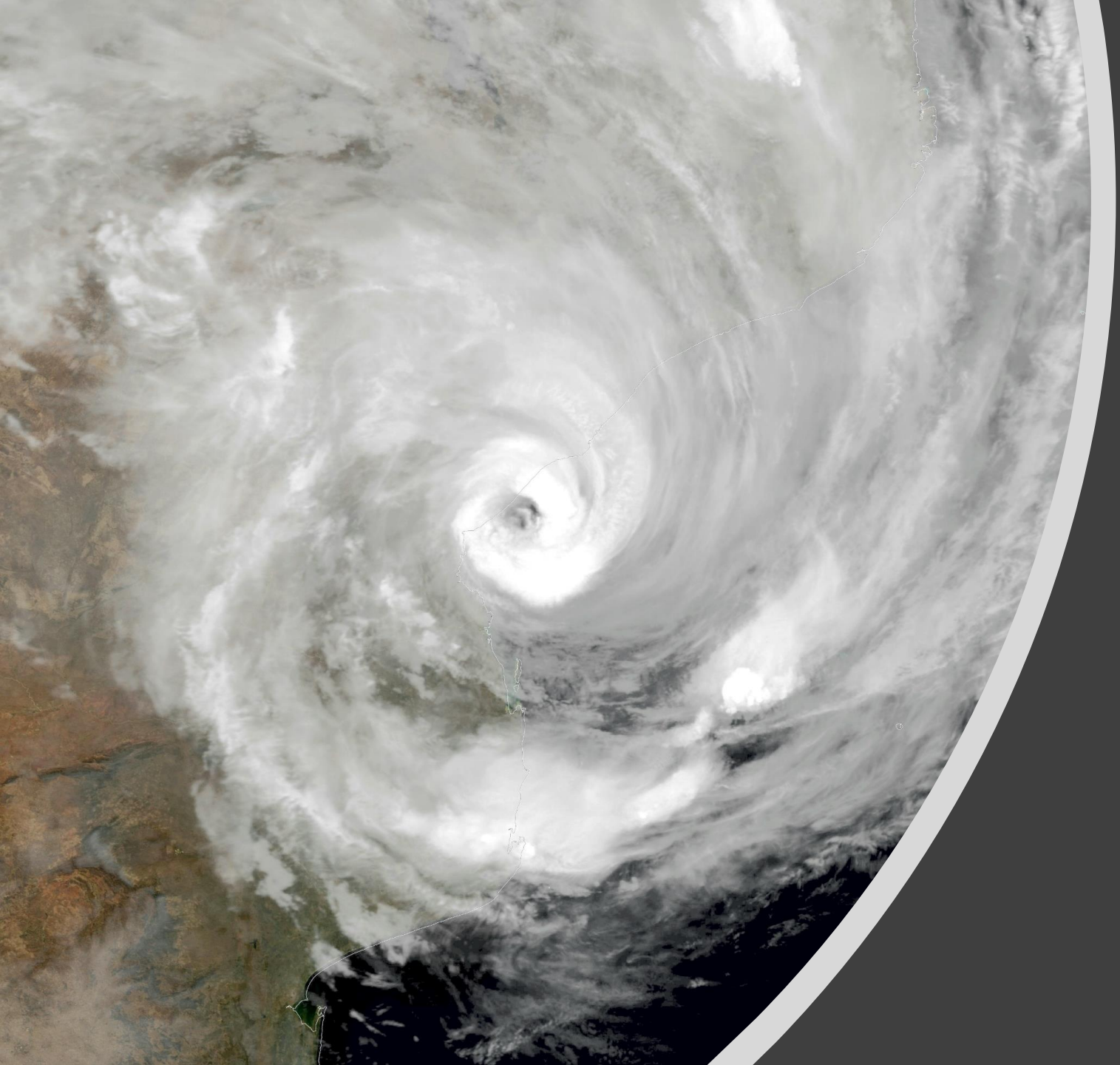
Initiative for Climate Action Transparency

A Loss and Damage Framework for M&E of extreme climate events in South Africa

23 Feb 2023



Loss and damage reporting in South Africa

Background

- **South Africa's Medium Term Strategic Framework (MTSF) 2019-2024** highlights a need to reduce the impact of climate change disasters on human life; livestock/crop yield; houses/shelter; infrastructure; biodiversity and environment.
- SA is prone to devastating floods, violent storms, veld fires, droughts.
- Over the past 20 years, an increase in weather and climate disasters have caused devastating damage and losses to human lives, livelihoods and the country's economy.
- In 2022 South Africa recorded the deadliest and costliest flood event on record with $3.6B economic loss, $1.8B insured loss, 455 fatalities.

Background

- Loss and damage reporting after weather related disasters play a crucial role in informing decisions and setting priorities for climate change mitigation and adaptation.
- Assessing the true social and economic costs of disasters is central to addressing their impacts, allocating adequate resources for monitoring and preparedness, assessing their changes over time, and building resilient communities.
- Currently there are limited tools, methods or data collections systems in place that guide how the country should approach the monitoring and evaluation of losses and damages from climate related disasters and thus track the country's progress towards mitigating impacts through adaptation efforts.
- Loss and damage data collection in SA is a random process undertaken by several government departments, research institutions, NGO's and private organizations using various methodologies across various spatial and temporal extents.
- From an international perspective, loss and damage reporting will become an important aspect of Biennial Transparency Reports (BTR).

Objectives

To develop a **framework** for the M&E of impacts of climate and weather-related disasters to serve as a guiding tool (broad, high-level elements and principles) to systematically record human and economic loss data arising from meteorological, hydrological, and climatological related disasters. This will minimize duplication and ensure optimal utilisation by end-users.

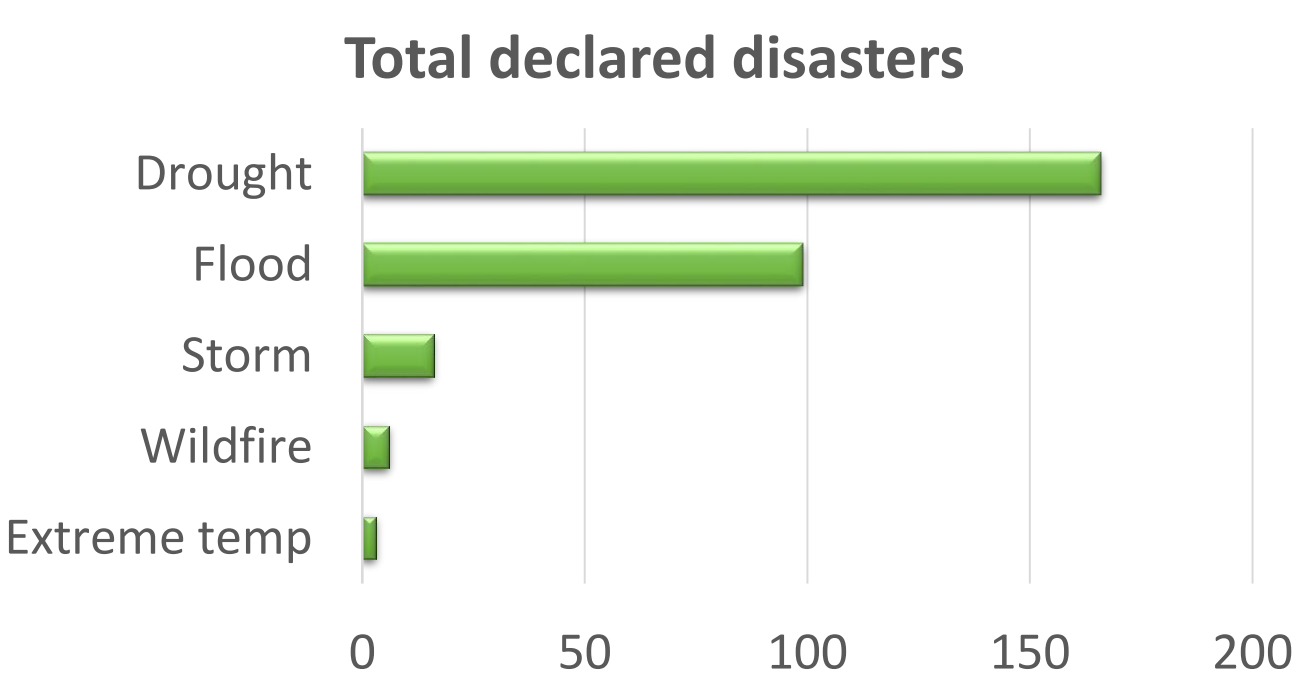
Approach

- A review of frameworks for the assessment of impacts from weather and climate-related hazards to better understand how criteria are measured or defined, the data that is required and the roles and responsibilities of those involved.
- Source available data on reported damages, loss and costs of impacts of weather and climate-related disasters
- Consultation with data stakeholders and related databases
- Highlight and address challenges in terms of data, funding and institutional capacity
- Develop framework to guide the country on how it should approach the monitoring and evaluation of losses and damages

