The benefits and the development of an early warning system

In the context of: The Mesoamerican Food Security and Early Warning System Project

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CARIWIN Regional Seminar
January 14-15, 2010, Georgetown, Guyana

What is an Early Warning System?

- A practical tool for implementing timely and appropriate responses to droughts and famine in the form of food aid and other mitigation strategies

- Involves forecasts based on climate projections and the area's drought history, possible outcomes of developing drought events, and answering questions about how long a drought might last and how severe it might be.

- Effective early warning systems should involve both technology and all interested parties in drought planning and response.

Sivakumar, M. (2009). *Early Warning Systems for Drought: Past and Present*. Online presentation of the World Meteorological Organization.

What are the benefits?

- Reduces vulnerability to drought
- Risk and impact assessment
- Mitigation and response
- Encourages interagency cooperation
- Increases awareness

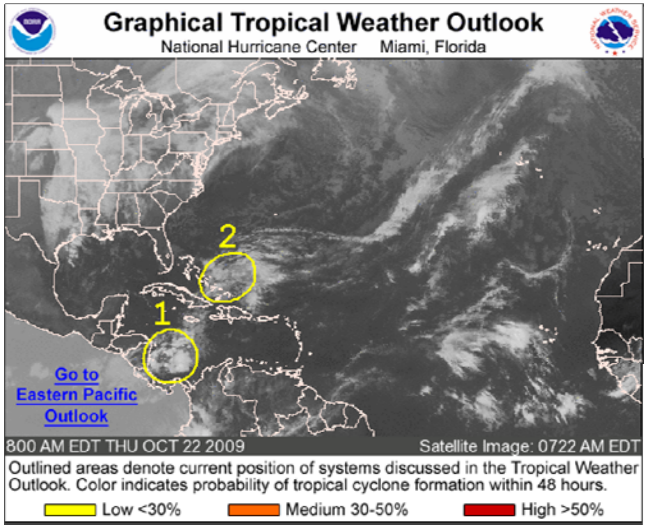
Mesoamerican Food Security Early Warning System

- Since 2004, the NOAA Climate Prediction Center (CPC) has worked with the United States Agency for International Development (USAID).
- MFEWS is an expansion of the Famine Early Warning System Network (FEWS NET) project.
- The role of CPC is to provide support to these projects by means of weather and climate monitoring.
- The information is used to generate a weekly hazards assessment.

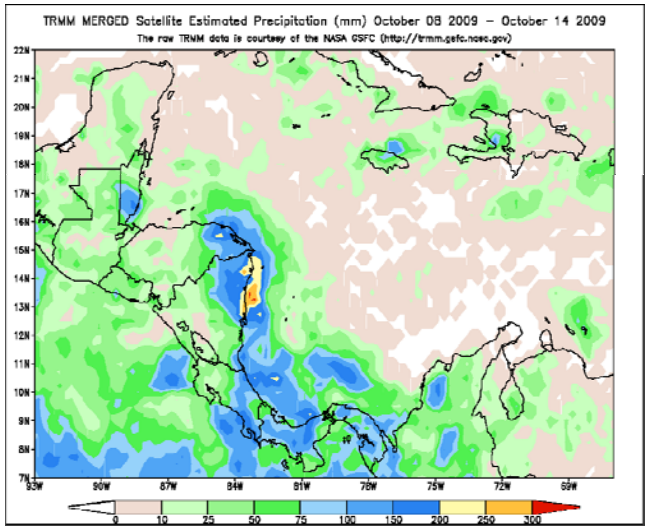
Data Sources

- For real-time weather and climate monitoring, a collection of resources is used.
  - National Hurricane Center
  - Tropical Rainfall Measurement Mission (TRMM)
  - CPC Morphing (CMORPH) Rainfall Estimator
  - United States Geological Survey (USGS)
  - Other supplemental products and information from field representatives***

