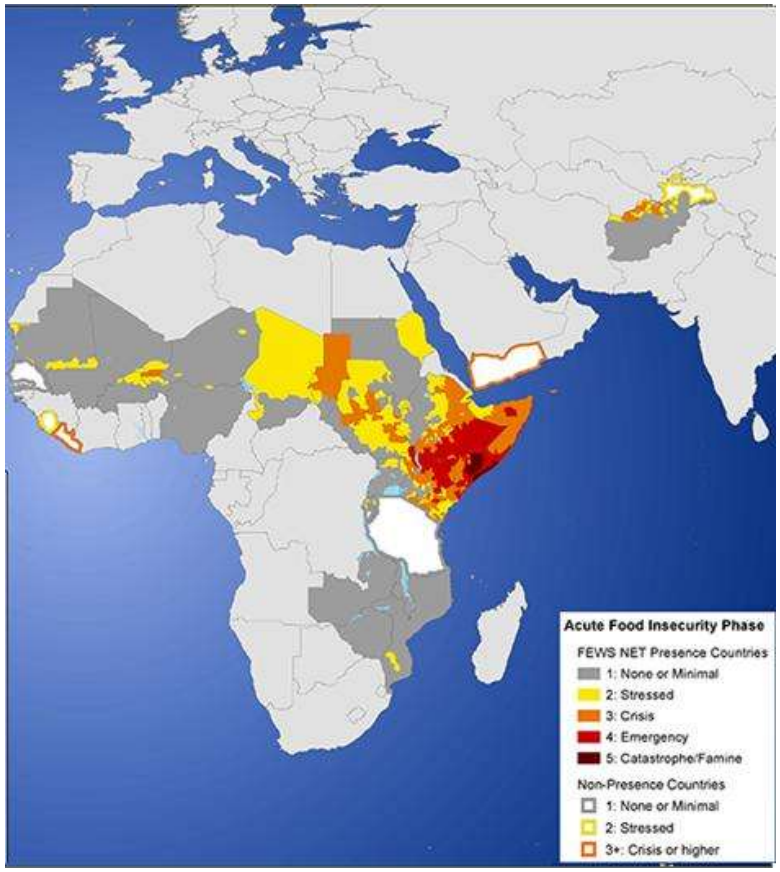


Estimated food security conditions, 3rd Quarter 2011 (August-September 2011)
(http://www.fews.net/Pages/imageryhome.aspx?l=en)

Derivation of drought LEP curves for principal rain fed crops in Malawi, Mozambique, and Niger using GeoWRSI

Harikishan Jayanthi, Greg Husak

University of California, Santa Barbara

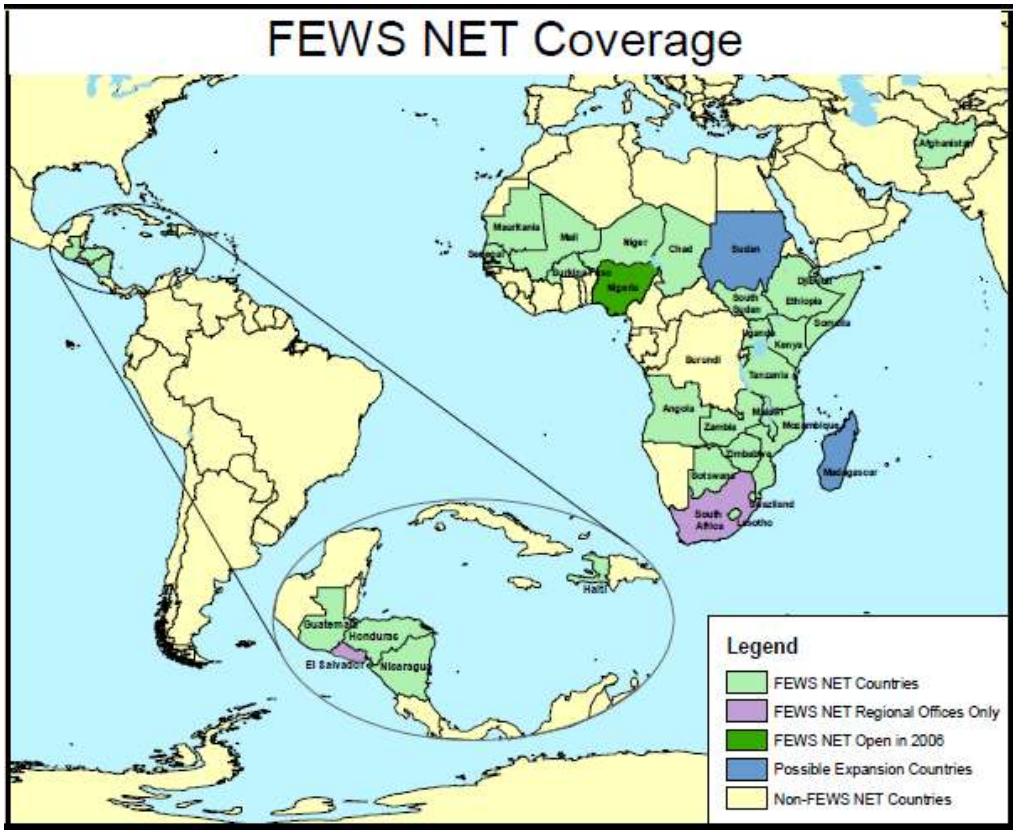
Chris Funk, Tamuka Magadzire, Diego Pedreros, James Verdin

U.S. Geological Survey

Famine **E**arly **W**arning **S**ystems N**ET**work

Goal

"to ensure that appropriate… emergency food aid is provided to the right <u>people</u> in the right <u>places</u> at the right <u>time</u> and in the right <u>way</u> in the economically poor and developing countries of Africa and in Latin America"



FEWS NET addresses three critical dimensions of food security:

- ***Availability***
- ***Access***
- ***Utilization***

FEWS NET is a food security <u>decision support system</u> with its own <u>climate services</u>

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FEWS NET Data Portal

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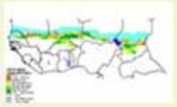
Home > Africa Data Portal

Product	Time Period	Data Available	PDF	PNG	IMS Map	Preview
eMODIS NDVI (Normalized Difference Vegetation Index)	Pentadal	X	X	X		▲
◉ North Africa ○ West Africa ○ East Africa ○ Southern Africa — View ->						
RFE (Rainfall Estimate)	Dekadal	X		X	X	▼
Vectorial Capacity Model -- Malaria (8-day)	Dekadal		X	X		▼
RFE Anomaly -- Malaria	Dekadal	X	X	X		▼
SPI (Standardized Precipitation Index)	Dekadal			X		▼
Moisture Index	Dekadal			X		▼
Moisture Index/Soil Water Index Anomaly	Dekadal			X		▼
BERM (Basin Excess Rainfall Map)	Dekadal			X		▼
Inter-Tropical Front (ITF) Position	Dekadal			X		▼
Croplands Water Requirement Satisfaction Index (WRSI)	Dekadal			X		▼
Rangelands Water Requirement Satisfaction Index (WRSI)	Dekadal			X		▲
◉ West Africa ○ East Africa — ○ Sep - Jan (short rains) — View >						

http://earlywarning.usgs.gov/fews/africa/index.php

Background of the study

- *Global Assessment Reports (GARxx)* address the issues involved in "*disaster risk reduction* at local, national and global levels".

- GAR(2011), in the context of agricultural droughts, highlighted that these are associated with:
  - multi-sectoral impacts, and
  - quantitative risk assessments are not available

Objective of the study

Collaborative study between

- *UNISDR, and*
- *FEWS NET (Famine Early Warning Network System)*

Regional characterization of agricultural drought risk using satellite estimated rainfall in African countries

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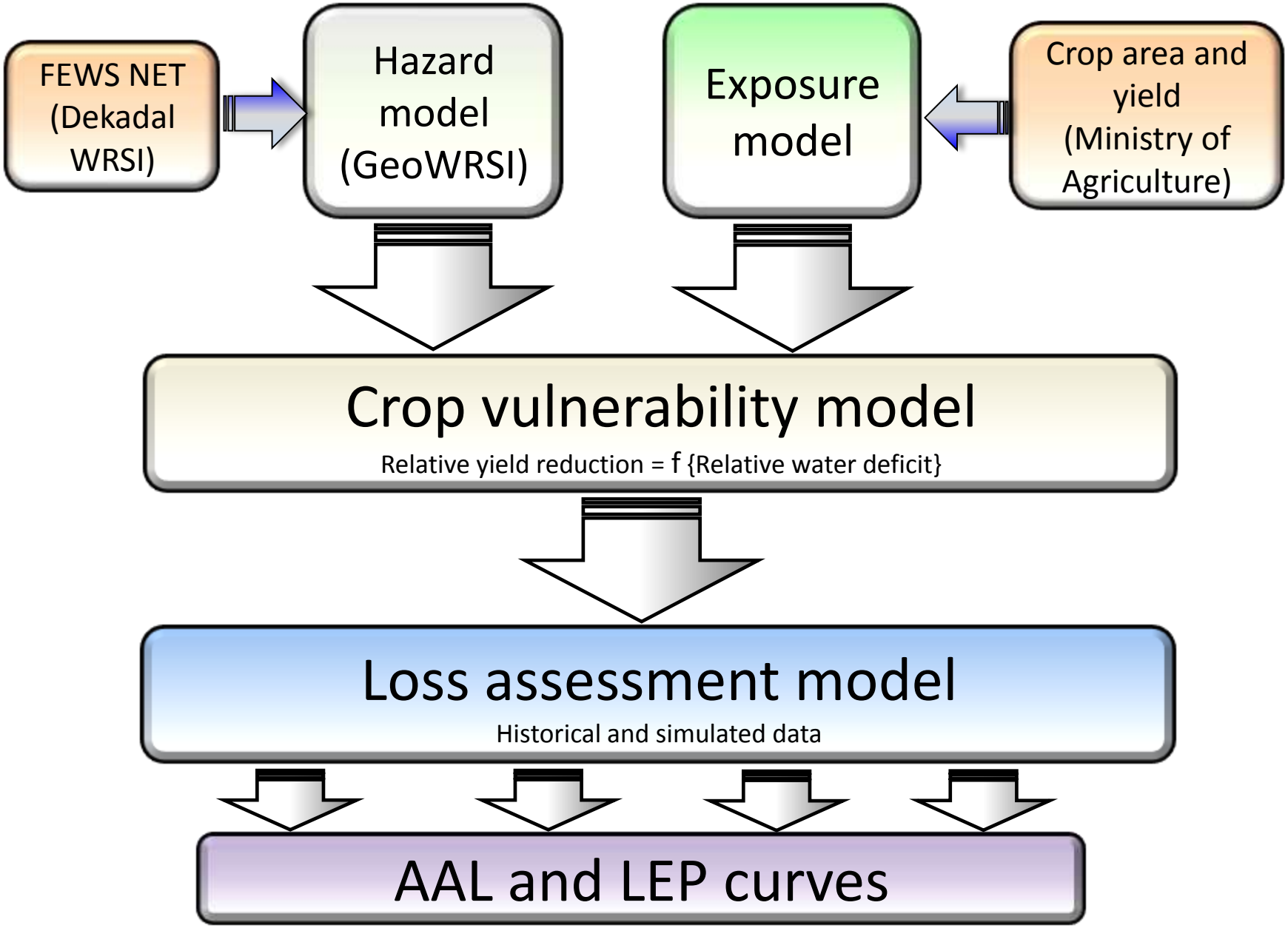
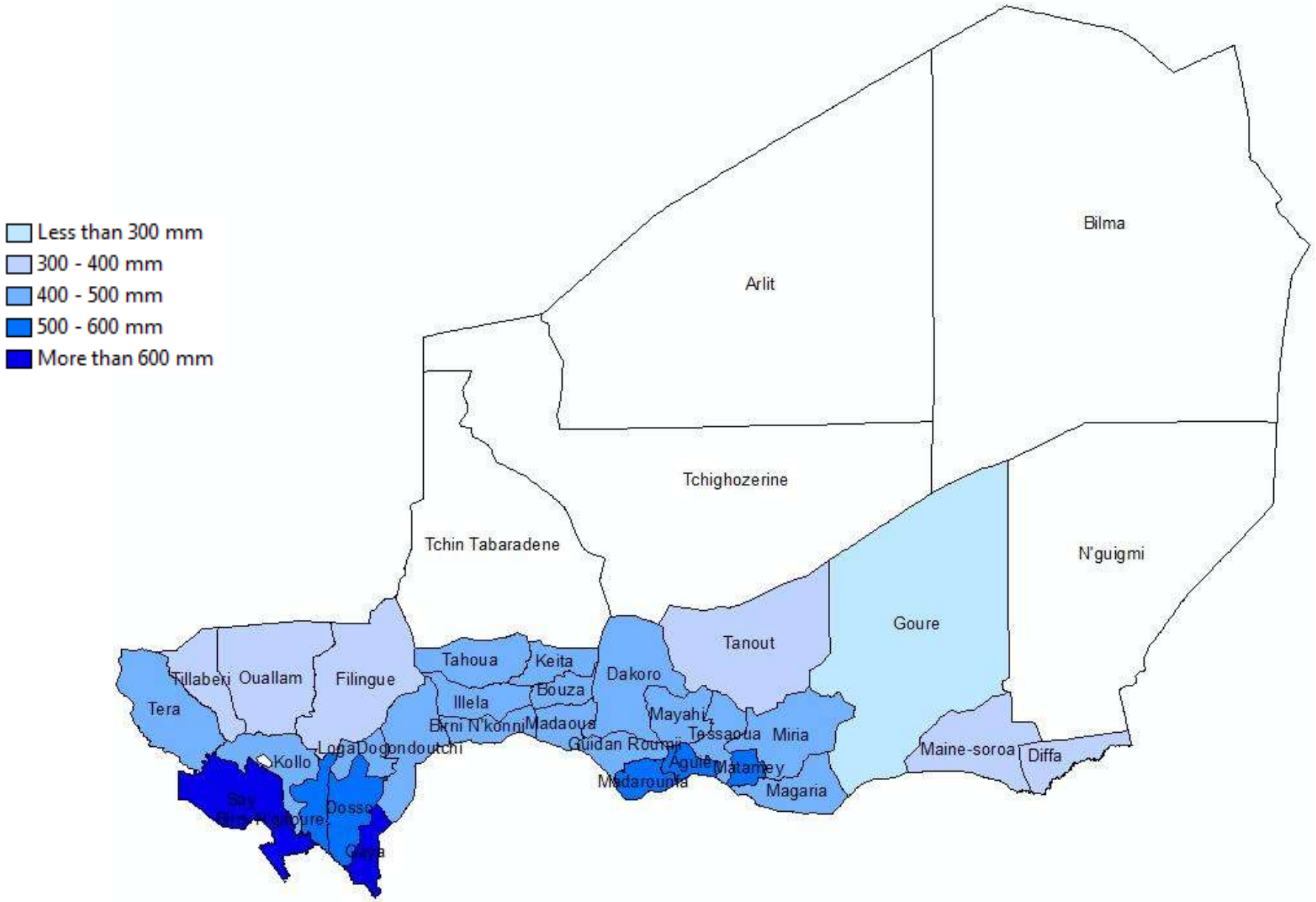
Basic template in the present analysis



