Data-driven Wildfire Monitoring for Next-Generation Disaster Management

M.A.P Scientific Services
Esri Southern Africa User Conference
www.mapss.co.za
30 October 2025

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About MAPSS

- MAPSS develops solutions that integrates science and GIS to better understand and manage our planet.
- In doing so, MAPSS empower organisations to boost their impact and foster successful strategies for thriving landscapes.
- Our team is passionate about what we do, our clients, and how our work makes a positive impact on our world.

esri

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5.5
11 Kilometers
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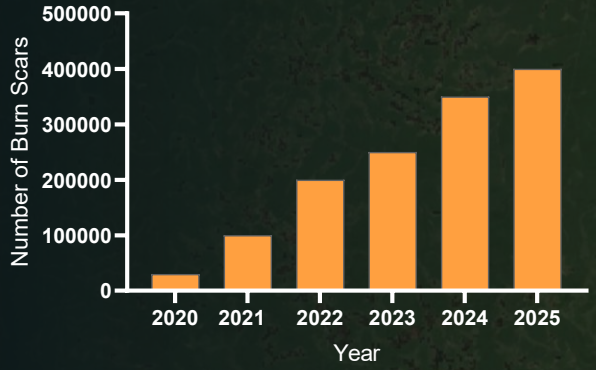
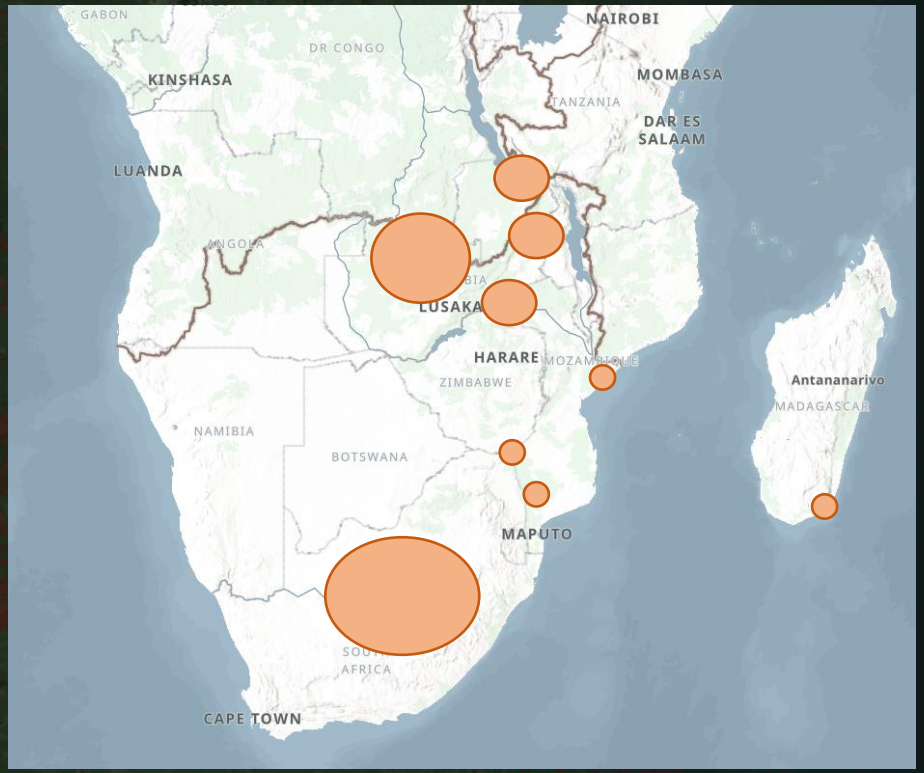
Project Areas

- Since 2020, we have mapped more than a million fires across southern Africa.
- Totals ~30 million hectares burnt.
- Support protected area management, provincial Fire Protection Associations, insurance and disaster management.





