

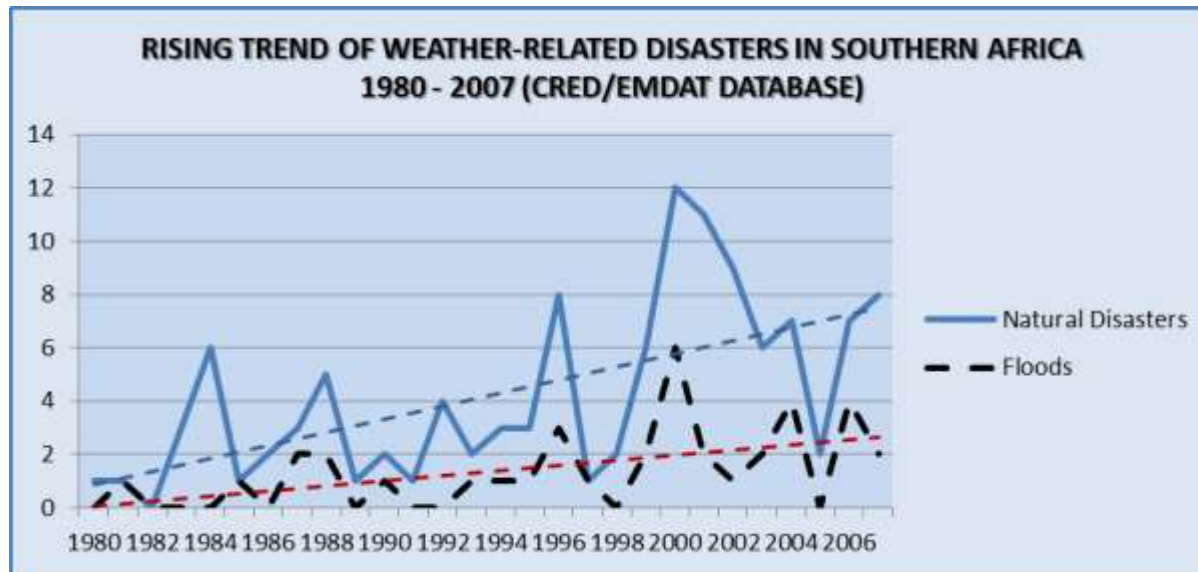
# ***PWS in support of Disaster Prevention and Mitigation***

*Eugene Poolman*

*RSMC Pretoria*

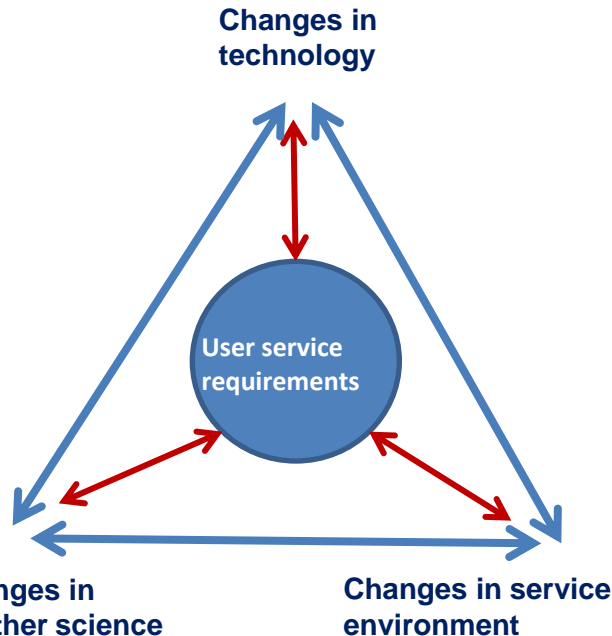
# Weather related disasters in the future

- Weather related disaster likely to increase in future due to:
  - Climate change
  - Increased vulnerability, particularly of growing urban populations
- Number of people affected is decreasing worldwide, but increasing in Africa (CRED)
- IPCC Special Report on Extreme Events (SREX): Call for more and improved Early Warning Systems (EWS) as a low-regrets measure



