

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# SPACE BASED SOLUTIONS FOR DRM AND EMERGENCY RESPONSE

National Disaster Management Centre

South Africa

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DL Pillay | NDMC | 13<sup>th</sup> July 2021

# PRESENTATION OVERVIEW

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2. Legislative Mandate of the NDMC

3. Drivers for Information at the NDMC

4. Affiliation of the NDMC with the International Charter:

Space and Major Disasters.

5. Tropical Storm Eloise

6. Activation of the Charter for Eloise

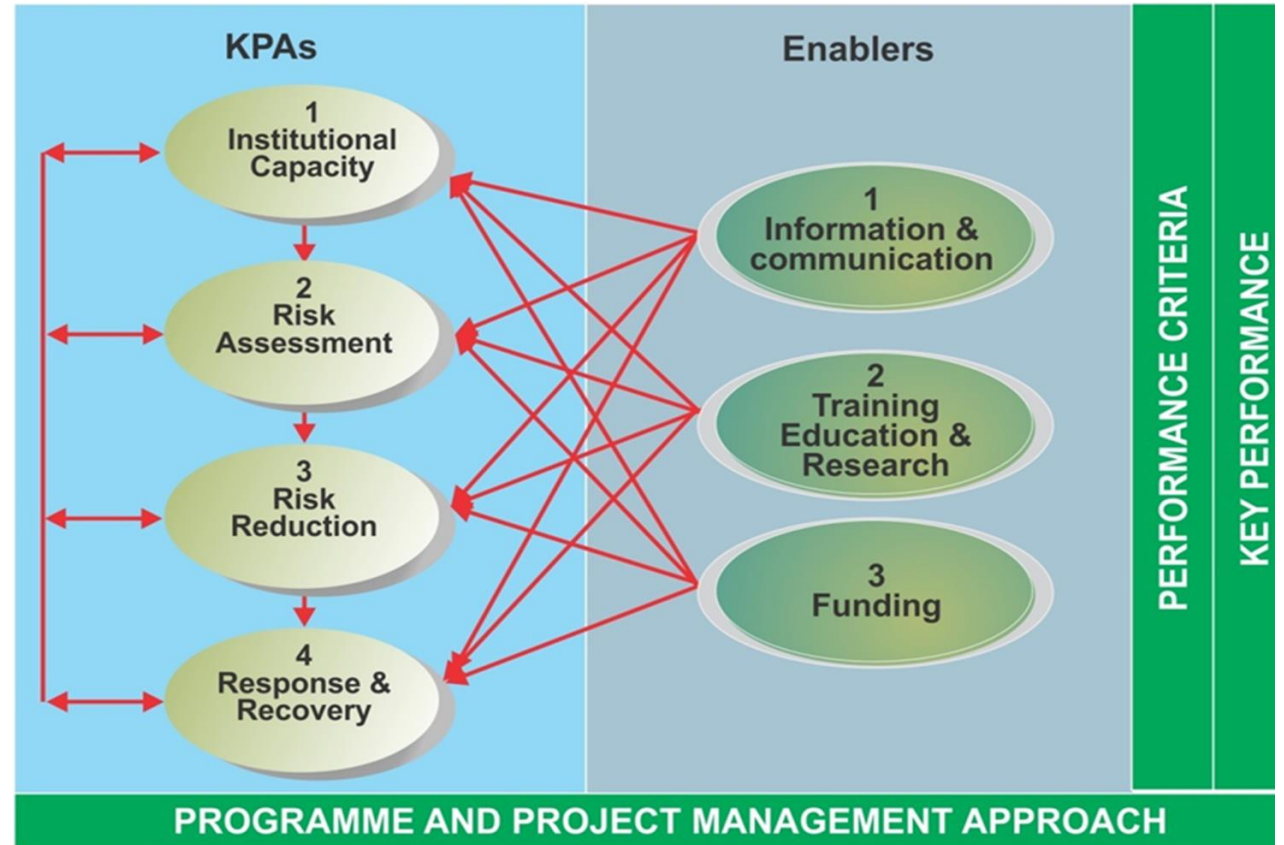
7. Lessons Learnt and way Forward

8. Summary



# INTRODUCTION

- National Disaster Management Centre, is a branch within DCOG.
- This function is coordinated through the implementation of the Disaster Management Act, 2002 (Act no 57 of 2002) as amended, as well as the accompanying Disaster Management Framework, 2005 across the three spheres of government. The NDMC also administers fire legislation (Fire Brigade Services Act, 1987).
- **The objective of the National Centre is to promote an integrated and coordinated system of disaster management, with special emphasis on prevention and mitigation. by national, provincial and municipal organs of state, statutory functionaries, other role-players involved in disaster management and communities. (Section 9)**
