

# Welcome

## How can El Niño long-range warning systems provide real benefits?



International  
Science Council



**T+T** Tonkin+Taylor

# Who is with you today?



**Michael H. Glantz**

Director, Consortium  
for Capacity Building



**Kareff Rafisura**

Disaster Risk Reduction  
UNESCAP



**Bapon Fakhruddin**

Natural Hazards Specialist  
Tonkin + Taylor



**Michael H. Glantz**

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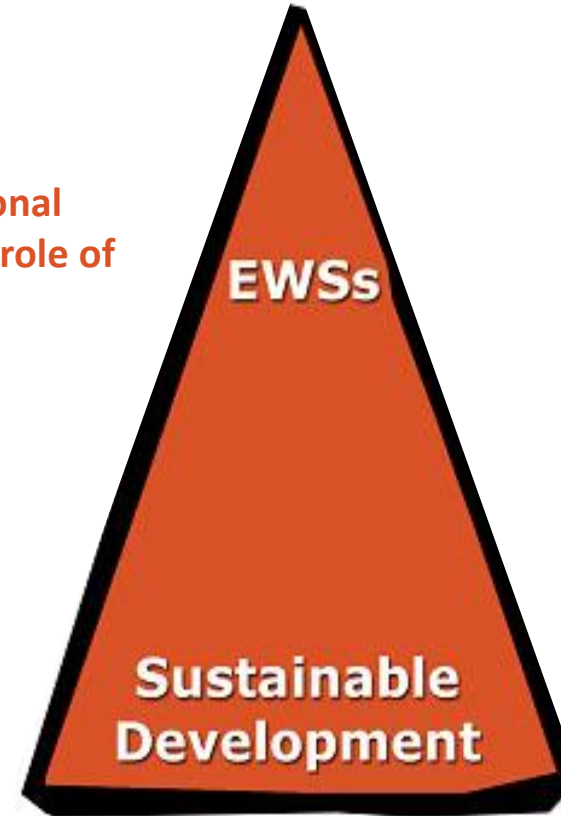
Director, Consortium  
for Capacity Building



# Heightened value of early warning systems

**A.**

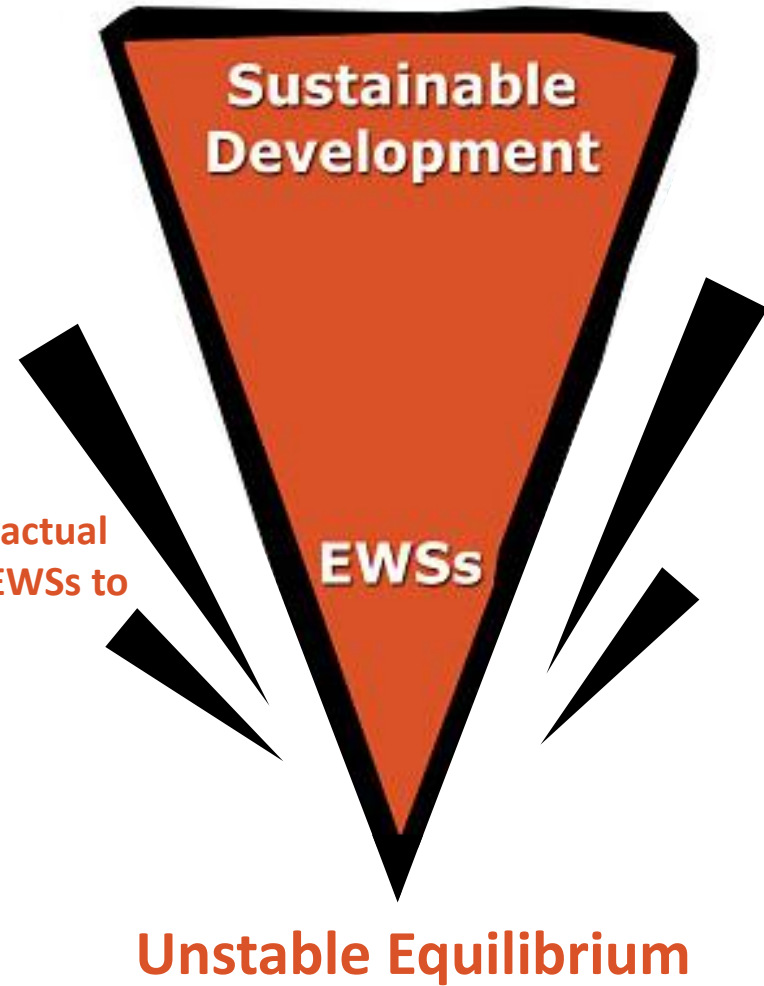
Represents traditional  
perspective of the role of  
EWSs in society