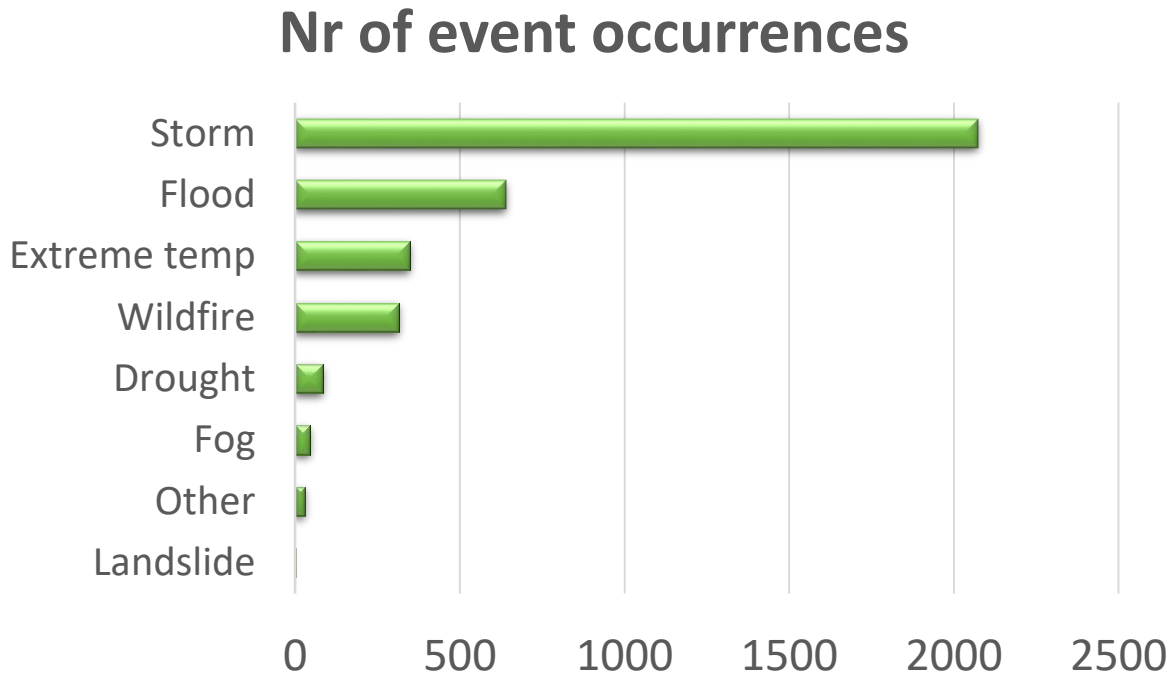
Review of frameworks to evaluate the impacts of weather and climate-related disaster

- Selected examples of recent frameworks reviewed which focused on impacts of weather and climate-related disaster/loss and damage :
  - Sendai Framework for Disaster Risk Reduction (2015)
  - Institutional Framework to address loss and damage (Roberts et al., 2014)
  - Comprehensive Risk Management Framework (Roberts and Pelling, 2018)
  - Principled Framework for Loss and Damage (Schinko et al., 2018)
  - Evidence-base National M&E Framework for Disaster Recovery Programs (Verlin and Argyrous, 2018)
  - The Flood Resilience Systems Framework (FLORES) (Magnuszewski et al., 2019)

Main severe/disaster event types



The number of occurrences per main disaster type recorded in South Africa according to the National Disaster Management database for the time-period 2007 – 2021.



The number of occurrences per main extreme/disaster types recorded in South Africa by the South African Weather Services' Caelum database for the time-period 2005 – 2021.

Disaster types per province

Province	Drought	Extreme temp	Flood	Storm	Wildfire	Grand Total
Kwa-Zulu Natal	44		40		1	85
Eastern Cape	29		14	10	1	54
Free State	41		4		3	48
Mpumalanga	26		7			33
Gauteng	1		20	2		23
Limpopo	6		4	4		14
Western Cape	10		3		1	14
Northwest	7		3			10
Northern Cape	2	3	4			9
Grand Total	166	3	99	16	6	290

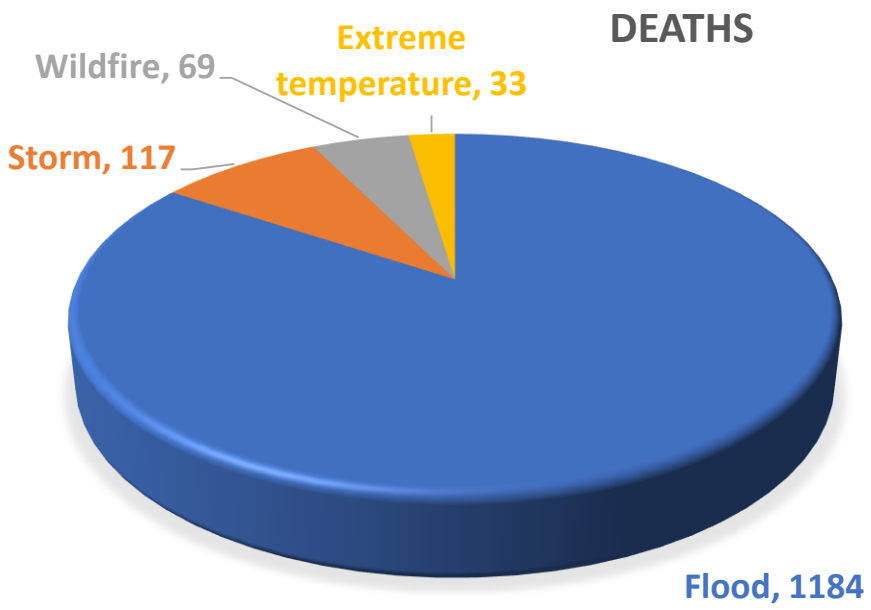
Count of new climate, hydrological or meteorological related disasters declared in South Africa and per province according to the National Disaster Management database for the time-period 2007 – 2021.

Extreme weather types per province

Province	Drought	Extreme temp	Flood	Fog	Landslide	Other	Storm	Wildfire	Total
Western Cape	13	77	192	16		14	413	131	856
KwaZulu-Natal	23	91	121	3	1	3	457	59	758
Gauteng		11	163	14		4	469	18	679
Eastern Cape	6	105	33	3		4	198	19	368
Mpumalanga	4	11	42	9			159	24	249
Free State	8	19	28	3		1	148	33	240
Limpopo	9	5	37			1	153	27	232
Northwest	16	7	35			1	129	12	200
Northern Cape	7	19	10			1	61	6	104

Count of main extreme/disaster types recorded per province in South Africa by the South African Weather Services' Caelum database for the time-period 2005 – 2021.

Economic and human impacts of disasters



Total number of deaths associated with different types of disasters in South Africa according to the International Disaster Database, CRED for the time-period 2005 – 2022.

Total damages (US dollars) associated with different types of disasters in South Africa according to the International Disaster Database, CRED for the time-period 2005 – 2022.

Costliest disasters in SA

Year	Disaster Type	Location	Total Damages ('000 US$)
2022	Flood	KZN	3600000
2017	Drought	WC, NC	1200000
1990	Drought	Limpopo, Mpumalanga, KZN, EC and NC	1000000
1987	Flood	KZN	765305
2008	Wildfire	KZN, FS	430000
2017	Wildfire	Knysna (WC)	420000
1990	Storm	KZN	393000
2017	Storm	KZN and Gauteng	320000
2017	Storm	WC, NC	283000
		KZN, FS, Limpopo,	

Conclusion

- KwaZulu-Natal is the province where the extremes of both drought and floods have been declared a disaster most often.
- The Western Cape and Free State provinces are the provinces which have been most affected by wildfire extreme events.
- Although drought has been declared a disaster most often, the impacts of drought are more difficult to quantify.
- The total damages inflicted by all types of weather, climatological and hydrological disasters for the period 2005-2022 were almost 6.5 billion US$.
- True costs of damages arising from weather related disasters to the economy could be much greater than what is recorded. Indirect consequences of disasters such as damage to ecosystem services, costs to rehabilitate biodiversity, loss of productivity, disruption of businesses, repairing damaged goods are often not considered when assessing damages.