- In addition to the National Centre, a disaster management centre must be established in every Province and in every District & Metropolitan Municipality, to coordinate disaster management in its sphere of responsibility (Sec 8 ,29 & 43)
- Staff of the various centres consist of the Head of the Centre and suitably qualified persons (sections 31A and 45A)
- <http://www.ndmc.gov.za/Pages/whatwedo.aspx>



# LEGISLATIVE MANDATE OF THE NDMC

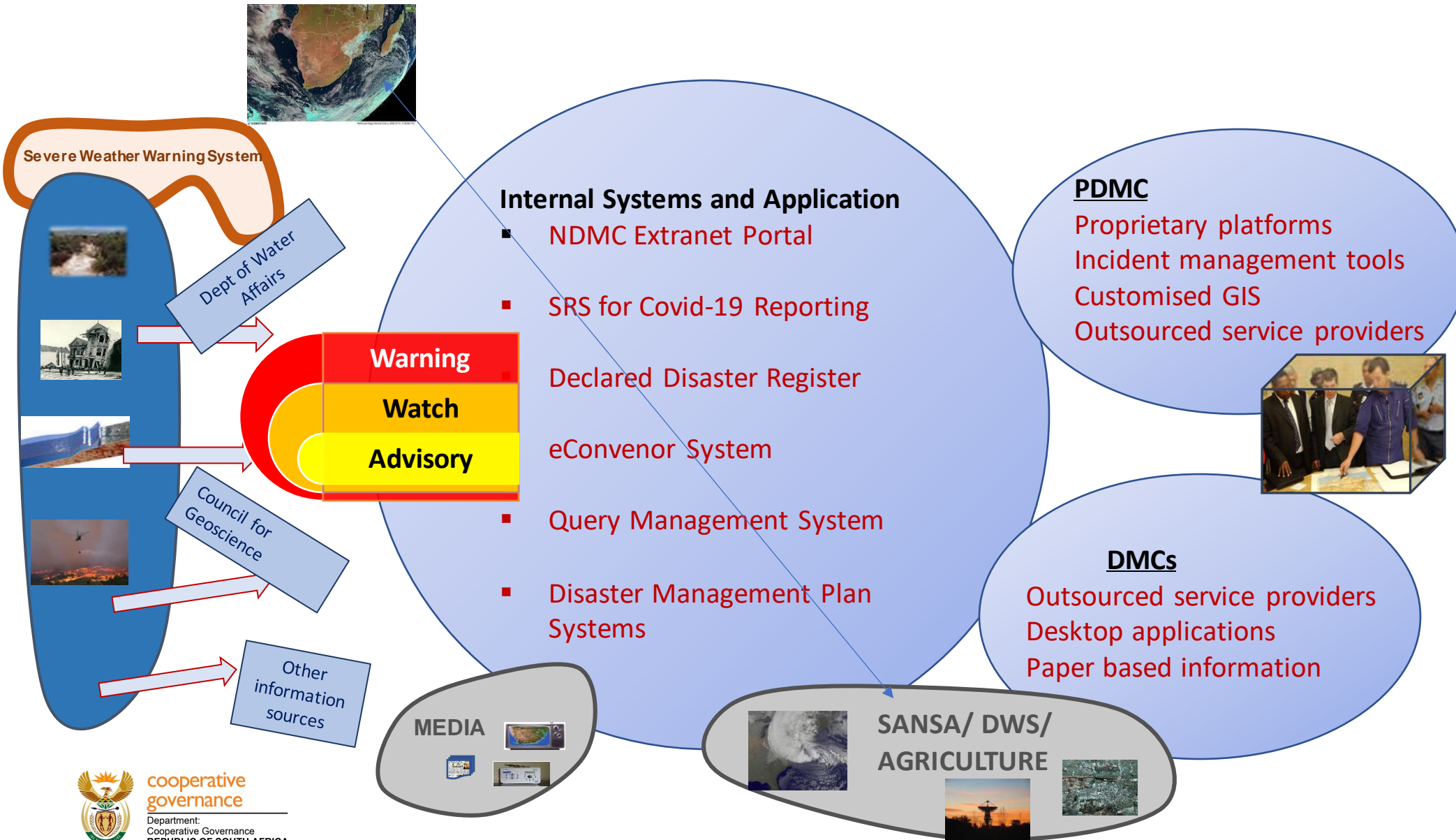
- The Act has explicit & distinct focus on DRR.
- Establishes adequate structures necessary for the management of disasters with **special emphasis on prevention and mitigation** by all spheres of government.
- The Act calls for the establishment of institutional & governance structures to ensure integration of stakeholder participation & to adopt a holistic and organised approach to the implementation of policy and legislation.
- The Act recognises the **multi-sectoral & multi-disciplinary nature of DM in the country.**
- The Act also provides mechanisms for involvement **in DM activities by private sector, traditional leaders, civil society, volunteers, etc**
- The Act also makes provision for the development of a National Disaster Management Framework.



