EARLY WARNING FOR FOOD SECURITY USING SATELLITE-BASED CROP AND RANGELAND MONITORING SYSTEM

Thursday, July 22, 2021

9:00 – 10:00 AM ET

USAID
FROM THE AMERICAN PEOPLE

SCALE
Strengthening Capacity in Agriculture Livelihoods and Environment

PRO-WASH
Practices, Research and Operations in Water, Sanitation and Hygiene

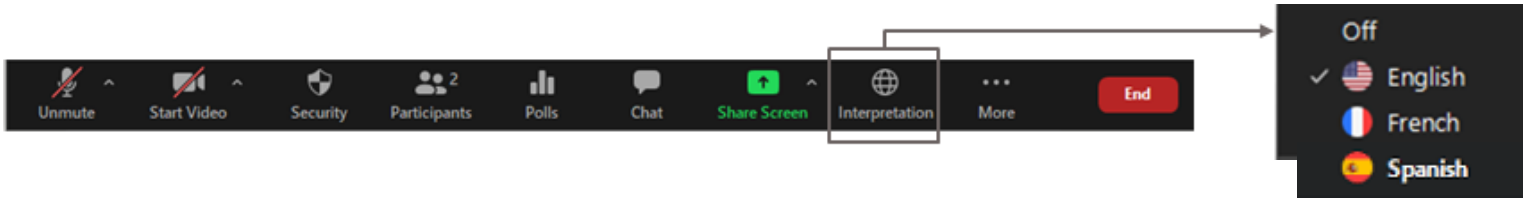
BEFORE WE BEGIN…

Everyone must select a language!

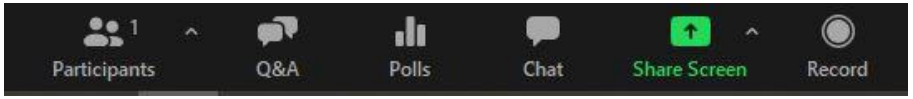
Click “interpretation” at the bottom of your Zoom window and select English or French.

Chacun doit choisir une langue !

Cliquez sur « interprétation » au bas de votre écran Zoom et sélectionnez anglais ou français.



- Introduce yourself in the chat box with your name and where you’re calling from
- Post your questions in the **Q&A box** at the bottom of your screen (do not include your questions in the chat box)



SCALE & PRO-WASH

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ICPAC

An initiative of the Organisation of African, Caribbean and Pacific States funded by the European Union

Joint Research Centre

Early Warning For Food Security Using Satellite-based Crop And Rangeland Monitoring System

The East Africa Agriculture Hotspots

Agenda

- Regional Overview
- Crop and Rangeland Condition Assessment in the Region
- The System: East Africa Agriculture Hotspots

Regional Overview

- Approximately 70% of the region highly dependent on subsistence rain-fed agriculture (crops & animals) that contributes significantly to the region's economy
- More than 80% of the region classified under ASAL
- Climate variability and change are one of the main drivers of food crises
- Future climate projections indicate increased frequency and intensity of extreme weather/climate events (drought, floods)
- Therefore need for continuous monitoring of agricultural conditions across seasons and across boundaries as early warning tool for early action
- 11 Eastern Africa countries
  - Burundi, Djibouti, Ethiopia, Eritrea, Kenya, Somalia, South Sudan, Sudan Tanzania, Rwanda, Uganda

East Africa Agriculture Hotspots

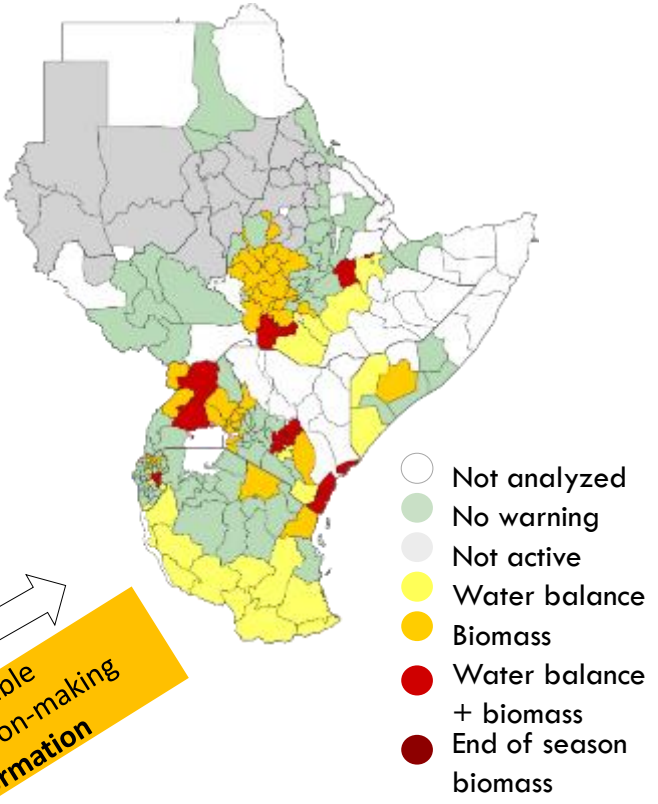
- Public online system for **monitoring crop and rangeland conditions** in near-real time
- Provides **automatic 10-day** warnings for poor or delayed vegetation
- ICPAC system that uses a service of the JRC implemented under the **Intra-ACP project**
- An adaptation of the ASAP system developed by JRC

Conditions in the field

Recorded by satellites

Satellite derived data

Actionable decision-making **information**



JUNE ASSESSMENT FROM AGRICULTURE HOTSPOTS

https://agriculturehotspots.icpac.net/

Regional June 2021 Assessment

- 4 countries classified as agricultural hotspots
- Based on :
  - Warnings from **EA Agriculture Hotspots**
  - Field information
  - Partner sources; GEOGLAM, ASAP, FSNWG, IPC