Stakeholders and data custodians – South African situation

Government departments

- Various spreadsheets, annual reports, registers, databases.
- Main aims are for own reporting, disaster relief and recovery funding

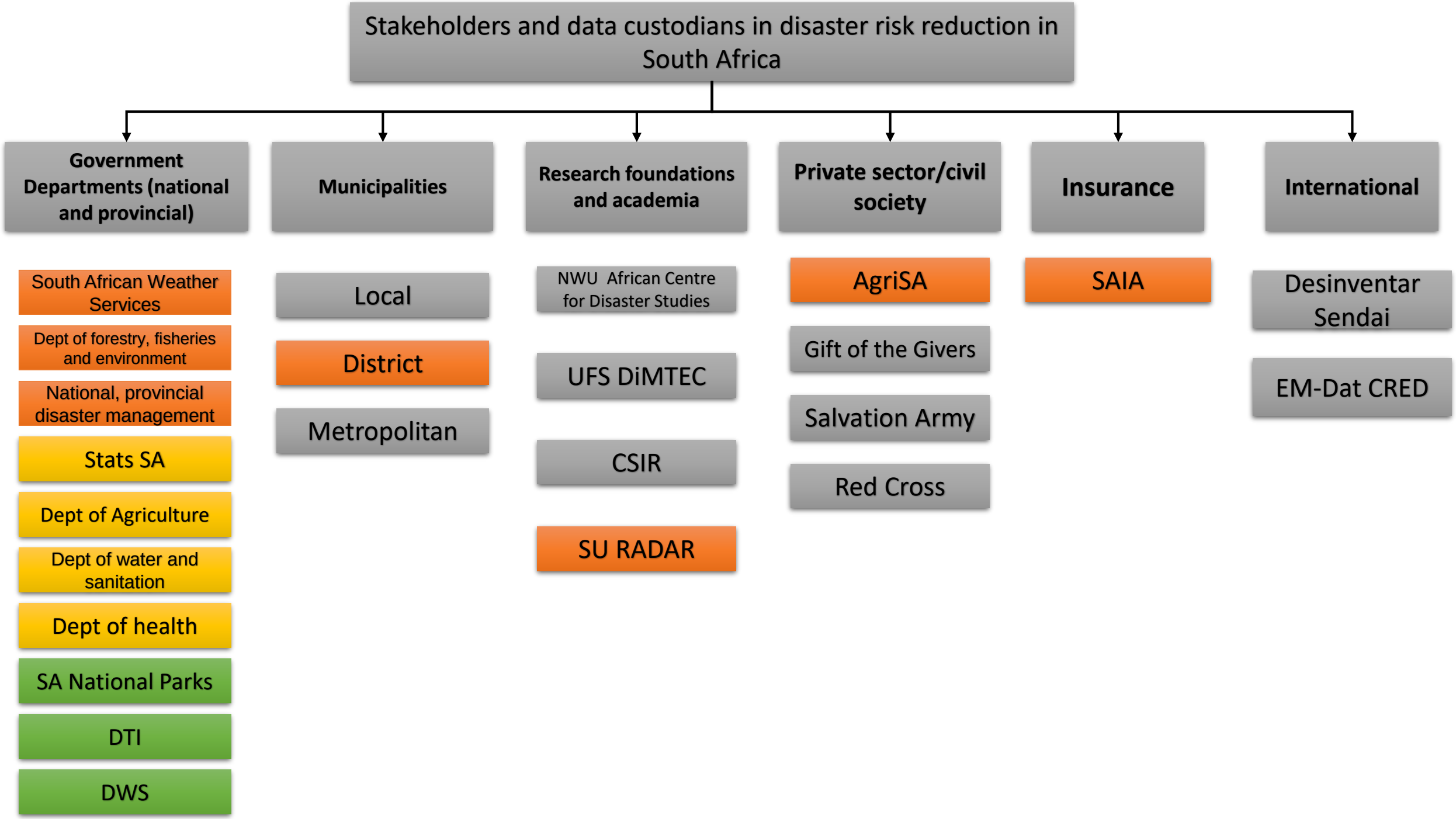
Research and academia

- Technical development of databases, frameworks, tools etc.
- Build prototypes without comprehensive engagement with all role players

Private sector

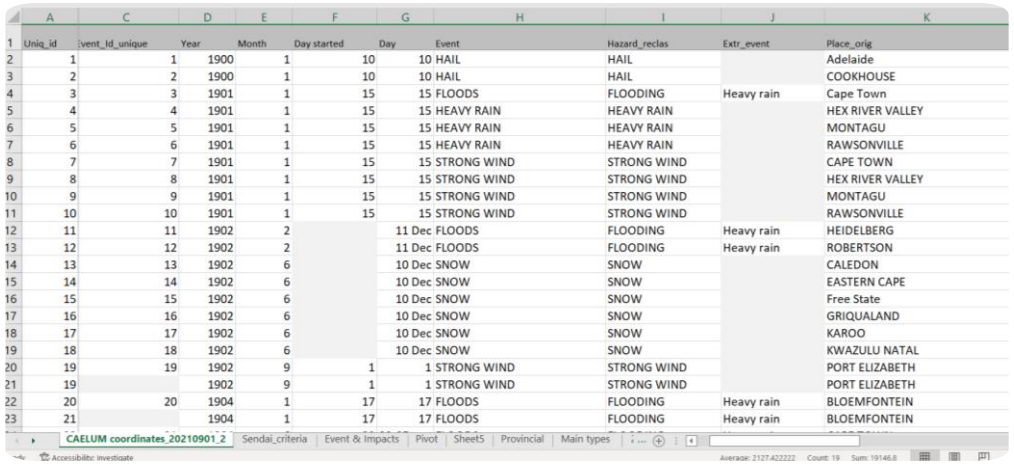
- Good record keeping
- Different methodologies
- Different aims

South Africa's Climate Change Response M&E system


Stakeholders and data custodians in disaster risk reduction in South Africa
Government Departments (national and provincial)
Municipalities
Research foundations and academia
Private sector/civil society
Insurance
International
South African Weather Services
Dept of forestry, fisheries and environment
National, provincial disaster management
Stats SA
Dept of Agriculture
Dept of water and sanitation
Dept of health
SA National Parks
DTI
DWS
Local
District
Metropolitan
NWU African Centre for Disaster Studies
UFS DiMTEC
CSIR
SU RADAR
AgriSA
Gift of the Givers
Salvation Army
Red Cross
SAIA
Desinventar Sendai
EM-Dat CRED

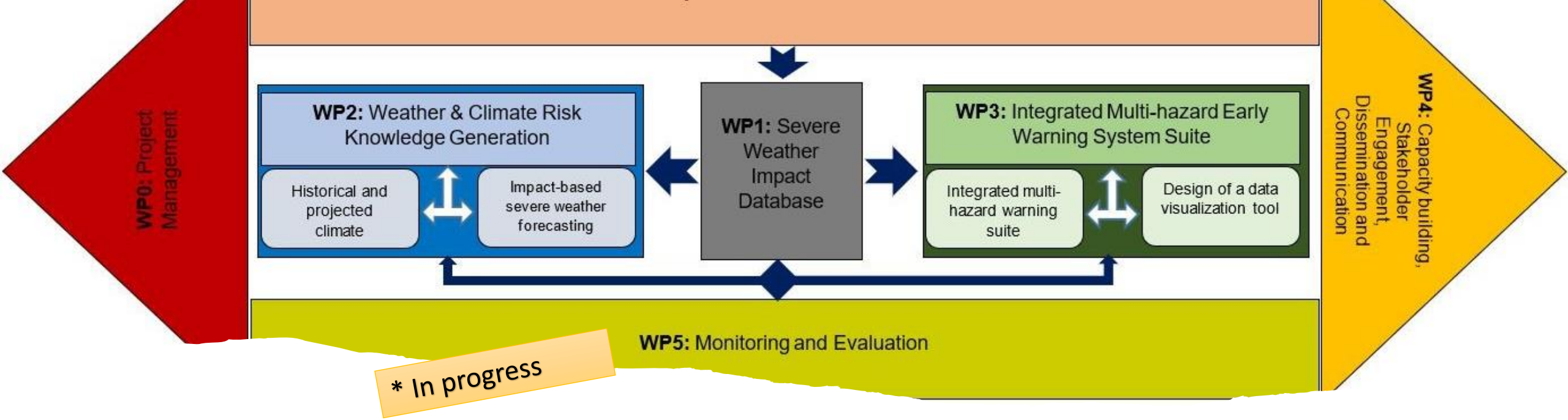
South Africa Weather Service (SAWS) CAELUM

- The CAELUM weather events database, a restricted commercial product, provides a history of notable weather events in South Africa.
- Compiled from newspaper reports and articles on weather-related events.
- The database provides information on weather related events as far back as the mid- 1800s.
- Includes the location of the event, and in some cases also a description of the impact and severity of the event.
- Descriptions are not standardized and not consistent across the database.
- Several events and years that are lacking information.