## Stakeholders

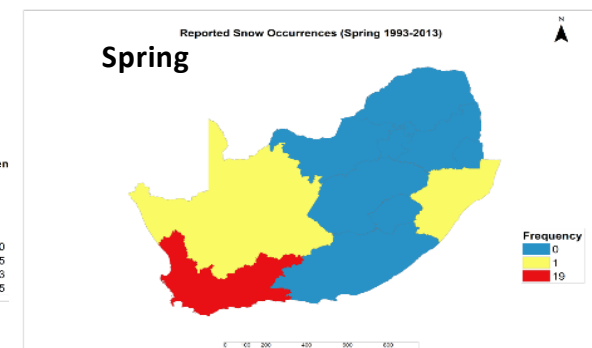
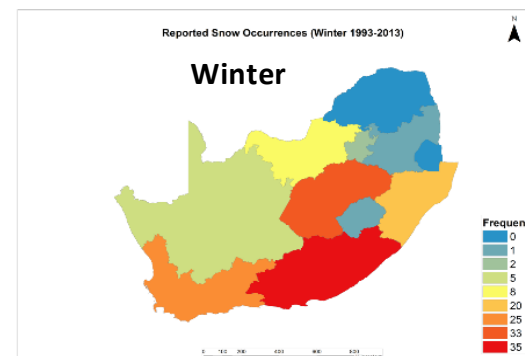
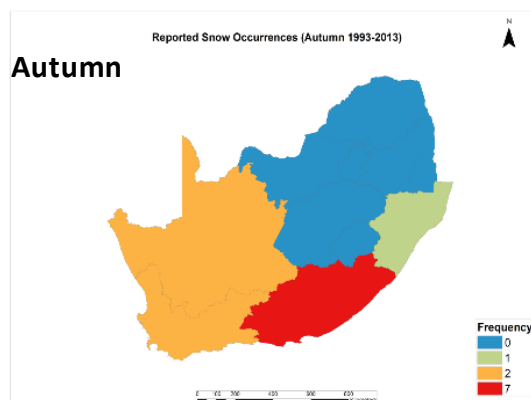
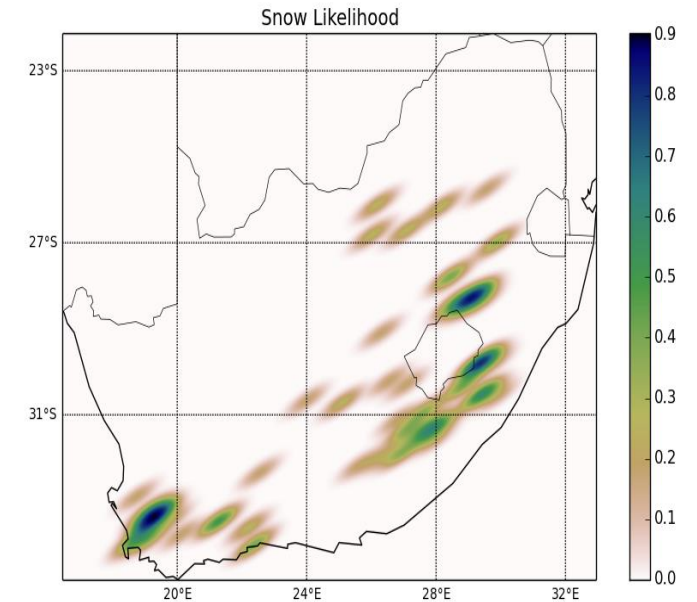
- 9 Provincial Disaster Management Centres
- District Disaster management Centres (DMCs)
- Municipal DMCs
- South African Weather Services
- FPASA
- Geoscience
- SANSA
- Sector Departments
- Parastatals

