EARLY WARNING FOR ALL (EW4ALL) INITIATIVE

Roadmap for South Africa

2025 – 2029

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Abbreviations

AA	Anticipatory Action
AI	Artificial Intelligence
AR6	Sixth Assessment Report
ARS	Automatic Rainfall Station
AWS	Automatic Weather Station
CAP	Common alerting protocol
CoE	Centre of Excellence
CSR	Corporate Social Responsibility
DCDT	Department of Communications and Digital Technologies
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EOC	Emergency Operation Centre
EVCA	Enhanced Vulnerability Capacity assessments
EW4ALL	Early Warnings for All
EWTT	Early warning Task Team
FbF	Forecast-based Financing
FFGS	Flash Flood Guidance System
HPC	High-Performance Computer
ICASA	Independent Communications Authority of South Africa
ICT	Information Communications Technology
IFRC	International Federation of Red Cross and Red Crescent Societies
IoT	Internet of Things
IPCC	Intergovernmental Panel on Climate Change
ITU	International Telecommunication Union
KZN	KwaZulu-Natal
LDN	Lightning Detection Network
M&E	Monitoring and Evaluation
ML	Machine Learning
NDMC	National Disaster Management Centre
NETP	National Emergency Telecommunication Plan
NMHS	National Meteorological and Hydrological Services
OPMET	Operational Meteorological
RADAR	Radio Detection and Ranging
RMTC	Regional Meteorological Training Centre
RSMC	Regional Specialised Meteorological Centre
RTH	Regional Telecommunication Hub
SARCS	South African Red Cross Society
SAWS	South African Weather Services
SWFS	Severe Weather Forecast System
UNDP	United Nations Development Program
UNDRR	United Nations Disaster Risk Reduction
UNEP	United Nations Environmental Program
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WMO	World Meteorological Organization

1. EXECUTIVE SUMMARY

The Early Warnings for All (EW4ALL) initiative, spearheaded by the United Nations as pronounced by the Secretary-General António Guterres on World Meteorological Day, 23 March 2022, requires that “every person on Earth is protected by early warning systems” by 2027. The World Meteorological Organization (WMO) was tasked to lead this effort. It is upon this call that the South African Weather Service, supported by the WMO, convened a consultative workshop. The workshop took place from 26–28 August 2024 at Diep in Die Berg, Wapadrand in Pretoria, South Africa.

The workshop was attended by various key stakeholders from the government represented by the Deputy Minister of the Department of Forestry, Fisheries and Environment, Ms Bernice Swarts; the United Nations Resident Coordinator in South Africa, Mr Nelson Muffuh; the WMO; and the Chief Executive Officer of the South African Weather Service (SAWS), Mr Ishaam Abader; and other high ranking officials from government, entities and other organisations, including the private sector and civic organisations. The consultative discussions and meaningful engagement from the workshop assisted in identifying gaps and proposed possible solutions thereof, which ultimately served as a building block to the development of the South African EW4ALL Roadmap.

Due to the significance and complex nature of the project, it requires a collaborative and well-co-ordinated effort between the four Pillars which include Pillar 1: Disaster Risk Knowledge represented by the National Disaster Management Centre (NDMC); Pillar 2: Detection, Monitoring, Analysis and Forecasting of Hazards and Possible Consequences represented by the SAWS; Pillar 3: Warning Dissemination and Communication represented by the Department of Communications and Digital Technologies (DCDT); Pillar 4: Preparedness and Response Capabilities represented by the South African Red Cross Society (SARCS). This collaboration is not only critical at national level, but also globally across the United Nations, International Agencies and International Financing Institutions, with Pillar 1: UNDRR and WMO; Pillar 2: WMO, UNDP, UNESCO and UNEP; Pillar 3: ITU, IFRC UNDP, WMO; and Pillar 4: IFRC.

An Early Warning System is an integrated system of hazard observation, monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enable individuals, communities, governments, economic sectors, and businesses to take timely and informed early action to reduce disaster risks ahead of hazardous events. Early warnings play a critical role in saving lives, property, critical infrastructure and support sustainable development. Furthermore, early warnings are an integral part to promoting inclusivity, community-based disaster risks strategies that prioritise vulnerable populations. Through national and international collaboration and sharing best practices, EW4ALL initiative will contribute towards economic stability and sustainable development initiatives that decrease poverty levels and create meaningful opportunities even to the marginalised groups of the society, including women, youth, people living with disabilities and indigenous people.

The successful implementation of this EW4ALL road-map will require an investment of about $60m (R1b) within five years. The investment will be focused on improving observation infrastructure, enhanced cutting edge technology, building of human capacity and institutional capacity.

2. BACKGROUND

South Africa is prone to weather and climate hazards, which include floods, severe thunderstorms, storm surge, drought, tropical cyclones, landslides, veld fires, extreme heat, extreme cold and snowfall. These disasters have a high social, environmental and economic impact. As a country with almost 3000 km of coastline, also influenced by the Atlantic and Indian oceans, South Africa is therefore exposed to both marine and terrestrial adverse weather conditions, which are aggravated by varying topography and diverse landscapes.

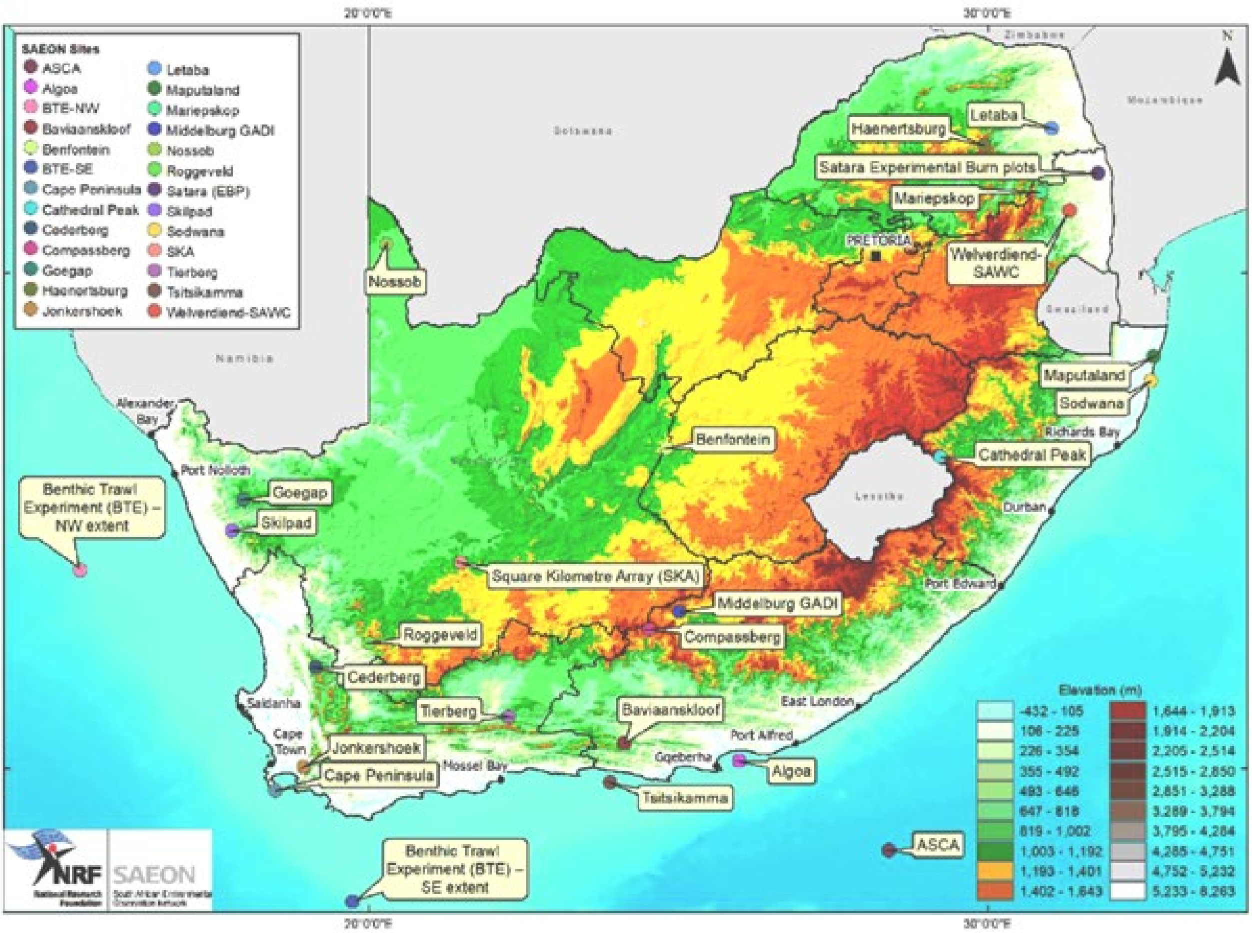

Figure 1: Topography of South Africa (Ref: M Bopape, et al., 2025)

In 2021, over 12 million people in South Africa were affected by drought, and over 8 million people were affected by severe thunderstorms and floods, mostly in the Mthatha area, Eastern Cape, where more than 3 000 people were displaced with a significant loss of livelihoods occurred. Also in 2024, parts of the Eastern Cape (Nelson Mandela Bay, Buffalo City and Sara Batman) were wrecked by floods wherein 27 people lost their lives and more than 10 000 people affected.

