

SATELLITE TECHNOLOGY CONTRIBUTION TO WATER AND FOOD SECURITY

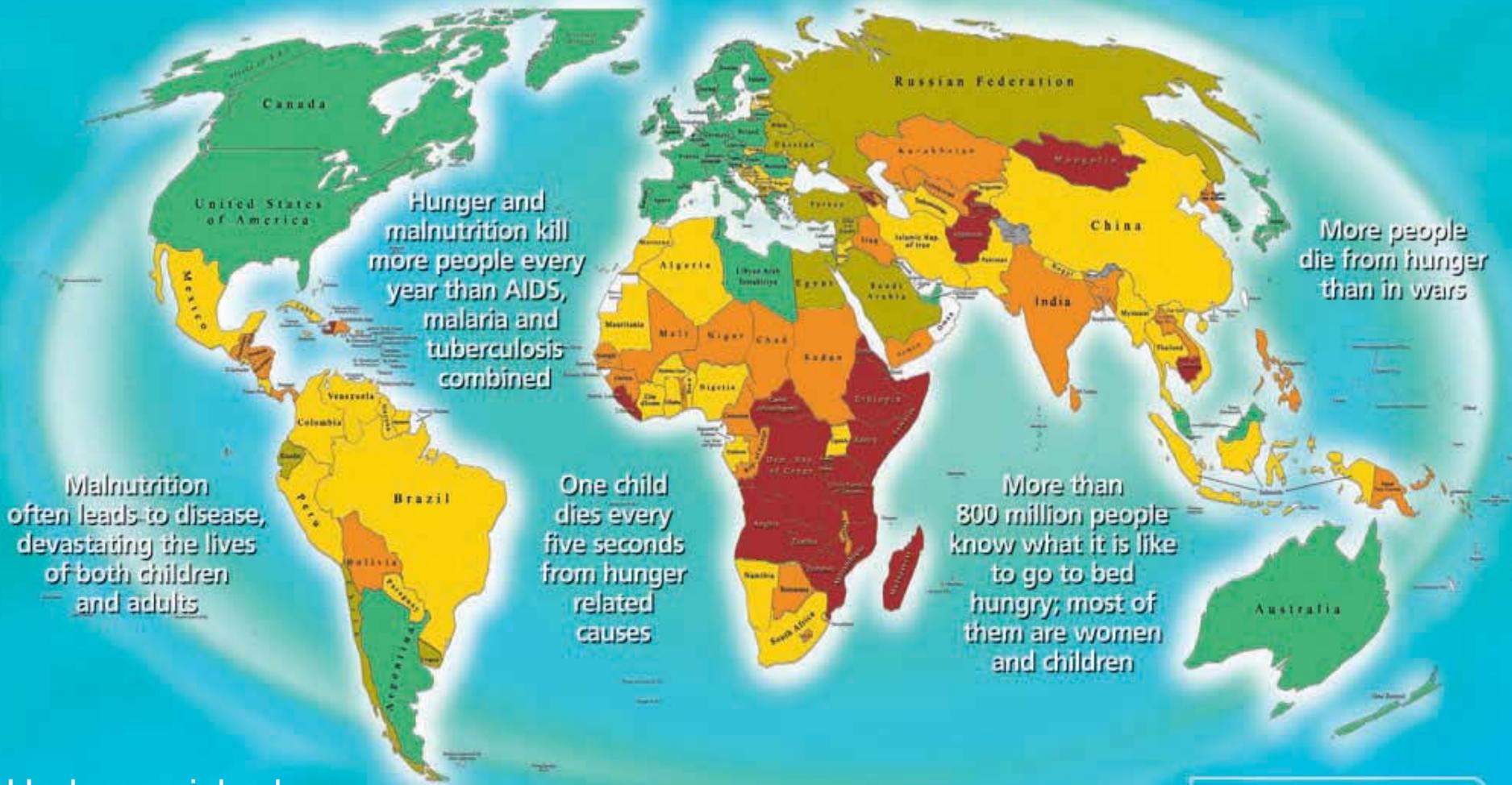
Molly E. Brown, NASA

Global Environmental Change and Food Security

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

- ⦿ Despite having the technical capacity to solve the problem, there continues to be many food insecure people in the world
- ⦿ Trends that contribute
 - Population growth
 - Energy Costs
 - Geopolitical disparities
 - Distribution of natural resources, particularly water
 - Climate: changing water cycle, increasing temperatures
- ⦿ Global monitoring of food resources needs global observations – satellites