	A	C	D	E	F	G	H	I	J	K
1	Uniq_id	Event_Id_unique	Year	Month	Day started	Day	Event	Hazard_reclas	Extr_event	Place_orig
2	1	1	1900	1	10	10	HAIL	HAIL		Adelaide
3	2	2	1900	1	10	10	HAIL	HAIL		COOKHOUSE
4	3	3	1901	1	15	15	FLOODS	FLOODING	Heavy rain	Cape Town
5	4	4	1901	1	15	15	HEAVY RAIN	HEAVY RAIN		HEX RIVER VALLEY
6	5	5	1901	1	15	15	HEAVY RAIN	HEAVY RAIN		MONTAGU
7	6	6	1901	1	15	15	HEAVY RAIN	HEAVY RAIN		RAWSONVILLE
8	7	7	1901	1	15	15	STRONG WIND	STRONG WIND		CAPE TOWN
9	8	8	1901	1	15	15	STRONG WIND	STRONG WIND		HEX RIVER VALLEY
10	9	9	1901	1	15	15	STRONG WIND	STRONG WIND		MONTAGU
11	10	10	1901	1	15	15	STRONG WIND	STRONG WIND		RAWSONVILLE
12	11	11	1902	2		11 Dec	FLOODS	FLOODING	Heavy rain	HEIDELBERG
13	12	12	1902	2		11 Dec	FLOODS	FLOODING	Heavy rain	ROBERTSON
14	13	13	1902	6		10 Dec	SNOW	SNOW		CALEDON
15	14	14	1902	6		10 Dec	SNOW	SNOW		EASTERN CAPE
16	15	15	1902	6		10 Dec	SNOW	SNOW		Free State
17	16	16	1902	6		10 Dec	SNOW	SNOW		GRIQUALAND
18	17	17	1902	6		10 Dec	SNOW	SNOW		KAROO
19	18	18	1902	6		10 Dec	SNOW	SNOW		KWAZULU NATAL
20	19	19	1902	9	1	1	STRONG WIND	STRONG WIND		PORT ELIZABETH
21	19		1902	9	1	1	STRONG WIND	STRONG WIND		PORT ELIZABETH
22	20	20	1904	1	17	17	FLOODS	FLOODING	Heavy rain	BLOEMFONTEIN
23	21		1904	1	17	17	FLOODS	FLOODING	Heavy rain	BLOEMFONTEIN

CAELUM coordinates_20210901_2 | Sendai_criteria | Event & Impacts | Pivot | Sheet5 | Provincial | Main types



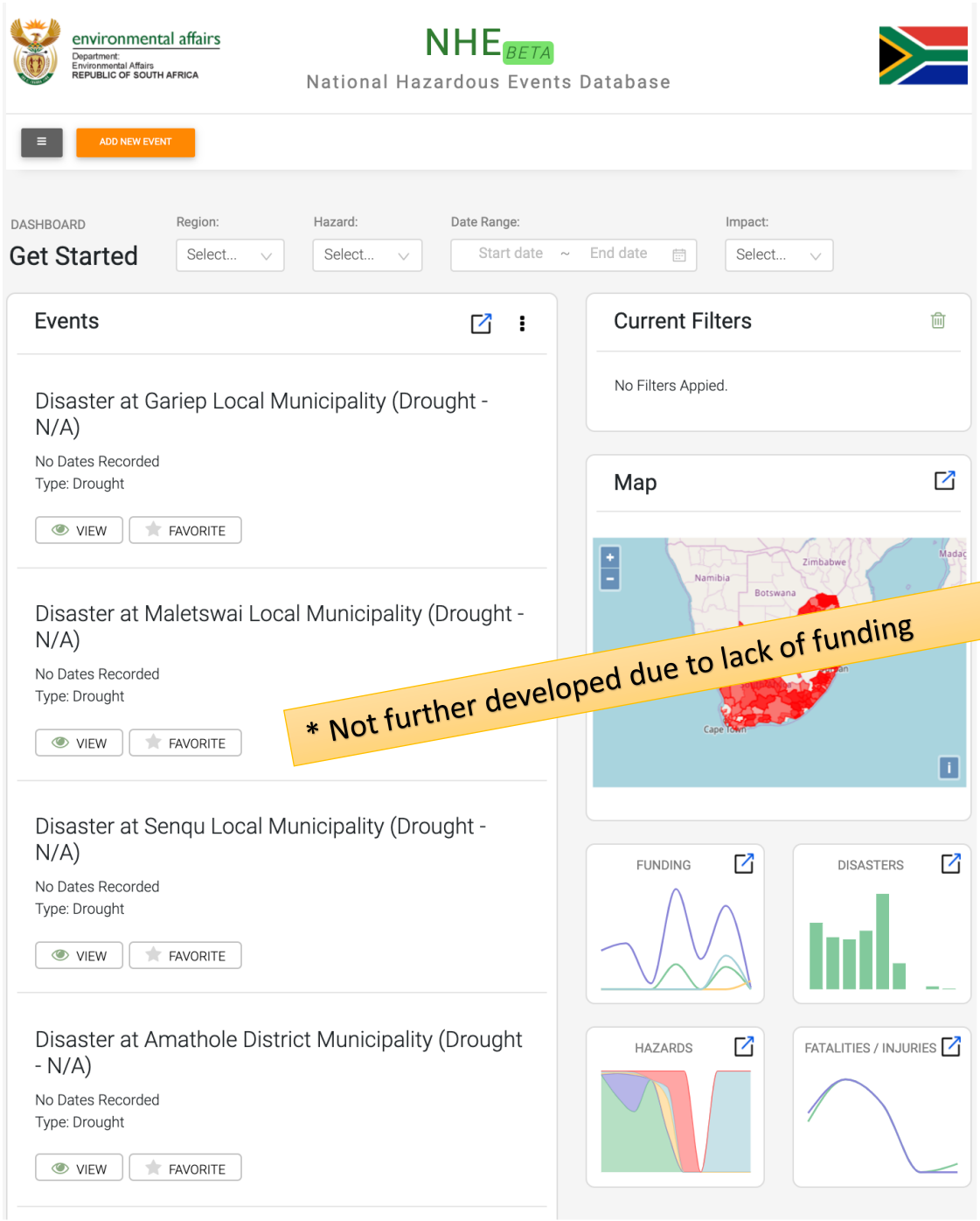
South African Weather Services: Severe Weather Impacts Database (SWID)

