



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

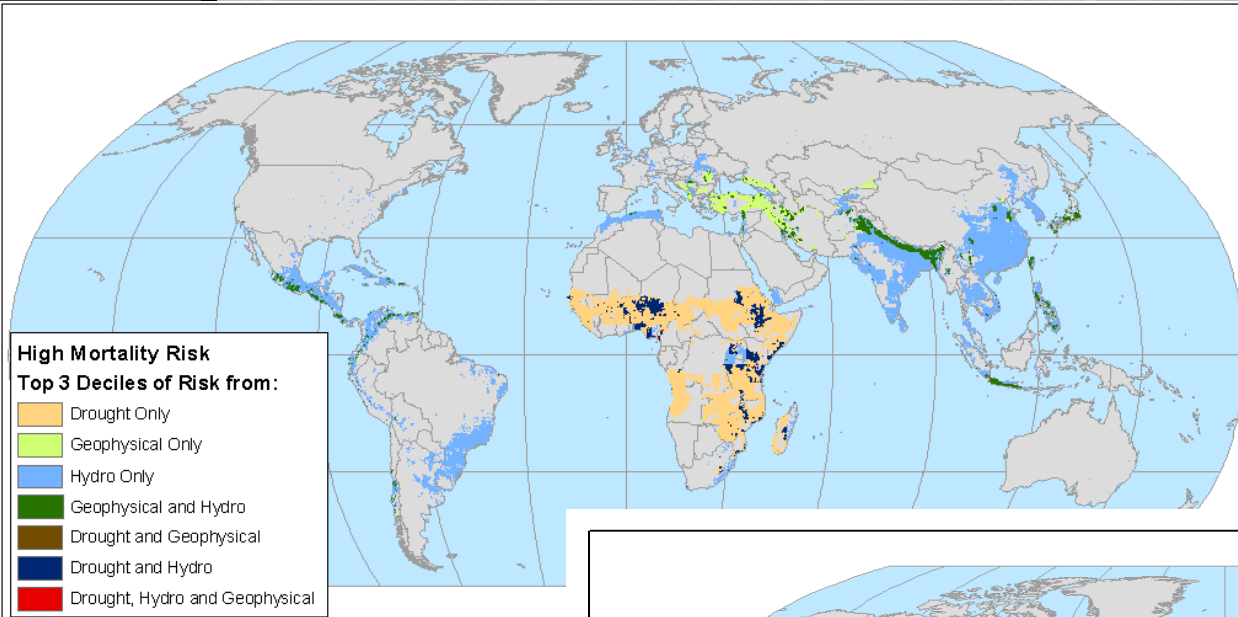


1) Climate, Disasters and Food Insecurity



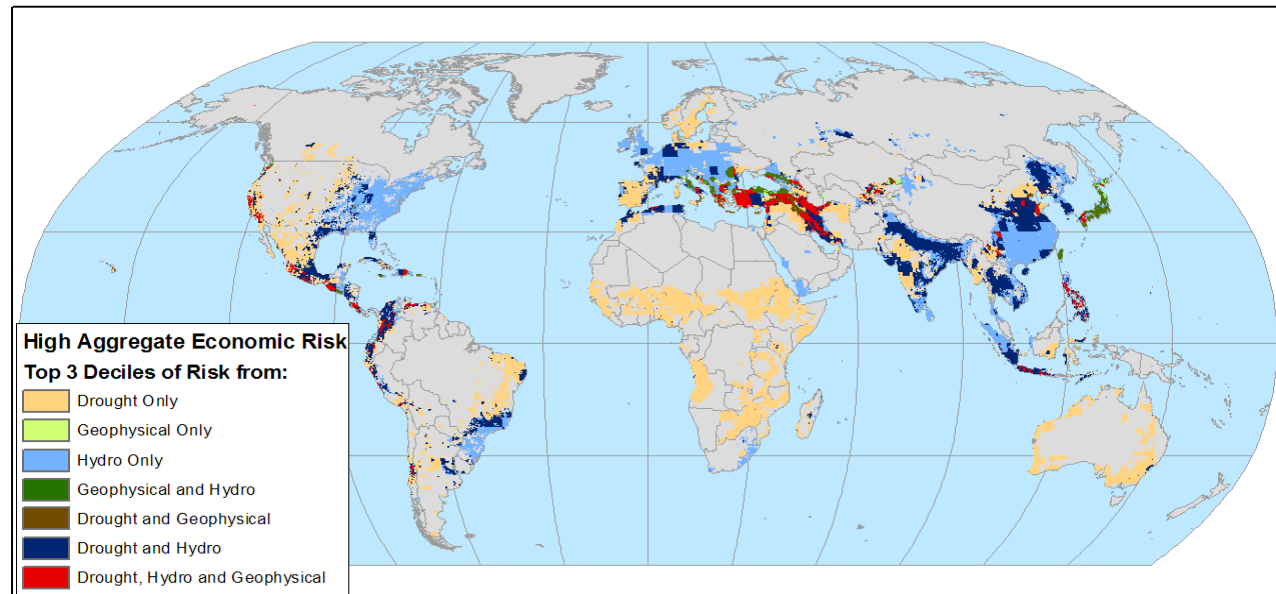
Disaster risk hotspots

(Dilley, Chen, Deichmann et al, forthcoming)



Mortality risks

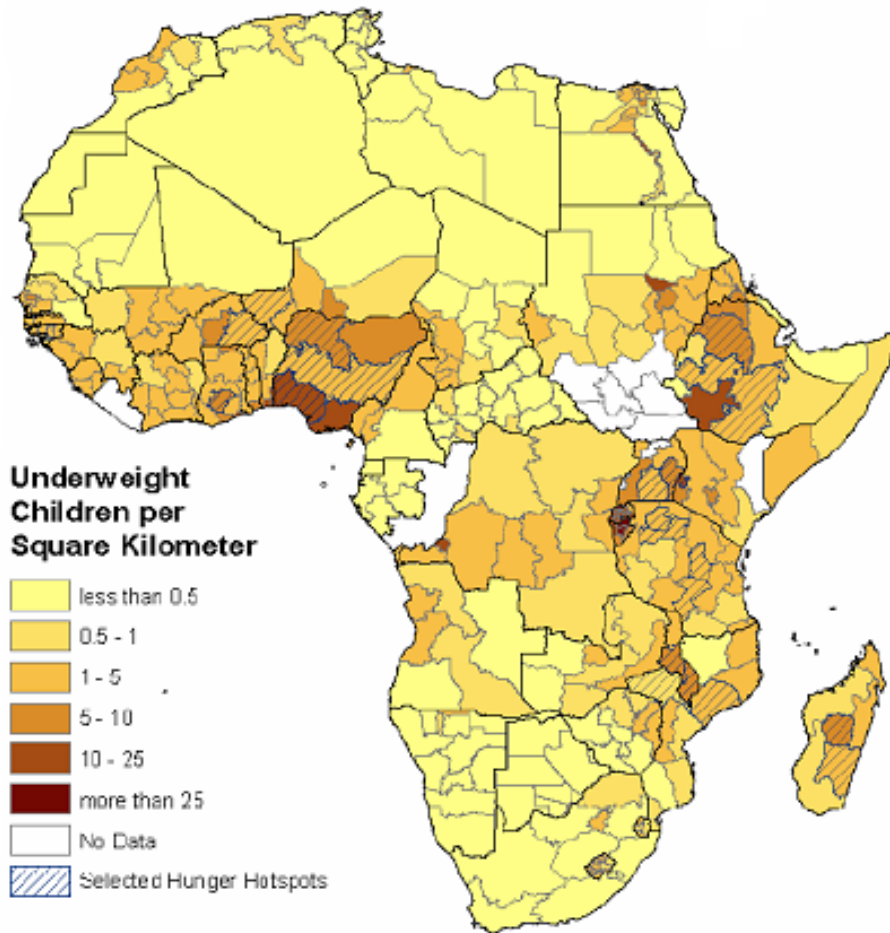
Economic loss risks



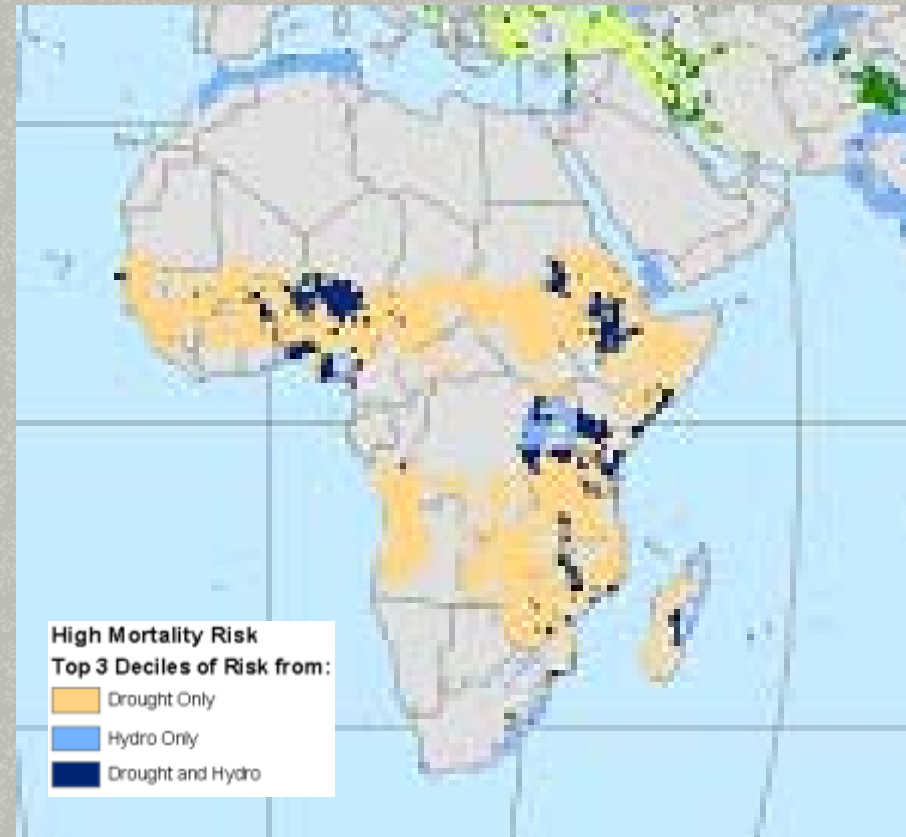


Hunger hotspots

(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.