WORLD HUNGER



Undernourished

>35% 20-34% 5-19% 2.5-4% <2.5%

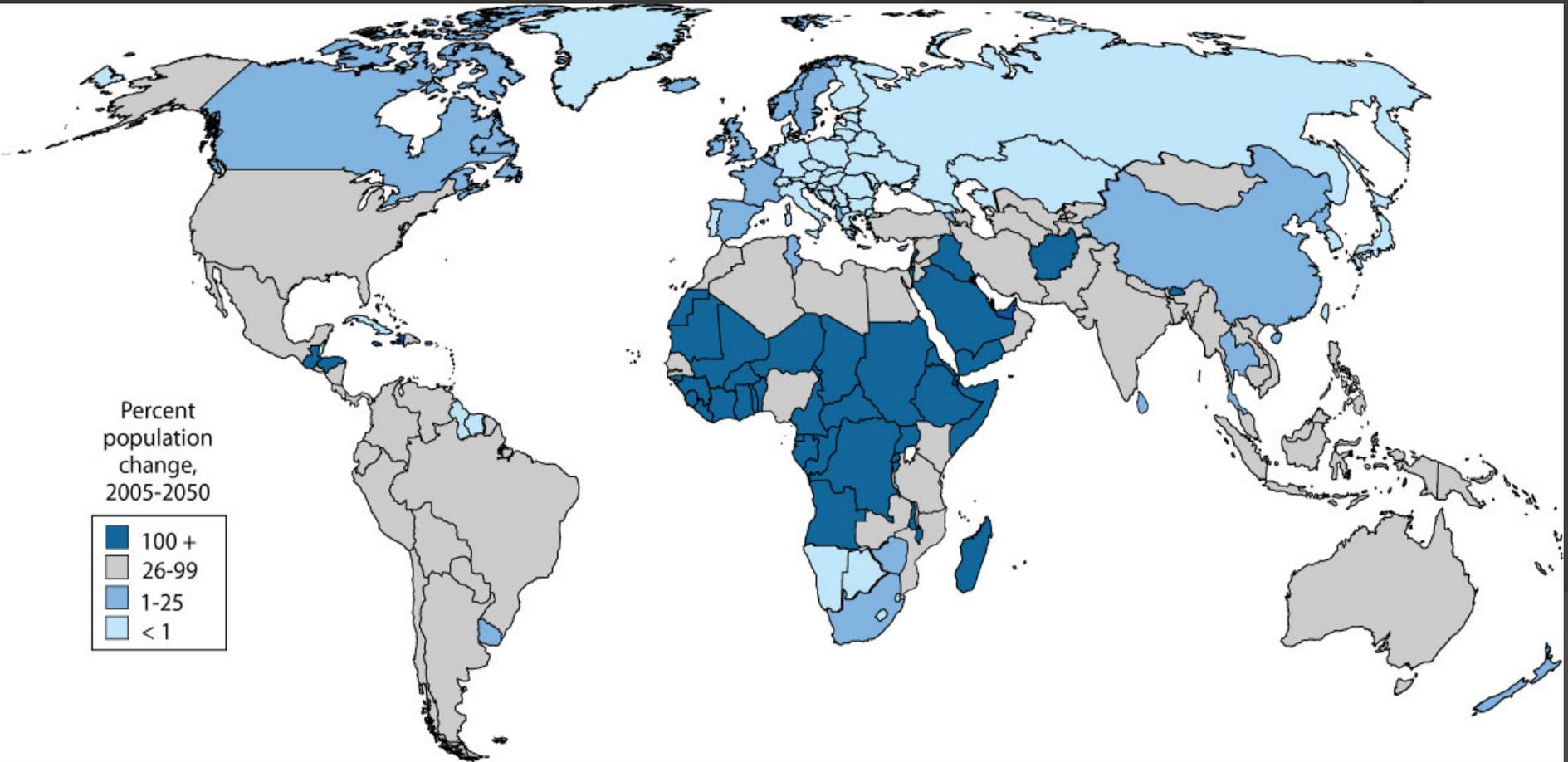
Category	1	2	3	4	5	no data	incomplete data
Undernourished	>35%	20-34%	5-19%	2.5-4%	<2.5%		
Description	Very high	Moderately high	Moderately low	Very low	Extremely low		



World Food Programme
Feeding The World's Hungry

Source: The State of Food Insecurity in the World 2001, Food and Agriculture Organization of the United Nations
© 2000 United Nations World Food Programme

Projected Population Change, 2005-2050



Source: Population Reference Bureau, *2005 World Population Data Sheet*.

Food security – more than just agricultural production

⦿ Food utilization

- Ability to derive nutrition from the food you eat
- Analysis at individual scale