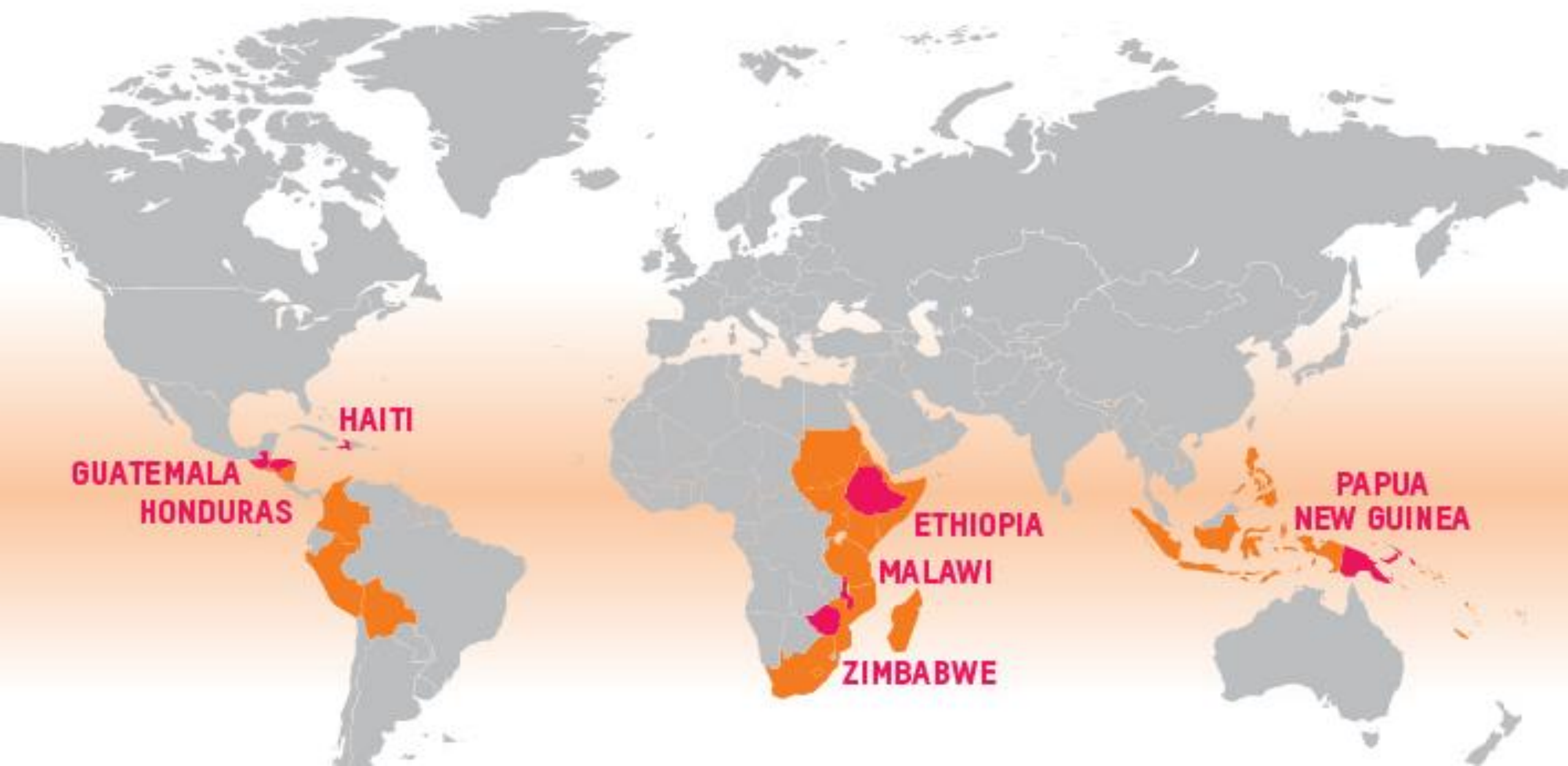
**Stable Equilibrium**

# Heightened value of early warning systems

**B.**  
Represents the actual  
importance of EWSs to  
society



# **DROUGHT. FLOODS. HUNGER.**

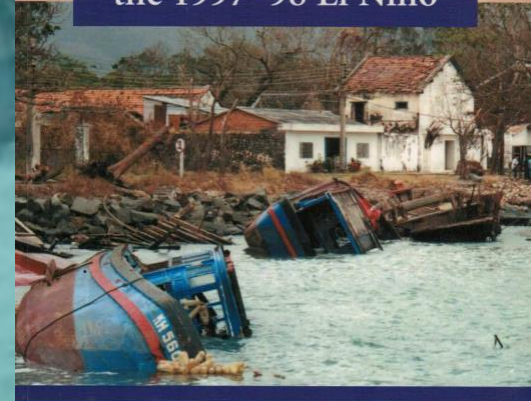




# Lessons learned from the 1997-98 El Niño

## Once Burned, Twice Shy?

Lessons Learned from  
the 1997-98 El Niño



*Edited by Michael H. Glantz*

Once burned, twice shy? – by Michael Glantz

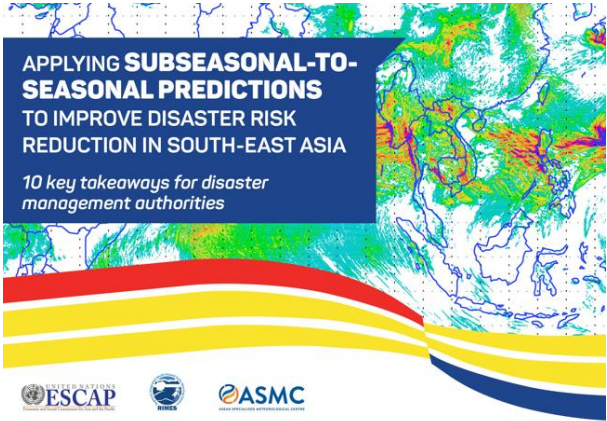
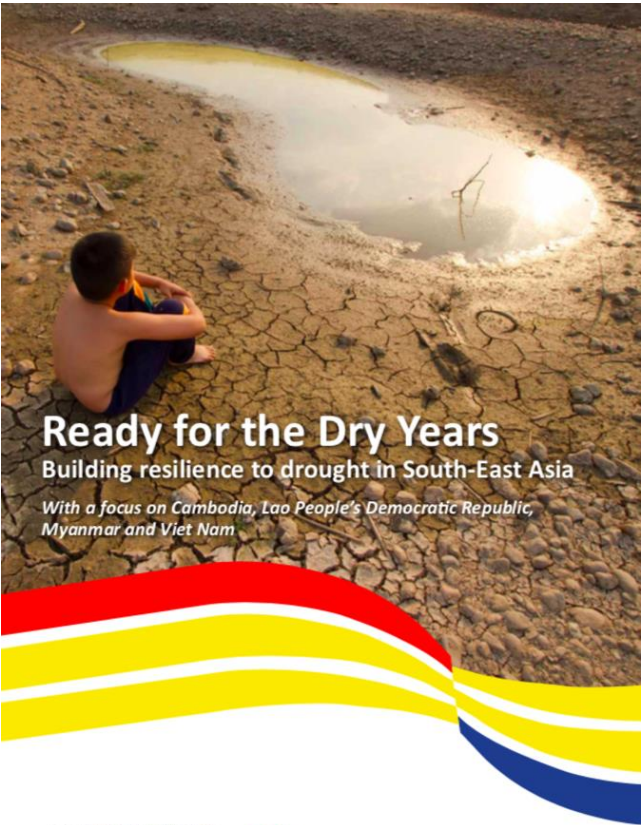


