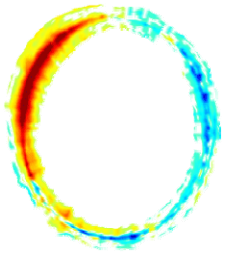
Seasonal Climate Forecasting for Natural Disaster Risk Management

Simon J. Mason

simon@iri.columbia.edu

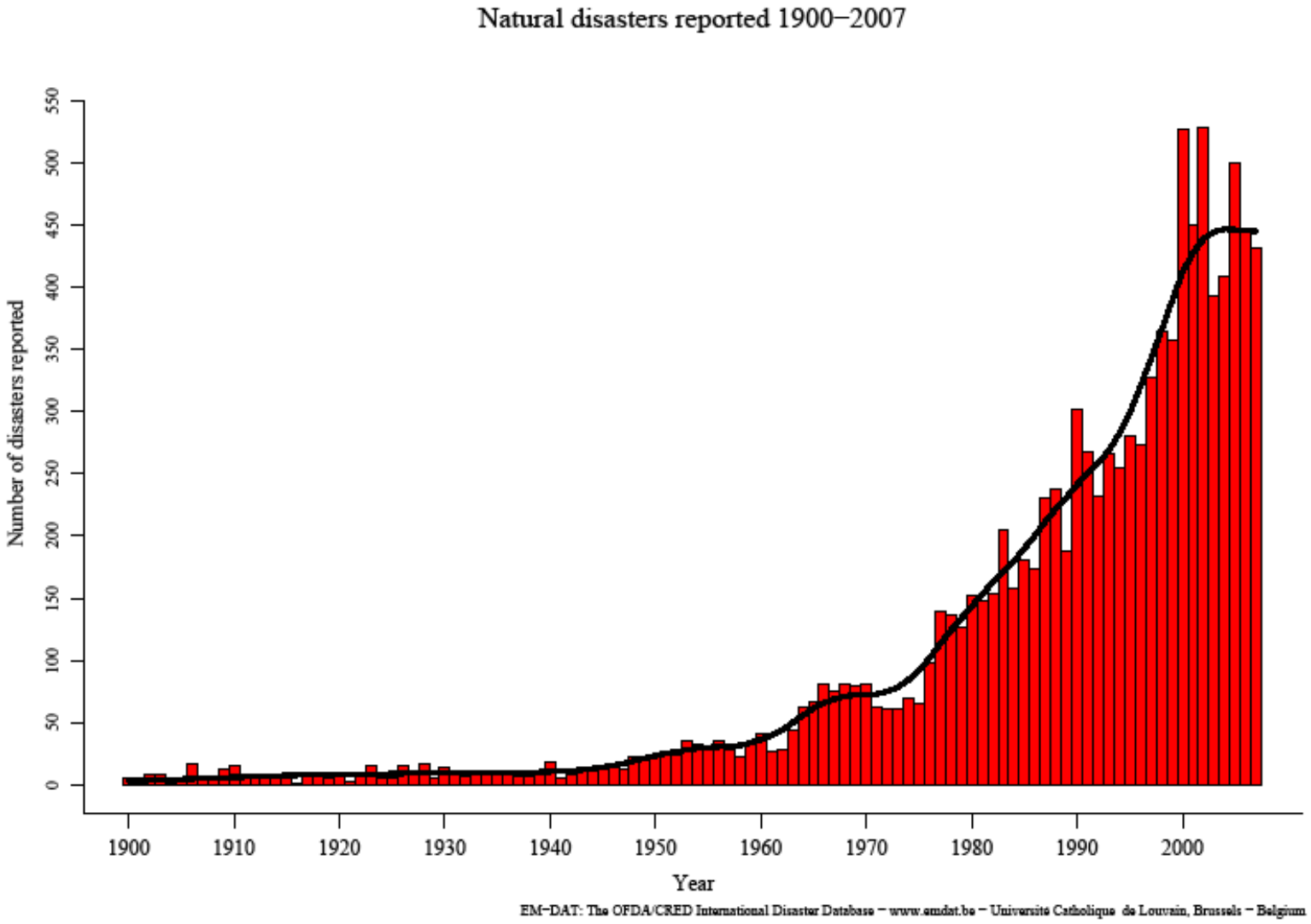


International Research Institute for Climate and Society
The Earth Institute of Columbia University

APEC Climate Symposium 2008

Lima, Peru, 19 – 21 August, 2008

The numbers of natural disasters has increased exponentially over the last few decades. Most of them are related to weather and climate events.



