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Satellite Precipitation Data, Food Security, and Nutrition Outcomes

Food Security

Food security is the ability of all people to attain sufficient food for an active and healthy life.

- Multi-scalar and multi-dimensional concept that includes
 - Availability – the presence of food in a community, region or country
 - Access – the ability of a household to purchase or gain access to the food
 - Utilization – the ability of an individual to use the food they eat
 - Stability – the maintenance of availability, access and utilization through time
- Poor food security has significant negative impacts on public health
 - Poor nutrition due to *poor access or availability* in the first 1000 days leads to long-term cognitive and health problems
 - Reductions in food consumption during the 'hungry season' can harm the long term health of pregnant women, infants and children

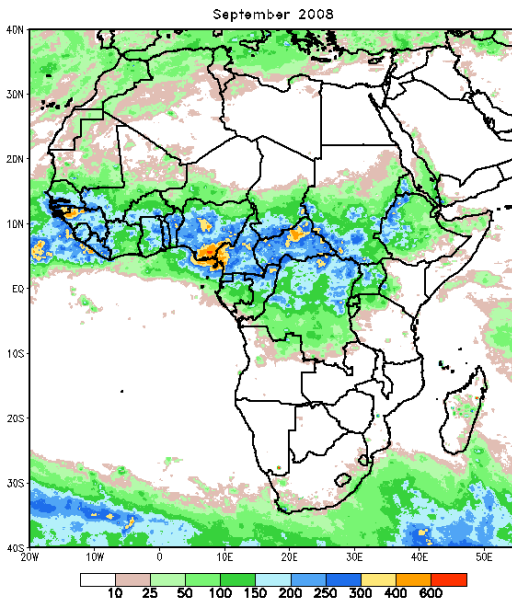
Satellite data is used...

- to identify regions that may experience food production decreases due to crop failure (*food availability*)
 - Crop modeling and hydrological drought
 - Identifying trends and ecological change

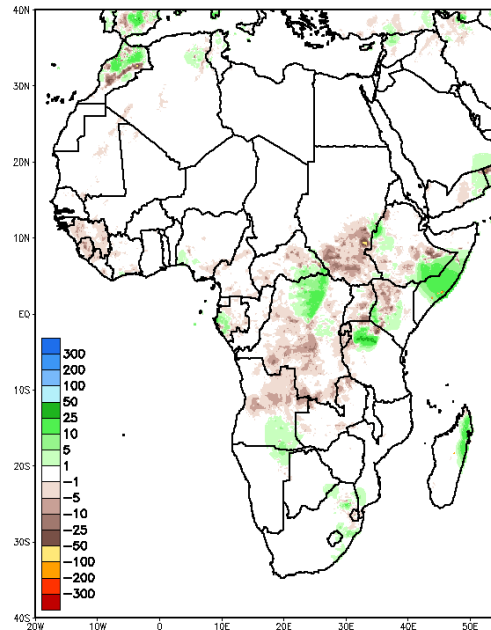
Yield Estimation: Rainfall Data

- RFE data, Version 2 from 2002
- RFE data, 'climatology' data from 1994
- Daily GTS rain data from UN WMO system

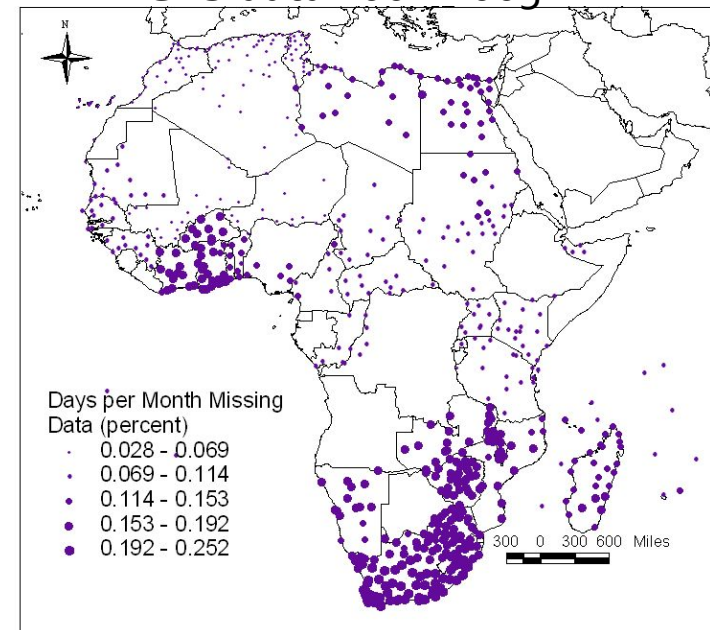
NOAA CPC FEWS-NET Rainfall Estimate (mm):
based on Satellite and Rain Gauge Data