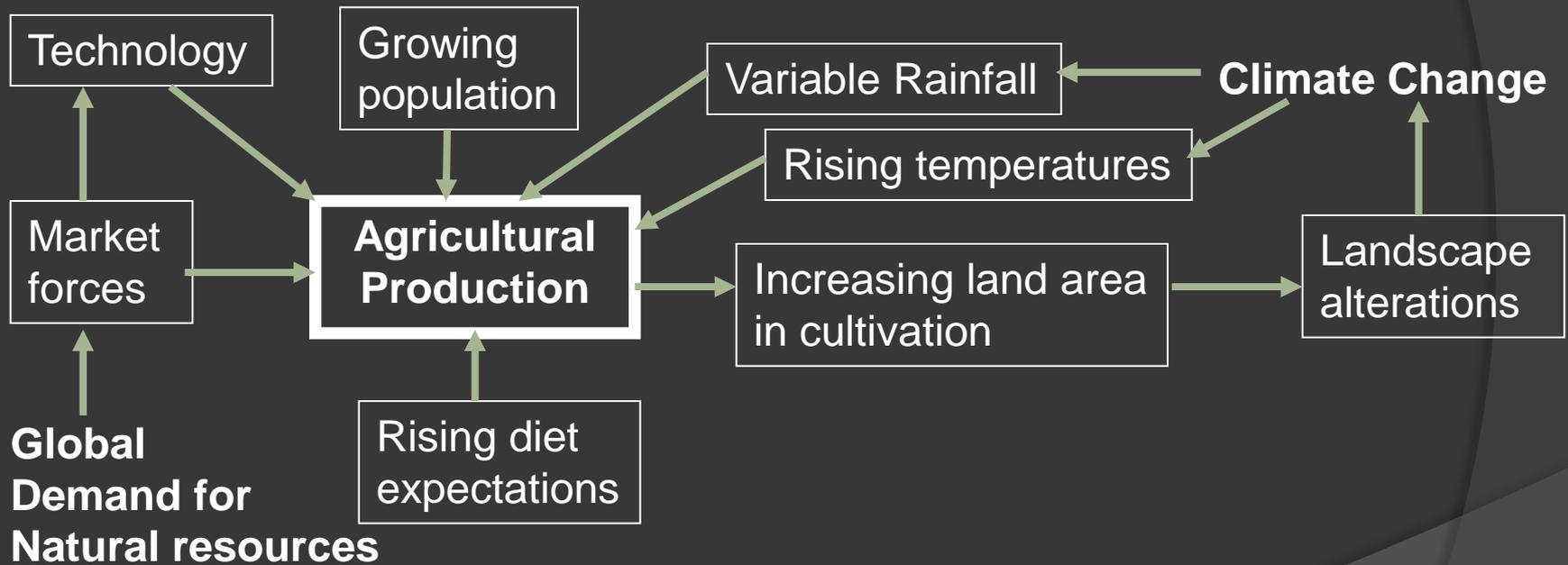
⦿ Food availability

- How much food is produced in a region
- Analysis at household, community scale

⦿ Food access

- Cost of food and affordability to the poorest
- Analysis at community and region scale

Food Demand, Markets and Ecosystems: Climate Change in Africa



As populations and incomes rise, the global demand for food will also grow – probably roughly doubling by 2050 and shifting towards more water-demanding diets.

Africa is No Longer Self-Sufficient in Food

Cereal yields on the continent are roughly one metric ton of grain per hectare of cultivated land, a figure little changed from 50 years ago and roughly one third of the yields achieved on other continents.



Lack of technology (irrigation, Improved seeds, fertilizer) means that African agriculture is far more weather-dependent than US Agriculture – and its people more vulnerable to food insecurity due to increasing food prices.



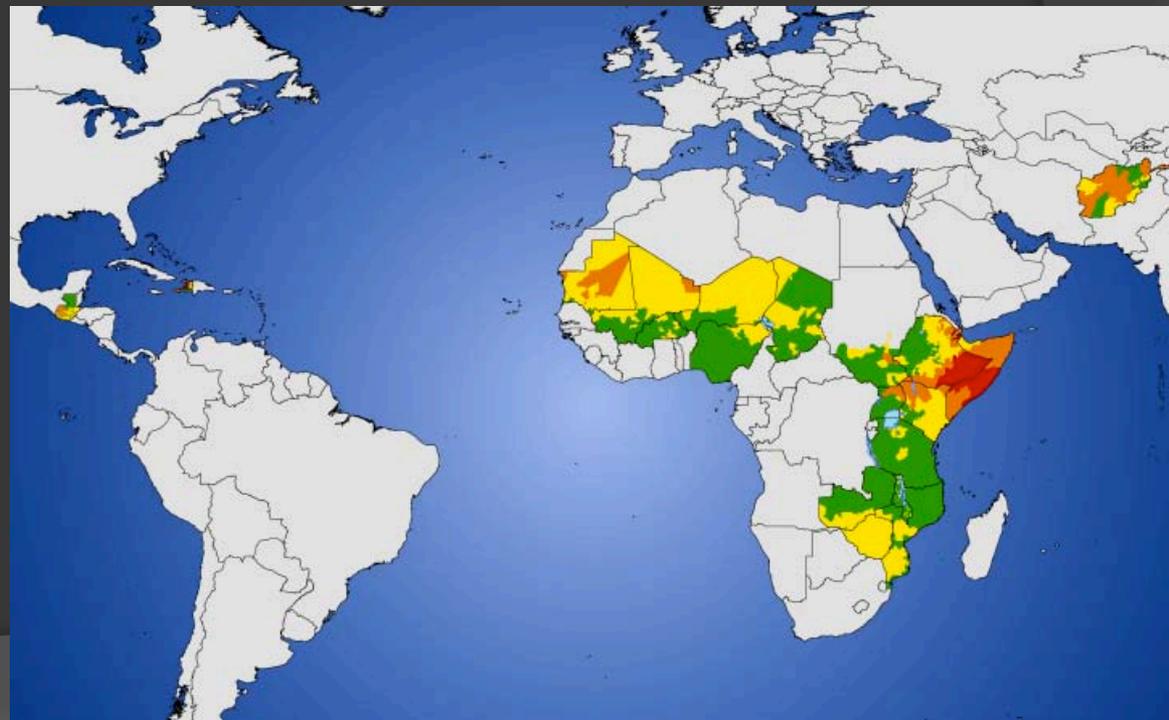
The Famine Early Warning Systems Network