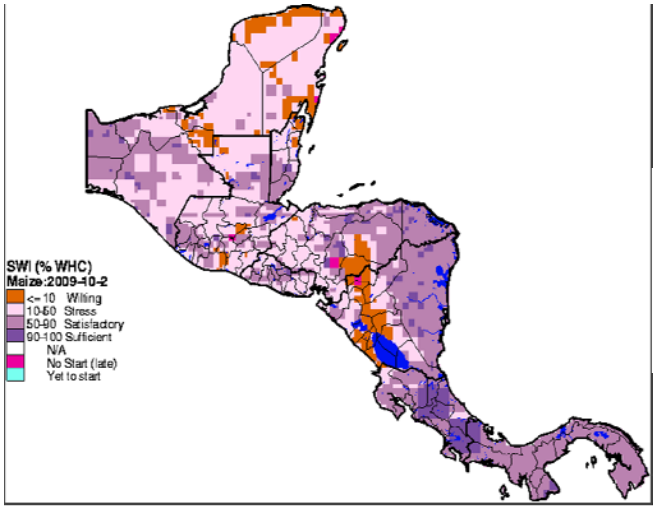
Data Sources



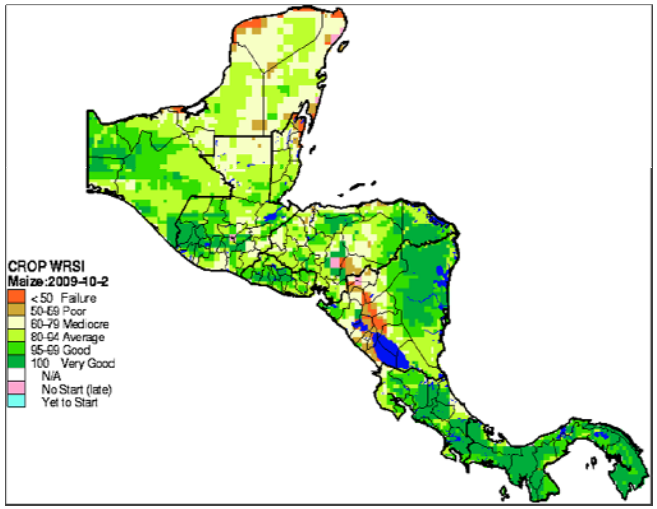
NHC Tropical Weather Outlook



TRMM Rainfall Totals



USGS Soil Water Index



USGS Water Requirement Index

Information Exchange

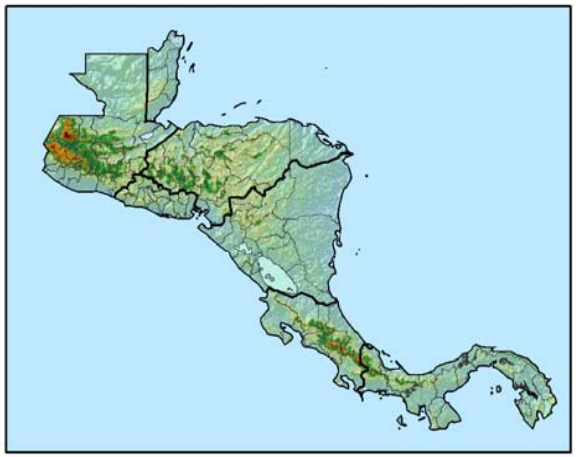
- Local and international experts in various disciplines related to food security and humanitarian aide
- Email and weekly teleconference briefings to discuss recent phenomenon and data
- This exchange is a critical factor in the timely dissemination of information pertinent to the MFEWS project

Producing the Weekly Weather Hazards Analysis

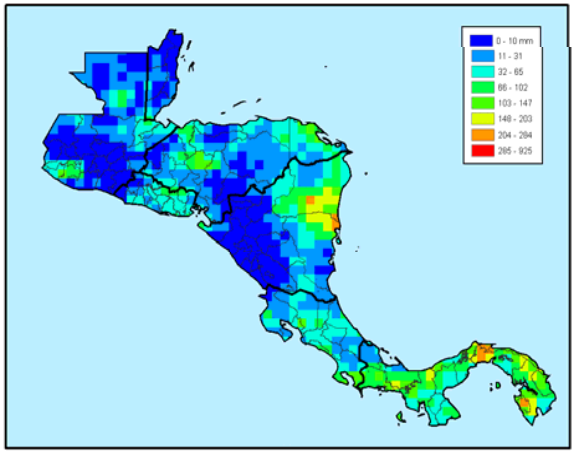
- ArcGIS 9.3 software is used to graphically depict conditions on the ground.

- The operational GIS database at the CPC consists of:
  - TRMM and CMORPH rainfall
  - Model guidance
  - Sea surface temperature
  - Land elevation
  - Administrative boundaries