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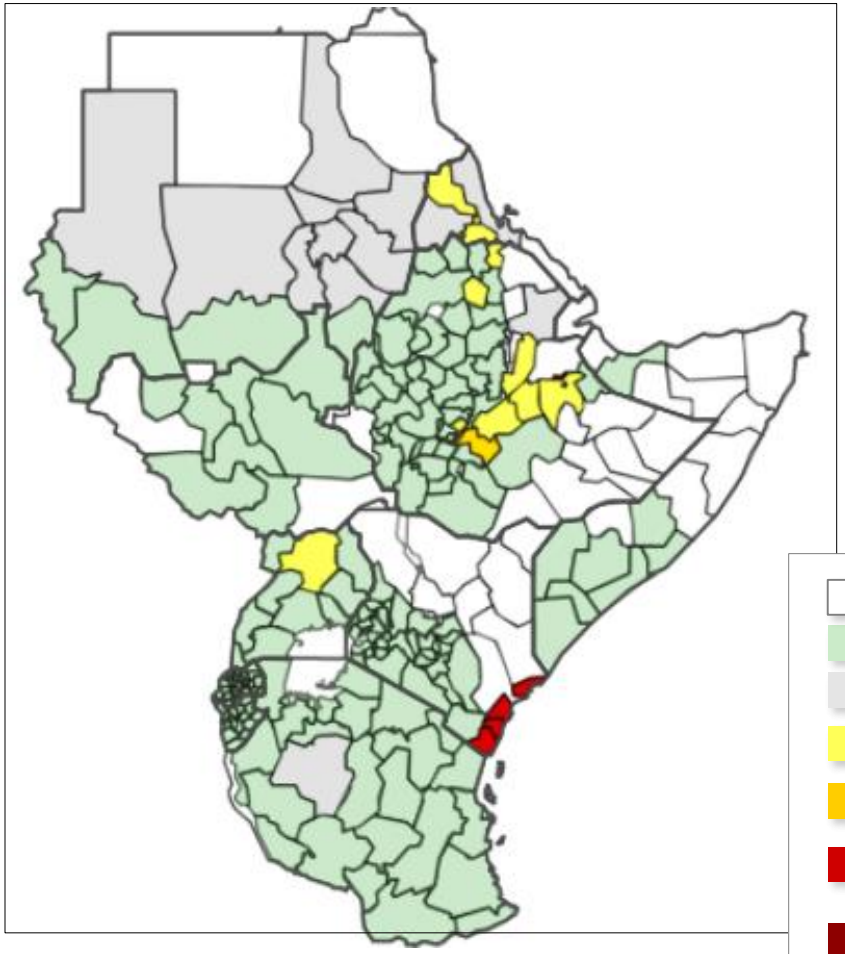
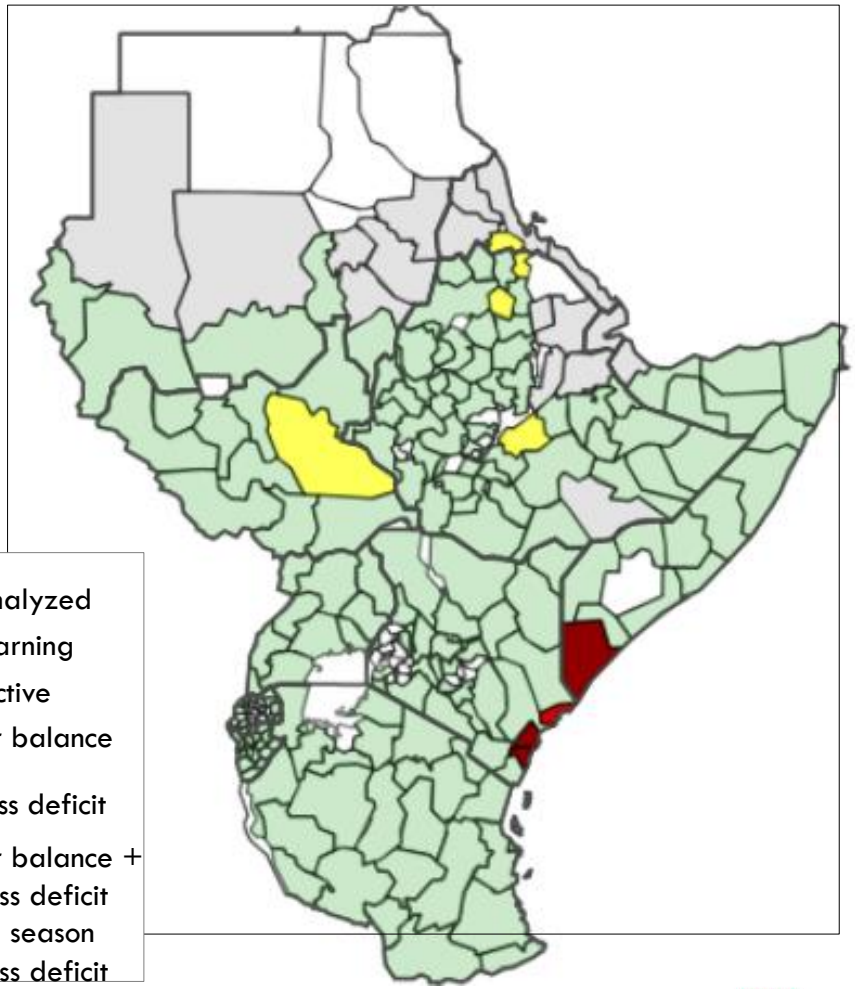
JUNE ASSESSMENT FROM AGRICULTURE HOTSPOTS

https://agriculturehotspots.icpac.net/

June Cropland Warnings (21st –30th June)



June Rangeland Warnings (21st –30th June)



Not analyzed
No Warning
Not active
Water balance deficit
Biomass deficit
Water balance + biomass deficit
End of season biomass deficit

