Achieving Food Security

amid Disparate and Volatile Climate Regimes

Gregory Gust
WCM, NWS Grand Forks ND

14th Annual CPASW – Burlington VT
22 March 2016

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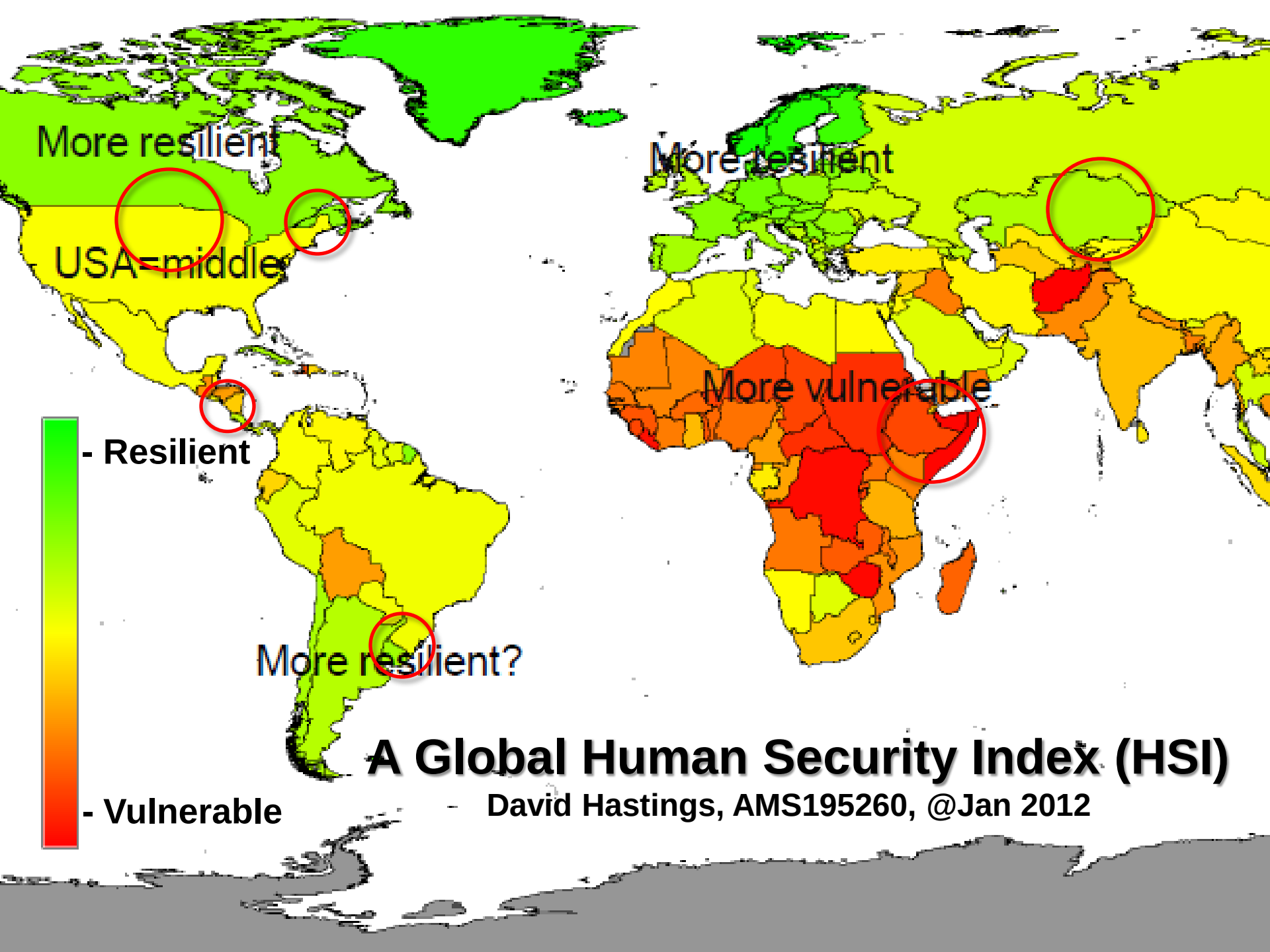
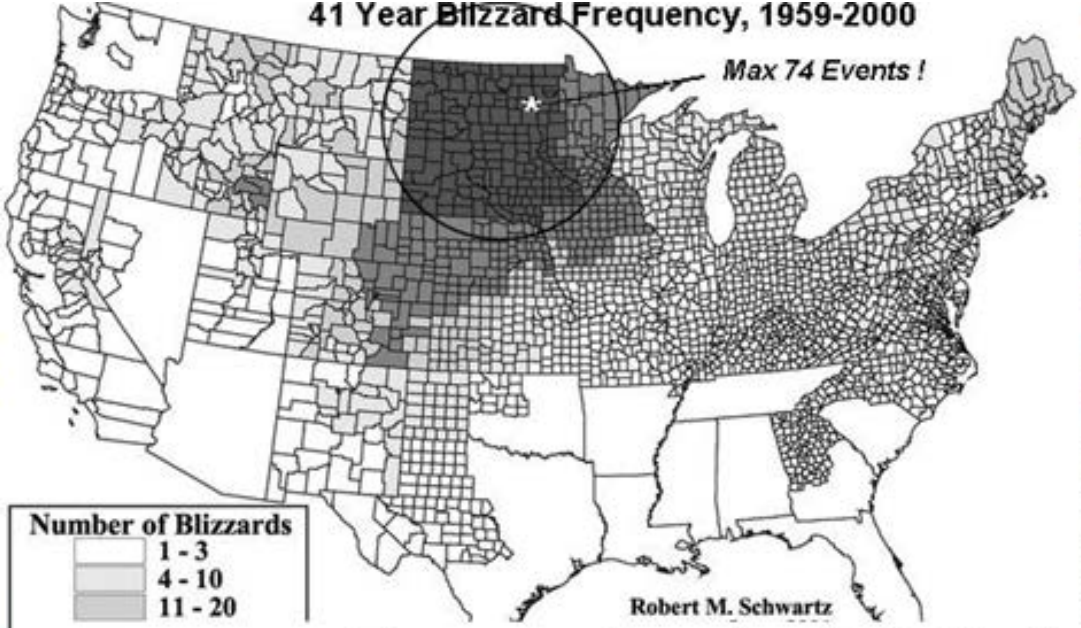


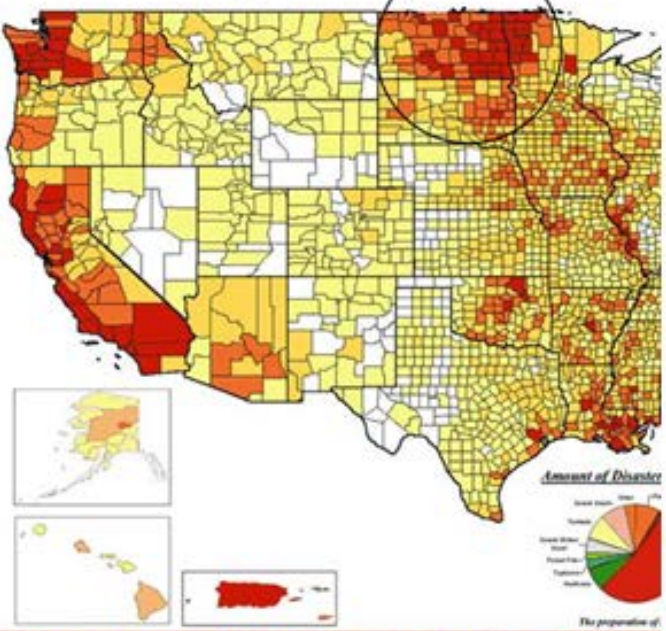
A Global Human Security Index (HSI)

