

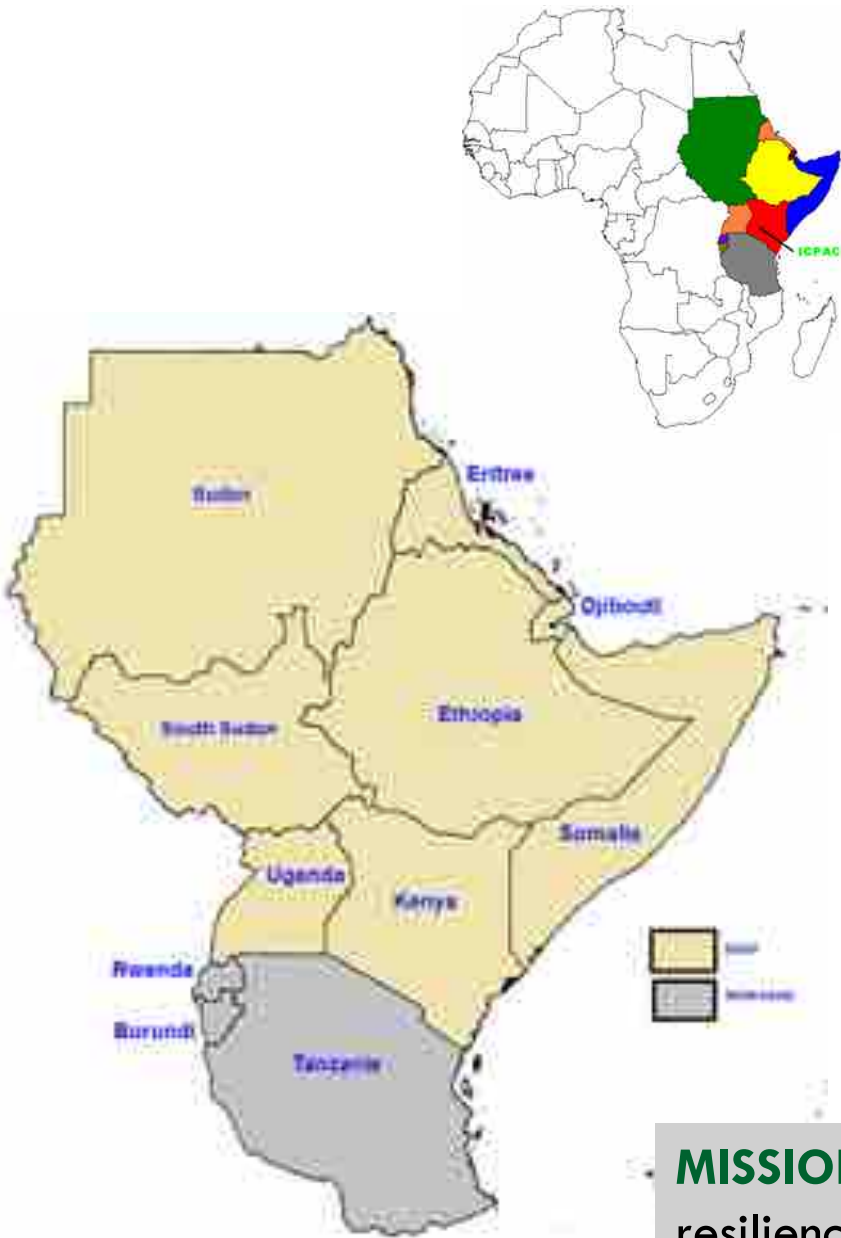


# CROP MONITORING FOR EARLY WARNING

EARTH OBSERVATION FOR NATIONAL TO REGIONAL ADAPTATION

Kenneth Kemucie Mwangi  
Climate, Agriculture & Environment Monitoring  
IGAD Climate Prediction and Applications Centre

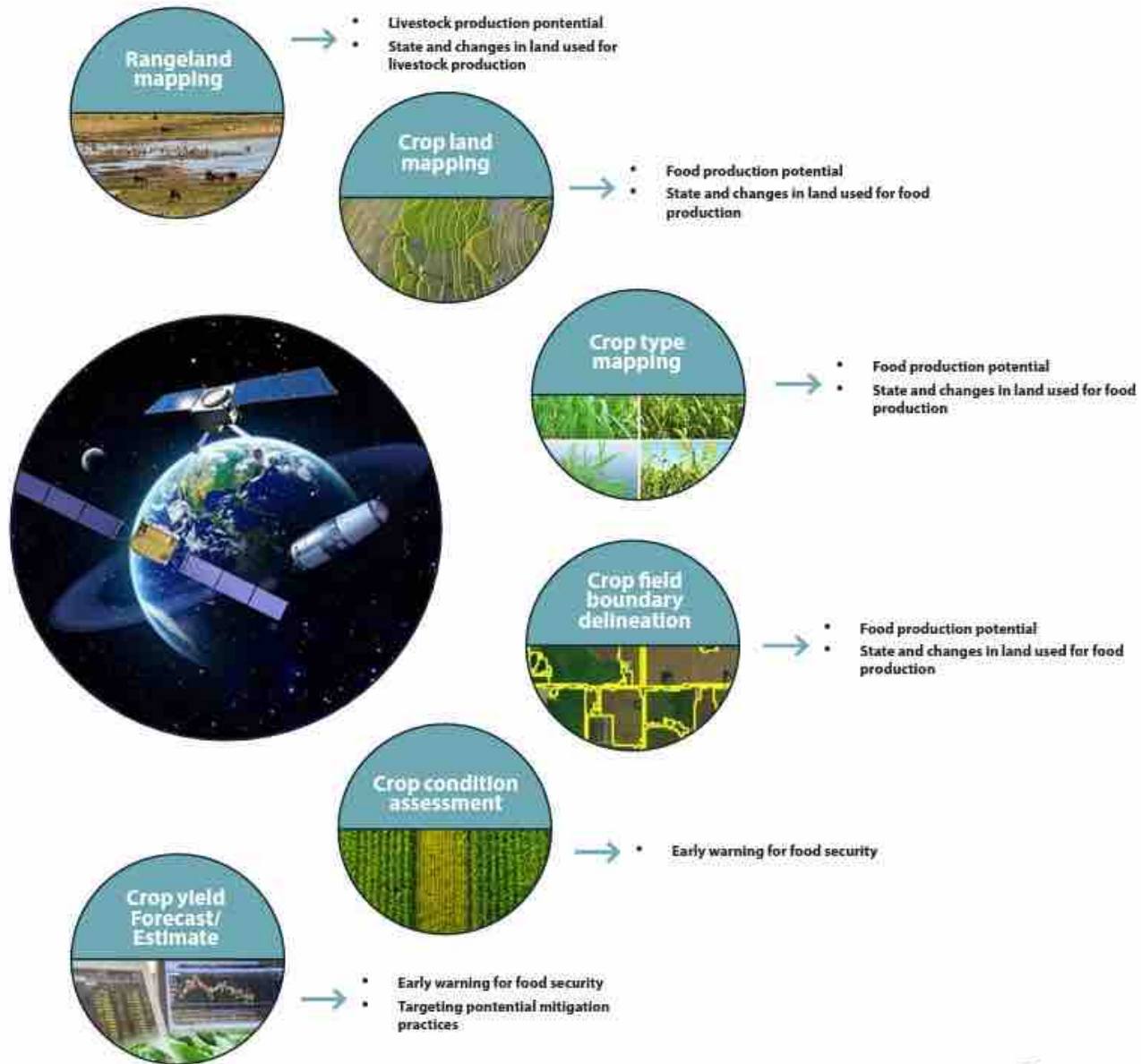
# ABOUT IGAD CLIMATE PREDICTION AND APPLICATIONS CENTRE-ICPAC



- Established in **1989** as the Drought Monitoring Centre, Nairobi (DMCN);
- 2007, the Protocol establishing the Centre signed & the name changed to: **IGAD Climate Prediction and Applications Centre (ICPAC)**
- A **WMO Regional Climate Centre (WMO-RCC)** for Eastern Africa.
- A member of **AUC/NEPAD Network for Water Centers of Excellence.**
- ICPAC has an Observer Status with the **UNFCCC**
- Part of **Global Agriculture Monitoring Initiative - GEOGLAM** on Crop Monitor for Early Warning since 2017