**Kareff Rafisura**

Disaster Risk Reduction  
UNESCAP



# Observations from public sector experiences in South-East Asia



# 1. Meeting differentiated information requirements

ENSO forecast



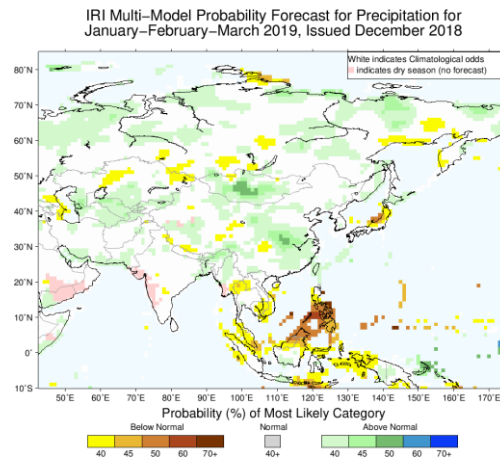
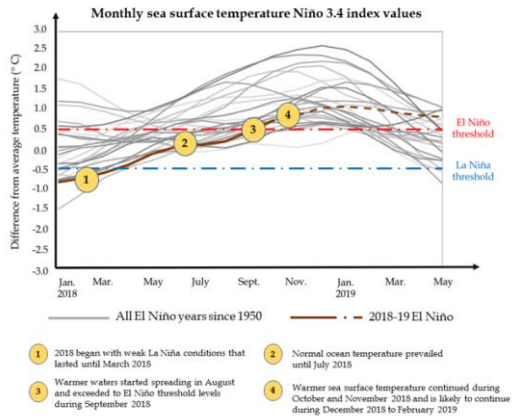
Climate & hydrological impacts