David Hastings, AMS195260, @Jan 2012

1. Emergency Managers
2. B-cast Media
3. Agencies/NGOs
4. Public



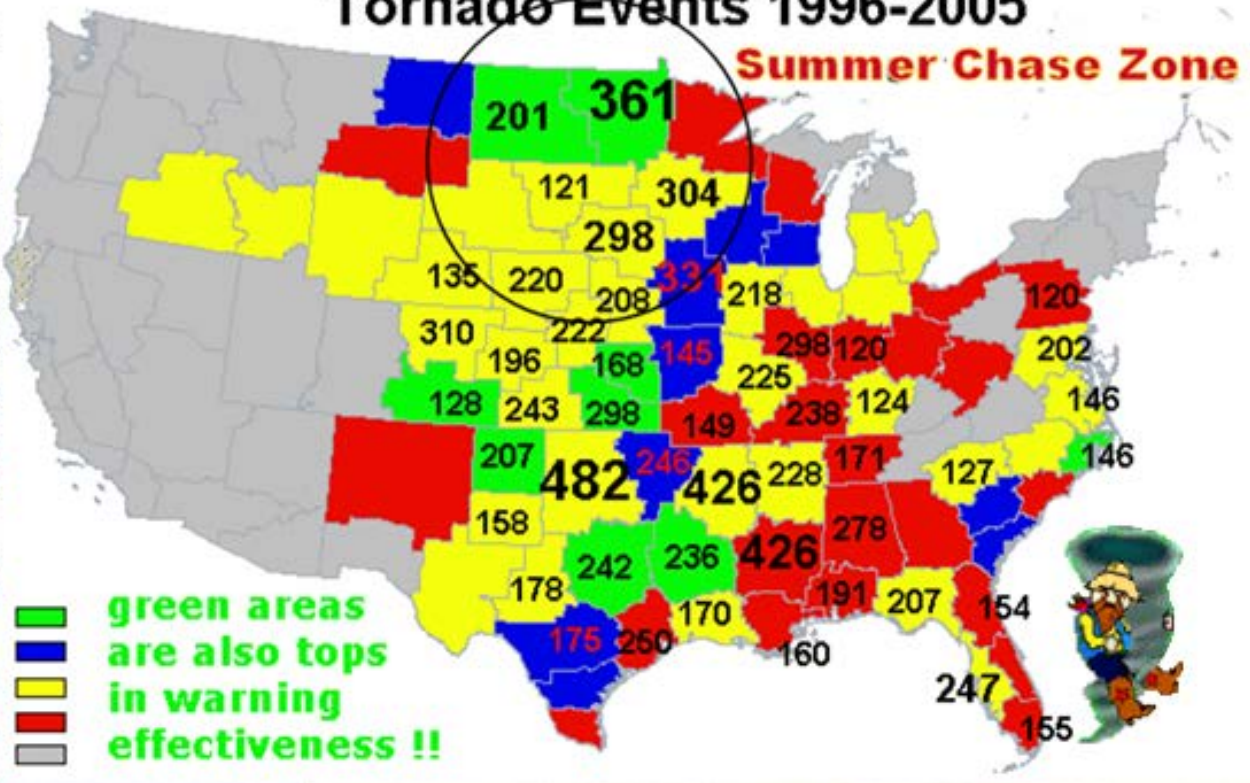
HISTORICAL PRESIDENTIAL DISA
1,928 Declarations ..1964 T



Who hasn't had a PDD since 1

Tornado Events 1996-2005

Summer Chase Zone



green areas are also tops in warning effectiveness !!

Four Phases of Emergency Management:

- Mitigation
- Preparedness
- Response
- Recovery

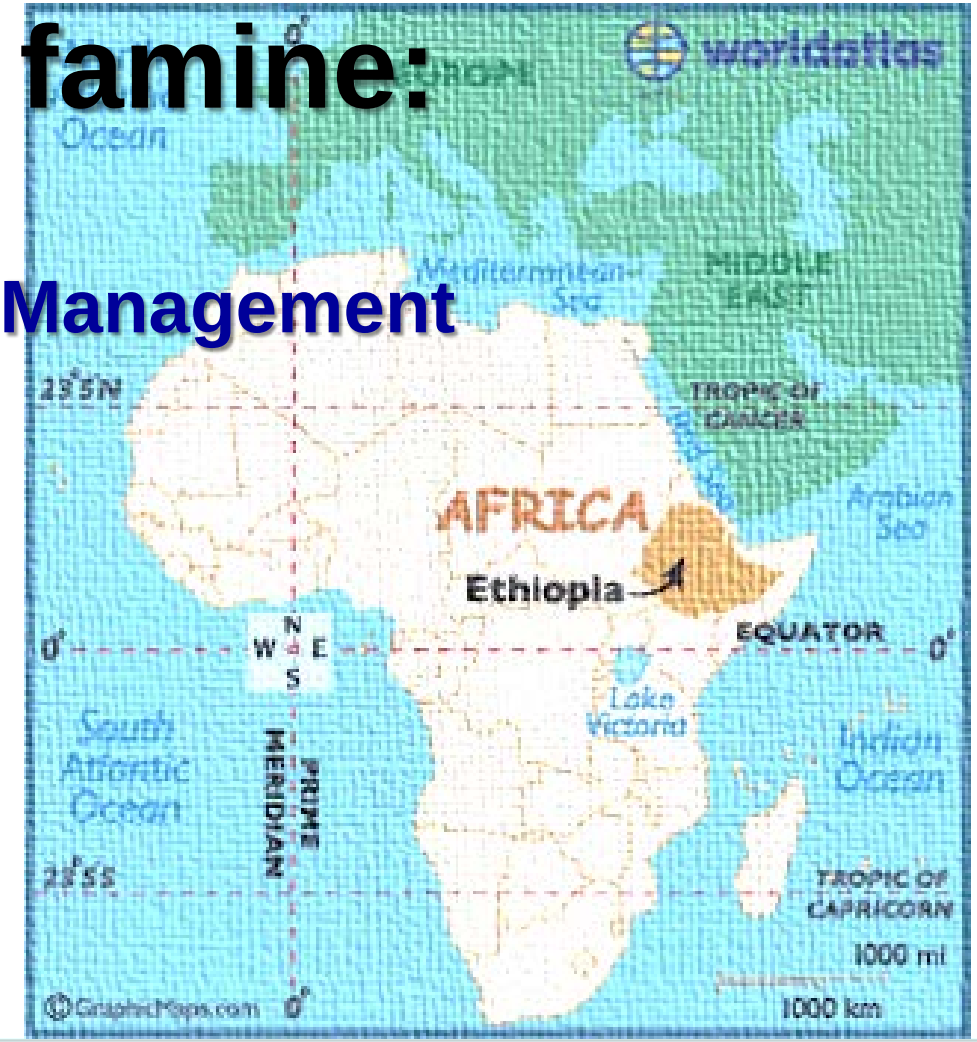
To break cycles of weather calamity and famine:

Step 1. Add Risk Management

Step 2.

Step 3.