KwaZulu-Natal (KZN) has appeared to be the most vulnerable and affected province, especially with floods. In April 2022, KZN experienced the worst mudslides and floods which claimed over 450 lives, 142 290 people being affected, and more than 10 000 people being displaced as their shelters were total destroyed. KZN (mainly the eThekwini Municipality) experienced two tornado events in June 2024 which affected more than 35 000 people. KZN continues to experience extreme events year after year, which makes it difficult to fully recover from the April 2022 devastating floods.

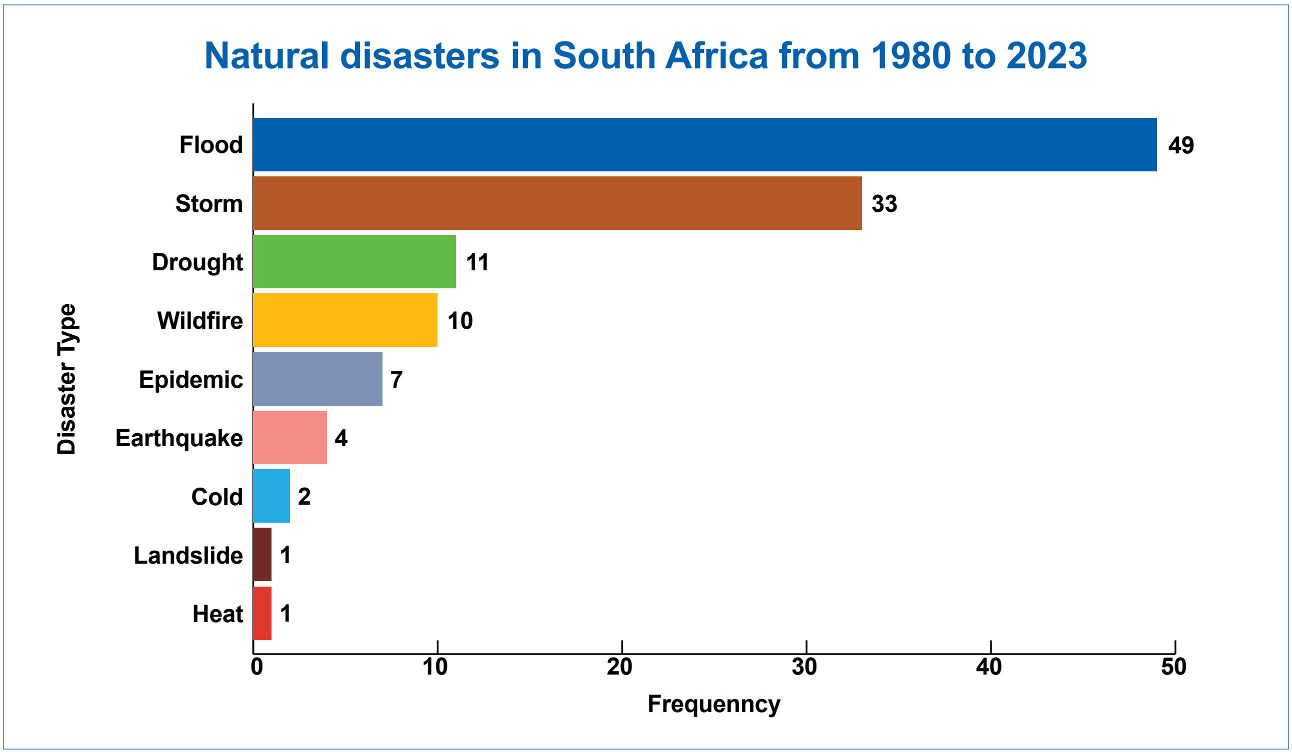

Figure 2: Natural Disasters in South Africa, 1980–2023.(Ref: M Bopape, et al., 2025)

In light of ongoing multi hazards disasters, key amongst others being floods, drought, severe thunderstorms, and veld fires, the EW4ALL has emerged as a proactive approach to disaster risk reduction.

Port St John's EC 2024 flood damage and Tongaat KZN tornado
(Ref: DPME rapid assessment report 2025)

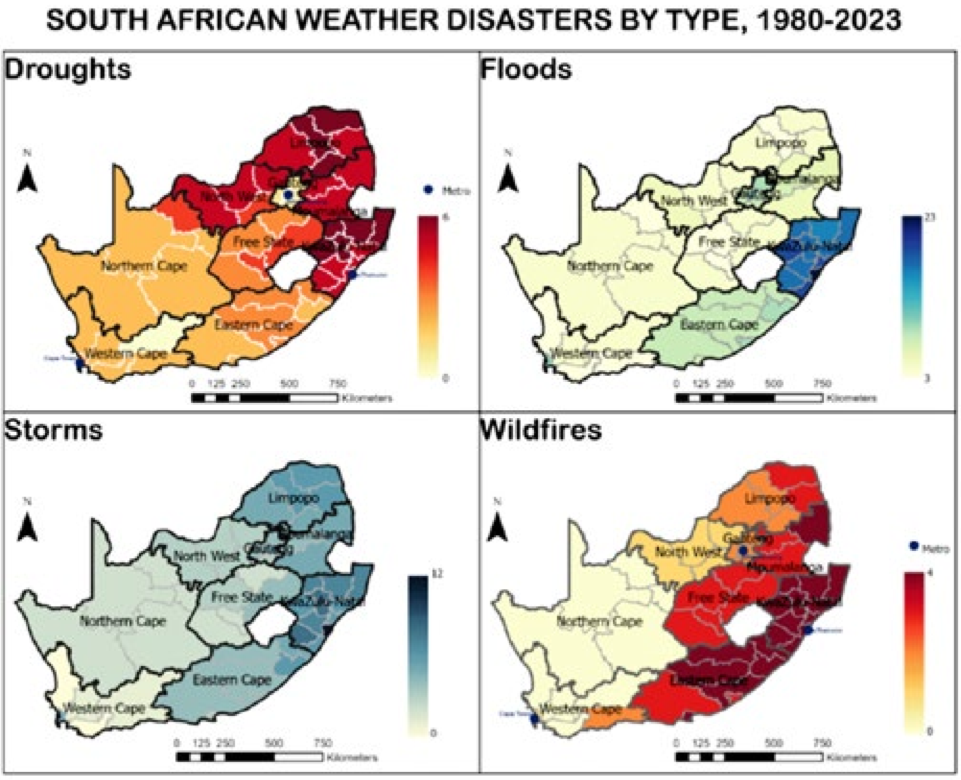

Figure 3: Key Disaster Types in South Africa. Ref: M. Bopape et al 2025

According to the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6)1 on the physical science basis of climate change, the global average precipitation has increased since 1950, with a faster rate of increase since the 1980s. The frequency and intensity of heavy precipitation events have also increased significantly since the 1950s over most land areas. South Africa has not been spared of these increased extreme events and continues to witness even more severe and devastating events.

The EW4ALL roadmap is aimed at ensuring that everyone in South Africa receives early warnings that can assist in informed decision-making and early action for safety of life and livelihoods. However, for an early warning system to be truly effective, it must be accessible and inclusive for all segments of society, reaching everyone and leaving no one behind.

3. THE EW4ALL ROADMAP FOR SOUTH AFRICA

This Roadmap presents a multi-sectoral and multi-stakeholder set of recommended actions emanating from the National Consultative Workshop held in August 2024 in Pretoria, South Africa. This initiative is a co-ordinated effort between the four national pillars which includes the SAWS, NDMC, DCDT, and South African Red Cross Society (SARCS). The national pillar leads are supported by their respective international bodies which include the United Nations Office for Disaster Risk Reduction (UNDRR), the World Meteorological Organization (WMO), the International Telecommunication Union (ITU), and the International Federation of Red Cross and Red Crescent Societies (IFRC).