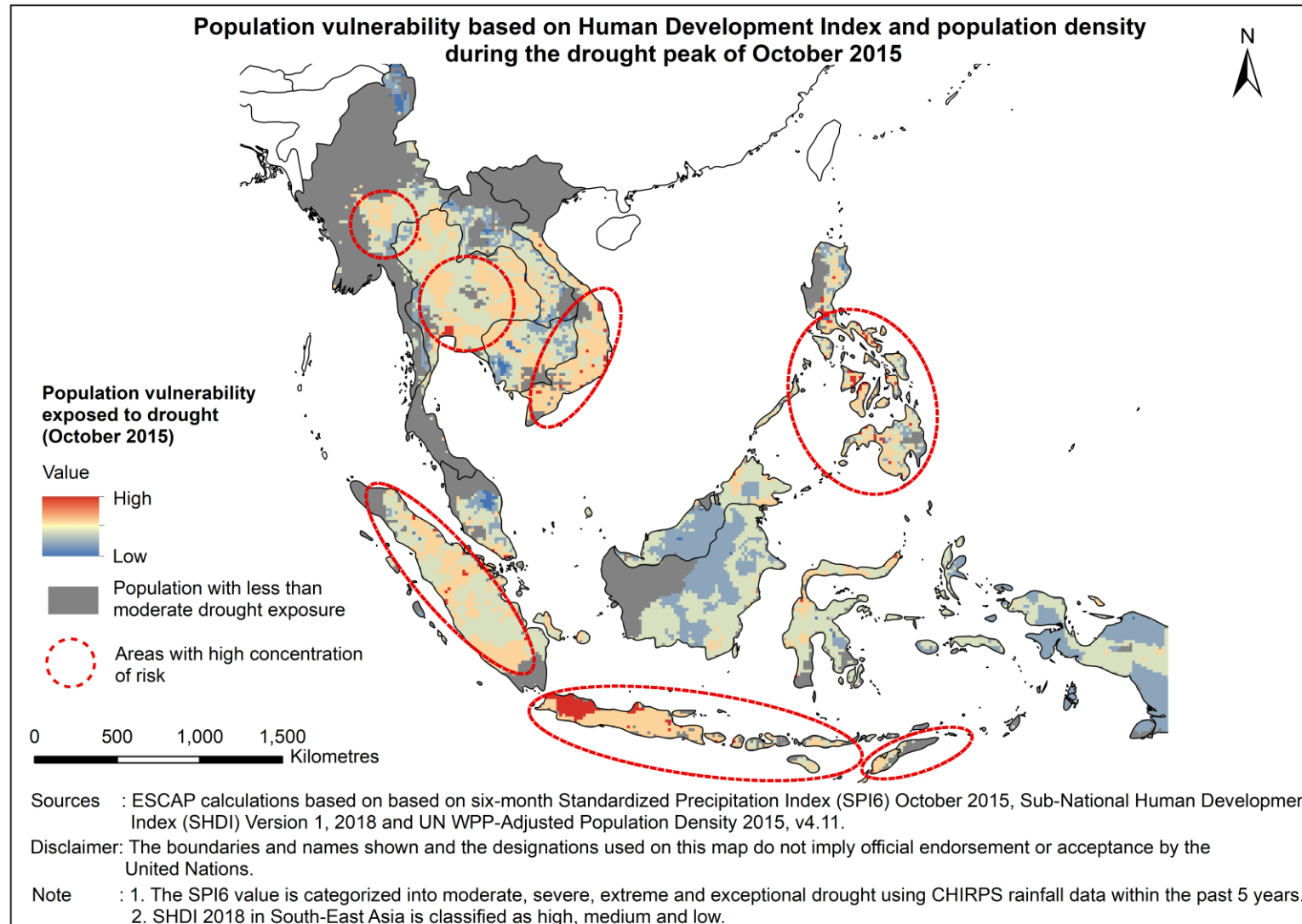
Impacts on sectors



Community impacts



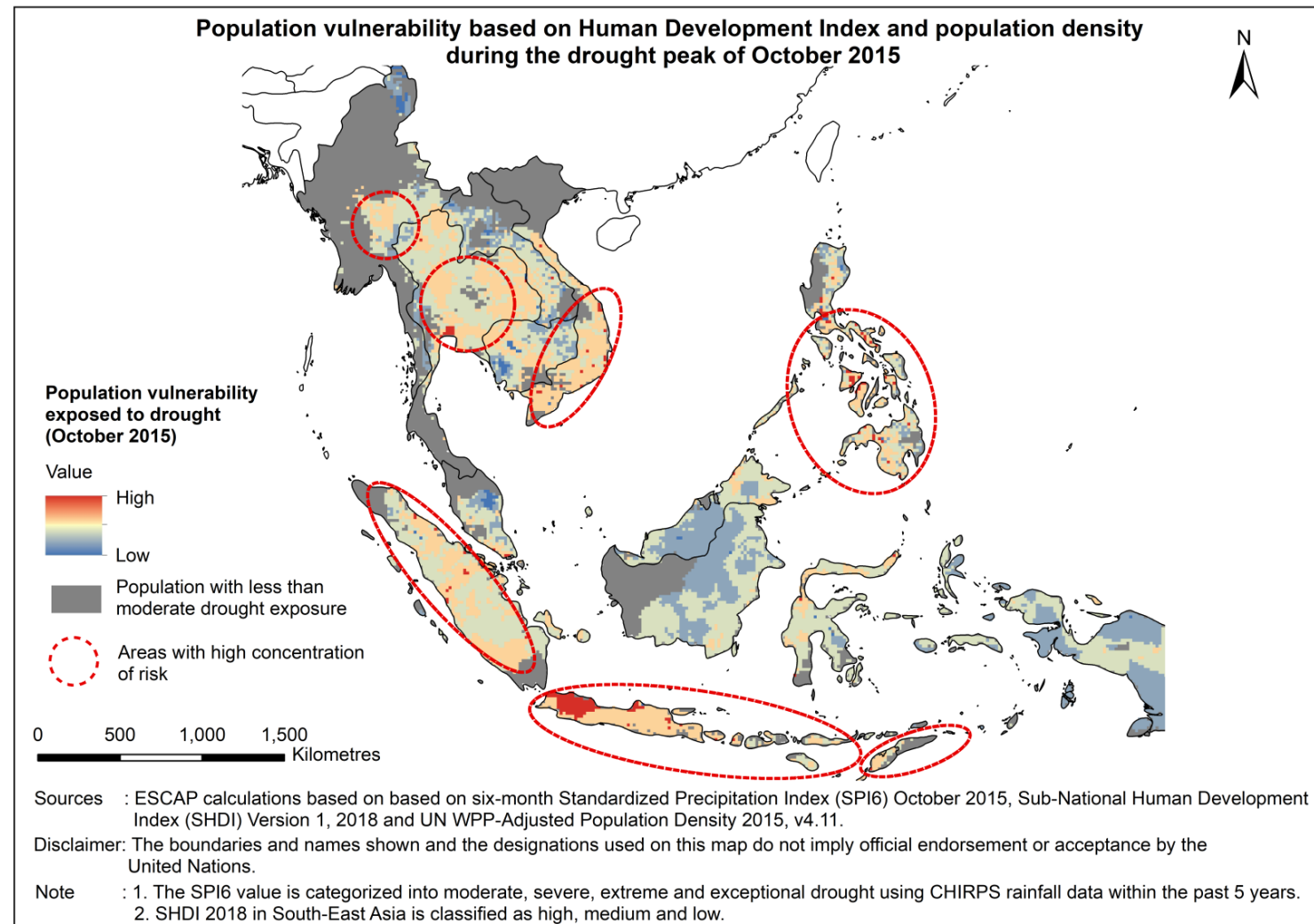
## 2. Early action in vulnerability hotspots, notwithstanding forecast limitations



**Source:** ESCAP and ASEAN (forthcoming, November 2020). Ready for the Dry Years Second Edition.



## 2. Early action in vulnerability hotspots, notwithstanding forecast limitations



# 3. Established communication channels & decision support tools

## El Niño Impact Outlook



Science and Policy Knowledge Series  
Integration of Disaster Risk Reduction and Climate Change Adaptation to

### El Niño 2015/2016 IMPACT OUTLOOK AND POLICY IMPLICATIONS

**1. Key Messages**

- The 2015-2016 El Niño is likely to be one of the strongest El Niño events in the region since 1977.
- Unlike the 1997-1998 El Niño that followed a neutral year in Niño, the 2015-2016 El Niño is following several months of a mild El Niño in 2014, the strongest phase so far and is intensifying.
- The observed impacts from July to October 2015 confirm patterns, resulting in drought conditions with intermittent heavy rain over the Asia and Pacific region.
- As indicated in previous El Niño Advisory Notes prepared for the 2015-2016 El Niño, the impact could be even more severe in uplands of Cambodia, central and southern India, eastern Indonesia, Philippines, central and northeast Thailand, Papua New Guinea and Timor-Leste.
- In the Pacific region alone, it is estimated that 4.7 million people are at risk of drought.
- The Pacific island countries are most likely to face severe risks of El Niño. The most vulnerable sectors are agriculture, freshwater fisheries, public health systems and infrastructure.