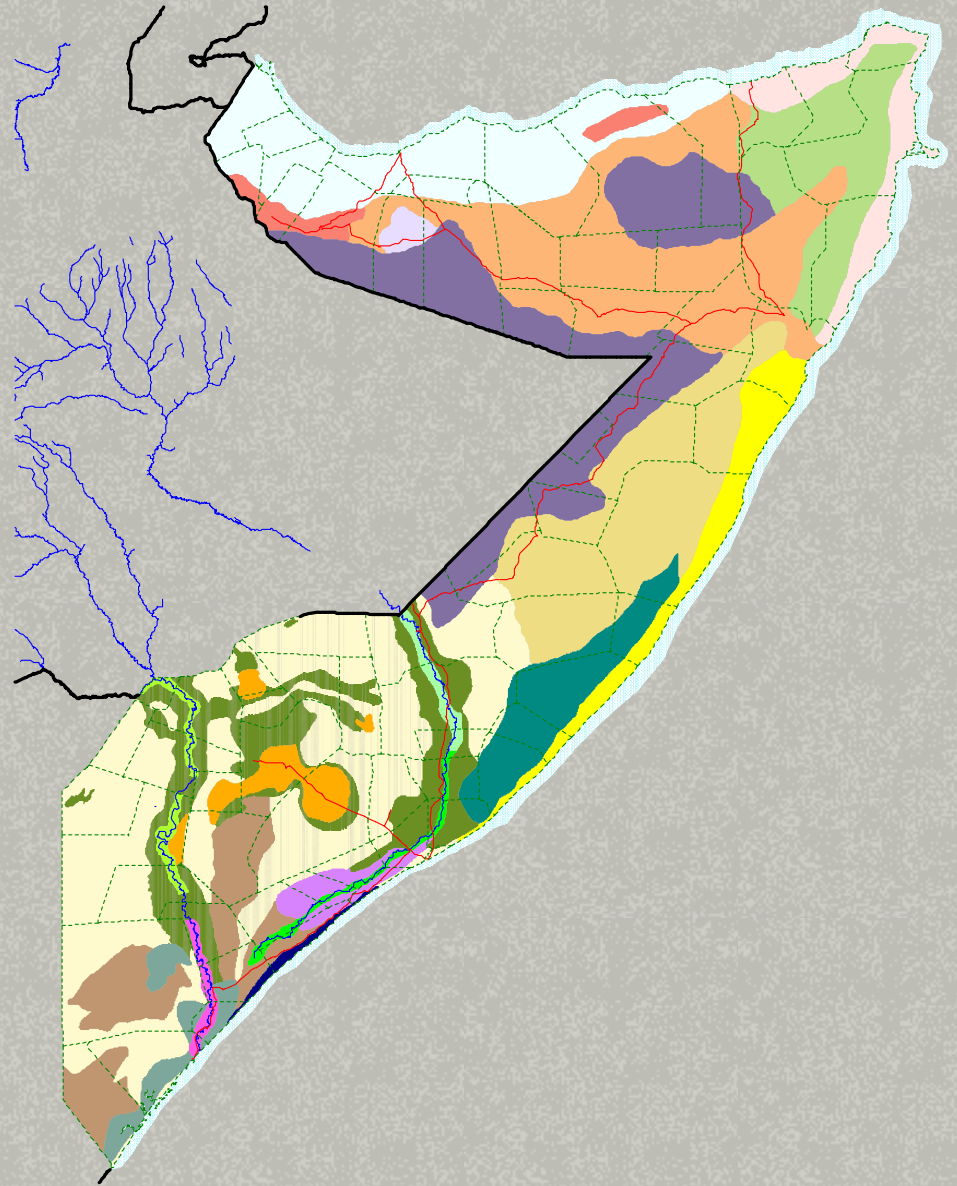
Disaster mortality
risk hotspots:
Drought and floods



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



Food economy zones



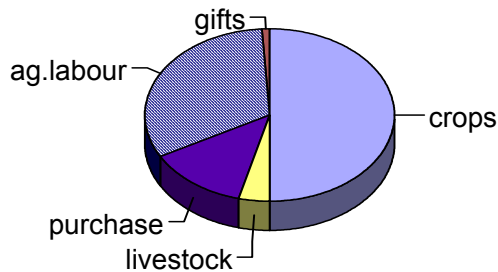


Information on response strategies allows an analysis of how households will cope with the effects of a hazard
(Slides courtesy Food Economy Group/FEWS)

