



# Climate, Disasters and Food Insecurity with examples from Africa

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# Outline

1. Climate, disasters, and food insecurity
2. Analysis of climate-related food insecurity risks
3. Climate prediction, impacts prediction
4. Risk management, examples from Africa
  - food security outlooks for contingency planning
  - protecting livelihoods by protecting livestock trade
  - preventing malaria epidemics

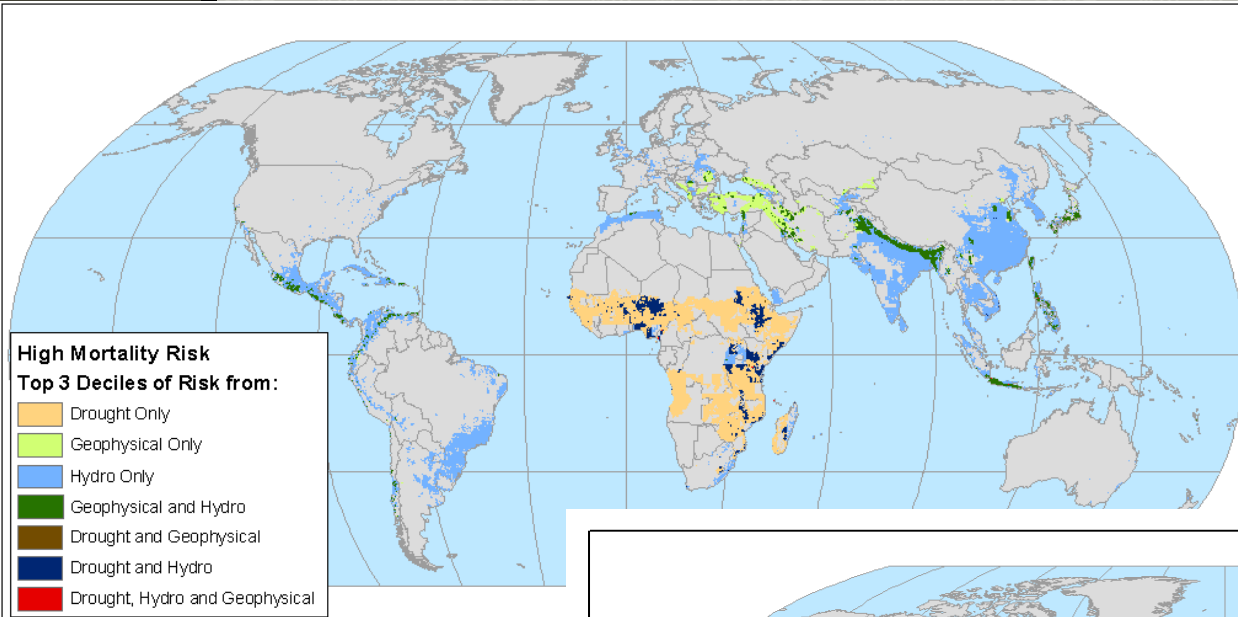


# 1) Climate, Disasters and Food Insecurity



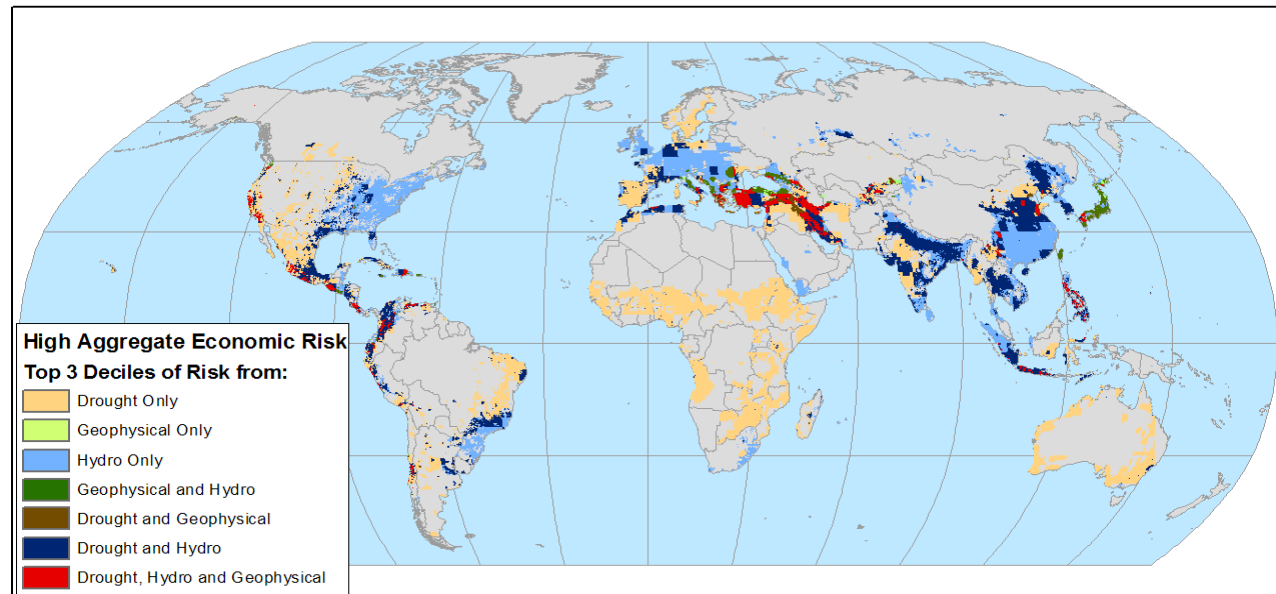
# Disaster risk hotspots

(Dilley, Chen, Deichmann et al, forthcoming)