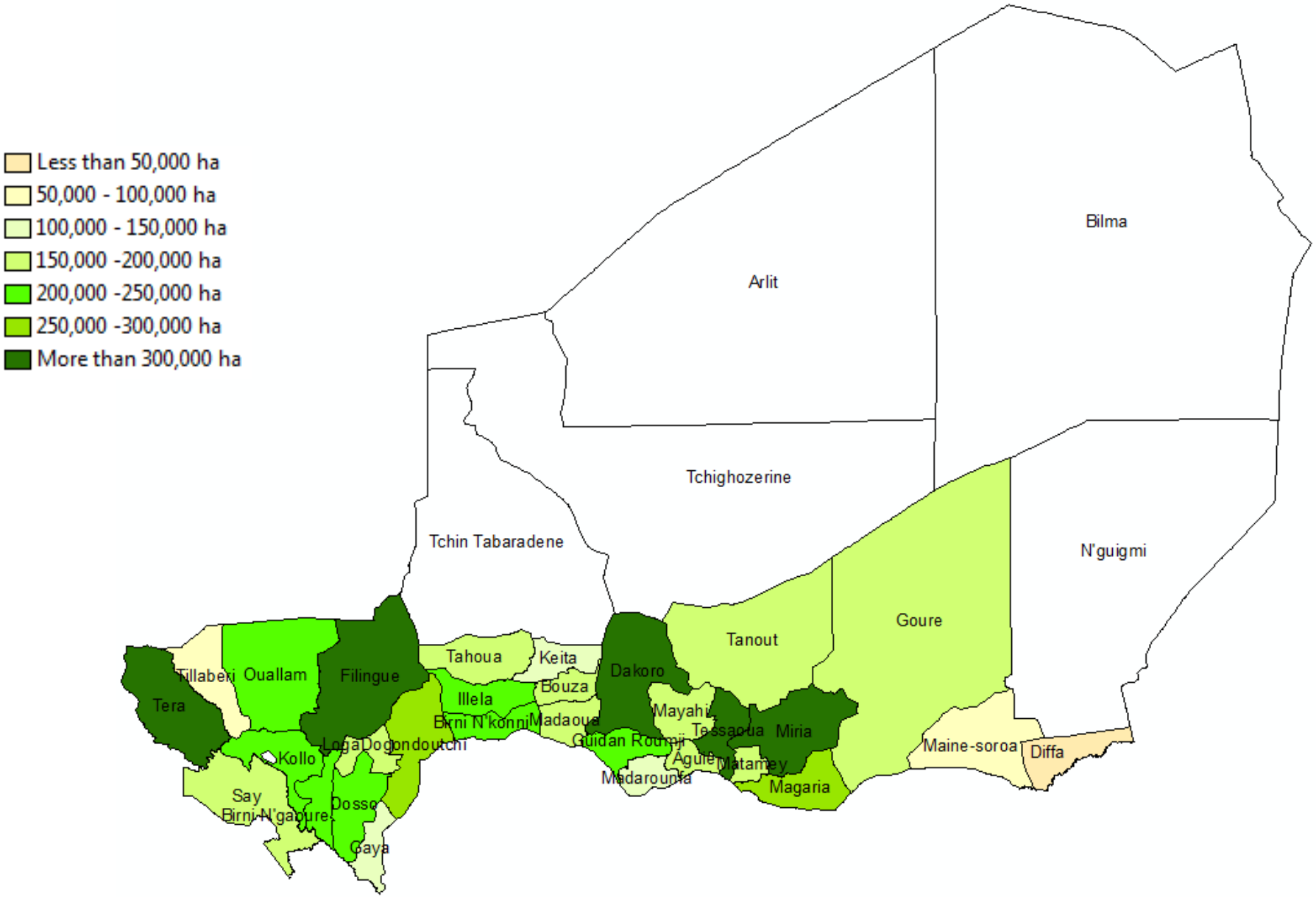
Results

Millet in Niger, Africa

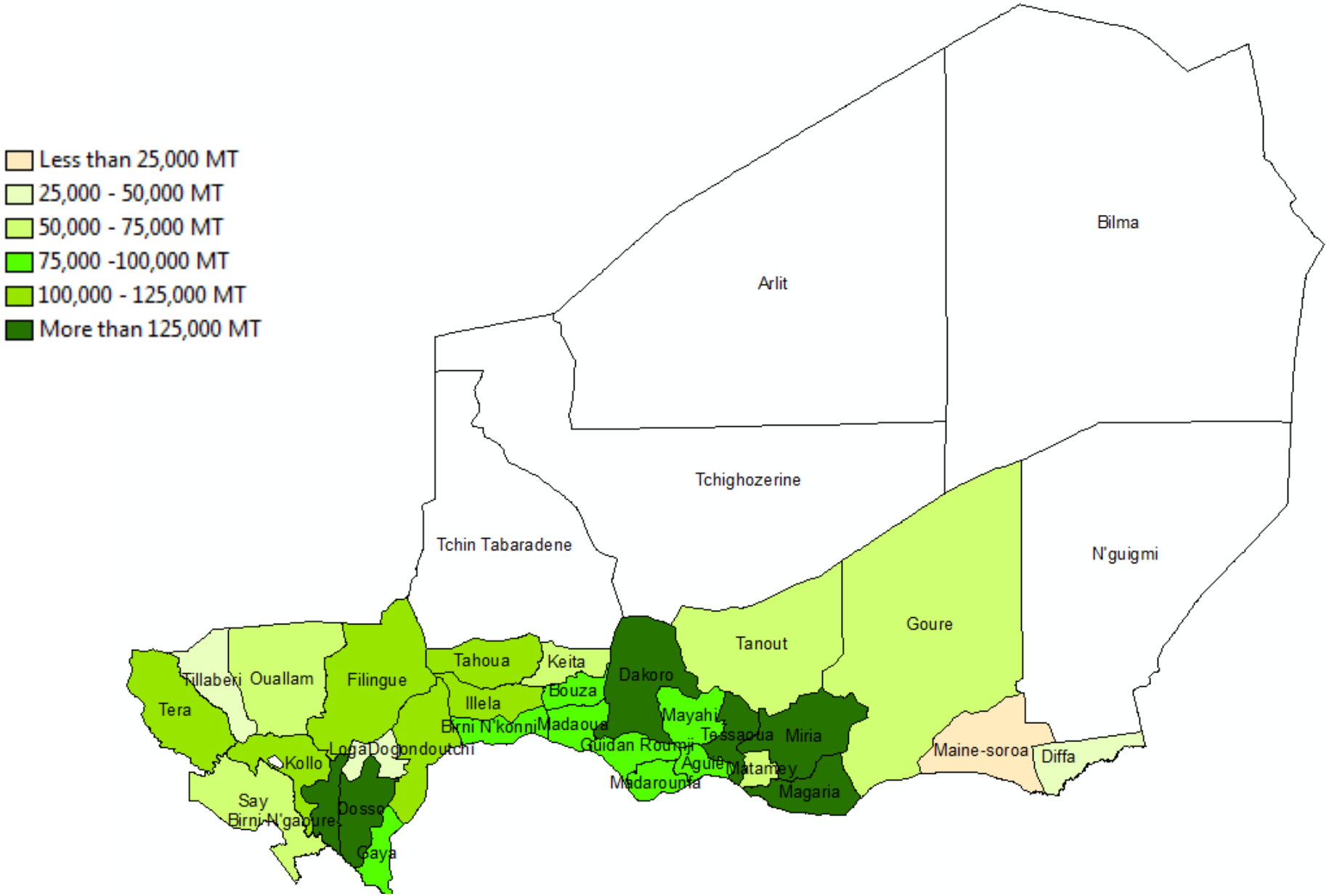
Seasonal rainfall (mm) (June to September)



Spatial distribution of millet cultivation (2007)



Spatial distribution of millet production (2007)