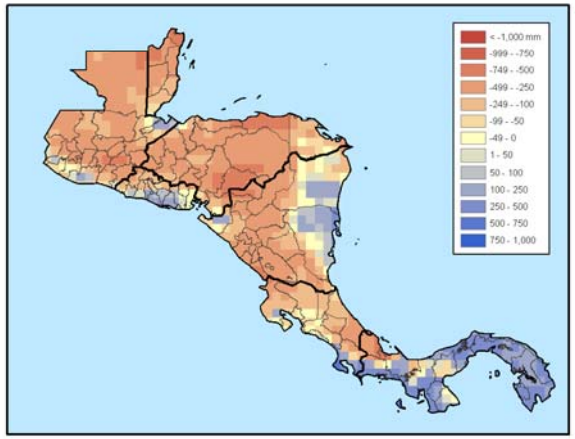
GIS Layers



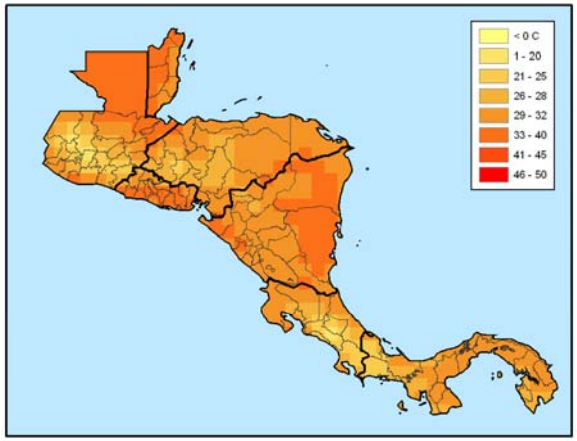
Land Elevation



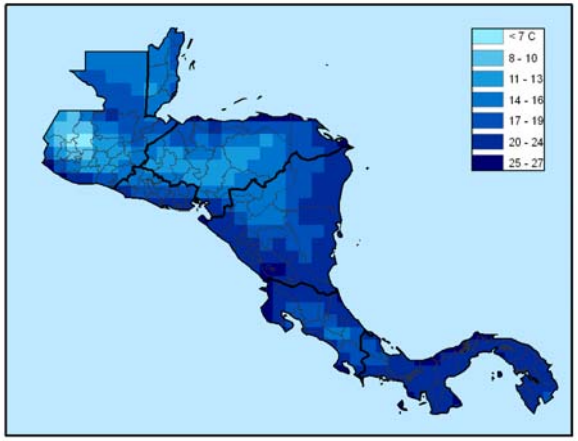
CMORPH Rainfall Totals



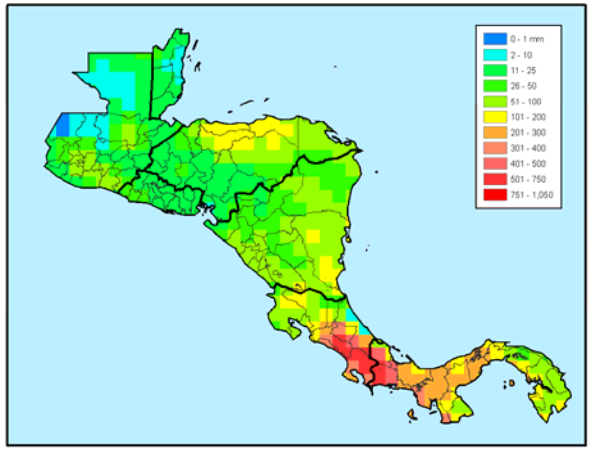
TRMM Rainfall Anomalies



Maximum Temperature



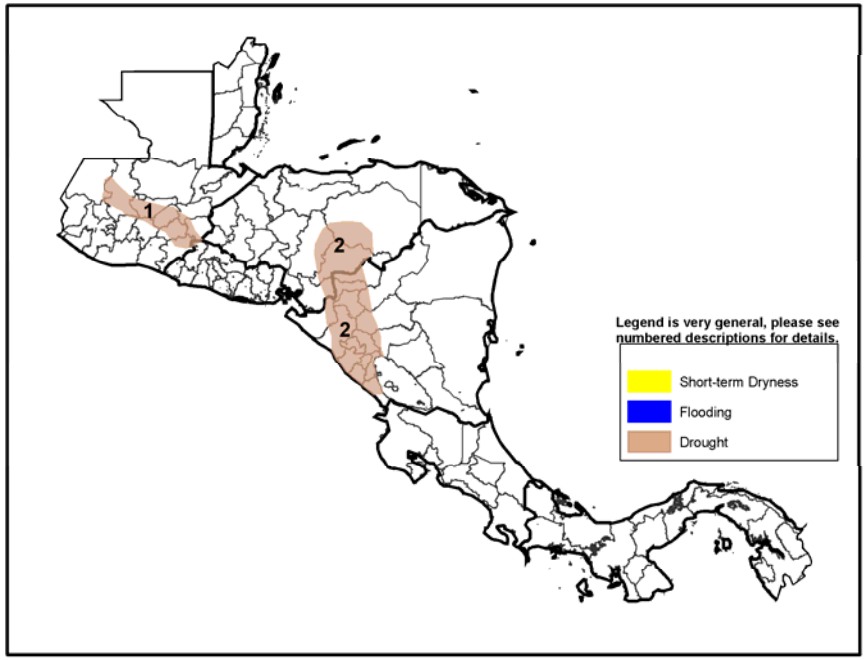
Minimum Temperature



Rainfall Outlook

Weather Hazards Polygons

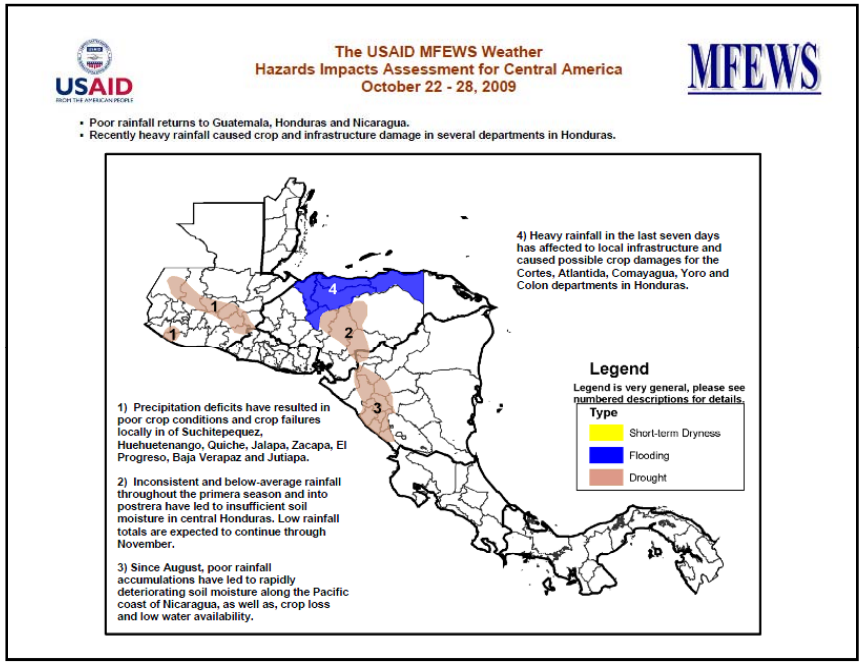
- Polygons indicate conditions of drought, flooding, short-term dryness, and humanitarian concern.
- The weather hazards polygons are drawn according to recent weather and climate trends, short-term and mid-term outlooks, and input from field representatives.