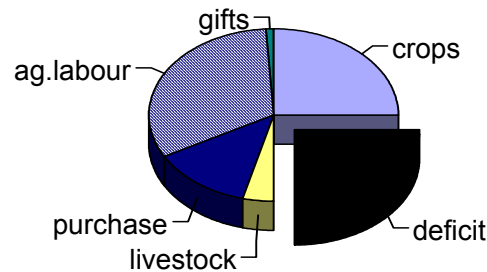
**Hazard example:
50% crop failure**

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

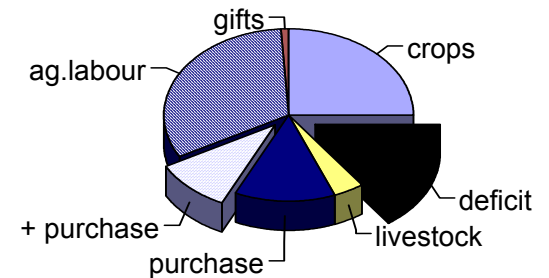
The baseline picture



Effect on access to crops



Final result

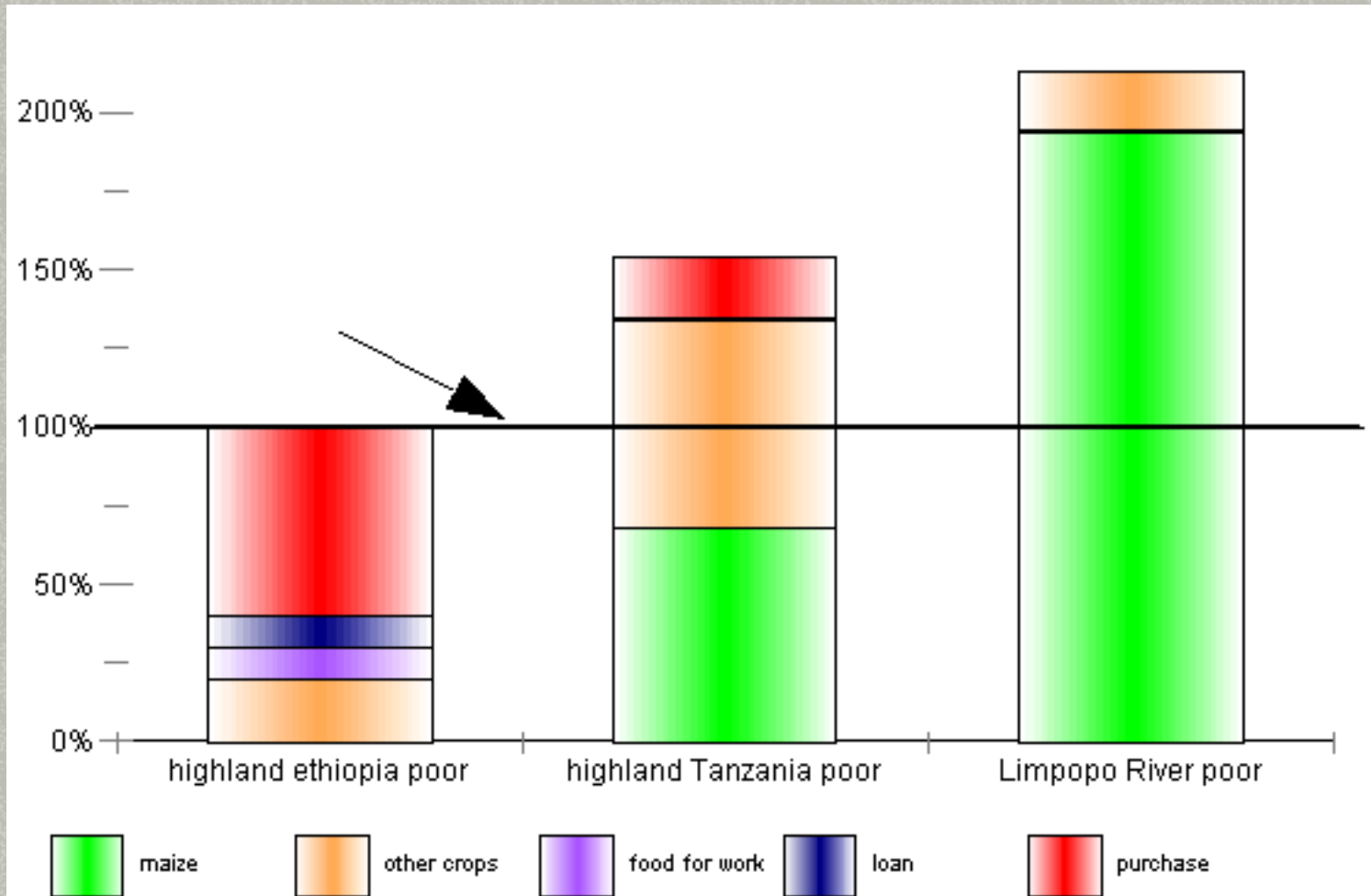


Outcome = Baseline + Hazard + Response



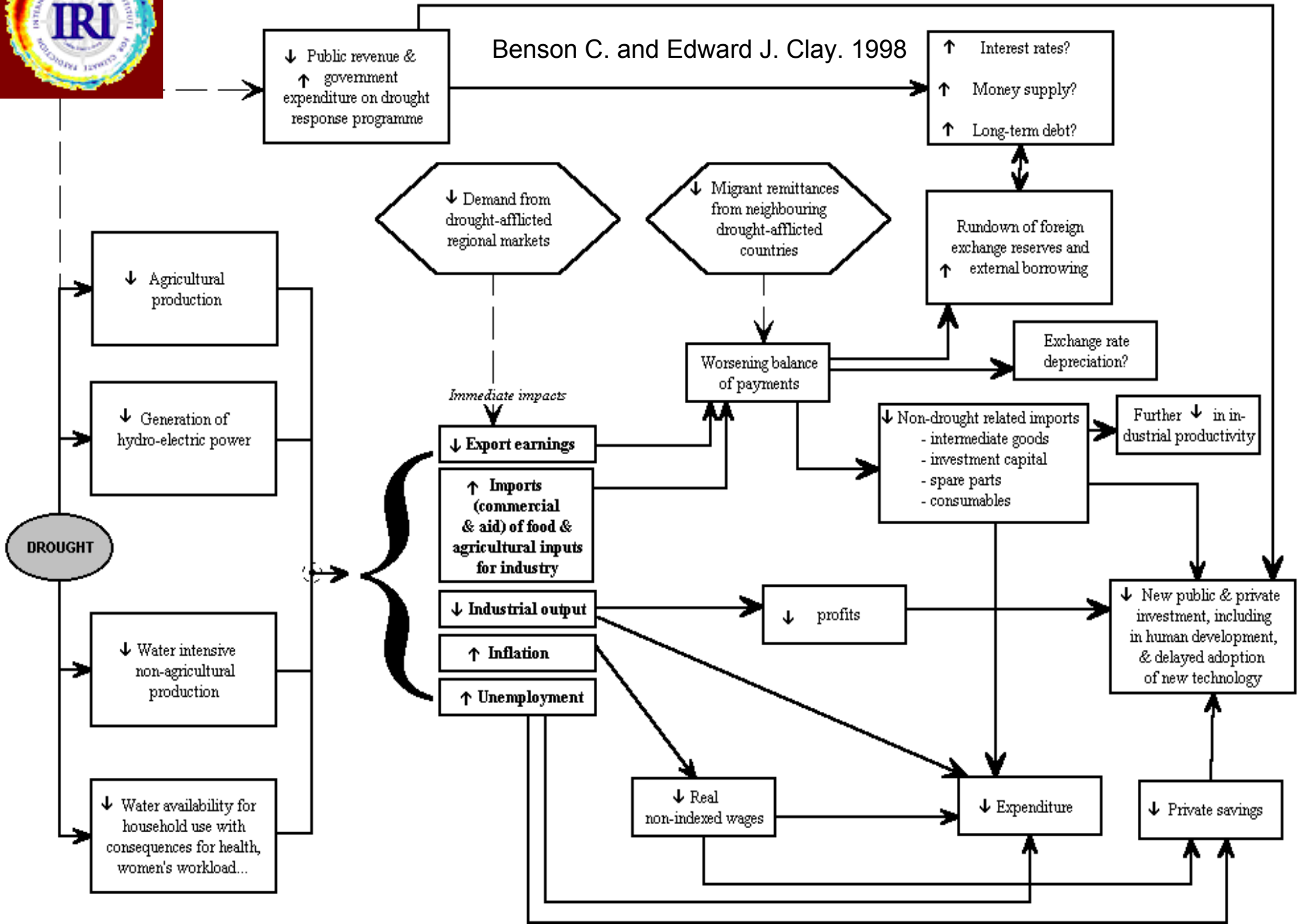
Households become food insecure when they cannot meet 100% of food requirements

% annual food requirements





Transmission of a drought shock through an economy



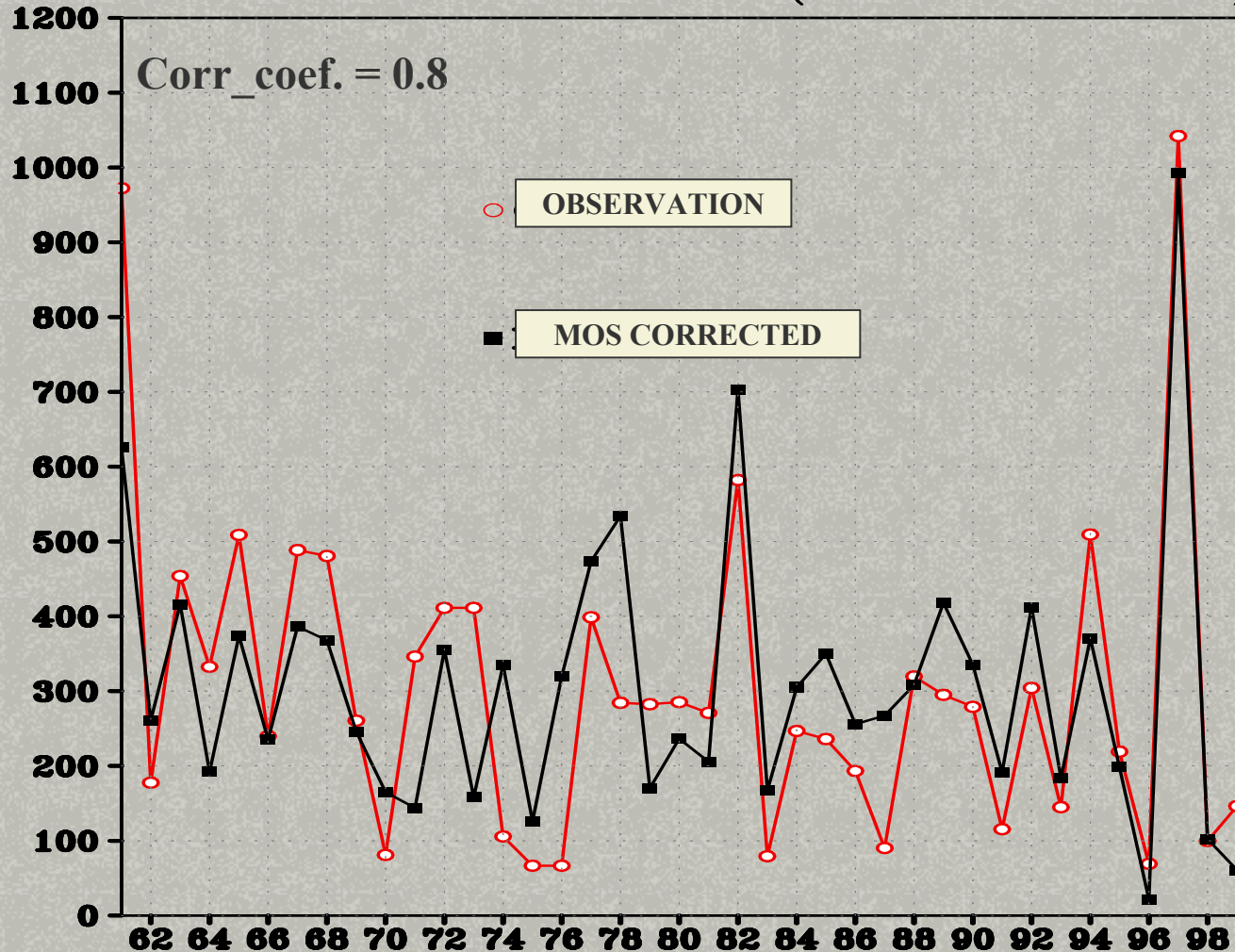


3) Climate Prediction, Impacts Prediction



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

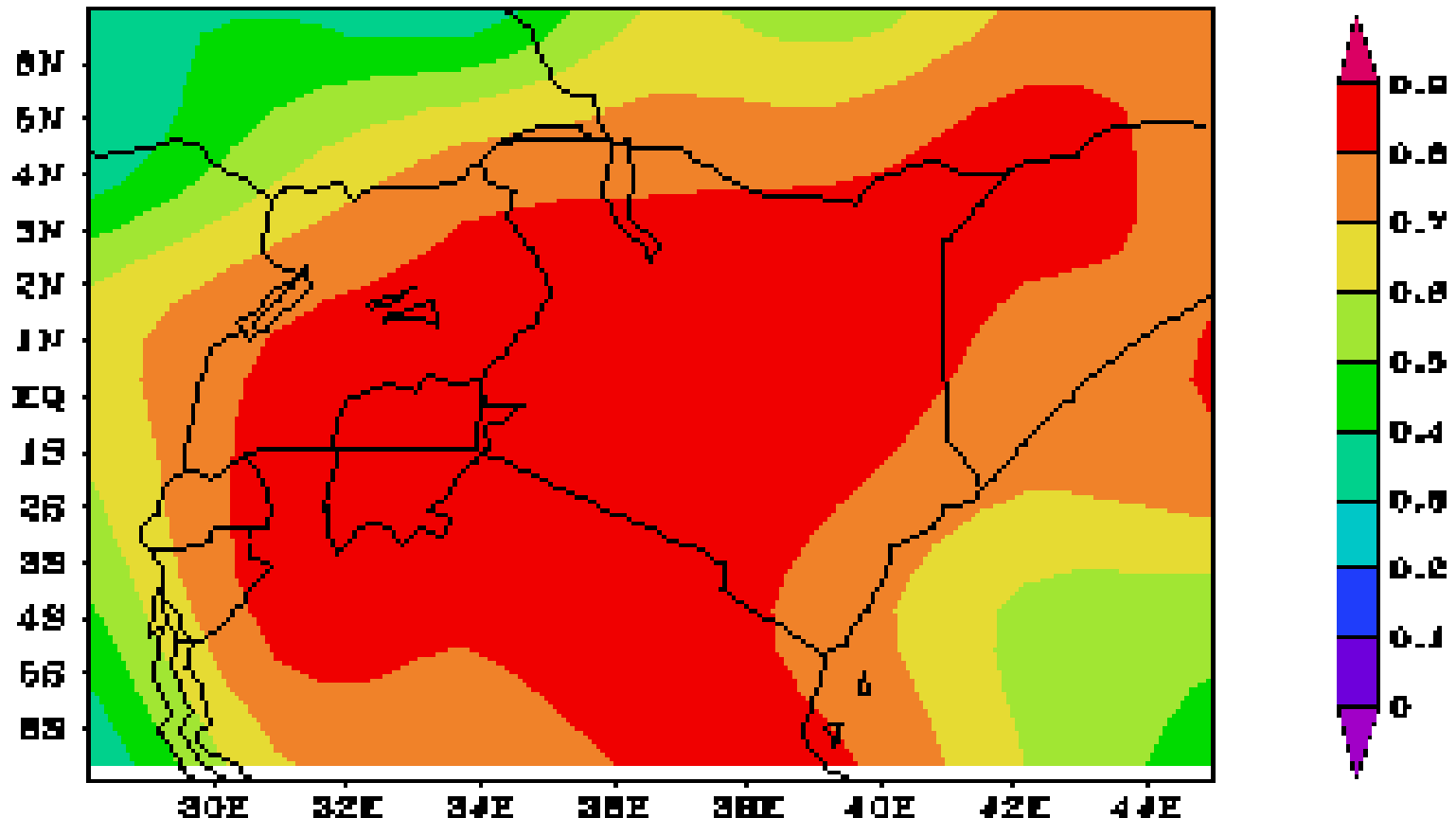
STATION : MARSABIT (2.32N 37.98E)