Mortality risks

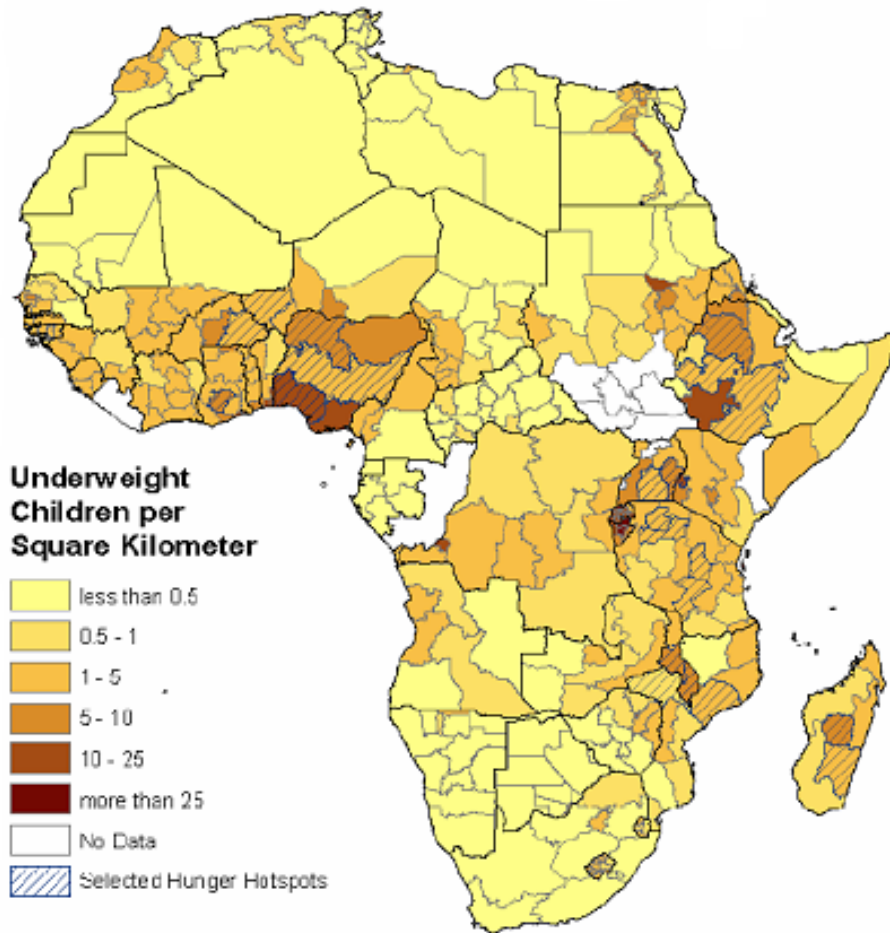
Economic loss risks



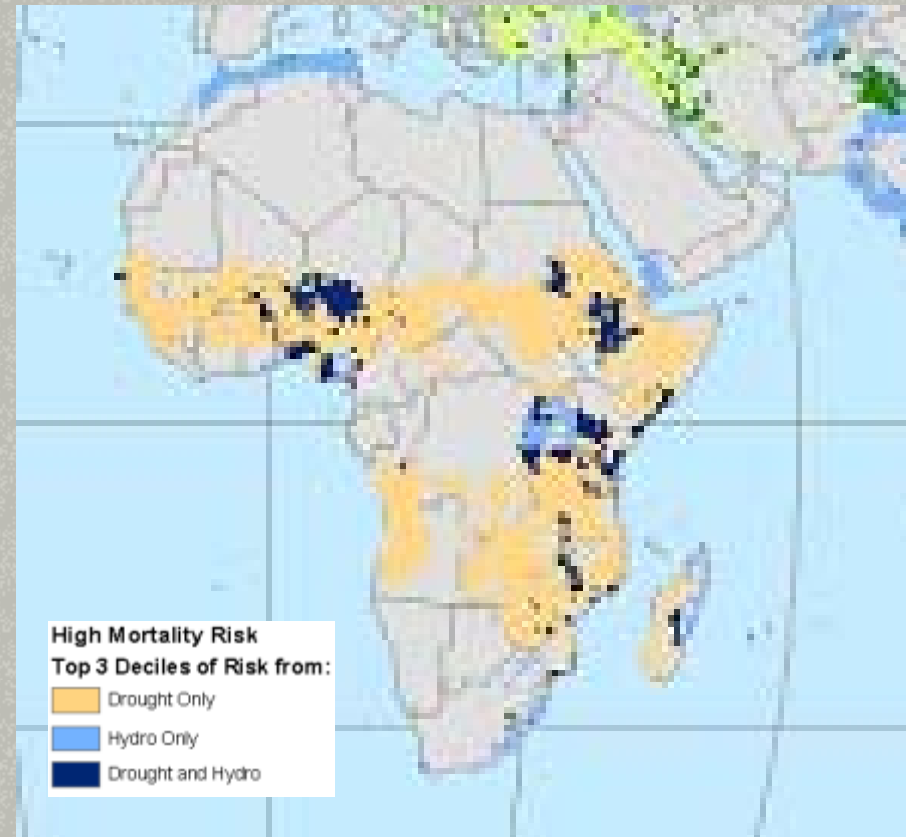


# Hunger hotspots

(CIESIN, Millennium Development Project)



Children are defined as underweight if their weight-for-age z-scores are more than two standard deviations (2 SD) below the median of the NCHS/CDC/WHO International Reference Population.



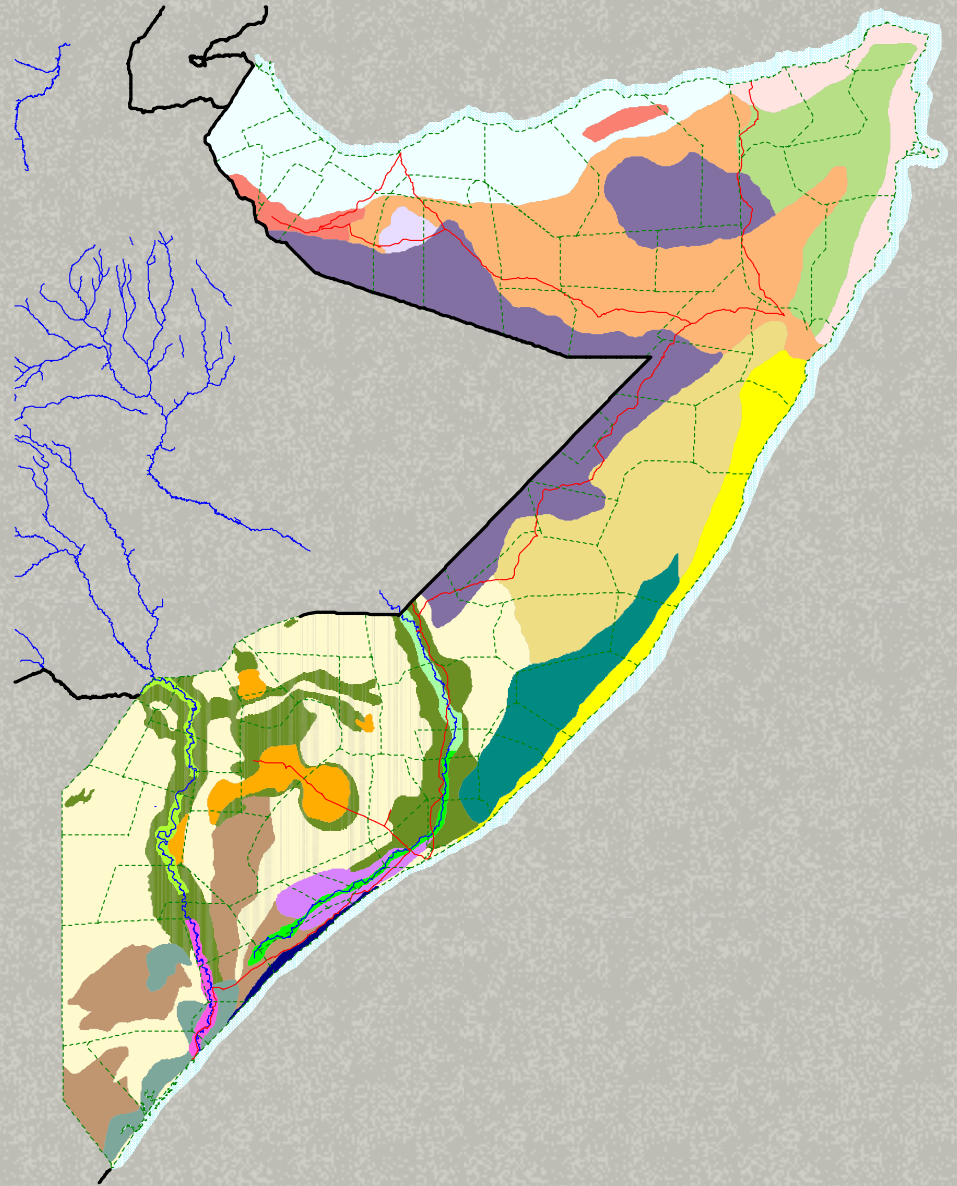
Disaster mortality  
risk hotspots:  
Drought and floods



## 2) Analysis of Climate-Related Food Insecurity Risks (Focus on Africa)



# Food economy zones



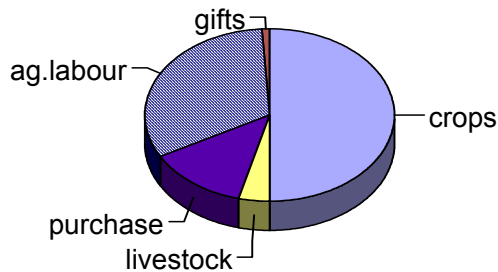


Information on response strategies allows an analysis of how households will cope with the effects of a hazard  
(Slides courtesy Food Economy Group/FEWS)