The Final Weekly Weather Hazards Analysis Product

- A two-page Word document that displays information both spatially and in text format.
- On the first page, the weather hazards layer map and complementary text for each polygon is included
- The second page provides more information and may include mid-to-long-term climate information as well as complementary images.
- The final product is converted to an Adobe file for mass distribution to prevent unauthorized edits to the assessment.

Final Central America Product



The USAID MFEWS Weather Hazards Impacts Assessment for Central America
October 22 - 28, 2009

MFEWS

- Poor rainfall returns to Guatemala, Honduras and Nicaragua.
- Recently heavy rainfall caused crop and infrastructure damage in several departments in Honduras.

4) Heavy rainfall in the last seven days has affected to local infrastructure and caused possible crop damages for the Cortes, Atlantida, Comayagua, Yoro and Colon departments in Honduras.

Legend

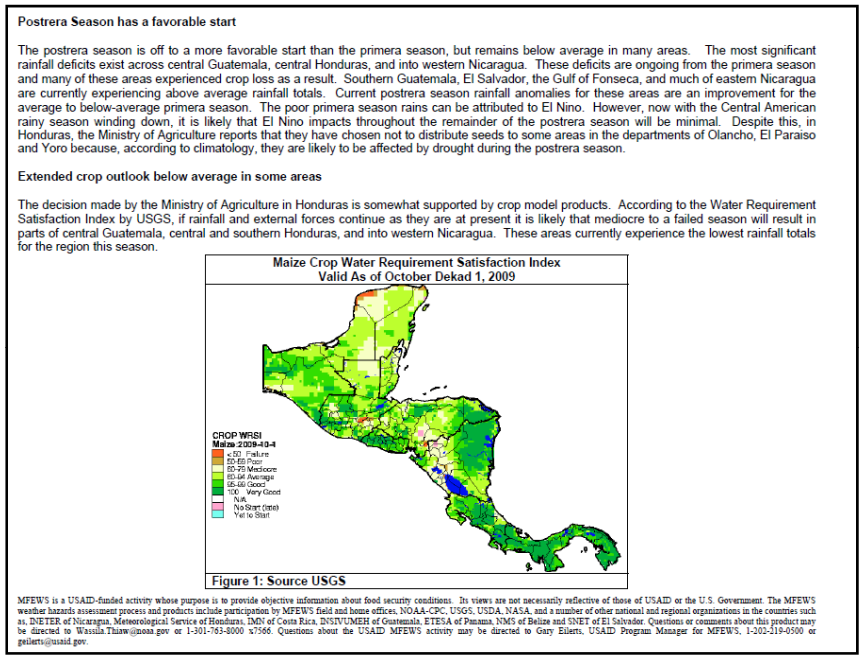
Legend is very general, please see numbered descriptions for details.

Type
- Short-term Dryness
- Flooding
- Drought

1) Precipitation deficits have resulted in poor crop conditions and crop failures locally in of Suchitepequez, Huehuetenango, Quiche, Jalapa, Zacapa, El Progreso, Baja Verapaz and Jutiapa.

2) Inconsistent and below-average rainfall throughout the primera season and into postrera have led to insufficient soil moisture in central Honduras. Low rainfall totals are expected to continue through November.

3) Since August, poor rainfall accumulations have led to rapidly deteriorating soil moisture along the Pacific coast of Nicaragua, as well as, crop loss and low water availability.



Postrera Season has a favorable start

The postrera season is off to a more favorable start than the primera season, but remains below average in many areas. The most significant rainfall deficits exist across central Guatemala, central Honduras, and into western Nicaragua. These deficits are ongoing from the primera season and many of these areas experienced crop loss as a result. Southern Guatemala, El Salvador, the Gulf of Fonseca, and much of eastern Nicaragua are currently experiencing above average rainfall totals. Current postrera season rainfall anomalies for these areas are an improvement for the average to below-average primera season. The poor primera season rains can be attributed to El Nino. However, now with the Central American rainy season winding down, it is likely that El Nino impacts throughout the remainder of the postrera season will be minimal. Despite this, in Honduras, the Ministry of Agriculture reports that they have chosen not to distribute seeds to some areas in the departments of Olancho, El Paraiso and Yoro because, according to climatology, they are likely to be affected by drought during the postrera season.

Extended crop outlook below average in some areas

The decision made by the Ministry of Agriculture in Honduras is somewhat supported by crop model products. According to the Water Requirement Satisfaction Index by USGS, if rainfall and external forces continue as they are at present it is likely that mediocre to a failed season will result in parts of central Guatemala, central and southern Honduras, and into western Nicaragua. These areas currently experience the lowest rainfall totals for the region this season.