**MISSION:** Foster climate services and knowledge to enhance community resilience for prosperity in the Greater Horn of Africa

# MONITORING AND MEASURING AGRICULTURE TRENDS USING EARTH OBSERVATION



**TABLE 1. STEPS UNDER EACH OF THE ELEMENTS OF THE FORMULATION OF NATIONAL ADAPTATION PLANS, WHICH MAY BE UNDERTAKEN AS APPROPRIATE<sup>a</sup>**

## ELEMENT A. LAY THE GROUNDWORK AND ADDRESS GAPS

1. Initiating and launching of the NAP process
2. Stocktaking: identifying available information on climate change impacts, vulnerability and adaptation and assessing gaps and needs of the enabling environment for the NAP process
3. Addressing capacity gaps and weaknesses in undertaking the NAP process
4. Comprehensively and iteratively assessing development needs and climate vulnerabilities

## ELEMENT B. PREPARATORY ELEMENTS

1. Analysing current climate and future climate change scenarios
2. Assessing climate vulnerabilities and identifying adaptation options at the sector, subnational, national and other appropriate levels
3. Reviewing and appraising adaptation options
4. Compiling and communicating national adaptation plans
5. Integrating climate change adaptation into national and subnational development and sectoral planning

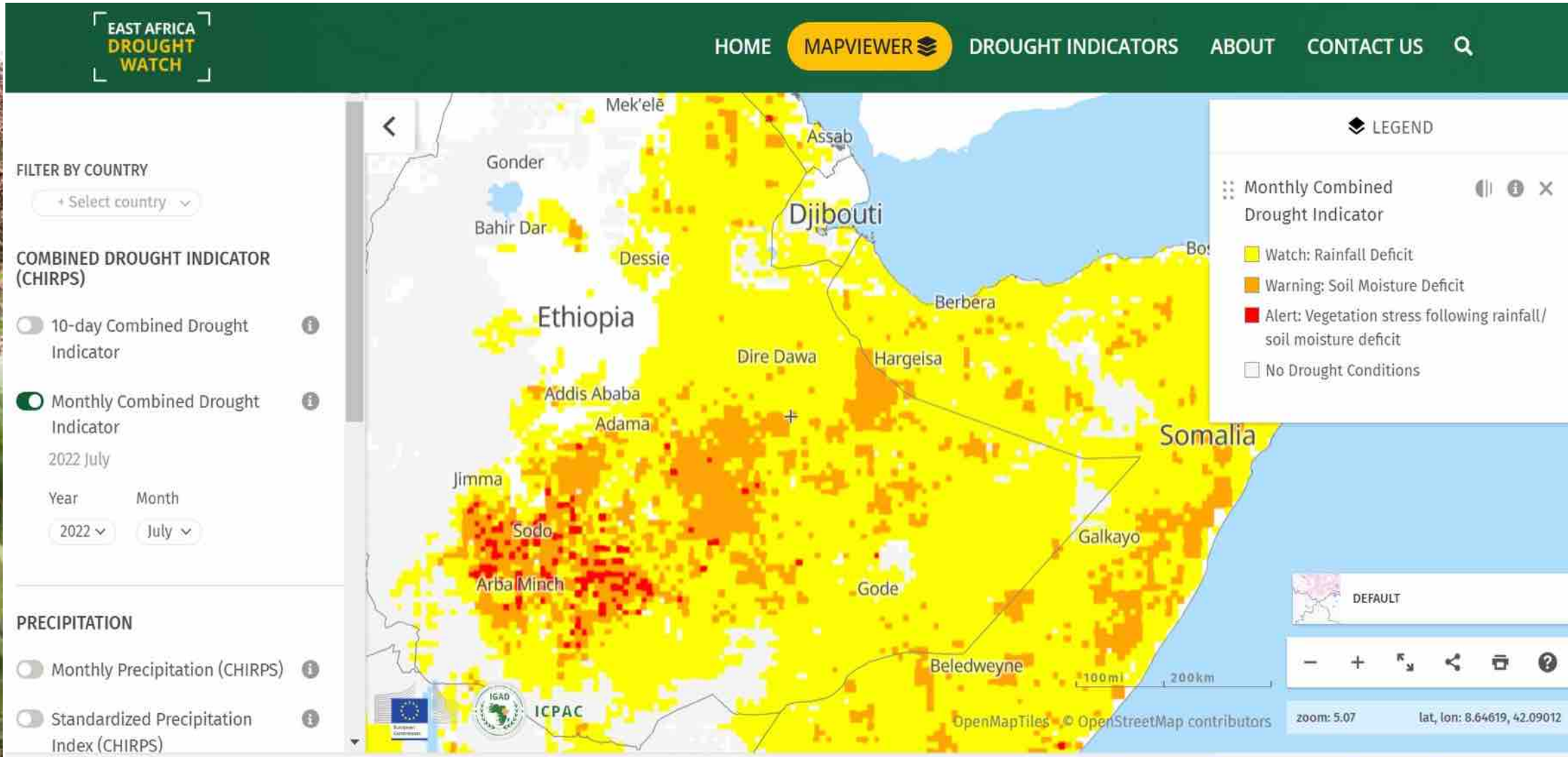
## ELEMENT C. IMPLEMENTATION STRATEGIES

1. Prioritizing climate change adaptation in national planning
2. Developing a (long-term) national adaptation implementation strategy
3. Enhancing capacity for planning and implementation of adaptation
4. Promoting coordination and synergy at the regional level and with other multilateral environmental agreements

## ELEMENT D. REPORTING, MONITORING AND REVIEW

1. Monitoring the NAP process
2. Reviewing the NAP process to assess progress, effectiveness and gaps
3. Iteratively updating the national adaptation plans
4. Outreach on the NAP process and reporting on progress and effectiveness

# CONVERGENCE MULTIPLE DATA/INFORMATION SOURCES



# CONVERGENCE MULTIPLE DATA/INFORMATION SOURCES



IGAD ICPAC IGAD Climate Prediction and Applications Centre

Agriculture Monitoring for Eastern Africa  
Earth Observation for Productive Croplands and Rangelands

In collaboration with the European Commission

Warning Explorer

MAP

SETTINGS

Date: 11-20/08/2022 (D23)