Source: CRED EM-DAT: http://www.emdat.be/


Can we forecast natural disasters at seasonal scales?
If we can, could anybody use the forecasts anyway?
GETTY IMAGES

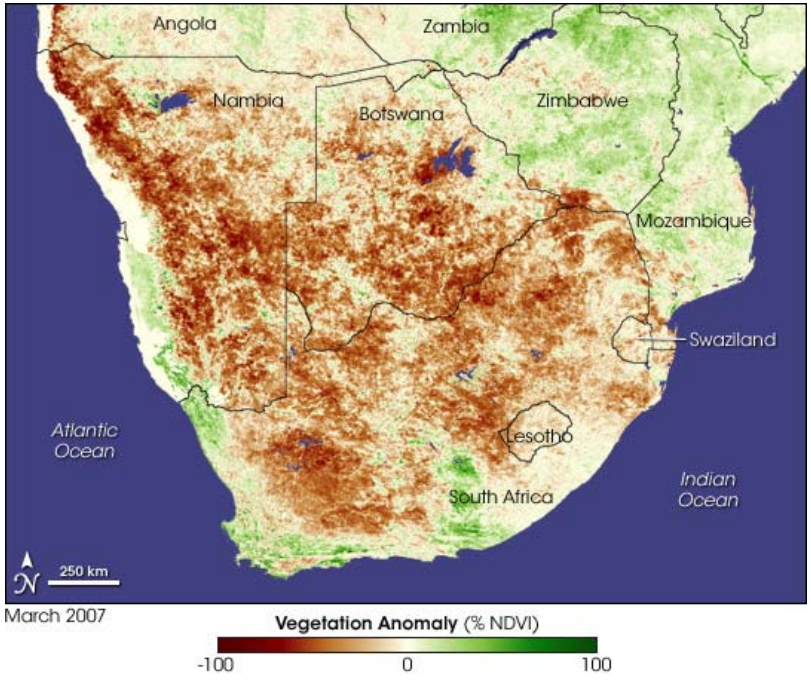
Most natural disasters are related to extreme weather and climate events.

Extreme events can be defined by:

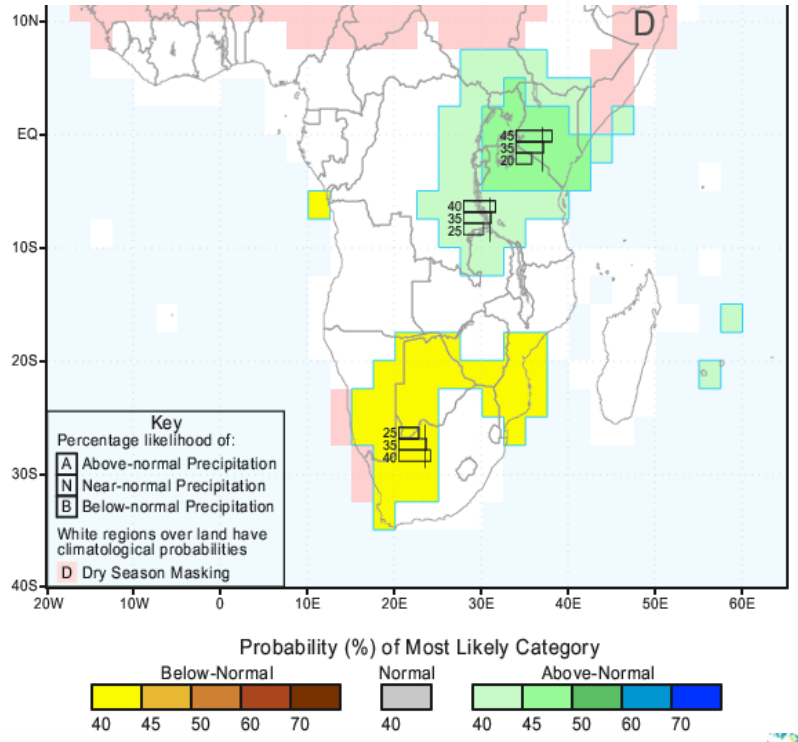
- Duration
- Magnitude
- Rarity
- Impact / losses