FEWS NET is a USAID-funded activity that works to strengthen the abilities of countries and regional organizations to manage risk of food insecurity through the provision of timely and analytical early warning and vulnerability information.

Oct-Dec 2008

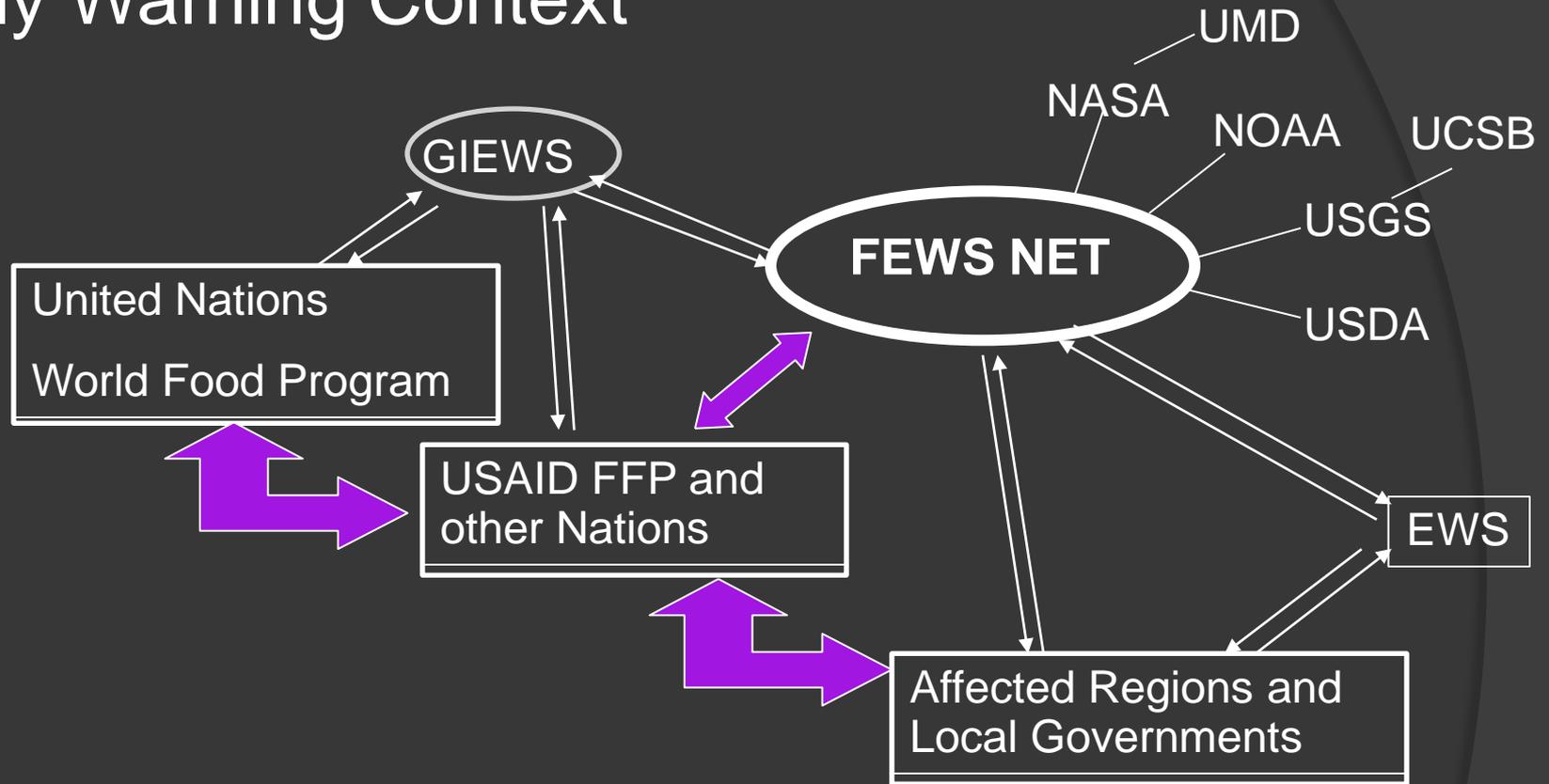
-  Generally Food Secure
-  Moderately Food Insecure
-  Highly Food Insecure
-  Extremely Food Insecure
-  Famine
-  No Data

Geographic Extent of
FEWS NET's 23 countries





Early Warning Context



'Early Warning' (EW) programs provide Information so Governments can respond to Food Security problems before lives or livelihoods are lost.