Warning layer: CROP RANGELAND

Indicators: SPI 1

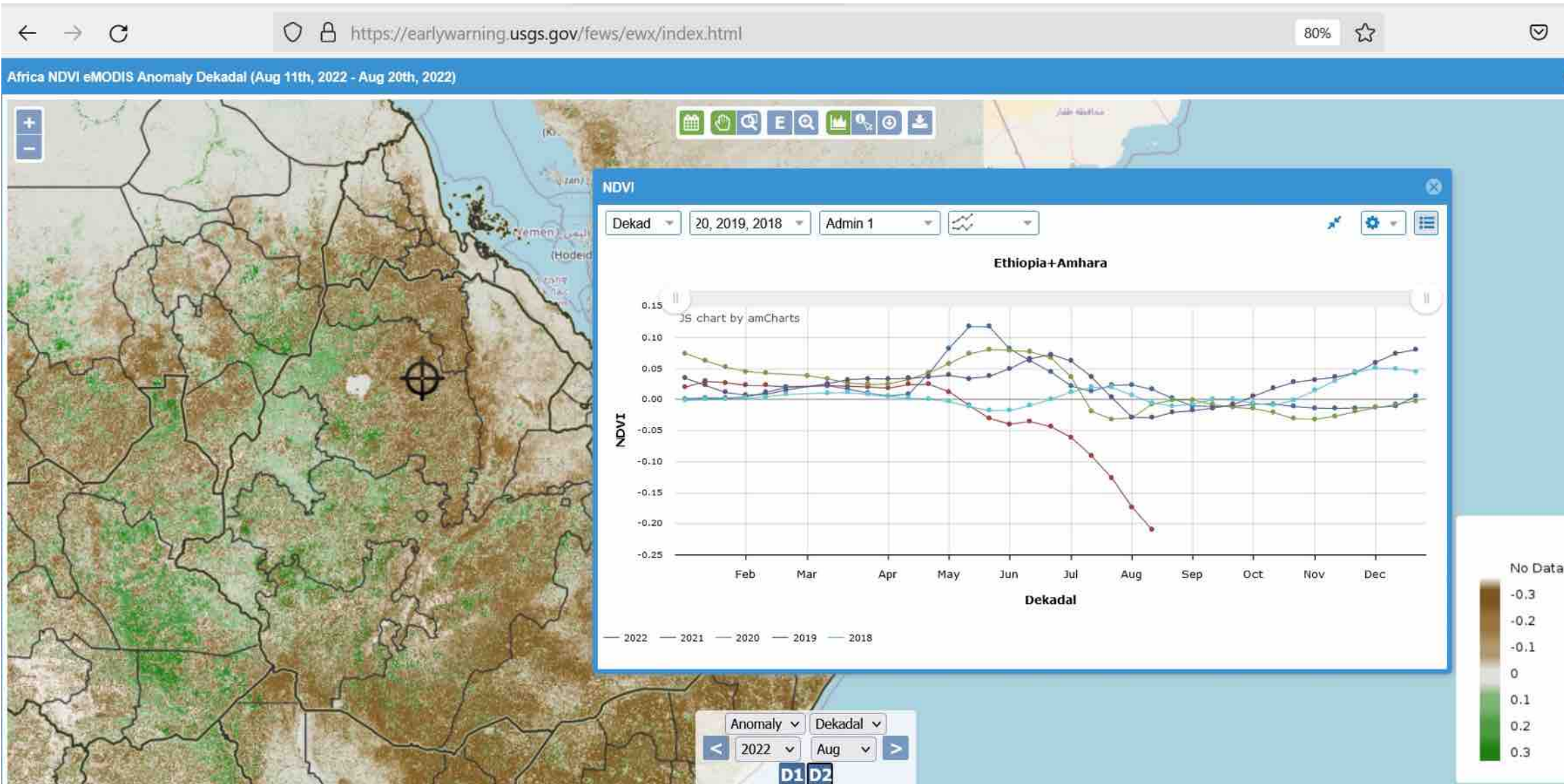
Land cover: Crop Area

Background: Open Street Map

LEGEND

- Warnings
  - Not analyzed
  - No warning
  - Not active
  - Water balance
  - Biomass
  - Water balance + biomass
  - End of season biomass
- Indicator
  - Very dry <-1.5
  - Dry -1.5:-1
  - Normal -1:1
  - Wet 1:1.5
  - Very wet >1.5
- Land cover
  - 0 - 20%
  - 20 - 40%
  - 40 - 60%