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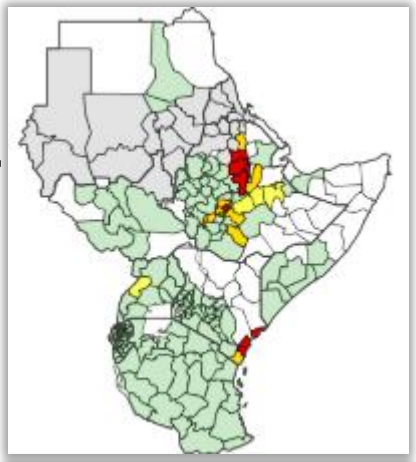
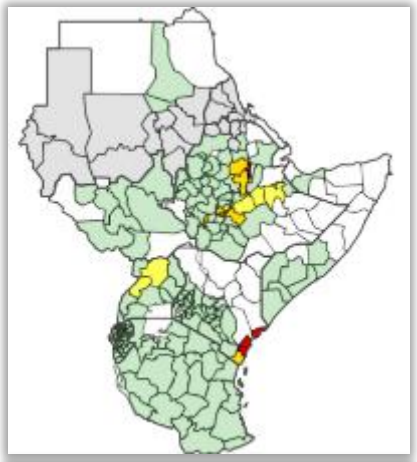
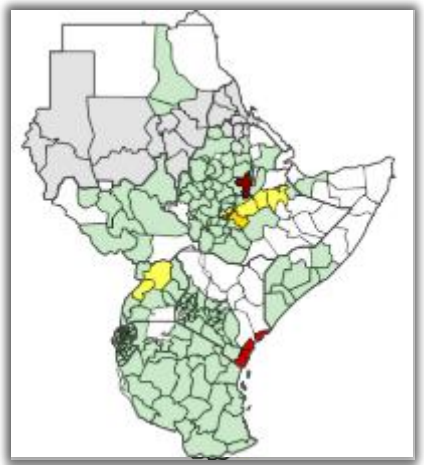
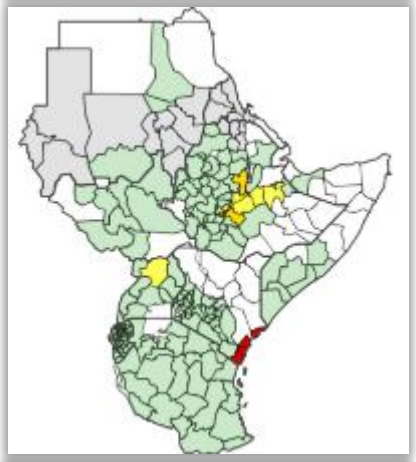
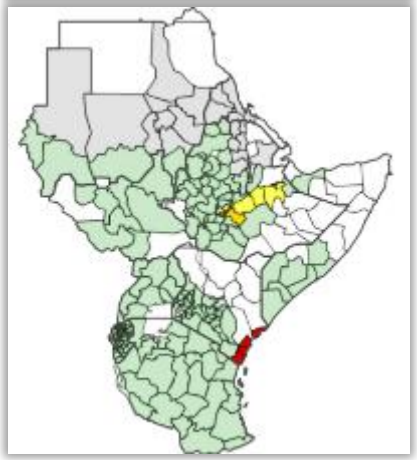
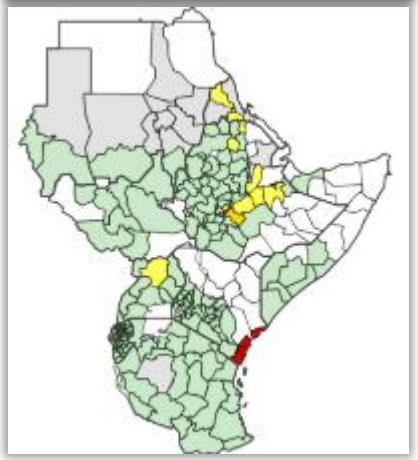
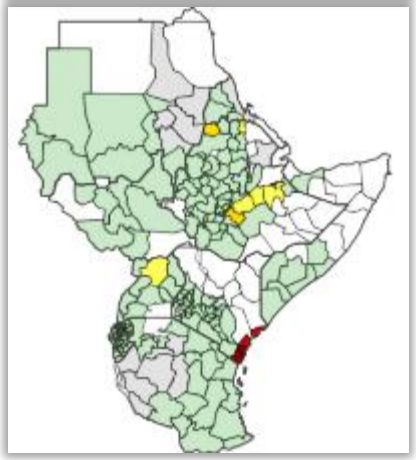
WARNINGS FOR CROPLAND MAY-JUNE-JULY 2021

	01st – 10th	11th – 20th	21st – 30th
May			
June			
July		NA	NA

LEGEND

- No warning
- Water balance deficit
- Biomass deficit
- Water balance + biomass deficit
- End of season biomass deficit
- Not active
- Not analyzed

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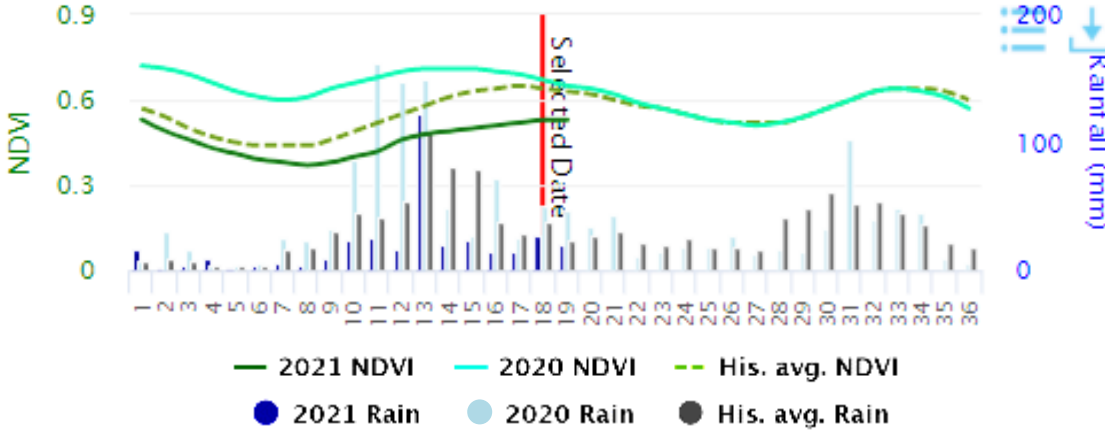
KENYA – JUNE ASSESSMENT FROM AGRICULTURE HOTSPOTS