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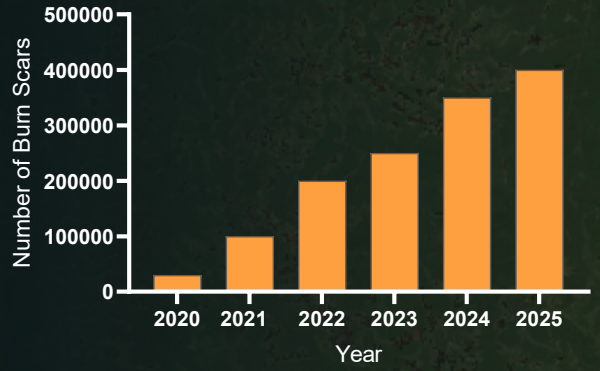
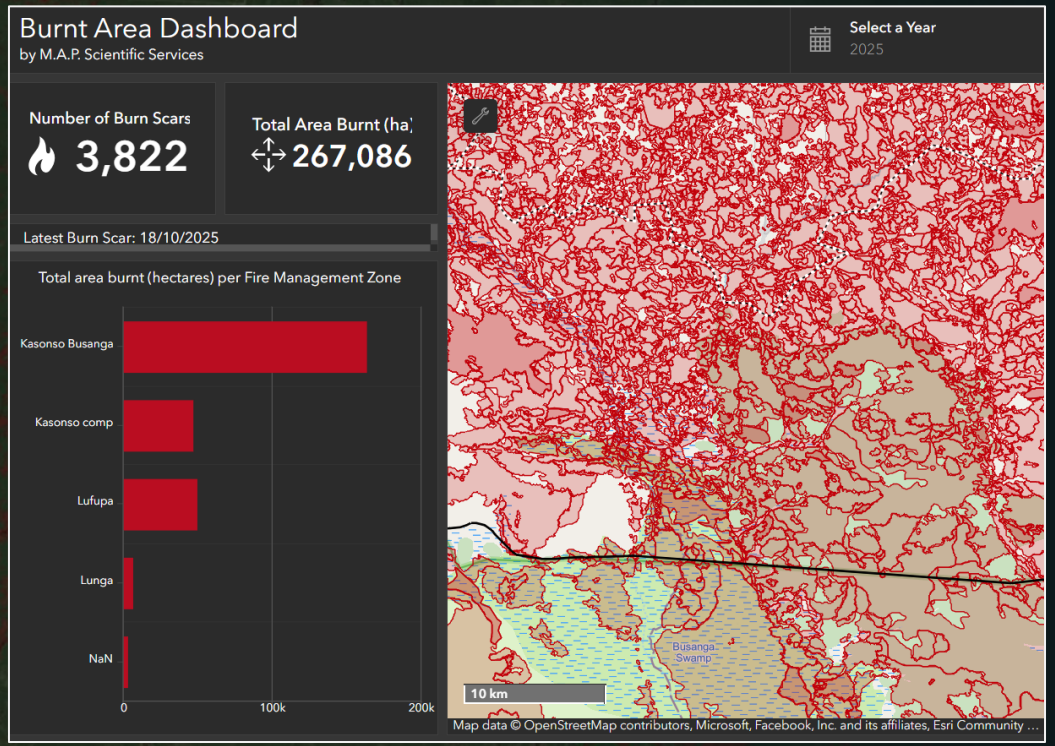
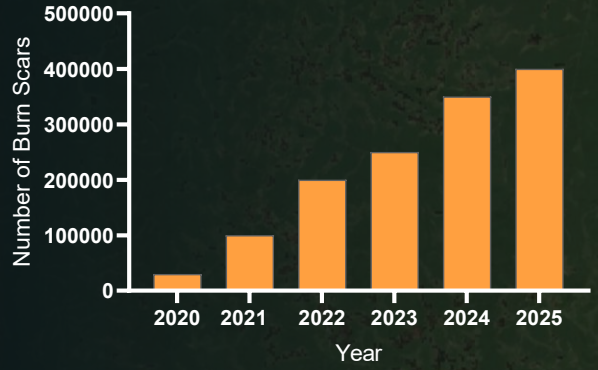




Project Team

- Since 2020, we have mapped more than a million fires across southern Africa.
- Totals ~20 million hectares burnt.
- Support protected area management, provincial Fire Protection Associations, insurance and disaster management.

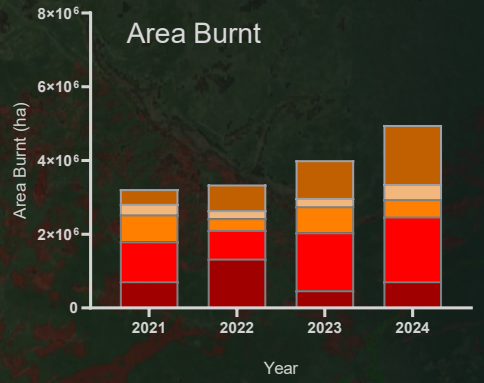


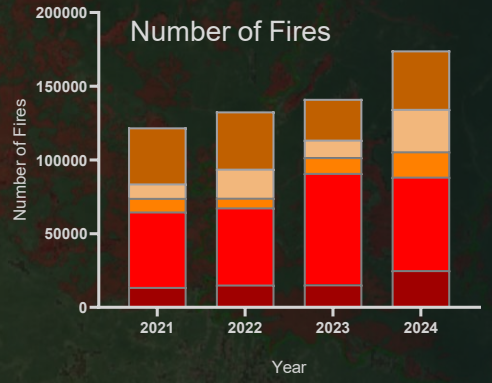
Wildfires: A Rising National Threat

- **South Africa 2021 – 2024** (MAPSS dataset):
  - Area burnt increased: 3.9 million ha to 5 million (+28%)
  - Number of fires increased: 122 000 to 174 000 (+42%)

- Coupled with rising climate extremes, wildfires now threaten communities, infrastructure, and ecosystems at unprecedented scale.

- However, most of our disaster management systems are still blind to the full picture.





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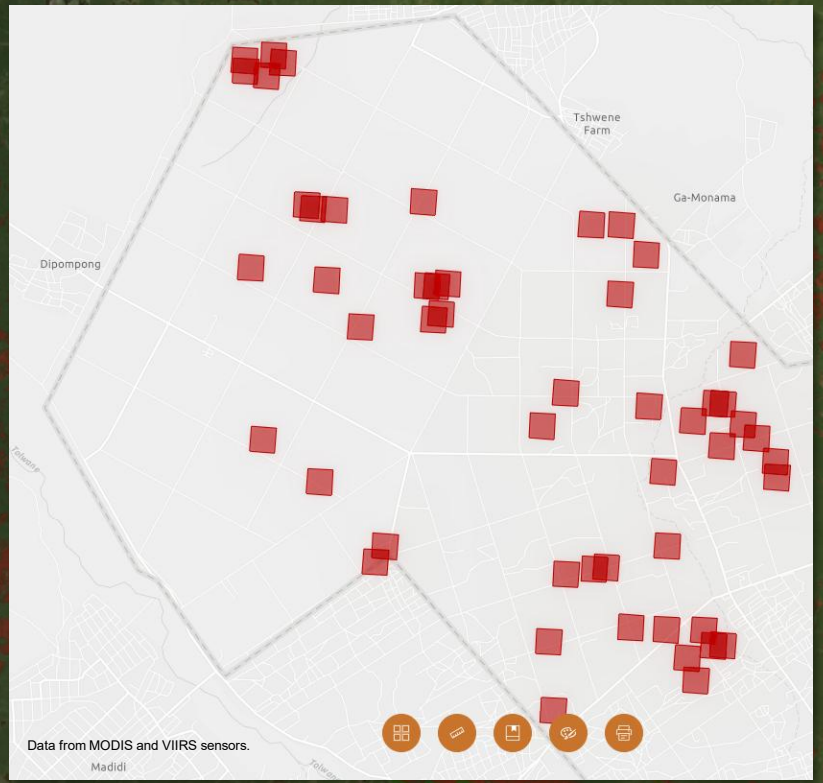
The Data Gap