Long-Duration Extreme Events

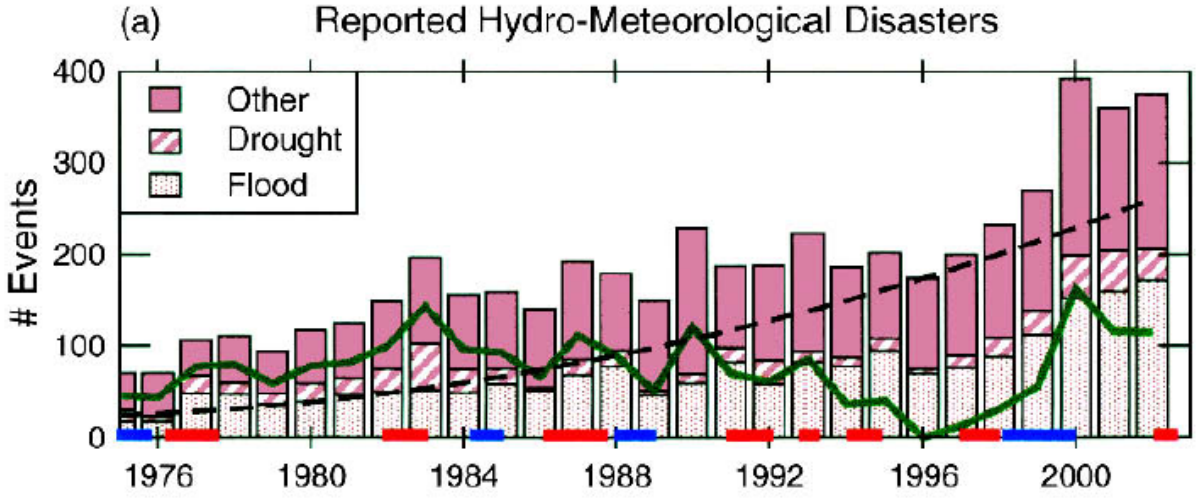
- the most obvious target for seasonal forecasts
- but the standard tercile-based seasonal forecasts are not very useful since “below-” and “above-normal” are not necessarily very extreme