Maize Crop Water Requirement Satisfaction Index
Valid As of October Dekad 1, 2009

CROP WRSI
Maize 2009-10-1
- <50 Failure
- 50-65 Poor
- 65-79 Mediocre
- 80-84 Average
- 85-99 Good
- 100 Very Good
- N/A
- No Start (yet)
- Yet to Start

Figure 1: Source USGS

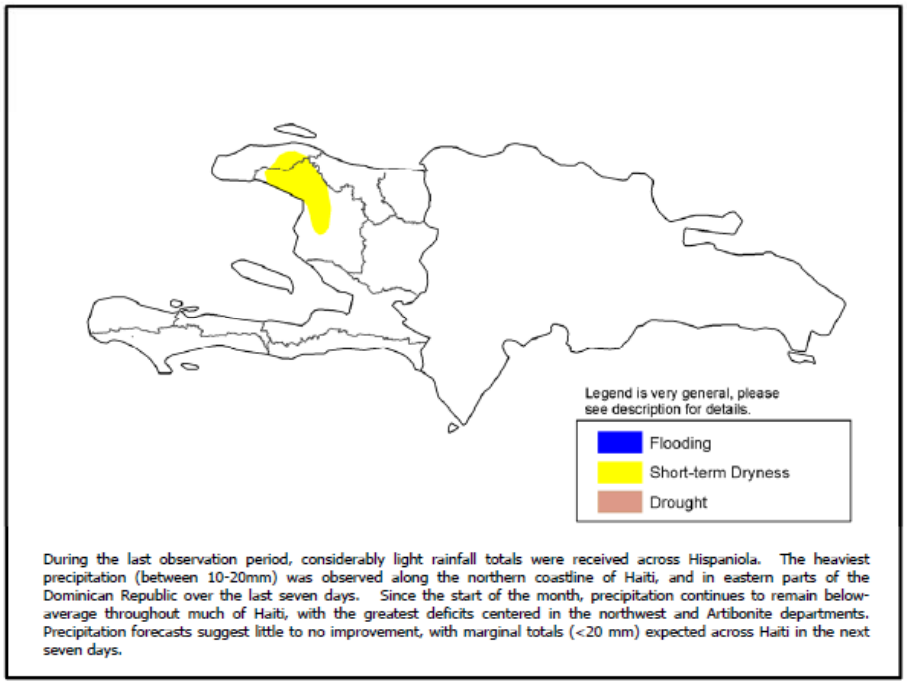
MFEWS is a USAID-funded activity whose purpose is to provide objective information about food security conditions. Its views are not necessarily reflective of those of USAID or the U.S. Government. The MFEWS weather hazards assessment process and products include participation by MFEWS field and home offices, NOAA-CPC, USGS, USDA, NASA, and a number of other national and regional organizations in the countries such as, INETER of Nicaragua, Meteorological Service of Honduras, IMN of Costa Rica, INSIVUMEH of Guatemala, ETESA of Panama, NMS of Belize and SNET of El Salvador. Questions or comments about this product may be directed to Wassila.Thiaw@noaa.gov or 1-301-763-8000 x7566. Questions about the USAID MFEWS activity may be directed to Gary Eilerts, USAID Program Manager for MFEWS, 1-202-219-0500 or geilerts@usaid.gov.

- Produced April – November during Primera and Postrera Seasons

Final Haiti Product

The USAID FEWS NET Weather Hazards Impacts Assessment for Hispaniola
November 26 – December 2, 2009

- Light rains continue across Haiti.