The four national pillar leads in South Africa are:

- Pillar 1: Disaster Risk Knowledge: National Disaster Management Centre (NDMC)
- Pillar 2: Observations and Forecasting: South African Weather Service (SAWS)
- Pillar 3: Dissemination and Communication: Dissemination and Communication: Department of Communications and Digital Technologies (DCDT)
- Pillar 4: Preparedness to Respond: South African Red Cross Society (SARCS)

The SAWS is a schedule 3A South African public entity, in terms of its enabling legislation, Act No. 8 of 2001, as amended in 2013, and is aligned to section 24 of Chapter 2 of the Constitution of the Republic of South Africa. As an authoritative voice in issuing weather and climate early warnings, the SAWS is tasked with the responsibility of ongoing collection of meteorological and ambient air quality data over South Africa and the surrounding southern oceans for meteorological use and improved weather forecasts. The SAWS has the responsibility to provide timely and accurate scientific data to the South African public and beyond as a Regional Specialised Meteorological Centre (RSMC). The SAWS, therefore, plays a critical role in the South African public life, also in empowering citizens to adapt to the effects of climate change induced extreme events.

Early Warning Systems are proven, effective, and feasible disaster risk reduction and climate adaptation strategies, that save lives and provide high value returns on investment. Yet, major gaps in early warning systems remain, especially when it comes to translating early warnings into risk-informed early actions. Early Warnings for All (EW4All) is a global initiative to ensure that everyone on Earth is protected by early warnings by 2027. This initiative is being fast-tracked into action on the ground. The UN Secretary-General released in November 2022 the High-level Executive Action Plan2 for this initiative, emphasising the urgent need to support the most-at-risk populations first.

While governments play a crucial role in driving action on early warning services for their citizens, adopting a "whole-of-society" approach that involves all stakeholders, including civil society and the private sector, can better strengthen and sustain early warning services. It is equally important to recognise that disasters and climate change affect people differently based on their gender, age, disability and other factors. Therefore, an intersectional approach is required to ensure that the early warning services are inclusive, responsive, and equitable. By involving all sectors of society and taking an intersectional approach, early warning services can be more effective in protecting most-at-risk populations from the impacts of disasters and climate change. This national consultation was led by the SAWS, and co-organised with the UN Resident Coordinator's Office, UNDRR, WMO, IFRC, ITU, the local National Disaster Management Centre (NDMC), South African Red Cross Society (SARCS) and the Department of Telecommunications and Digital Technologies.

Figure 4: EW4ALL Concept

3.1 Objectives

This roadmap provides a framework for the coordinated efforts of key stakeholders, government departments, priority sectors, academic institutions, NGO's and business. The aim is to achieve an inclusive and actionable national integrated multi-hazard early warning system that will be able to reach every person in South Africa. The adoption of the EW4ALL initiative is necessitated by the growing need for adaptation to the impacts of the increasing frequency and severity of extreme weather events consequential to the loss of lives, spread of waterborne and vector-borne diseases, food insecurity, disruption in energy and water supply, and damage to critical infrastructure.

The South African government, through the Department of Monitoring and Evaluation, conducted a Rapid Assessment on the effectiveness of the Impact Based Early Warning System in February 2025. The recommendations of the study highlighted the following:

- Enhance communication strategies
- Strengthen the observation Infrastructure
- Foster stakeholder collaboration
- Conduct regular training
- Effective and meaningful engagement of the communities

The implementation of this Roadmap will serve as a strategic guide to drive initiatives spanning national to local levels, channel investments towards enhancing Early Warning Systems for more effective Disaster Risk Reduction (DRR) and facilitate the seamless integration of comprehensive early warning mechanisms. Organisations are encouraged to incorporate these actions into their operational frameworks, aligning with their primary and supportive responsibilities. This harmonisation ensures the optimal utilisation of resources across the spectrum from national to local levels.

The primary objective of this Roadmap is to provide the national and local governments with a structured blueprint for a community-based, people-centric Early Warning System in South Africa through targeted actions and resource allocation. It presents a set of recommended actions designed to prioritise investments in EWS and DRR, in accordance with Target G of the Sendai Framework for Disaster Risk Reduction, and the Climate Change Adaptation Strategy.

3.2 Purpose

The purpose of this Roadmap is to:

a) Review the current state of early warning systems in South Africa and evaluate the progress in implementing the four pillars of the EW4All initiative.
b) Explore the linkages and alignment among ongoing and upcoming initiatives and consolidate key stakeholder commitments to strengthen early warning services.
c) Establish a national coordination mechanism or affirm existing national coordination mechanisms to guide efforts to scale-up early warning programming across the four pillars and linking national and local engagement.
d) Address the identified gaps in the existing national early warning systems, with respect to the minimum core capabilities checklist tool provided by the EW4All initiative.
e) Achieve resource mobilisation, technical expertise, cutting-edge technological capabilities, and investments towards the development of an effective, accurate and actionable early warning system.

Figure 5: Multi-Hazard Early Warning Systems (MHEWS)

This roadmap provides a basis for coordinated efforts among diverse national and local agencies, channelling focused programming and resource allocation towards scaling up the national early warning systems.

The recommendations presented herein are based on identified national gaps, priorities and needs covering the four pillars as well as the interpillar domain of EWS.

Additionally, the EW4ALL Roadmap considers the interpillar domain, covering aspects around governance, stakeholder coordination, advocacy, monitoring and evaluation, and financing for early warning systems. This holistic approach guarantees a comprehensive and well-rounded enhancement of South Africa's early warning infrastructure.

4. EW4ALL PILLAR LEADS

4.1 Pillar 1: Disaster Risk Knowledge

4.1.1 Gap Analysis

Pillar 1 gap analysis was performed in collaboration with the UNDRR lead and the National Disaster Management Centre (NDMC) representatives. The NDMC utilised an internal platform of stakeholders, namely the Early Warning Task Team (EWT T) to perform the gap analysis and then cross-checked this with the UNDRR lead. Pillar 1 concentrated on the thematic area of disaster risk knowledge and its outcomes. For the purposes of the workshop, only four of the seven outcomes were analysed. The outcome analysis is presented according to the 4 outcomes in Table 1. In addition, the Pillar 1 team performed a cross-pillar analysis that concentrated on the main outcomes.

The gap analysis was presented to the workshop participants and thereafter group discussions were held. Delegates were divided into four groups to discuss the four outcomes that were presented in terms of Pillar 1. Each of these four groups refined the gap analysis with additions to missing or inadequate information, such as lead and supporting agencies and verifying the output indicators. The discussions are shown in the Table 1. In terms of the gap analysis for the four outcomes, the following items were cited as common gaps or priorities for Pillar 1:

- Establishing and appropriate data and infrastructure platform that embraces the smarter use of technology to allow wider access to risk knowledge. This requirement also includes specific needs such as a need to track loss and damage from disasters, and the incorporation of indigenous systems in both the access and the transmission of risk information. Furthermore, it includes the developing (in hybrid) and institutionalisation of risk information according to main sectors, and incorporating appropriate community mechanisms and channels for its distribution.
- A national access mechanism for risk knowledge is required in South Africa, combined with all identified technology, stakeholder and institutionalisation requirements.
- Risk knowledge in its different forms should be the basis of information in the current impact-based warnings and knowledge systems process in the country.

The country seeks to achieve a DRR decision support system that also informs preparedness and mitigation activities at ground level.

Table 1: Pillar 1 Roadmap – Disaster Risk Knowledge

OUTCOME 1: PRODUCTION OF RISK KNOWLEDGE												
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline					Budget	Budget Source
				Lead	Support	Y 1	Y2	Y 3	Y 4	Y5		
1. Lack of a Disaster Tracking System (Loss and Damage)	Loss and Damage system operational system	Loss and Damage database	A) Participation in working groups. B) Draft version 1 of the Terms of Reference. C) National consultations meetings conducted. D) Finalise draft and submit for approval. E) Allocate a custodian department for procurement. F) Appoint a service provider. G) MOU and Data sharing signings.	NDMC DFFE	Sector departs	A B C	A B C D E	A C E F G	A C G	A C G	R3 m	National sector department budget
2. Lack of national shared capacities to quantify (collect), validate of risk knowledge	Identification and aggregation of key risk knowledge	Identification of key risk data owners Prioritising key risks and data sources Develop a risk data database Institutional agreements with risk owners Risk standard guidelines Research support for risk information	A) Finalise component input into the EW4ALL document. B) Stakeholder consultations C) Identification of risk owners for risk knowledge. D) Formal agreements and draft 1 of guidelines. E) Phase 1: Data Aggregation and centralisation. F) Phase 1: Granular visualisation and integration. G) Demonstration workshops and workgroups.	NDMC Risk Knowledge entities	Key Sector departments for risk data identification: DWS / CGS / Mining	A	A B C	B D E F G	B F G	A C G	R2 m	NDMC and Partners