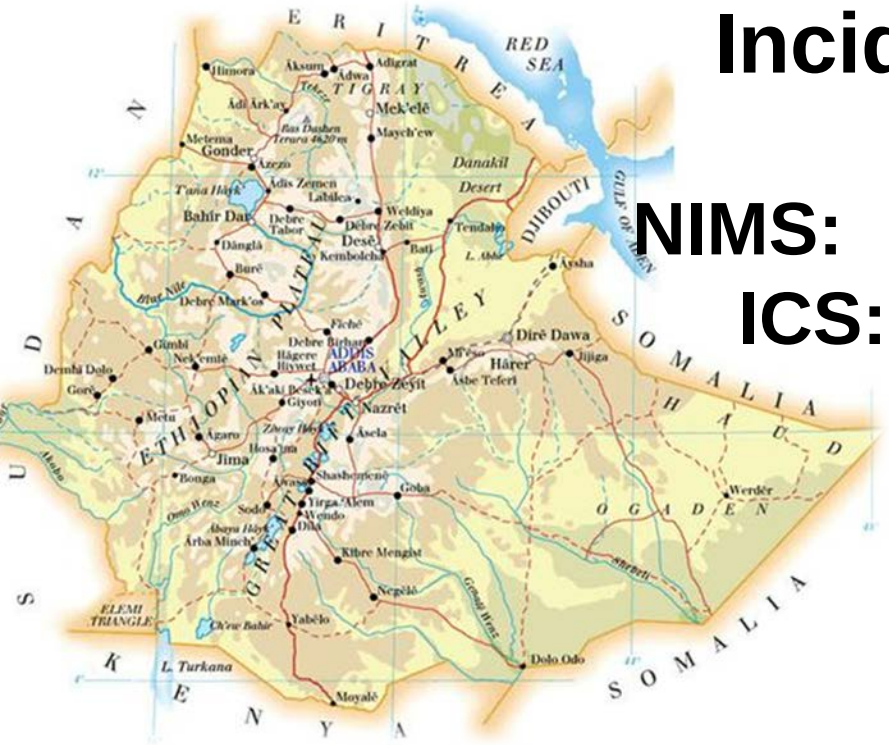
Step 4.



Step 1: Ethiopian NIMS/ICS.

Feb 2010 through Feb 2016

National Incident Management System
Incident Command System



NIMS: How we deal with disaster

ICS: How agencies interact in an emergency

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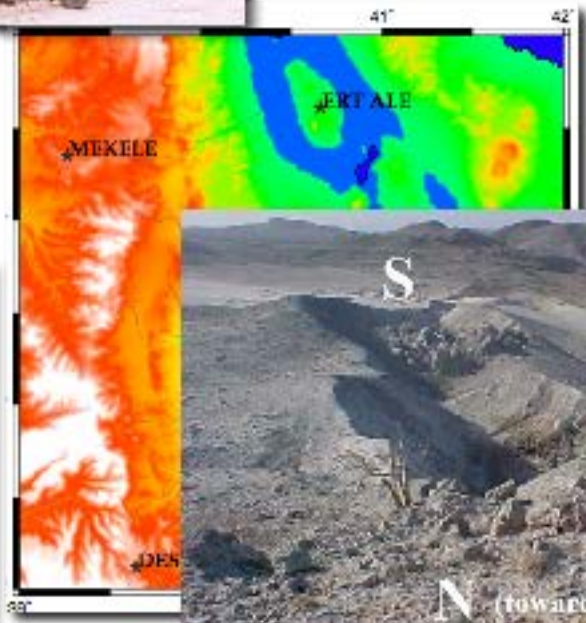
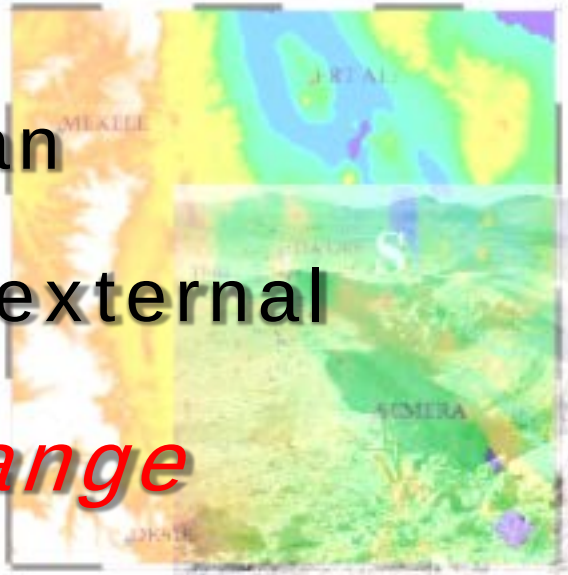
HAZARDS / SHOCKS



HAZARDS / SHOCKS

- Droughts; chronic food insecurity; famine
- Floods; other extreme weather events
- Human and animal disease outbreaks
- Earthquakes
- Fires: wildland and urban
- Conflicts: internal and external
- *Looming climate change*



Mapping NIMS/ICS to an Ethiopian Context:

GoE

Government of Ethiopia

MoARD

Ministry of Agriculture and Rural Development

DRM/FSS

Disaster Risk Management / Food Security Sector

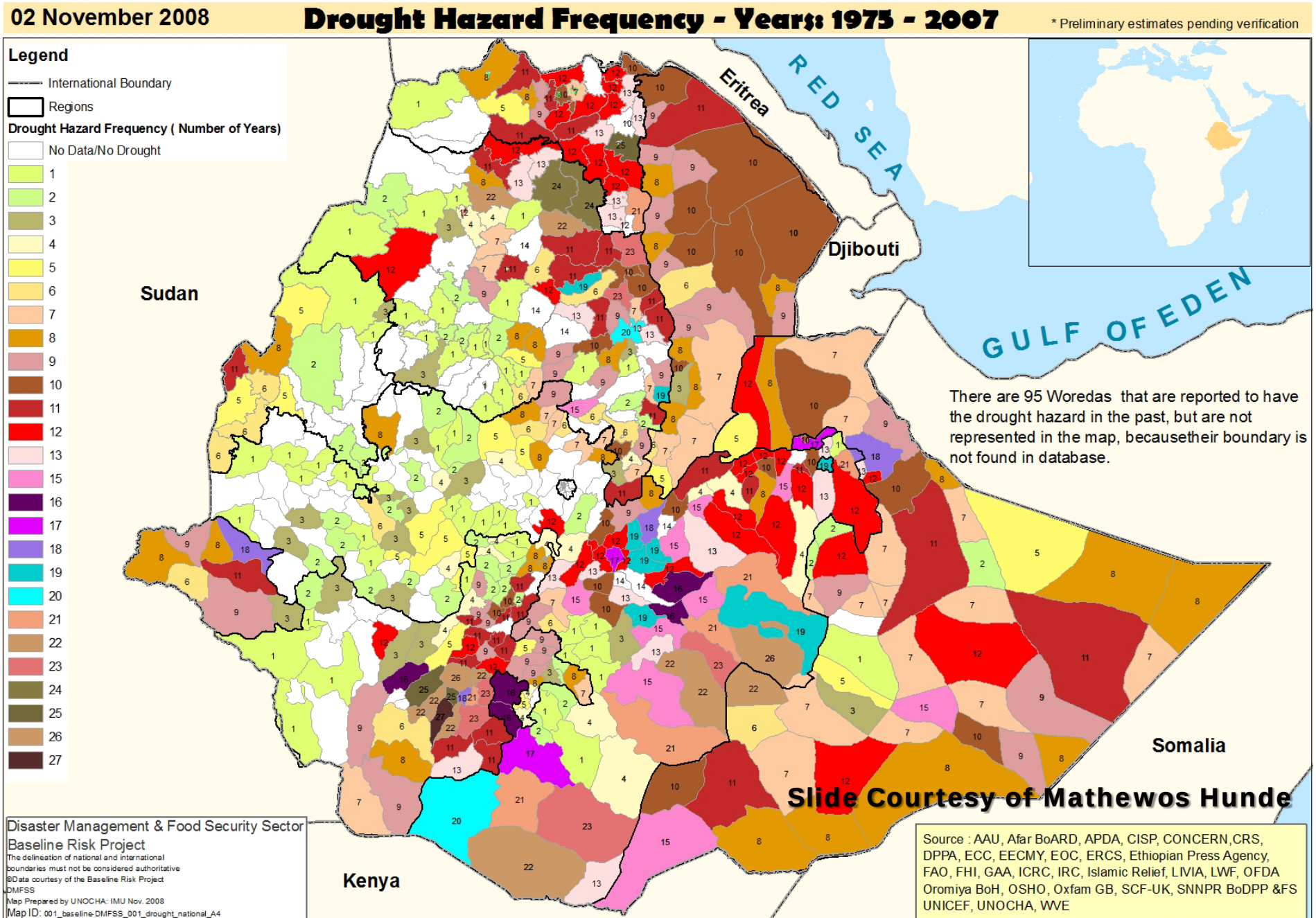
EWRD ← ← ← *Ethiopia's FEMA*

Early Warning and Response Directorate

Step 1. Add Risk Management.