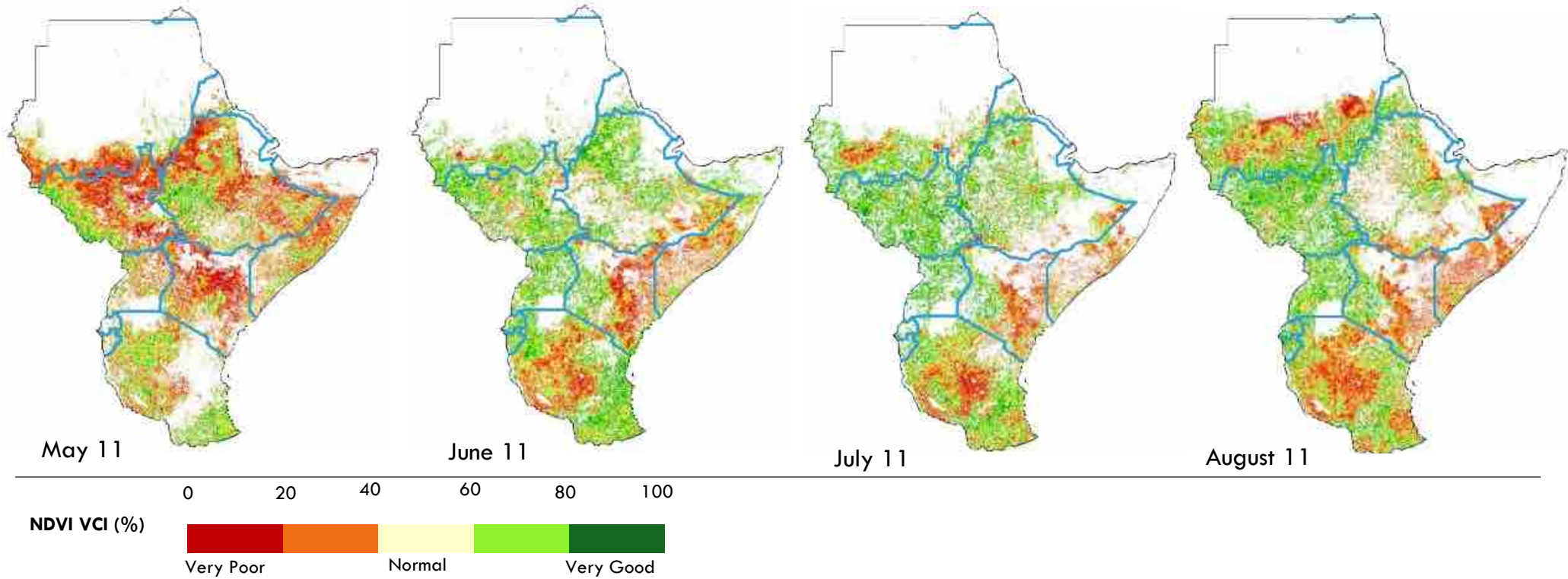
# CONVERGENCE MULTIPLE DATA/INFORMATION SOURCES



# REGIONAL MONITORING OF VEGETATION AND CLIMATE

## Progress of Vegetation Conditions

Data Source: SPOT  
VGT/PROBA V NDVI

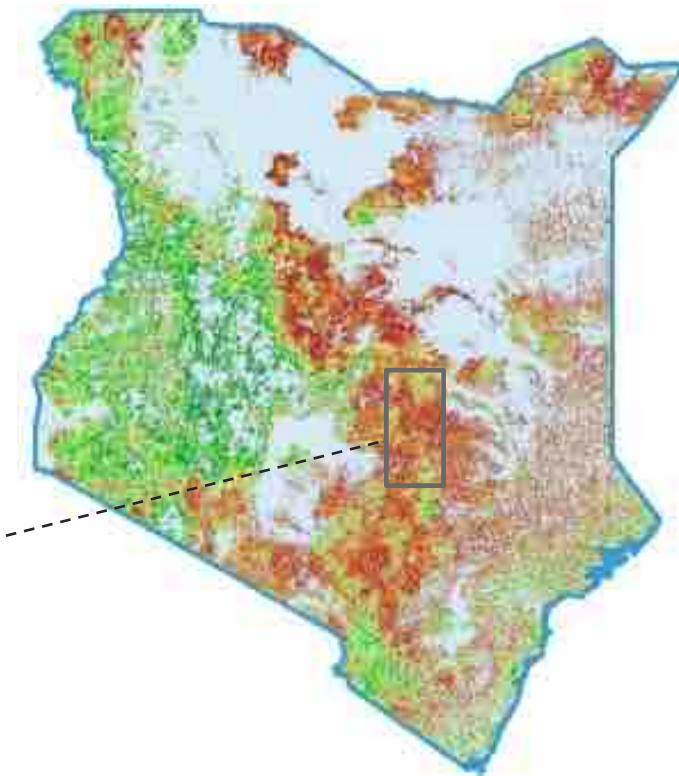
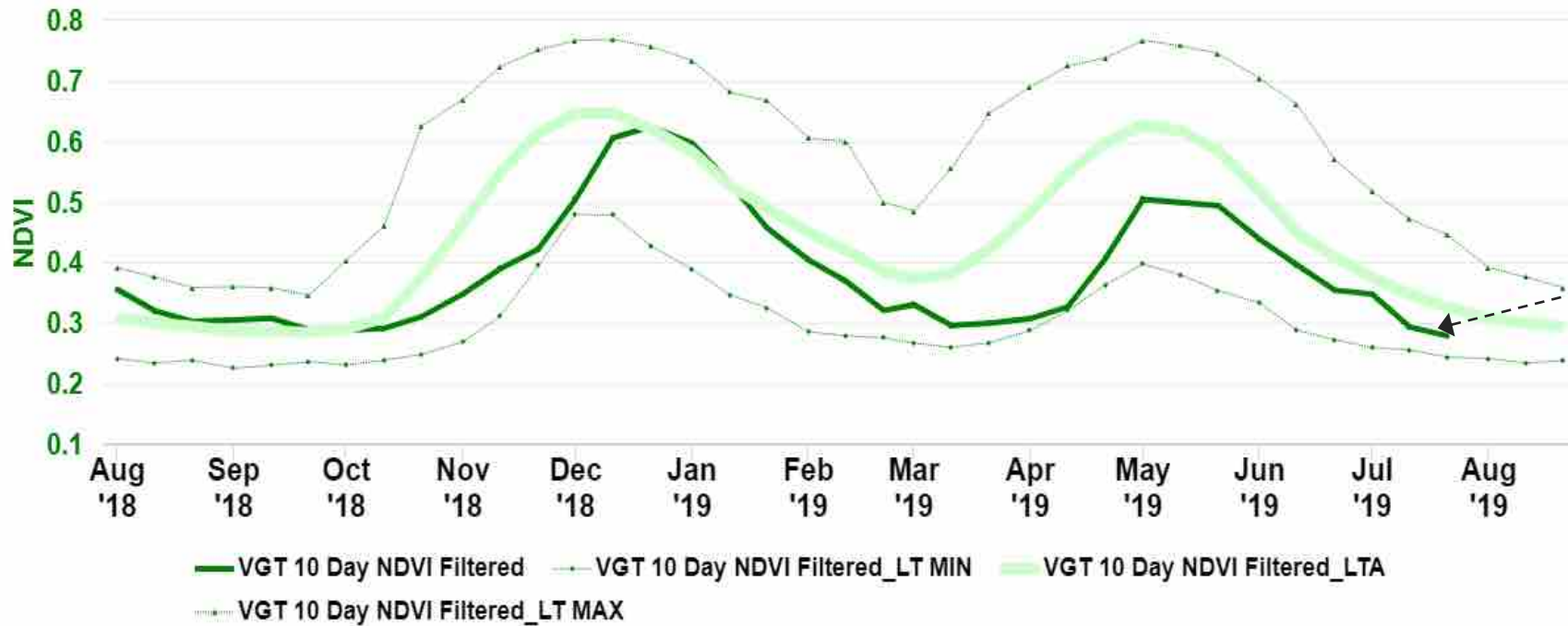


# NATIONAL MONITORING OF VEGETATION AND CLIMATE

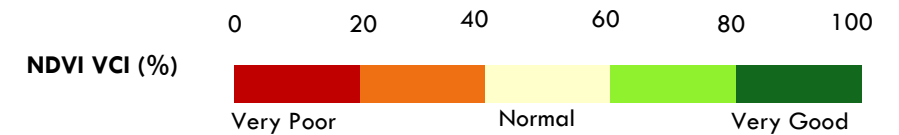
## Vegetation Conditions in Tharaka Kenya