2015/2016

### 2018/2019 El Niño Asia-Pacific Impact Outlook for December 2018 to February 2019

Issued jointly by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES)

6 December 2018

The El Niño Southern Oscillation (ENSO) is like a seesaw, it takes two – the ocean and the atmosphere – to complete. This year, despite widespread above-average sea surface temperatures (SST) across the equatorial Pacific Ocean, the atmosphere has not yet responded. Therefore, only “borderline” conditions have prevailed in the region so far.

Although the stage is set for the tango, ENSO may or may not materialize, or just slightly influence some parts of the region.

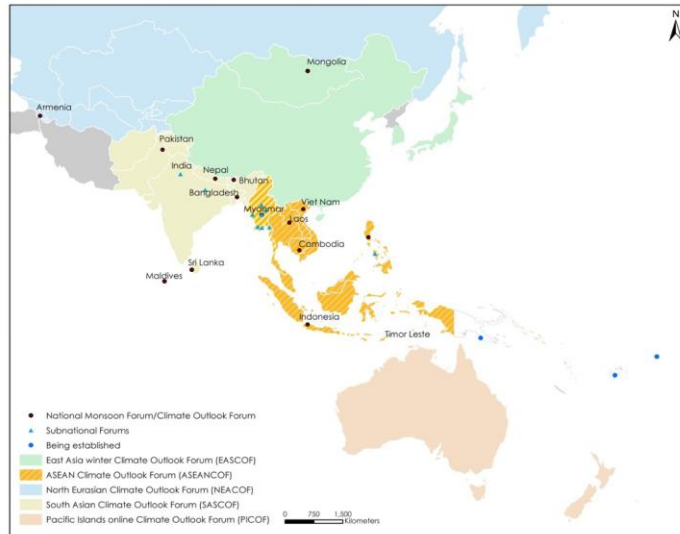
This situation requires policymakers and disaster managers to closely monitor its evolution. And, considering that El Niño is not the only factor causing climate-related disasters in the region, it is advisable to pay close attention to short and medium-range weather forecasts, as well as the already prevailing conditions that could make societies susceptible to the consequences resulting from the slightest deviations in rainfall and temperature as compared with what is normally expected.

This advisory is intended to inform the efforts of Governments, development and humanitarian agencies to understand the risks and to mitigate the potential impacts. Its coverage is regional and therefore, readers working in locations that are potentially at risk are encouraged to further refine the analysis using local exposure and vulnerability data. In this regard, the step-wise assessment tool developed by ESCAP, United Nations Development Programme (UNDP) and RIMES (2016) will be useful in guiding these efforts.<sup>1</sup>

1 ESCAP, UNDP and RIMES, 2016.

2018/2019

## Monsoon Forums/Climate Outlook Forums



## Climate Field Schools



## Easy-to-use decision support tools

Specialized Expert System for Agro Meteorology Early Warning (SESAME)

Sign in to start your session

Username

Password

Admin

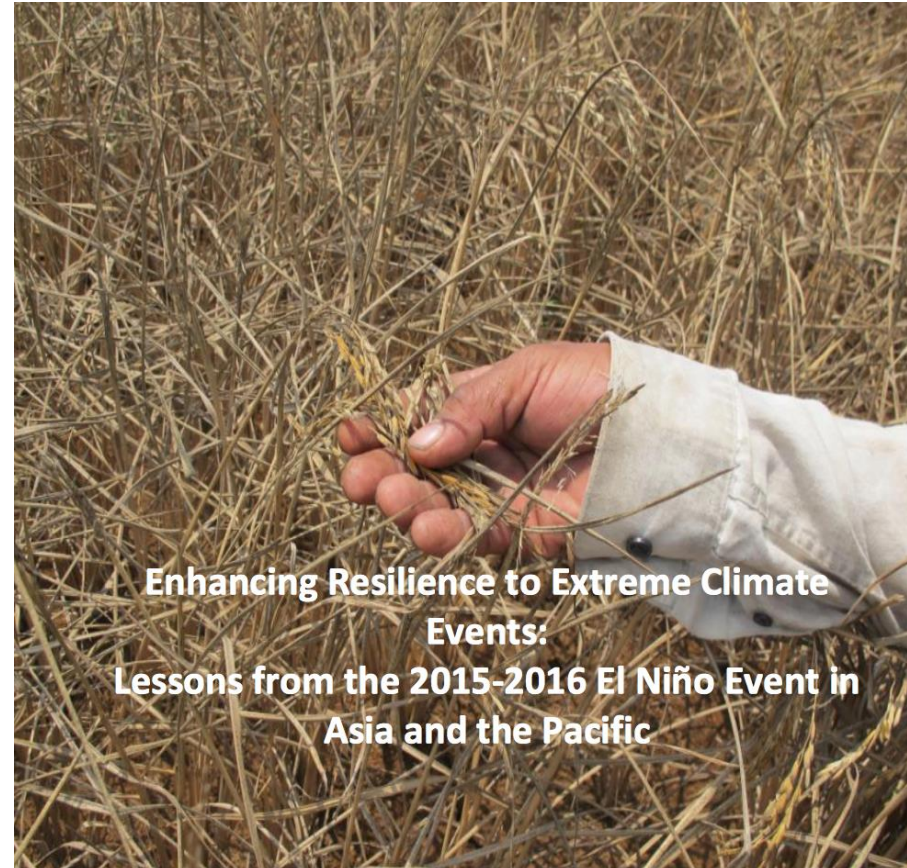
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Powered by Regional Integrated Multi-Hazard Early Warning System (RIMES)