Hotspot

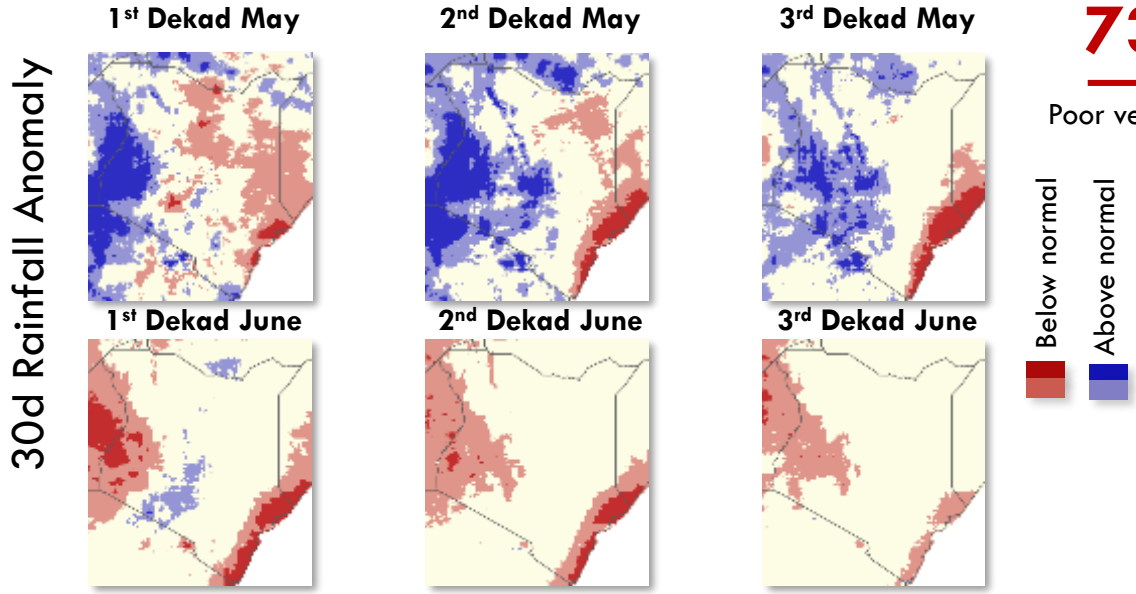
- Coastal region most affected (Kilifi, Malindi, Kwale and Lamu counties)
- Irregular and delayed rains in previous MAM season
- Coastal areas showing water balance deficit and vegetation stress (level 3 warning)

KEN – Kilifi, 2021 June 3rd Dekad

NDVI-Rainfall time-series



30d Rainfall Anomaly

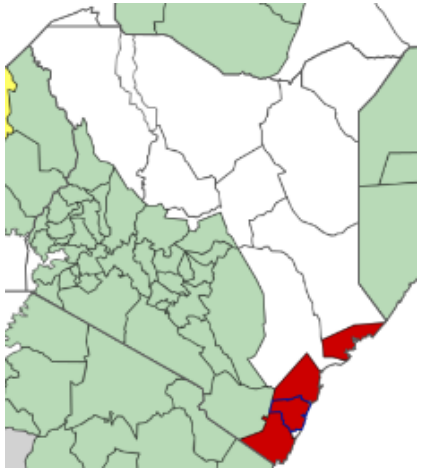


73% Poor vegetation

97% Severe water deficit

100% Poor rain (last 90d)

Active Crop Area



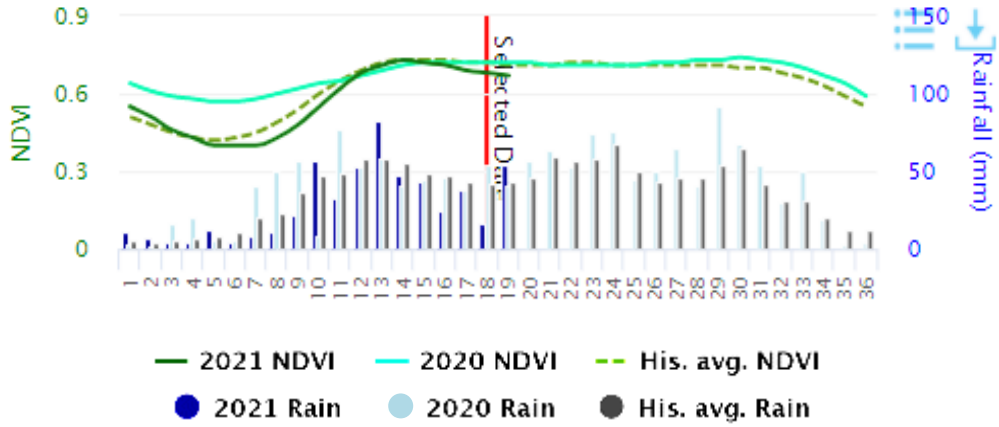
UGANDA – JUNE ASSESSMENT FROM AGRICULTURE HOTSPOTS

Non-Hotspot

- Warnings in North Uganda
- Irregular and delayed rains in MAM
- As of June, still at the beginning of a long season therefore a chance of recovery if receives rain
- Vegetation (NDVI) lower than normal at the start of the season, recovered towards end of April but on the decline as of June