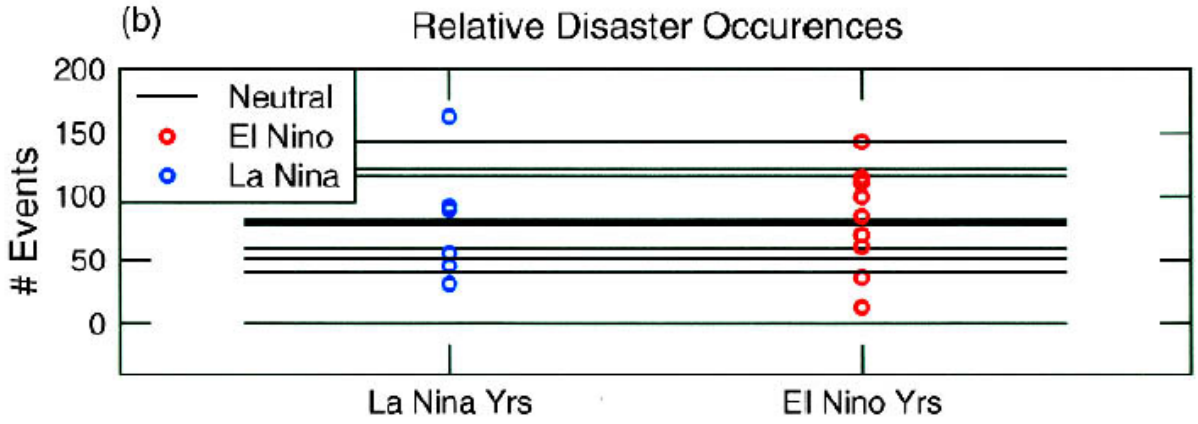


Southern Africa, March 2007 drought conditions.



Forecast from October 2006





Most natural disasters are caused by flooding, and are often associated with extreme weather events that are unpredictable at seasonal timescales.

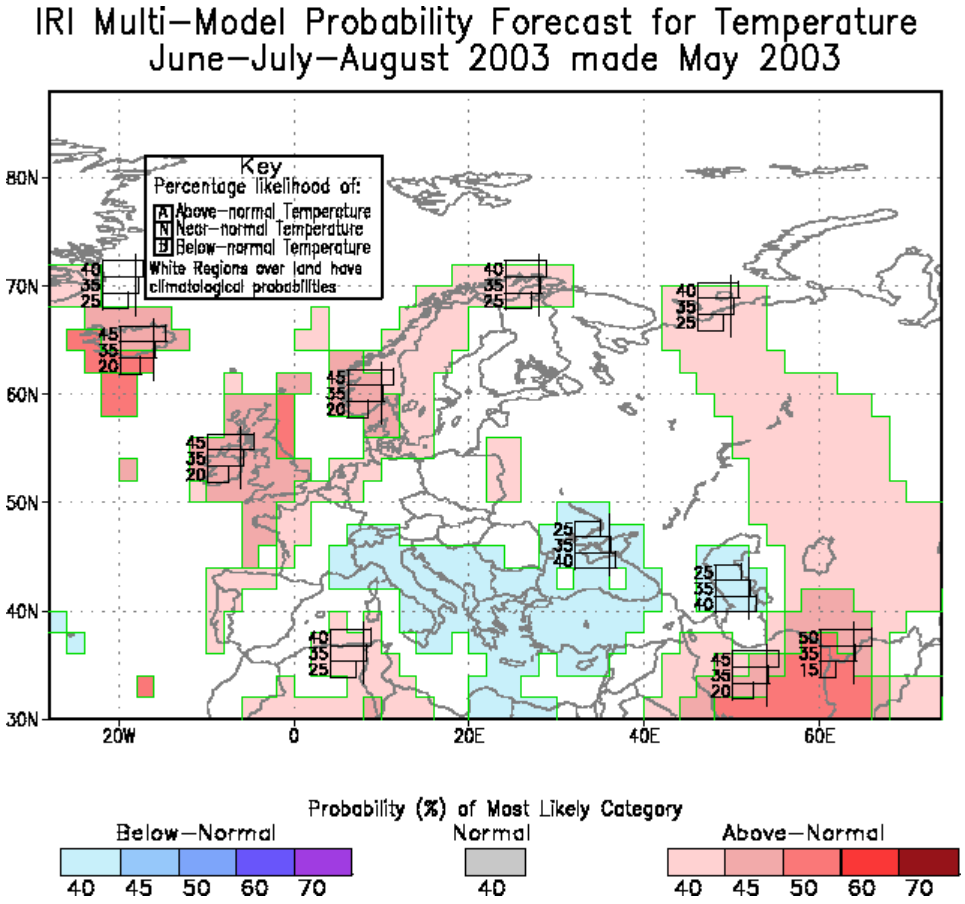
There is no marked increase in disasters during ENSO events.