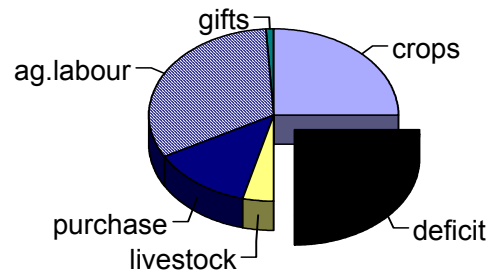
**Hazard example:  
50% crop failure**

**Coping step example:  
Sell 1 additional goat**

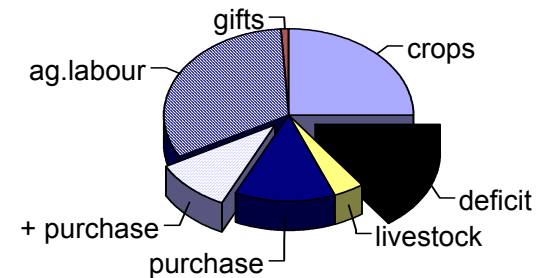
**The baseline picture**



**Effect on access to crops**



**Final result**

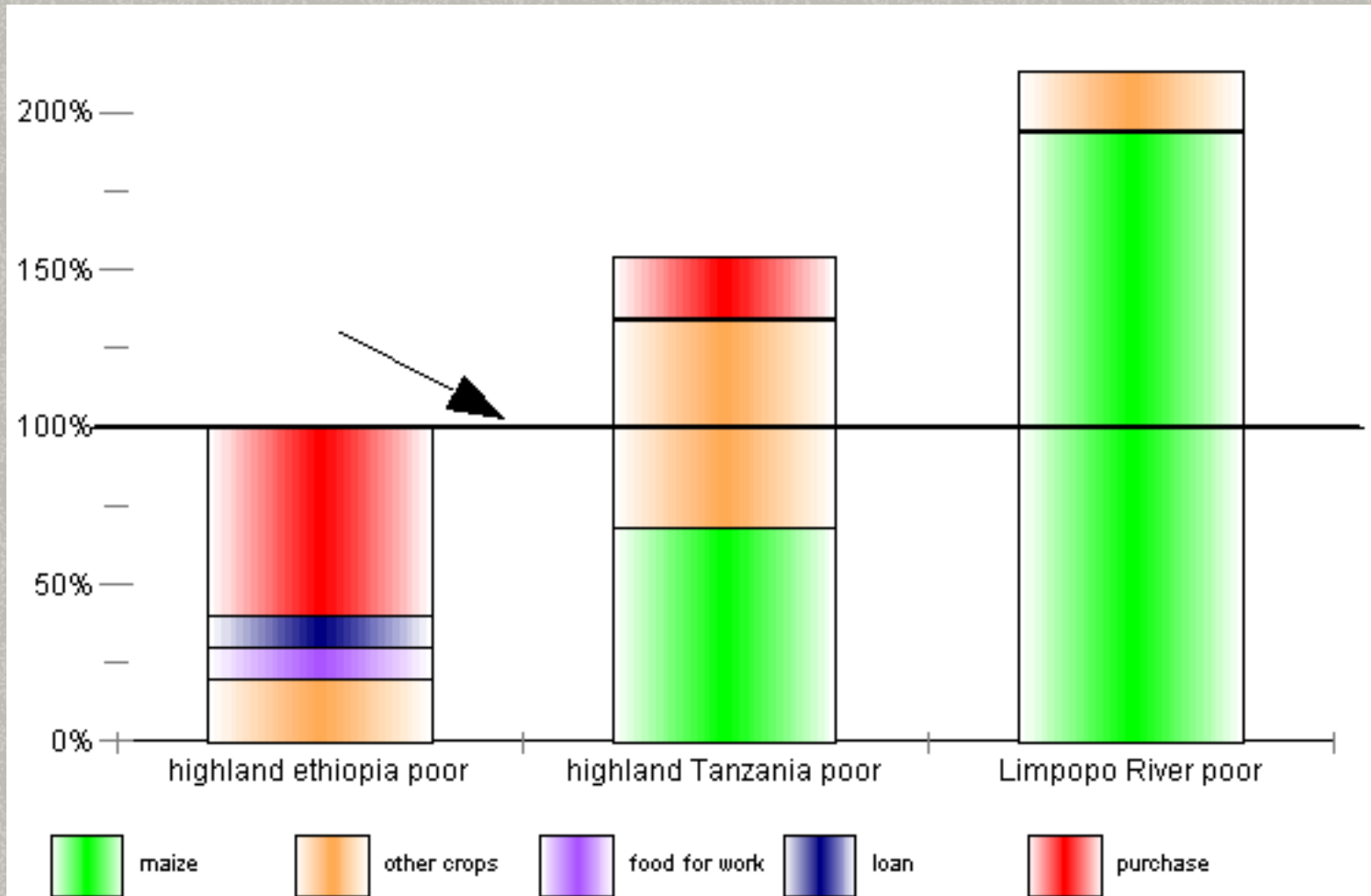


**Outcome = Baseline + Hazard + Response**



Households become food insecure when they cannot meet 100% of food requirements

% annual food requirements





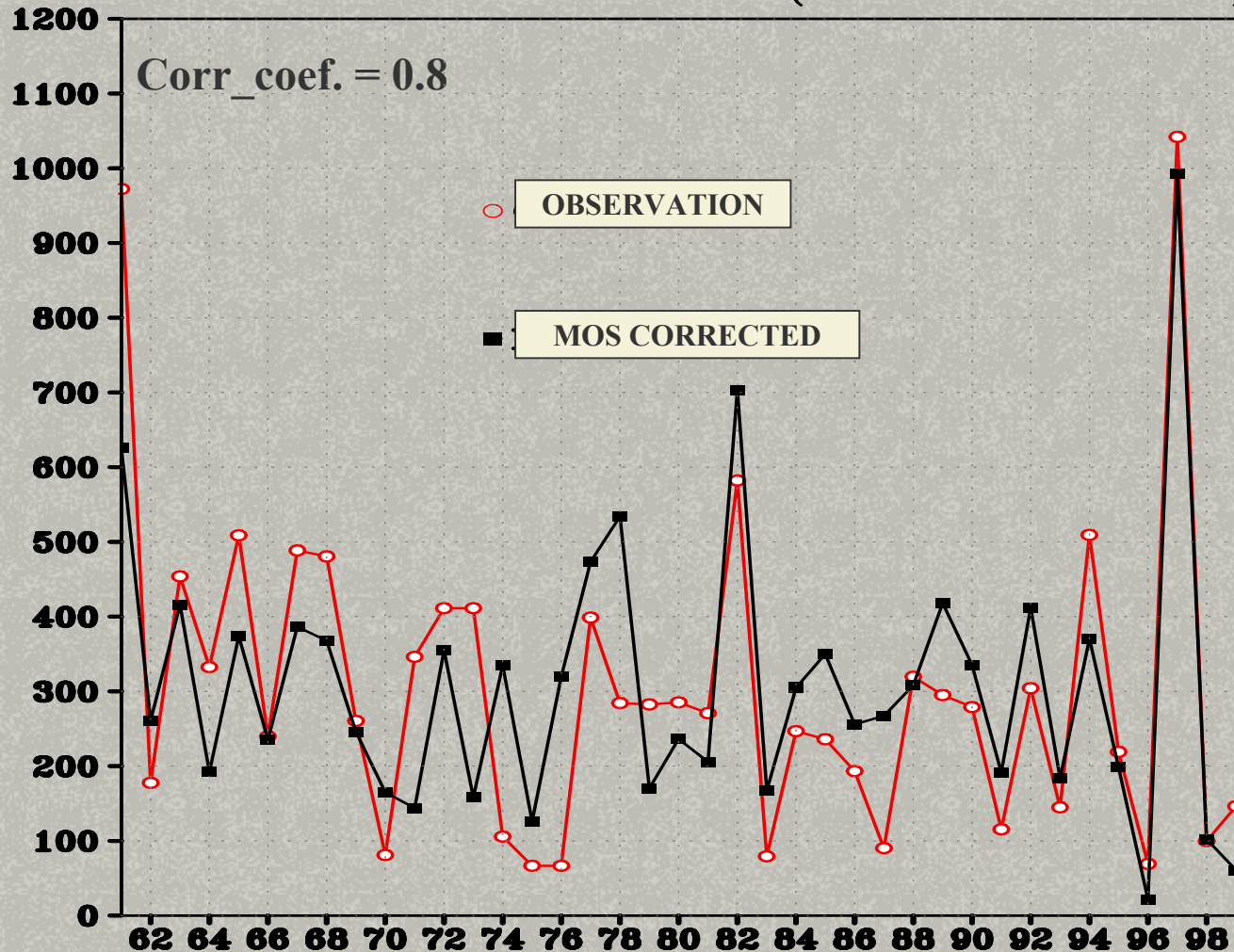


# 3) Climate Prediction, Impacts Prediction



# Statistically corrected ECHAM4 GCM Oct-Dec precipitation to a station (Indeje)

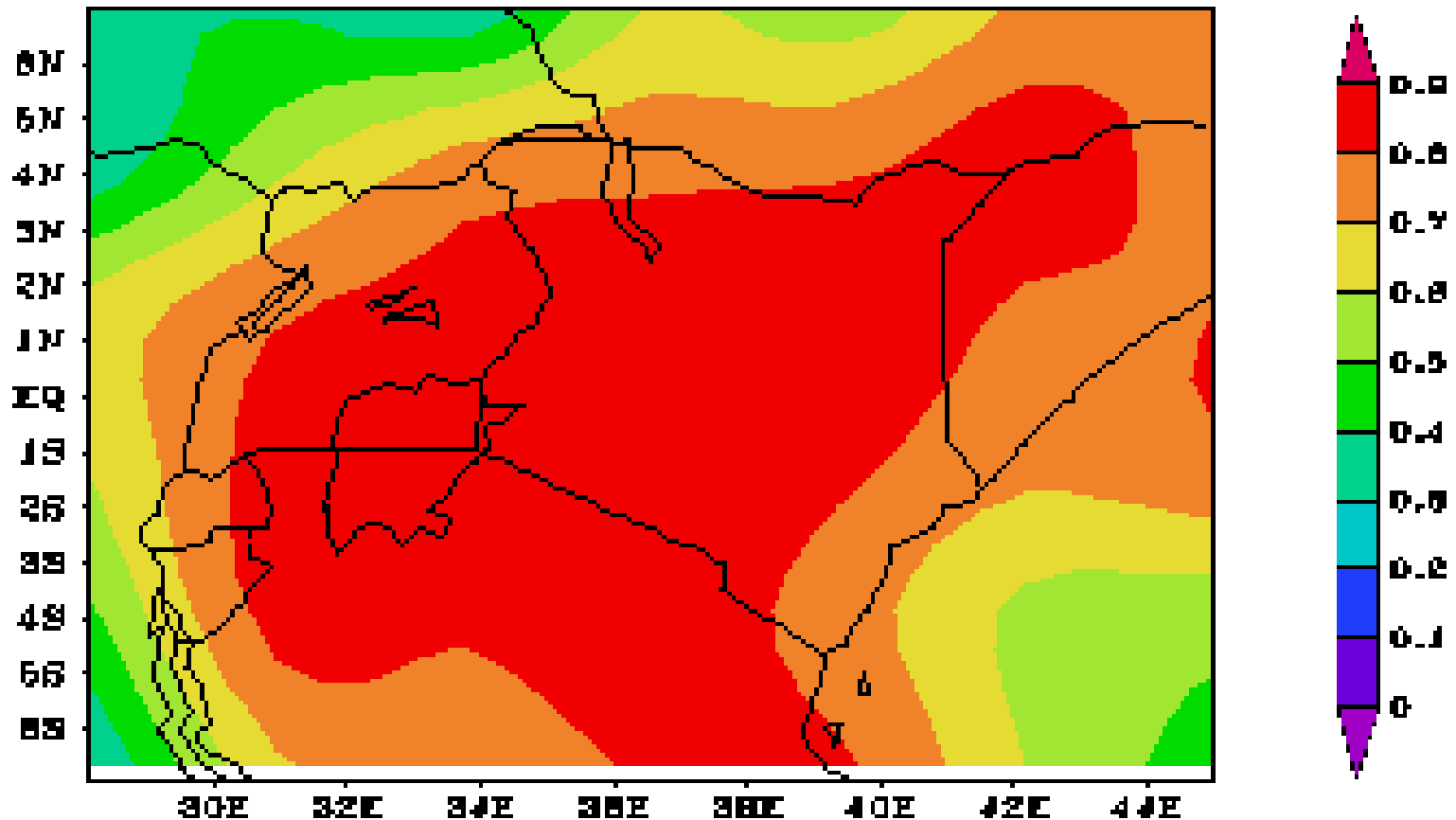
STATION : MARSABIT (2.32N 37.98E)