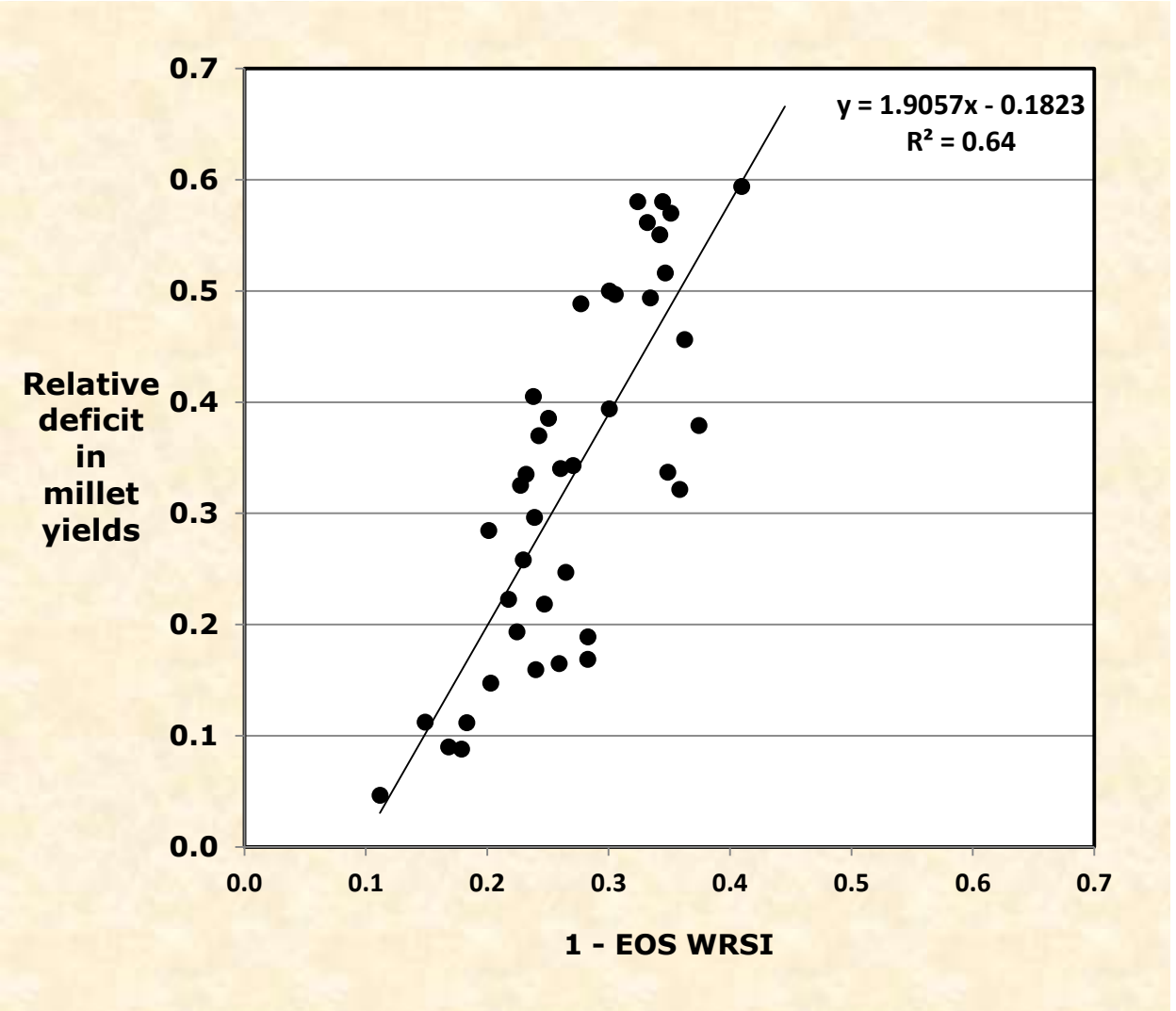
Millet vulnerability model - Niger

Relative yield deficit

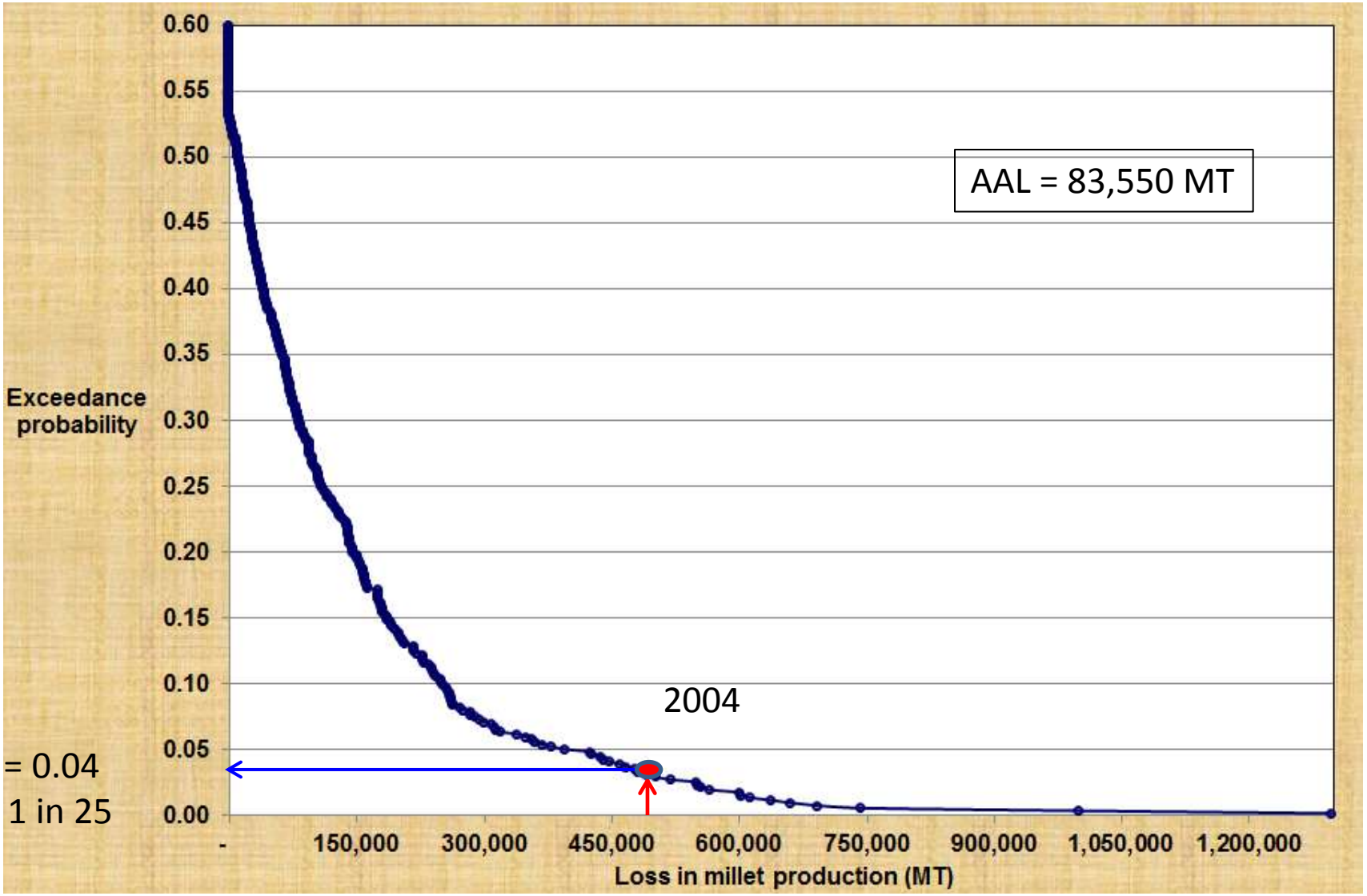
$$\frac{Y_{reference} - Y_{actual}}{Y_{reference}}$$