A first step involved increasing Risk Management in the governmental process, so that Mitigation and Preparedness became regular parts of the Emergency Management cycle, not just response and recovery. [Mitigation-Preparedness-Response-Recovery]

Susceptibility to Drought…

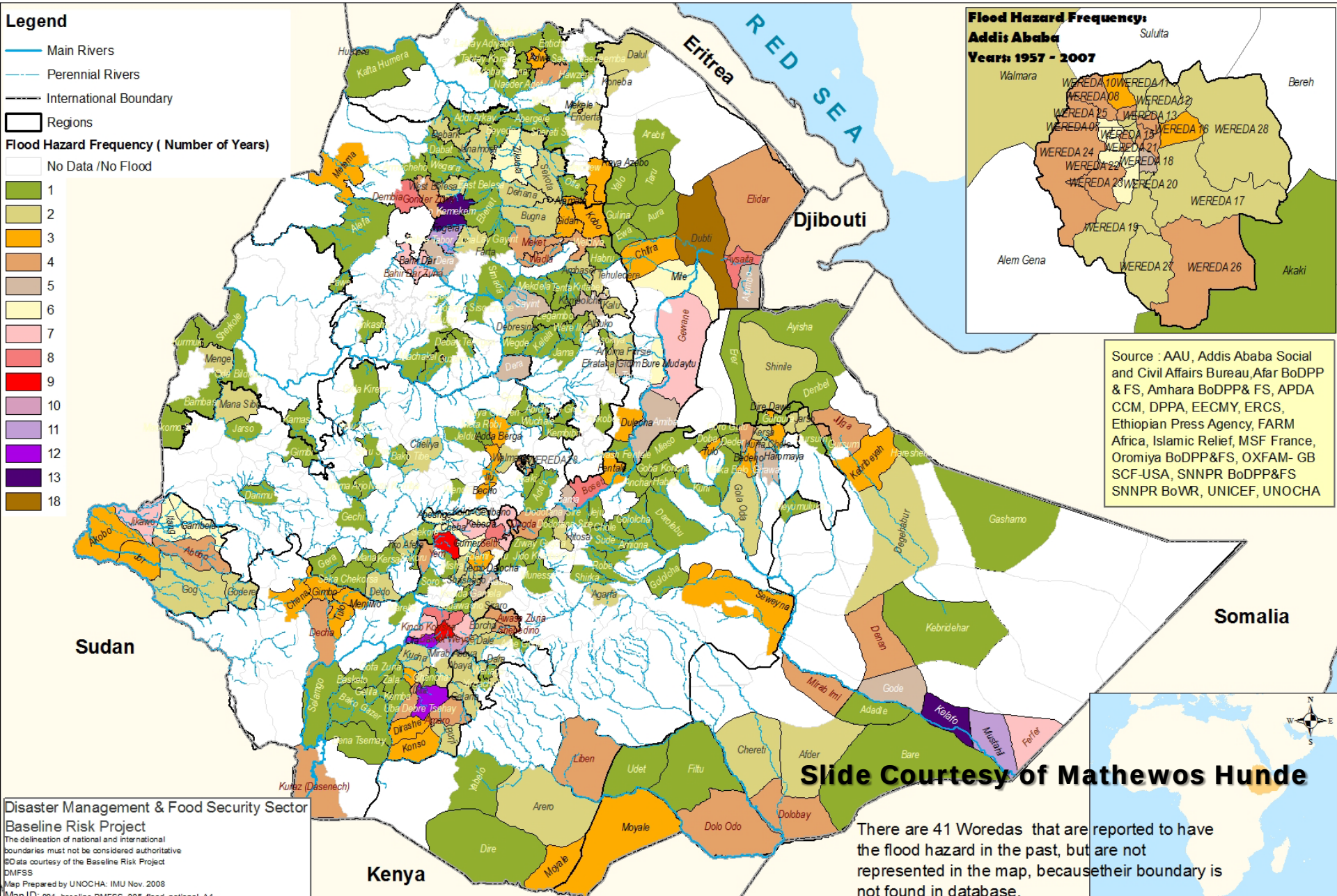


Susceptibility to Flood…

02 November 2008

Flood Hazard Frequency - Years: 1957 - 2007

* Preliminary estimates pending verification



Slide Courtesy of Mathewos Hunde

There are 41 Woredas that are reported to have the flood hazard in the past, but are not represented in the map, becausetheir boundary is not found in database.

Disaster Management & Food Security Sector
Baseline Risk Project

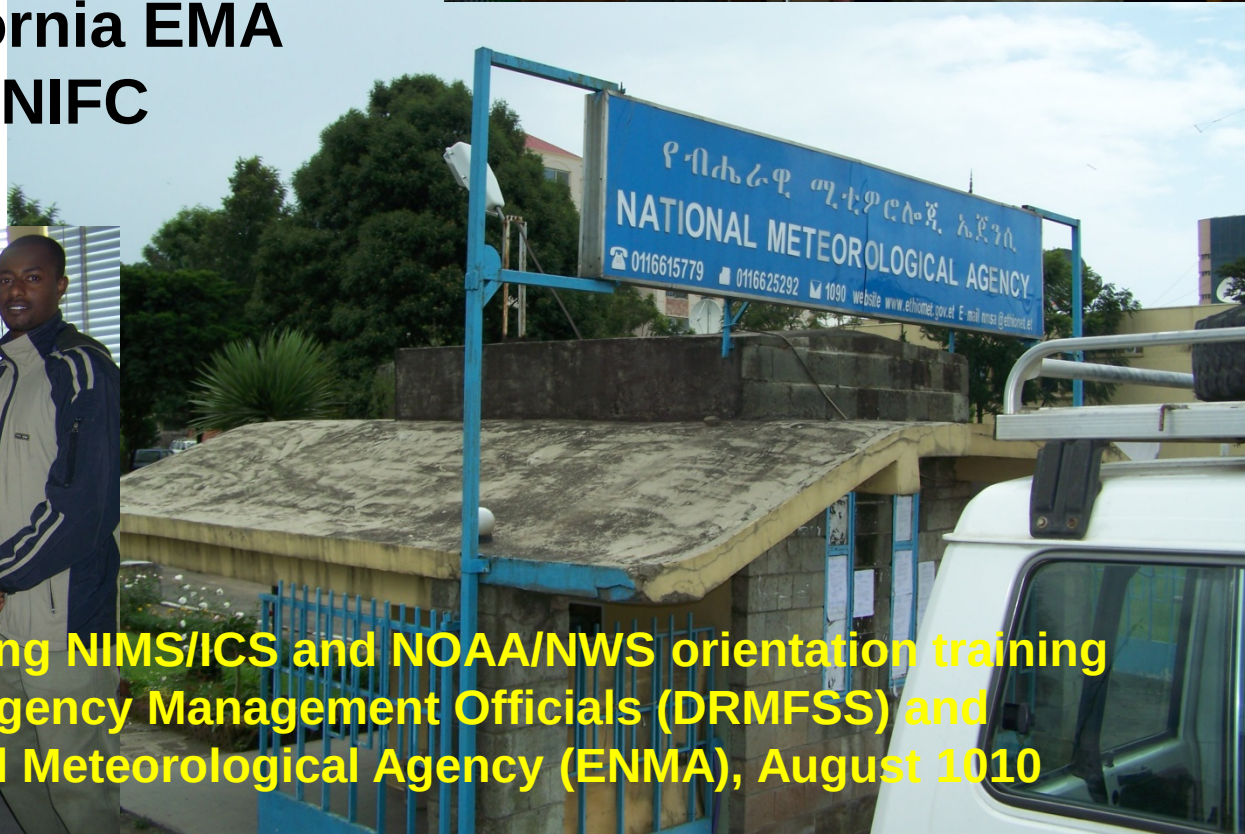
The delineation of national and international boundaries must not be considered authoritative
©Data courtesy of the Baseline Risk Project
DMFSS
Map Prepared by UNOCHA: IMU Nov. 2008