Kenya - Eastern - Tharaka

From 2018-08-01 To 2019-08-28



Data Source: SPOT  
VGT/PROBA V NDVI



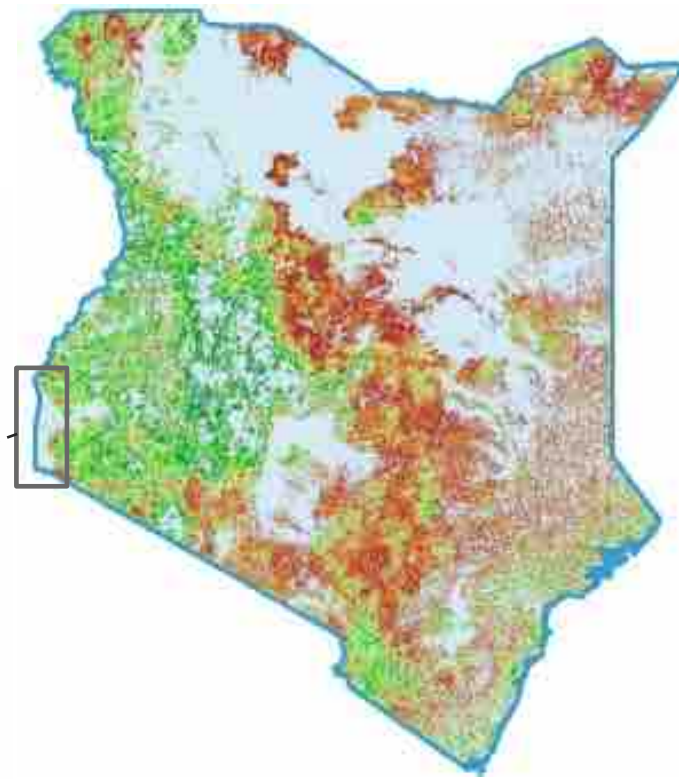
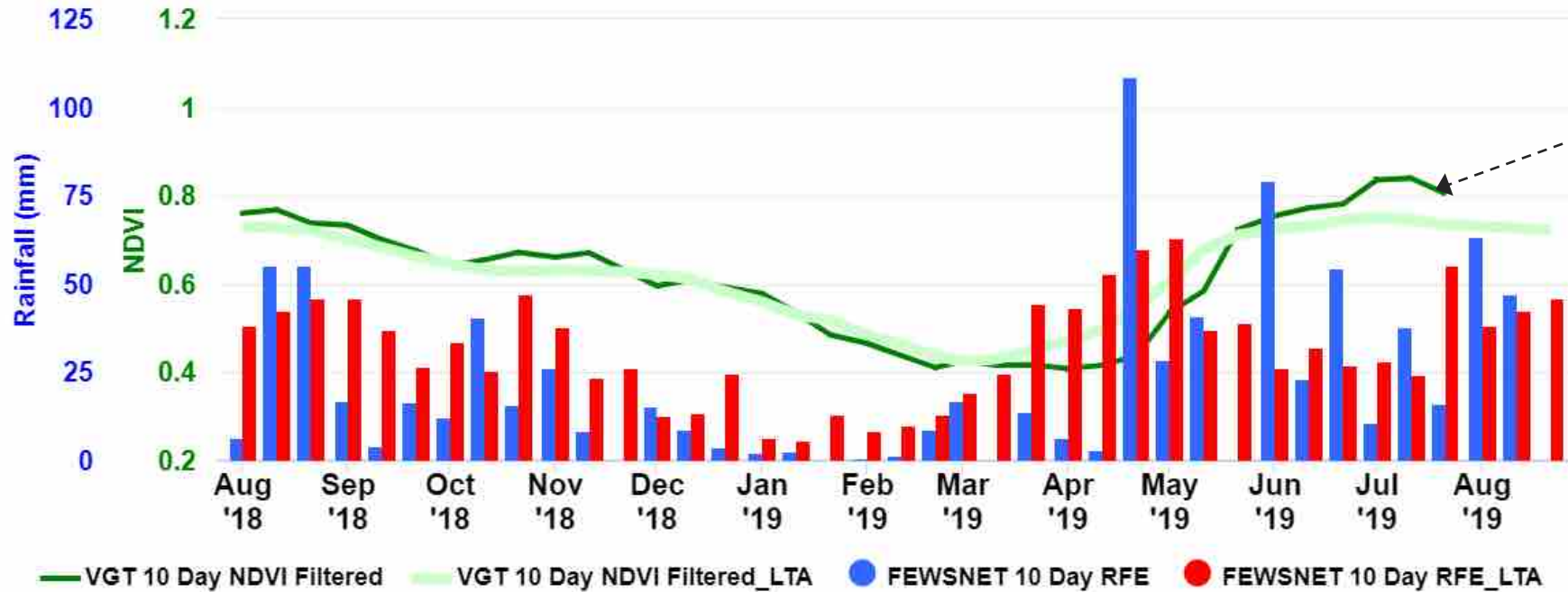


# NATIONAL MONITORING OF VEGETATION AND CLIMATE

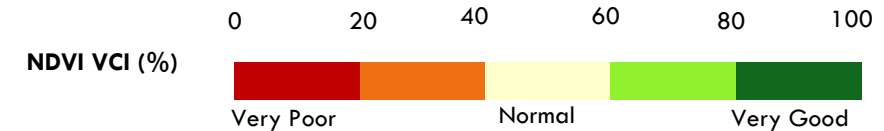
## Vegetation Conditions in Trans Nzoia Kenya

### Kenya - Rift Valley - Trans Nzoia

From 2018-08-01 To 2019-08-28



Data Source: SPOT  
FEWS NET RFE

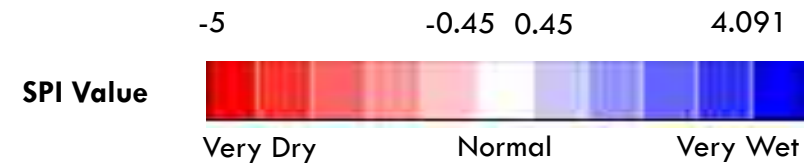
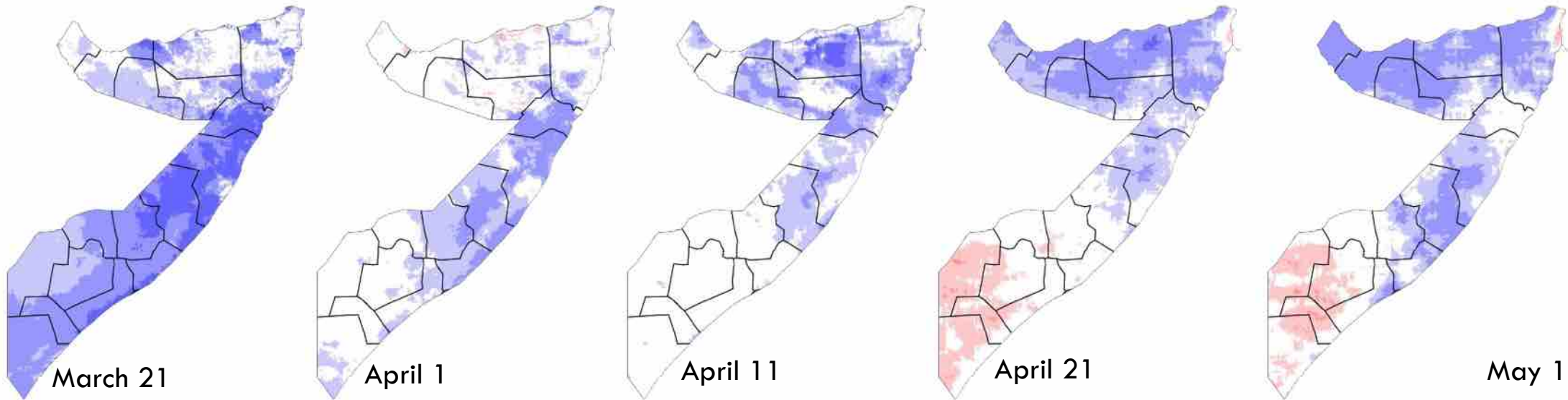