End-of-season (EOS) WRSI

$$\frac{Actual\ evapotranspiration}{Water\ requirement}$$

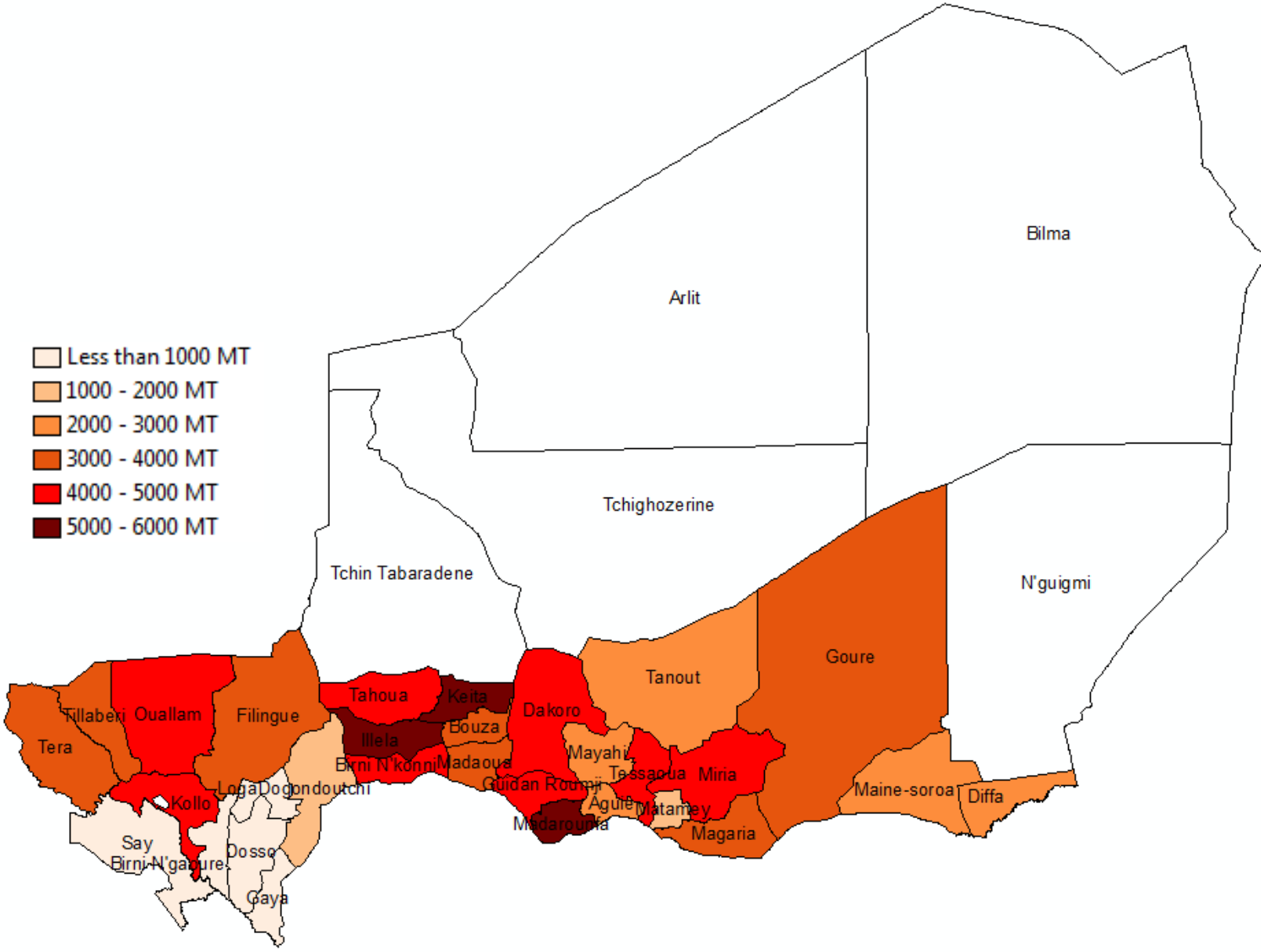


LEP curve for millet

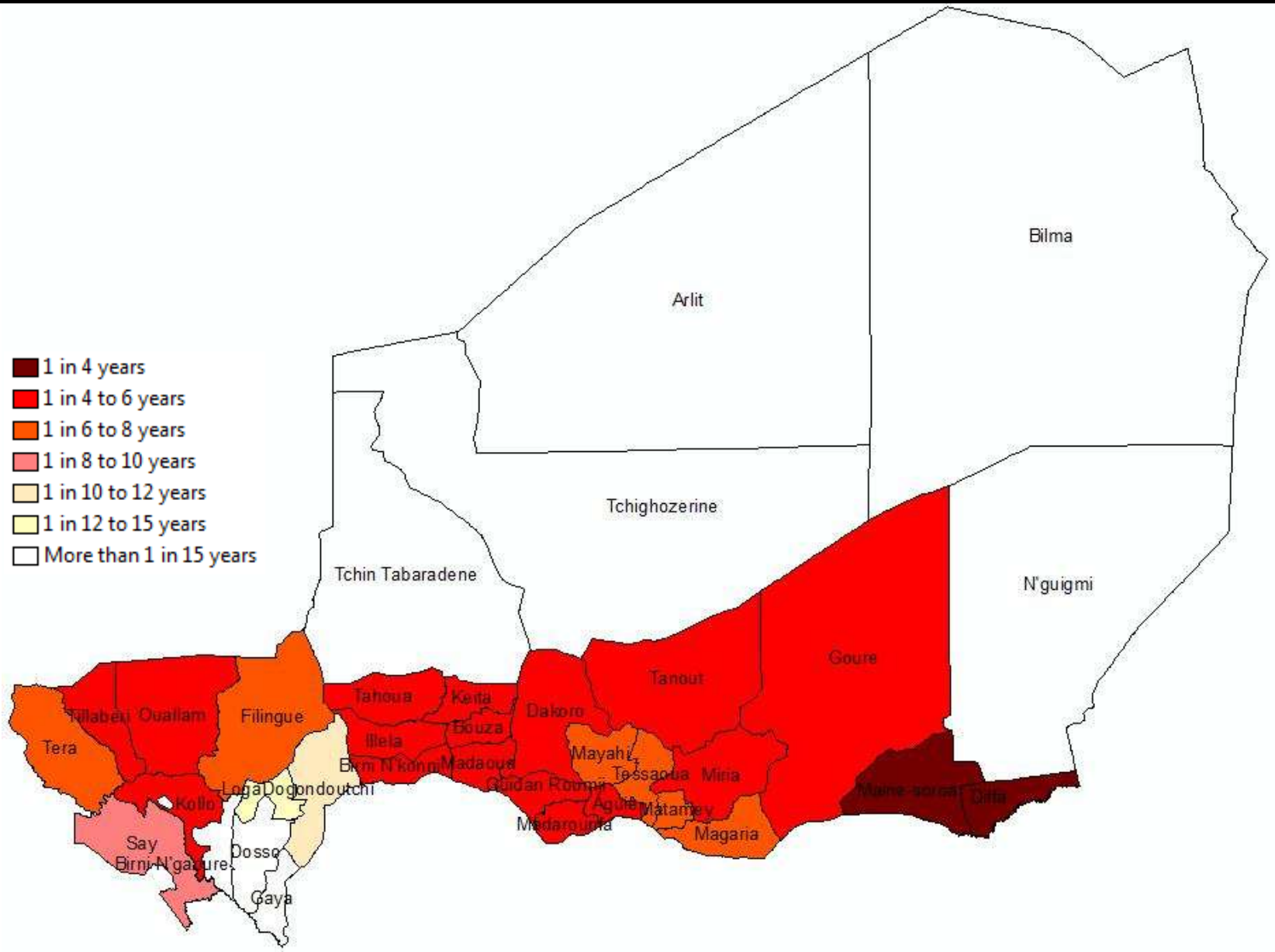


The AAL is calculated with respect to the potential production expected from the millet cultivated areas of 2007