OUTCOME 1: PRODUCTION OF RISK KNOWLEDGE												
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline					Budget	Budget Source
				Lead	Support	Y 1	Y2	Y 3	Y 4	Y5		
3. Lack of country specific data sources that include aspects of traditional / scientific / local and indigenous knowledge including participatory processes.	List of data sources	Indigenous, scientific and local risk knowledge integration	A) Finalise component input into the EW4ALL document. B) Conduct community Consultation / desktop research on indigenous communities in SA. C) Data integration and standardisation. D) Capacity Development and training. E) Harnessing Institutional support and collaboration.	NDMC DTA SALGA	NGO SARCS Community agencies UN agencies	A	A B C	B C D E	B C D E	B C D E	R3 m	NDMC and Partners

OUTCOME 2: ACCESS TO RISK KNOWLEDGE												
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline					Budget	Budget Source
				Lead	Support	Y 1	Y2	Y 3	Y 4	Y5		
1. Lack technology and infrastructure solutions to enable access to risk knowledge	Enhanced technology and infrastructure platforms for risk knowledge	Improved technology and infrastructure platforms for risk knowledge	A) Finalise component input into the EW4ALL document. B) Conduct status analysis and knowledge requirements. C) Identification of data products and services. D) Data integrations and standardisations. E) Development of channels of access. F) Training & Education to facilitate access	NDMC PDMC DTDC	NGO SARCS Community development agencies UN agencies	A	A B C D F	B C D E F	B C D E F	D E F	R6 m	NDMC and Partners

OUTCOME 3: RISK KNOWLEDGE USE IN EARLY WARNINGS IMPROVEMENT												
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline					Budget, USD/LCU	Budget Source
				Lead	Support	Y 1	Y2	Y3	Y 4	Y5		
2. Lack of Risk Knowledge to support decision Support and Impact Based Forecasting	Enhanced risk informed DRR decision support tools	Improved risk knowledge decision in hazard forecasting	A) Finalise component input into the EW4ALL document. B) Identify response measures for each level of impact-based forecasting. C) Risk informed design prototype development, testing and deployment D) Conduct regular training, awareness and simulation exercises.	Service (NDMC) (SA Weather Service) DM DM Service (NDMC)	SALGA PDMC DPME Sector Provincial Departments NGO Civil Society	A	A B C	B C D	B C D	B C D	R3 m	NDMC and Partners

OUTCOME 4: RISK KNOWLEDGE MONITORING AND EVALUATION												
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline					Budget, USD/LCU	Budget Source
				Lead	Support	Y 1	Y2	Y 3	Y 4	Y5		
3. Inadequate M&E Capabilities to monitor use of risk knowledge in Early Warnings	Enhanced M&E capabilities to use risk knowledge in Early Warnings	Improved M&E capabilities to use risk knowledge in Early Warnings	A) Finalize component input into the EW4ALL document. B) Development M&E measurement matrix. C) Define performance indicators for risk knowledge within EW. D) Employ M&E indicators and analysis. E) Develop a set of recommendations.	NDMC COGTA Service (NDMC) (SAWS) PDMC	DPME PDMC National Sector Departments	A	A B C	B D	D E	D E	R3 m	NDMC and Partners

4.2 Pillar 2: Detection, Observations, Monitoring, Analysis and Forecasting of Hazards.

The South African Weather Service (SAWS) leads Pillar 2 focusing on Detection, Observations, Monitoring, Analysis and Forecasting of Hazards, with support from international pillar lead, the World Meteorological Organization (WMO).

4.2.1 Gap Analysis

The following gaps have been identified during the EW4ALL consultative workshop under Pillar 2:

- Insufficient coverage of automated and remote sensing national observation infrastructure network (AWS, ARS, RADAR, LDN, and Upper Air)
- A need for all consolidated GBON observation infrastructure under the SAWS for QC and data feeds processing for national use.
- A need for Government ringfenced observation infrastructure maintenance of these systems.
- A need for collaboration and data sharing on meteorological and hydrological data for research purposes (rainfall, river flow, estuary levels, dam inlets and dam levels) in real time for better EW4All.
- A need to develop risk maps of entire country in GIS format with Numerical weather prediction information including real time satellite info overlays.
- A need for protection of current and future national observation infrastructure.
- Limited ability to perform high resolution numerical weather prediction modelling.
- The absence of national preparedness financing framework for AA implementation.
- Limited application of advanced technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), Machine Learning (ML), etc. to improve the forecast value chain.
- Lack of awareness, training and access to impact-based warnings with hazard relevant instructions.
- Insufficient dissemination channels, and language barriers to reach exposed and vulnerable communities, including people with disabilities.
- The mobile activation and visualisation of warnings per location based on IBF
- Establishment of a Media centre where real time significant and high impact events can be communicated and provide live updates.

These identified gaps were considered in the development of this Roadmap and will assist the SAWS to enhance its observation capacity, weather forecasting, analysis and monitoring capabilities. Furthermore, it will assist in providing reliable, actionable and accurate impact-based multi-hazard forecasts and early warnings to save lives, property, and strengthen sustainable development.

4.2.2 The Current State of the SAWS Early Warning System

The SAWS implemented Impact-Based Forecasting in 2017, with the focus on informing the public about what the anticipated weather hazard will do, in other words, the potential impacts of the hazard. This was a significant shift from just informing the public on what the weather or weather conditions will be, without elaborating on the impacts. The Impact-Based System has brought significant improvements to the SAWS' early warning system. Despite being one of the first countries to implement Impact-Based Forecasting and its superior facilities relative to other NMHS' in Africa, the SAWS identified some development needs for sustaining and improving its services during the consultative workshop. This included observation infrastructure coverage, modelling capabilities, priority sector specific early warning services, and the integration of emerging technologies such as AI, ML, and IoT. Therefore, this roadmap aims to address these gaps. Currently, the SAWS operates a network of observation infrastructure consisting of:

- 11 Radar Systems (10 S-Band and 1 C-Band)
- 265 Automatic Weather Stations
- 156 Automatic Rainfall Stations
- 26 Lightning Detection Network Sensors
- 949 Manual Rainfall Stations
- 13 Solar Radiation Sensors
- 8 Biomet Stations

The SAWS AWS' and ARS' are developed and assembled in-house. The ICT infrastructure includes the OPMET database and supercomputer for running high resolution models. The SAWS, as a WMO designated RSMC, hosts several regional centres including the Flash Flood Guidance System in Southern Africa (FFGS), the Severe Weather Forecast System (SWFS) and the Centre of Excellence (CoE) in Satellite Training. The SAWS is also a Regional Meteorological Training Centre (RMTC) and Regional Telecommunication Hub (RTH), as designated by the WMO. The SAWS has also been ISO 9001certified, effective October 2011, and continues to maintain this status.

The SAWS is in the process of implementing a five-year Infrastructure Sustainability plan aimed at increasing and sustaining its observation infrastructure (AWS', ARS' Weather Radar Systems, and Lightning Detection Network (LDN) across the country to achieve the implementation of EW4ALL initiative.

This roadmap aims to build partnerships and collaborations to strengthen the community awareness activities, expand risk knowledge, increase public understanding of the forecasts and early warnings, enhance adaptation strategies, and targeting the most vulnerable communities. This will also assist in resource mobilisation to successfully implement an inclusive national integrated multi-hazard early warning system.

4.2.3 Pillar 2: Key Action Areas

In recognition of the identified gaps in the existing early warning system, the SAWS (Pillar 2) seeks to:

a) Enhance the national observation infrastructure network

- Modernise and increase the observation network for (AWS', ARS', RADARs and the LDN).
- Strengthen the SAWS' maintenance capabilities to ensure continuity in data collection.

b) Mitigate against theft and vandalism of the observation infrastructure

- Implement security measures such as fences, surveillance cameras, armed response security services for Radar and AWS sites.

c) Enhance computing capabilities to run high resolution forecasting models

- Acquire a High-Performance Computer (HPC).

d) Improve the Impact-Based Forecasting and early warnings

- Integrate emerging technologies into forecasting operations.
- Increase community engagements and awareness campaigns through collaboration and partnerships.

e) Develop and implement community-based and priority sector early warning systems

- Identify vulnerable communities and develop a community-based early warning system through collaboration and partnerships.
- Co-produce sector specific early warning systems (with Health, Energy, Water, Agriculture, and Basic Education sectors).