- Accurate fire data is the foundation of effective disaster management:
  - Early warning and preparedness.
  - Response coordination.
  - Recovery and assessment.
  - Risk reduction and planning.

- However at present, the most widely used fire data is:
  - Coarse (375m – 500m).
  - Incomplete - many fires are not recorded.
  - Area burnt is not mapped accurately.



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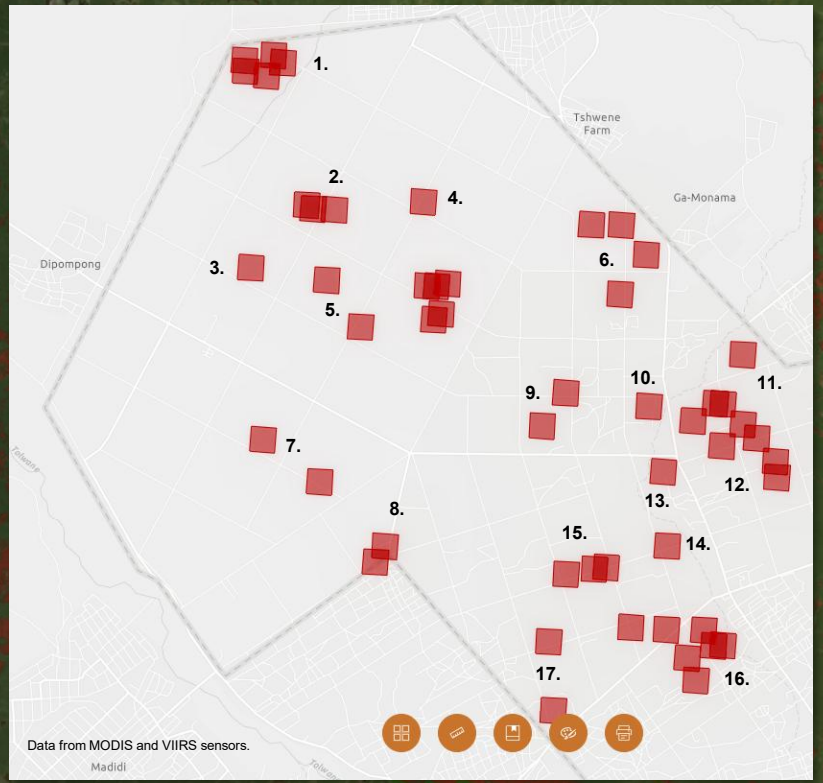
The Data Gap

Example – Apies Rivier FPA Gauteng (2025)

- MODIS and VIIRS: 48 active fire hotspots linked to about 17 burn scars.



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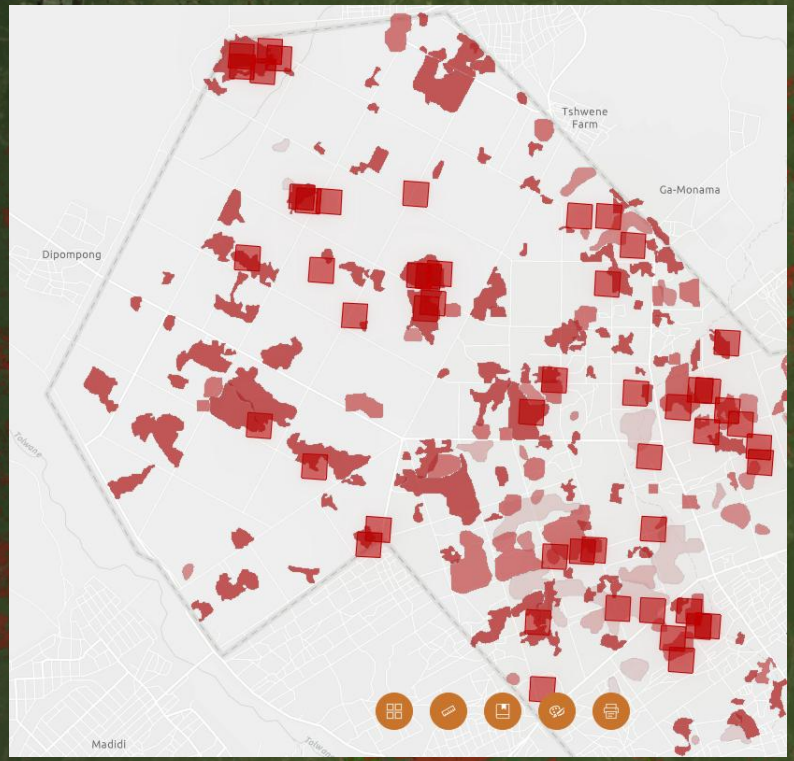
Bridging The Data Gap

Example – Apies Rivier FPA Gauteng (2025)

- MODIS and VIIRS: 48 active fire hotspots linked to about 17 burn scars.