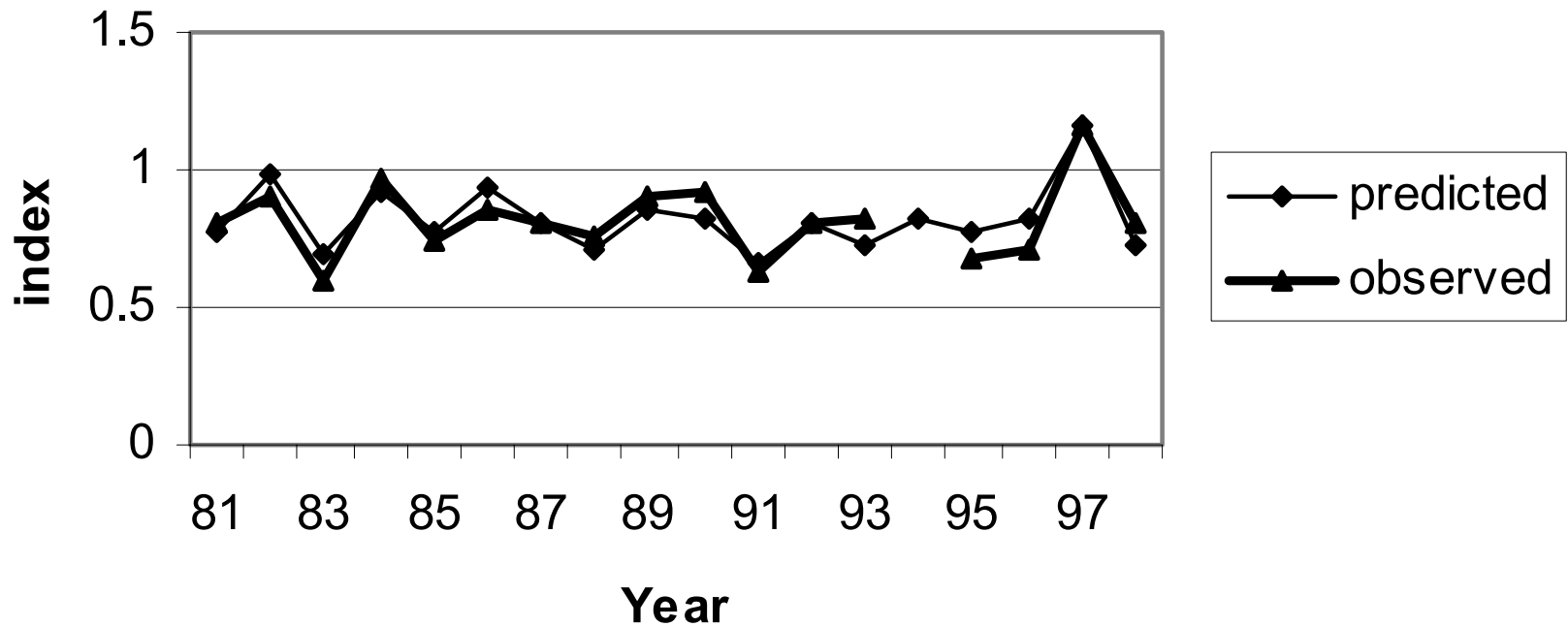
Correlation between statistically corrected climate model output and observed rainfall, Oct-Dec

**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)

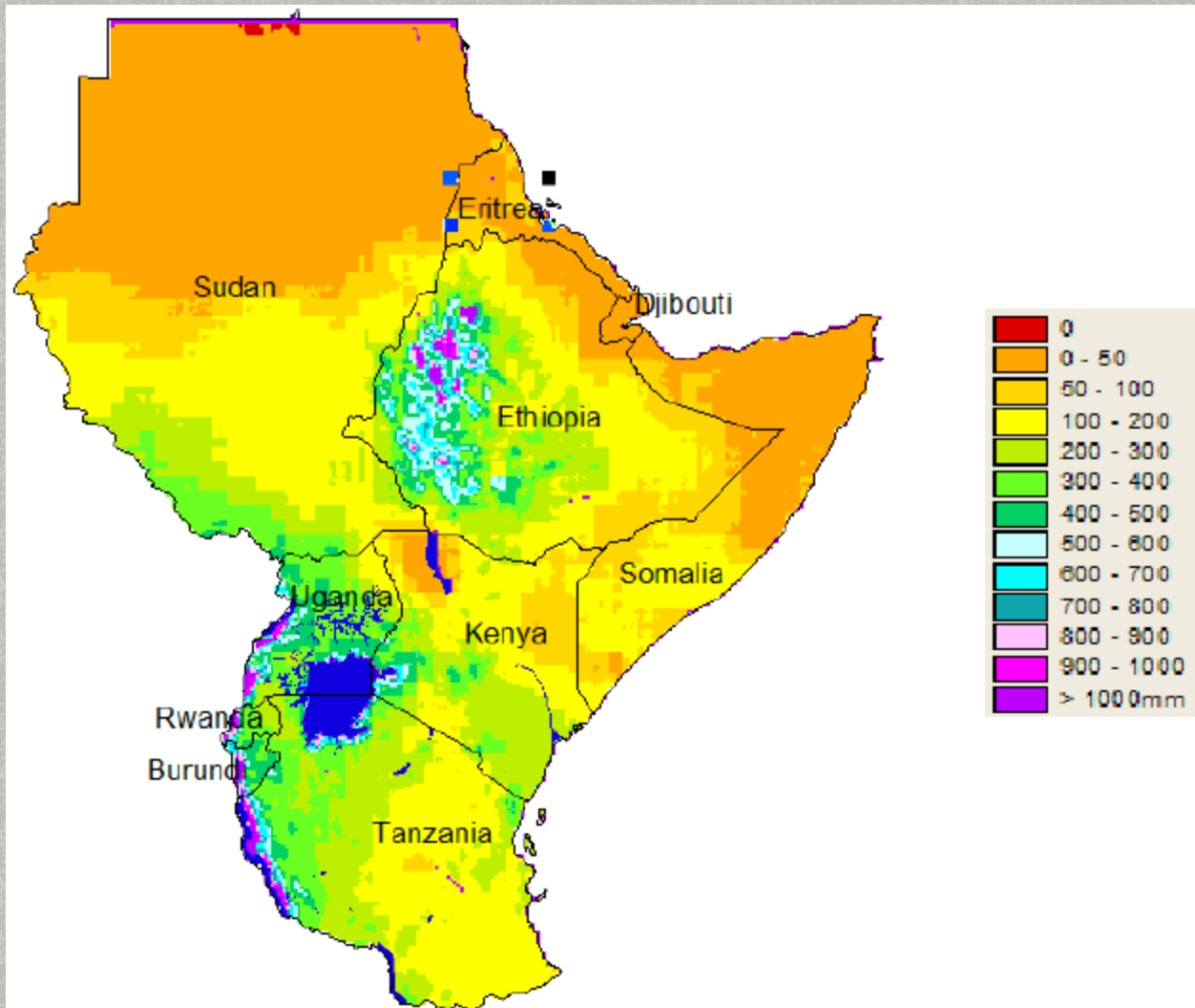
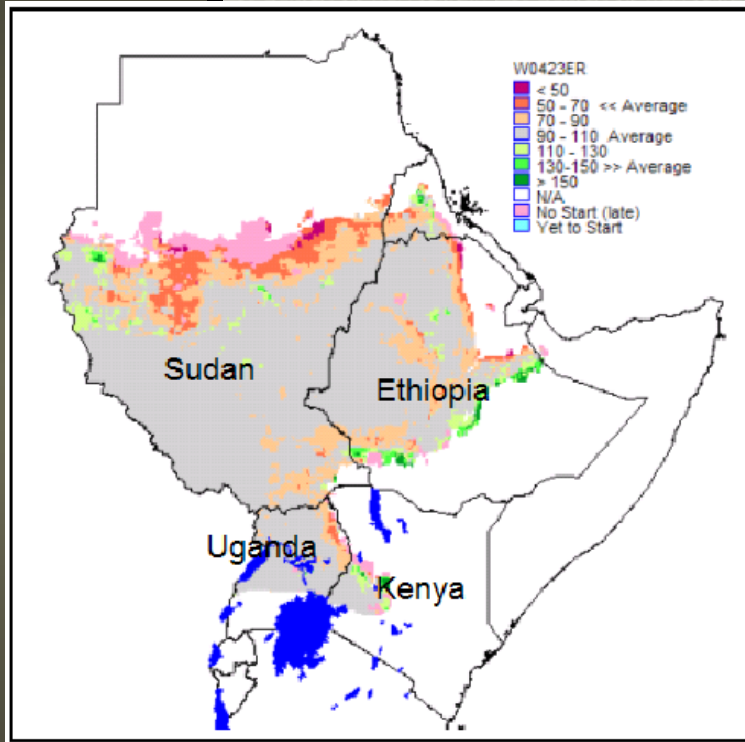