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# Challenges Lessons learned Improving future planning + response



Enhancing Resilience to Extreme Climate  
Events:  
Lessons from the 2015-2016 El Niño Event in  
Asia and the Pacific







**Bapon Fakhruddin**

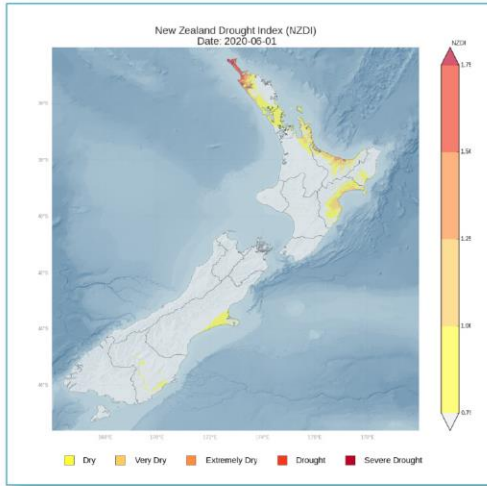
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Natural Hazards Specialist  
Tonkin + Taylor

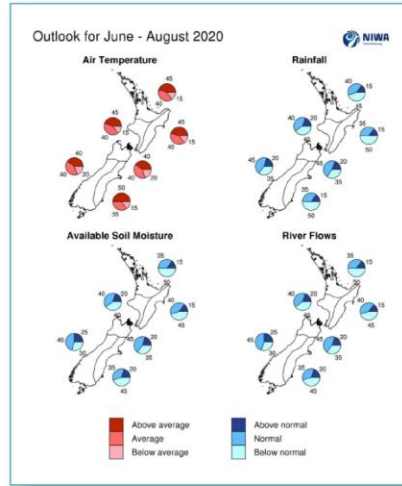


# Long range hazard forecasting and dealing with uncertainty

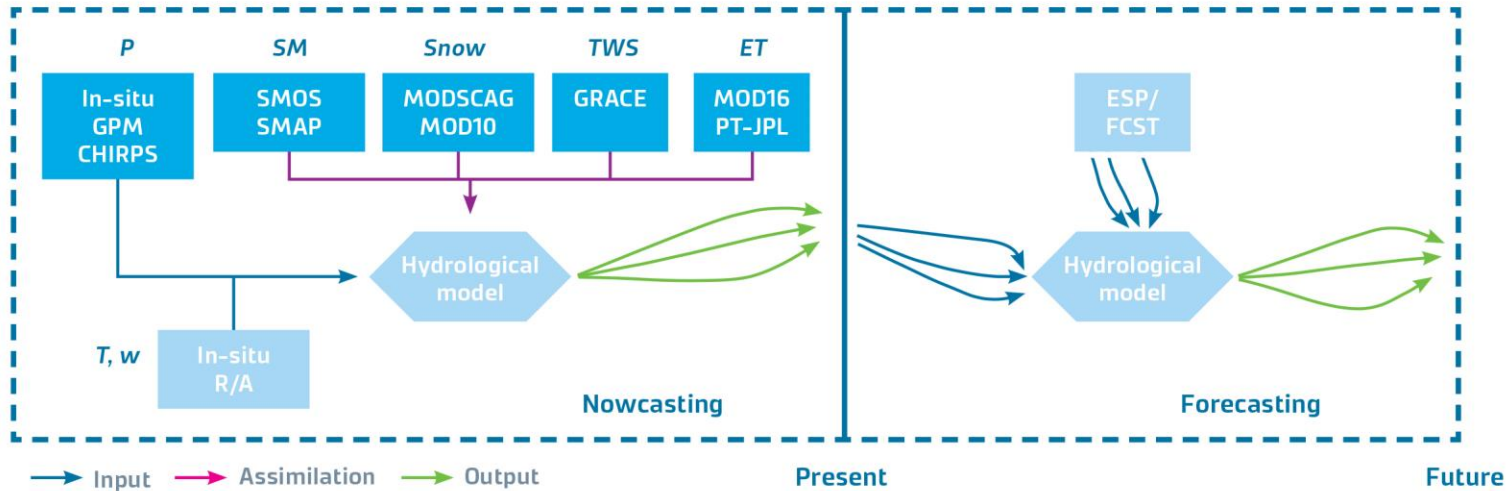
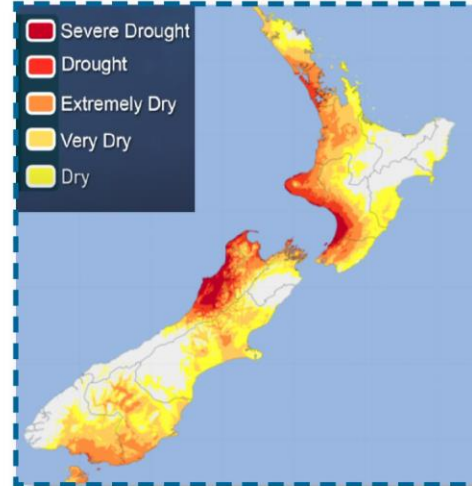
Nowcasting- Drought Index



Seasonal Outlook (1-3 months)



Drought Forecasting





# Drought early warning system

## Hydro-meteorological Variables

- Rainfall
- Streamflow
- Temperature
- Evaporation
- Soil-moisture
- Groundwater level
- Reservoir/lake level
- Satellite estimated products