# THE DRIVERS OF THE NDMC INFORMATION PLATFORM



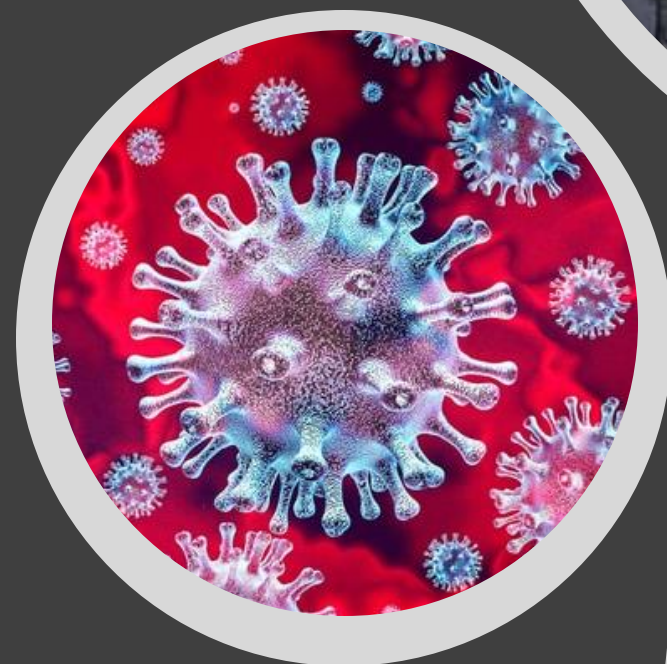
# CALCULATION OF SNOW HAZARD USING SATELLITE IMAGERY




- The NDMC and the CSIR entered a MOU in 2013 with an envisioned set of data products derived from satellite imagery.
- At the current time, the NDMC was undertaking to produce several hazard profiles to inform DRR planning in South Africa.
- Moderate Resolution Imaging Spectroradiometer (MODIS) snow product data was used with a combination of image classification techniques, machine learning and the validation of with historical data from the South African Weather Service.
- MODIS imagery allowed for the confident cross validation of historical SAWS data and the ability to produce a hazard potential map for snow .
- With this baseline data set, the NDMC has been able to improve on the spatial detection of snow hazard across different seasons.
- The quarterly seasonal profile, captures and expands on the information captured in the initial hazard



# SA: INTERNATIONAL CHARTER FOR SPACE AND MAJOR DISASTERS

- In 2018 the NDMC and UN SPIDER co hosted a workshop on the Impact of Drought on local farmers in the Eastern Cape as part of the Evidenz Project. This is where the discussion on the NDMC affiliation to the Charter began.
- In 2019 The NDMC applied for “authorized user” status in terms of the International Charter For Space and Major Disasters.
- Later that year, the NDMC undertook to complete project managers training together with SANSA (South African National Space Agency)
- The SANSA entity in South Africa would be the in-country project manager and aligned to the Charter prerequisites.
- COVID-19 arrives!
- NDMC application was unprocessed and in 2020 there was limited engagements with the provisions of the Charter.