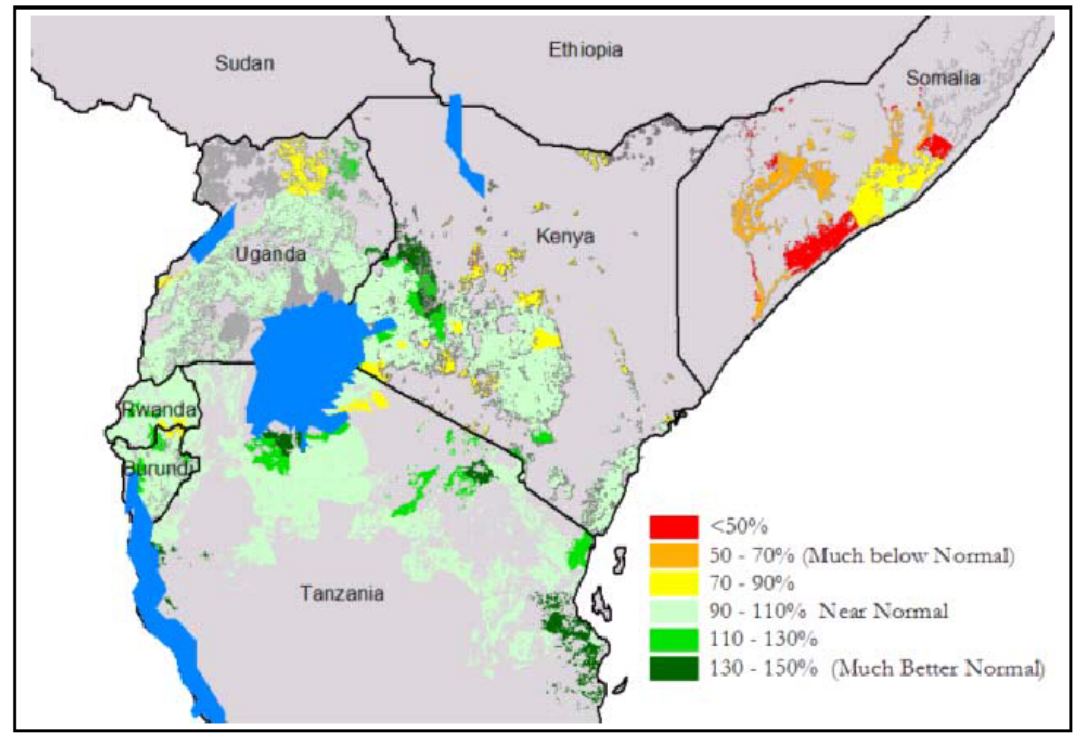
Figure 2: Mostly likely scenario for rainfall amounts in the GHA, SON 2004



Expected crop performance (USGS)



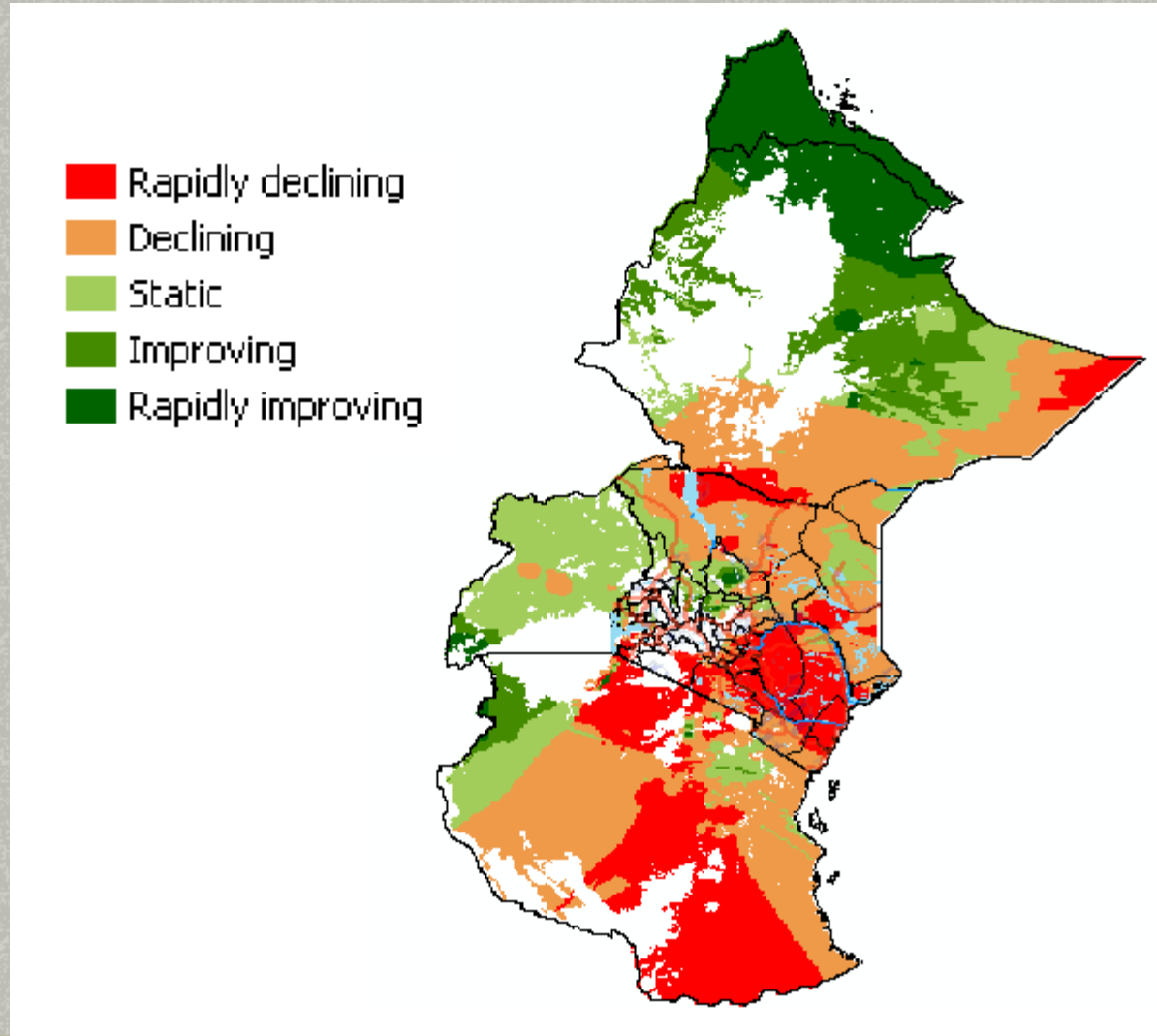
Northern season: JJA



Equatorial season: SOND



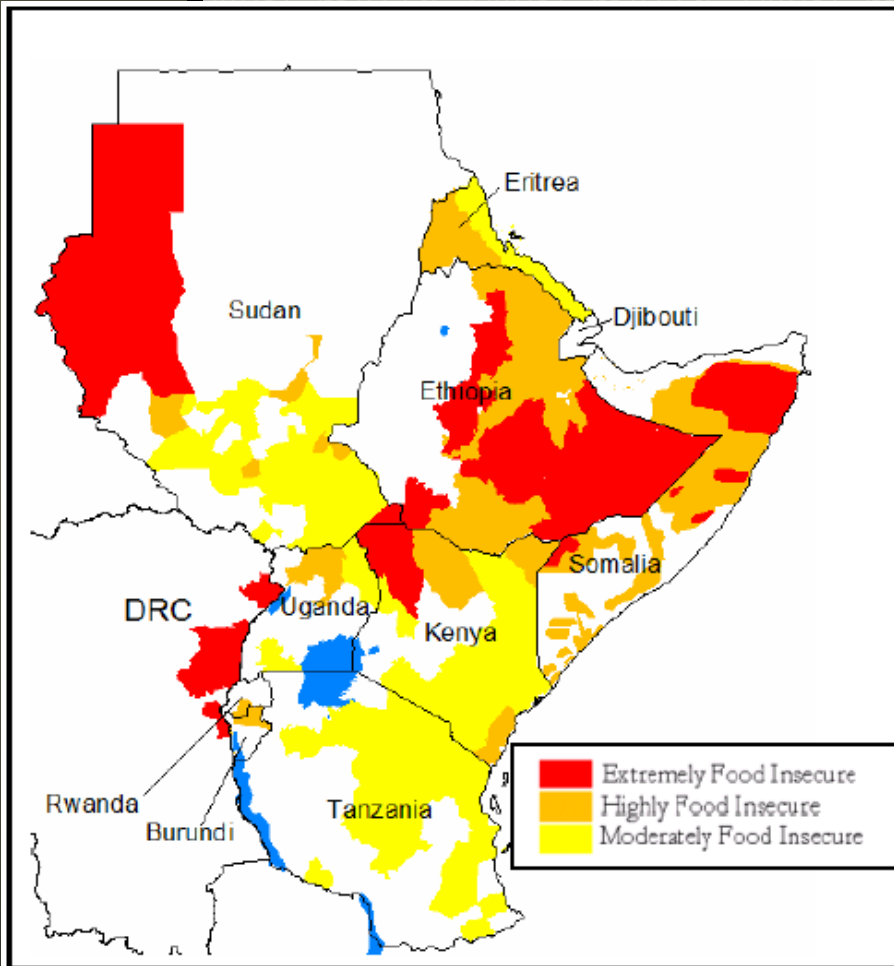
Expected October forage deviations (Texas A&M)