MAPSS Solution

- AI model mapping every burn scar in South Africa every 5-days at 10m resolution.
- 179 burn scars = 1 242 ha burnt
- Fire data sources that authorities rely on consistently underestimate number of fires and area burnt.



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Bridging The Data Gap

Example – Apies Rivier FPA Gauteng (2025)

- MODIS and VIIRS: 48 active fire hotspots linked to about 17 burn scars.

MAPSS Solution

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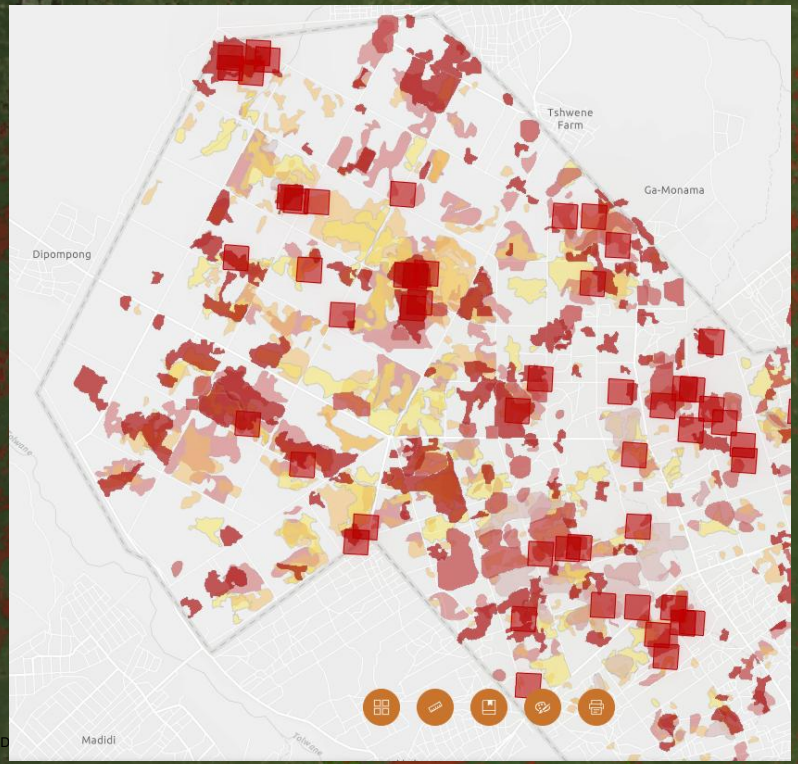
- Fire data sources that authorities rely on consistently underestimate number of fires and area burnt.

- Accurate, consistent, and accessible fire data transforms disaster management – from reactive firefighting to proactive risk reduction.



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How Data Transforms Disaster Management

Preparedness
Identifies high-risk zones before the fire season; supports resource planning and community awareness.

Response
Provides near real-time fire detections to guide operations.

Mitigation
Analyses long-term fire frequency, intensity, and emissions for policy and land-use decisions.

Recovery
Delivers verified burn scar maps for damage assessment and funding requests.

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Data in Practice

1. Esri Experience Builder designed to operationalise the workflow to mitigate wildfire impact.

Current Clients

- Seven out of the nine Umbrella FPAs in South Africa since 2020.
- The solution is vital for FPA operations and legal reporting requirements.
- However, FPAs are non-profits and chronically underfunded.

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Home | Map Viewer | Active Fires | Burn Scars | BAP Reporter | Feedback

Welcome to the MAPSS Wildfire Hub

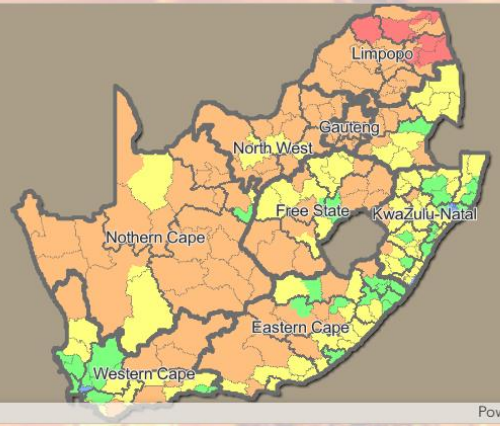
Next Active Fire Data Refresh
12:00
All times are shown in GMT+2

Total Number of Fires
50,673
(10/05/2025, 02:00 - 30/10/2025, 03:05)

Total Area Burnt
1,282,317.3 ha
(04/02/2025 - 07/10/2025)

Fire Danger Index - Today

- Safe (0-20)
- Moderate (24-45)
- Dangerous (46-60)
- Very Dangerous (61-75)
- Extremely Dangerous (76-100)



To filter all data to a single FPA, please choose the FPA below:

Clear all

Layers

FPA Boundaries

Map Viewer | Active Fires | Burn Scars | BAP Reporter | Trends

Current Burnt Area Viewer

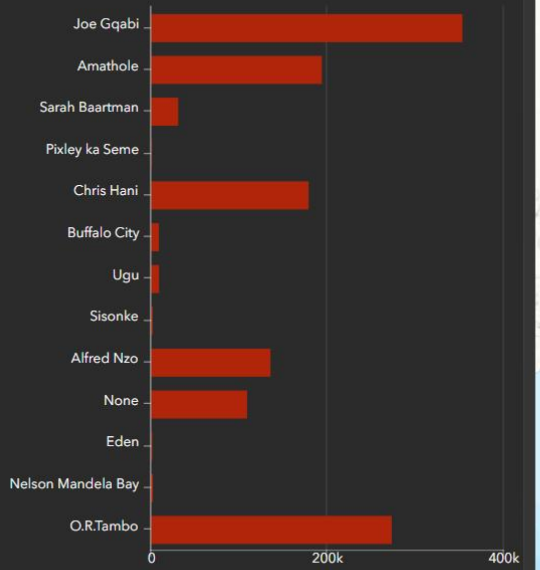
Powered by M.A.P Scientific Services

Select recent data range
All data

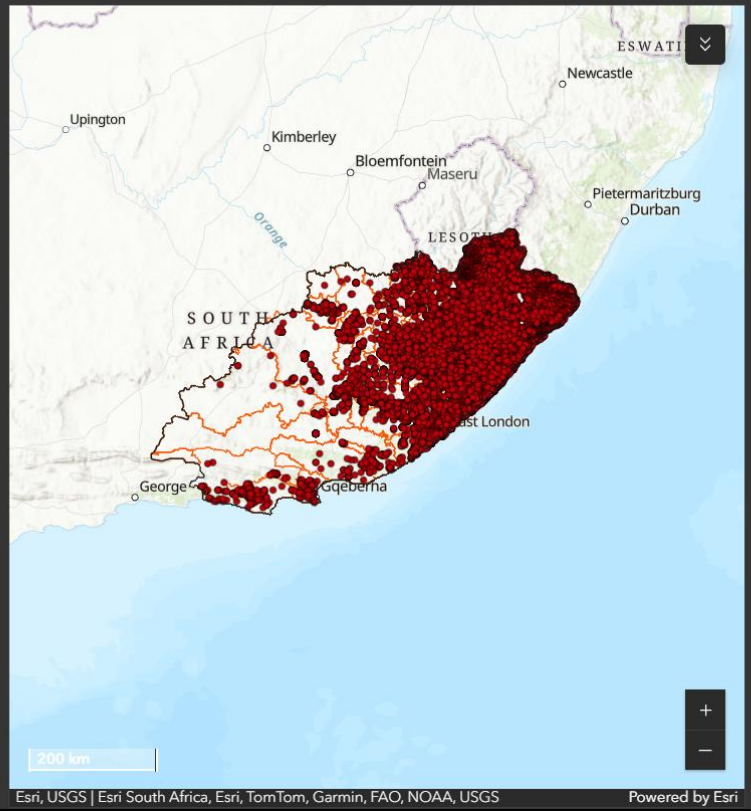
Year
2025

Area burnt (ha)	Burn scars
1,284,874.50	73,366

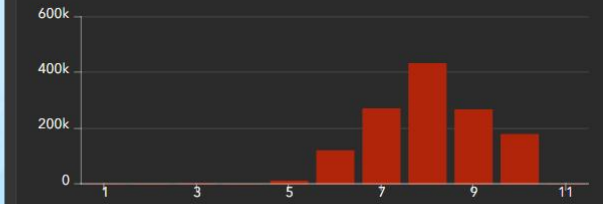
Area burnt (ha) by District Municipality