Daily Climatology-RFE minus Operational-RFE (mm)
October 22 2008

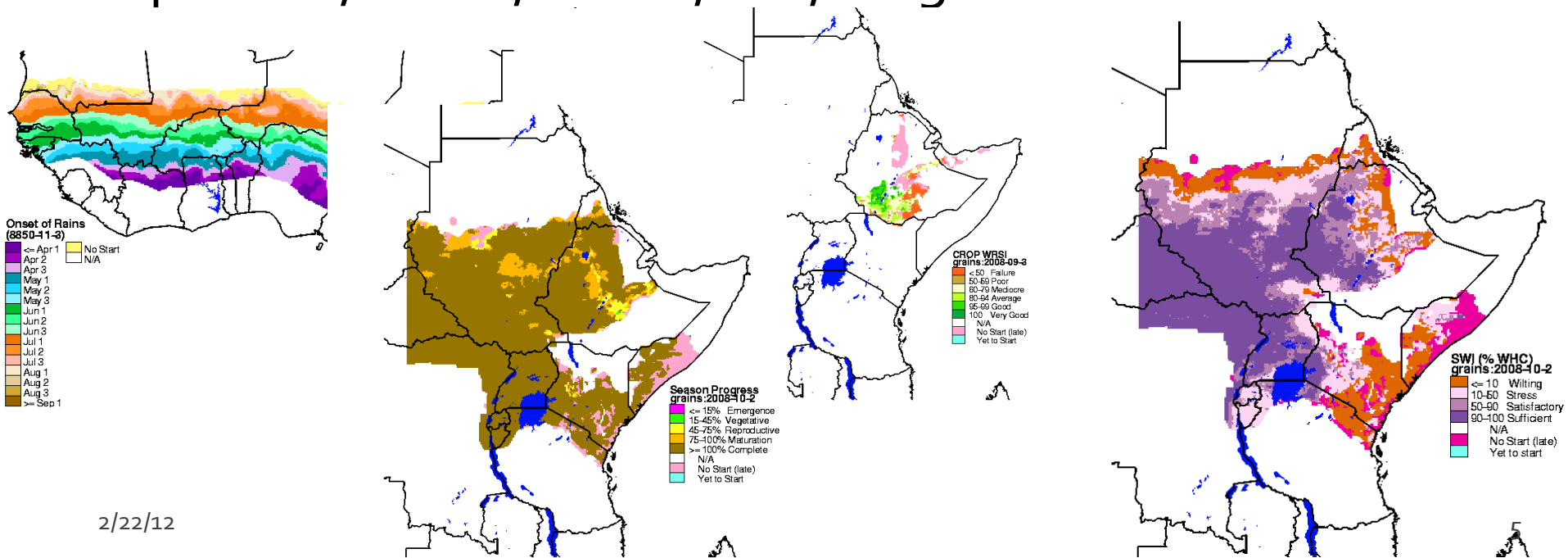


GTS data 2001-2005



Yield Estimation: Modeled Data Products

- Start of Season (onset of rains), soil water index, number dry days
- Evapotranspiration data products
- WRSI – water requirement satisfaction index for pasture, millet, maize, teff, long and short rains