Table 2: Pillar 2 Roadmap - Detection, Observations, Monitoring, Analysis and Forecasting of Hazards

OUTCOME 1: MONITORING AND OBSERVATION												
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline					Budget	Budget Source
				Lead	Support	Year 1 (2025)	Year 2 (2026)	Year 3 (2027)	Year 4 (2028)	Year 5 (2029)		
1. Insufficient coverage of automated and remote sensing National observation infrastructure network (AWS, ARS, RADAR and LDN, and Upper Air)	Increase national coverage and modernization of aging critical automated infrastructure, (Radar, LDN, AWS, ARS, and Upper Air)	AWS: 150 stations upgraded 70 New stations installed Coastal: At least 1 observation instrument per 100 km ARS: 940 manual stations replaced. Radar: 3 Radars replaced 2 New Radars installed 1 New Upper Air System installed.	A) Implement Infrastructure sustainability plan for the increased national coverage network and modernize the national network. B) Source funding from Private public partnerships C) Improve data availability and up time of Infrastructure.	SAWS	Private public partnerships Insurance agencies Mining entities International Funding Organisations	A B C	A B C	A B C	A B C	A B C	R250 m	SAWS/ External funded projects/ PPP
2. Need for protection of current and future national observation infrastructure	National infrastructure: protection programme	50 % reduction in vandalism national incidents. 80 AWS sites security fencing implemented	A) Review Quarterly monitoring report for protection of assets. B) Review measures and escalate problem areas. C) Community awareness programmes.	SAWS	SAPS Private security Disaster Management Centers Communities	A	A B C	A B C	A B C	A B C	R15 m	SAWS / PPP

OUTCOME 2: FORECASTING MODELS												
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline					Budget, USD / LCU	Budget Source
				Lead	Support	Year 1 (2025)	Year 2 (2026)	Year 3 (2027)	Year 4 (2028)	Year 5 (2029)		
1. Limited ability to perform run high resolution numerical weather prediction modelling	Acquire new national high performance computing capabilities to achieve high resolution numerical modelling	Procurement of High-Performance Computer (HPC) Implemented	A) Internal procurement process finalised. B) Access to HPC for enhanced operations (high resolution modelling capabilities, case studies, etc).	SAWS	DFFE National Treasury UKMET BOM China NMHS	A	A B	B	B	B	R150 m	SAWS/ Funding opportunities
2. Limited Application of advanced technologies such as AI, IoT, ML, etc. to improve the forecast value chain	Integration of advanced technologies to improve the national forecast capabilities Accuracy, verification and performance measures of advanced technologies for South Africa	A) Survey and research on available AI applications for weather applications. B) Data collection, testing and verification of advanced technologies. C) Testing and validation using various datasets and scenarios and Integration of AI, ML, IoT into operations.	SAWS	UP NWU WITS UKMET BOM China NMHS SAEON CSIR ARC WRC National Sector Departments	A	A B	C	C	C	R6 m	Partnerships and Collaboration	

OUTCOME 3: IMPACT BASED FORECASTING											
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline				Budget	Budget Source
				Lead	Support	Year 1 (2024-2025)	Year 2 (2025-2026)	Year 3 (2026-2027)	Year 4 (2027-2028)		
1. Lack of awareness, training and access to the Impact based warning with hazard relevant instructions	Improving understanding and access to IBF levels among DM personnel, media and the public and develop hazard related instructions for SA	Streamline and improve of IBF training and awareness conducted yearly (DM: workshops, media: interviews and public: community outreach) Review hazard-based instructions	A) Review current programmes for awareness and training. B) Developed improved plan for period of EW4ALL. C) Training and capacitation of DM personnel, media and the public. D) Develop hazard-based instructions for SA.	SAWS	NDMC National Sector departments International partners National stakeholders	A	A B C	C D	D	R3 m	SAWS

OUTCOME 3: IMPACT BASED FORECASTING												
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline					Budget	Budget Source
				Lead	Support	Year 1 (2025)	Year 2 (2026)	Year 3 (2027)	Year 4 (2028)	Year 5 (2029)		
2. Lack of priority sector specific impact-based Early Warnings: (Health, Energy, Water, Agriculture, Basic Education)	Phased tailoring of sector needs impact-based forecasting and early warning system	Completion of priority sectoral needs assessment for IBFS Sector Specific Products developed	A) Identify priority sectors. B) Conduct sector needs assessment in relation to impact base forecast. C) Co-production impact tables of sector specific impact tables and implementation of early warnings	SAWS	NDMC and Leading Departments and relevant sectors	A	A B C	B C	C	C	R5 m	SAWS / Partnerships through co-production approach

OUTCOME 4: DISSEMINATION CHANNELS												
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline					Budget	Budget Source
				Lead	Support	Year 1 (2025)	Year 2 (2026)	Year 3 (2027)	Year 4 (2028)	Year 5 (2029)		
1. Insufficient dissemination channels and language barriers to reach exposed communities and people with disabilities	Strategy developed to Increase dissemination of alerts to vulnerable groups including, working sessions with people living with disabilities, women, youth, children, and reaching out to deep rural communities. Establish a Media Centre	Implement Cellular Broadcast Warning Dissemination . Enhanced availability of Community based early warning system Completed Review of vulnerable groups including Youth, Women, and People with disabilities Implement languages translation tools and services including the use of technology for Impact based warnings Implement a Media Centre for effective dissemination and live updates of high impact events	A) Establish MoU with the Independent Communications Authority of South Africa (ICASA). B) Partner with local actors, NGO, Civil Society Organisations or community agencies to promote access and understanding to Impact Based forecasting. C) Conduct needs assessment for people living with disabilities. D) Review of language translation tools and services.	SAWS NDMC PDMC Language translation entities	Depart of Communications and digital communities Depart of Women, Youth and Persons with Disabilities National Department of Health UNICEF and CSIR Drone Technology agencies South African Red Cross Society (SARCS) Disabled People of SA GCIS	A	A B C	B C	B C	B C	R20 m	Partnerships and Collaboration through co-production approach

4.3 Pilar 3: Dissemination and Communication

The workshop discussions and deliberations on Pillar 3 - “Warning Dissemination and Communication” was led by the Department of Communications and Digital Technologies (DCDT), supported by the International Telecommunications Union (ITU) Regional Office, the Independent Communications Authority of South Africa (ICASA), and SMMEs.

Pillar 3 in the EW4ALL roadmap focuses on warning dissemination and communication. It aims to ensure that early warnings reach people at risk in time for them to take action.

Pillar 3 also considers the integral component of Multi-Hazard Early Warning Systems based on a multi-channel approach and a common alert protocol, which supports sending message alerts of different communication channels such as radio and television broadcasting, mobile applications, satellite, social media, and where practically possible, the use of Artificial Intelligence (AI) will be considered to take advantage of digital transformation in early warning systems.

In warning dissemination and communication, South Africa supports a multi-channel approach which aims to increase the effectiveness of an alert and helps address the diversity of communities at risk. It will also increase the effectiveness of an alert because people are likely to receive the same alert through different channels.

A part of Pillar 3 supports a feasibility of using community-based infrastructure platforms as communications platforms for early warning systems.

The elaboration within this pillar highlights the need to address aspects of alert message consistency, understandability and promotion of action, and the address the needs of vulnerable populations should be considered.

Pillar 3 also considers an integral component of Multi-Hazard Early Warning Systems which manages and delivers early warning alerting messages to those in affected areas and wider at the national level, which allows them to take action to mitigate the impacts of the hazard.

4.3.1 Gap Analysis

The EW4ALL workshop was preceded by the DCDT and ICASA conducted a Pillar 3 country stocktaking checklist for the EW4All. The analysis considered several key thematic areas related to this Pillar and included:

1) **Governance:** Functions, roles and responsibilities, government policy or legislation, regular coordination and planning.
2) **Infrastructure:** Availability and reach of mobile-networks, satellite networks, radio services and TV broadcasting networks. Availability of cell-broadcast and location-based SMS.
3) **Inclusion:** Considered whether public awareness platforms do exist and whether public and other stakeholders are aware of which authorities issue the warnings and trust in their messages.
4) **Quality and trust:** Whether systems are in place to send alert messages which are consistent to avoid confusion and reinforce the message.

In line with the above, the gap analysis was conducted with consideration of the following leading questions:

1) Are organisational and decision-making processes supporting EW4ALL in the country in place and operational?
2) Are communication systems and equipment in place and operational?
3) Are impact-based early warnings in the country communicated effectively to prompt action by affected groups?

At a high level, the following gaps were established included:

- Inadequate policy, legislation and regulations to address infrastructure-related matters concerning EW4ALL.
- Mobile early warning systems, in particular, cell-broadcast systems and/or location-based SMS systems, might be in place on mobile network operator platforms, however, the feature might not be activated to send alert messages to the population or affected communities. The feature, if available, is used as a value-added service in the day-to-day business of mobile network operators.
- There is no clear or a common communication strategy for EW4ALL – if such a communication strategy exists, evidence-based documentation should be easily available.
- The National Emergency Telecommunication Plan (NETP) is not in place / does not exist or, if in place, does not cater for the EW4ALL initiative.
- Multiple communication channels do not provide universal coverage to support EW4ALL.