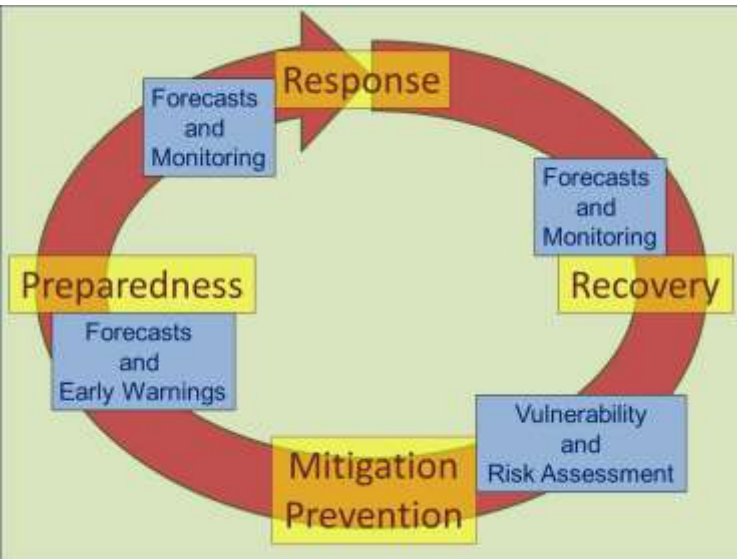
# Challenge to forecasting services

## Influences on Public Weather Services



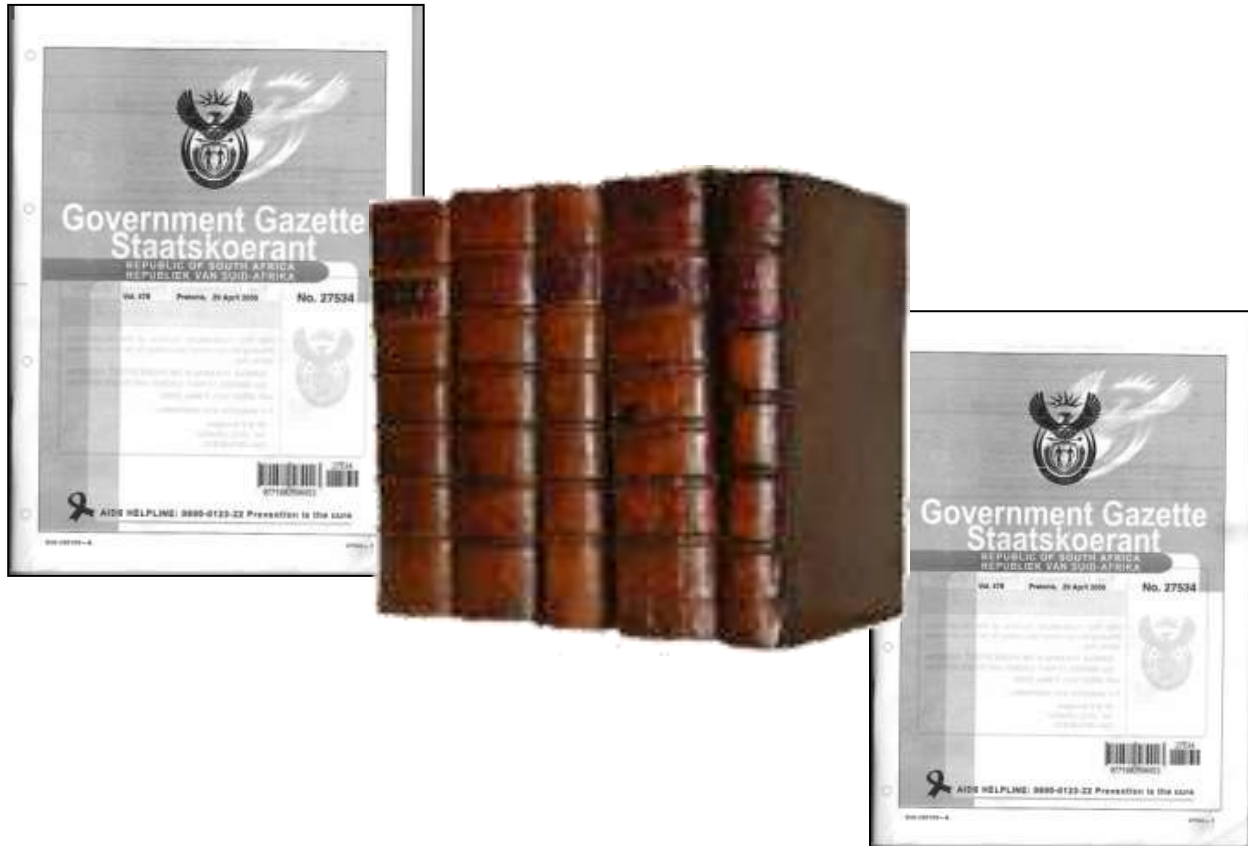
- There are significant changes in the environment of weather service delivery (the science, technology, user needs)
- What does the future hold for weather forecasting and forecasting services?
- How can weather forecasting and warning services adapt to reduce the threat of weather related natural disasters and increase community resilience?