UGA – Mid Northern, 2021 June 3rd Dekad

NDVI-Rainfall time-series



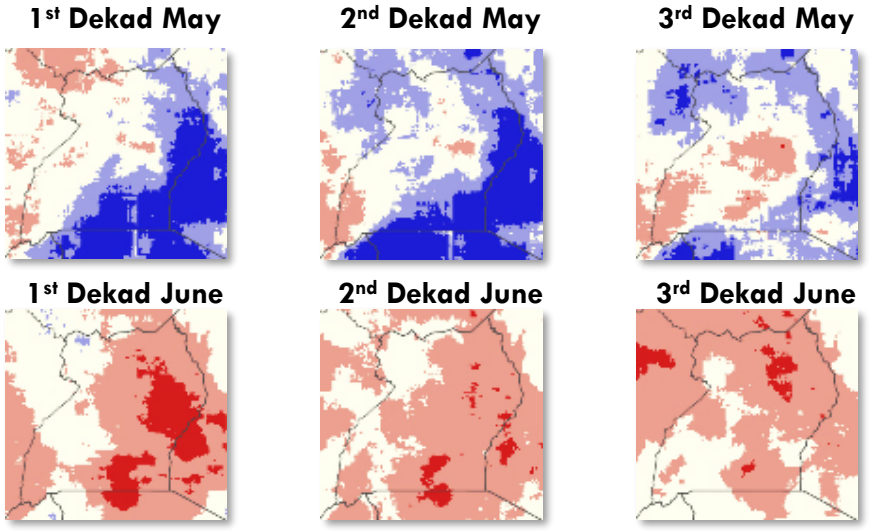
6% Poor vegetation

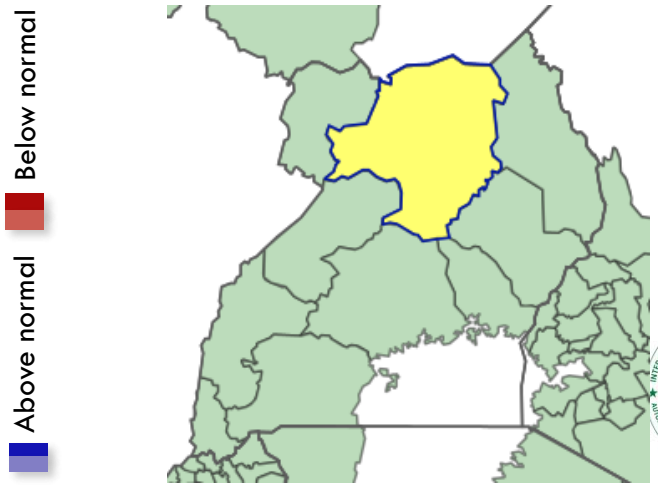
9% Severe water deficit

37% Poor rain (last 90d)

Active Crop Area

30d Rainfall Anomaly



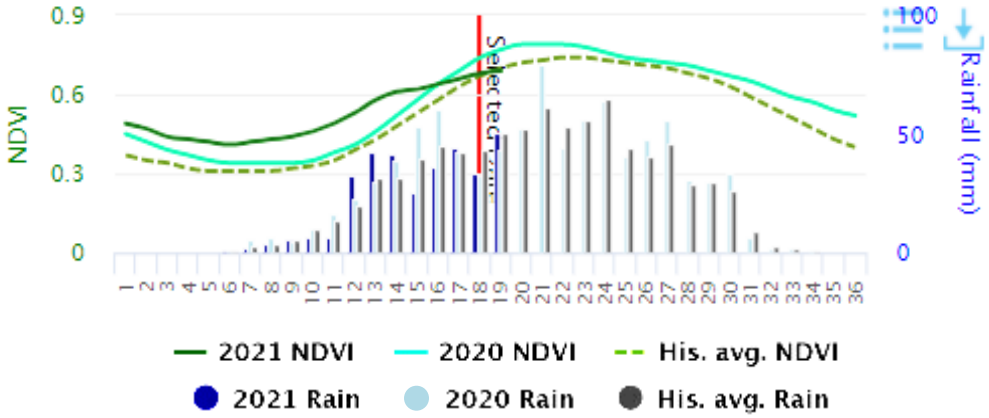


SOUTH SUDAN – JUNE ASSESSMENT FROM AGRICULTURE HOTSPOTS

Hotspot

- No agro-meteorological warnings for crops, however classified as hotspot because of socio-economic, conflict and impact of 2020 floods
- Water deficit warning for rangeland over Jonglei
- Exceptional vegetation conditions recorded for Jonglei, Upper Nile, Unity and North Bahr Ghaza
- NDVI above normal, and higher than 2020; rainfall higher than above normal

SSD – Jonglei, 2021 June 3rd Dekad

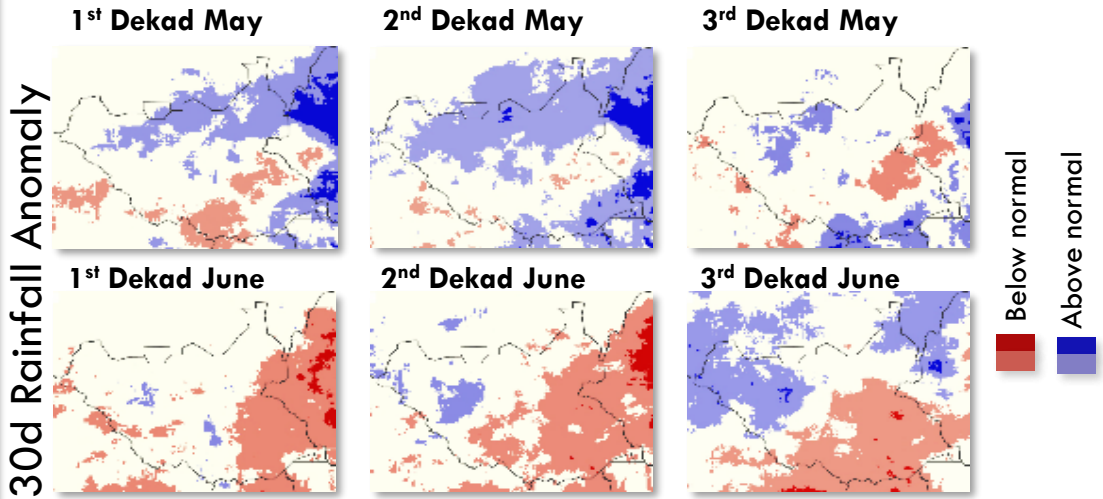


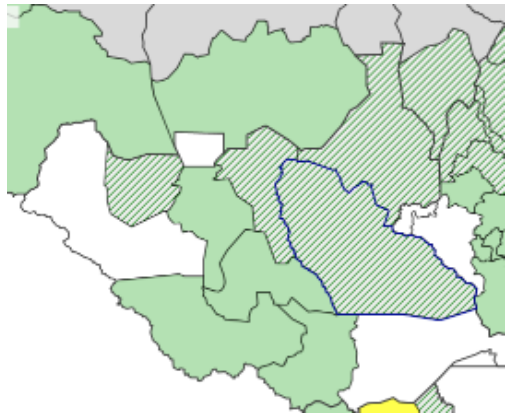
49% Abundant vegetation

3% Poor vegetation

14% Poor rain (last 90d)