## Drought indices

- Standardized Precipitation Index (SPI)
- Potential Evapotranspiration Deficit (PED)
- Palmer Drought Severity Index (PDSI)
- Soil Moisture Deficit (SMD)
- Crop Moisture Index (CMI)
- Surface Water Supply Index (SWSI)
- Soil Moisture Deficit Anomaly (SMDA)

## Climate indices

- El Nino-Southern Oscillation (ENSO)
- Sea Surface Temperature (SST)
- Southern Oscillation Index (SOI)
- Pacific Decadal Oscillation (PDO) North
- Atlantic Oscillation (NAO)
- Inter-decadal Pacific Oscillation (IPO)
- Madden-Julian Oscillation (MJO) Indian
- Ocean Dipole (IOD)

## Methodology

- Regression models
- Time series models
- Ensembles probability models
- Neural network models
- Hybrid models

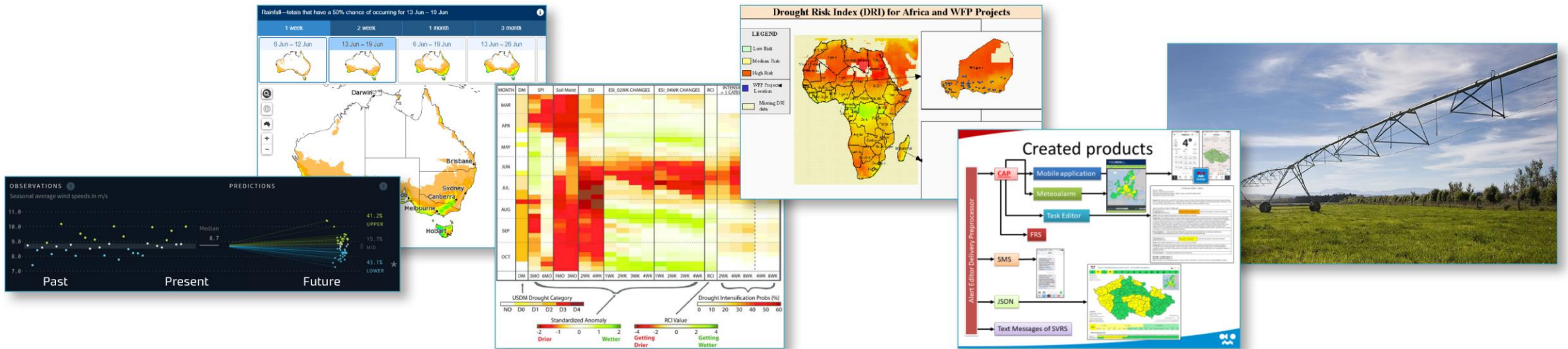
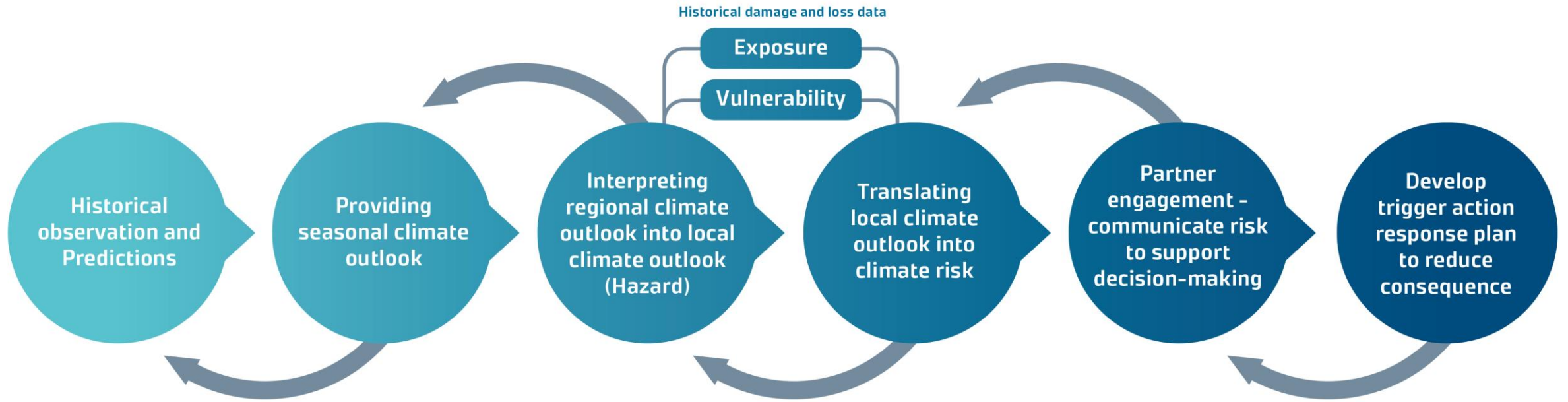
## Output

- Lead time
- Initiation and termination
- Nature of severity
- Probability of occurrence