# What is the Role of NMS in DRR?



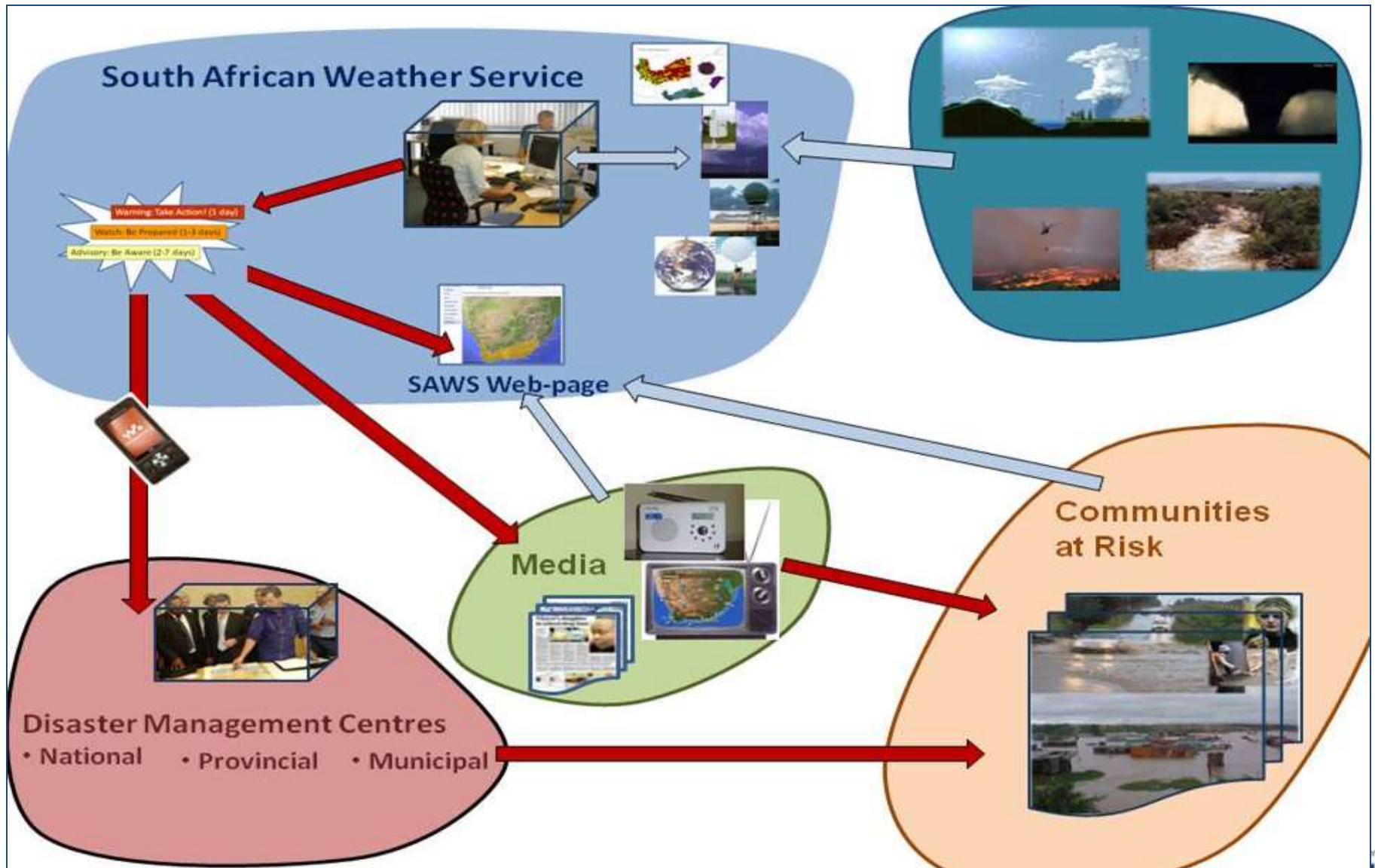
- NMSs involved in all the phases of DRR at all time scales
- Main focus is services related to hazardous weather
- Primary users are local communities and disaster management structures
- Services must be closely integrated with stakeholders
- Activities should be covered by appropriate legislation

# Legislative Environment



- How many countries have a Disaster Management legislation?

# EWS as an End-to-End Warning System



PCAST PRE 20150615 0011



Meteorological Center (RSMC)  
Pretoria

# Main Participants in EWS

- *Technical Monitoring Agencies*
  - Key national agencies to issue early warnings (like NMHSs)
  - Usually the *single official* voice for early warning information in country
- *Authorities Concerned with Impact*
  - Emergency management departments, disaster management centers
    - Responsible for declaring disasters
    - Coordinate response and recovery activities
    - Undertake preventative mitigation and preparedness activities
- *Communities*
  - EWS will fail if communities are not involved in risk assessment, dissemination, preparedness and response
- *Political Role Players, administrators*
  - Their support is crucial to make it work