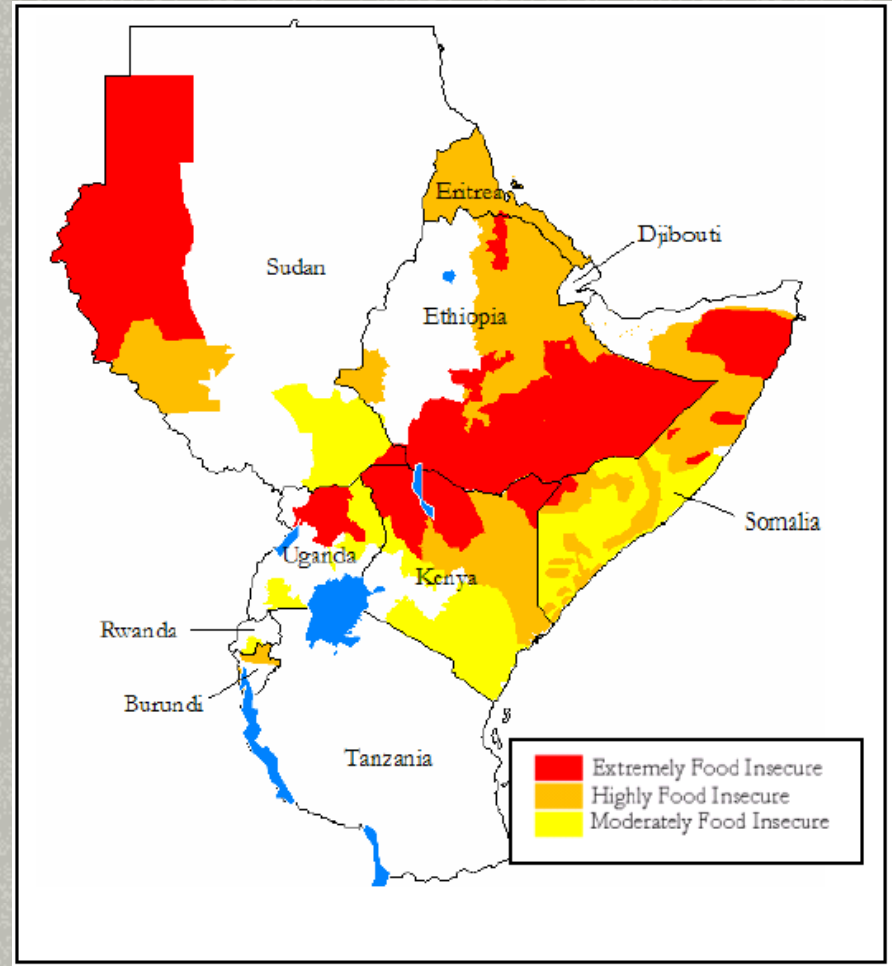


Food insecurity in August, 2004 and outlook for December

Current (August)



Outlook for December

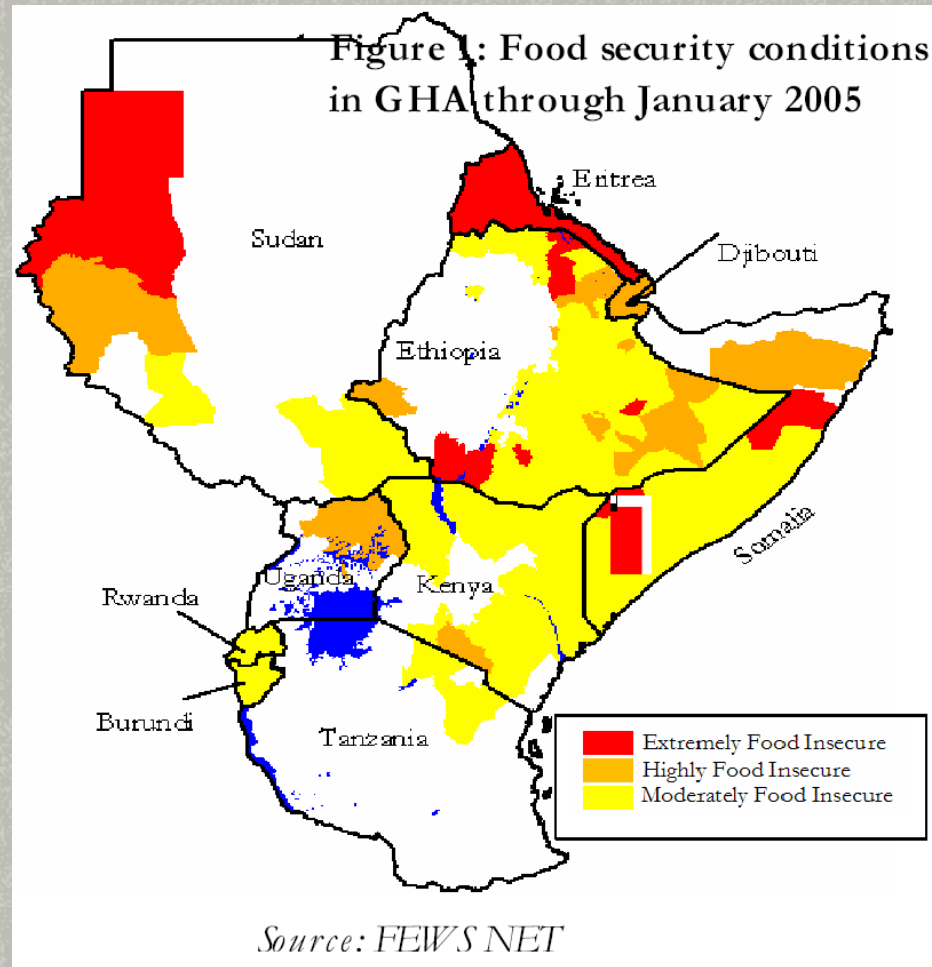
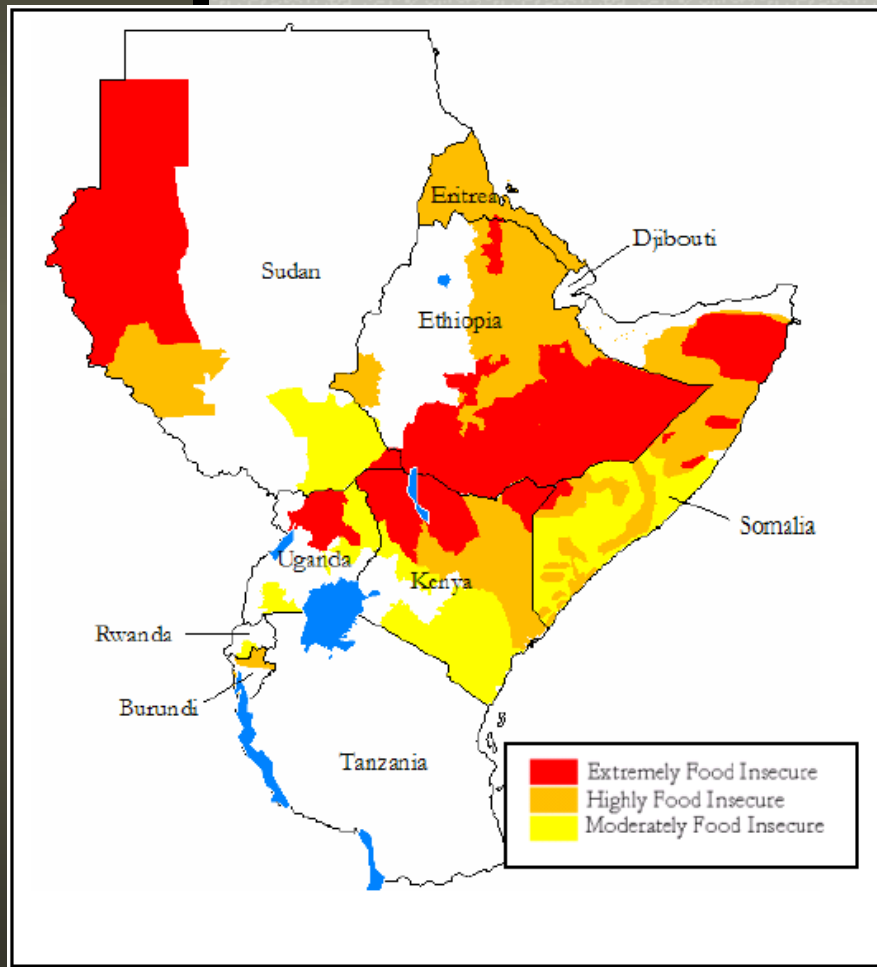