A Common Alerting Protocol (CAP) has been adopted and implemented in South Africa for warning messages to make sure alert messages sent across the different channels are consistent to avoid confusion and reinforce the messages not integrated.

Table 3: Pillar 3 Roadmap – Dissemination and Communication

OUTCOME 1: POLICY AND REGULATION											
Gap Identified	**Associated Output**	**Output indicator**	**Activities**	**Responsibility**		**Implementation Timeline**				**Budget, USD / LCU**	**Budget Source**
				Lead	**Support**	**Year 1 (Ending March 2024/25)**	**Year 2 2025/26)**	**Year 3 2026/27**	**Year 4**		
1. Inadequate national legal framework (legislation, policy and regulation) to support early warning systems and related infrastructure	Review of all DRM policies to support early warnings (communications perspective)	Amended and approved national legal framework to support early warning communications and systems	Finalise draft of EW roadmap Document all related early warnings communication policies and standards (if any). Review of all related policies to early warning communications. Conduct stakeholder engagement (advocacy) and public consultations sessions. Draft amended version of legal policy framework. Submit to relevant government clusters including provincial entities. Submit to FOSAD. Submit to Cabinet committee Develop and implement a communication strategy for early warnings.	COGTA (NDMC) DCDT	DFFE Human settlement Council for Geoscience (CGS) Relevant National sector departments and associated agencies NGO Civil society WMO UNDRR ITU	A	B C	D E	F I	R500K	DCDT

OUTCOME 2: ACTIVATION OF MOBILE EARLY WARNING SYSTEMS											
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline				Budget, USD / LCU	Budget Source
				Lead	Support	Year 1	Year 2	Year 3	Year 4		
2. Lack of activation of *mobile early warning systems in particular cellular broadcasting system (CBS) and or location based system (LBS) to alert communities in specific locations	Early warning systems activated in specific locations	Cellular broadcasting system (CBS) and or location based system (LBS) activated	Finalise component in draft of EW roadmap Determination of availability of LBS and CBS for inclusion in mobile early warnings system. Stakeholder consultations with mobile network operators and satellite network operators.as a policy determination. Agreements (MOU AND SLA) developed to utilise mobile services, satellite operators (TV e.g. radio broadcasting, social media platforms).	COGTA (NDMC) DCDT DFFE	Relevant National sector departments and associated agencies. NGO Civil society WMO UNDRR ITU	A	B C	C	D	R1 m	DCDT / ICASA

OUTCOME 3: Development/ Update of a National Emergency Telecommunication Plan (NETP) for Early Warning Communications											
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline				Budget, USD / LCU	Budget Source
				Lead	Support	Year 1	Year 2	Year 3	Year 4		
3. The Lack of a National Emergency Telecommunications Plan for early warning systems in South Africa	Developing a National Emergency Telecommunications Plan for South Africa	Developed or updated National Emergency Telecommunications Plan for South Africa	Finalise component in draft of EW roadmap. Consultation with ITU and relevant local stakeholders. Develop a Draft NETP. Consultation with key stakeholders. Submission to the relevant Ministerial cluster/ structure.	COGTA (NDMC) DCDT DFFE	ITU	A	B C	 D	E	R2 m	DCDT/ Emergency Services

OUTCOME 4: DEVELOPING CAP WARNING PROTOCOLS FOR PRIORITY HAZARDS											
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline				Budget, USD / LCU	Budget Source
				Lead	Support	Year 1	Year 2	Year 3	Year 4		
4. The lack of CAP developed for priority hazards distributing early warning messages and alerts in a multi-channel format	Phased developed of CAP protocols for early warnings	CAP developed for priority hazards distributing early warning messages and alerts in a multi-channel format	Finalise component in draft of EW roadmap. Stakeholder consultation and ITU. Implementation protocol ITUTx1303 as advised by ITU in phased manner by priority hazard owners. Pilot CAP Testing for functionality. . Final Testing and rollout of CAP.	COGTA/ NDMC DFFE	DCDT	A	B	C	D E	R500 K	DCDT

4.4 Pillar 4: Preparedness and Response

The South African Red Cross Society (SARCS) leads Pillar 4 on Preparedness and Response, with support from international pillar lead which is the International Federation of the Red Cross and Red Crescent. Pillar 4 seeks to:

- Improve disaster preparedness initiatives, especially Anticipatory Actions (AA), Prepositioning, Emergency Operation Centre (EOC), Capacity Building of local disaster response teams, and Enhanced Vulnerability Capacity Assessment (EVCA).
- Incorporate principles for people-centred, locally led approaches under EW4All.
- Map on-going preparedness and anticipatory actions, coordination mechanisms, institutional and operational capacity needs, documentation and sharing of best practices.
- Enable local-level engagement (localisation) and consultation to inform community-led EW4All initiatives.
- Conduct hazard-specific simulations in at-risk communities to enhance preparedness.
- Enforce adherence to contingency planning and retain implementation proactiveness.
- Strengthen collaboration dialogues at all levels to enhance preparedness for effective response.
- Establish pre-disaster agreements with governments and the private sector.

Emphasis under this pillar is on reviewing and strengthening existing Disaster Preparedness Plans and promoting the development of a multisectoral Early Action Protocol for South Africa. This will enable more collaborative approaches to reduce risks, vulnerabilities, save lives and livelihoods.

AA is an approach which systematically links early warnings to actions and finance designed to protect the lives and livelihoods ahead of a hazard. AAs should complement longer-term investment in risk reduction and should aim to strengthen people's capacity to manage risks. AAs can be launched automatically when the trigger is tied to a pre-agreed plan and pre-approved financing as in the case of Forecast-based Financing (FbF), but there are also alternative approaches that meet the same goals with a different decision-making framework e.g. expert judgment. AA is part of the Disaster Risk Management (DRM) continuum which should be integrated into preparedness efforts to reduce the impacts of incidents and disasters to communities at risk

In addition, EVCA enables communities to identify hazards, vulnerabilities and capacities to curb risks. The communities then develop resilience plans based on the information from the assessment. DRM practitioners work with the communities based on the plans to save lives and improve livelihoods.

4.4.1 Gap Analysis

The following gaps have been identified under Pillar 4 for EW4ALL:

- Relevant guidelines and policies for an enabling environment for AA
- Capacities at the local level that enable first responders to act quickly and effectively based on early warning alerts
- Commitment for financing and delivery mechanisms for effective preparedness ahead of hazards and crises
- Collaboration between stakeholders for informed action on the ground.

Moreso, it has been noted that there is often a lag between hazards striking and the disaster response kicking in. This is dangerous and unnecessary as it puts lives and livelihoods at greater risk, where loss and damage could be curbed.

Table 4: Pillar 4 RoadMap - Preparedness and Response

OUTCOME 1: ENABLING ENVIRONMENT FOR ANTICIPATORY ACTION											
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline				Budget (ZAR)	Source
				Lead	Support	Year 1 (2024–2025)	Year 2 (2025–2026)	Year 3 (2026–2027)	Year 4 (2027–2028)		
1. A need to review the DRM National legal framework and supporting policies for inclusion of AA provision by relevant departments	Revised DRM National legal framework and supporting policies for the inclusion of AA by relevant departments	Approved National legal framework and supporting policy frameworks for AA	A) Multi-stakeholder engagements and Desktop analysis of existing National legal/ policy framework- (DRM). B) Gap analysis finalisation. C) Proposal for alignment of AA into national legal and policy frameworks. D) National dialogues and communications on AA proposals.	SARCS CoGTA	Relevant sectoral departments (at various levels) UN agencies Civil society organizations Humanitarian organizations Private sector	A B	B C	C	D	R5 m	

OUTCOME 2: CAPACITY BUILDING											
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline				Budget (ZAR)	Source
				Lead	Support	Y1 (March 2025)	Y2 2025/26	Y3	Y4		
1. Limited knowledge and awareness of AA for local preparedness	Practical interventions on AA for local preparedness and effective response	Established set of AA interventions at local level early warning and enhanced preparedness	A) Conduct community-based hazard, vulnerability and capacity. Assessments with emphasis on AA and indigenous knowledge systems. B) Develop contingency plan and integrate AA. C) Identification and integration of existing digital and analogue platforms to promote learning and sharing.	SARCS supplemented by NDMC	Local Municipalities Humanitarian Organisations COGTA	A B	B C	C	C	R30 m	
2. Lack of local prepositioning, preparedness and capacity for timely response	Improved prepositioning, preparedness and response	Enhanced community preparedness for local action	A) Assessment of Early Action Protocols for local hazards. B) Establish primary and secondary interventions for capacity building. C) Coordinate protocols to activate existing and established for relief banks. D) Operational capacity development on relief banks and prepositioning.	SARCS NDMC DSD NGOs	Local Municipalities NGOs COGTA	A	B C	C D	D	R250 m	