District | Local Municipality | FPA/AOI

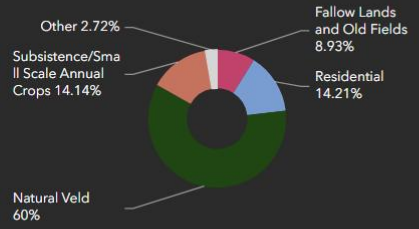


Area burnt (ha) per month



Area burnt | Number of burn scars

Majority land cover type



Latest fire verified: 01/11/2025

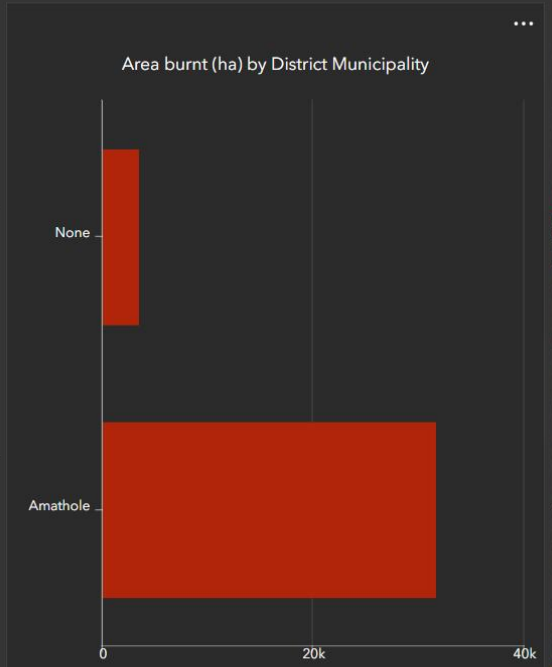
Current Burnt Area Viewer

Powered by M.A.P Scientific Services

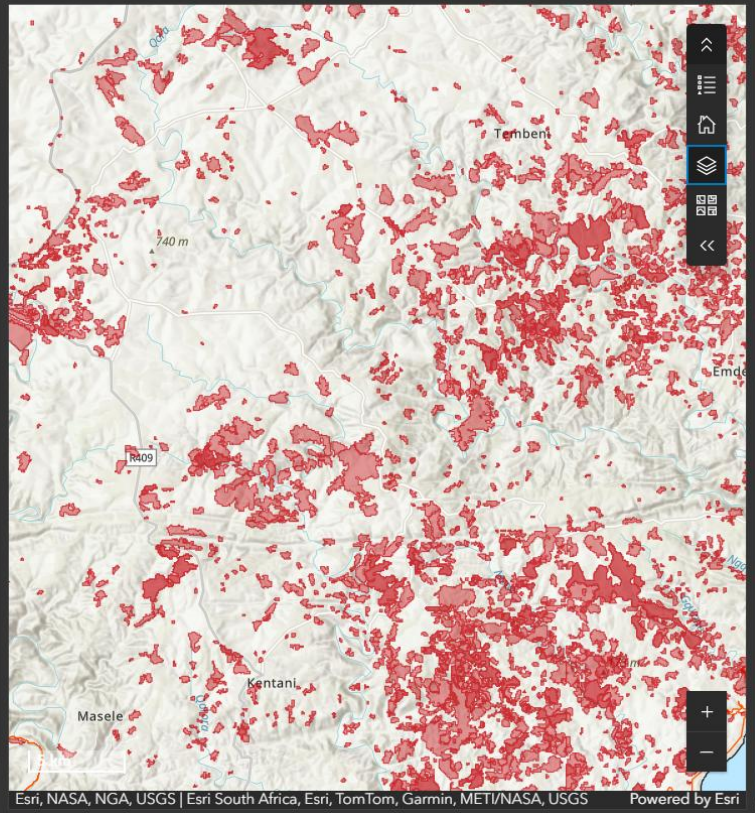
Select recent data range
All data

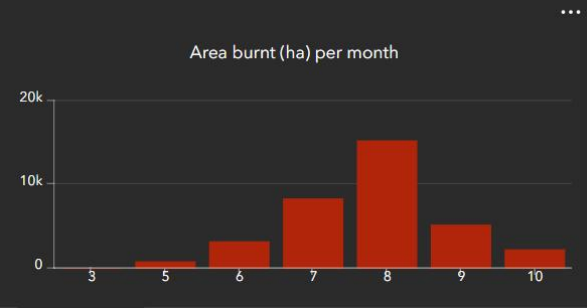
Year
2025

Area burnt (ha)	Burn scars
34,916.20	5,863

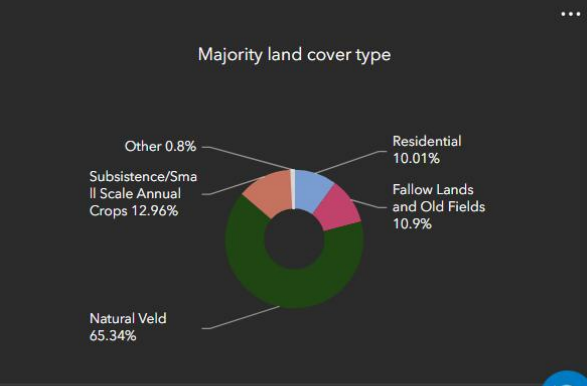


District | Local Municipality | FPA/AOI





Area burnt | Number of burn scars



Latest fire verified: 01/11/2025

Near Real Time Fire and Thermal Anomalies

by M.A.P Scientific Services

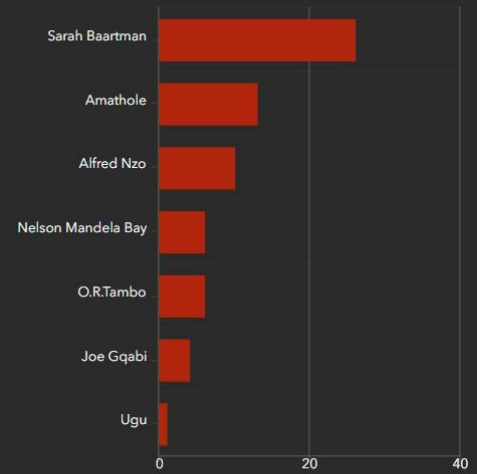
Select a date: Past 12-hours | Past 24-hours | Past 48-hours | Past 3-months

Number of active fires

105

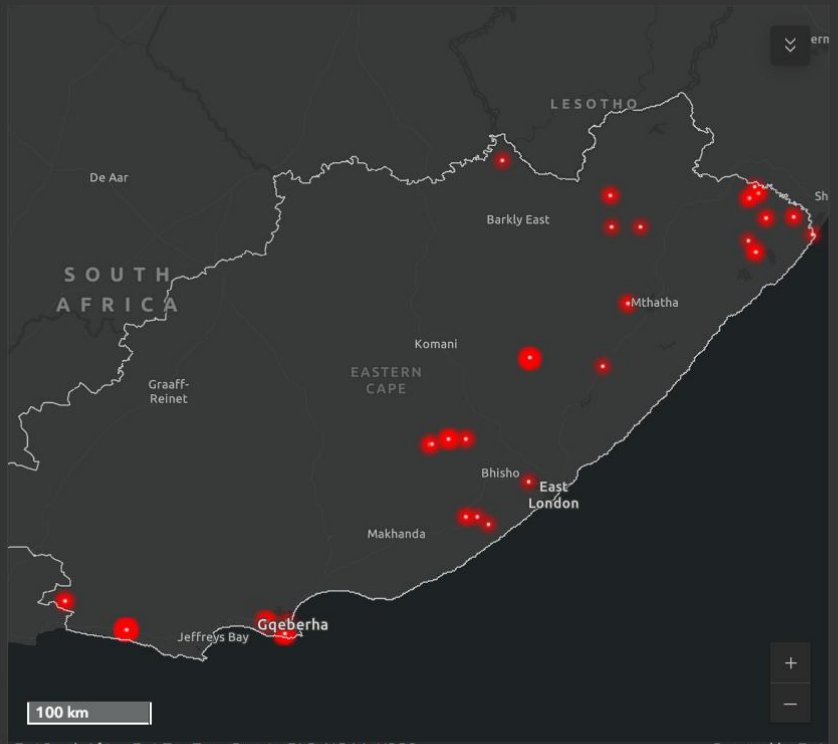
Latest active fire detected: 10/11/2025, 09:09