# The Multi Dimensions of EWS

- An EWS can distinguish between different dimensions with its own roles and impacts:
- National early warning system
  - Mandated to for example the national meteorological service
  - Based on scientific monitoring systems
- Community based early warning system
  - Functions at the community level
  - Utilizes community based techniques or systems and knowledge
- Essential that all dimensions are integrated to avoid conflicting information



# International Developments in EWS

- **Development of an ISO Standard on Public Warnings**
  - Requires a regular revision of EWS and modifications where needed
- **Standardization is becoming important**
  - Using Common Alert Protocol (CAP) = xml based dissemination format
  - Intensively used in the USA, particularly during hurricane Sandy

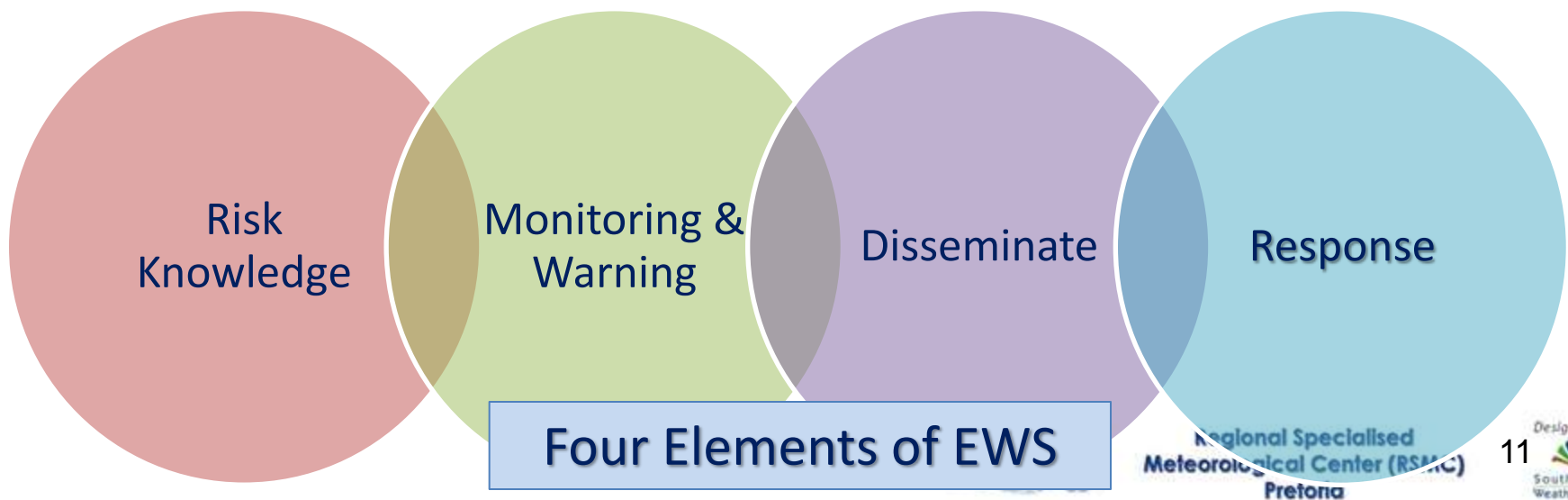
# International Developments in EWS (continued)

- **Warnings should focus on most disastrous weather related hazards**
  - to provoke response and action from emergency management and communities
- **International focus on reaching the End-users more effectively**
  - Products to be tuned to improve decision making
  - Warning dissemination effectiveness
  - Public awareness campaigns

# Effective National Early Warning Systems

## Three essential requirements

- **Technology:** State-of-the-art hazard monitoring technology and effective dissemination capabilities and procedures
- **Coordination:** Excellent coordination between all role players, Met Services, DMCs, Media, Local Communities
- **Information sharing:** Communities at risk must receive, understand and appropriately react to warnings