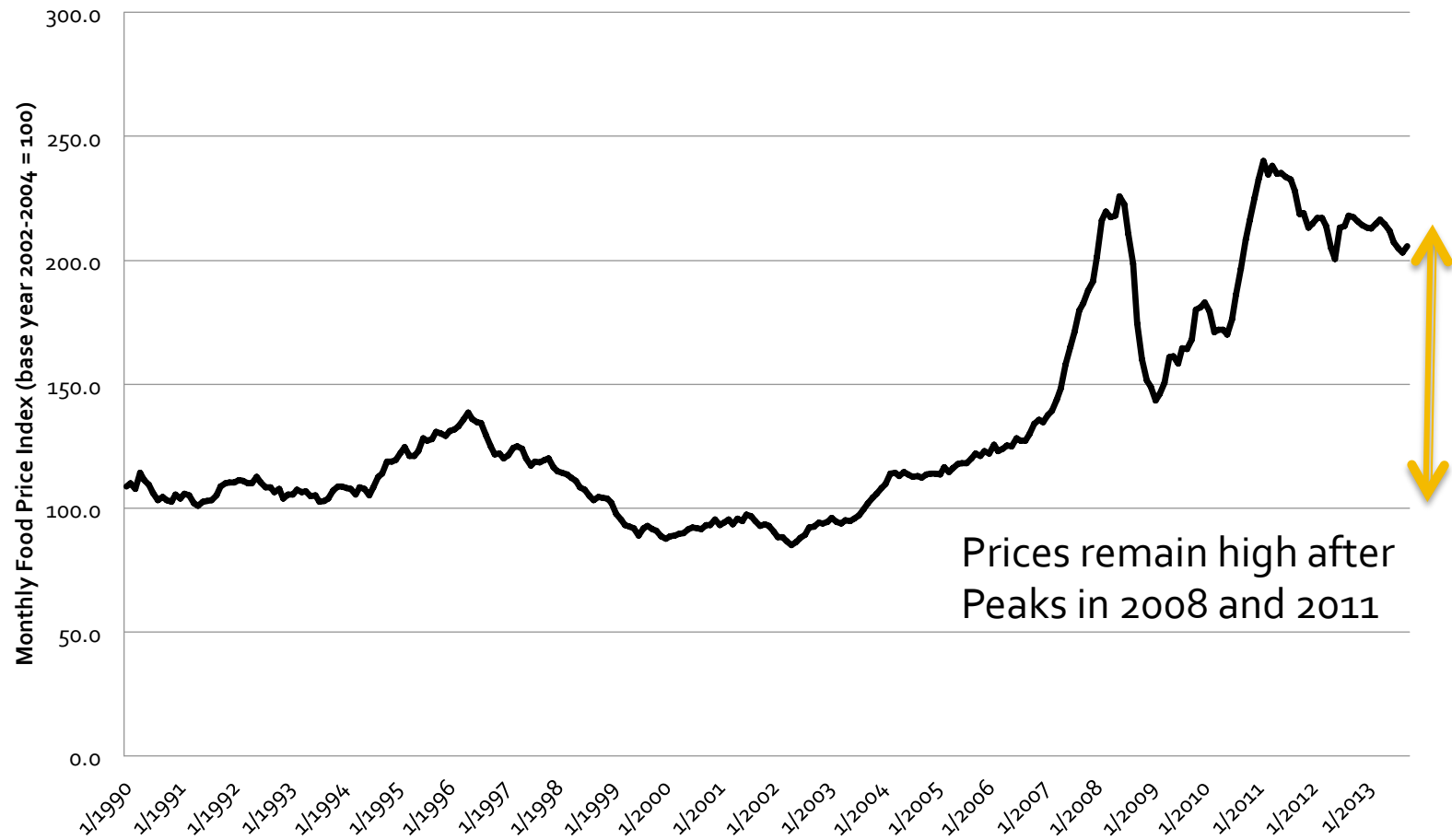


Satellite data is used...