Legend:

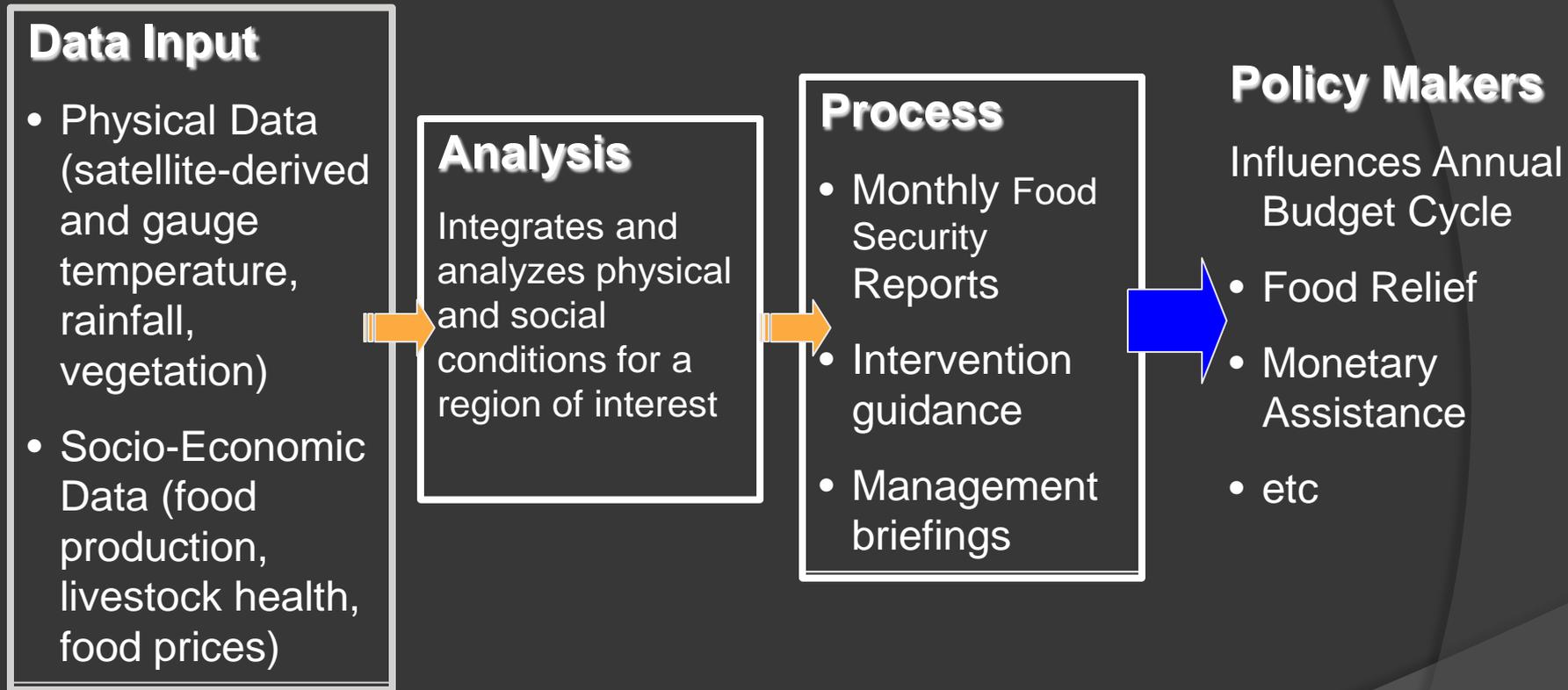
GIEWS: Global information and early warning system

EWS: Local Early Warning Systems

FEWS NET: Famine Early Warning System Network



FEWS NET process



FEWS NET operates in a complex, consensus based decision making environment.

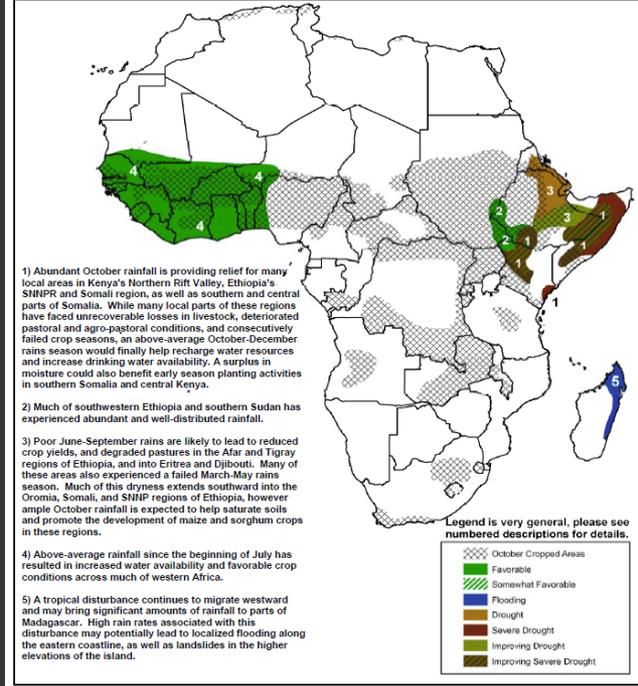


Diversified and targeted information products

And an integrated early warning information system....