August 2010: NIMS/ICS Orientation Training:

Team trains in Addis Ababa,

Then travels to the USA…

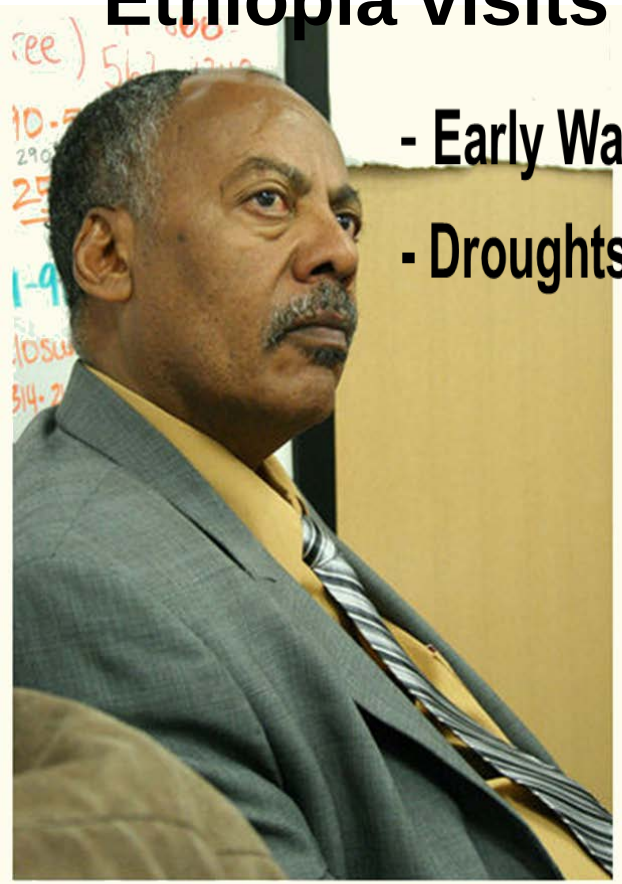
- WFO PSR at Salt River Project
- WFO STO at California EMA
- WFO BOI at USFS/NIFC



WCM Greg Gust providing NIMS/ICS and NOAA/NWS orientation training to Ethiopian Emergency Management Officials (DRMFSS) and To Ethiopian National Meteorological Agency (ENMA), August 1010

August 2011: NIMS/ICS - boots on ground!

Ethiopia visits Souris and Missouri River Floods



- Early Warning System
- Droughts and Floods

Ethiopian Delegation visits Missouri River Joint Information Center

OMAHA, Neb. - Taddesse Bekele Fanta, deputy Director of the Ethiopian Early Warning and Response Directorate, listens to a presentation by members of the U.S. Army Corps of Engineers Aug. 11. Fanta led a delegation of Senior Emergency Managers from Ethiopia during a visit to the Corps' Missouri River Joint Information Center Aug. 11. Delegates learned, first hand, how the Corps responded and continues to manage the unprecedented flooding of the Missouri River this year. (U.S. Army Corps of Engineers photo / Tommy Clarkson)

WCM Greg Gust (taking photos) coordinates North Dakota and Nebraska area NIMS/ICS site visits during historic Northern Plains flooding episodes.

To break cycles of weather calamity and famine:

Step 1. Add Risk Management

Step 2. Add Ag. Adapt/Mitigation Strategies

Step 3.

Step 4.

Step 1: NIMS/ICS 2013 and beyond…
Guided implementation in Ethiopia.

Step 2: Food Security, Ag Market Stability.

MoARD

Ministry of Agriculture and Rural Development

EIAR ← *Ethiopia's Ag Schools*

Ethiopian Institute of Agricultural Research

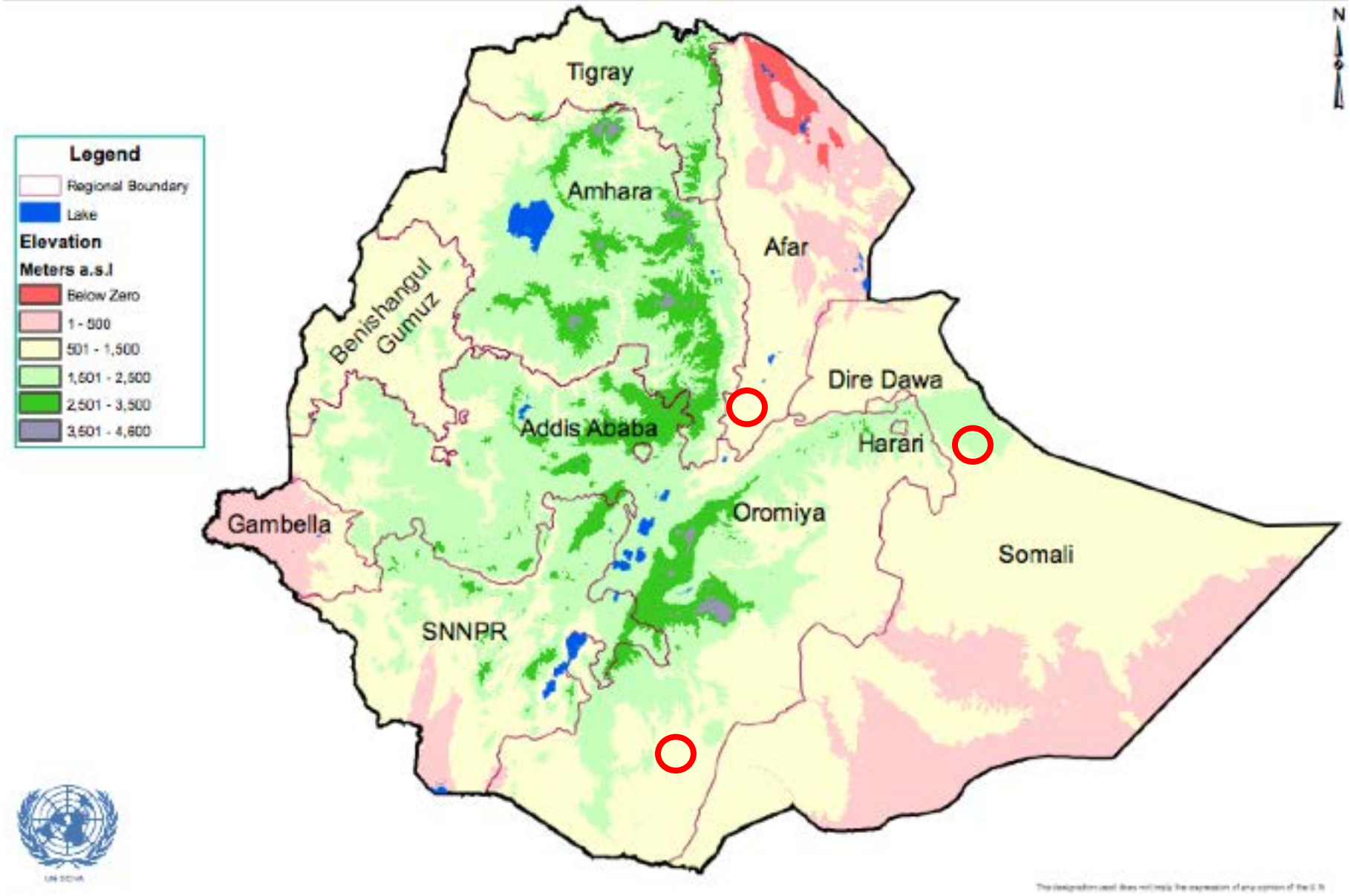
Theory: **Mitigation and Adaptation will improve Resiliency.**

USAID Global Climate Change Initiative (GCCI), Land-Use Analysis Projects

PRIME: Pastoralist areas Resiliency Improvement and Market Expansion
(2012-2017)

- Subsistence farming on 23% arable land
- Rain-dependent agriculture
- *Belg* (short) season
- *Keremt* (long) season (and *meher* crops)
- Land degradation issues

DIGITAL ELEVATION MODEL of ETHIOPIA



NOAA/NWS role in PRIME:

(as technical advisor only)

- **Dig up the weather/climate records.**

  Historical Ag Wx sites. Modern Ag Wx and ENMA sites.