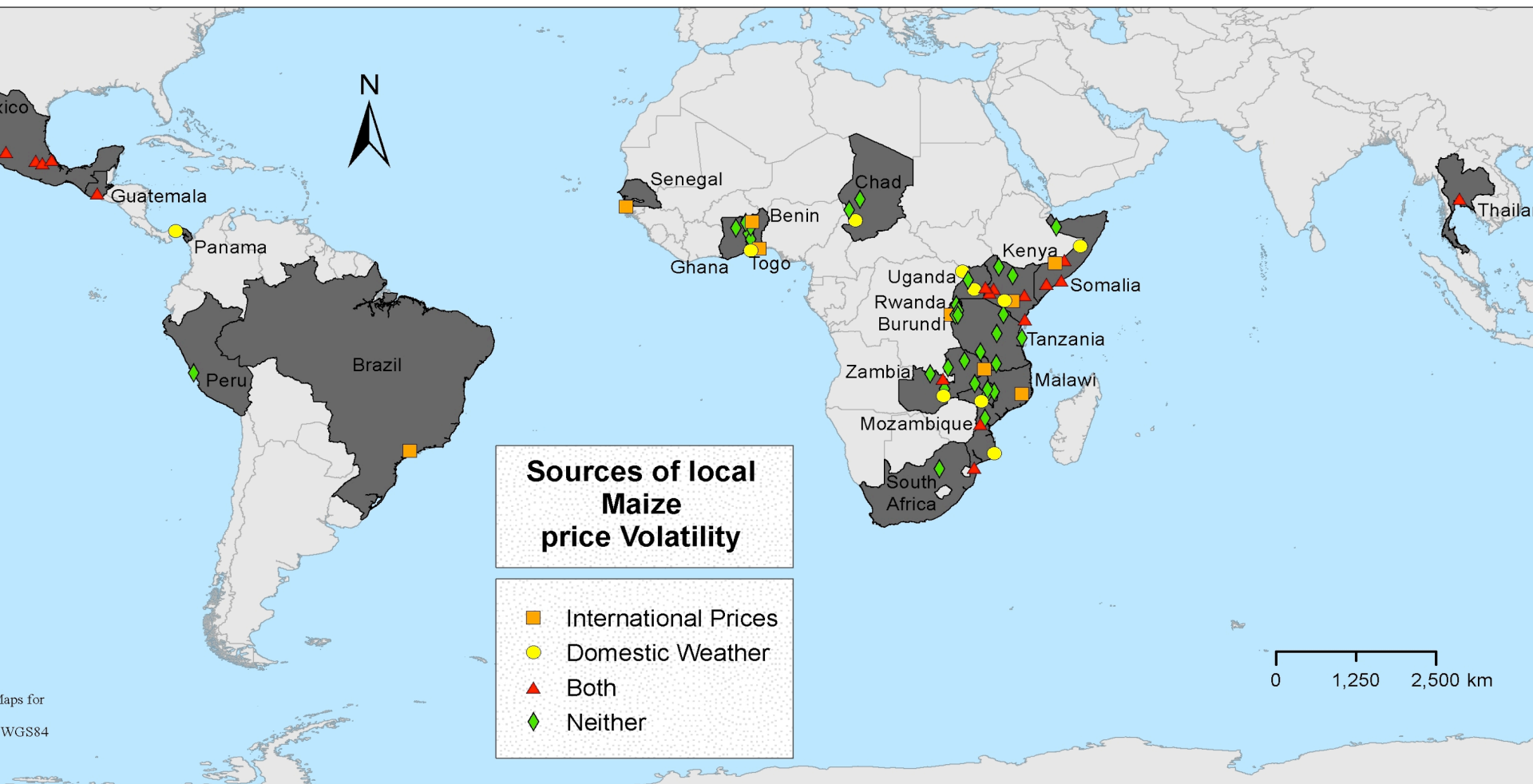
- To understand the impact of production deficits or surpluses on food prices and the broader agricultural economy (*food access*)
 - Increase in food price due to weather and international price shocks
 - Reductions in income due to changes in wage labor, broader income earning opportunities

Food and Fuel

FAO International Food Price Index (2002-2004 = 100)