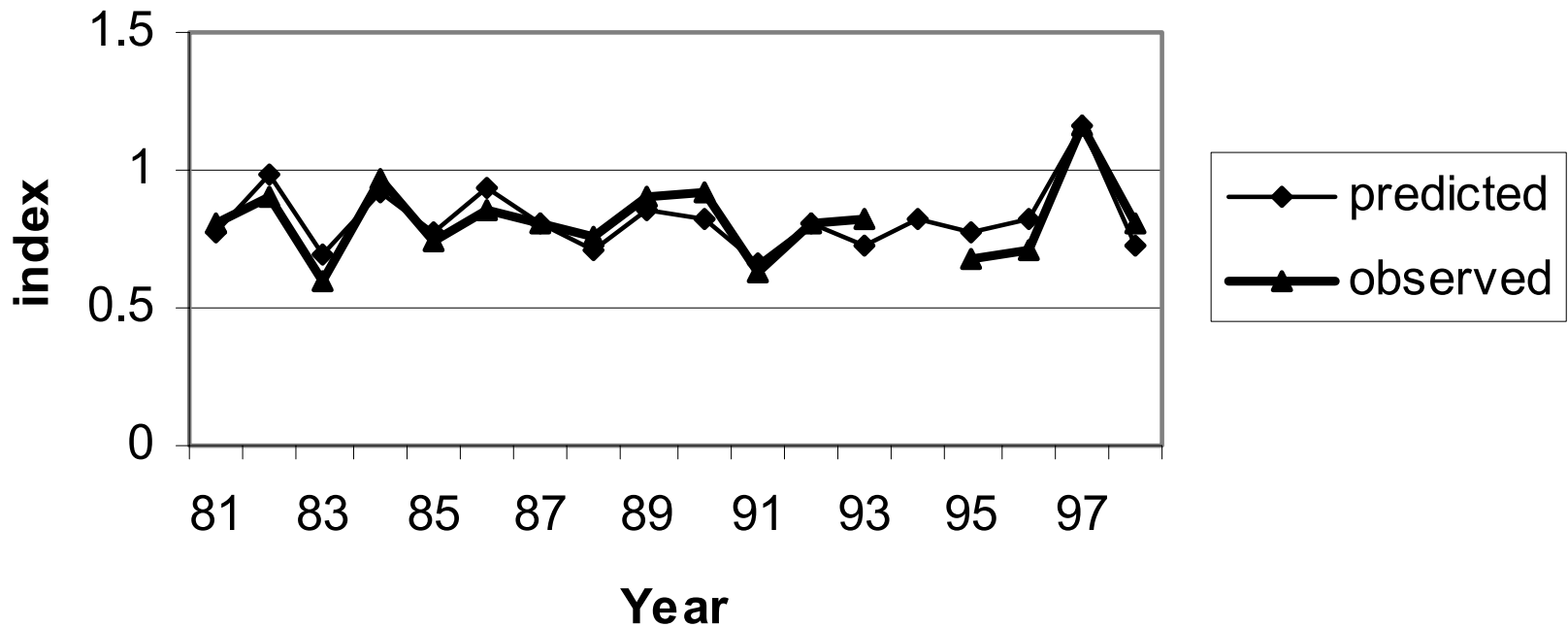
# Correlation between statistically corrected climate model output and observed rainfall, Oct-Dec

ECHAM4 AND OBS. PCP  
SVD CORRELATION MAP





# NDVI forecast, OND, Eastern Kenya





# Tailoring process for decision-support

- Identify risk managers and decision calendar/options
- Design operationally useful product
- Conduct joint research
- Product
- Application
- Testing



## 4) Risk Management, Examples from Africa

- Food Security Outlooks for Contingency Planning in the Greater Horn of Africa



# Seasonal climate forecast (USGS)

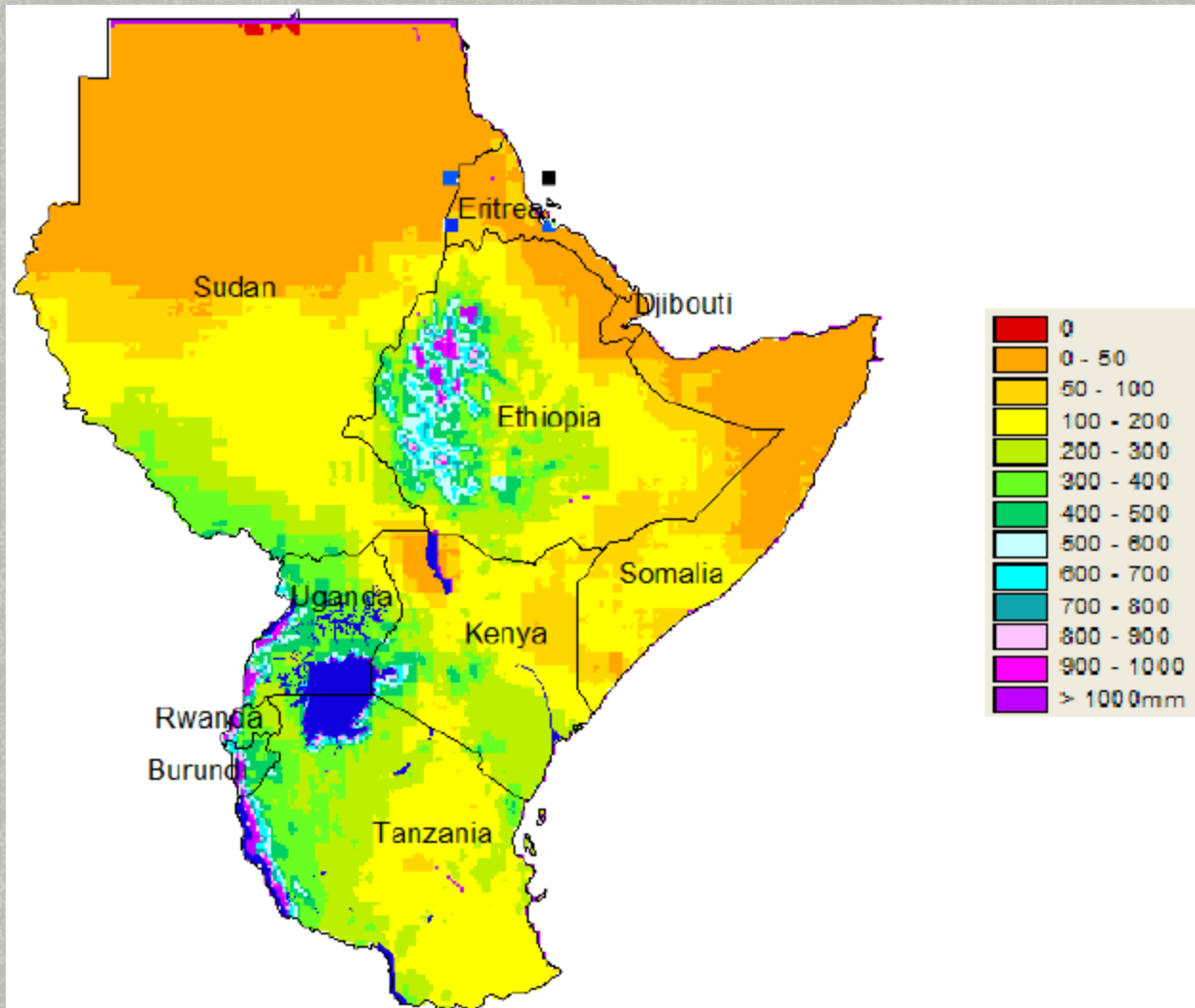
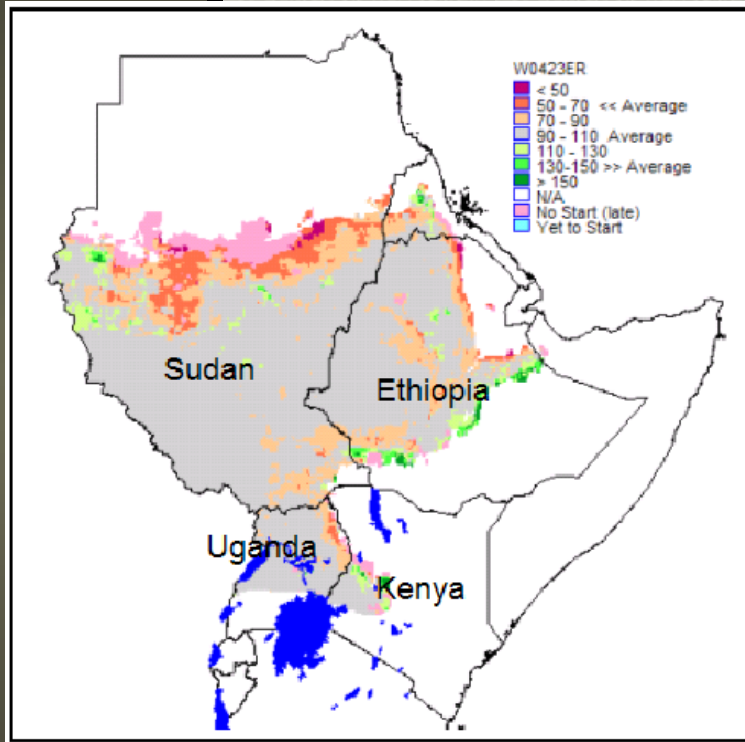