 Affairs  

**CONCEPT NOTE**

**UN-SPIDER Bonn International Conference**

**Space-based Solutions for Disaster Management in Africa:  
Challenges, Applications, Partnerships**

Organized by  
**United Nations Office for Outer Space Affairs (UNOOSA) / UN-SPIDER  
Centre for Remote Sensing of Land Surfaces (ZFL), University of Bonn**

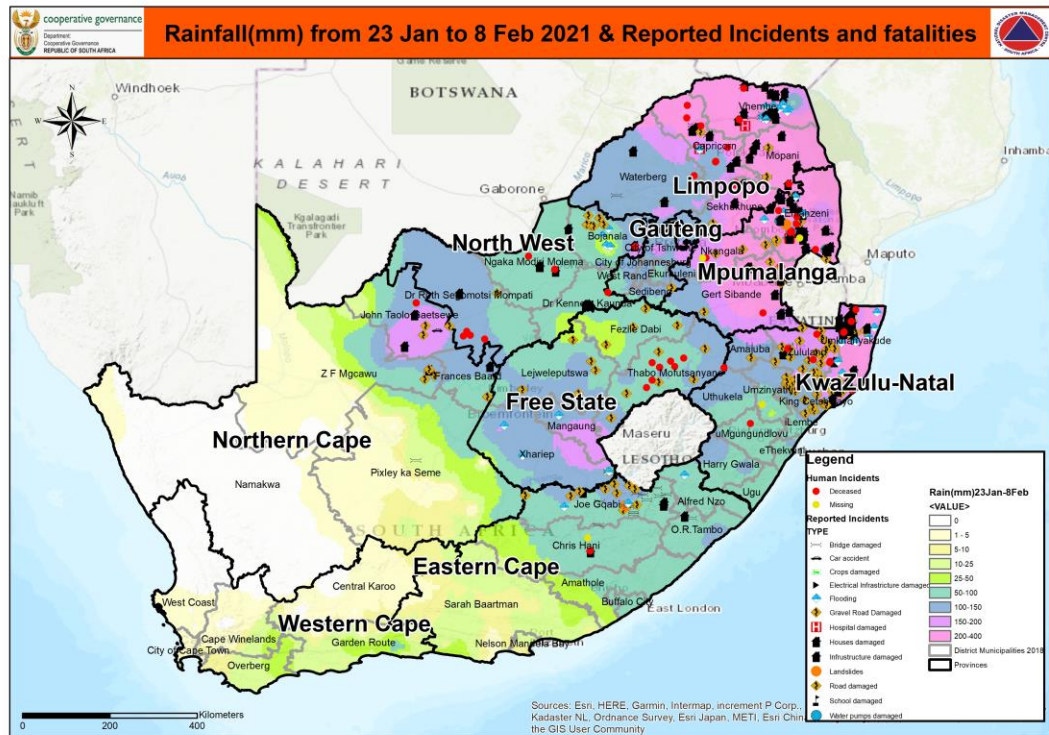
In cooperation with the  
**German Aerospace Center (DLR)**

With the support of the  
**German Federal Ministry for Economic Affairs and Energy (BMWi)**

6 – 8 November 2019

UN Campus  
Bonn, Germany

# TROPICAL STORM “ELOISE”: JAN/FEB 2021



Tropical Storm arrived in South Africa via its entry from Mozambique on the 23<sup>rd</sup> Jan 2021.