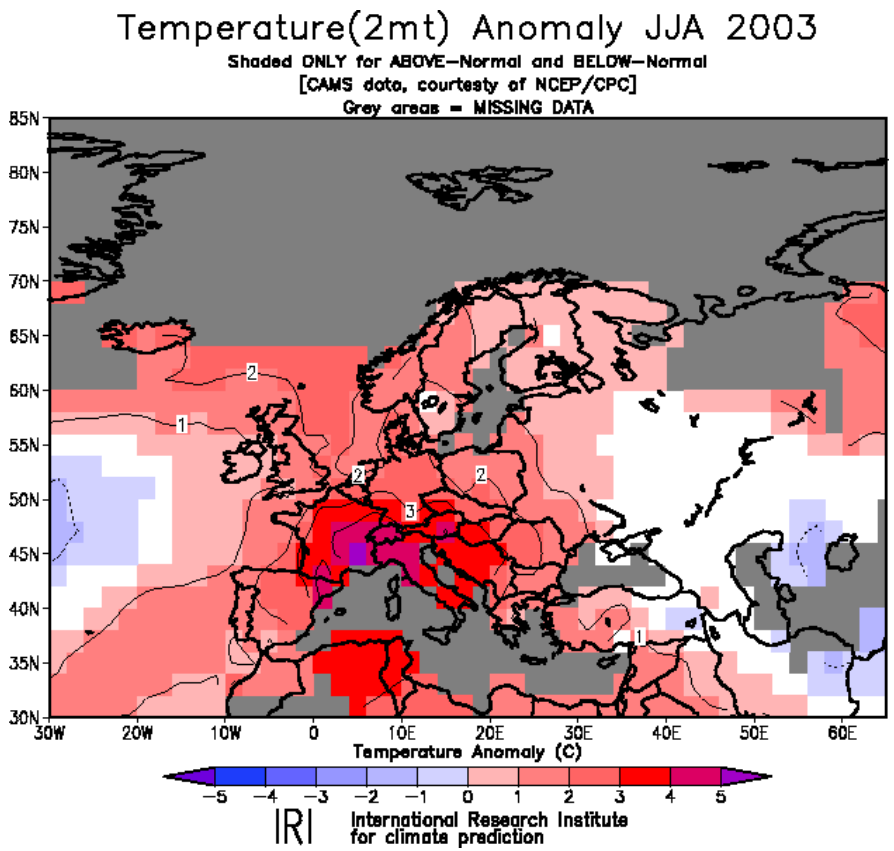
Intense Events

- not viable to predict specific weather events at seasonal timescales
- but some degree of predictability of frequencies of tropical cyclones, for example
- an important application for medium- and extended-range weather forecasts

Hurricane Emily,
July 2005

Rare events





Europe 2003 summer heat-wave had a return period of at least 9,000 years.

Rare events

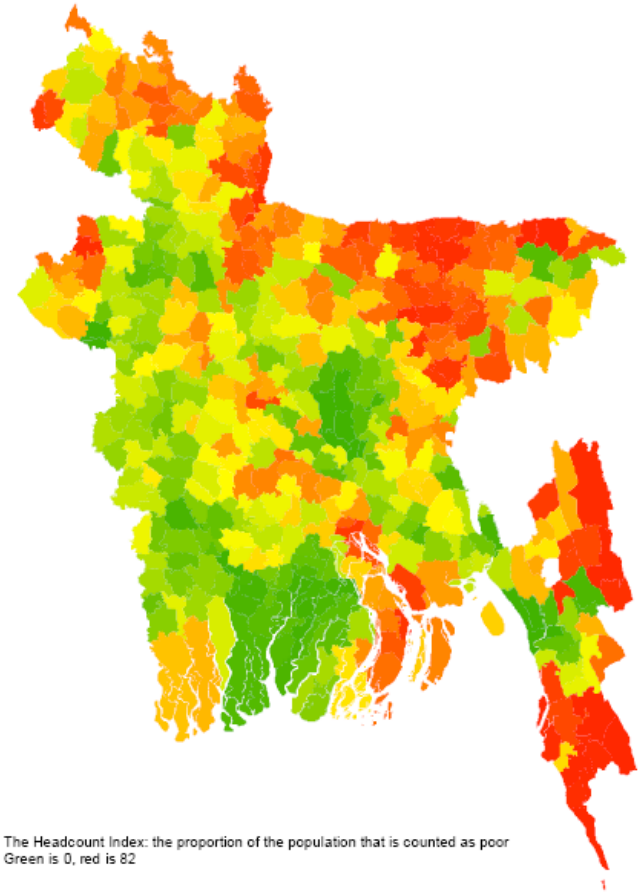
τάχ' ἄν τις εἰκὸς αὐτὸ τοῦτ' εἶναι λέγοι,
βροτοῖσι πολλὰ τυγχάνειν οὐκ εἰκότα.