- In the last seven days, consistent rains were observed across many parts of southern and eastern Ethiopia, Somalia and northeastern Kenya. As rainfall totals remain above-average for the October-December season, anomalous moisture continues to replenish water resources, and is beginning to improve areas impacted by long-term drought.
- Tropical activity in the Indian Ocean basins is expected to bring increased moisture to parts of the Greater Horn and Southern Africa. An anomalous early-season cyclone developing in the southern Indian Ocean may result in significant amounts of rain and potential localized flooding along eastern portions of Madagascar.



Country Reports

Regional Reports

Executive Overview

Alert Statements

Market/Trade Information

ETHIOPIA NETWORK on food security

Monthly Report

Menacing Epidemic Threatens 6.9 Million People

A number of meningitis cases were reported in Ethiopia in October 2008. The highest number of cases was reported in the Amhara region, with 100 cases reported. The Amhara region is one of the most densely populated regions in Ethiopia, with a population of approximately 10 million people. The Amhara region is also one of the most drought-affected regions in Ethiopia, with significant crop losses and livestock deaths. The Amhara region is also one of the most densely populated regions in Ethiopia, with a population of approximately 10 million people. The Amhara region is also one of the most drought-affected regions in Ethiopia, with significant crop losses and livestock deaths.

FAO/IFPRI Crop and Food Security Assessments

Executive Overview of Food Security Threats in Sub-Saharan Africa

April 21, 2004

Alerts: Food Insecurity in Africa

Summary: The 2003/04 season has been a very challenging one for southern African agriculture with continued deteriorating crop and food conditions across the entire crop production season. Overall, the 2003/04 season was characterized by a combination of factors that led to a significant decline in crop and food production. The 2003/04 season was characterized by a combination of factors that led to a significant decline in crop and food production.

Le Tchad: Alerte d'urgence alimentaire

Sans aide accrue, la famine menace les réfugiés soudanais

Une famine croissante menace au Tchad environ 1 300 000 réfugiés soudanais et 1 million de Tchadiens. Ces réfugiés sont dans une situation alimentaire critique, avec des réserves épuisées et un accès limité aux services de base. Les conditions de vie sont devenues de plus en plus difficiles, et les réfugiés sont de plus en plus vulnérables à la famine.

FEWS NET Alert Status

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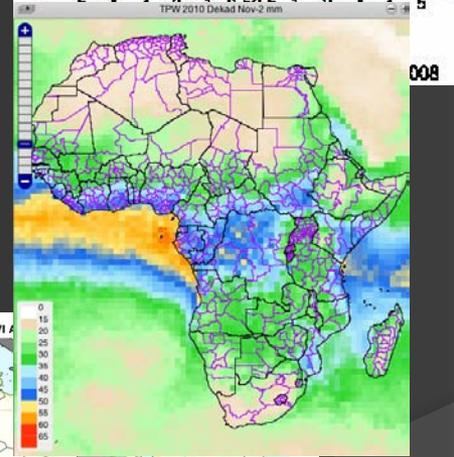
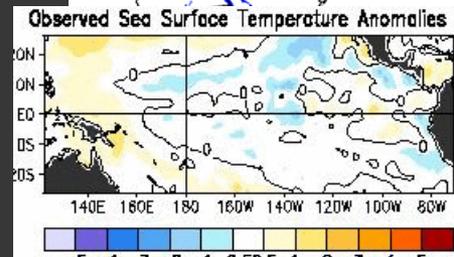
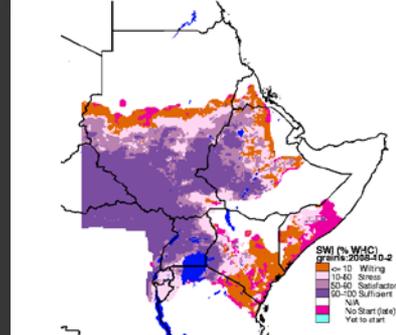
Remote sensing provides an Objective Analysis of Hazards for Earlier Early Warning

- Problem specification: identification of potential changes in:
 - Agricultural production (veg., rain, yields)
 - Value of Assets (livestock through rangeland, market information)
- Remote sensing provides information on both cropped area and yield estimates
- It is the least controversial information on production