Active Crop Area





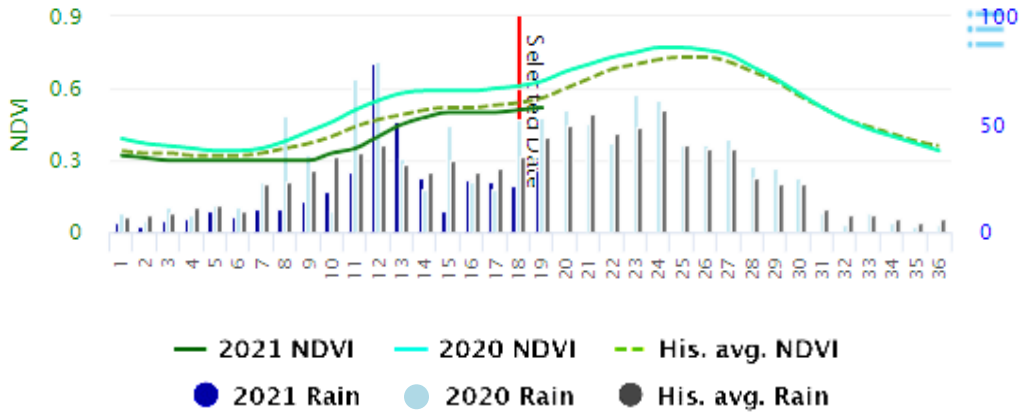
ETHIOPIA – JUNE ASSESSMENT FROM AGRICULTURE HOTSPOTS

Hotspot

- Central-Eastern Ethiopia most affected
- Irregular and delayed rains in March-April-May season affecting Belg crops,
- Rains towards end of April beginning of May good start of main season
- Followed by below average rain in June. As of June, most areas with warnings are due to water deficit (level 1 warning)
- Improvements observed between May and June assessment

Ethiopia – West Arsi, 2021 June 3rd Dekad

NDVI-Rainfall time-series

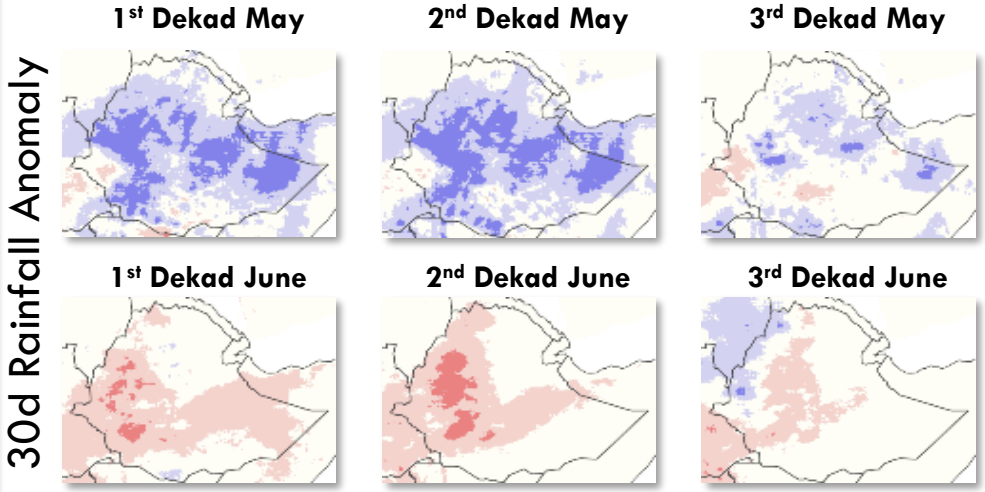


37% Poor vegetation

17% Severe water deficit

Active Crop Area

30d Rainfall Anomaly

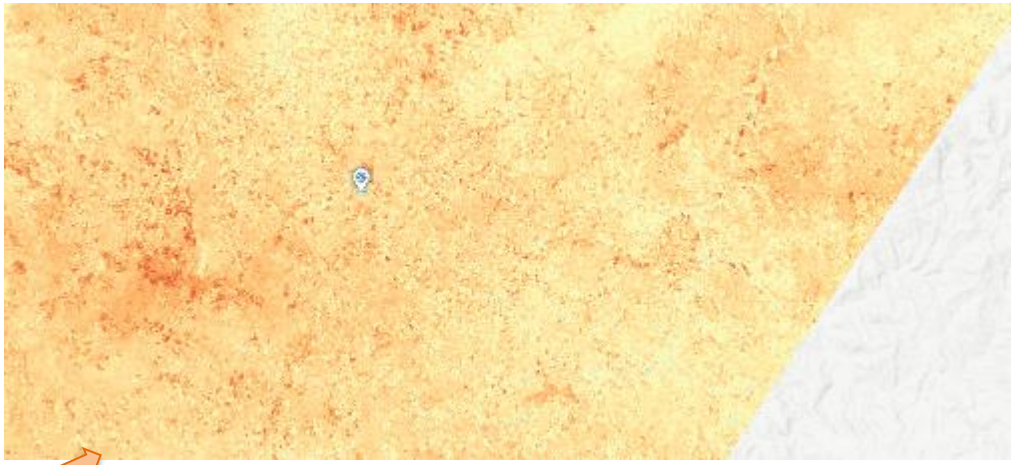


ETHIOPIA TIGRAY

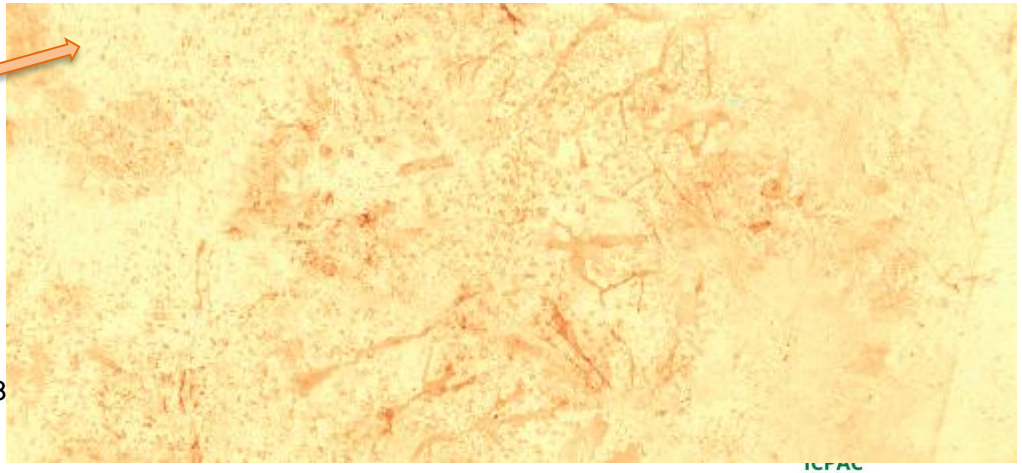
ASAP High Res. Viewer: 10 m SENTINEL imagery for monitoring decrease of crop area in Tigray