Number of active fires per District Municipality



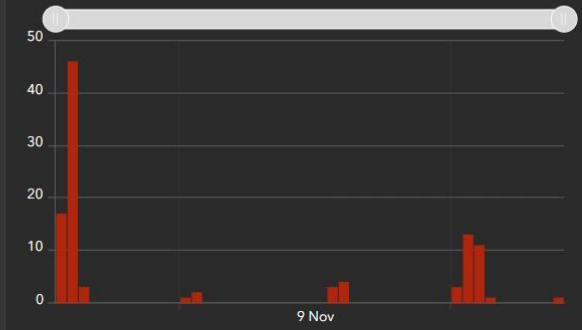
District | Local Municipality | FPA

Each hotspot/active fire detection represents the center of a pixel flagged as containing one or more fires, or other thermal anomalies (such as oil/natural gas wells).
For MODIS the pixel is approximately 1km and for VIIRS the pixel is approximately 375m

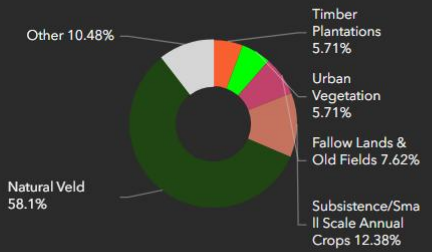


Fire and Thermal Anomalies | Weather

Number of active fires per hour



Active fires per land cover type



Burn Scar Report

Area of Interest (AOI) Information

Area : 1,353.84 hectares

Sept 9 2025 11:20:13 South Africa Standard Time

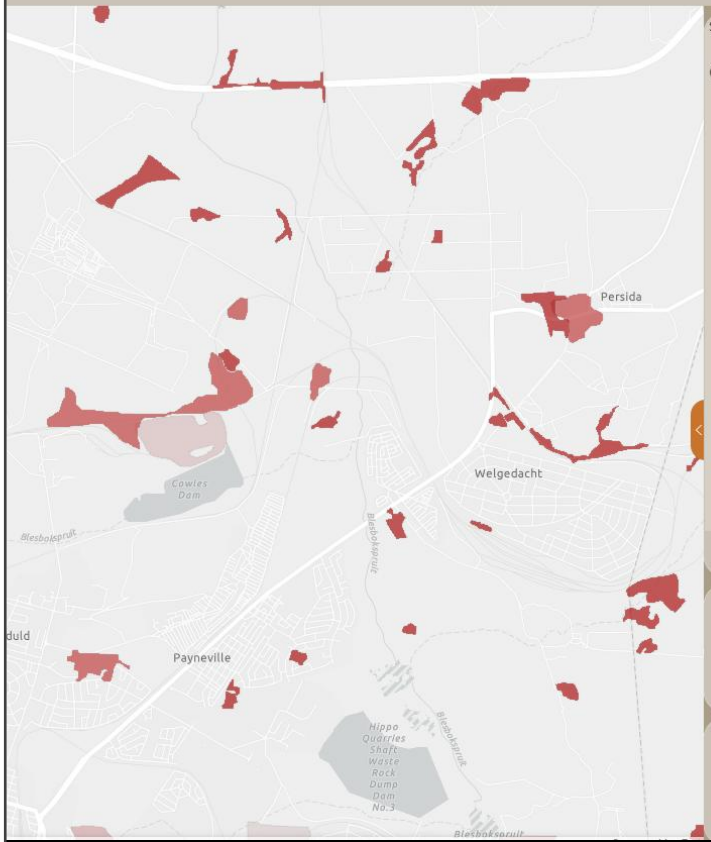
Enter comments here

Burnt Area/s

#	Predate	Postdate	Majority landcover type	FPA	Area(hectares)
1	7/27/2025, 12:00 AM	8/1/2025, 12:00 AM	Nat Veld	*No Data*	1,353.84

Farm Portions

#	21 Digit Code or LPI	Portion Tag Value	Portion Number	Parent Farm name	Farm area (ha)	Area(hectares)
1	T0JP00000000018400002	2/184	2	OU THOMAS ZYN LOOP 184 JP	726.504510	23.69
2	T0JP00000000018400004	4/184	4	OU THOMAS ZYN LOOP 184 JP	720.988764	68.52
3	T0JP00000000015600000	156	0	156	2956.902286	161.63
4	T0JP00000000018200009	RE/9/182	9	VRISCHGEWAAGD 182 JP	1700.265790	269.45
5	T0JP00000000018300000	183	0	183	2791.878095	374.57
6	T0JP00000000015300002	2/153	2	153	1528.805038	455.98



Step 1

Choose your report type:

- FPA Report
- Burn Scar Report
- Farm Portion Report
- Area Summary Report

< Previous | Next >

Number of Burn Scars

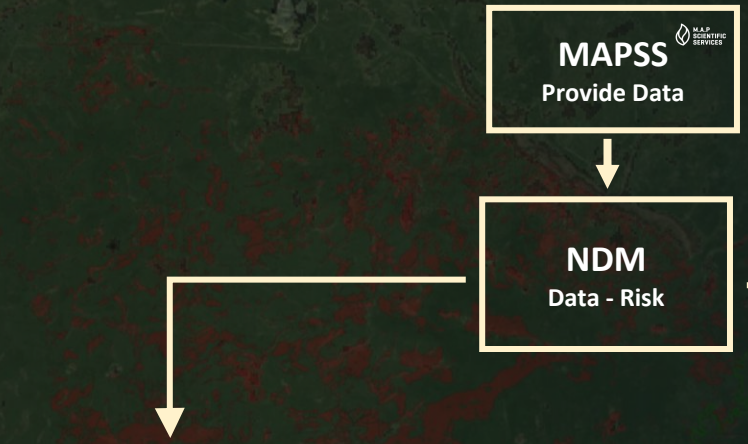
1258

Area Burnt

1258 ha

The Vision - A Unified National Platform

- Central hub (NDMC) with live MAPSS wildfire feed.
- Umbrella FPA nodes with per province data: active fires, burn area, frequency, risk zones.
- APIs support real-time data sharing nationwide.
- Enhances coordination across NDMC, FPAs, municipalities.
- Builds national capacity for data-driven decision-making.



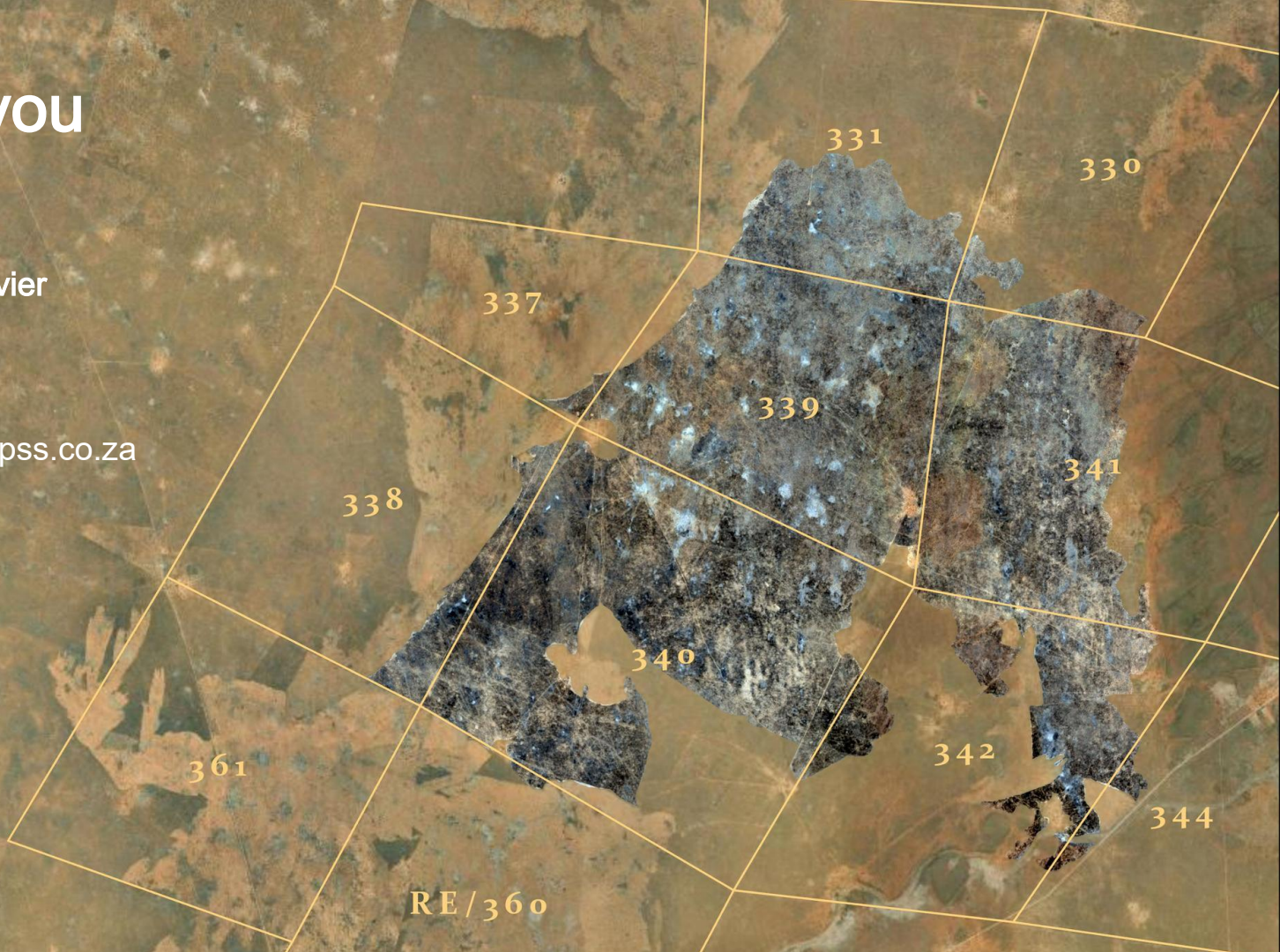
Support Disaster Management for Municipalities

Support rural firefighting efforts by delivering data to FPA's

Thank you

Dr Pieter Olivier

E-mail: pieter@mapss.co.za



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