## Impact of Tropical Storm Eloise:

- Negatively affected a total of 7 provinces affected and 31 Districts.
- The impact varied in different provinces but mainly resulted in the following:
  - Deaths and missing people (54 and 5 respectively)
  - Infrastructural damage to houses, roads, schools, bridges and water pumps.
  - Agricultural damage was also incurred to various crop areas.
  - Education and specific sector interruptions
  - Financial loss and loss of livelihoods.

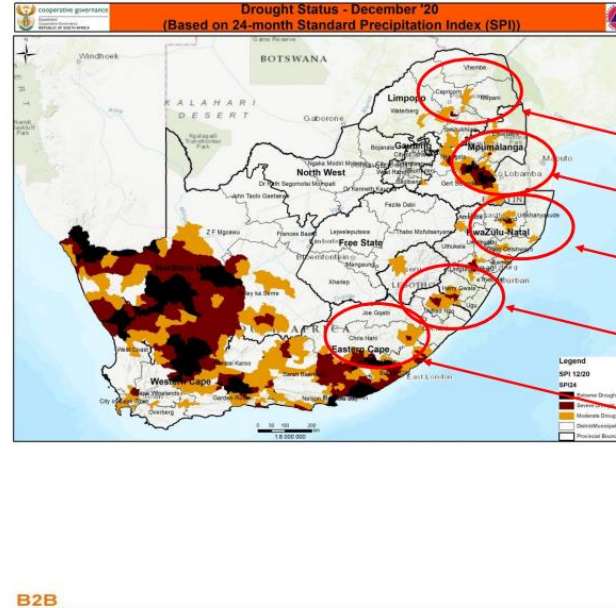
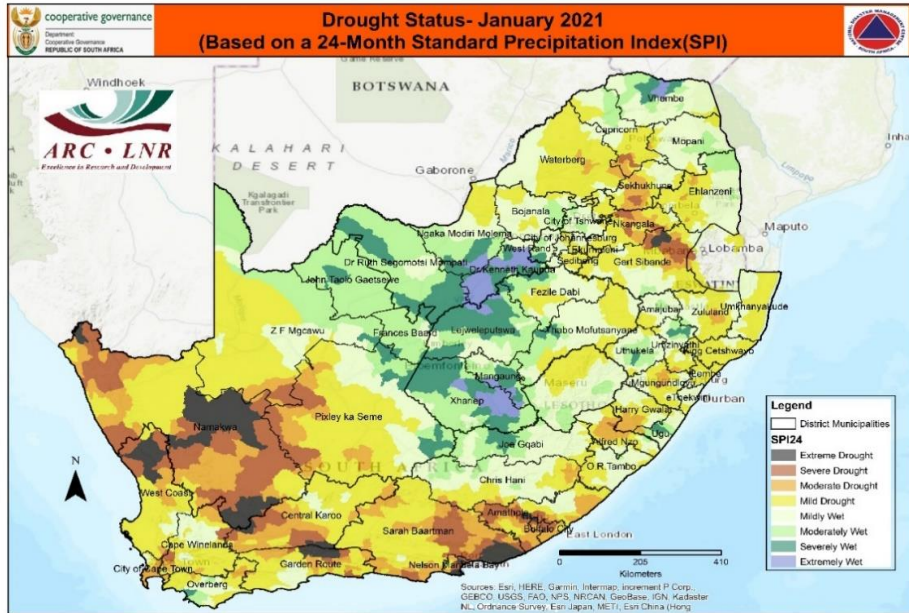