# REGIONAL MONITORING OF VEGETATION AND CLIMATE

## Rainfall Standardized Precipitation Index (SPI) - Somalia

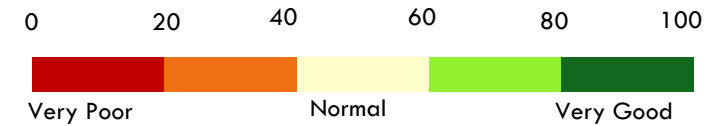
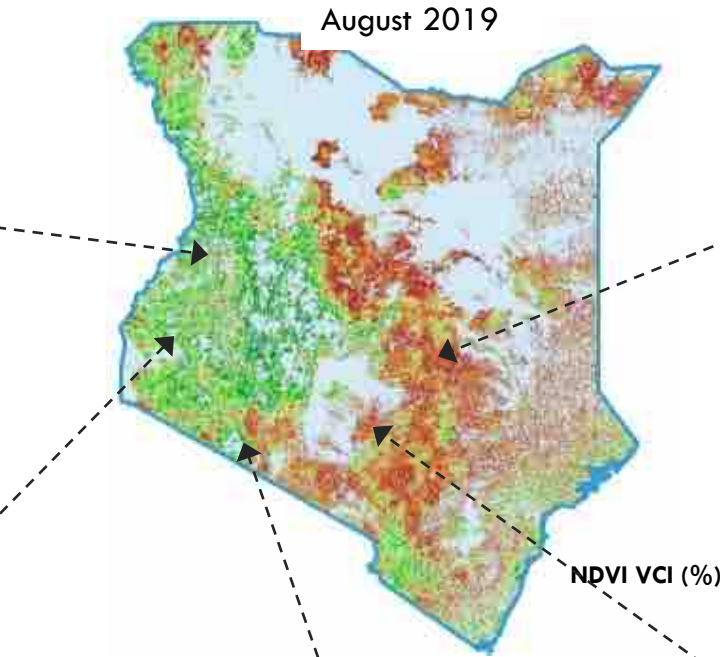
Data Source: eStation  
CHIRP Africa  
JRC/MARS SPI

YR 2020



# FIELD CONDITIONS MONITORING

## Validating Satellite Vegetation Conditions With Field Crop Conditions



# CROP MONITORING & REPORTING PLATFORM



**Home Page**

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User Information  
 Username: Kenuche  
 First Name: Kenneth  
 Last Name: Mwangi  
 Email: kmwangi@icpac.net  
 User Country: Kenya  
 Organization: ICPCAC  
 Registration Date: July 26, 2017  
 Privilege: International/Regional  
 Source:

Latest submitted reports  
 Region: Mal

Home | Map | Monthly Assessment | Archive

Tweets by @ICPCAC

ICPCAC  
 Kenya Reports will host the 5th Edition of the Greater Horn of Africa Climate Outlook Forum during the last week of August 2018.

ICPCAC  
 THE FIFTH GREAT HORN OF AFRICA CLIMATE OUTLOOK FORUM (GHAFOP 2018) IS BEING HELD IN NAIROBI, KENYA FROM AUGUST 27-29 AUGUST 2018. REGISTER HERE: https://www.icpac.net/ghafop2018/

ICPCAC

**Reports Export Page**

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Archive

Date Observed	Country	Region	Crop	Condition	Trend	Driver(s)	Comments	User
August 13, 2018	Ethiopia	Shabelle	Maize main season	Favourable	Stable			kenuche
August 13, 2018	Ethiopia	Agay	Sorghum main season	Favourable	Improving			kenuche
August 13, 2018	Ethiopia	South Oromia	Maize main season	Watch	Improving	Dry		kenuche
August 13, 2018	Ethiopia	Gambela	Maize main season	Favourable	Stable			kenuche
August 13, 2018	Ethiopia	Bendishangul-Gumuz	Maize main season	Favourable	Improving			kenuche
August 13, 2018	Ethiopia	Bendishangul-Gumuz	Sorghum main season	Favourable	Improving			kenuche
August 13, 2018	Ethiopia	Central Oromia	Maize main season	Watch	Stable	Dry		kenuche
August 13, 2018	Ethiopia	West Oromia	Maize main season	Favourable	Improving			kenuche
August 13, 2018	Ethiopia	Agay	Maize main season	Favourable	Stable			kenuche
August 13, 2018	Ethiopia	Shabelle	Sorghum main season	Favourable	Stable			kenuche
August 13, 2018	Ethiopia	Gambela	Sorghum main season	Favourable	Stable			kenuche
August 11, 2018	Ethiopia	Amhara	Maize main season	Favourable	Improving			kenuche
August 11, 2018	Ethiopia	Amhara	Sorghum main season	Favourable	Improving			kenuche
August 06, 2018	Rwanda	South	Maize main season	Favourable	Improving	Wet		kenuche
August 06, 2018	Rwanda	North	Maize main season	Favourable	Stable	Wet		kenuche

Search Filters  
 Countries: All  
 Regions: All  
 Crops: All  
 Condition: All

Export Condition Maps  
 Start Date:   
 End Date:   
 Region: All regions

Export Discrepancy Maps

Date	Crop	Condition	User
2017-09-12	Maize 1	Poor	kenuche
2018-05-02	Maize 1	Favourable	kenuche
2018-06-06	Maize 1	Favourable	kenuche
2018-07-04	Maize 1	Favourable	kenuche

**Crop Conditions Reporting**

Monthly Assessment  
 Assessment period: August 1 - August 31 (CURRENT)  
 Crop: Maize main season

Condition: Select a Condition  
 Trend: Select a Trend  
 Confidence: Select a Confidence  
 Observed Date: 2018-08-16  
 Driver: Wet, Dry, Extreme Event, Delayed Planting, Late Rains, Pests, Disease, Flood, Socio-economic








**Reporting per Crop Growing Region**

**Crop Calendars**

Legend:  
 -0.4 to 0.4 NDVI  
 Crop Stages: Planting-Early Vegetative, Vegetative-Reproductive, Ripening Through Harvest, Harvest (End of Season), Out of Season or N/A, Minimal Production  
 Crop Condition: Exceptional (Blue), Favourable (Green), Watch (Yellow), Poor (Red)

# CROP MONITORING & REPORTING PLATFORM

## Conditions

-  Exceptional: Conditions are much better than average\* at time of reporting. This label is only used during the grain-filling through harvest stages.
-  Favourable: Conditions range from slightly lower to slightly better than average\* at reporting time.
-  Watch: Conditions are not far from average\* but there is a potential risk to final production. The crop can still recover to average or near average conditions if the ground situation improves. This label is only used during the planting-early vegetative and the vegetative-reproductive stages.
-  Poor: Crop conditions are well below average. Crop yields are likely to be 10-25% below average. This is used when crops are stunted and are not likely to recover, and impact on production is likely.
-  Failure: Crop conditions are extremely poor. Crop yields are likely to be 25% or more below average.
-  Out of Season: Crops are not currently planted or in development during this time.
-  No Data: No reliable source of data is available at this time.

\*Average\* refers to the average conditions over the past 5 years

## Drivers

These represent the key climatic drivers that are having an impact on crop condition status. They result in production impacts and can act as either positive or negative drivers of crop conditions.

-  Wet: Higher than average wetness.
-  Dry: Drier than average.
-  Hot: Hotter than average.
-  Cool: Cooler than average or risk of frost damage.
-  Extreme Events: This is a catch-all for all other climate risks (i.e. hurricane, typhoon, frost, hail, winterkill, wind damage, etc.)
-  Delayed-Onset: Late start of the season.
-  Pest & Disease: Destructive insects, birds, animals, or plant disease.
-  Socio-economic: Social or economic factors that impact crop conditions (i.e. policy changes, agricultural subsidies, government intervention, etc.)
-  Conflict: Armed conflict or civil unrest that is preventing the planting, working, or harvesting of the fields by the farmers.