South African Weather Service

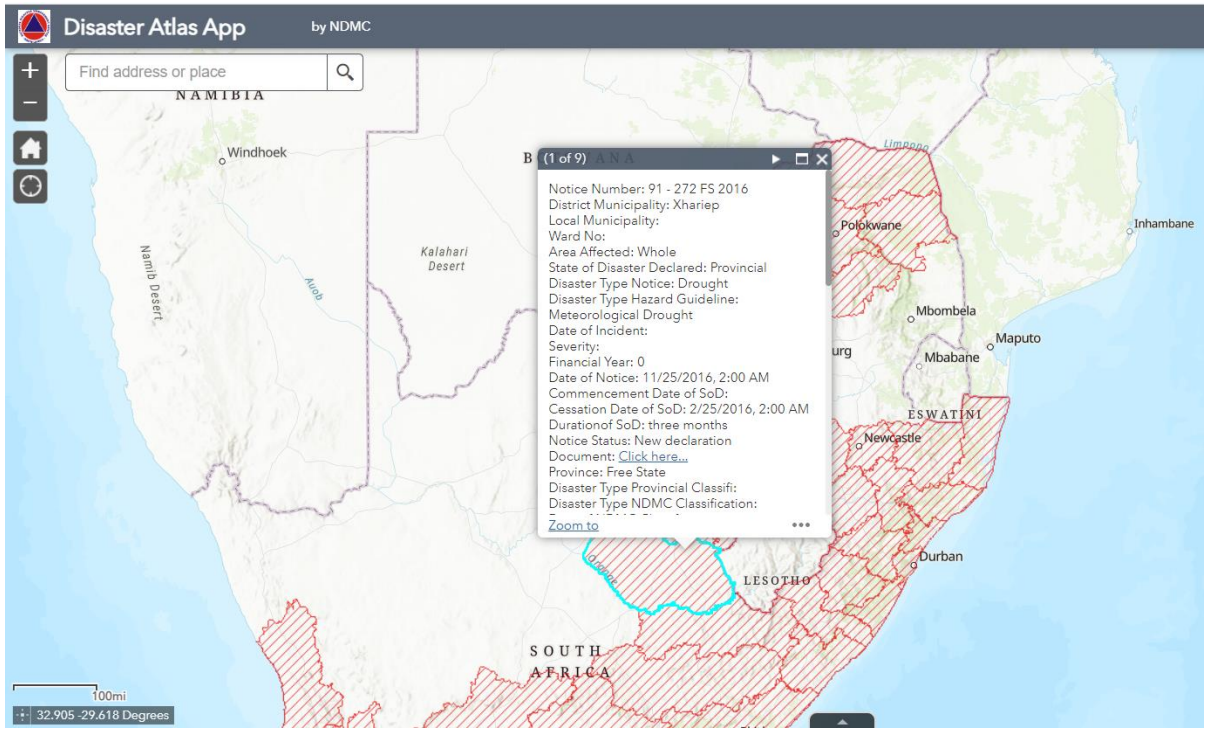
- A user-friendly and standardized platform of archiving extreme weather systems, events and their impacts which will be easily available to policy makers, and other stakeholders
- Serve as a monitoring and evaluation tool to verify severe weather forecasts and warnings e.g. Southern Africa Regional Flash Flood Guidance (SARFFG) early warning system.
- Support impact-based forecasting and Integrated Climate Multi-hazard Early Warning System (ICMHEWS) by linking weather systems and events with the related loss and damage data.
- Enable partnerships with national and subnational stakeholders e.g. disaster management centres, CSIR and ARC to manage loss and damage
- Contributing towards the objectives of the National Framework for Climate Services (NFCS)

SAEON: National Hazardous Events Database

- A Prototype of a Web-Based National Hazards Events Database for South Africa
- South Africa Environmental Observation Network (SAEON) have developed a framework for an interoperable web-based National Hazards Events Database (NHE) for South Africa in order to address the gaps in national and international disaster reporting.