  1200 co-op type climate sites. Maybe 20 automated 24/7 sites.

- **Test expansion of ENMA sites.**

  Harar/Jijiga area of northeast Somali Region.

  Add a "long term" mini-mesonet in one of three study areas.

- **Test expansion of improved comms links.**

  +95% cell phone saturation… **Wx Reporting? Alerting?**

July 2013: USFS/PRIME and USAID-Ethiopia

Land Use Project w/Field Surveys and Data Checks

WCM Greg Gust (taking photos) w/USFS Team instruct local surveyors and identify/secure available climate data records in study areas.

Data/Processes:

- all pretty basic
- all quite delayed

To break cycles of weather calamity and famine:

Step 1. Add Risk Management

Step 2. Add Ag. Adapt/Mitigation Strategies

Step 3. Add Ag. Infrastructure Improvements

Step 4.

Step 3. Stir Vigorously (Add Improvements).

Additional Capacity Building work in Ethiopia involves such gross infrastructure needs as transportation (need rails and roads), communications (cellular infrastructure is high, copper and fiber is quite low), and reliable energy (ie, Grand Renaissance Dam project).

The PRIME Project in Ethiopia was targeted at Pastoralists (herders), an important agricultural sector often situated in some marginal grazing areas… with some pretty basic needs… but not intended to markedly change that way of life.

The CRW Project in Kazakhstan was targeted at Wheat Farmers, in what is considered to be the Bread Basket of Central Asia. Here there is a strong desire to employ western methods to replace the "vacated" soviet-style infrastructure and technologies.

And I'll leave it at that…

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Step 2, 3, 4: CRW Performance Evaluation.

CRW - Improving the Climate Resiliency of Kazakhstan Wheat and Central Asian Food Security Project

Some **Findings and Recommendations @ 9 Dec 2015**

Note: PRIME and CRW are both funded under USAID GCCI - Global Climate Change Initiative

CRW Background

- $2.2 million four-year (2012-2016) program managed by UNDP Kazakhstan, with support of $450,000 delivered by USAID's CCRD (Climate Change Resilient Development) Project.
- **Program goal**: Catalyze the process of adaptation in Kazakhstan's wheat sector.
- **Local institutional beneficiaries:**
  - **KazAgroInnovation (MinAg)**
  - **KazHydomet**
  - **NSRI (Satellite Imagery)**


«Kazhydromet»
«EURASIAN WATER CENTER»

Evaluation Question 1:

To what extent has the CRW project been effective in improving practices within KazHydromet/NSRI/MinAg for collecting and analyzing agrometeorological data, and making seasonal and climate predictions?

- **Brought key stakeholders together, but collaboration is challenged.**
- **Inadequate surface reporting network and large amounts of un-digitized historical data.**
- **New tools and techniques - Yes!**
  - **Some digitized records, faster processing of assessments.**
  - **KHM still tweeking new numeric forecast methods (IRI-CPT).**

Evaluation Question 2:

To what extent has the CRW project been effective in improving practices within KazHydromet/NSRI/MinAg for disseminating weather and climate related data to farmers and other key stakeholders, as well as to each other?

- Uses “costly” fee-based system for distributing most agro-meteorological information to farmers and other institutional stakeholders.
- Most farmers do not receive KHM/MinAg bulletins, despite the CRW support to improve their structure and dissemination.
- Improved internet site had stalled and the prospects were unclear.

Evaluation Question 3:

To the extent that there are improved practices in the collection, analysis and dissemination of weather and climate information… can they be sustained?

- **Yes! Sustainability was only marginally considered…**
  But… professional interest is very high!
  High desire to acquire technological advances.

- **Yes! Both KazHydromet and NSRI have the capacity to maintain the technology and software which was provided, thus increasing the likelihood of sustainability.**

- **But institutional roadblocks remain…**

To break cycles of weather calamity and famine:

Step 1. Add Risk Management

Step 2. Ag Mitigation/Adaptation Strategies

Step 3. Add Ag. Infrastructure Improvements

Step 4. Build-up Hydro-Met Capacity

Step 4. Mix in an All-Hazards Capacity.

As Drought, Famine, and Flood has brought EWRD, EIAR and ENMA closer together.

EWRD ← ← ← *Ethiopia's FEMA*
Early Warning and Response Directorate

EIAR ← *Ethiopia's Ag Schools*
Ethiopian Institute of Agricultural Research

E-NMA ← *Ethiopia's NOAA/NWS*
Ethiopian National Meteorology Agency.

Other partnerships are in play:

- ENMA and NCEP… African Mets at NCEP assist in the production of various climate assessments and outlook products in concert with the African Centre of Meteorological Application for Development (ACMAD) and the various African National Met Services.

- EIAR and UNL/NDMC… Graduate research under Dr. Tsegaye Tadesse…

May 2014: CPC African Desk celebrates 20th Anniversary!

Posted May 7th, 2014, by NWS Insider Staff …*over 130 African Mets trained by NCEP so far!*

Wassila Thiaw as NCEP African Desk coordinator (red sweater), seated with Amira Ebrahim (Egypt), Awatif Ebrahim (Egypt), Aaron Ntiranyibagira (Burundi), Lofti Khammari (Tunisia); Standing, Enalkachew Bekele (Ethiopia), Vadalamani Kumar (CPC).


Also… FFG - Hydrology!
NIMS/ICS - Early Warning!
Maybe… CA/KHM Capacity?
Future Central Asian Desk?

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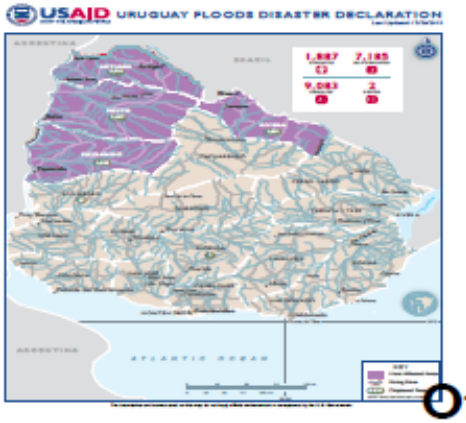
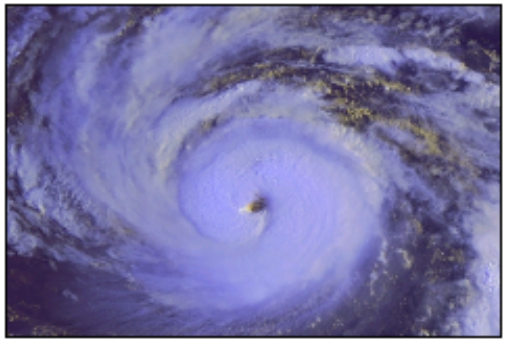
Lessons learned in building Hydrometeorological Early Warning Systems in developing countries : Why some systems fail and others succeed



By

Curtis B. Barrett and
A. Sezin Tokar, Ph.D.