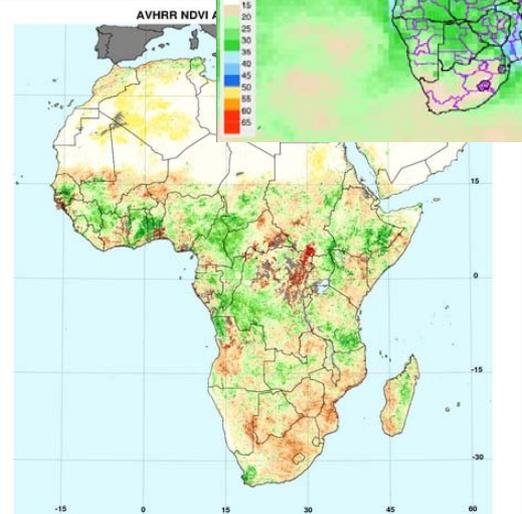
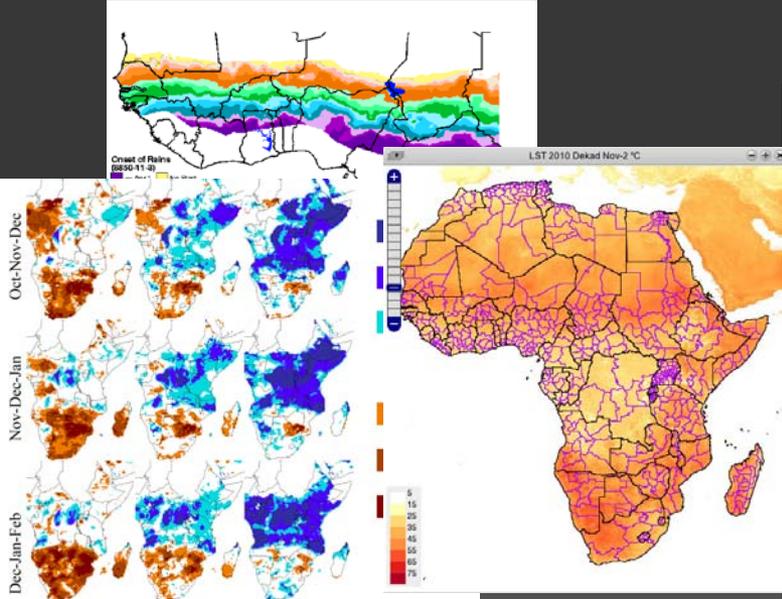
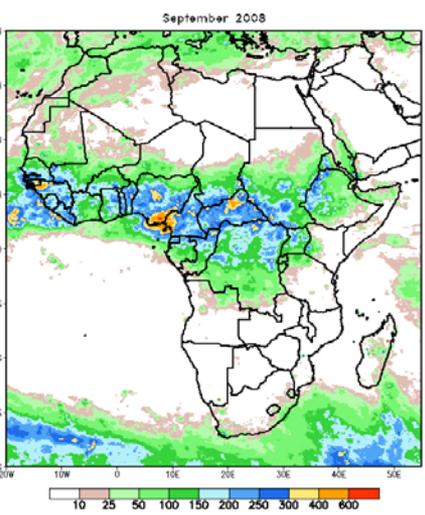


Satellite Products

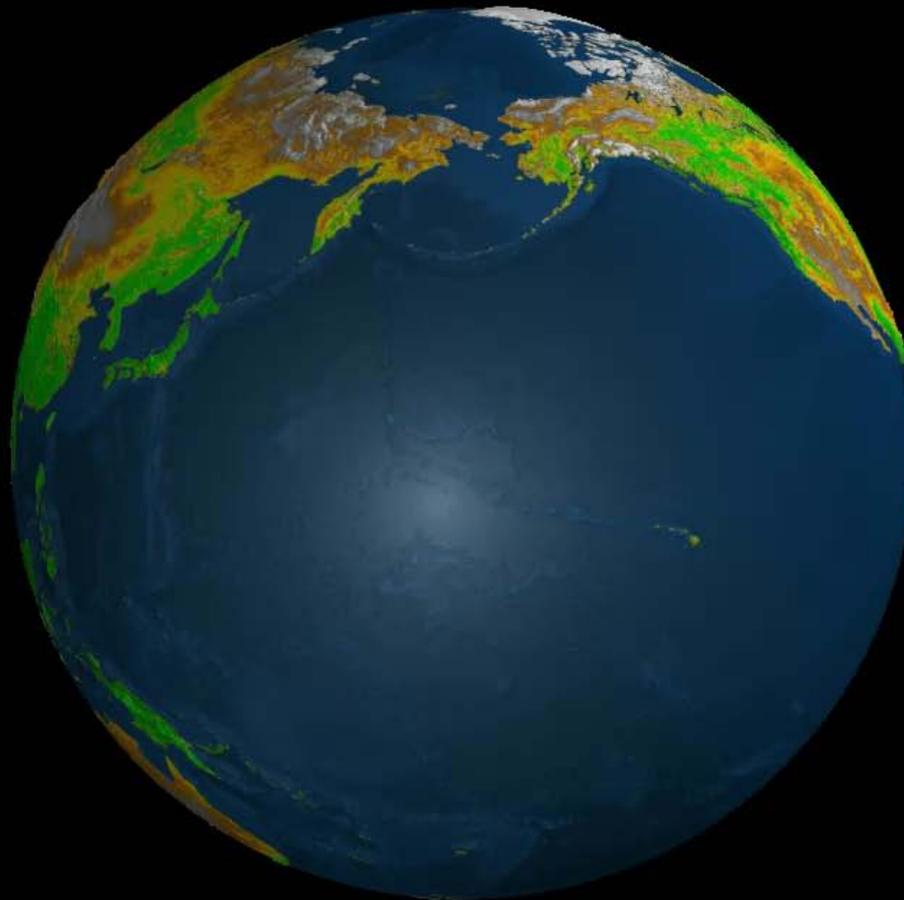
- NDVI from AVHRR, SPOT, MODIS
- Rainfall from TRMM, SSM/I
- Temperature from MODIS
- Crop models using rainfall inputs
- Predictive products from GFS, WRF