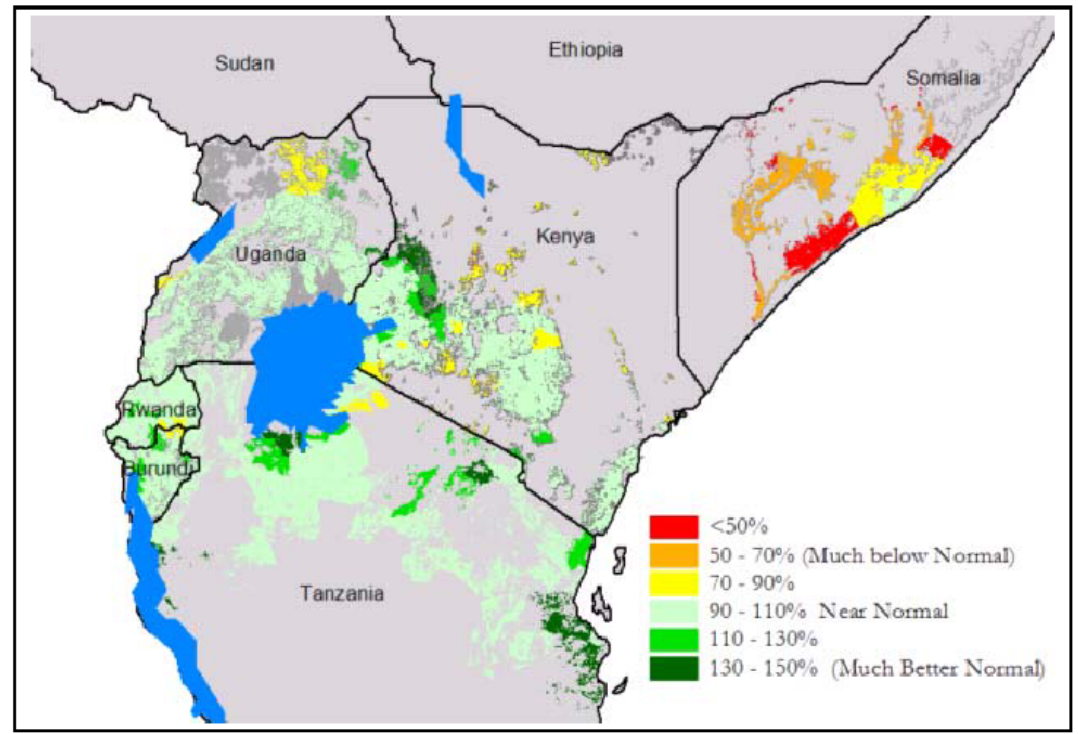
Figure 2: Mostly likely scenario for rainfall amounts in the GHA, SON 2004