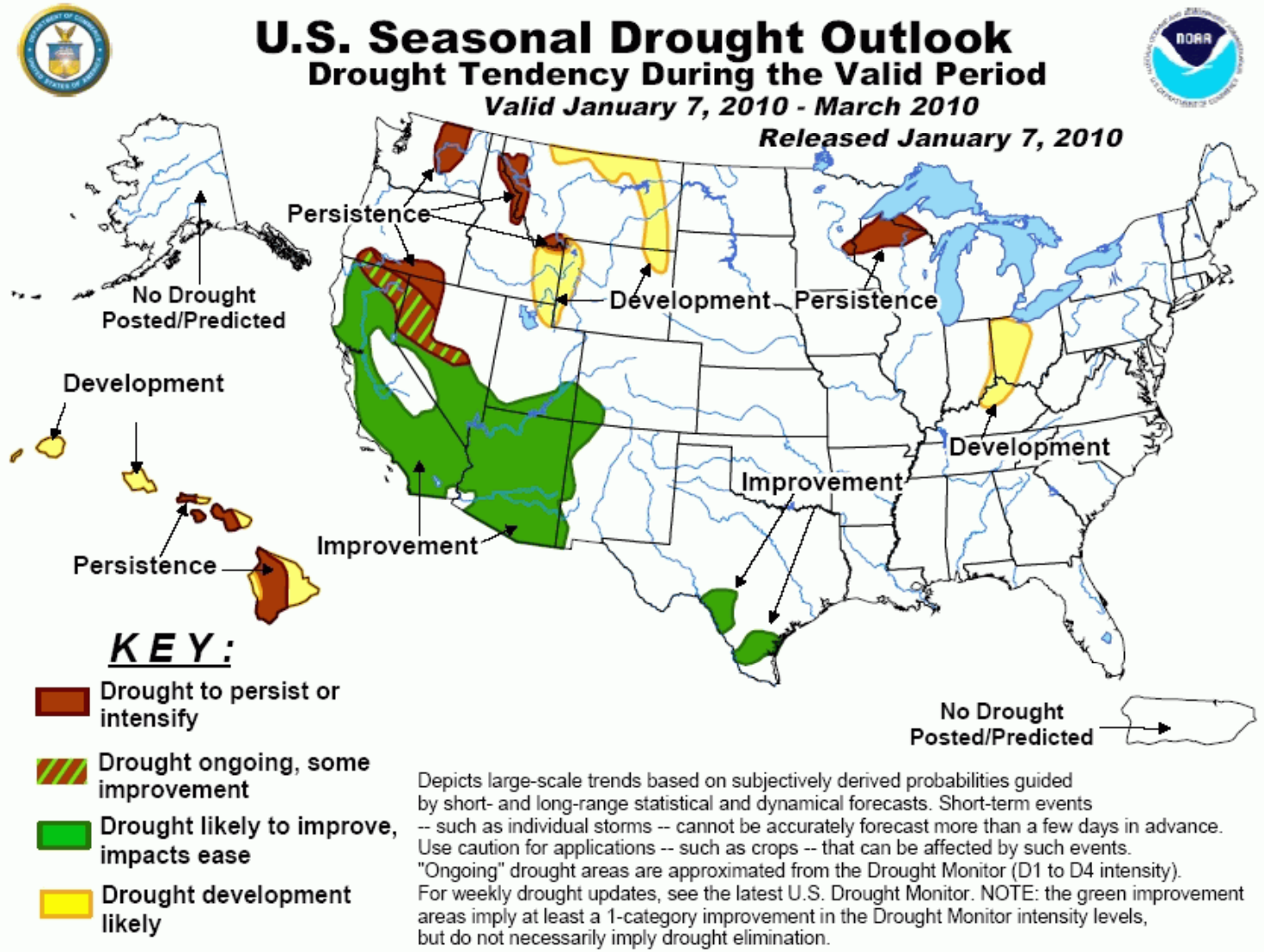


During the last observation period, considerably light rainfall totals were received across Hispaniola. The heaviest precipitation (between 10-20mm) was observed along the northern coastline of Haiti, and in eastern parts of the Dominican Republic over the last seven days. Since the start of the month, precipitation continues to remain below-average throughout much of Haiti, with the greatest deficits centered in the northwest and Artibonite departments. Precipitation forecasts suggest little to no improvement, with marginal totals (<20 mm) expected across Haiti in the next seven days.

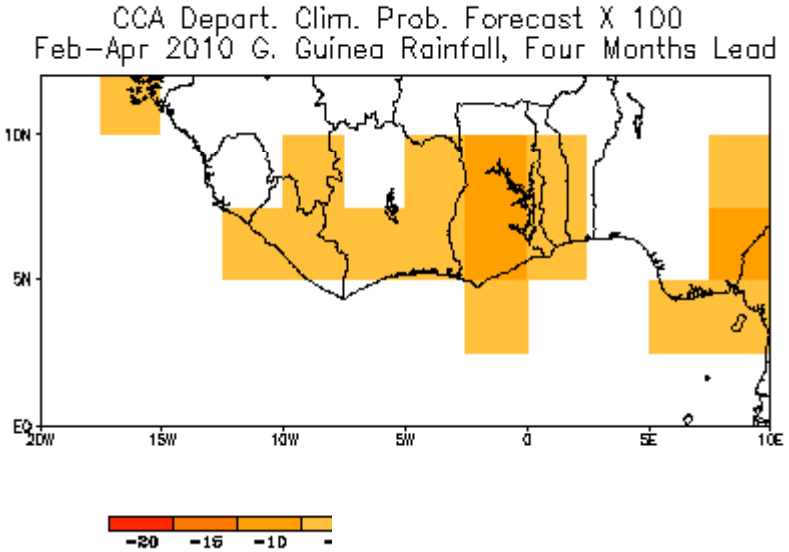
Distribution

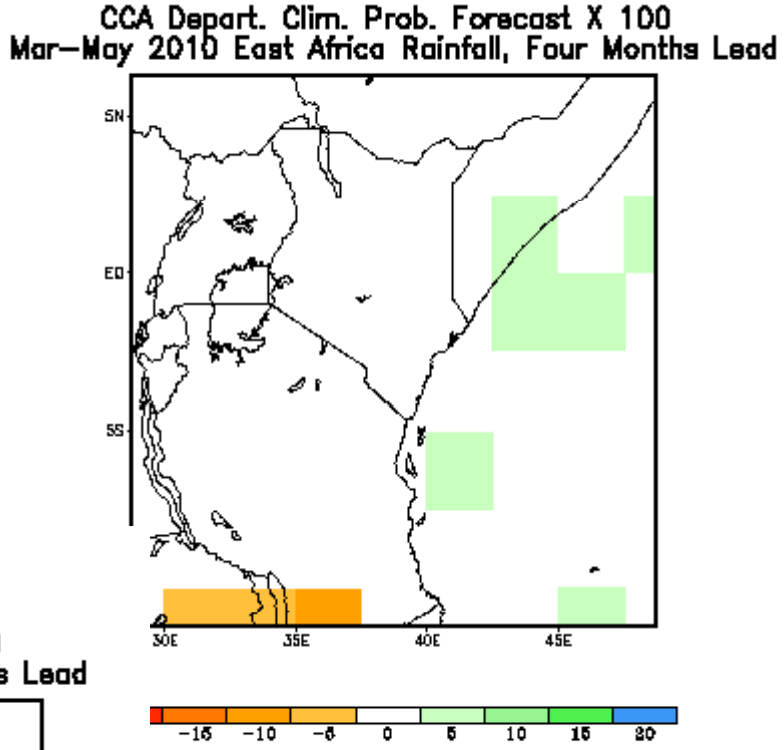
- The assessment and complementary data are available to the public via e-mail, the CPC's website, ftp server, and USAID's Famine Early Warning System Network (FEWS NET) website.
  - http://www.cpc.ncep.noaa.gov/products/fews/central_america/
  - http://www.fews.net/Pages/archive.aspx?pid=300
- GIS shapefiles are also provided to the MFEWS representatives in Central America and to colleagues at Chemonics International