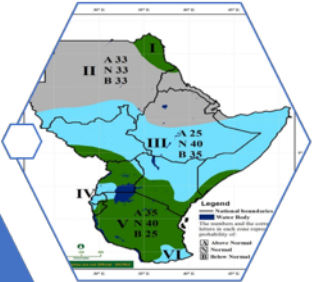


# EASTERN AFRICA CROP MONITOR

## Components of Crop Monitoring

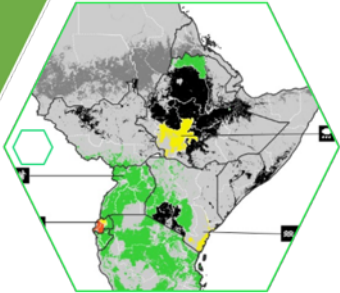
Monitor weather Indices  
 Rainfall anomalies  
 Rainfall onset and cessation  
 Trends in temperature  
 SPI

Climate Information



Utilize expert crop monitor network  
 Gather monthly crop conditions  
 Gather information on any drivers/causes of Negative crop conditions  
 Outlooks on crop performance  
 Adopt developed crop yield model and apply for yield prediction

Crop Conditions



Agricultural Markets Information

+ Yield forecast  
 Price trend forecast

Partner with market monitoring organizations to get trade information  
 Provide information on grain prices in major production markets in the region



# EASTERN AFRICA CROP MONITOR

Bulletins

**EASTERN AFRICA CROP MONITOR**  
BULLETIN NO. 7  
IGAD ICPAC

**VEGETATION CONDITIONS**  
Progress of Vegetation Conditions  
(Data Source: MDT VSI/FOIA + NDVI)

**CROP CONDITIONS**  
The cropping season was characterized by a timely start in western parts of the equatorial region and above normal rains in northern sub-regions of Eastern Africa. Planting is expected in June for the main cereals in northern sub-regions, while crops in the equatorial and southern sub-regions are in vegetative stages and early maturity in the southern sub-region. Crops are generally in favourable conditions due to above average rainfall. In some of the crop lands, excessive rainfall led to flooding in localized scale. Desert locust poses a threat to crops in high invasion zones due to vegetative crop stage coinciding with hatching and hopper development.

**OVERVIEW**  
Climate: The East Africa region witnessed the wettest March to May period in the region in early agricultural activities. The unusually high rainfall amount also led to localized flooding in parts of Kenya, Uganda, Tanzania, Rwanda, and Burundi. Standing crop in crops and expected to continue being favourable into the late September season. The development and multiplication of desert locust in the wet and semi-wet areas of the region.

**CROPS**  
The Eastern Africa region is currently under different crop stages. Planting and very vegetative to early maturity stages in equatorial and southern regions. Most crop response and expected to continue being favourable due to high rainfall amount in crop areas and above average rains experienced in per May 2020 assessment. Desert locust has affected Ethiopia, Central Somalia and Northern Kenya and poses a risk of invasion to the region.

**DRIVERS**  
Regional rains declined due to increased local production and improved market a favourable outlook in the previous season. Since March 2020, recently recorded COVID-19 cases across the countries. Staple maize commodity price trends were near and below its reference was 30% high in South Sudan, 30% increase high supplies from Uganda sustained 1 lower than the average but still the highest in the region.

**CONDITIONS**  
Ecological  
Temperature  
Moisture  
Wind  
Rain  
Fog  
Height of Insects  
Hot Spots

**CROPS**  
Maize  
Sorghum  
Millet  
Wheat  
Rice  
Cassava  
Banana  
Sugarcane  
Cotton  
Soybean  
Peanut  
Sunflower  
Cocoa  
Cashew  
Rubber  
Tea  
Coffee  
Hemp  
Tobacco  
Cane  
Sisal  
Custard Apple  
Mango  
Guava  
Lemon/Lime  
Orange  
Pineapple  
Watermelon  
Cantaloupe  
Tomato  
Cucumber  
Eggplant  
Okra  
Beans  
Cowpea  
Soybean  
Mung Bean  
Lentils  
Chickpeas  
Pigeon Peas  
Sesame Seed  
Mustard Seed  
Safflower  
Sunflower Seed  
Cottonseed  
Castor Seed  
Soybean Meal  
Soybean Oil  
Soybean Cake  
Soybean Hull  
Soybean Flour  
Soybean Lecithin  
Soybean Protein  
Soybean Starch  
Soybean Fiber  
Soybean Bran  
Soybean Meal  
Soybean Oil  
Soybean Cake  
Soybean Hull  
Soybean Flour  
Soybean Lecithin  
Soybean Protein  
Soybean Starch  
Soybean Fiber  
Soybean Bran

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IGAD ICPAC GMES AID AFRICA

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## Featured Publications

**Eastern Africa Crop Monitor June 2020**  
15 06 2020  
The cropping season was characterized by a timely start in western parts of the equatorial region and above normal rains in northern...

**Eastern Africa Crop Monitor December 2019**  
15 12 2019  
The crop season was characterized by an early start in western parts of the equatorial region and higher than normal rains in northern...

**Eastern Africa Crop Monitor July 2019**  
15 07 2019  
The crop season was initially characterized by a false start in western parts of the equatorial region and late rains in northern...

**Desert Locust Prediction December, 2020**  
09 12 2020  
In the current desert locust invasion areas of Eastern Africa region, locust swarms have been reported in the last 6 weeks in northern...

# EASTERN AFRICA CROP MONITOR



## Global Agricultural Monitoring

No. 58 – March 2021 [www.cropmonitor.org](http://www.cropmonitor.org) 





**Overview:**  
In **East Africa**, planting is underway for secondary & Ethiopia, land preparation is underway for the start of crops in the south, and there is some concern due to forecast below-average March to May rains in east. Forecast Alert Pg. 5 and Regional Outlook Pg. 10. In **West** of most main and second season cereals finalized in Jul favourable and of season production, and conditions at continued development and harvesting of second season. **Middle East and North Africa**, conditions are generally development except in parts of Morocco, Algeria, an conditions and in Syria and Libya due to ongoing conflict challenges. In **Southern Africa**, conditions are development of main season cereals; however, there is impacted by dry conditions as well as in central and so where Tropical Storm Gumbé compounded recent in Storm Eloise. In **Central and South Asia**, there is some wheat crops where below-average precipitation has been three months and is forecast to continue through May (2 Pg. 15). In northern **Southeast Asia**, there is concern development in parts of Myanmar and Thailand where increased irrigation water availability and in parts of northern Viet Nam where flooding and cold weather. **Central America and the Caribbean**, Apr/May season vegetative to reproductive stage in Nicaragua and conditions are favourable.



The Crop Monitor



**Global Agricultural Monitoring** [www.cropmonitor.org](http://www.cropmonitor.org)  @GeoCropMonitor

Prepared by members of the GEOGLAM Community of Practice, coordinated by the University of Maryland Center for Global Agricultural Research and funded through NASA Harvest.



The Crop Monitor is a part of GEOGLAM, a GEO global initiative.