OUTCOME 3: FINANCING & DELIVERY MECHANISM											
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline				Budget, USD / LCU	Source
				Lead	Support	Y1 (March 2025)	Y2 2025/26	Y3	Y4		
1. Absence of national preparedness financing framework for AA implementation	Established financial framework to guide AA and preparedness financing	Targeted AA financing to improve preparedness	A) Participation in national IGR and Budgeting Structures. B) Development of draft Business case for increasing DRM funding for AA financing. C) Consultation with key national sector. departments e.g. national treasurer. D) Forge private-public partnership agreements. E) Fort-Annual review of financing strategies for AA.	SARCS NDMC National Treasury Key sector Departments	Provincial Treasury Private sector Business communities National and international donors and partners	A	B C D	C E	D E	R300 m	

OUTCOME 4: STAKEHOLDERS COLLABORATION											
Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline				Budget	Source
				Lead	Support	Y1 March 2025)	Y2 2025/26	Y3	Y4		
1. Limited stakeholder collaboration for preparedness and response	Improved collaboration in preparedness and response	Integrated and improved multi-stakeholder collaboration	A) Identification and engagement of relevant multi-sector stakeholders. B) Establish collaborative agreements for targeted preparedness and response initiatives. C) Ongoing stakeholder consultation. D) Implementation, monitoring and evaluation.	NDMC SARCS	Local and provincial DM NGO Sector departments	A	B C D	B C D	C D	R10 m	

4.5 Inter-Pillar

4.5.1 Governance and Coordination of Early Warning Systems

The purpose of the interpillar component is to ensure effective coordination and successful implementation of the roadmap by establishing EW4All Coordination Committee. The coordination committee will comprise of the Pillar Leads, Key Stakeholders representatives and Partners that will meet quarterly during the first two years and then twice annually in the remaining three of the five years with the purpose of monitoring and reporting on the progress of the implementation against the following parameters:

a) political and policy advances,
b) scientific and technical development,
c) finance mobilisation, and
d) assess progress in the EWS Maturity levels against the global best practices.

The Coordination committee will provide annual reports on progress to the Pillars accounting authorities covering the following activity areas:

- Implementation of Impact-Based Forecasting (IBF) and National Multihazard Early Warning System (MHEWS).
- System-wide tests and no fail-safe mechanisms
- Established routine testing protocols and contingency measures
- Alignment of Legislation, Policies, and SOPs.
- Financial resources mobilisation mechanisms
- Coordination and institutional arrangements.
- Communication, community awareness, and public education.
- Broad-based trainings and cross-cutting capacity development.
- Simulations, drills, and stress test of the system

Interpillar Category	Output	Output Indicator	Output Process	Timeframe	Lead and Co Lead Department
1. EW4ALL Governance	EW4ALL National Coordination Committee/ Task Team	Conduct Quarterly or Bi Quarterly meetings with all pillar leads Maintain and Issue register and record decisions	• Develop ToR and SOP's for the governance unit. • Second or appoint members. • Integrate into existing national DRM governance	2026 (setup) 2027-2029 (operational)	Lead: NDMC and SAWS Support: DPME; DFFE, DCDT, SARCS
2. Policy Revision and Alignment	Develop a set of revised DRM and sectoral policies to include AA and EW4ALL provisions	Approved legal frameworks Approved policy amendments	• Conduct multi-stakeholder review. • Conduct gap analysis. • Draft amendments. • Submit to cabinet	2026–2029	Lead: CoGTA and DFFE Support: NDMC, SAWS, DPME, DCDT, DIRCO.
3. Review Legislation to Support EW4ALL	Develop legal instruments supporting mobile alerts and CAP protocols	Activation of CBS/ LBS; Adoption of the hazard specific CAP protocols	• Engage ICASA. • Draft MoUs. • Test and pilot CAP protocols.	2026–2029	Lead: DCDT Support: ICASA, NDMC, SAWS
4. Implement Coordination to Support EW4ALL National Imitative	Develop Integrated multi-stakeholder collaboration framework	Develop and signed MoUs Develop joint initiatives and planning procedures Develop shared platforms and communications procedures	• Identify and Map stakeholders • Engage and formalize agreements • Establish feedback loops • Perform quarterly reviews	2025–2029	Lead: SAWS and NDMC Support: DWS, NDoH, SARCS, DCDT, DALRRD, SARCS
5. Planning and Finance	National AA financing framework and EWS investment pipeline developed	Develop business case and seek approval Seek funding initiatives and mobilised resources	• Develop AA business case • Engage National Treasury; • Establish PPPs; • Integrate into sectoral, IDPs and national budgets	2025–2029	Lead: NDMC, SAWS and NT, Support: SARCS, Treasury
6. Advocacy and Awareness Promotion for EW4ALL	Develop a national communication strategy and inclusive outreach program	Calculate the annual % population Reached with the diversity of channels Monitor and record community feedback	• Develop strategic partnerships with media, NGOs, CSOs; • Conduct training and simulations	2025–2029	Lead: SAWS, NDMC and DCDT Support: GCIS, DPME, DALRRD, DWS, Presidency, DIRCO
7. Monitoring and Evaluation of EW4ALL	EW4ALL M&E framework integrated into national system	Develop annual reports; develop and track performance indicators; Conduct stakeholder reviews	• Develop M&E matrix aligned with SDGs/Sendai; • Conduct evaluations;	2025–2029	Lead: DPME Support: DFFE, SAWS, NDMC

5. IMPLEMENTATION MECHANISM

5.1 Coordination Structure

The implementation of the actions outlined in this Roadmap is coordinated by the EW4All Coordination Committee comprising the four Pillars.

Mandate

The Coordination Committee will ensure the implementation of the EW4All Roadmap and Action plan as outlined in this document.

Functions

The Coordination Committee should meet at least once every quarter to:

- Meet regularly to monitor progress on the implementation of the EW4All Roadmap and Action plan.
- Coordinate the national multi-hazard early warning including capacity building, technical assistance, simulation exercises across agencies, awareness raising and knowledge sharing among key stakeholders.
- Mobilise resources in a coordinated manner to ensure effective implementation of the EW4All and ensure the effective utilisation of funds.
- Conduct regular reviews of activities and timelines.
- Ensure monitoring and evaluation and make essential recommendations.
- Provide guidance and technical expertise and recommend best practices for improved and agile early warning systems.
- Promote collaboration and coordination between the various stakeholders in early warning systems, including public entities, previously disadvantaged communities, people living with disabilities, civil society organisations, academic institutions, private sector and international organisations, and ensuring gender equality and social inclusion.

Structural Composition of the Coordination Committee

The members of the Coordination Committee will consist of the following:

- The South African Weather Service (SAWS) as the authoritative voice in weather forecasts and early warnings.
- The National Disaster Management Centre (NDMC) responsible for disaster management co-ordination and risk reduction.
- The Department of Communications and Digital Technologies (DCDT)
- The South African Red Cross Society (SARCS)
- The Department of Monitoring and Evaluation (DPME)
- The Independent Communications Association of South Africa (ICASA)
- South African Local Government Association (SALGA) representing local government
- Representatives from relevant public entities
- Representatives from key sector departments (Health, Education, Agriculture, Water and Sanitation, Mining, Academic Institutions)
- Members nominated and appointed to the Coordination Committee by their respective organisations
- Experts from other institutions as deemed necessary

The Coordination Committee will be co-chaired by the National Pillar Leads. The Secretariat will be nominated from the pillar leads and will be responsible for recording of the meeting sessions, capturing and distribution of the minutes.

A Quorum will be reached with at least 51% of the Coordination Committee members available.

Decisions will be made by consensus within the scope of the Coordination Committee's mandate and functions, but the Chairperson may call for a vote on decisions where necessary.

The agenda, minutes, reports and supporting documents shall be distributed to all Coordination Committee members at least two days before the meeting. Signed minutes must be distributed and kept on record by the Chairperson of the Coordination Committee. A copy of the minutes will be made available to the members electronically.

Key Responsibilities of the Coordination Committee

The Coordination Committee will have the following responsibilities:

- Convene quarterly meetings and when required.
- Serve as the main coordinating mechanism for the national EW4ALL activities and establish collaborative relations with regional and international support organisations.
- Coordinate development partner investments, resource mobilisation by assessing projects, and other initiatives to avoid duplication and wasteful expenditure.
- Organise capacity building and outreach activities, workshops / conferences with all relevant stakeholders, experts and institutions (including the WMO, UNDRR, ITU and IFRC) to assess the progress on EW4All implementation and recommend necessary improvements.
- Develop a monitoring and evaluation mechanism to produce annual reports on the implementation of EW4All.