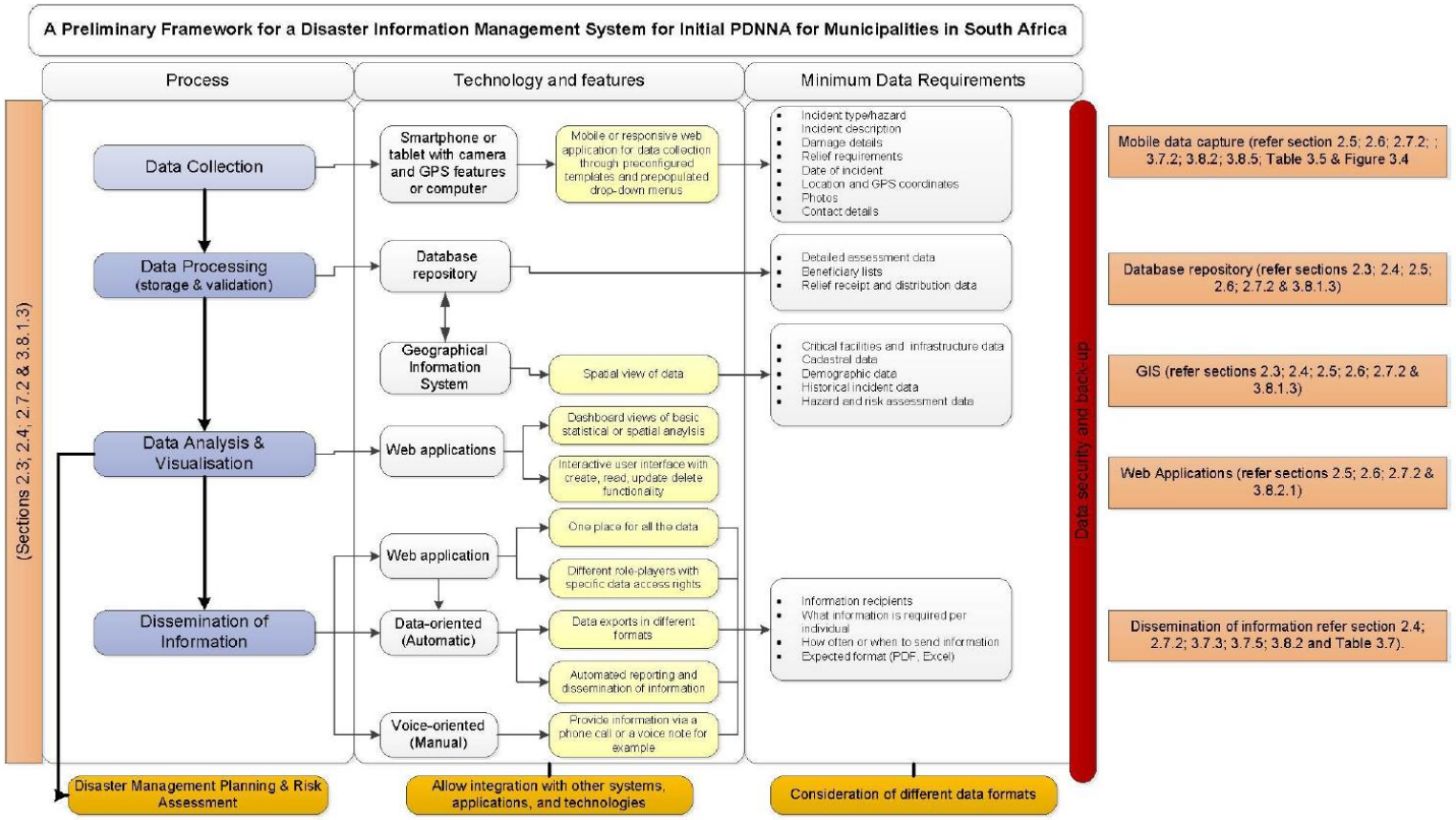


National Disaster Management Center (NDMC) online Disaster Atlas Application

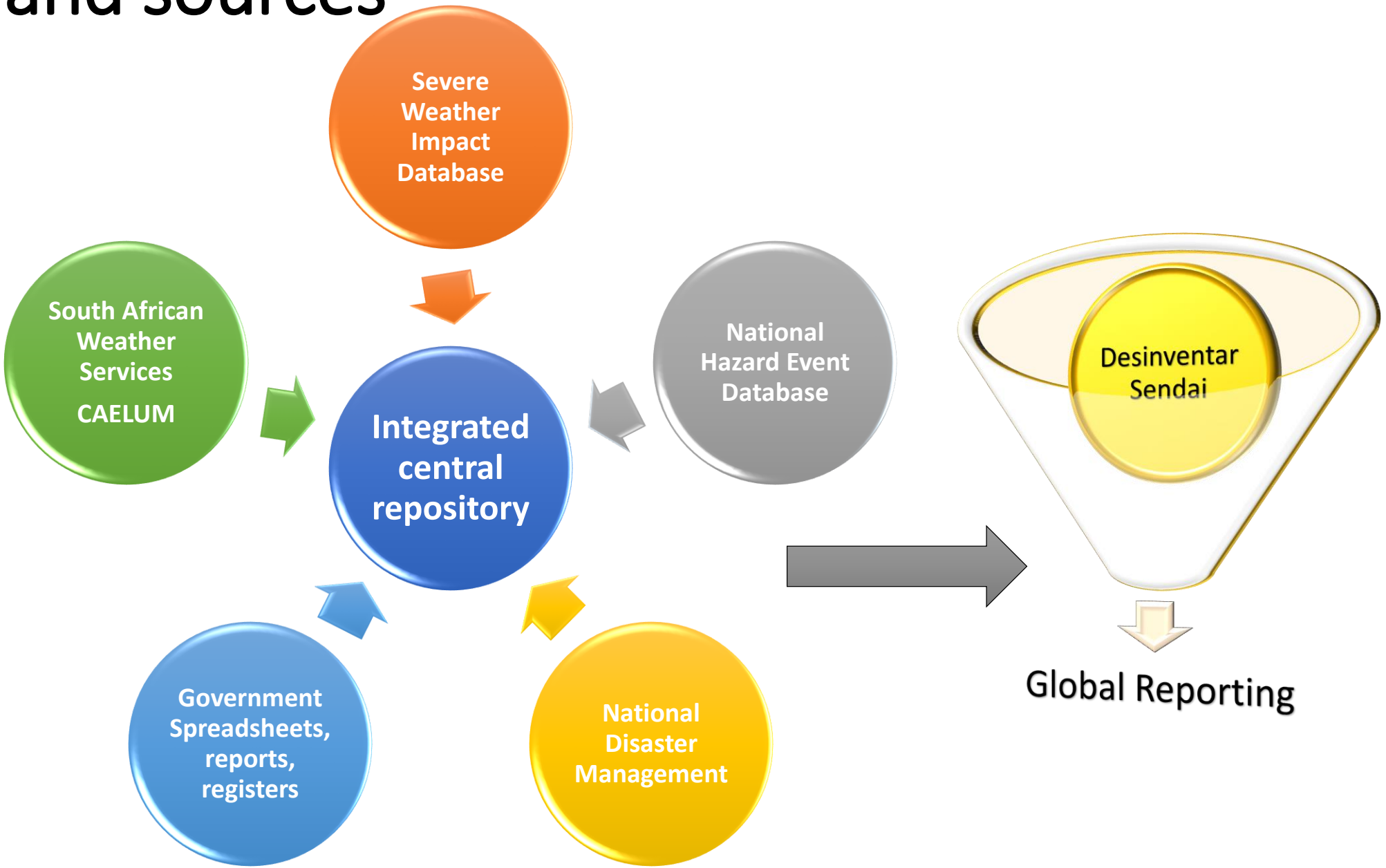


Framework for a Disaster Information Management System for Initial PDNNA

- what and how technology, including mobile devices such as smartphones and tablets, web-based systems, and spatial views, can improve the way municipalities in South Africa conduct initial on-site post-disaster damage and needs assessments
- The preliminary framework provides for an effective approach to important activities such as data collection, processing, analysis, and dissemination of information
- It does not describe indicators, formulas, responsibilities, categories etc.



Databases and sources



Challenges

Challenges

Data

- Data gaps, scale inconsistencies, lack of meta-data, lack of consistent classification and data collection methodology amongst data custodians and data sources in reporting on meteorological, climate and hydrological extreme events.
- Lack of coordination and integration of disaster-related data collection and reluctance to share data amongst custodians, and various other role players in the government sphere and insurance industry.
- Lack of reporting on indirect economic losses, complex methodologies to calculate impacts, especially related to droughts and the knock-on effects of other severe events.
- Poor understanding of insured damages caused by meteorological, climate and hydrological extreme events (insurance companies are not inclined to share this information). Access to data and collaboration on disaster research is often limited by lack of public-private partnerships.
- Disparity between the true cost of damages and the actual funding allocated for disaster relief and recovery. The actual amount of disaster relief funding does not reflect the true costs incurred by the local authorities.

Challenges and Gaps

Funding

- General lack of funding /or sustained funding, databases are supported for limited time or only to prototype level.

Capacity and skill

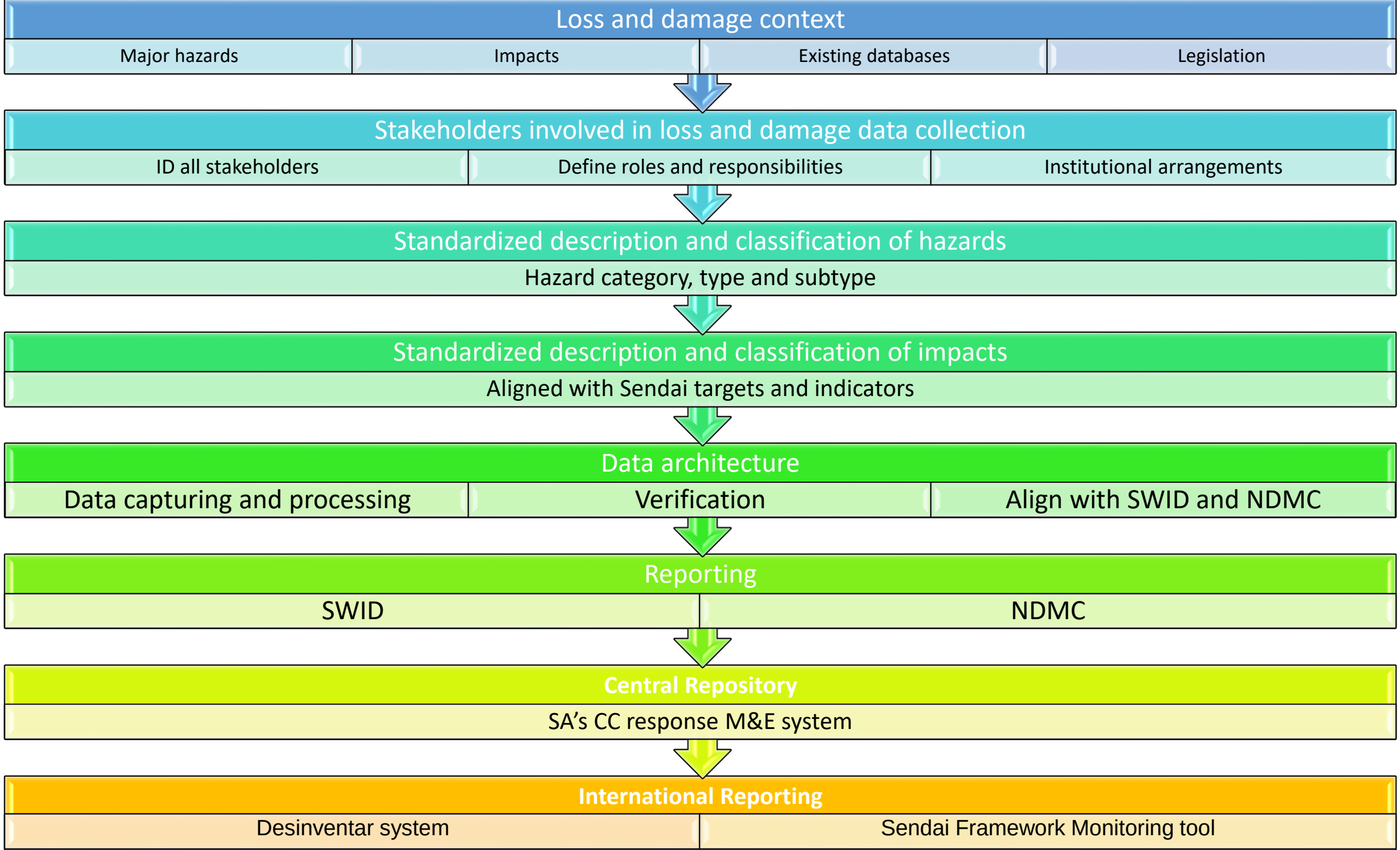
- A lack of awareness, skill, and capacity at local government level to capture and report on losses and damages associated with weather related extreme events.
- Lack of coordination between different departments and organizations to integrate data and other information.