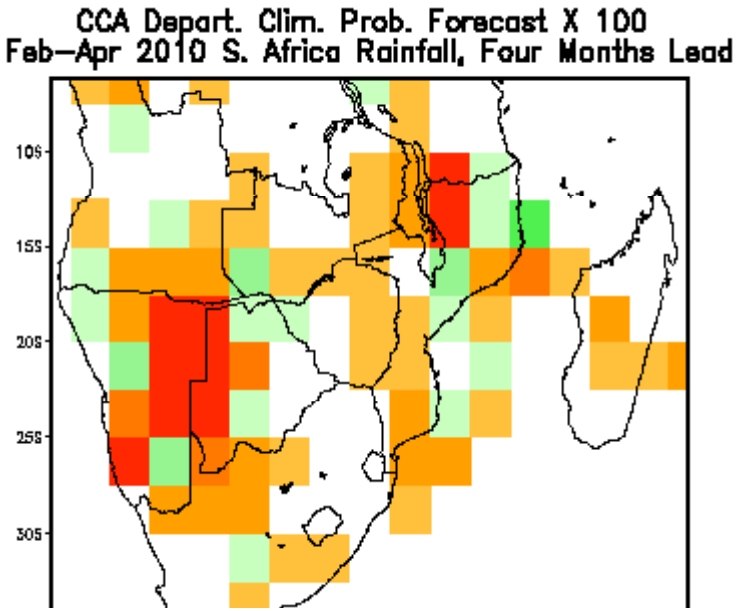
Additional Products

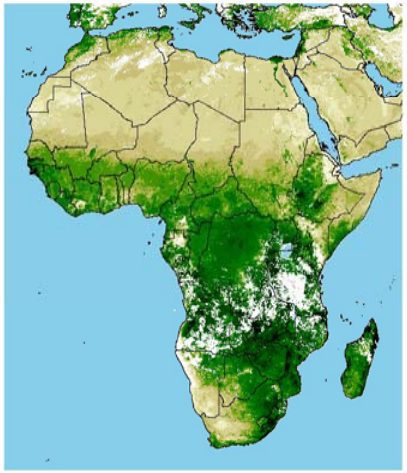


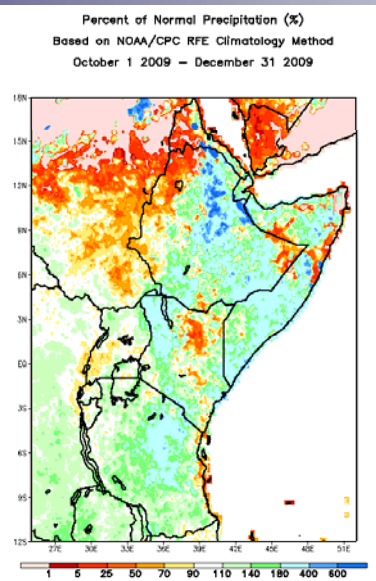
Additional Products

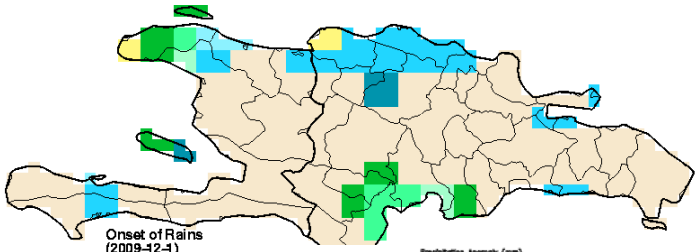


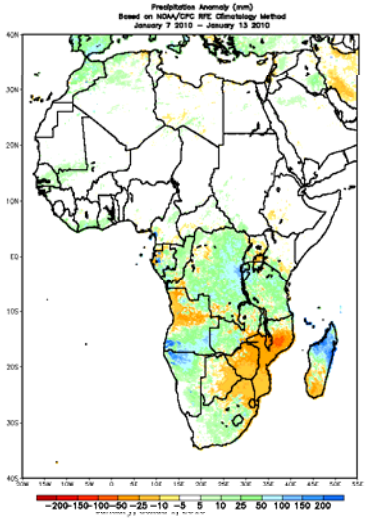


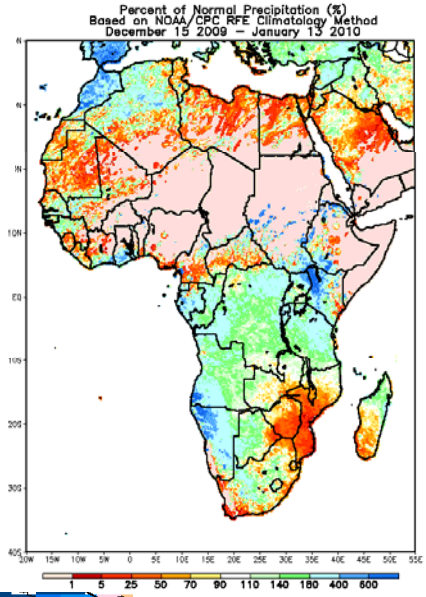


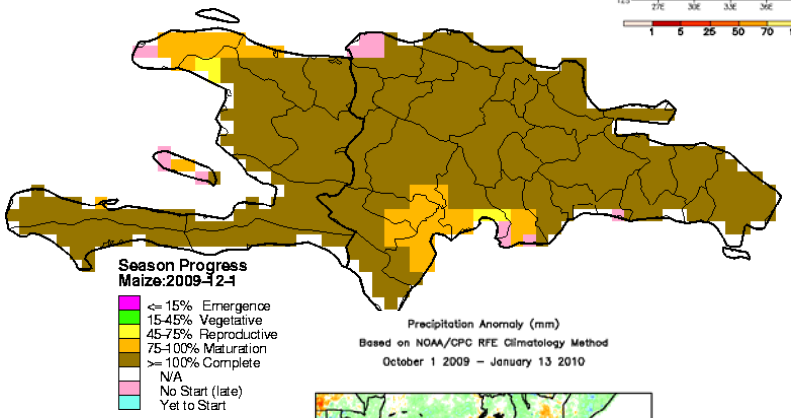


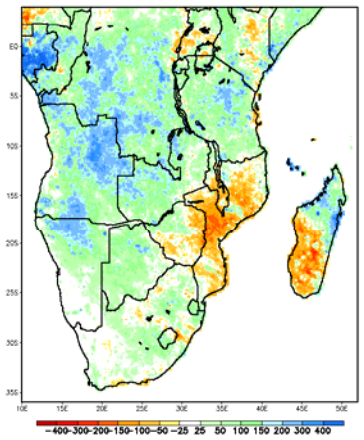

Percent of Normal Precipitation (%)
Based on NOAA/CPC RFE Climatology Method
October 1 2009 – December 31 2009
1 5 25 50 70 90 110 140 180 400 600

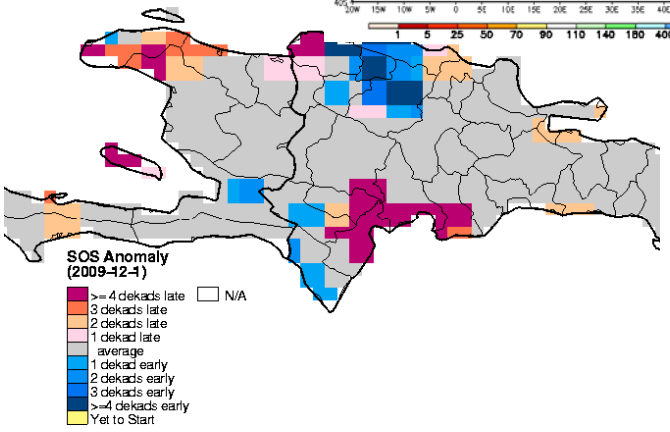

Onset of Rains
(2009-12-1)
<= Jul 3
Aug 1
Aug 2
Aug 3
Sep 1
Sep 2
Sep 3
>= Oct 1
No Start

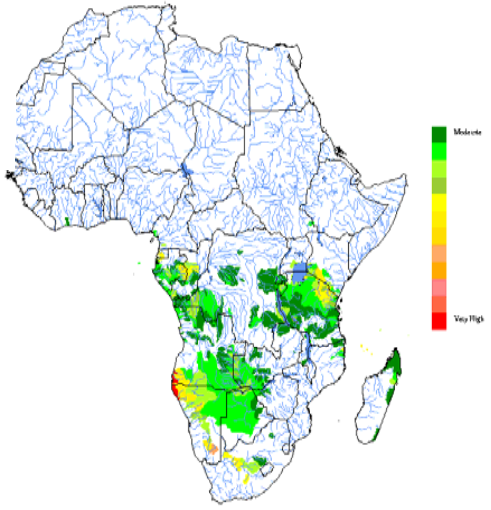

Precipitation Anomaly (mm)
Based on NOAA/CPC RFE Climatology Method
January 7 2010 – January 13 2010
-200 -150 -100 -50 -25 -10 -5 5 10 25 50 100 150 200


Percent of Normal Precipitation (%)
Based on NOAA/CPC RFE Climatology Method
December 15 2009 – January 13 2010
1 5 25 50 70 90 110 140 180 400 600


Season Progress
Maize:2009-12-1
<= 15% Emergence
15-45% Vegetative
45-75% Reproductive
75-100% Maturation
>= 100% Complete
N/A
No Start (late)
Yet to Start


Precipitation Anomaly (mm)
Based on NOAA/CPC RFE Climatology Method
October 1 2009 – January 13 2010
-400 -300 -200 -150 -100 -50 -25 25 50 100 150 200 300 400


SOS Anomaly
(2009-12-1)
>= 4 dekads late
3 dekads late
2 dekads late
1 dekad late
average
1 dekad early
2 dekads early
3 dekads early
>=4 dekads early
Yet to Start
N/A


Moderate
Very High

Questions???