# Expected crop performance (USGS)



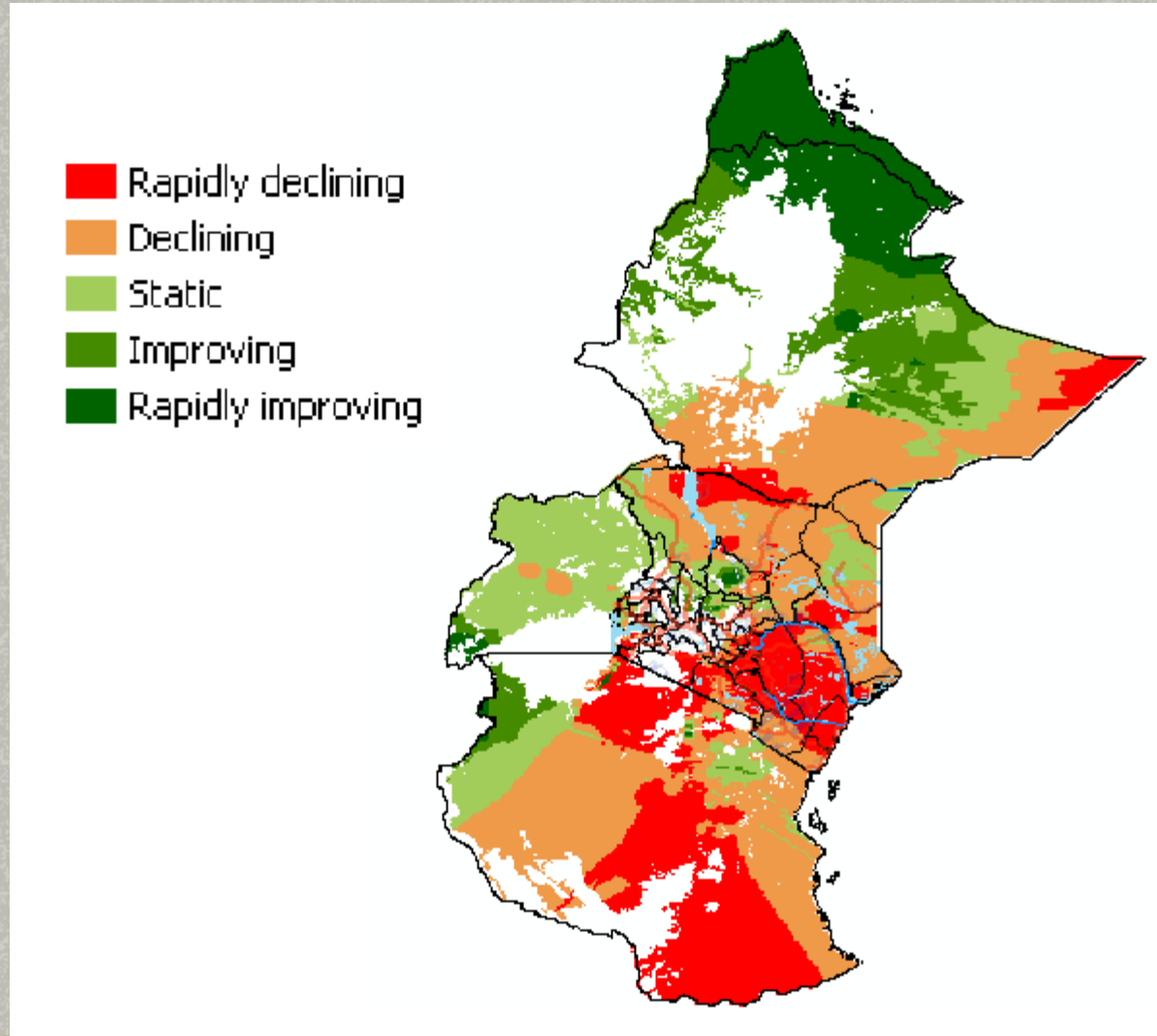
Northern season: JJA



Equatorial season: SOND



# Expected October forage deviations (Texas A&M)

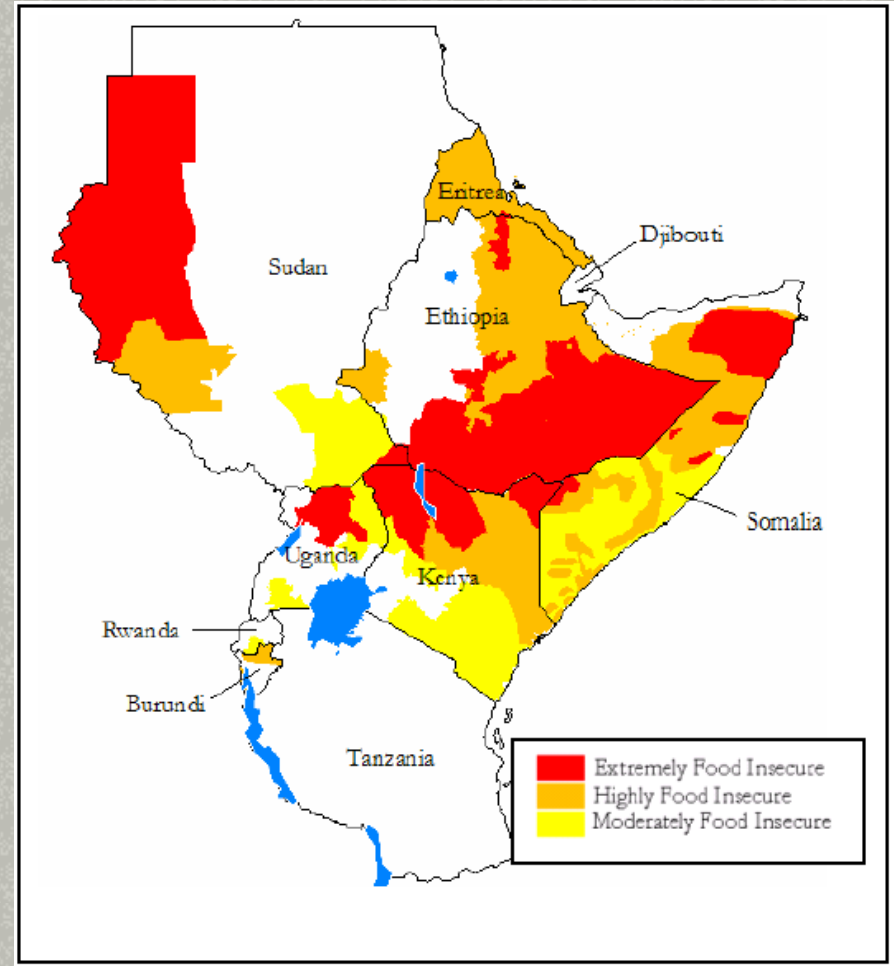
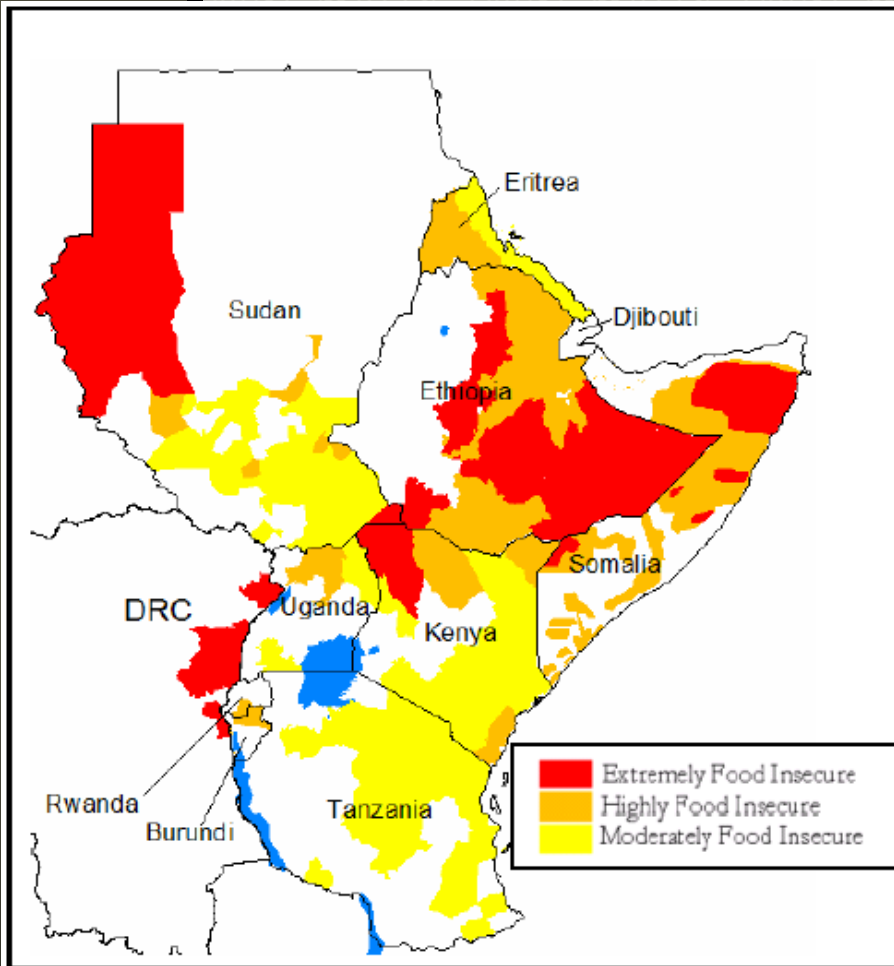




# Food insecurity in August, 2004 and outlook for December

Current (August)

Outlook for December

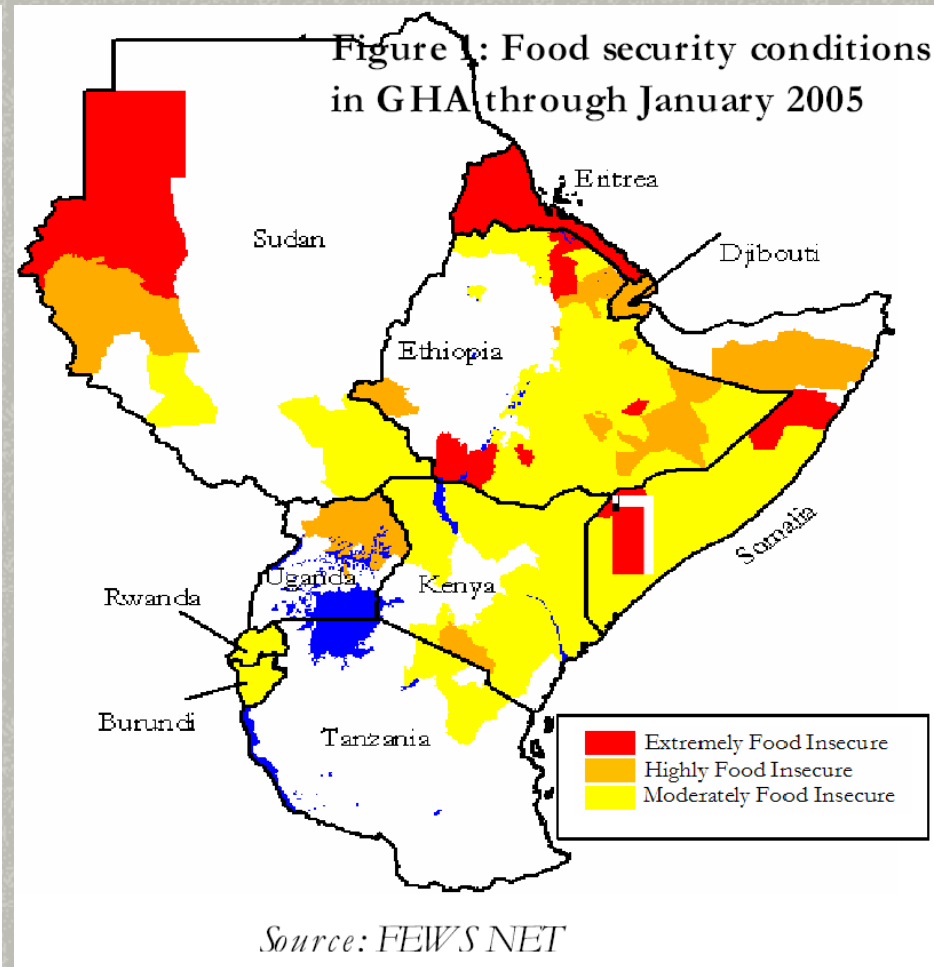
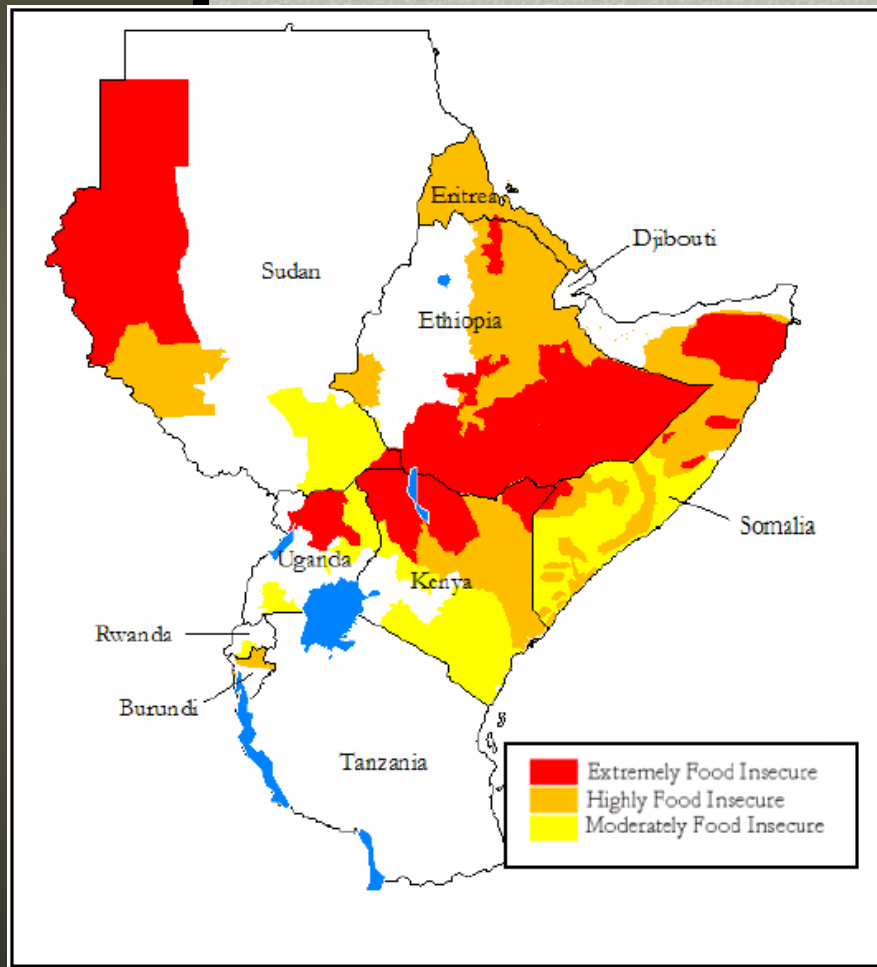