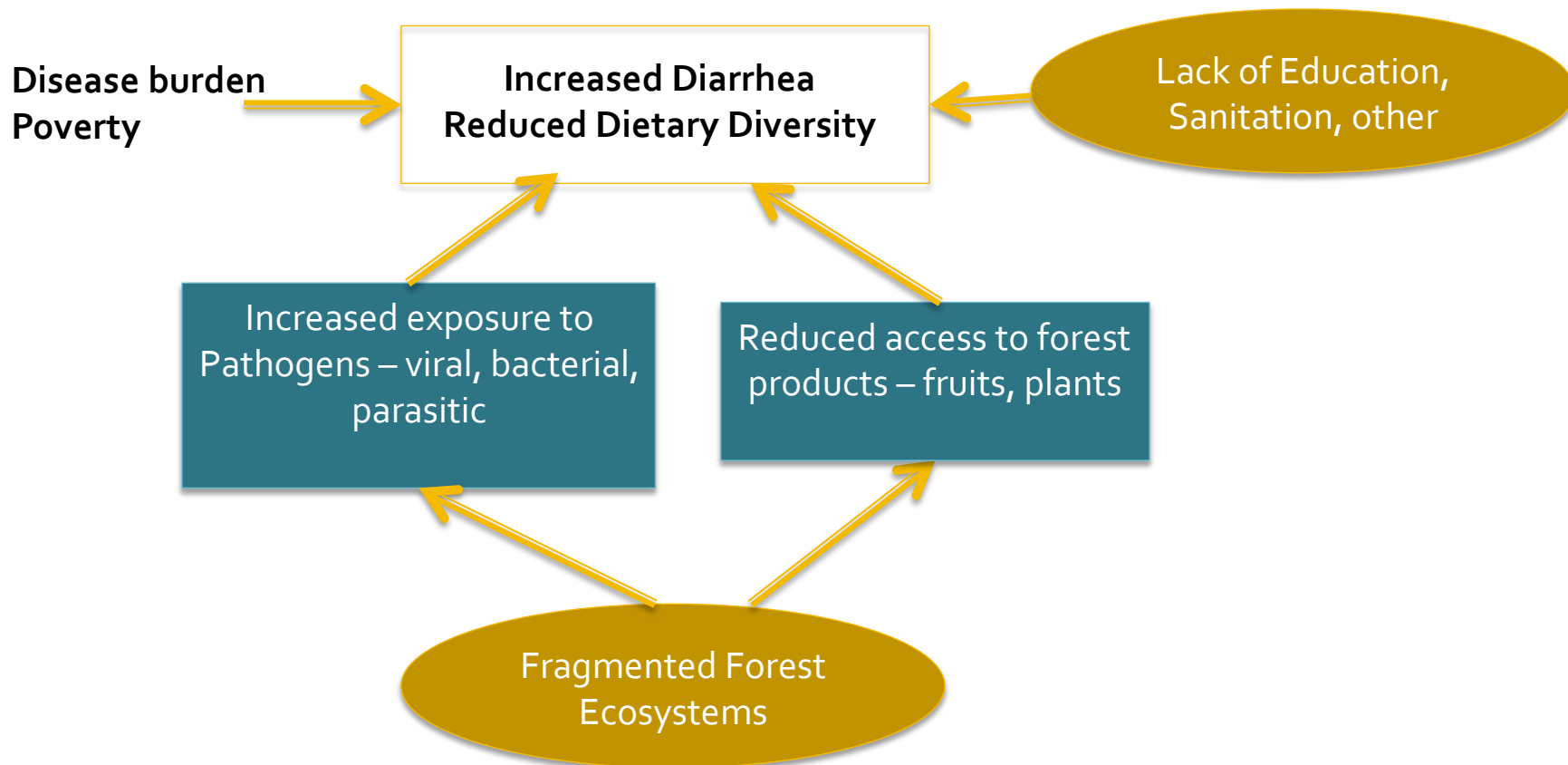
Local prices affected by production and supply shocks



Satellite data is used...