Average annual loss (MT) for millet in Niger



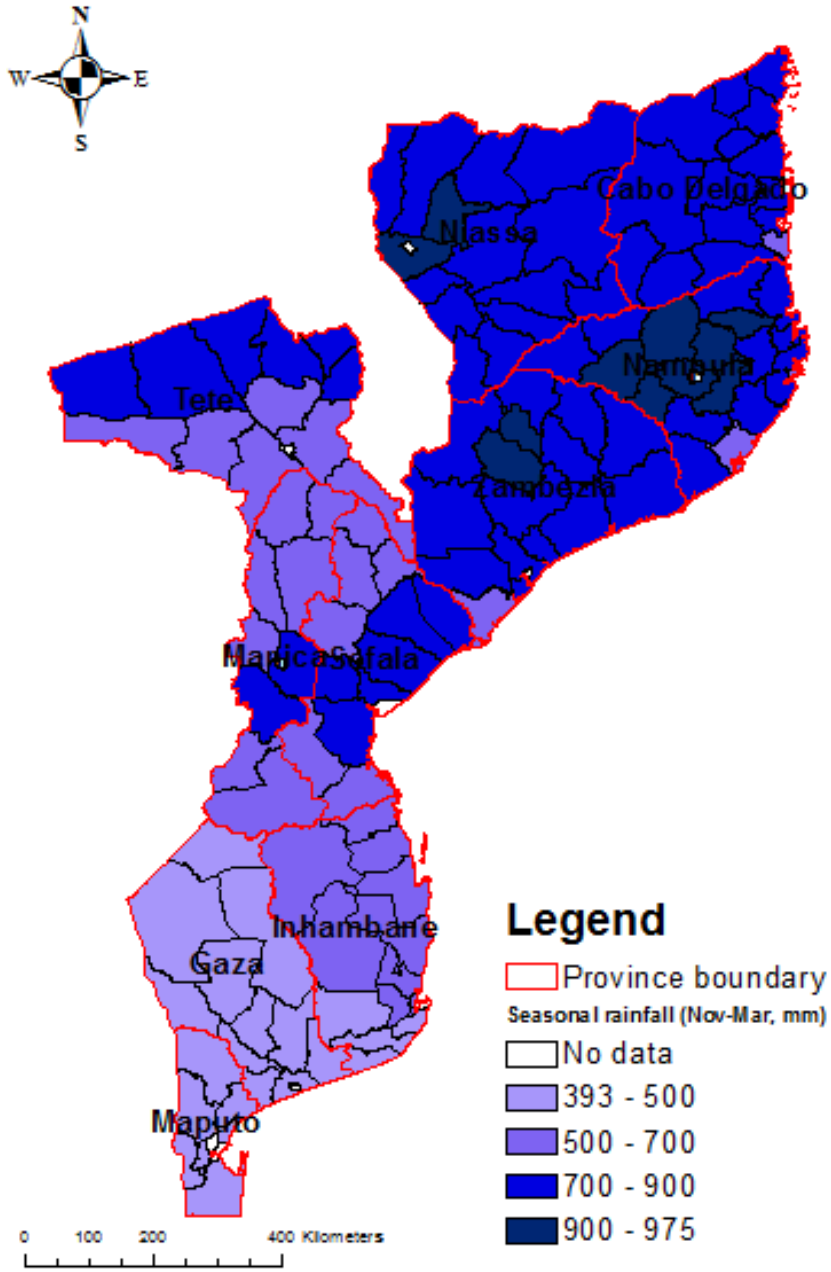
Drought frequency map

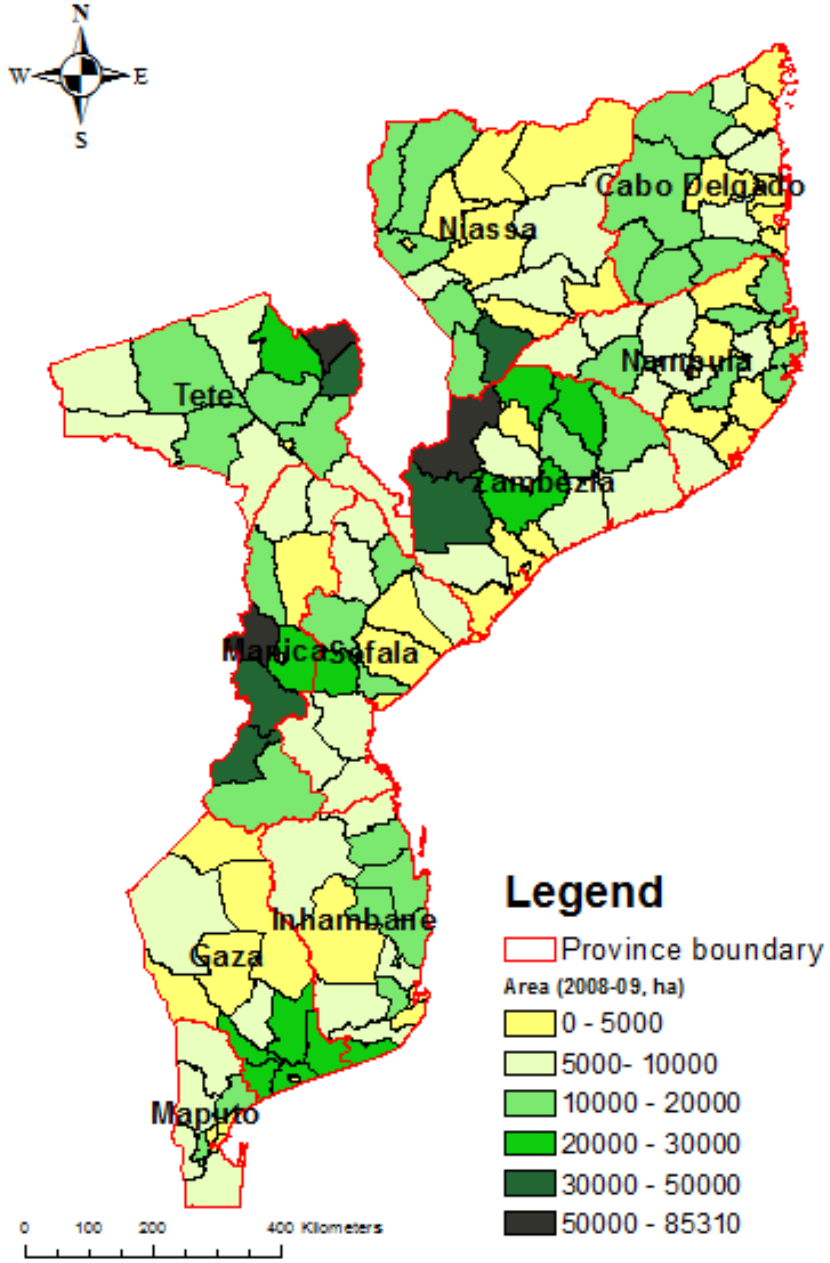


Results

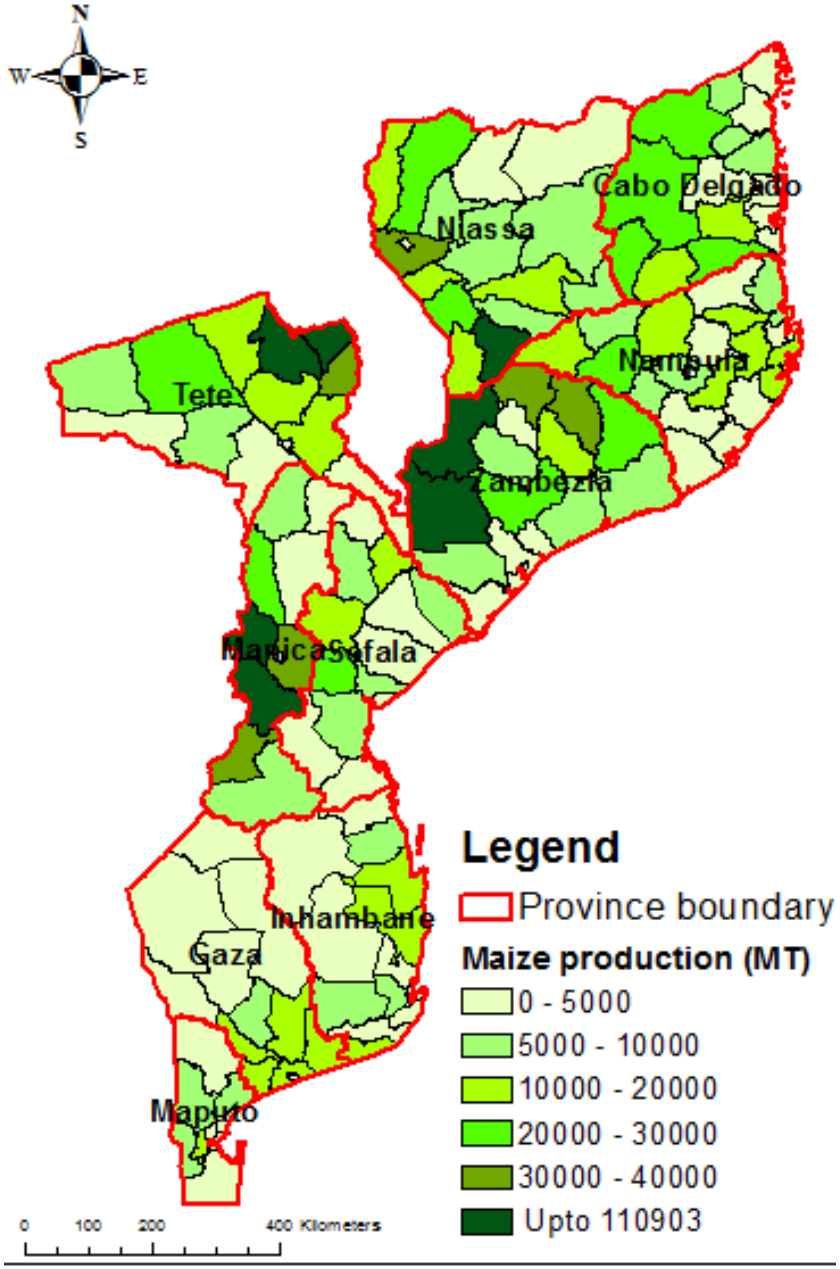
Maize in Mozambique

Spatial distribution of maize cultivation with rainfall





Spatial variability in maize production



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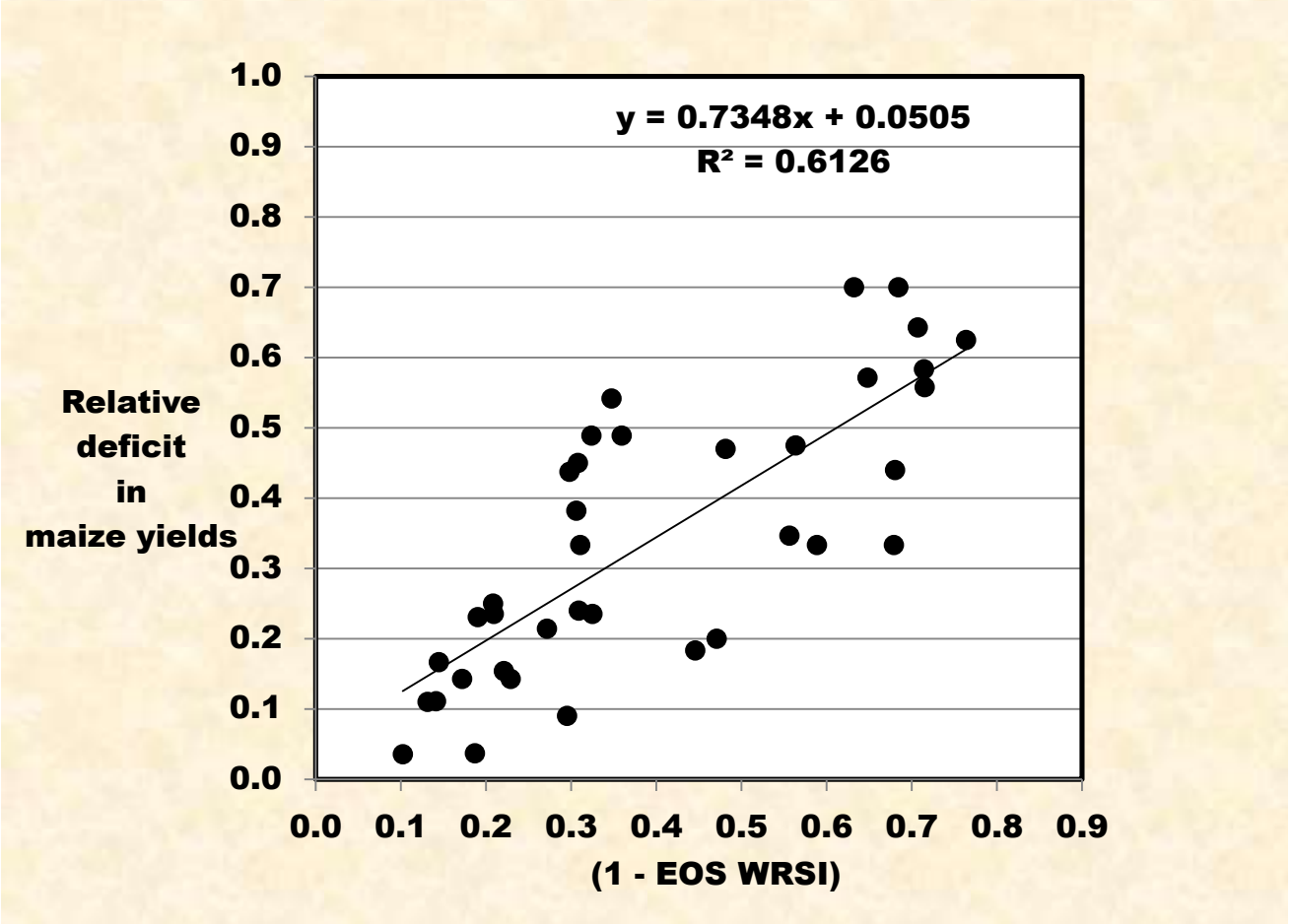