Aristotle

It is in the very nature of probability that improbable things will happen.

Rare events are inherently difficult to predict, because they are inherently low-probability outcomes, but observed and expected changes in their frequency because of climate change are of great interest.

Impacts



The Headcount Index: the proportion of the population that is counted as poor
Green is 0, red is 82

Forecasting the impacts of extreme weather and climate events requires an understanding of the vulnerability of human populations as well as of the physical climate system.

A PARTNERSHIP TO SAVE LIVES

International Federation of Red Cross and Red Crescent Societies

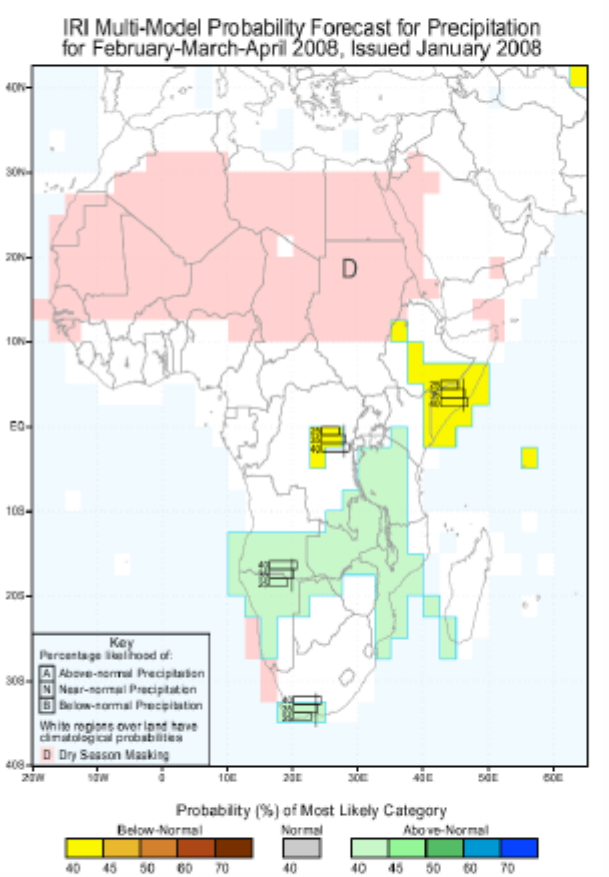
The International Research Institute for Climate and Society

Early-warning, early-action. Science meets the Federation.

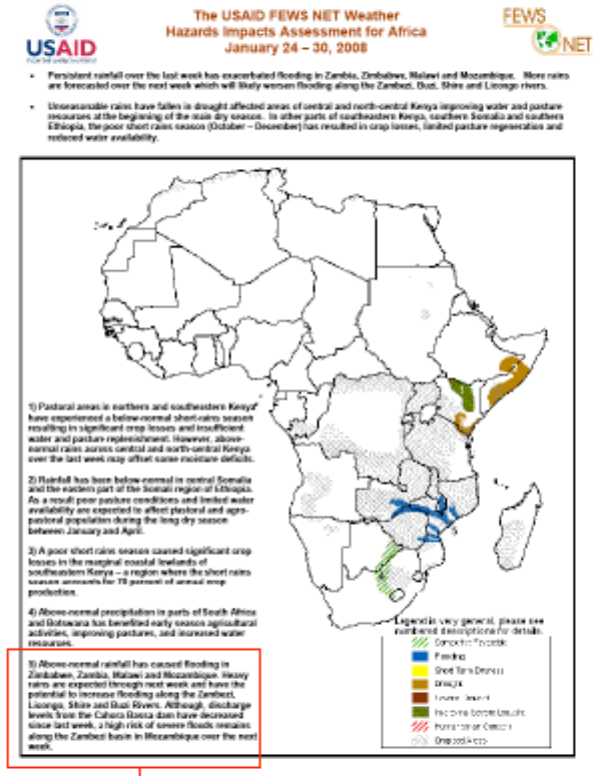
“Improved early warning can have a significant impact on a more strategic approach to disaster response.”