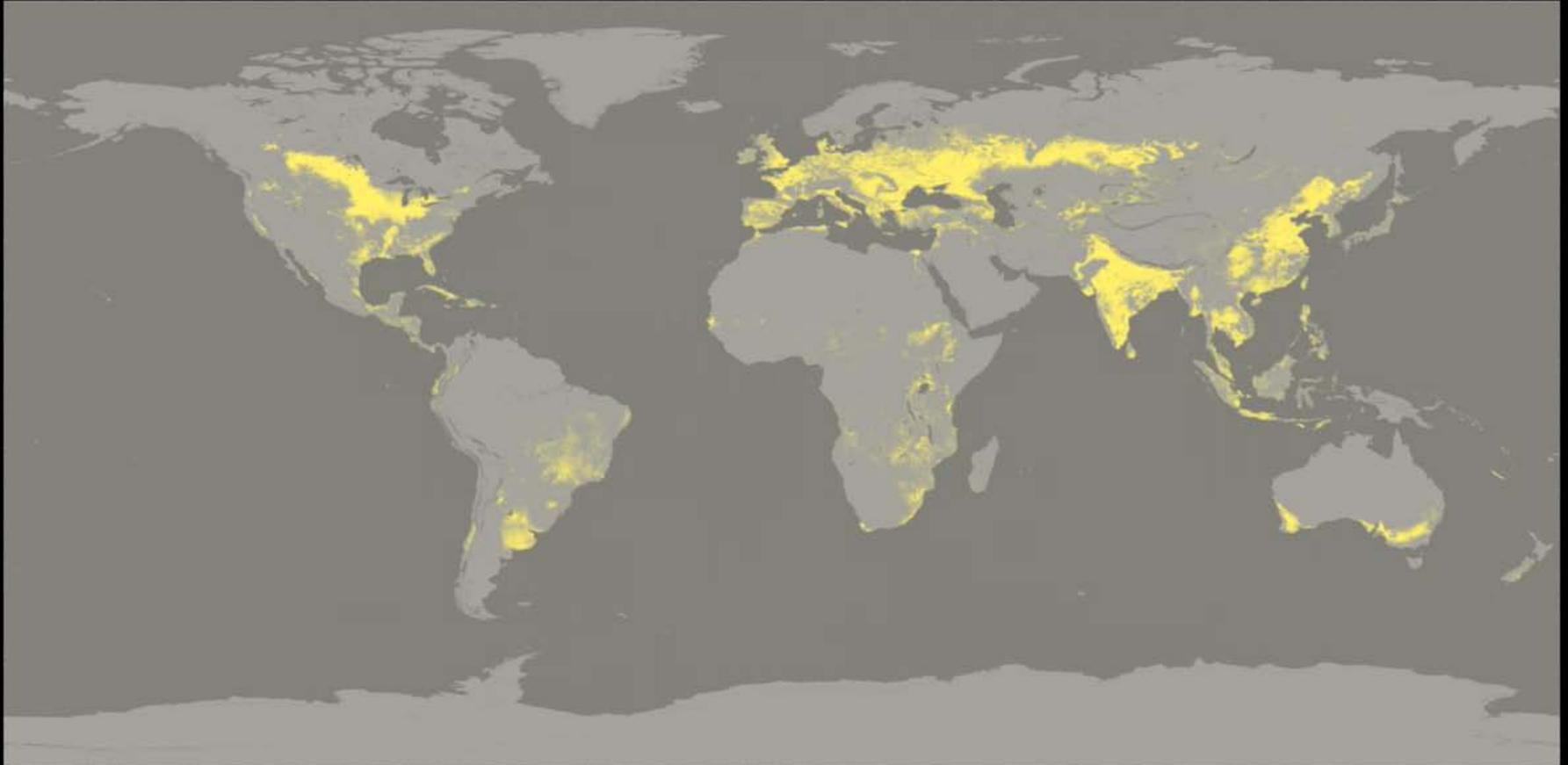
NOAA CPC FEWS-NET Rainfall Estimate (mm): based on Satellite and Rain Gauge Data



Satellite Data for Drought Management



NDVI for Wheat in Australia





Conclusions

- Food production is critical to the basic food security of millions in Africa
- Remote sensing provides early warning of trouble (impending decline in production)
- Integrated observations and models will provide improved data tools for decision makers – enables the incorporation of non-biological factors into the model for more precise and specific information
- Improved coordination for decision support