# Food security outlook compared to reported food security in December

Outlook for December

Reported in January





## 4) Risk Management, Examples from Africa

- Protecting Livelihoods by Protecting Livestock Trade between the Greater Horn of Africa and the Middle East

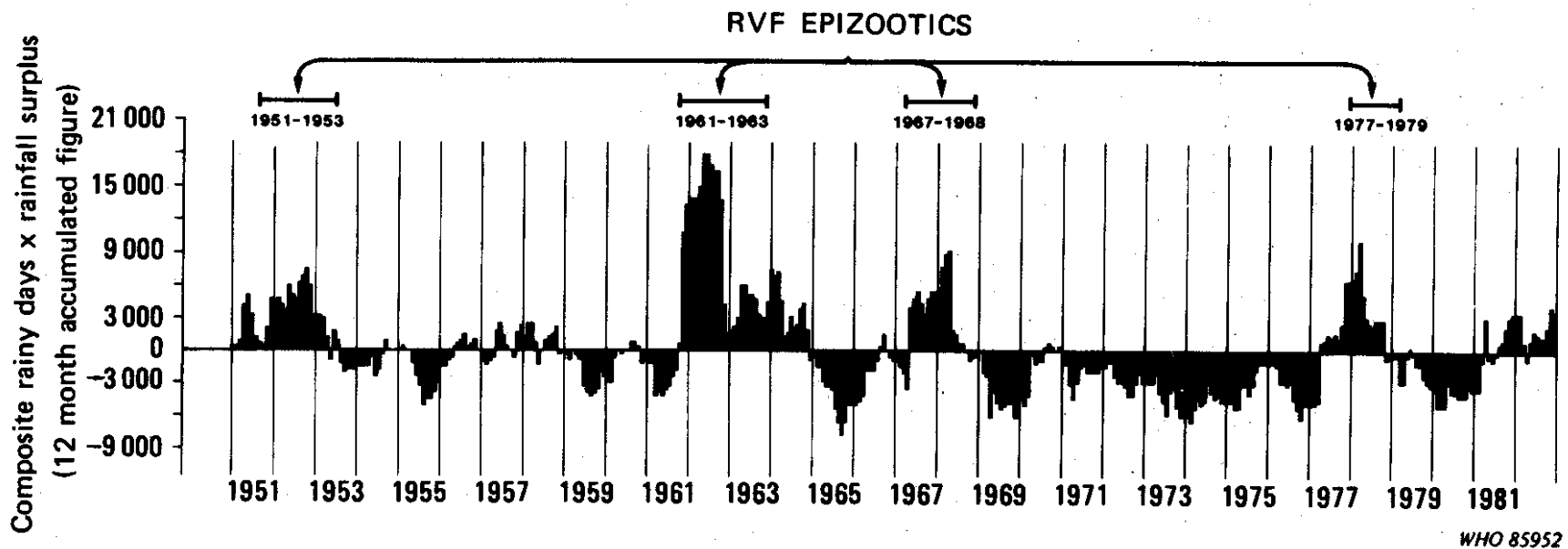


# Livestock trade: Rift Valley Fever risk model

- Billion dollar livestock trade between the GHA and the Middle East
- RVF livestock disease outbreaks lead to imposition of trade barriers
- Mosquito-borne, climate/environment-related
- Model provides early warning for surveillance and control
- Red Sea Livestock Trade Commission