- The humanitarian aid community is focusing on Tigray where there is a high risk of food insecurity
- Main crop season is just starting in July, the small orange/red dots are fields that at the same time of the year (first 10 days of July) appear less green in 2021 than in 2020. Meaning they are not (yet) planted in 2021.
- Further monitoring needed in July/August to confirm significant decrease in cultivated area

Western



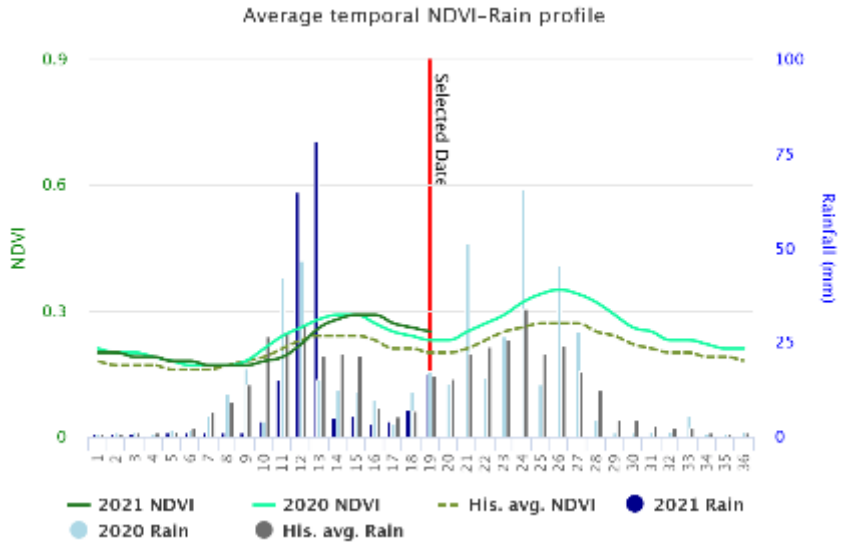
Eastern

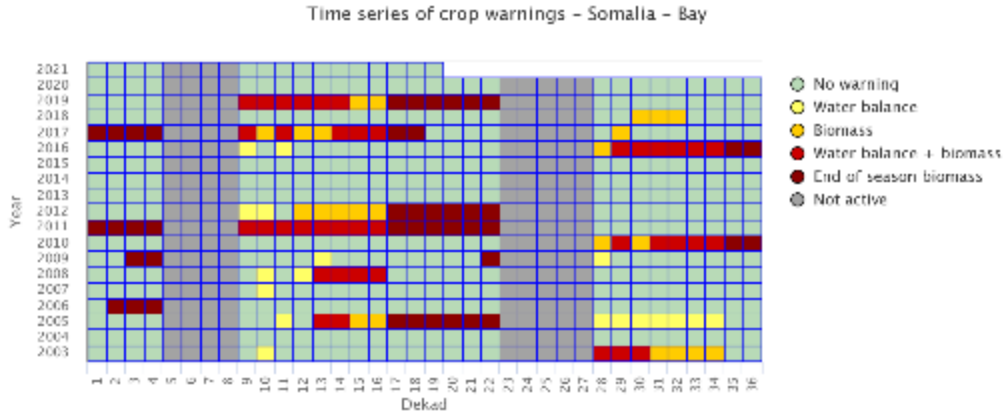


SOMALIA

Hotspot

- No strong automatic warnings for crops during the season, however very irregular rainfall distribution. 60% of pastoral areas in Lower Juba experienced a severe seasonal rainfall anomaly.
- In Bay (graphs on the right), the high cumulated rainfall amounts and vegetation signal to some extent hide the negative impact on crop conditions.
- Because the system is based on statistical comparison with other seasons, in areas frequently hit by drought, a moderate drought does not appear as exceptional
- Proves that automatic warnings are not sufficient and still need to be integrated by experts analysis





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MAY CROPLAND WARNINGS – ADMIN LEVEL WARNINGS

Ethiopia		Uganda	Kenya
Debubawi	Guji, North Shewa	Gulu	Kwale
Semen Wello	Sidama	Pader	Kilifi
Debub Wollo	Mirab Arsi	Kitgum	Uasin Gishu
Oromia	Hadiya	Lira	Taita Taveta
Afar Zone 3	Wolayita	Apac	Makueni
Mirab Hararghe	Alaba	Masindi	Lamu
Misraq Harerge	Kembata Tembaro	Lake Albert	West Pokot
Arsi	Dawro	Hoima	Elgeyo-Marakwet
Misraq Shewa	Konta	Kibale	
Silti	Basketo		
Debub Mirab Shewa	Jimma		
Hareri	Yem		
Fafan, Horo Guduru	Gurage		
Bale	Mirab Shewa		
Dire Dawa			

JUNE CROPLAND WARNINGS – ADMIN LEVEL WARNINGS

Ethiopia	Uganda	Kenya	Eritrea
Dire Dawa	Gulu	Kwale	Debub
West Arsi	Pader	Kilifi	Maekel
Alaba	Kitgum	Lamu	Anseba
Selti	Lira	Malindi	
Arsi	Apac		
West Harerge			
East Harerge			
Hareri			
Afar Zone 3			
Wag Himra			
Eastern			

Legend

- Water balance deficit
- Biomass deficit
- Water balance + biomass deficit
- End of season biomass deficit