Disasters versus local extreme events

- Not all extreme weather, hydrological or meteorological events fulfil the criteria for being declared disasters.
- many small scale disasters occur each year because of flooding, fires and storms.
- These events are under reported in databases.
- Nov, 14. 2021 Hailstorm, Mpumalanga - severe property and vehicle damage
- Feb, 2022. Flash flood, Gauteng Province, South Africa - 187 people homeless - One person died and 3 people are reported missing

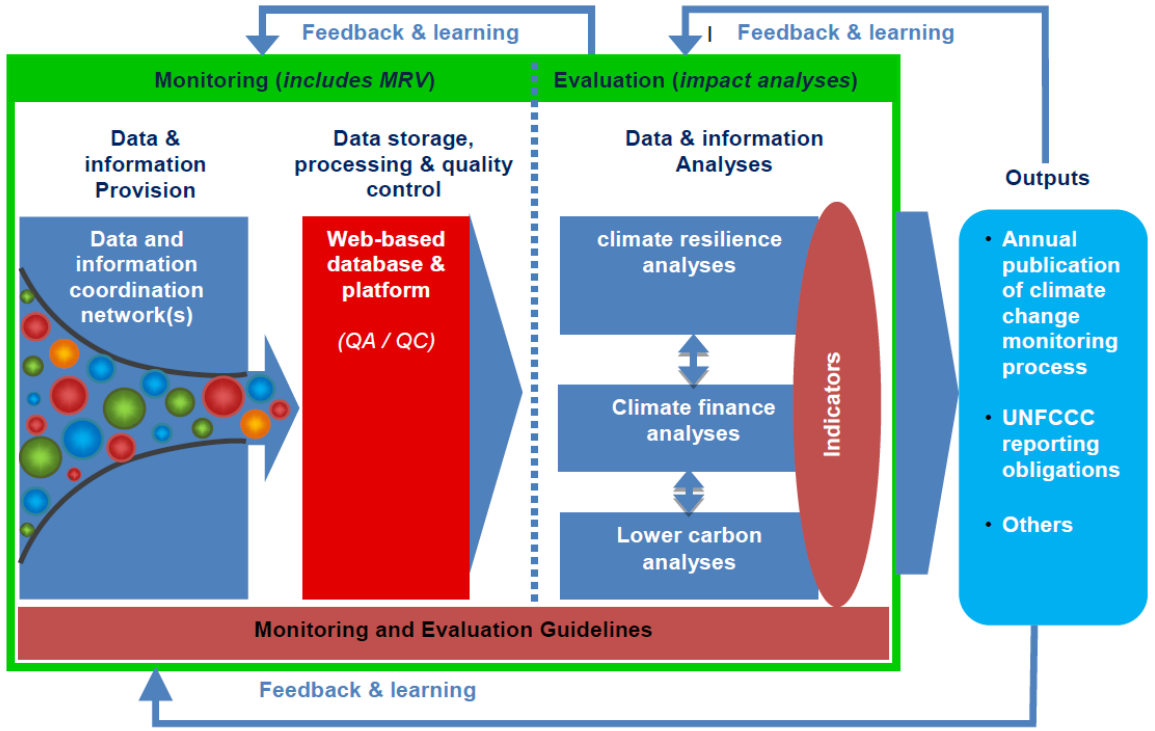
How far have we come?

Loss and Damage Framework


Loss and damage context
Major hazards
Impacts
Existing databases
Legislation
Stakeholders involved in loss and damage data collection
ID all stakeholders
Define roles and responsibilities
Institutional arrangements
Standardized description and classification of hazards
Hazard category, type and subtype
Standardized description and classification of impacts
Aligned with Sendai targets and indicators
Data architecture
Data capturing and processing
Verification
Align with SWID and NDMC
Reporting
SWID
NDMC
Central Repository
SA's CC response M&E system
International Reporting
Desinventar system
Sendai Framework Monitoring tool

L & D framework

- The L&D framework will ensure that the stakeholders involved in loss and damage from weather and climate disasters are well coordinated and understand their role and responsibilities in terms of tracking what has been prioritized in the MTSF.
    - build on existing data collection and databases in place
- The L&D framework will raise awareness of loss and damage and promote coordinated and enhanced action across climate change adaptation and DRR.
- The L&D framework will contribute towards understanding how the country is doing in achieving the proposed MTSF target and fulfill the reporting requirements.
- This work supports transparency in reporting and developing best practice methodologies that can be utilised as guidance by other countries and for capacity building.



South Africa's Climate Change Response M&E system

Practical application

Excel tool

- Key outcome of the framework is a simple Excel-based loss and damage tool.
- Initially aimed at municipalities - can later be expanded to include more stakeholders.
- Focuses on the most critical elements and data needs to monitor climate impacts.
- Easy-to-use Excel tool which guides the user through the data entry process using macros and lookup tables.
- Built-in reporting functionality that allows the user to view a summarised view of specific disaster event and associated human or economic loss.
- Events can later be edited and allow for the collection of spatial GIS data.

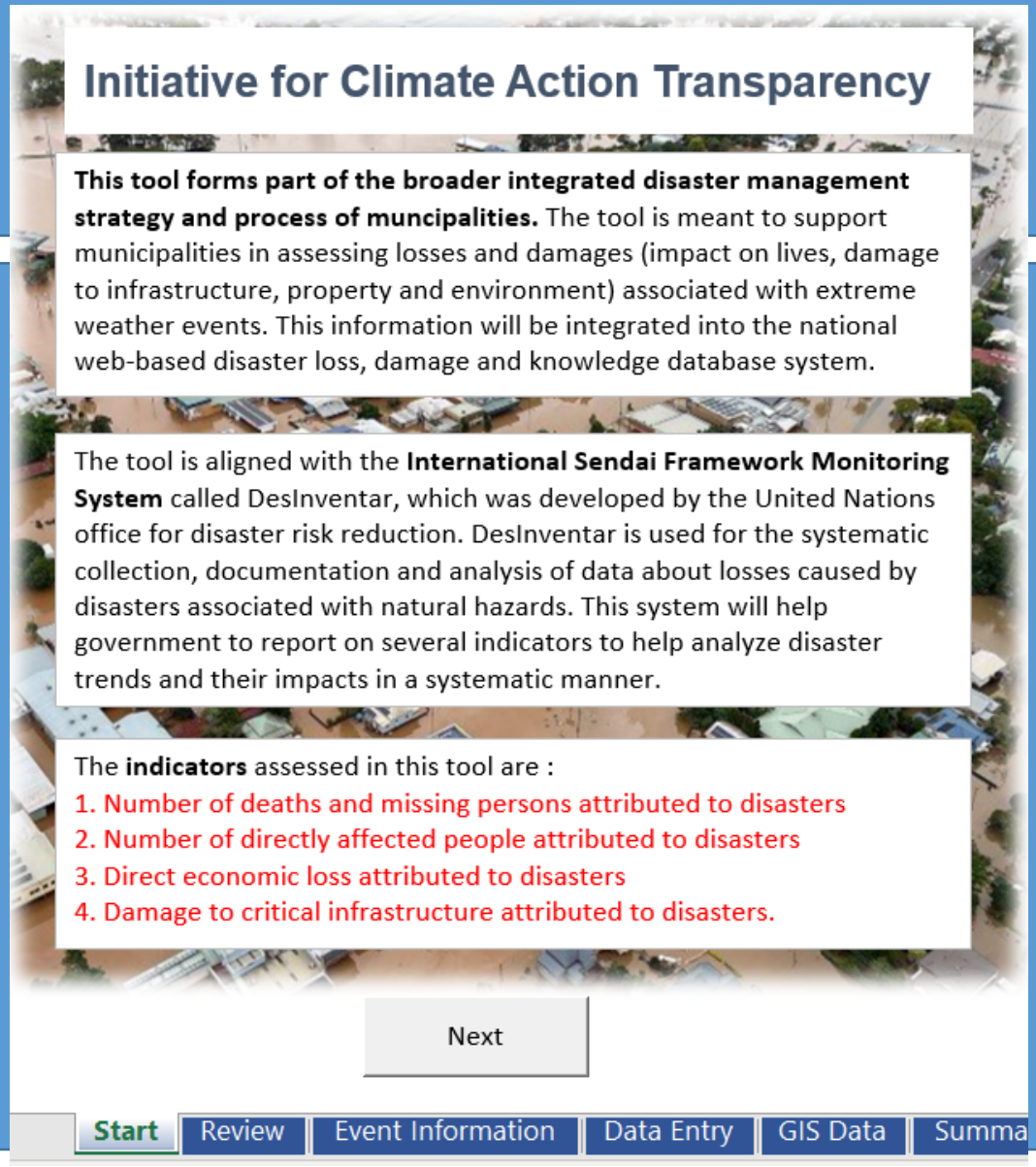
Information related to Excel tool

Tool Introduction

- What is the aim of the tool?
- Who are the intended users?
- What is loss and damage?
- Why do we need the tool?
- What is the difference between declared disasters and extreme weather events
- How is this tool aligned with other reporting tools and disaster management processes?