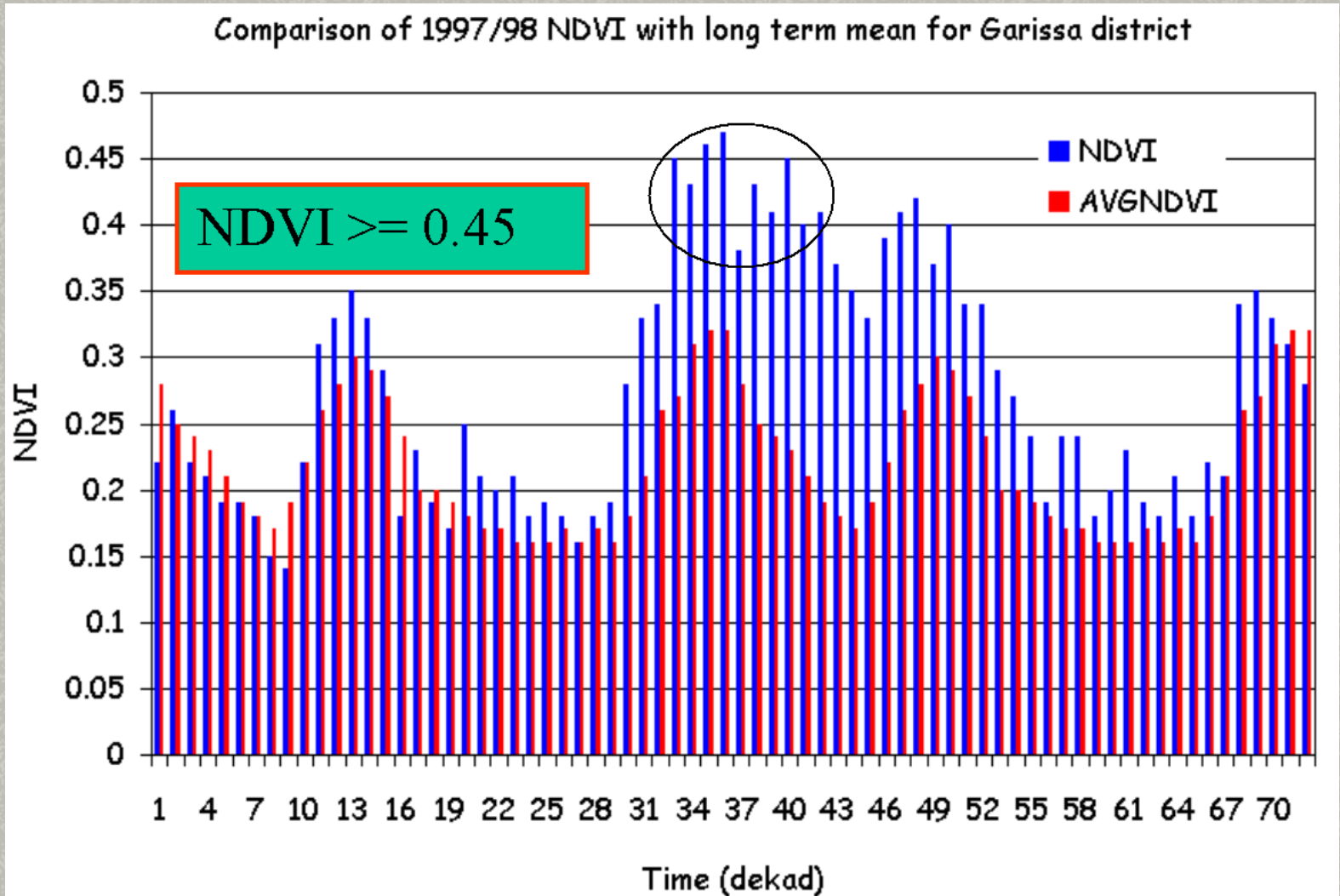


# Cumulative rainfall threshold for Kenya outbreaks (Davies)





# NDVI threshold, 1997 outbreak (Linthicum et al, Gadain)





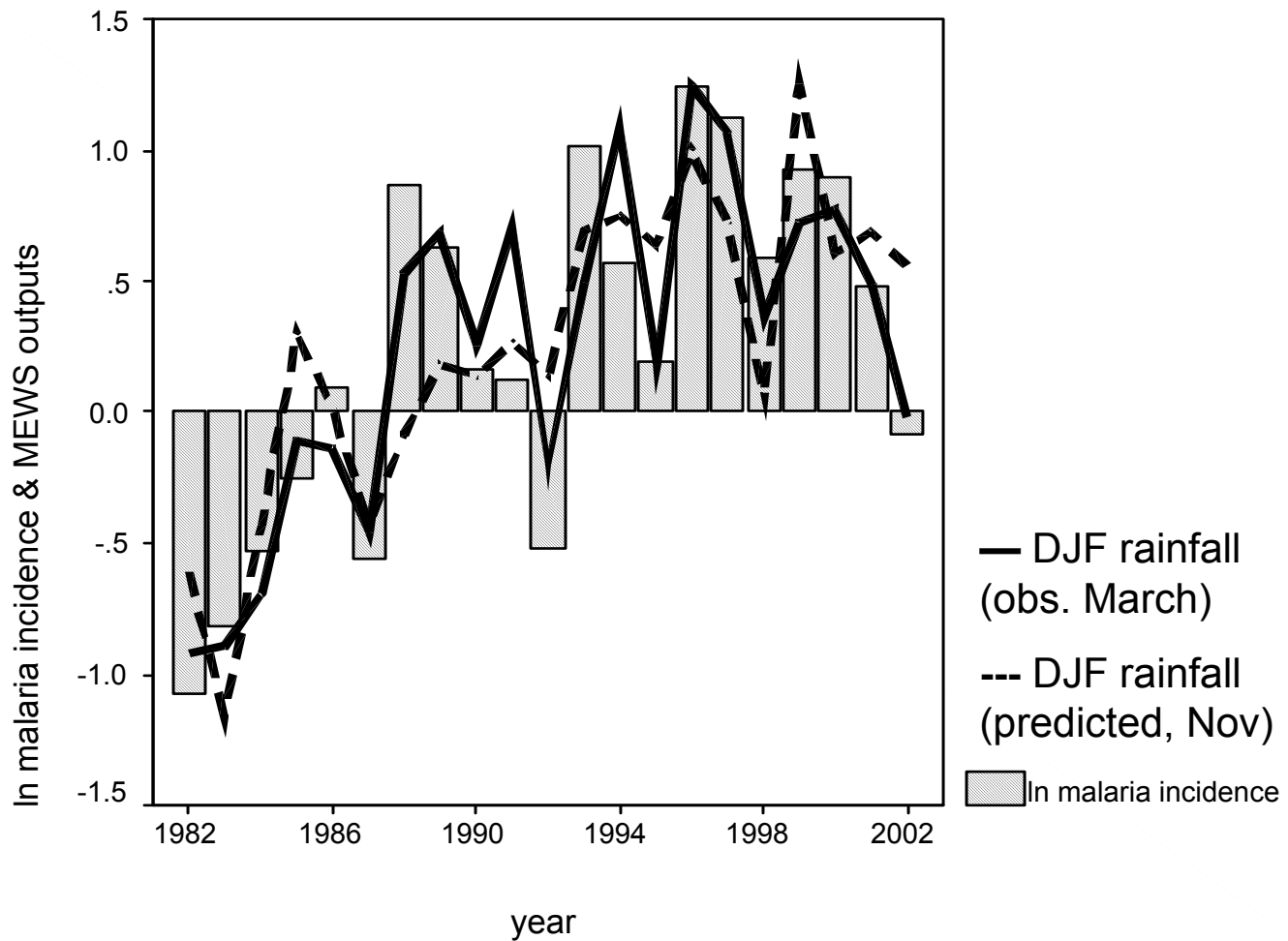
## 4) Risk Management, Examples from Africa

- preventing malaria epidemics in southern Africa



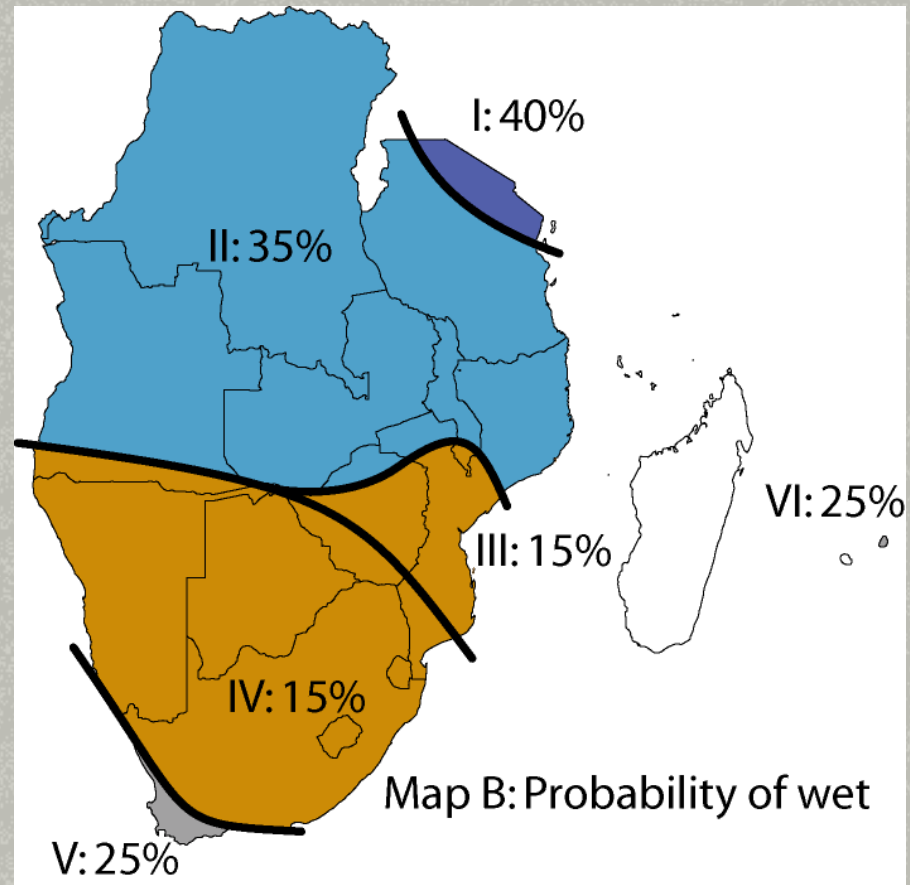
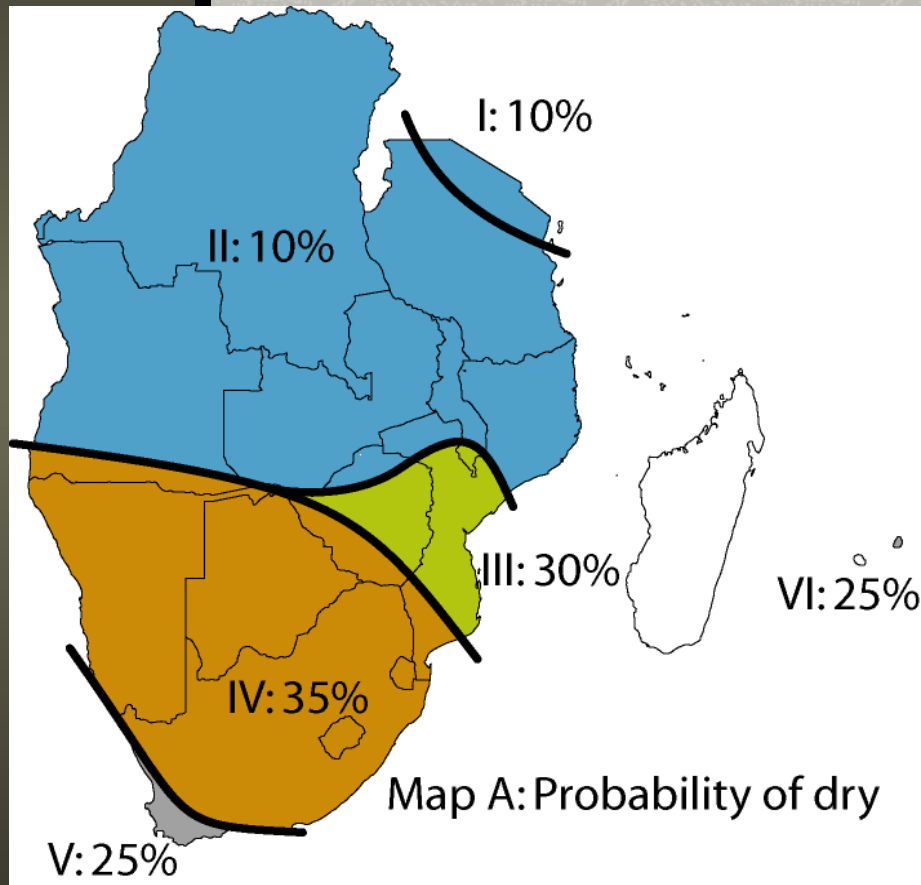
# Malaria incidence: Botswana

M. Thomson, S. Mason, S.J. Connor





# Tailored malaria forecast made December, for DJF 2004-05





Malaria  
early  
warning  
poster,  
distributed  
to regional  
health and  
control  
offices

# Malaria Surveillance, Forecasting, Preparedness and Response in Southern Africa

Coordinating authors:  
Siboniso Moyo, Isaac Mtshali, Zokuthi Mkhabela,  
Augustine Mwaanga, Victor Mwaanga



**References**  
Moyo S, Mtshali I, Mkhabela Z, Mwaanga A, Mwaanga V, et al. (2014) Malaria Surveillance, Forecasting, Preparedness and Response in Southern Africa. *PLoS ONE* 9(12): e112000. doi:10.1371/journal.pone.0112000





# Conclusion

- By
  - assessing risks
  - identifying risk factors, and
  - understanding who manages them
- We can
  - create information and capacity
  - to manage risks instead of managing emergencies.