Office of U.S. Foreign Disaster Assistance
U.S. Agency for International Development

Working Toward a More Weather, Water and Climate Ready World—Issues and Opportunities: Part 2 (Joint with Board on Global Strategies

2016 AMS Annual Conference, New Orleans, Louisiana

Wednesday January 13, 2016

Some Hydro Lessons Learned:

- **Need to refine implementation and improve sustainability of End-to-End Early Warning Systems.**
- **Need better donor coordination to reduce duplication and increase integration.**
- **Must Build Capacity of National Hydro-Met Agencies!**
- **Must Invest in locally sustainable systems!**

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Eth - Kaz - Curt Blend

Lessons Learned *internationally*:

- **Many/Most countries don't have a "free" distribution of wx/climate info (data, analyses, forecasts)**
  - **among their component agencies**
  - **to their citizens**

- **Ag, HydroMet, and Satellite people don't freely share.**

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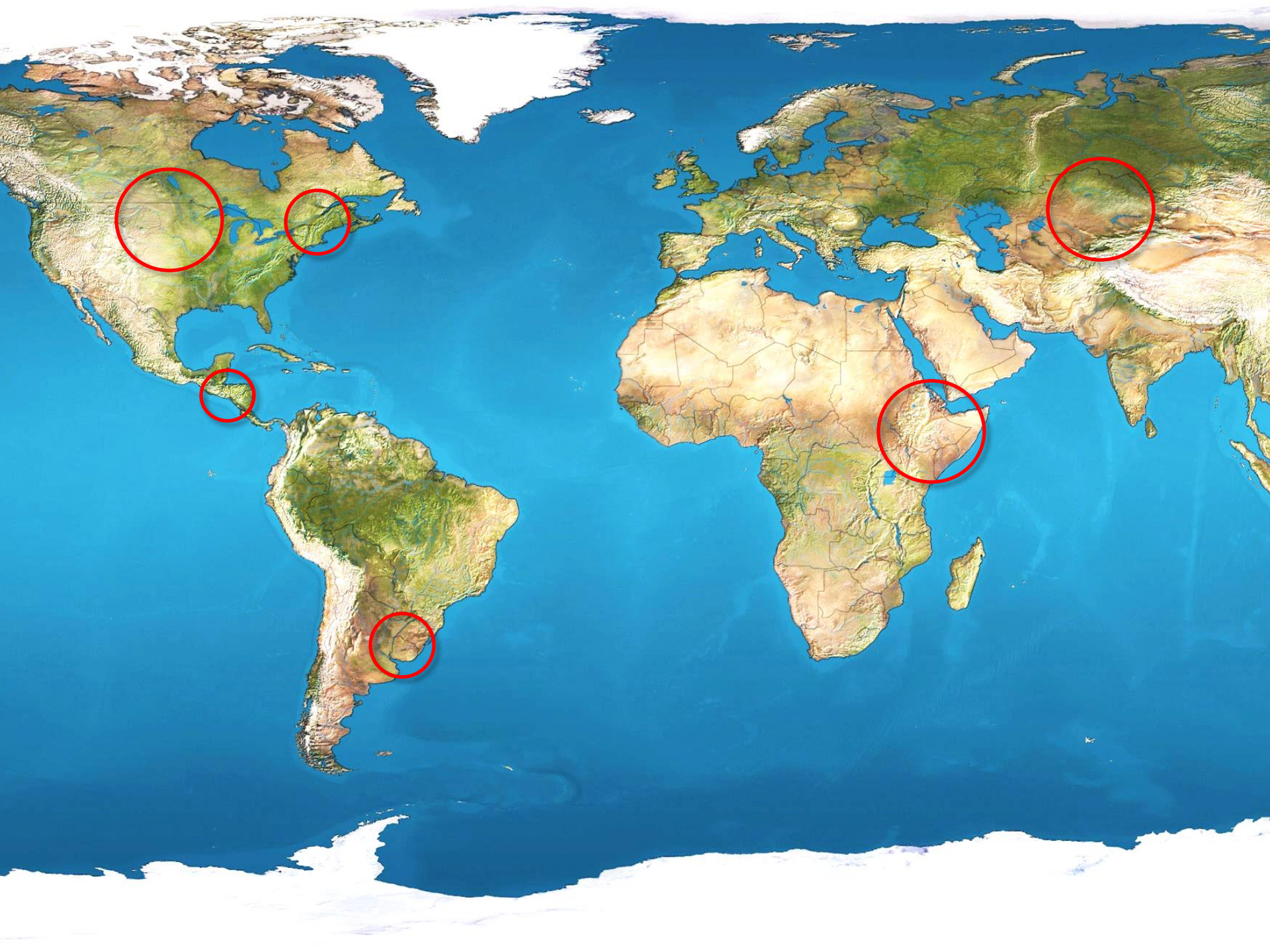
Eth - Kaz - Curt Blend

Lessons Learned *locally and internationally*:

- **More real-time reports are critical to us all!**
  - **Improve our awareness, responsiveness**
  - **To provide Decision Support Services**
- ***Every* Development Program needs...**
  - **Follow-through .....complete the plan**
  - **Follow-up .....make sure its working**



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Some North Dakota takeaways…

International Red River Basin Commission

- Long Term Flood Solutions (2010+)
- Forecast Working Group (2012+)

ND Climate Change Scenario Planning Workshop (2015)

Here, workshop participants examined a potential extreme drought scenario they not-so-fondly renamed "Little Hell on the Prairie". Photo courtesy of Dr. Gregor Shuurman, NPS.

Central ND: *getting Warmer and/or Wetter??*

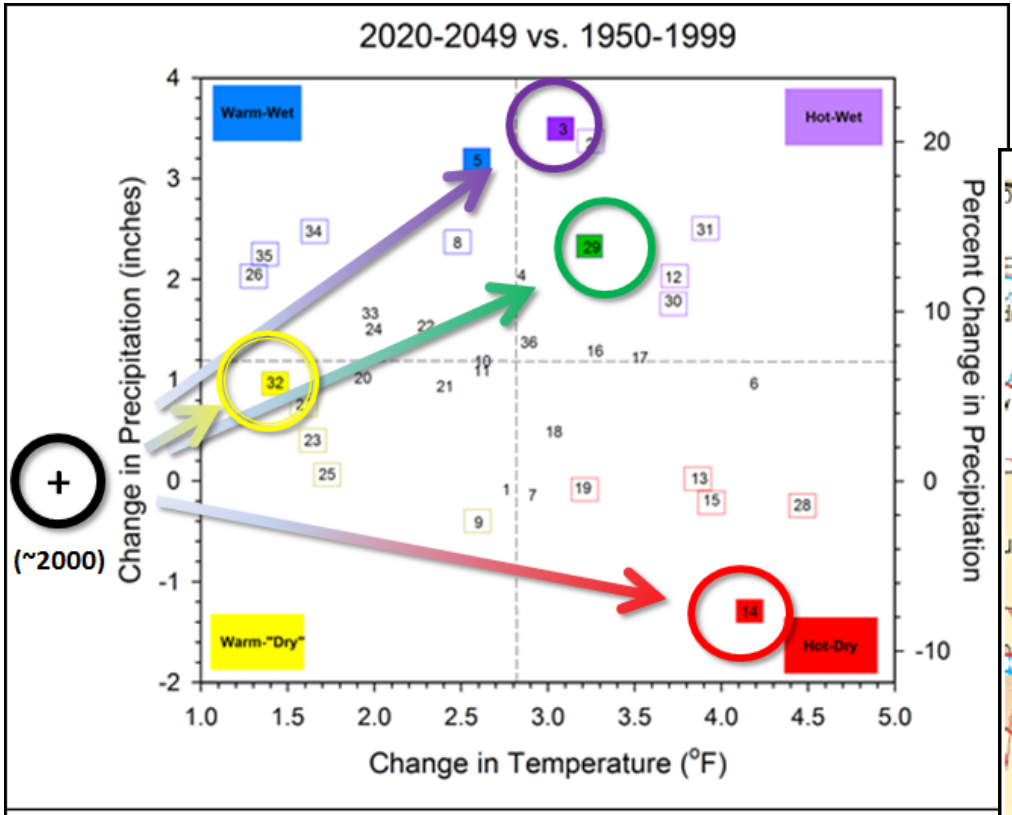


Fig 2. A sampling of projections in the Bureau of Reclamation's CMIP3 hydrology dataset (http://gdo-dcp.ucllnl.org/downscaled_cmip_projections/dcpInterface.html#Welcome) for 1/8 degree area near KNRI headquarters (47.34°N, 101.27°W). Source graph courtesy Amy Symstad (USGS/NPWRC), Nick Fisichelli (NPS/CCRP), and Andrea Ray, (NOAA/ESRL).