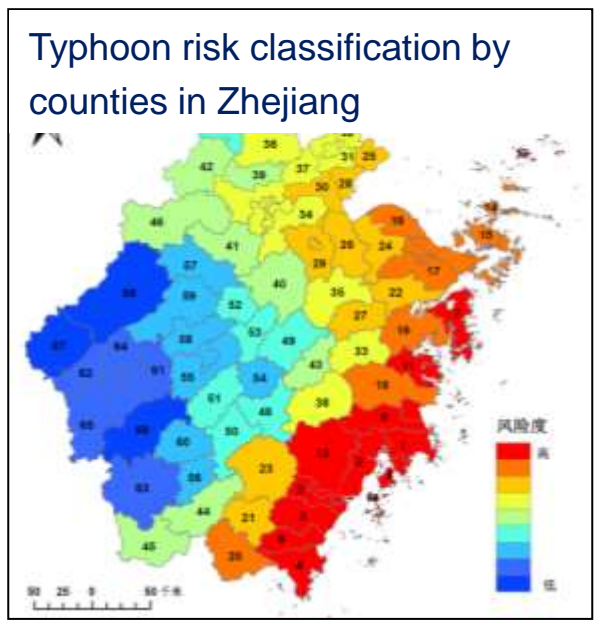
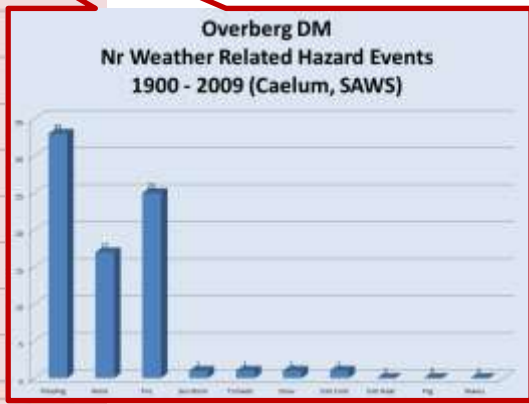
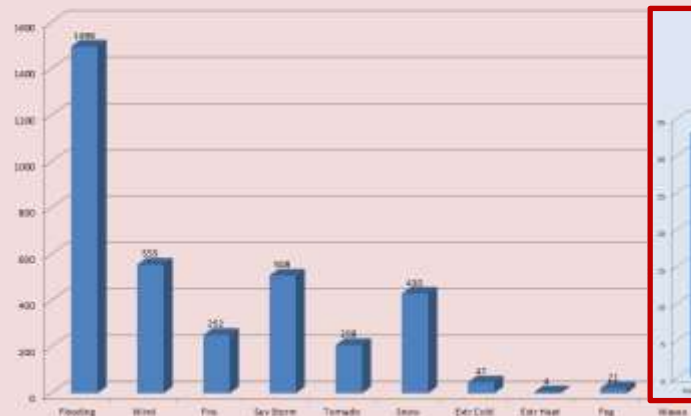
# 1. RISK KNOWLEDGE

Risk  
Knowledge

- Are the hazards known?
- Are the vulnerabilities assessed for each hazard?
- What are the patterns and trends? How does it change with seasons, and between dry and wet years?