Maize vulnerability model - Mozambique



Relative yield deficit

$$\frac{Y_{reference} - Y_{actual}}{Y_{reference}}$$

End-of-season (EOS) WRSI

$$\frac{Actual\ evapotranspiration}{Water\ requirement}$$

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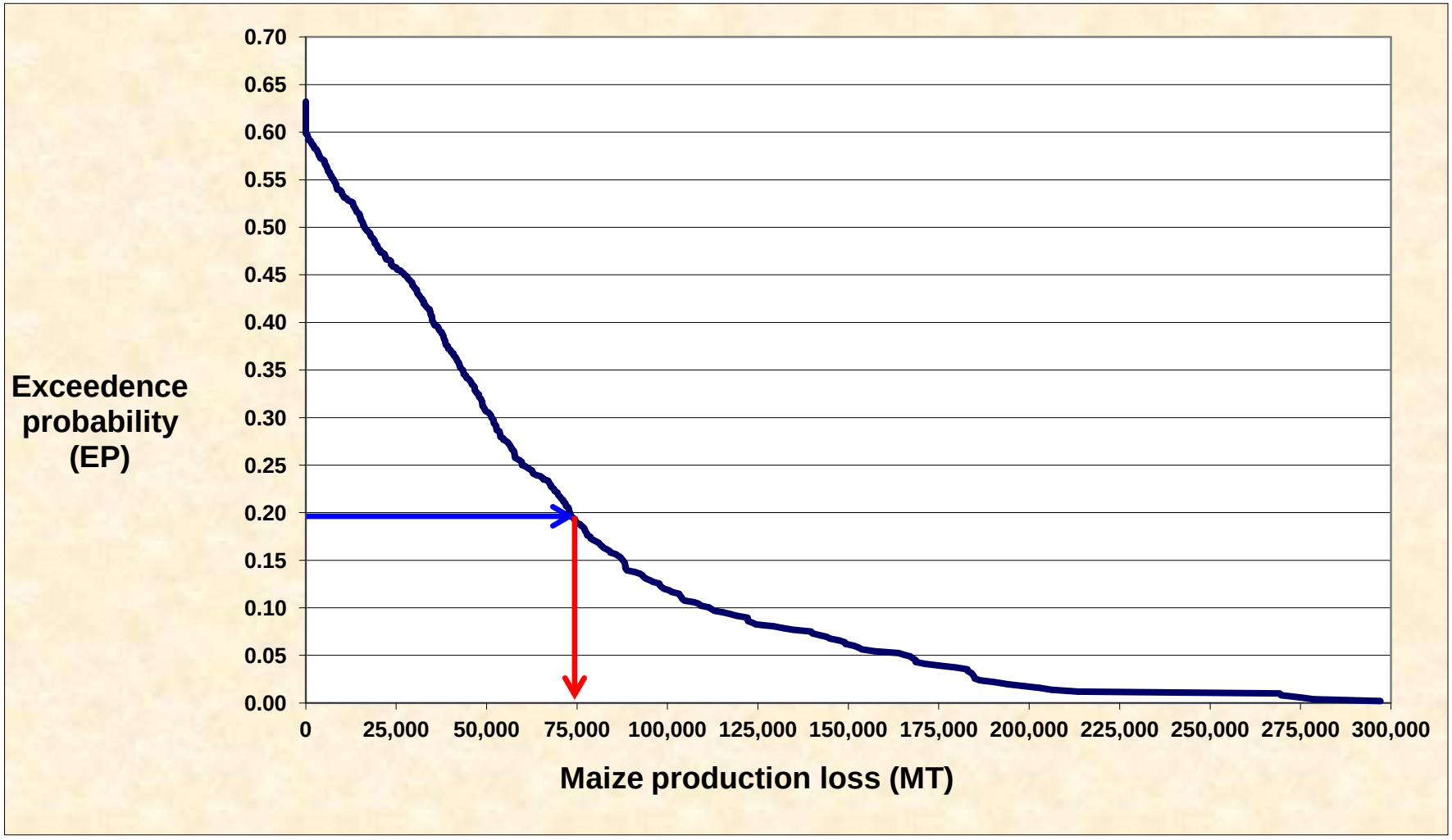
LEP curve for maize in Mozambique



The AAL is expressed in terms of actual production realized from the maize cultivated areas during 2007-08 in Mozambique