Financing of Coordination Committee Meetings

The Pillar Lead institution shall be responsible for organising and financing the Coordination Committee meetings and should ensure allocation of funds in the budget for this responsibility. The Coordination Committee will be responsible for resource mobilisation to organise the workshops / conferences.

Amendment or Variation of the Terms of Reference

This Terms of Reference may be amended, varied or modified in writing after consultation and agreement by Coordination Committee members.

5.2 Monitoring and Evaluation

The purpose of Monitoring and Evaluation (M&E) for this Roadmap is to:

- Track progress in implementing the EW4ALL initiative and its effectiveness.
- Ensure that forecasts and early warnings are timely, accurate, reach out to the target audience, actionable and acted upon.
- Provide evidence to improve system design, coverage, and communication.
- Strengthen accountability to communities, government, development partners, and funders.

The M&E process will be led by Department of Monitoring and Evaluation (DPME) in co-ordination with the National Pillar Leads (SAWS, NDMC, DCDT, RCSA). The role of the DPME in leading M&E is crucial for the successful implementation of this roadmap. Furthermore, the support of International Pillar Leads (UNDRR, WMO, ITU and IFRC) is critical to ensure alignment to the international best practices. The reports will assess progress, identify limitations, evaluate risk and inform policy direction on the implementation of the roadmap. Evaluation of progress will be reviewed annually by the EW4All Coordination Committee based on the M&E reports compiled by the DPME.

5.2.1 Evaluation Scope

a) Risk Knowledge:

- Are hazards, vulnerabilities, and exposures mapped and updated?
- Indicators: Number of hazard/risk assessments conducted; frequency of updates; integration into planning.

b) Monitoring and Detection:

- How well are hazards detected and tracked in real-time?
- Indicators: Coverage of monitoring stations; uptime of equipment; forecast accuracy.

c) Dissemination and Communication:

- Are warnings reaching the right people on time?
- Indicators: Percentage of the population receiving warnings; diversity of communication channels (radio, SMS, TV, social media); average lead time between warning and event.

d) Response and Preparedness Capacity:

- Are communities and institutions prepared to act?
- Indicators: Percentage or number of communities with contingency / evacuation plans; frequency of drills; proportion of warnings that trigger effective response.

5.2.2 Monitoring Framework

- Inputs: Budgets, human resources, training, infrastructure, partnerships.
- Processes: Data collection, risk assessments and regular updates, forecasting protocols, communication strategies.
- Outputs: Hazard bulletins, alerts, community outreach, training conducted.
- Outcomes: Increased awareness, faster response, reduced losses.
- Impact: Less casualties reduced economic damage, improved community awareness and resilience.

5.2.3 Methods and Tools

- Routine Monitoring: System logs (forecast availability and accuracy, lead time), surveys on warning reach, stakeholder feedback and reports.
- Community Feedback: Post-disaster “after-action reviews,” perception surveys, focus groups.
- Evaluation Studies: Mid-term and end-line evaluations on EWS performance and cost-effectiveness.
- Simulation Exercises: Targeted community drills with monitoring of response times and coordination effectiveness.

5.2.4 Roles and Responsibilities

- National: The SAWS – observations and monitoring of weather, climate and air quality, forecasts, issuing of alerts and early warnings, technical validation.
- Disaster Management Centres (NDMC and PDMCs) – coordination, risk knowledge, risk mappings, integration of indigenous knowledge systems (IKS), community outreach programs, dissemination,
- DCDT, supported by Local Government and Traditional Leaders – last-mile communication, and dissemination technologies rollout.
- The South African Red Cross Society (SARCS), supported by Civil Society and Private Sector – preparedness drills, anticipatory action, community training, and awareness campaigns.
- Communities – feedback, co-production of impact-based early warning systems, local monitoring, meaningful participation and response.

5.2.5 Reporting and Learning

- Quarterly Monitoring reports: operational metrics, challenges, corrective actions.
- Annual Evaluation: effectiveness and efficiency of the system.
- Exchange Platforms: stakeholder conferences, workshops, lessons learned feedback, and exchanges (knowledge, skills, technologies, resources, and best practices).

5.2.6 Critical Success Factors

- Integration into the national M&E frameworks (linking to SDGs & Sendai Framework targets).
- Use of impact-based forecasting indicators (measuring lives and livelihoods saved, not just technical accuracy).
- Meaningful community participation and gender-sensitive approaches in evaluation.
- Continuous capacity building and feedback loops.

6. INVESTMENT AND FUNDING MECHANISMS FOR EW4ALL INITIATIVE

6.1 Significance of EW4ALL Funding

- Effective national multi-hazard early warning system that saves lives, livelihoods, and critical infrastructure.
- Reduces economic losses from climate induced disasters (cost-benefit ratio up to 1:10).
- Essential for climate resilience society, national security, and sustainable development

6.2 Possible Funding Sources

6.2.1 National Budget and Treasury Allocation

- The National Treasury should consider making base funding provision for the EW4ALL to enhance disaster risk reduction (DRR) and climate adaptation.
- Dedicated funds for disaster preparedness and resilience.
- A co-financing approach in partnership with the Private Sector (PPP) such as insurance, telecoms, agriculture, mining, etc., co-funding the early warning infrastructure, while benefiting from risk reduction and early warning services.
- Community-based funding where municipalities, NGOs, and Corporate Social Responsibility (CSR) allocate budgets towards early warnings, adaptation and resilience.
- Insurance Risk Pools using sovereign insurance facilities such as the African Risk Capacity to fund early warning as a cost-saving resilience measure.

6.2.2 International Climate and Development Finance

Multilateral Climate Funds

- Green Climate Fund (GCF): Large-scale projects for climate-resilient EWS.
- Adaptation Fund and Global Environment Facility (GEF): Grants for regional and national systems.
- Systematic Observations Financing Facility (SOFF): Strengthening climate data systems.

Development Banks

- World Bank, AfDB, ADB should consider making provision for grants to upgrade infrastructure and technology.

Bilateral Aid

- Targeted donor support for capacity building, training, and equipment.

6.2.3 Innovative Financing Instruments

Blended Finance

- Combines concessional donor money with private investment to de-risk EWS projects.

Resilience Bonds

- Financial instruments tied to disaster risk reduction outcomes, with early warnings as a condition.

Impact Investment

- Investors fund EWS projects that demonstrate both social impact (lives saved) and economic resilience.

6.2.4 Community-Level and Grassroots Financing

Community Contributions

- Local cooperatives and municipalities contribute to localized warning systems (sirens, colour coded flags, community radios, etc).

Corporate Social Responsibility (CSR)

- Businesses (especially extractive industries, logistics, and agriculture) fund local EWS as part of risk management.

6.2.5 Sustainability Financing

Co-production and developmental planning

- EWS embedded within health, education, agriculture, energy, mining, water, tourism and infrastructure to ensure continuous budget support.
- Co-produce sector specific forecasts and early warning services.

6.2.6 Next Steps

- Establish National EWS Financing Task Team (NDMC, SAWS, DCDT, SARCS, National Treasury, DBSA, Key Departments, Private Sector, and Business)
- Develop Project Pipeline for climate funds (GCF, Adaptation Fund)
- Implement the Cellular Broadcast for impact based early warnings dissemination.
- Establish PPPs for observation infrastructure improvement and last-mile alerts
- Integrate EWS funding into municipal IDPs and national budgets

7. CONCLUSION

The EW4ALL Roadmap marks a decisive step towards building a safer, more resilient South Africa in the face of intensifying climate and disaster risks. By strengthening risk knowledge, enhancing monitoring and forecasting capabilities, improving communication systems, and empowering communities to act swiftly, the roadmap provides a clear pathway to safeguard lives, livelihoods, and critical infrastructure.

This is not only a technical plan, but also a call for collective responsibility, uniting government, science institutions, local authorities, private sector, civil society, and communities in co-producing and owning the multi-hazard early warning solutions.

With intentional investment, continuous monitoring and evaluation, and strong regional and global partnerships, this roadmap positions South Africa to move from a reactive to a proactive stance in dealing with climate change and subsequent disasters thereof and ensuring that early warnings lead to early action. The successful implementation of this Roadmap will be a great honour to our national development priorities, the SDG's, the Sendai Framework, and our shared commitment to leaving no one behind, and will be a constant reminder to fulfil our G20 commitment as the 2025 host country.

Early Warnings for All

South African Weather Service

National Disaster Management Centre · South Africa

communications & digital technologies

Department: Communications & Digital Technologies

REPUBLIC OF SOUTH AFRICA

The South African Red Cross Society · SARCS