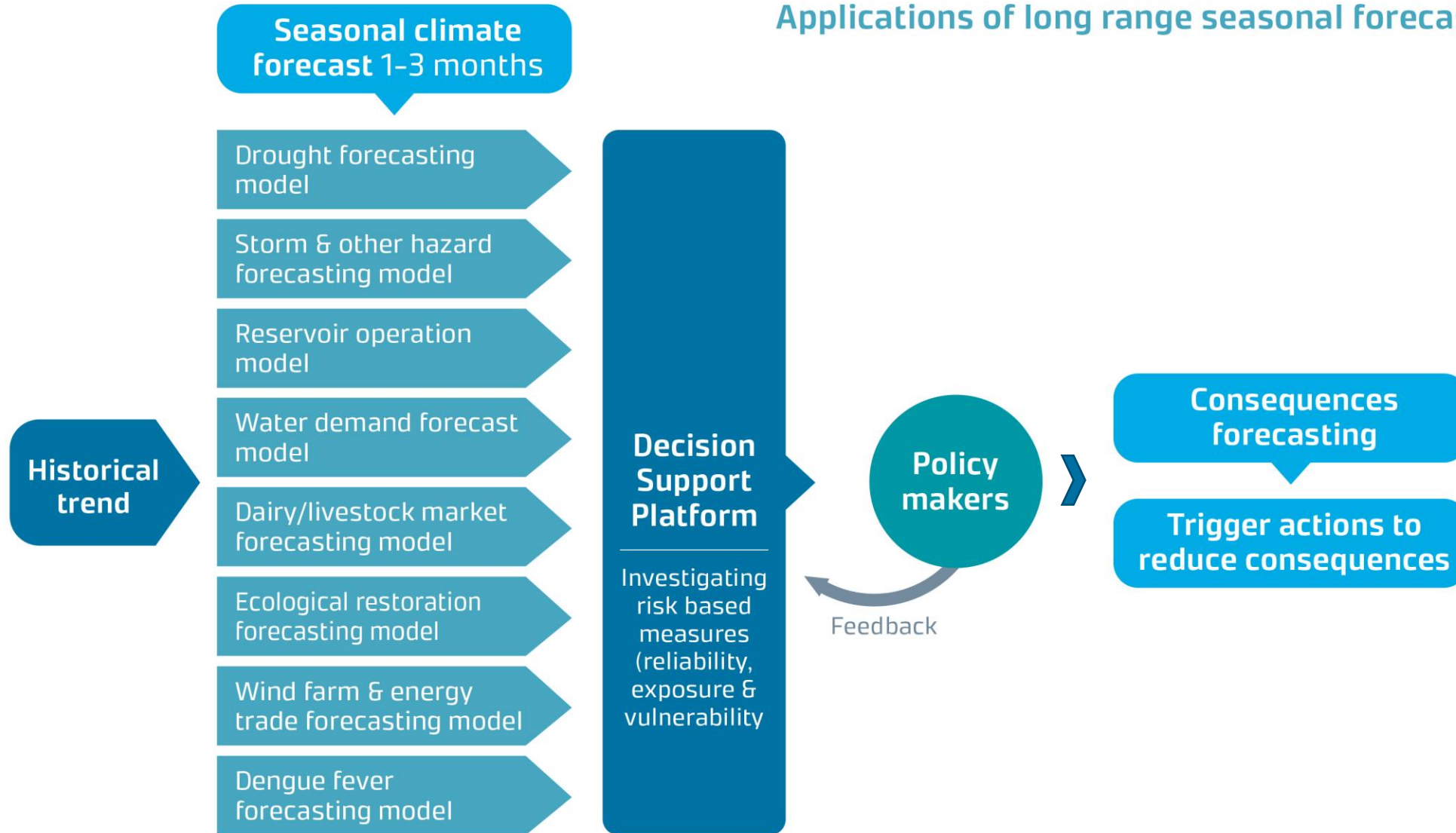
## Drought warning Spatio-temporal

- Severity (S)
- Duration (D)
- Intensity (I)
- Frequency (F)
- Area (A)

# Climate information and application system

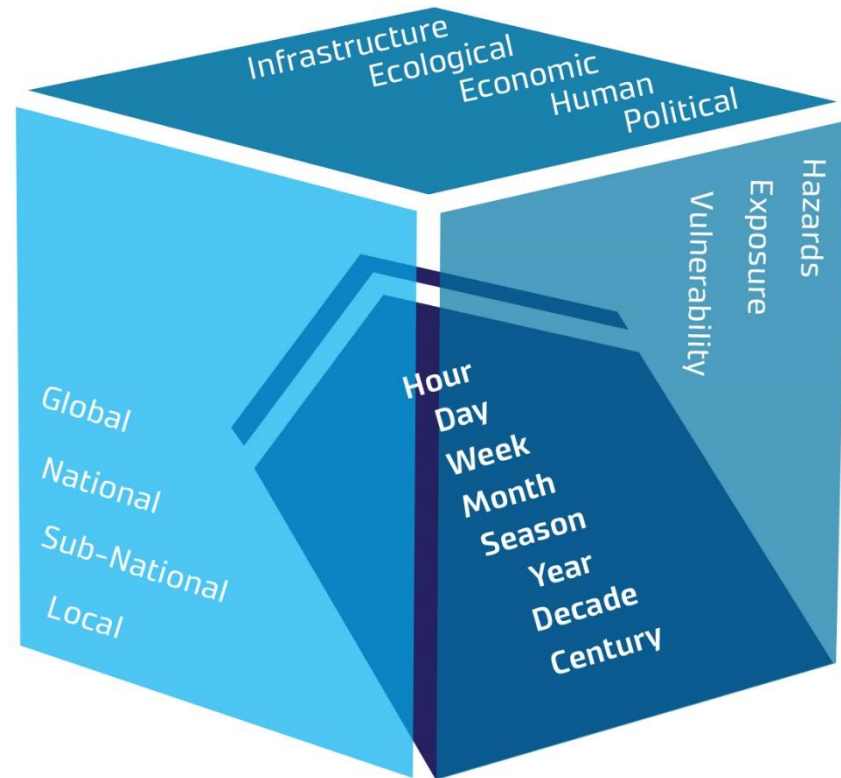


## Applications of long range seasonal forecasts





# Coherence from Global Risk Assessment Frameworks (GRAF)



## Multi-Hazard Impact Based Early Warning System



Q+A