AAL = 39,650 MT

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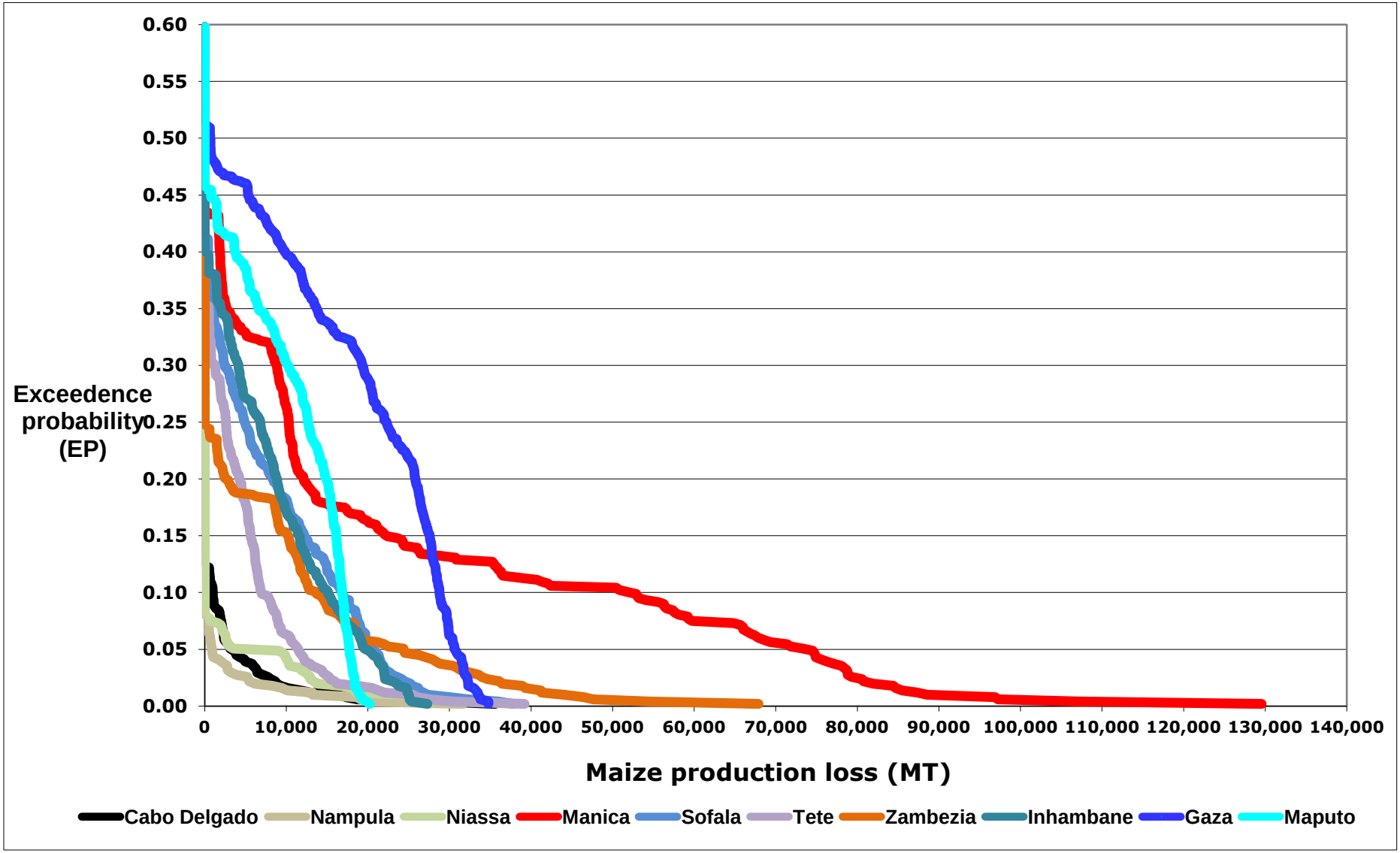
Maize losses to drought in different provinces in Mozambique



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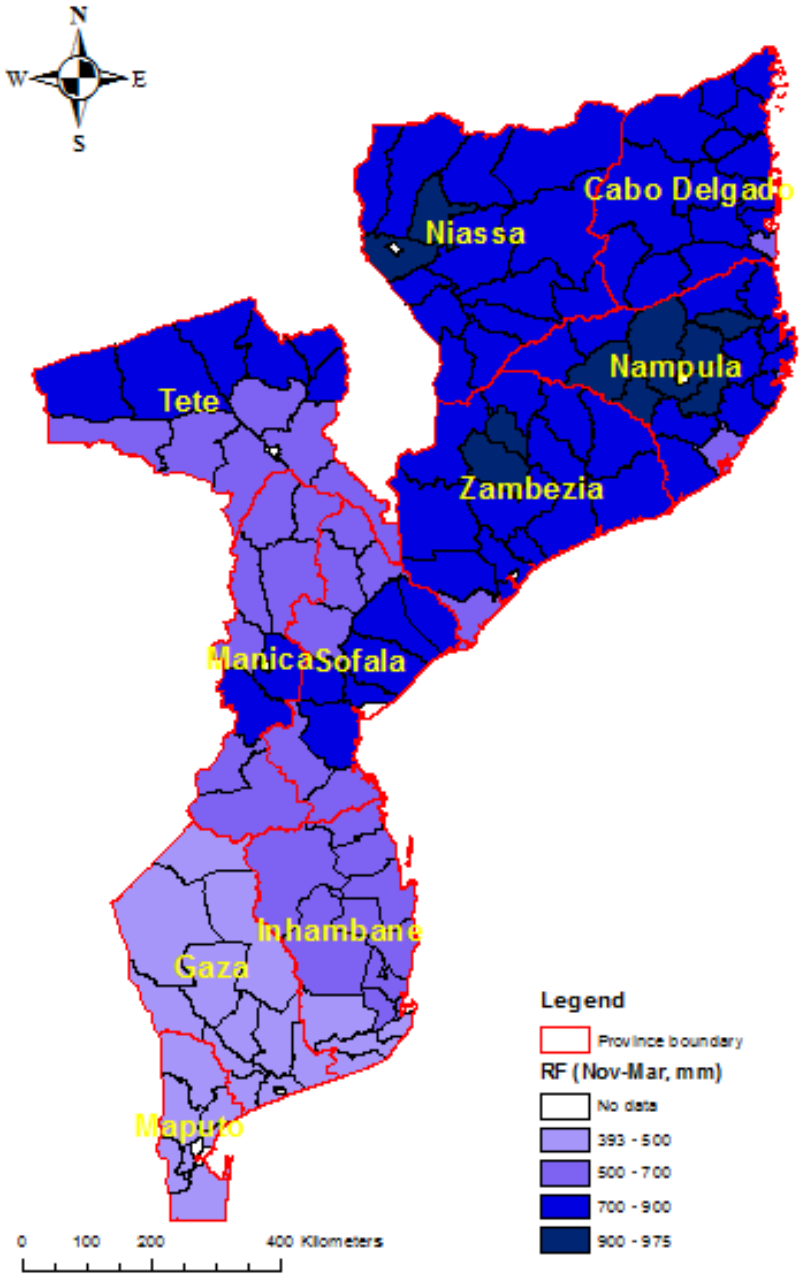
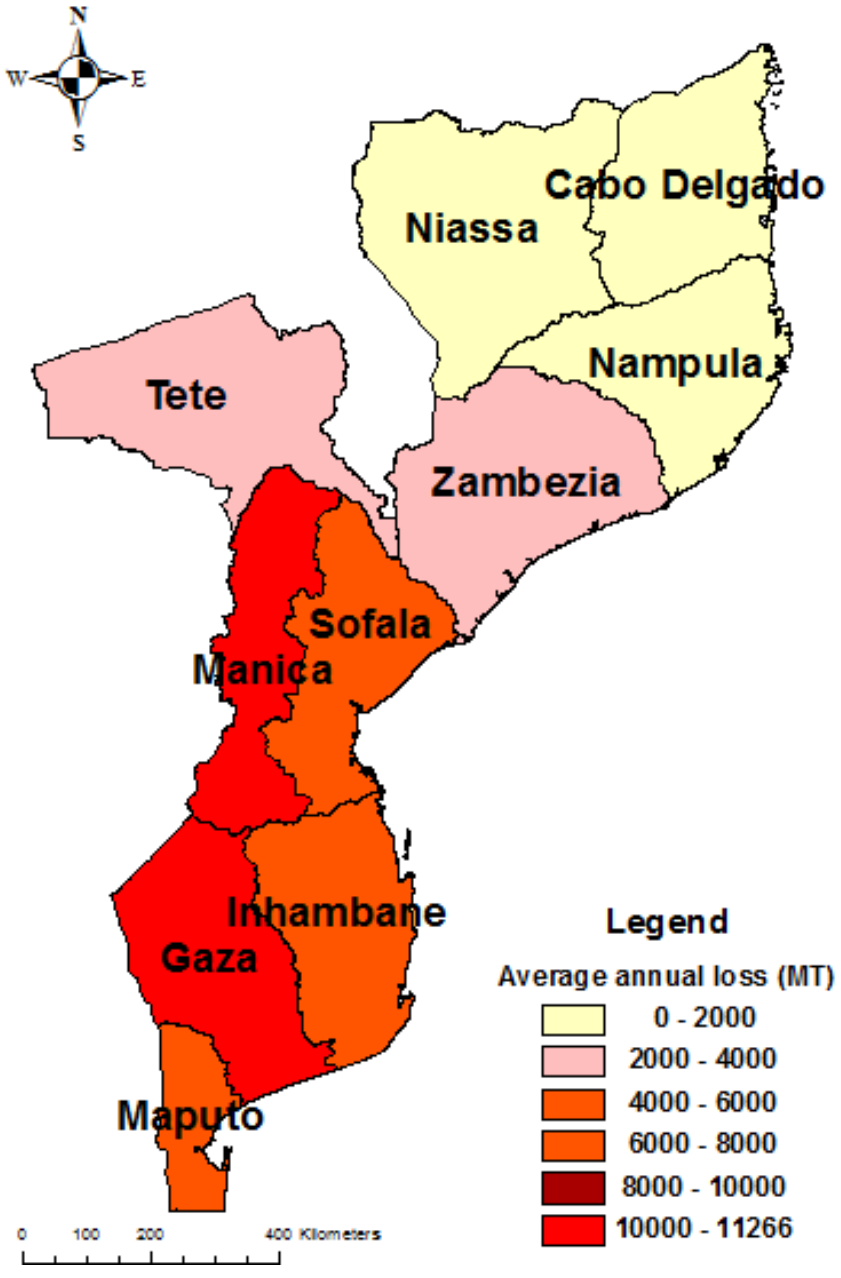
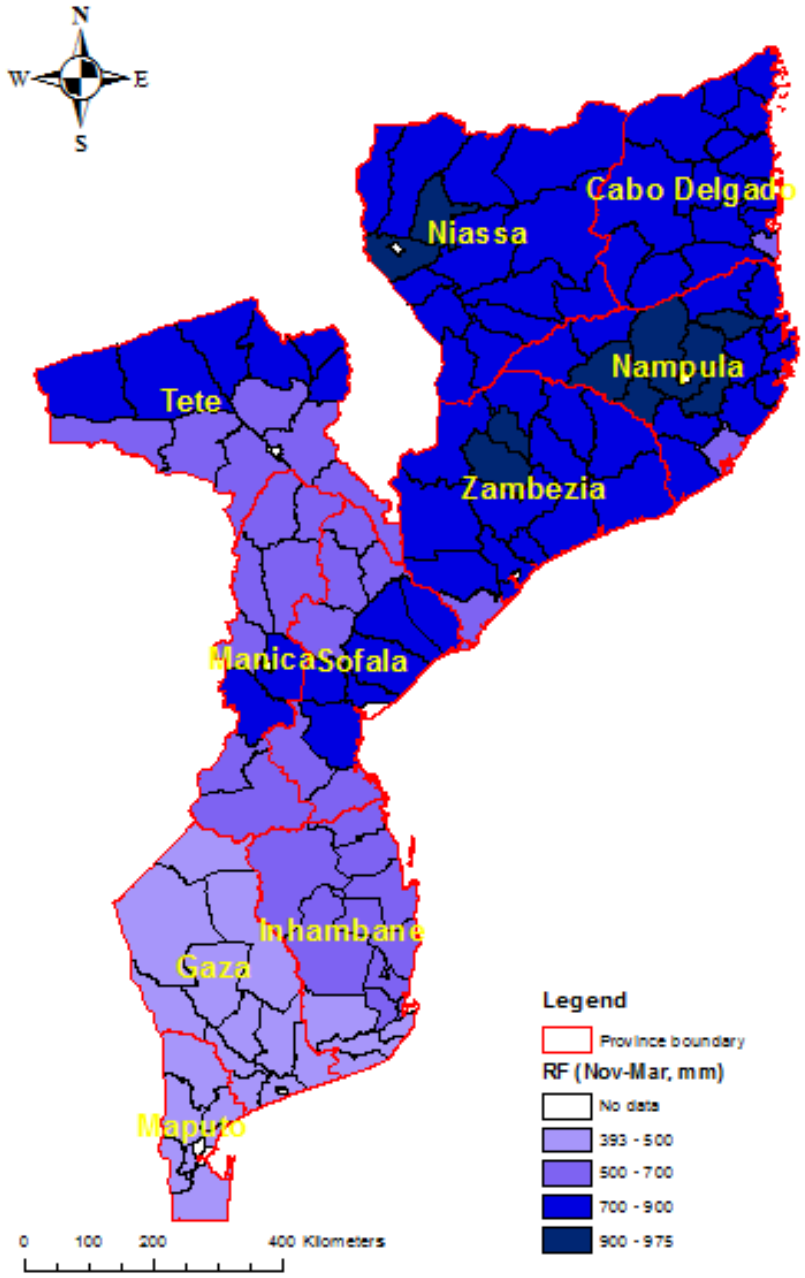
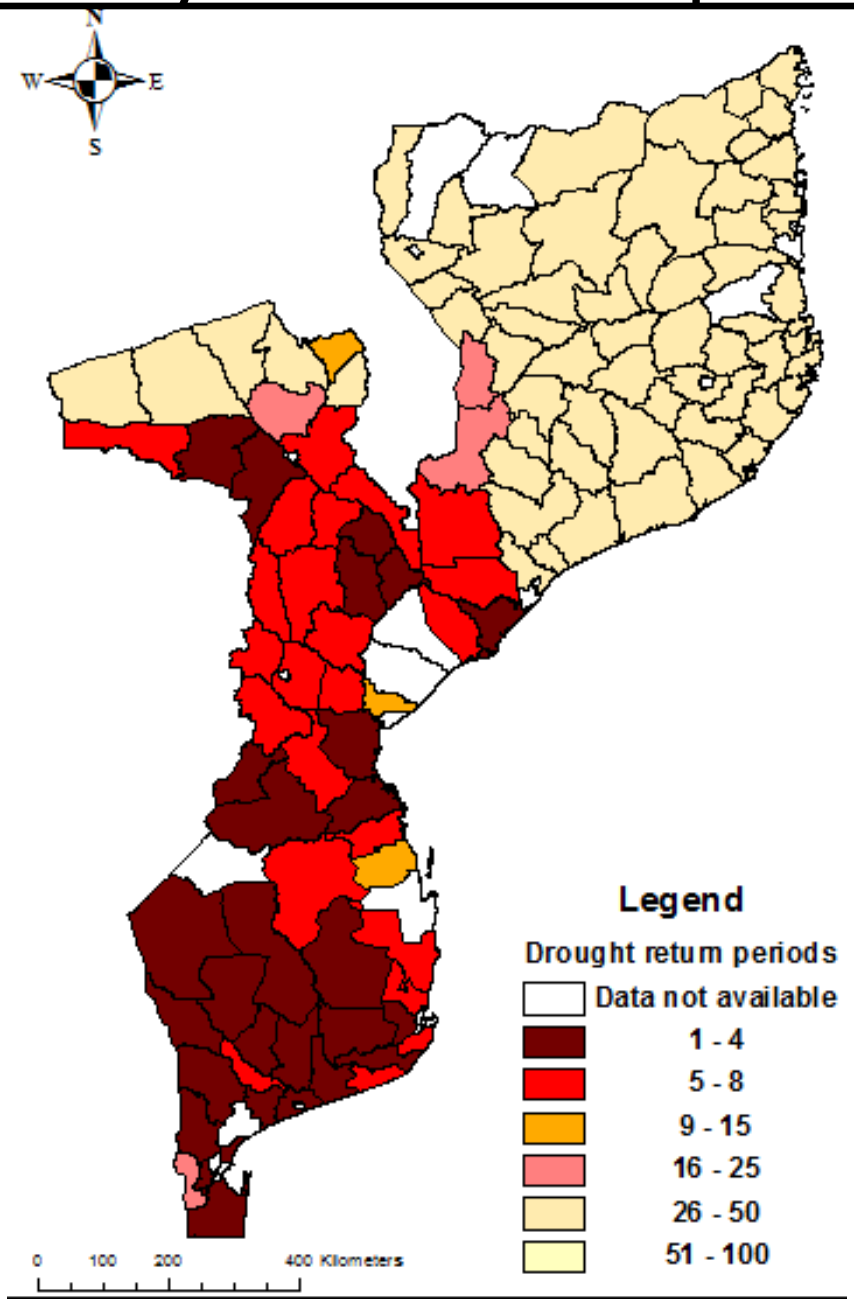
Rainfall and AAL (MT) for maize in Mozambique