Food security outlook compared to reported food security in December

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

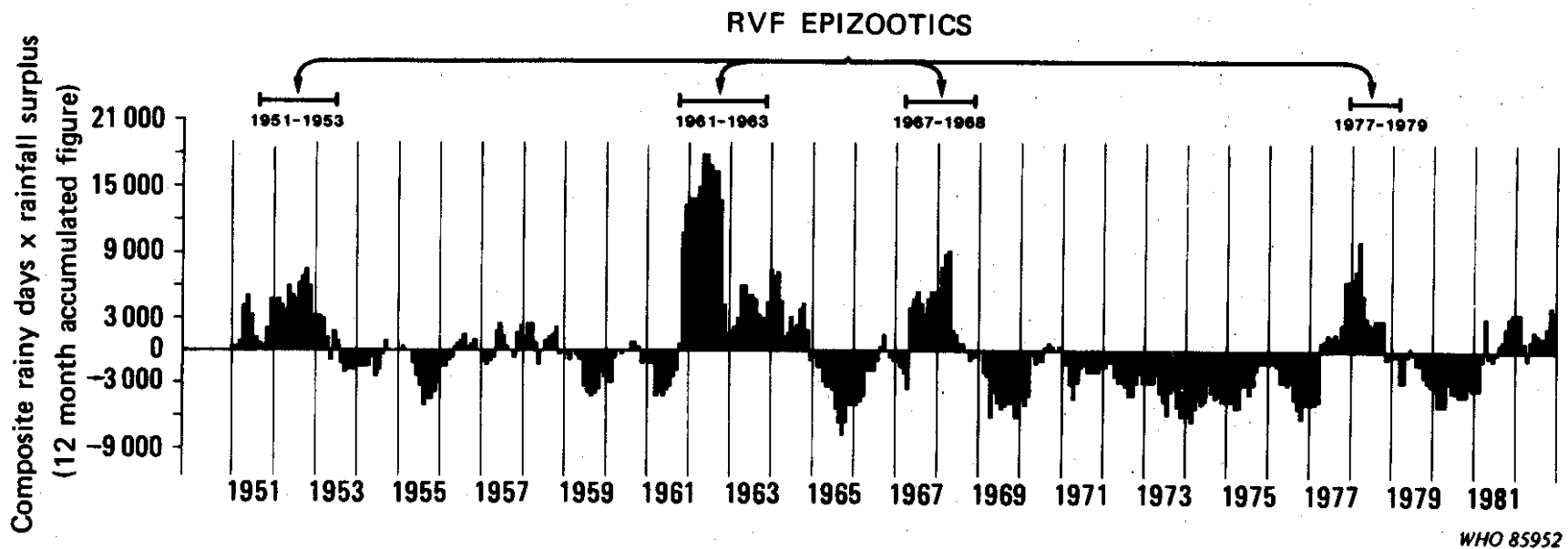


Livestock trade: Rift Valley Fever risk model

- 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

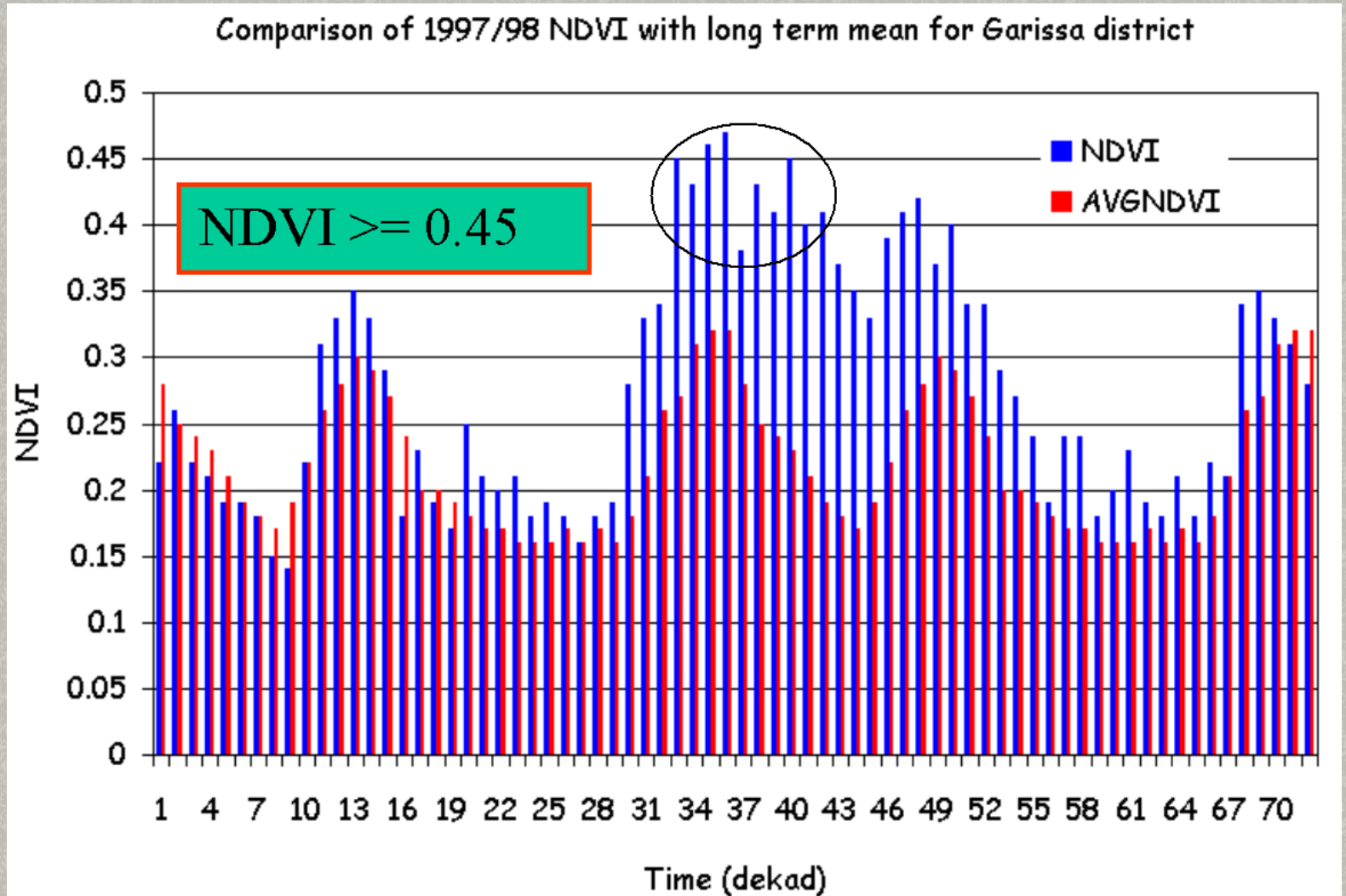


Cumulative rainfall threshold for Kenya outbreaks (Davies)





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





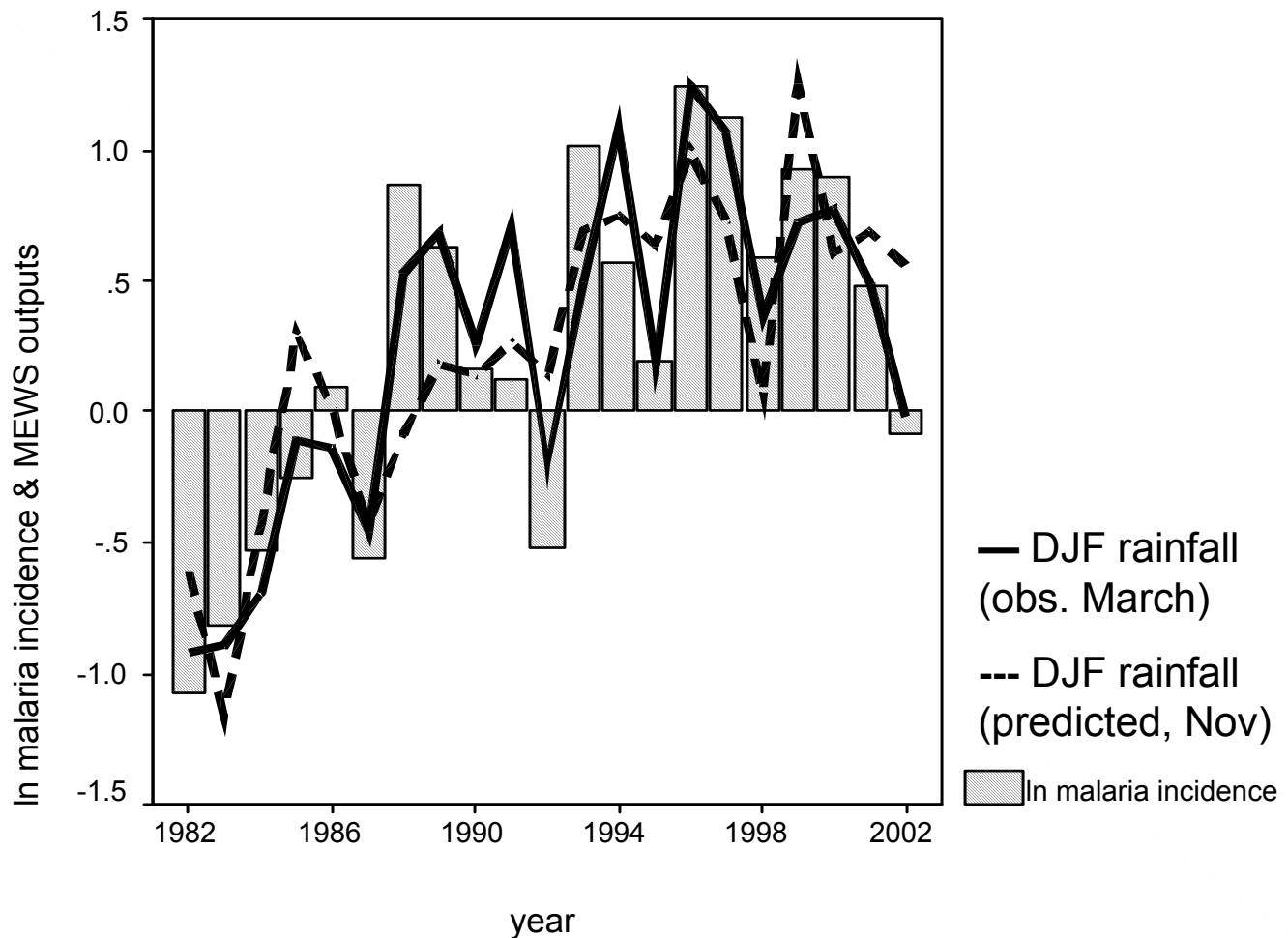
4) Risk Management, Examples from Africa