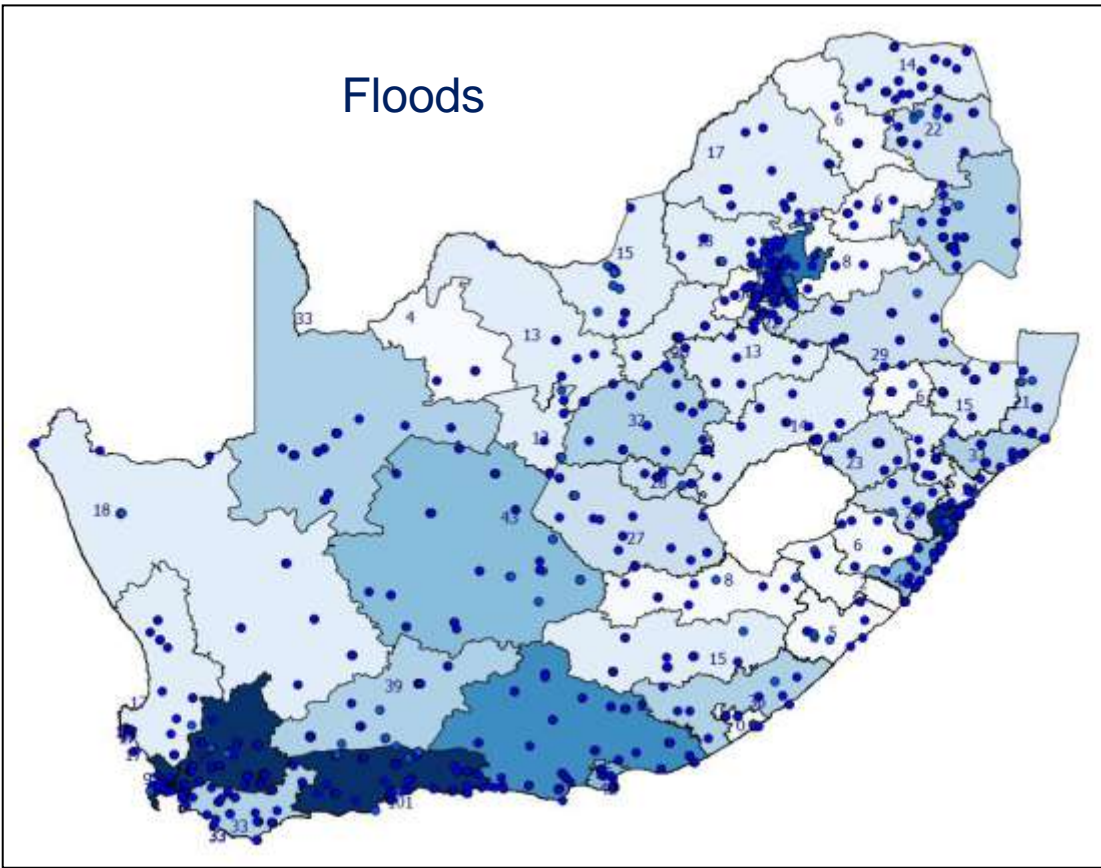


**South Africa**  
**Nr Weather Related Hazard Events**  
**1900 - 2009 (Caelum, SAWS)**

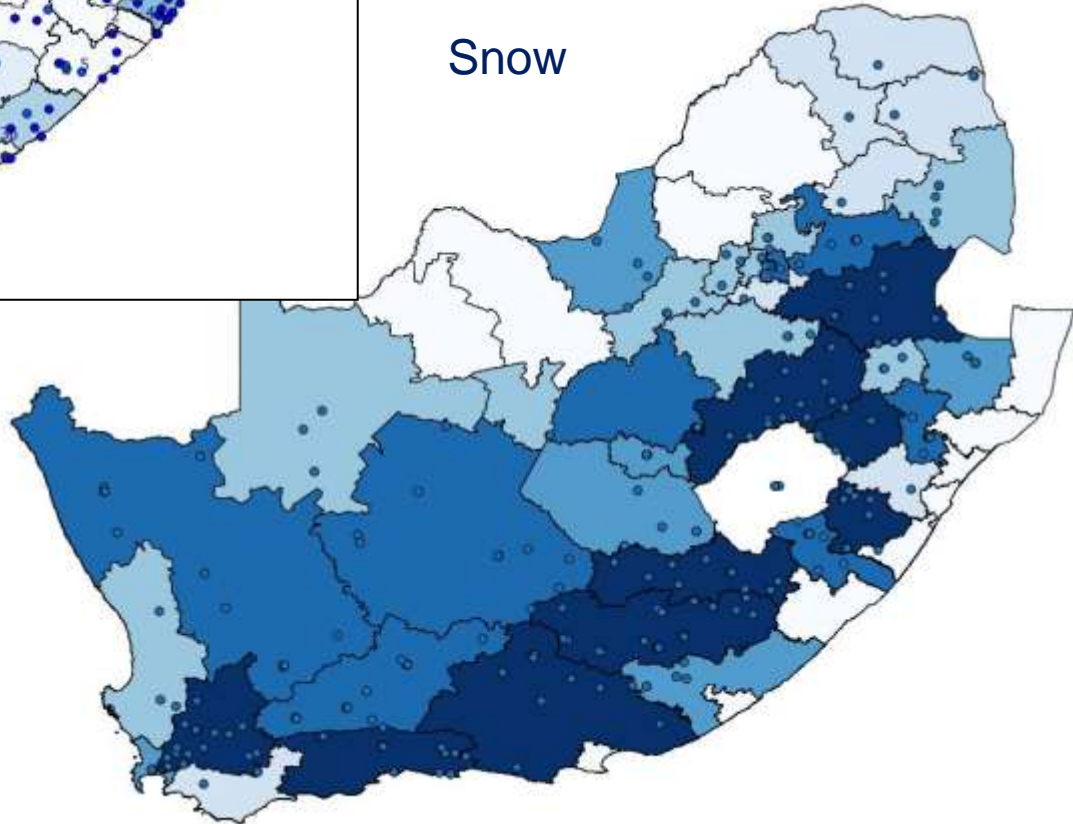




# Floods



# Snow



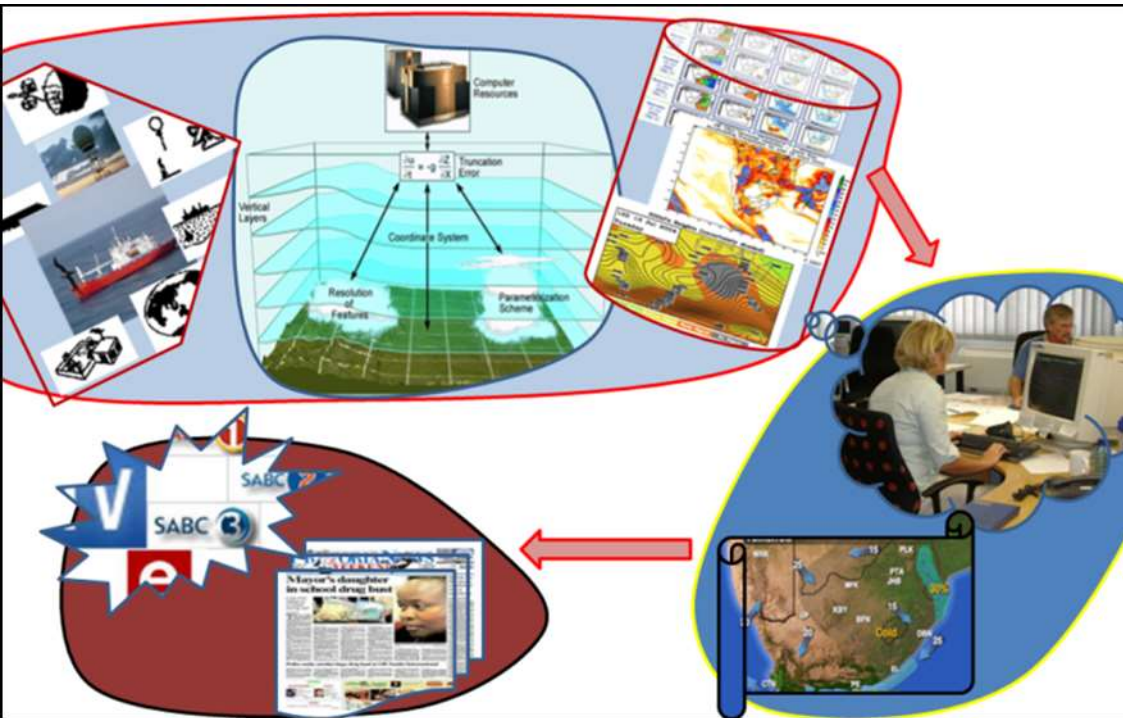
Number and distribution of reported weather events 1900 – 2009 (Source: Caelum)

## 2. MONITORING & WARNING PREPARATION

Monitoring &  
Warning

- Is there a sound scientific basis for making forecasts?
- Are the right parameters being monitored?
- Can accurate and timely warnings be generated?

- Scientific: Use of EPS, NWP and Nowcasting systems
- Timely: Extend the lead time using the EPS products





# 3. DISSEMINATION

Disseminate



- Do warnings reach those at risk?
- Do people understand the warnings?
- Do they contain useful information that enable proper responses?
- What is the best practice to ensure effective dissemination to communities at risk?