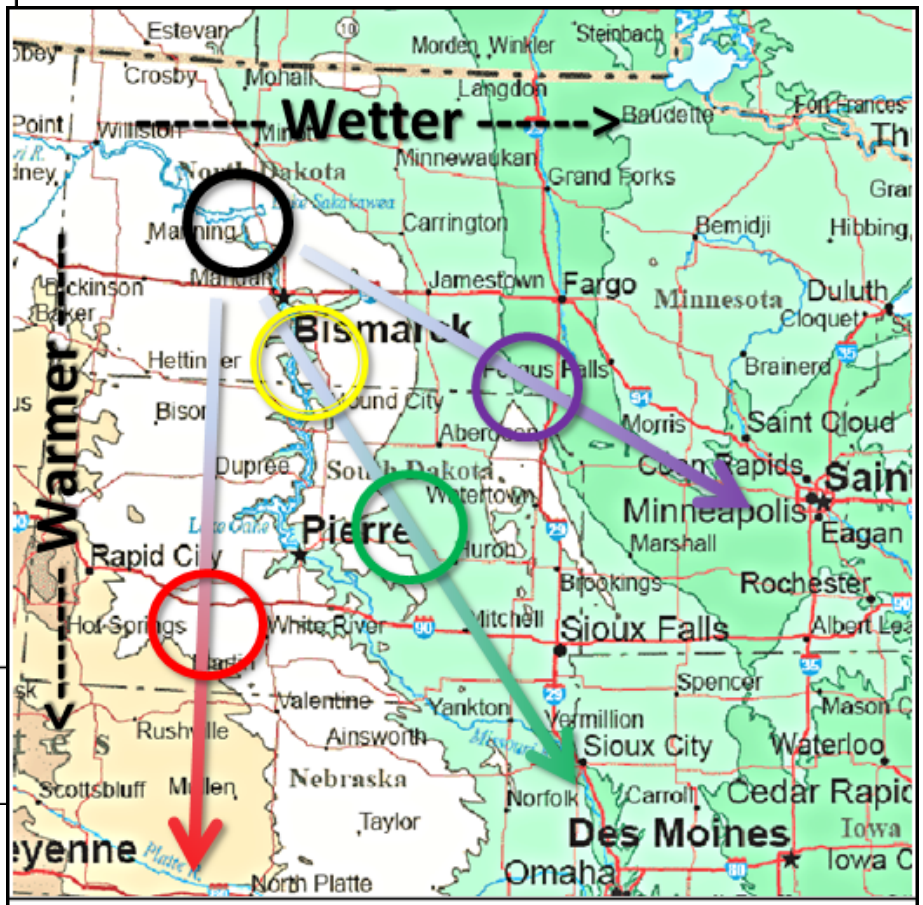
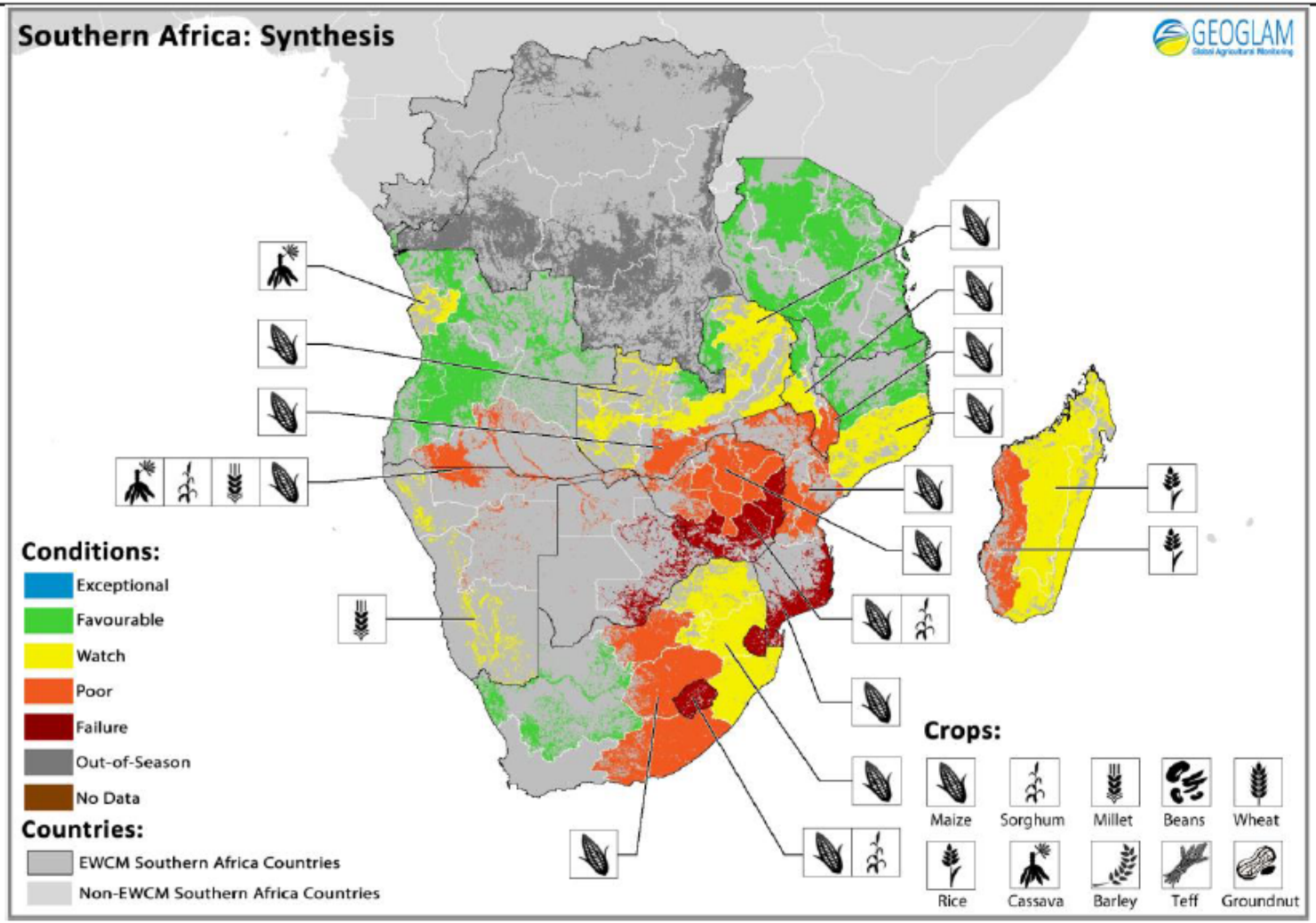


Fig 3. Select climate scenarios depicted as a subtle shift in ND climate normals to a new warmer and either wetter or slightly drier climate regime - more like our neighbors to the south and east. In the **Hot Flood See-Saw** scenario, central ND climate could resemble that of southeast ND by mid century, and southern Minnesota by the end of the century.

Scenarios courtesy of Andrea Ray, Amy Symstad, and Nick Fisichelli.

GEOGLAM Early Warning Crop Monitor

Crop Conditions at a glance as of February 28th



Crop condition map synthesizing information for all EWCM crops as of February 28th. Crop conditions over the main growing areas are based on a combination of inputs including remotely sensed data, ground observations, field reports, national and regional experts. ***Crops that are in other than favourable conditions are displayed on the map.***