- preventing malaria epidemics in southern Africa



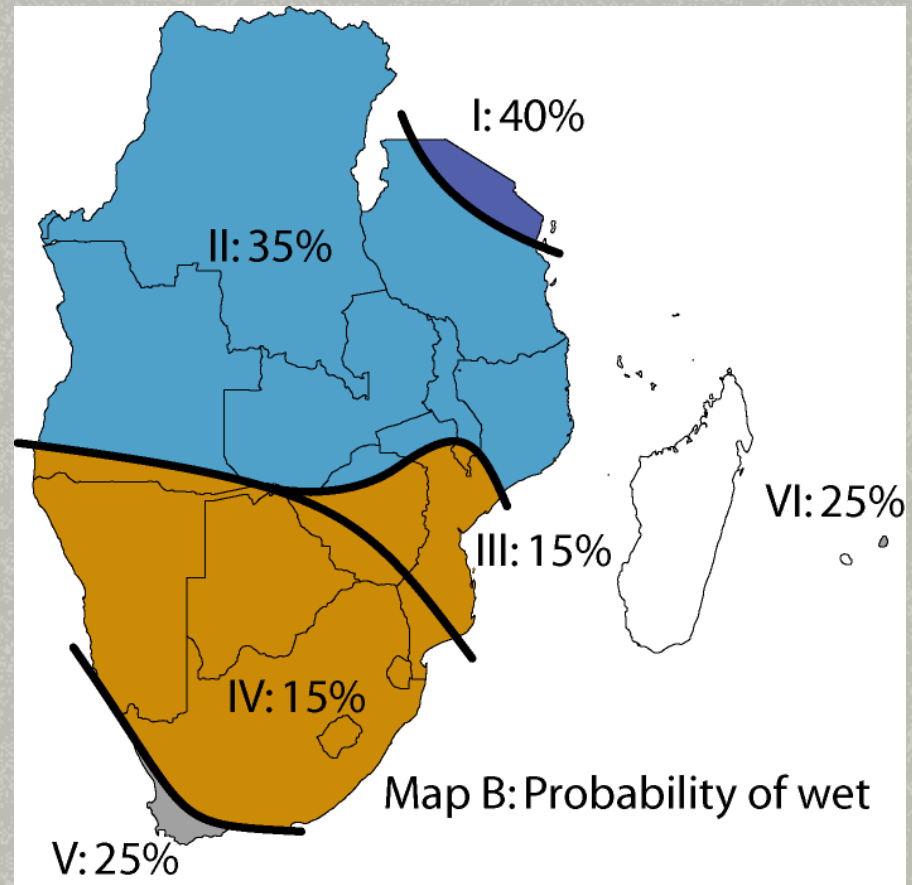
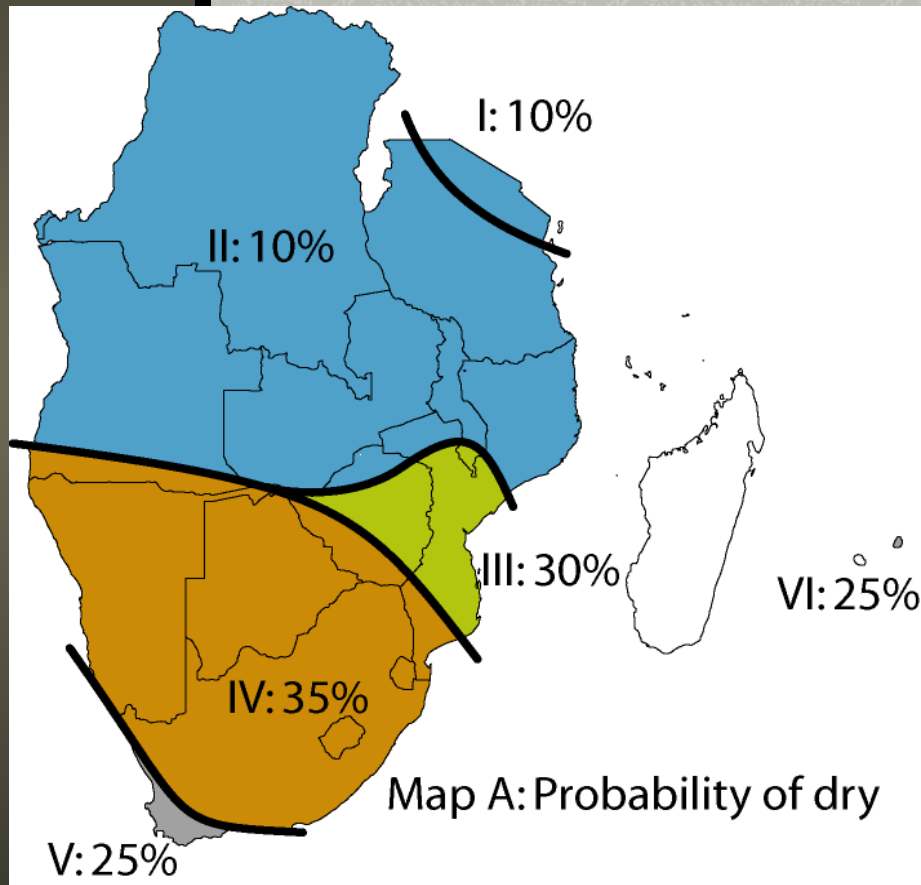
Malaria incidence: Botswana

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





Tailored malaria forecast made December, for DJF 2004-05

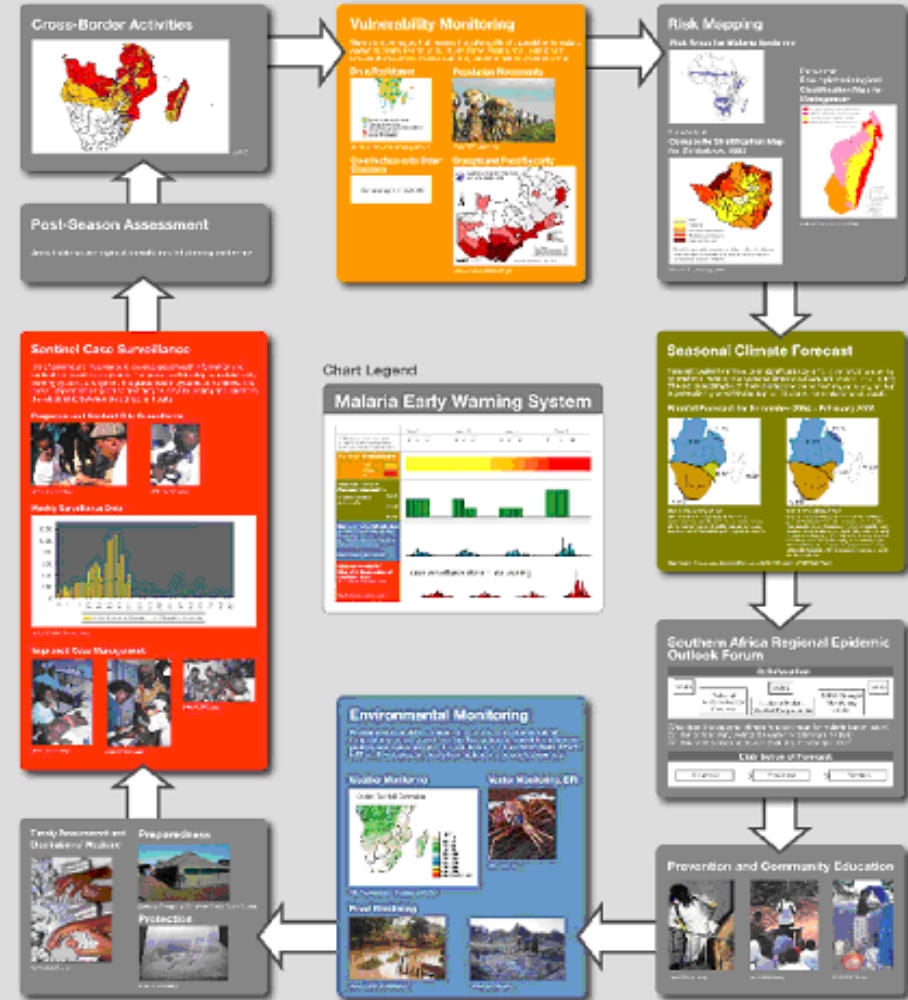




Malaria
early
warning
poster,
distributed
to regional
health and
control
offices

Malaria Surveillance, Forecasting, Preparedness and Response in Southern Africa

Coordinating authors:
Siboniso Moyo, Sarah Wainwright, Elizabeth
Simpson, Lisa Stone, Victoria Mwaikambo



References

1. WHO. World malaria situation, 2004. *Wkly Epidemiol Rec* 2005; 30(12): 1-12.

2. WHO. World malaria situation, 2005. *Wkly Epidemiol Rec* 2006; 31(12): 1-12.

3. WHO. World malaria situation, 2006. *Wkly Epidemiol Rec* 2007; 32(12): 1-12.

4. WHO. World malaria situation, 2007. *Wkly Epidemiol Rec* 2008; 33(12): 1-12.

5. WHO. World malaria situation, 2008. *Wkly Epidemiol Rec* 2009; 34(12): 1-12.

6. WHO. World malaria situation, 2009. *Wkly Epidemiol Rec* 2010; 35(12): 1-12.

7. WHO. World malaria situation, 2010. *Wkly Epidemiol Rec* 2011; 36(12): 1-12.

8. WHO. World malaria situation, 2011. *Wkly Epidemiol Rec* 2012; 37(12): 1-12.

9. WHO. World malaria situation, 2012. *Wkly Epidemiol Rec* 2013; 38(12): 1-12.

10. WHO. World malaria situation, 2013. *Wkly Epidemiol Rec* 2014; 39(12): 1-12.

11. WHO. World malaria situation, 2014. *Wkly Epidemiol Rec* 2015; 40(12): 1-12.

12. WHO. World malaria situation, 2015. *Wkly Epidemiol Rec* 2016; 41(12): 1-12.

13. WHO. World malaria situation, 2016. *Wkly Epidemiol Rec* 2017; 42(12): 1-12.

14. WHO. World malaria situation, 2017. *Wkly Epidemiol Rec* 2018; 43(12): 1-12.

15. WHO. World malaria situation, 2018. *Wkly Epidemiol Rec* 2019; 44(12): 1-12.

16. WHO. World malaria situation, 2019. *Wkly Epidemiol Rec* 2020; 45(12): 1-12.

17. WHO. World malaria situation, 2020. *Wkly Epidemiol Rec* 2021; 46(12): 1-12.

18. WHO. World malaria situation, 2021. *Wkly Epidemiol Rec* 2022; 47(12): 1-12.

19. WHO. World malaria situation, 2022. *Wkly Epidemiol Rec* 2023; 48(12): 1-12.

20. WHO. World malaria situation, 2023. *Wkly Epidemiol Rec* 2024; 49(12): 1-12.





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.