# PROVINCIAL DAMAGES: MPUMALANGA

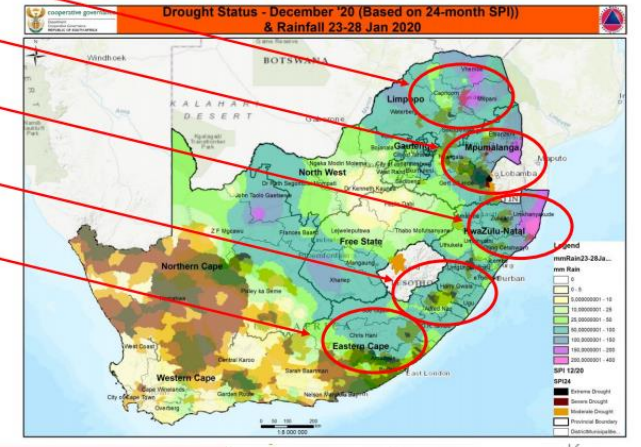
- The three provinces most impacted was Mpumalanga, Kwazulu Natal and Limpopo.
- Certain provinces were severely impacted as the Tropical Storm combined with interior weather conditions to bring excessive rainfall to other provinces like the Northwest and Free State provinces.



# EXCESSIVE RAINFALL AND UNANTICIPATED BENEFITS



Provinces with drought areas (left) are compared with areas that received in excess of 50mm of rainfall as a result of tropical Storm Eloise.