- to identify regions with long term environmental change, with implications for
 - Presence and virulence of disease vectors (*utilization*)
 - Ability to produce food or support a growing population (*availability, access*)
- to monitor the stability of food and agricultural activities
 - Impact of severe weather events on availability and access (*food security*)

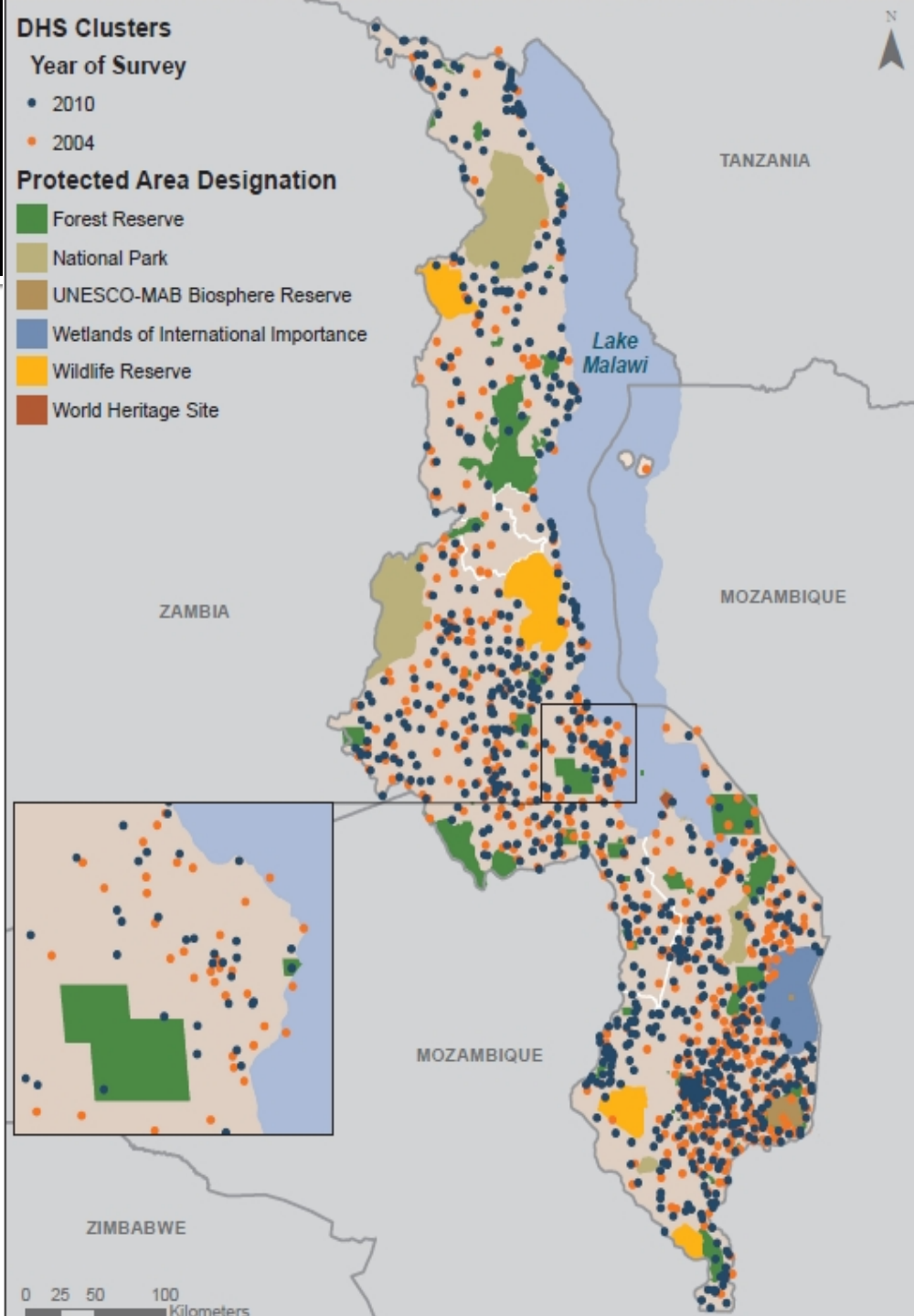
Example: Malawi and forest cover



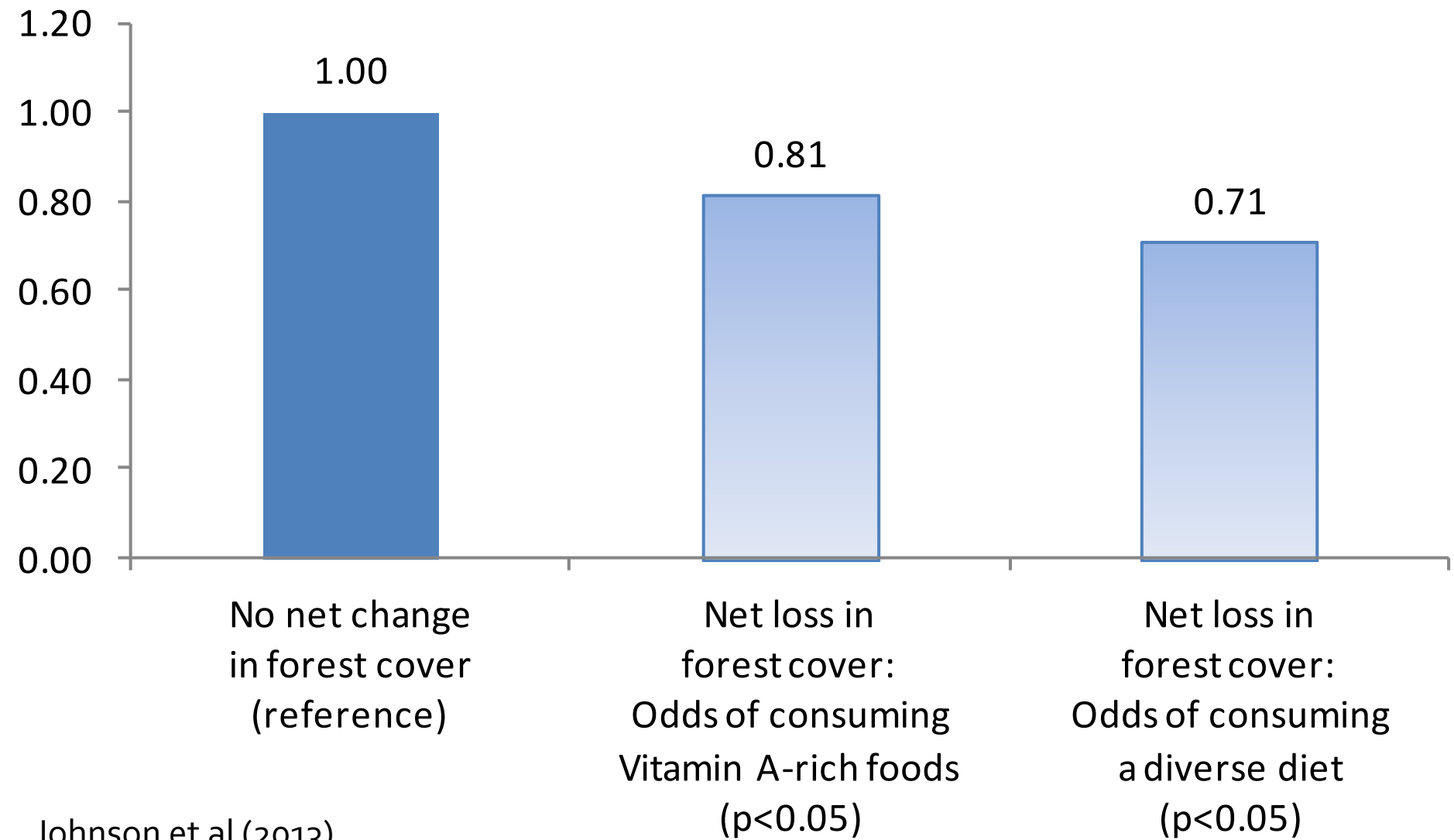
Malawi

Map of Malawi showing 2010 forest cover overlaid with approximately 12,000 households with data from the 2010 DHS survey. Nutrition information from children under five was the primary focus.