International Federation
of Red Cross and Red Crescent Societies

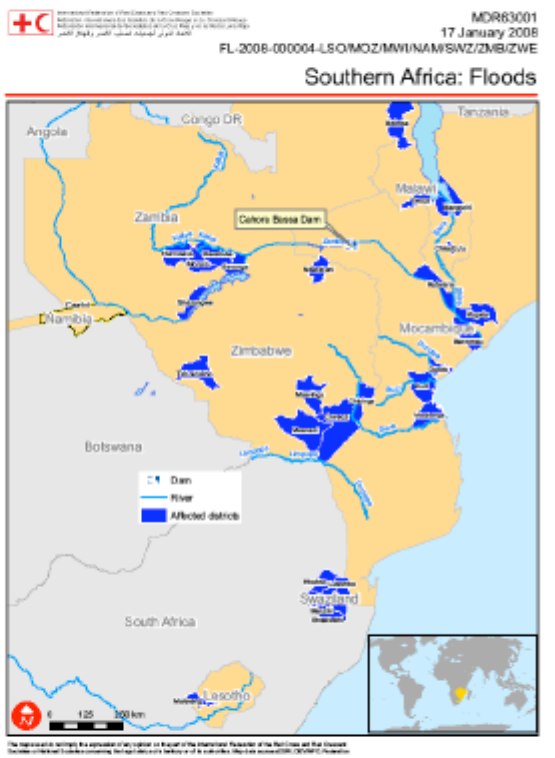
Seasonal forecast



One week forecast



Observation



Above-normal rainfall has caused flooding in Zimbabwe, Zambia, Malawi and Mozambique. Heavy rains are expected through next week and have the potential to increase flooding along the Zambezi, Licongo, Shire and Buzi Rivers. Although, discharge levels from the Cahora Bassa dam have decreased since last week, a high risk of severe floods remains along the Zambezi basin in Mozambique over the next week.

http://iridl.ldeo.columbia.edu/maproom/.IFRC/

Emergency appeal

International Federation
of Red Cross and Red Crescent Societies

West and Central Africa: Flood preparedness

Emergency appeal n° MDR61003
11 July 2008

This preliminary Emergency Appeal seeks CHF 750,000 (USD 731,134 or EUR 462,475) in cash, kind, or services to support the National Societies of West and Central Africa to assist 47,500 beneficiaries.

CHF 483,047 has been allocated from the Federation's Disaster Relief Emergency Fund (DREF) to start the planned activities. Discussions are currently taking place to reallocate approximately CHF 550,000 remaining from the 2007 West Africa floods appeal to support this appeal. While these discussions are underway, partners are encouraged to provide timely support to this appeal.

Red Cross Volunteer, Lomé, Togo, June, 2008

Conclusions

- Most natural disasters are related to extreme weather and climate events.
- But it is primarily only long-duration extreme events that are the target of seasonal forecasts, and current forecasts are not generally targeted to indicate the risks of natural disasters.
- For effective disaster risk management seasonal forecasts in isolation are not useful, but need to be integrated into a broader climate services offering interpreted forecast information that includes forecasts at all time-scales, monitoring and historical information.
- Forecasting of high impact events requires good understanding of vulnerability, and so climate information has to be explicitly tailored.