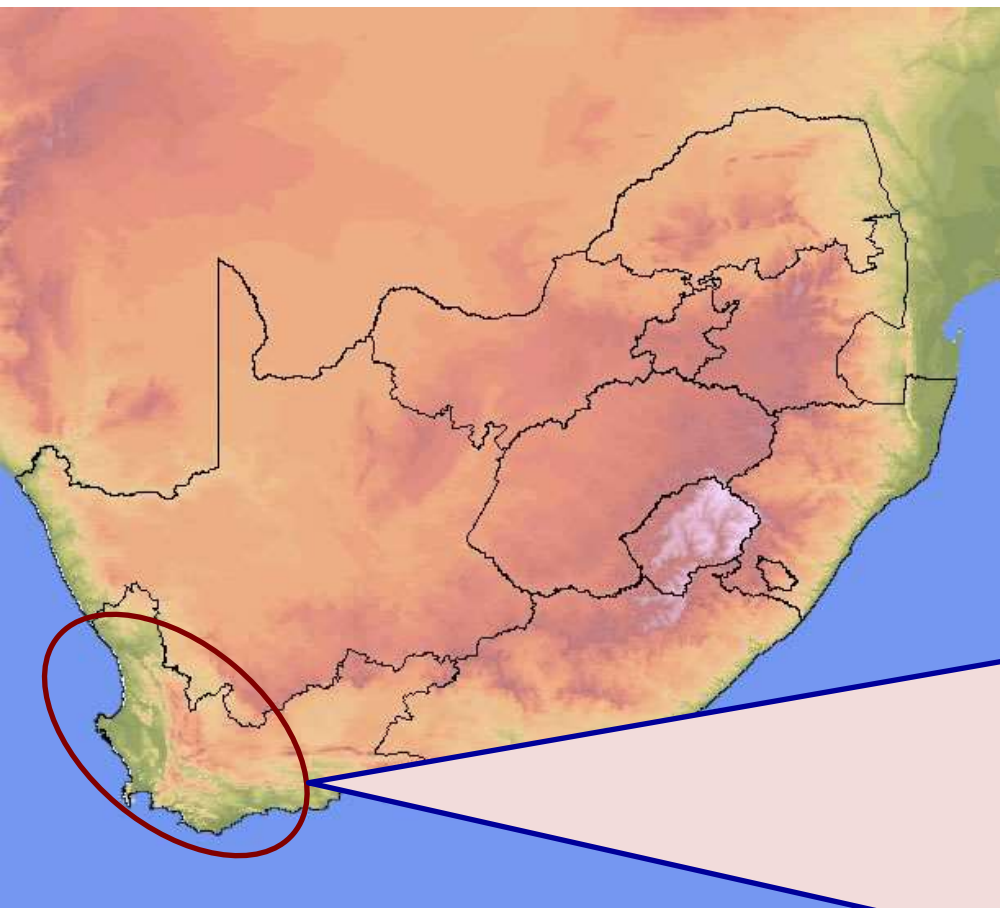
## Warning dissemination mechanisms

Disseminate

- To Disaster Management Centers prior and during event:
  - Internet, email, SMS, telephone
  - Specialized info through a DM website
- To general public and communities at risk:
  - Media, including TV, internet, newspapers, radio, community radio
  - Via local disaster managers
- Problem of dual communication to the public:
  - Developed cities
  - Rural communities – do we reach them effectively?

# The Challenge of User Relevant Forecasts

Disseminate



## Forecast for:

Jun – Aug 2010

## Region:

Western Cape

## Expected Weather:

Possibly more active cold frontal period towards mid-winter over western parts

## Consequences:

- ✓ Moderate risk of local flooding
- ✓ Coastal impacts due to high swell and strong winds caused by fronts
- ✓ Risk of wildfires throughout winter

# 4. RESPONSE CAPACITY

Response



- Do communities understand their risks?
- Do they respect their warning service?
- Do they know how to react?
- What is their coping capacity?
- Outreach & Public awareness campaigns

# User Requirements

(Based on research in USA, UK, SA, etc.)

Response

- Expectations from society are for the safety of families and their possessions, and minimal disruption of their daily lives
- Thus a requirement for continuous improvement of the MHEWS
- Can be summarized by a statement by a disaster manager: “Tell me **what** is going to happen, **where**, **when** and what the **impact** will be?”
- Information integration into user decision support systems:
  - *Seamless forecasting products* (over all timescales from next few hours to next season)
  - *Forecast lead time* for enough time for preparedness activities
  - Description of *forecast uncertainty* to weigh options for action depending the threshold
  - *Impact information* to direct reaction to relevant areas and on appropriate response

# Humanitarian Agencies Generally Requires: (according to WMO)

Response

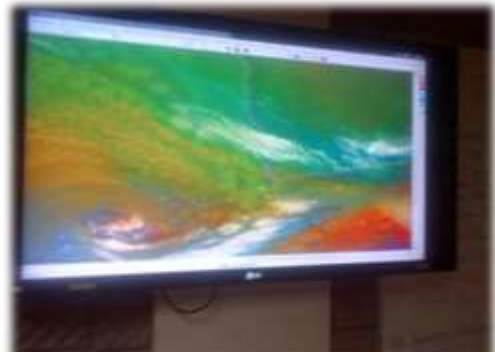
- Weather and hydrological information at *all spatial and time scales*
  - Need info to be *available 24/7* as required by operational needs, in a consistent, easily-understandable manner, tailored to their specific needs
  - Information to be augmented by *consultation and interpretation* to extract full value for effective action
  - A mechanism for *two-way communication* to exchange information
  - Require information (data, warnings) to be *readily available and geo-referenced* where possible for ingesting into commonly used systems
  - Require *training on meteorological/hydrological concepts*
  - Require *validation of authoritative advice*
  - Welcome *active and sustained engagement* with weather services
- **Importance of collaboration between NMS and DMA**

# Improve collaboration with Disaster Management

- How can we improve collaboration with Disaster Management?
- **Most important: Develop partnerships**
  - DRM need a professional they can trust to interpret the data
  - Build a relationship - importance of knowing them personally
  - Attend DRR meetings, be there

# Real-time Collaboration in Joint Operations Centres (JOC)

- Concept: Virtual forecasting desk within the JOC:
  - All relevant weather and disaster information needed by forecaster available at DMC JOC
  - Virtual forecasting desk duplicates forecasting environment in JOC and local Forecasting Office
- Forecaster on duty when required during adverse weather
  - Provide real-time weather warnings and information to all JOC members as event unfolds
- Typical example: NMBM-DMC
  - Activated at least three times in 2012/13 during severe flooding and snow events





# CONCLUSION

- A challenge facing *natural scientists* and *social scientists*:
  - exploit scientific and technological developments to *improve disaster risk reduction services* to the benefit of increasingly more vulnerable communities
- NMSs need to change from being product-centric to service oriented in term of DRR
- Improvements in services needed to enable best use of risk-based warnings
- Can only occur through strong collaboration and partnerships between role players from different sectors
- Developments allow new opportunities for better services in forecasting the risk of hazardous weather and their consequences in the next few years

# Questions?