Step 1: Start

- Introduction to tool



Step 2: Event Information

- Designated Reporting Institution/Dept
- Contact details
- Location of event
- Date of event
- Extent of event
- Declared disaster: use existing reference
- Type of event divided into main and sub -categories according to NDMC classification.

Step 3: Data entry

1. Human: Indicators to reduce disaster mortality and affected people

- Nr of Deaths, Nr of Missing, Nr Injured, Nr Homeless, Nr Of Dwellings Damaged, Nr Of Dwellings Destroyed, Nr of people whose livelihoods were disrupted

2. Economic: Indicators to assess total value of all damages and economic losses

- Productive - Agriculture, Forestry, Fisheries, Aquaculture, Industry, Commerce, Tourism, Financial sector
- Infrastructure – Transport, Communications, Energy, Water and Sanitation, Waste Management, Community Infrastructure
- Cross cutting e.g. Biodiversity and Environment, Green Infrastructure

Step 4: Reporting

- Summary of disaster event and associated impacts.
- Detailed report on economic losses and damages.

Step 5: Review

- Load event, view progress and add to/edit existing information

Definitions

- Explanation of terms used in tool and guidance document
- Categories of disaster/hazard events

Hydrological Hazard
Avalanche, Snow, Debris
Coastal Erosion
Debris/Mud Flow/Rockfall/Landslide
Doline/Sinkhole/Subsidence
Flash Flood
Flood (Estuarine)
Flood (Raised Watertable)
Flood (Riverine)
Flood (Urban Infrastructure)

Meteorological Hazard
Cold Wave
Convective Storm
Frost/Freeze
Hail
Heat Wave
Heavy/Persistent Rain
Lightning
Sandstorm/Duststorm
Snow/Ice
Storm Surge
Strong Wind
Tornado
Tropical Cyclone

Climatological Hazard
Meteorological Drought
Hydrological Drought
Agricultural Drought
Fire – Cultivated Forest
Veldfire

Guidance document

Section 1: Tool introduction

This loss and damage tool is self-contained in an Excel file. It guides the user through the data entry process using macros and lookup tables and the collected data is stored on separate spreadsheets. This approach ensures that the data is collected accurately, and that data integrity is maintained while still having access to the data for further analysis. The reporting functionality allows the user to view a summarised view of the event and the productive economic loss.

What is the aim of the tool?

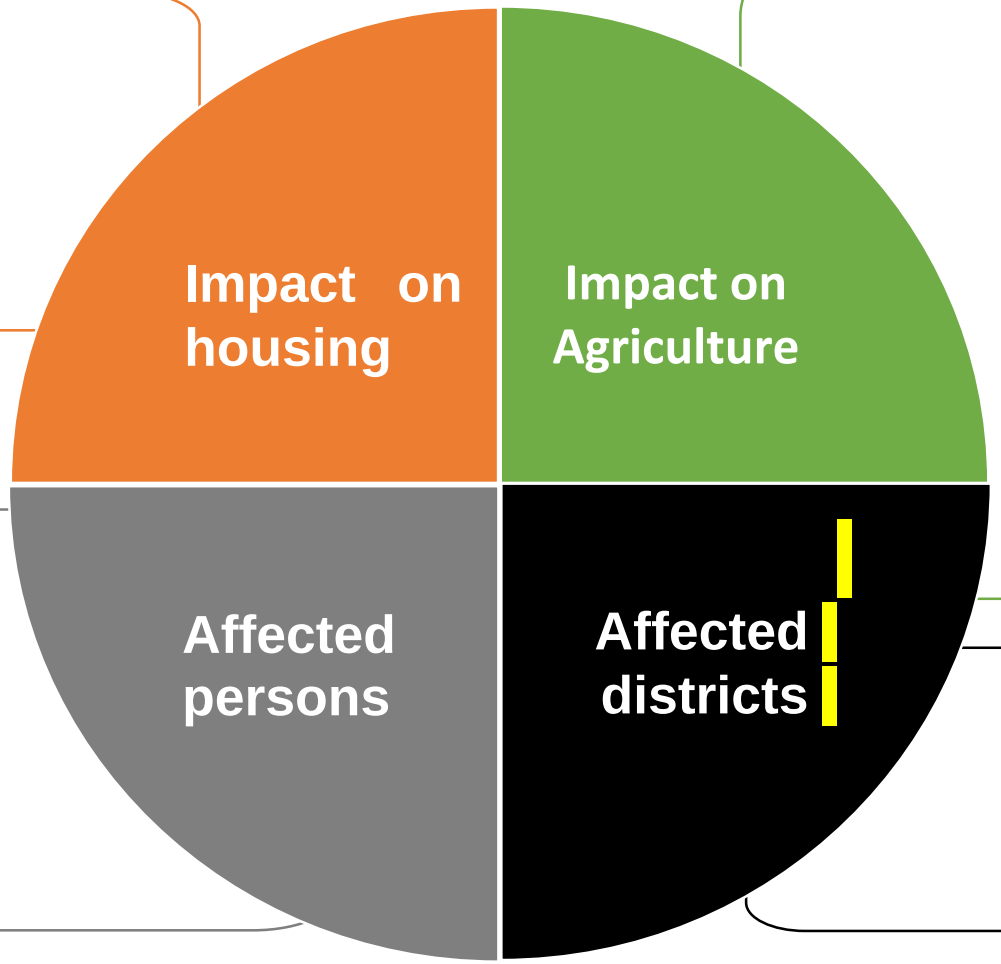
The tool is meant to support municipalities in assessing losses and damages (impact on lives, damage to infrastructure, property and environment) associated with climate-associated disasters or other extreme weather events. This information will

Case Study : KZN floods April 2022

- Parts of the KZN province received rainfall of between 200 and 400 mm over a 24-hour period. A humanitarian disaster ensued, leaving 8,300 homes damaged, 40,000 people displaced. Various sectors including; Human Settlements, Education, Infrastructure, Agriculture, Health, etc. were affected.
- Initially declared as a provincial disaster on 13 April 2022, in terms of the Disaster Management Act, 2002 (57 of 2002) (DMA), but due to other provinces also affected, declared a national disaster. No 46241-KZN 2022

EFFECTS AND IMPACT OF THE FLOODING (KZN)

- **8584** houses totally destroyed
- **13 536** houses were damaged



- Total of farm dwellers affected **267**
- Total of farm workers affected **589**
- Total # of hectares **2 647.65** affected on crop fields.
- Crop losses estimated costs: **R31 910 039**
- Livestock death **16 675**
- Livestock injured **73**
- Damaged infrastructure est. costs **R105 525 500**

- **448** Fatalities reported
- **88** Missing people reported
- **50** People injured

- All **10** District Municipalities and eThekwini Metro

Infrastructure

Prasa lost about 300km of its rail infrastructure in the floods, estimated recovery costs to be between R2.8bn and R3bn, KZN road repair estimated to cost R5.6 billion.

cooperative governance
Department:
Cooperative Governance
REPUBLIC OF SOUTH AFRICA

KWAZULU-NATAL
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

SUMMARY INCIDENT PER DISTRICT

Municipalities	Number of Incidents	Households Affected	Houses Destroyed		Homeless	People Affected	Fatalities	Injuries	Missing Person
			Totally Destroyed	Partially Damaged					
uMkhanyakude	03	86	78	08	10	273	00	01	**00**
uThukela	05	2180	1692	1731	221	12902	02	13	**00**
uMzinyathi	04	206	153	124	21	1208	02	01	**02**
UMgungundlovu	07	687	242	796	97	3705	02	04	**02**
Zululand	05	360	171	264	00	2348	00	00	**00**
EThekwini	505	17158	3000	7200	5423	40000	386	01	**39**
ILembe	20	3000	1442	1406	399	9328	31	21	**00**
Harry Gwala	17	650	297	252	250	1856	03	02	**00**
King Cetshwayo	155	755	349	688	172	5201	04	03	**01**
UGu	35	1769	1049	910	288	7437	07	04	**04**
Amajuba	29	218	111	157	14	1022	00	00	**00**
TOTAL	**785**	**27069**	**8584**	**13536**	**6895**	**85280**	**448**	**50**	**88**

Infrastructure damage

Water infrastructure R60 million

Discussion

- What are barriers to the successful uptake of the tool and how can we overcome them?
- Are there any training needs in terms of capacity building for monitoring and evaluation?
- Recommendations for further involvement of role-players to ensure uptake of the reporting tool and its continued use