Cover Photo by Kenneth Mwangi

**Contributing partners**



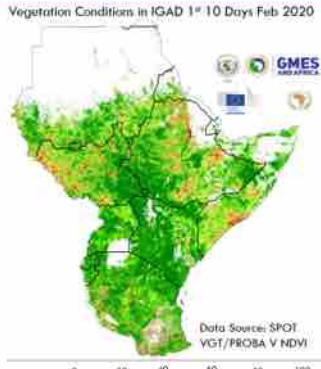
\*EC contribution is provided by the Joint Research Centre of the European Commission

## Food Security Nutrition Working Group

**FSNWG** **GHA Vegetation Conditions: Feb 2020**


February 2020

Vegetation Conditions in IGAD 1<sup>st</sup> 10 Days Feb 2020



Vegetation Condition Index (VCI) show good and very good vegetation due to above average rains in most parts of the region. South Sudan however has had vegetation affected by flooding caused by excess rainfall at the in Sept-Dec 2019. Amhara and Tigray Ethiopia has parts with poor to very poor performance due to conditions poorer than long term or usual conditions.

Rangeland areas of Ethiopia, Kenya and Somalia show a mixture of very poor, poor and some areas good vegetation conditions. This could be cause by above average seasonal rainfall, and desert locust invasion in some areas.



**REGIONAL FOCUS ON THE INTERGOVERNMENTAL AUTHORITY ON DEVELOPMENT (IGAD) MEMBER STATES**

**2020 GLOBAL REPORT ON FOOD CRISES**

JOINT ANALYSIS FOR BETTER DECISIONS

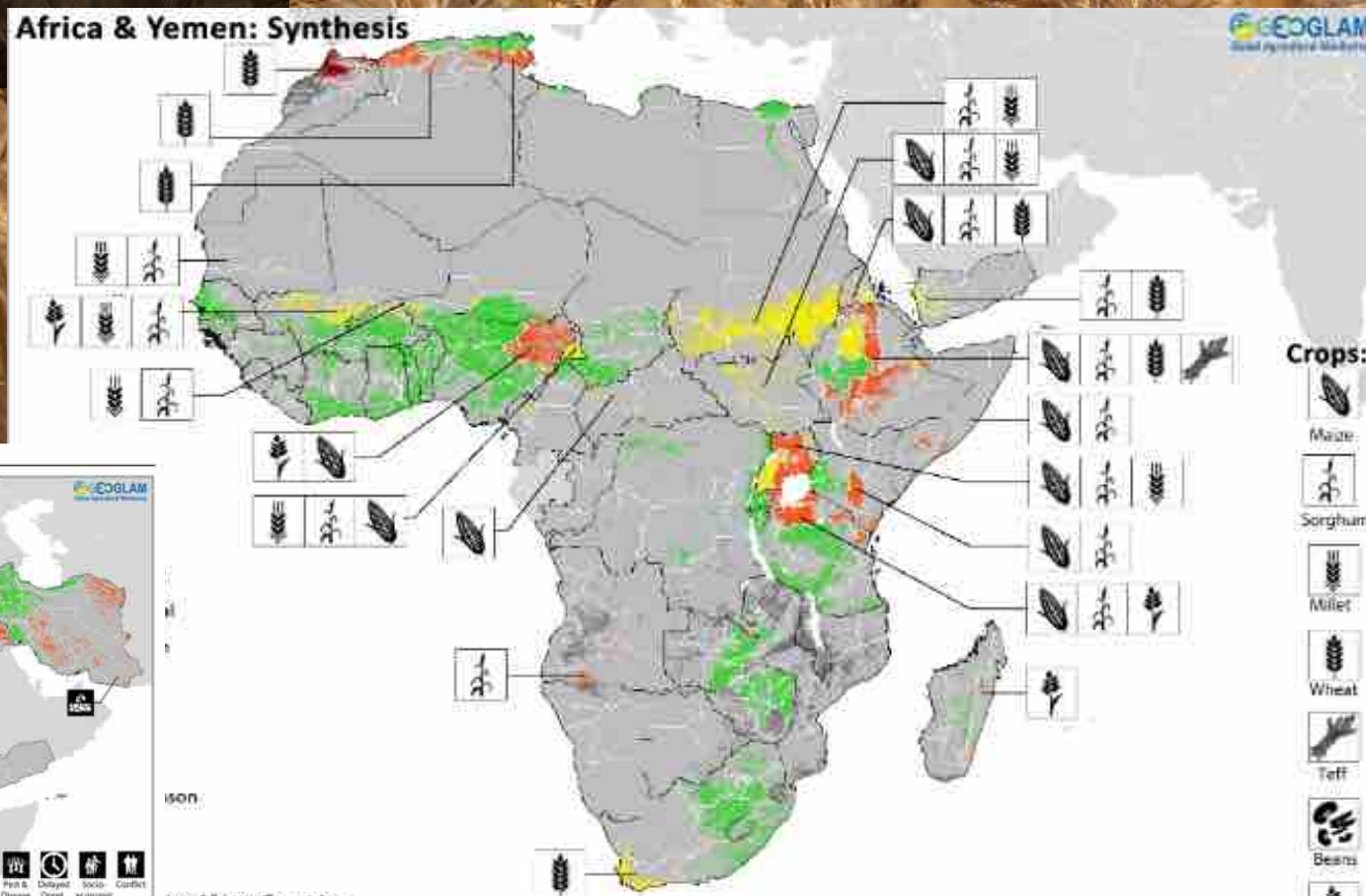


## GEOGLAM CropMonitor.org

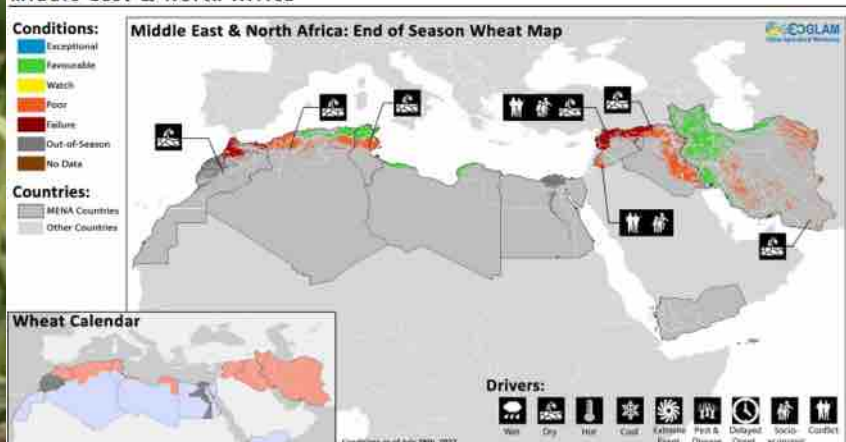
### Crop Monitor for Early Warning

### July 2022 Africa

Africa & Yemen: Synthesis



Middle East & North Africa



Warning African Countries



# CROP MONITOR REPORTING ON FOOD SECURITY FOR EARLY ACTION



## Drought

- Consecutive seasons of below average rains



## Conflict and insecurity

- Leading to loss of lives, displacement, loss of livelihoods, assets



## Macro-economic challenges

- Inflation and currency depreciation
- Limit food access



## COVID-19

- Socio-economic impacts including disruption and loss of livelihoods
- Urban populations hardest hit



## Displacement

- 4.79 million refugees and asylum seekers and 10.59 million IDPs  
(As of August 2021)



## Transboundary Pests

- Risk of proliferation persists, though currently limited by poor seasonal rains

Thank you



[www.icpac.net](http://www.icpac.net)

[www.igad.int](http://www.igad.int)