Rainfall and drought frequency in Mozambique

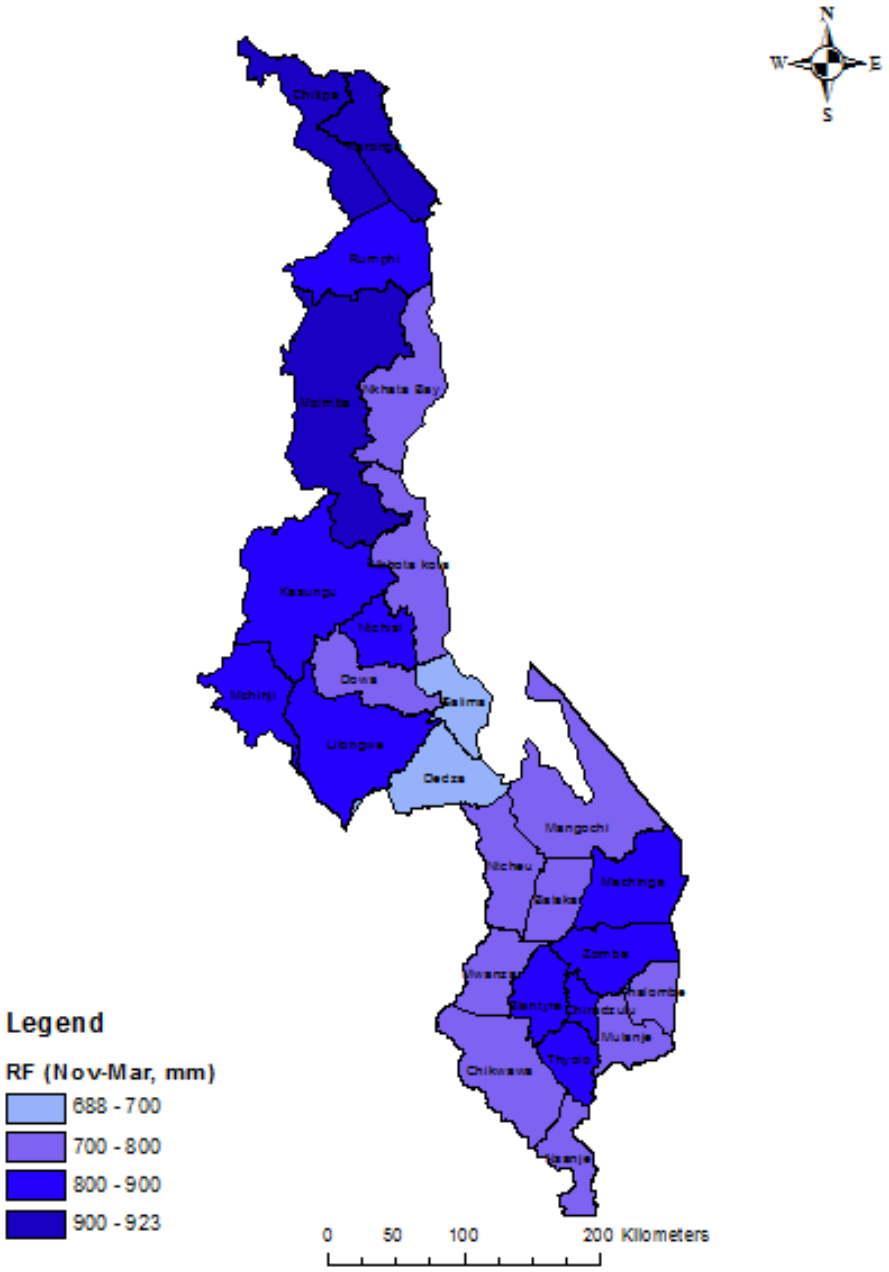


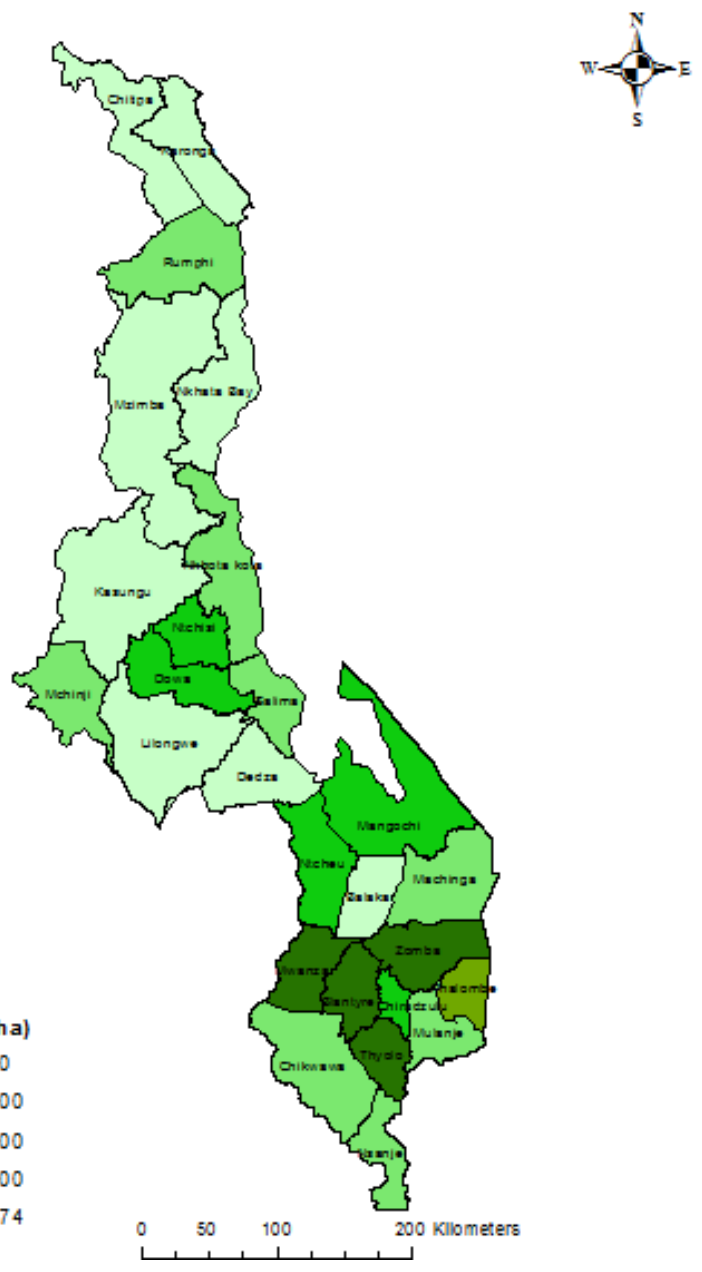


Results

Maize in Malawi, Africa

Spatial variability in maize cultivation with rainfall





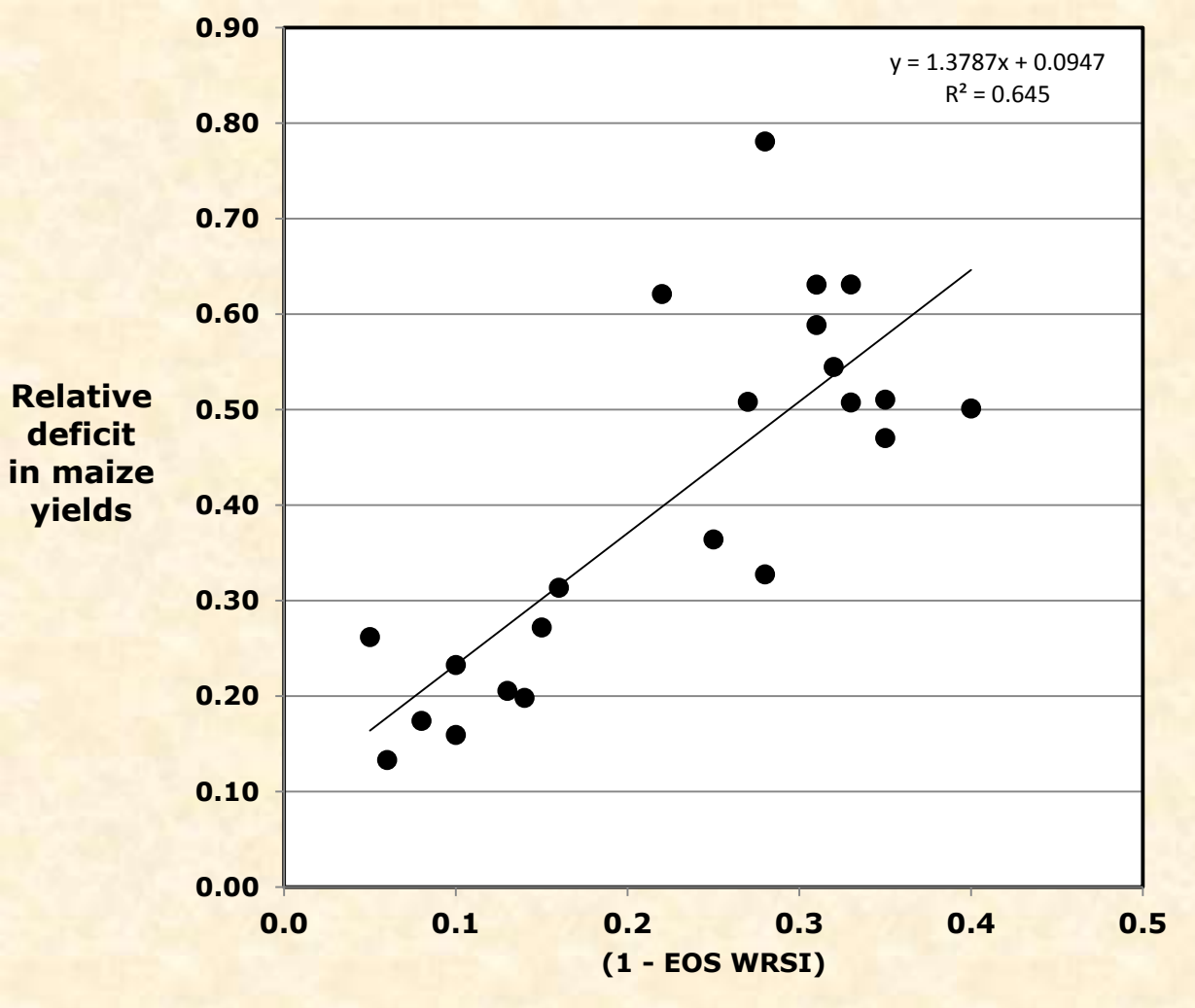
Maize vulnerability model - Malawi

Relative yield deficit

$$\frac{Y_{reference} - Y_{actual}}{Y_{reference}}$$

End-of-season (EOS) WRSI

$$\frac{Actual\ evapotranspiration}{Water\ requirement}$$



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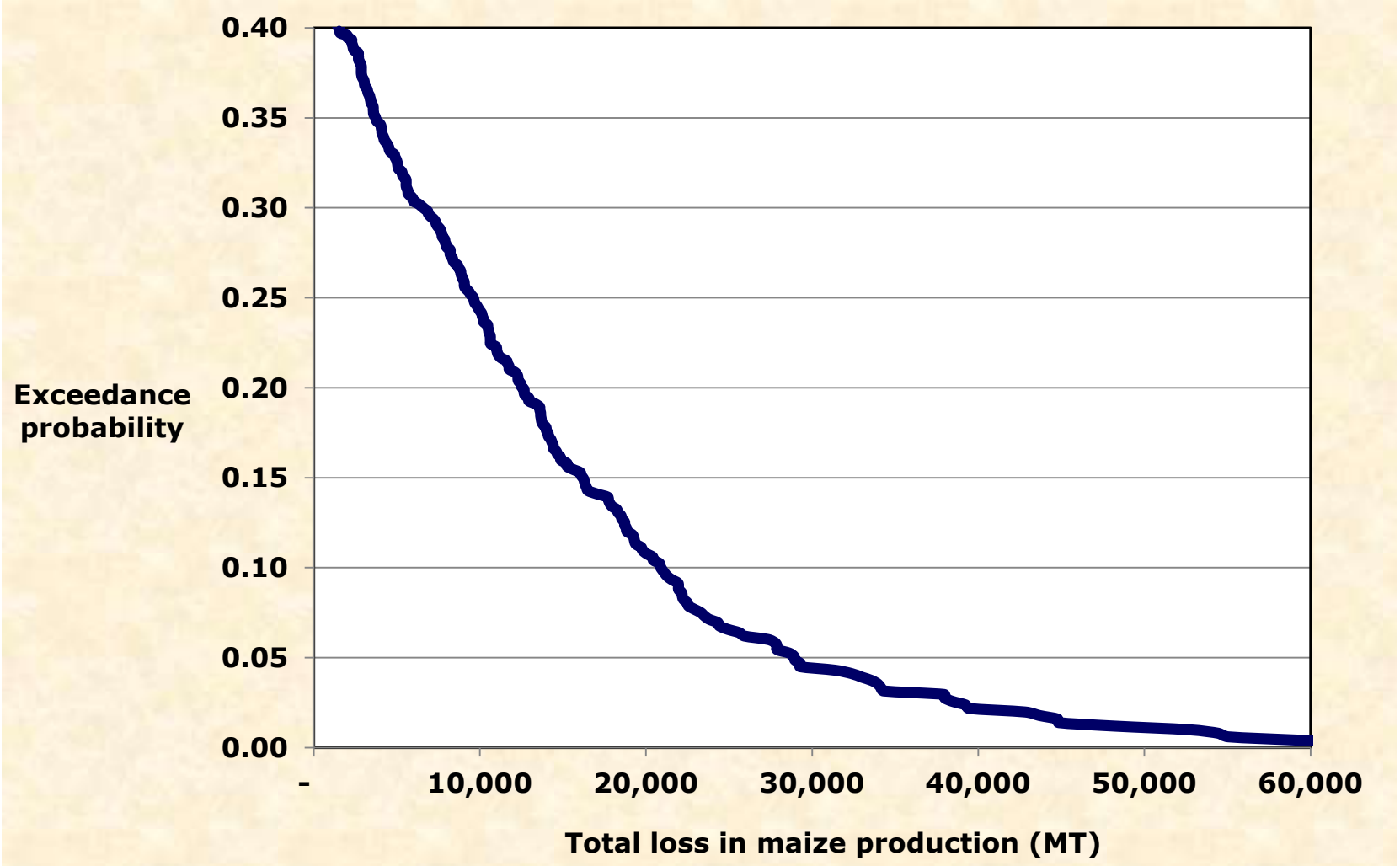
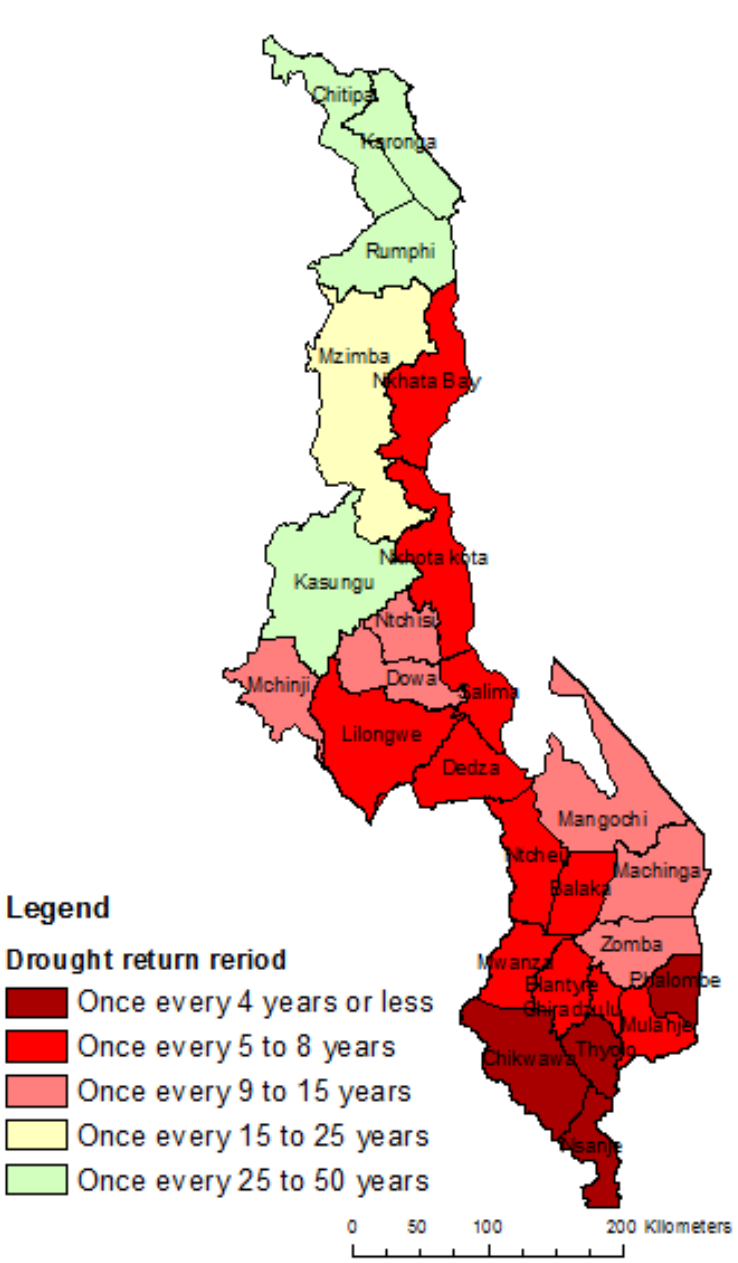
LEP curve for maize



AAL = 6,226 MT

The AAL is estimated using the total actual production realized during 2008-09

Return period map and losses for maize in Malawi



Return period (years)	Loss (MT)
100	52,652
50	42,816
20	28,912
10	21,126
5	13,719
AAL	6,266

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Conclusions

- Loss exceedance probability (LEP) curves created
  - Based on satellite rainfall estimates for 2000-2011
  - Derived from generated seasonal rainfall
- Drought vulnerability models for millet and maize developed
- Loss metrics designed in tabular and spatial expressions

Thanks

Wholehearted acknowledgments:

UCSB
Pete Peterson, Laura Harrison, Andrew Hoell,
Amy Mcnally, Candida Dewes,
Libby White.