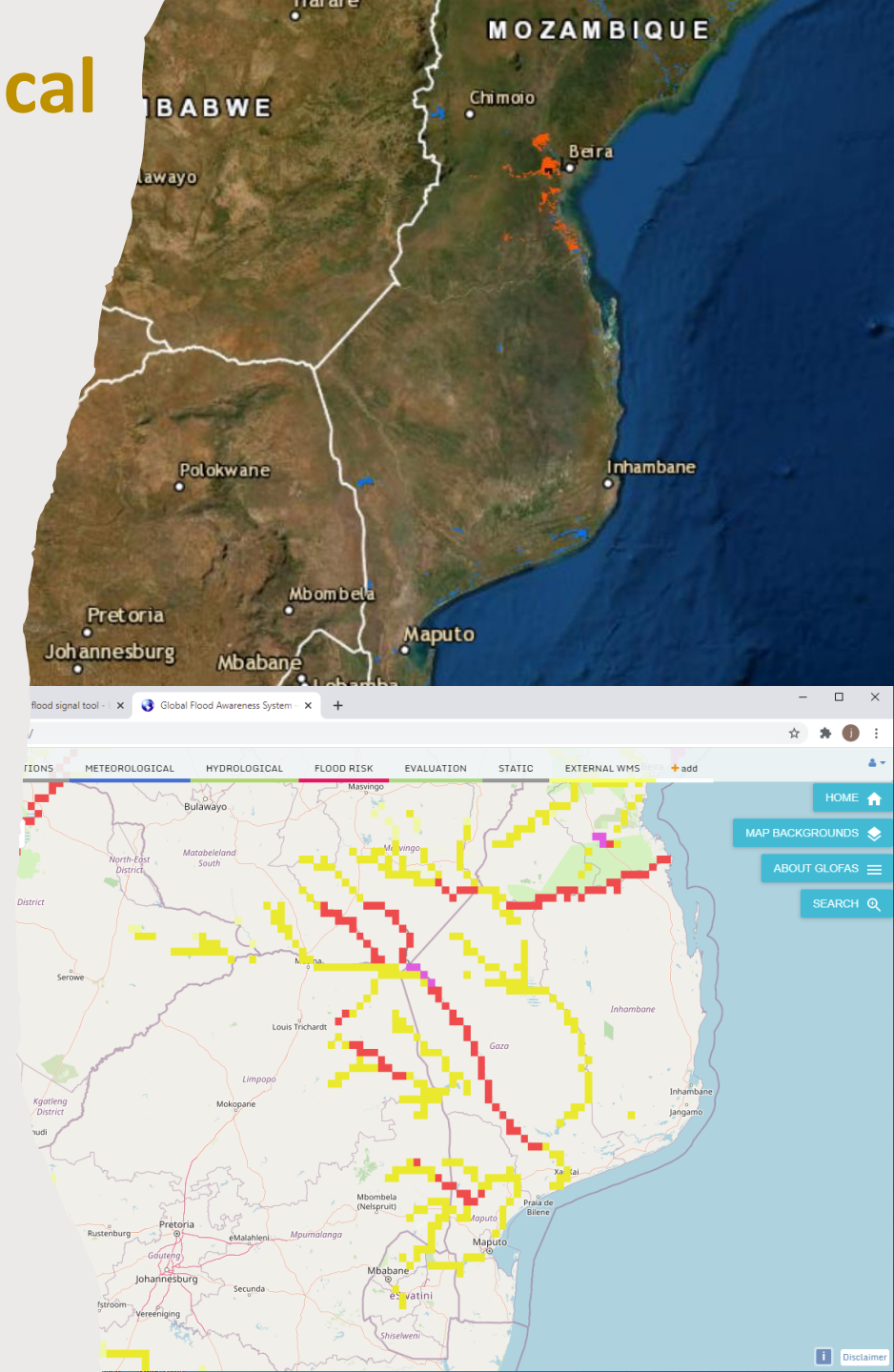


The drought status map from January 2021 (Right) indicates the cumulative impact on drought areas in the central and northern parts of South Africa which is partly due to Tropical Storm Eloise

- Tropical Storm Eloise did have a rainfall positive effect on areas within several provinces that we experiencing drought conditions (left).
- The figure on the left indicates an analysis perform on areas of drought as depicted in December 2020 and areas that received excessive rainfall during the storm.
- Products from the UN SPIDER platform will assist in the future to quantify large scale rainfall.

# Activation of the International Charter: Tropical Storm Eloise

- Shortly after the arrival of Tropical Storm Eloise, the NDMC began their attempt to activate the Charter using the channels and processes advised in the recent training.
- SANSa and NDMC began the discussion on geoprocessing capabilities and data products.
- The NDMC was informed that the Charter had already been activated for Mozambique by UNOSAT on behalf of OCHA.
- The NDMC was unable to access imagery and information for the three provinces impacted by the Tropical Storm Eloise.
- The NDMC did receive global flood products from UN SPIDER during that period that was useful in preparing for the impact of the post flood period during Eloise.
- SANSa used their satellite portfolio to access imagery for the period and compiled several spatial products.
- The above reiterated the need for synoptic data products that maximize the coverage in wide impact disaster occurrences.



# IN COUNTRY MAPPING FOR TROPICAL STORM ELOISE

- The NDMC with SANSA was able to provide moderate scale and infrared satellite imagery for the detection of inundated areas.
- Combined with active mapping efforts, the NDMC was able to quantify the impact of Tropical Storm Eloise in the three main provinces.
- This synoptic assessment led to targeted land verification exercise and disaster relief efforts.

## NDMC Decision Matrix

- 1) Current, active satellites that can be used to map flooded areas.
  - Optical: SPOT 6/7, Pleiades, Sentinel 2, Landsat, Worldview 1-4, Quickbird
  - SAR: Sentinel 1, Radarsat 2, TerraSAR-X, TanDEM-X
  - Charter member satellites inclusive of the above.
- 2) Radar satellite vendors that supply imagery to SANSA and the usefulness of these resources to map flooded areas.
  - Sentinel 1 (9m) is useful for dams and rivers greater than 30 meters in width
  - Radarsat 2 (3m) is useful for water ponds, rivers and detection of water within settlements
  - TerraSAR-X (1m) is useful for water ponds, rivers and detection of water within settlements
- 3) Knowledge of any drone technology (with operational skills) that can be used for flood applications in South Africa.
  - CAD Mapping



## Summary and Lessons Learnt

- Disaster management risk reduction in South Africa and across its provinces is dependent on large data streams in various forms and sources.
- NDMC learnt that the ability to integrate data from different sources lead to focused DRR efforts
- NDMC to consider improved activation efforts of the Charter.
- Value chain for in country project management base on quick turnaround times is vital.
- Take the innovative steps and consider improved platforms for data and information products development.
- Regional collaboration to the activation of the charter is an envisioned area of improvement.
- The NDMC has since taken decisive steps to work with SANSA on joint response products that promote improved planning and relief efforts.
- NDMC and UN SPIDER to revitalize efforts to complete the authorized user status for South Africa.