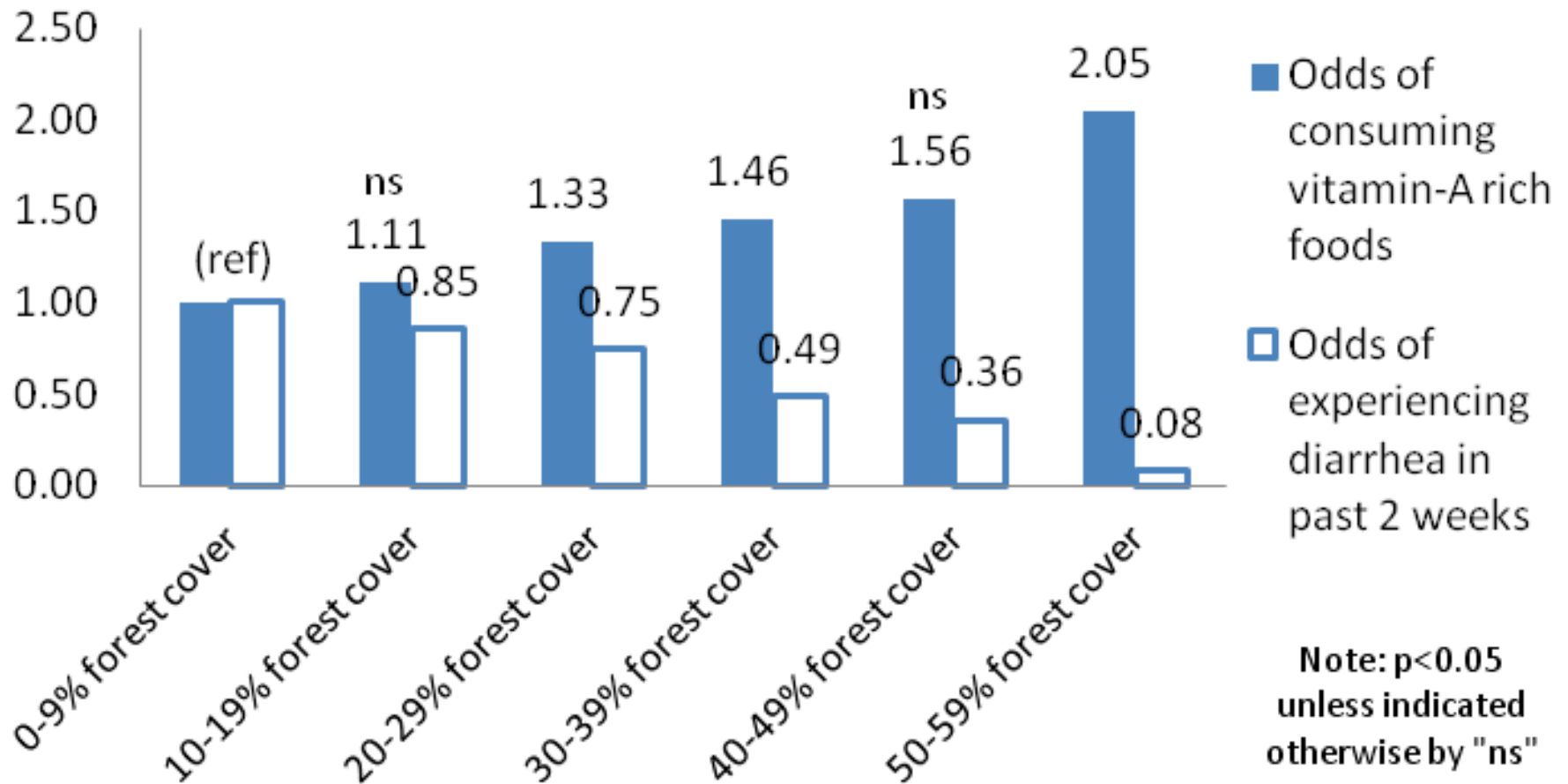
MODIS Vegetation Continuous Fields was used to estimate change in forest cover 2000 to 2010



Regression Results



Regression Results



Conclusions

- The public health implications of poor food security can be due to
 - Short term changes in productivity
 - Broad economic impacts due to changes in food production
 - Long term impacts on health and nutrition due to land cover change
- Satellite data on rainfall and vegetation can be instrumental in understanding the complex causes and consequences of extreme weather events on availability, access, utilization and stability elements of food security