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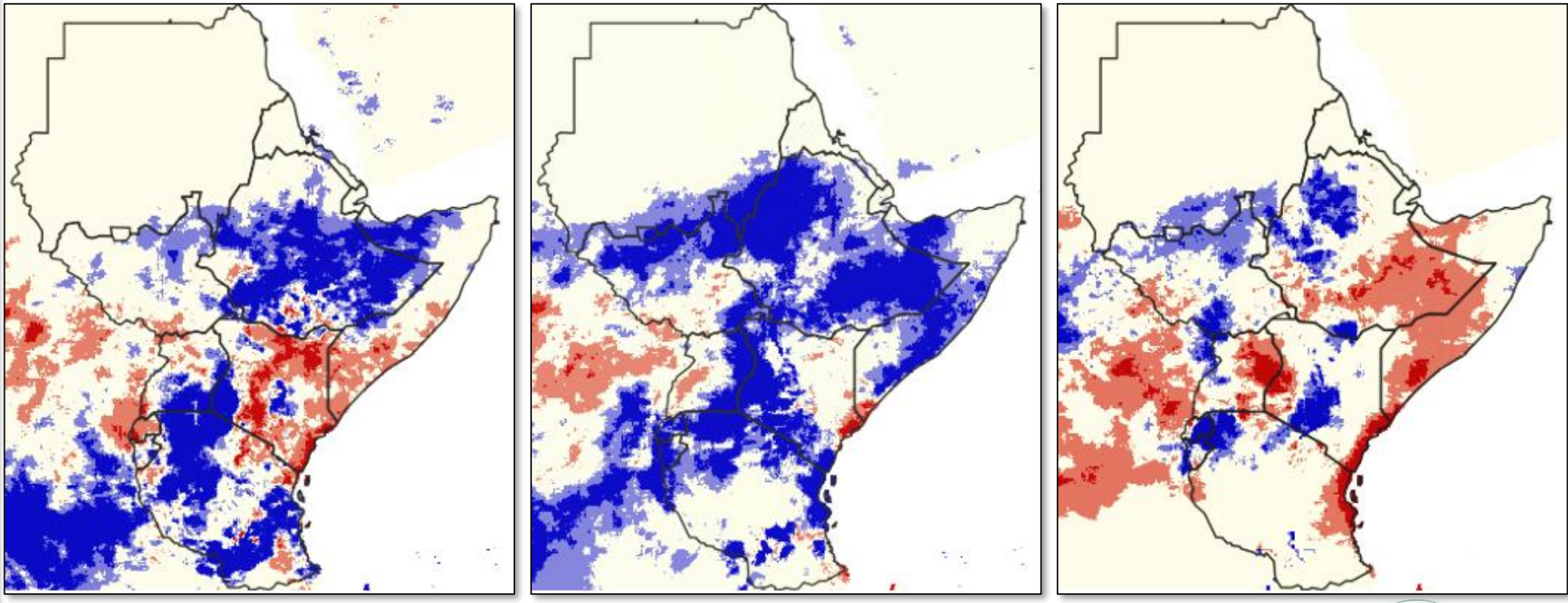
FLOODS

- High intensity rainfall in the first dekad of May

10 Day Precipitation Anomaly Maps

3rd Dekad Apr | 1st Dekad May | 2nd Dekad May



Legend

- Very bad (less than 25mm)
- Bad (-25 to -11m)
- Normal (-10 to +10mm)
- Good (11 to 25mm)
- Very good (above 25 m)

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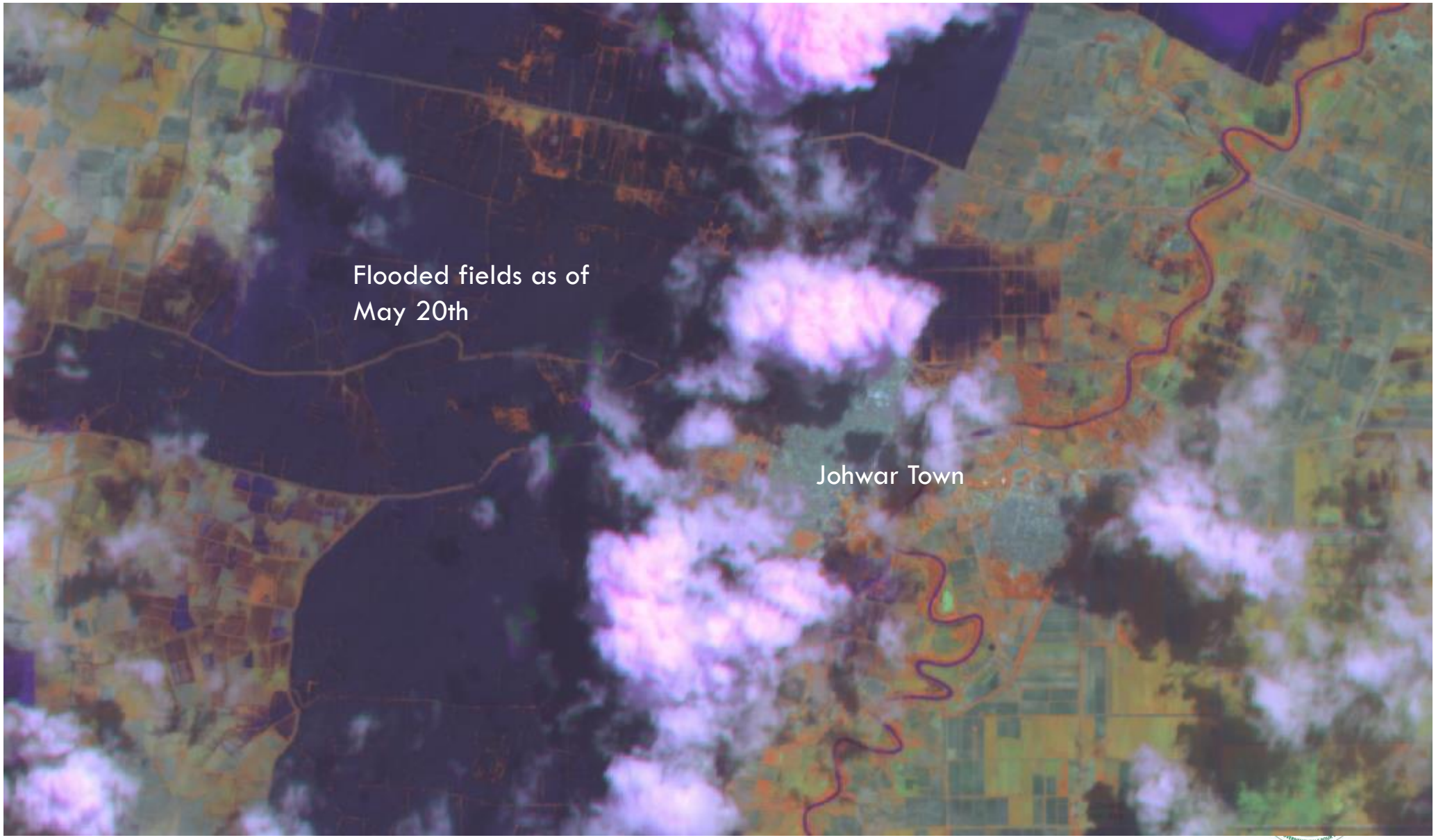
FLOODS – JOHWAR IN SOMALIA



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THE SYSTEM

East Africa Agriculture Hotspots

https://agriculturehotspots.icpac.net/

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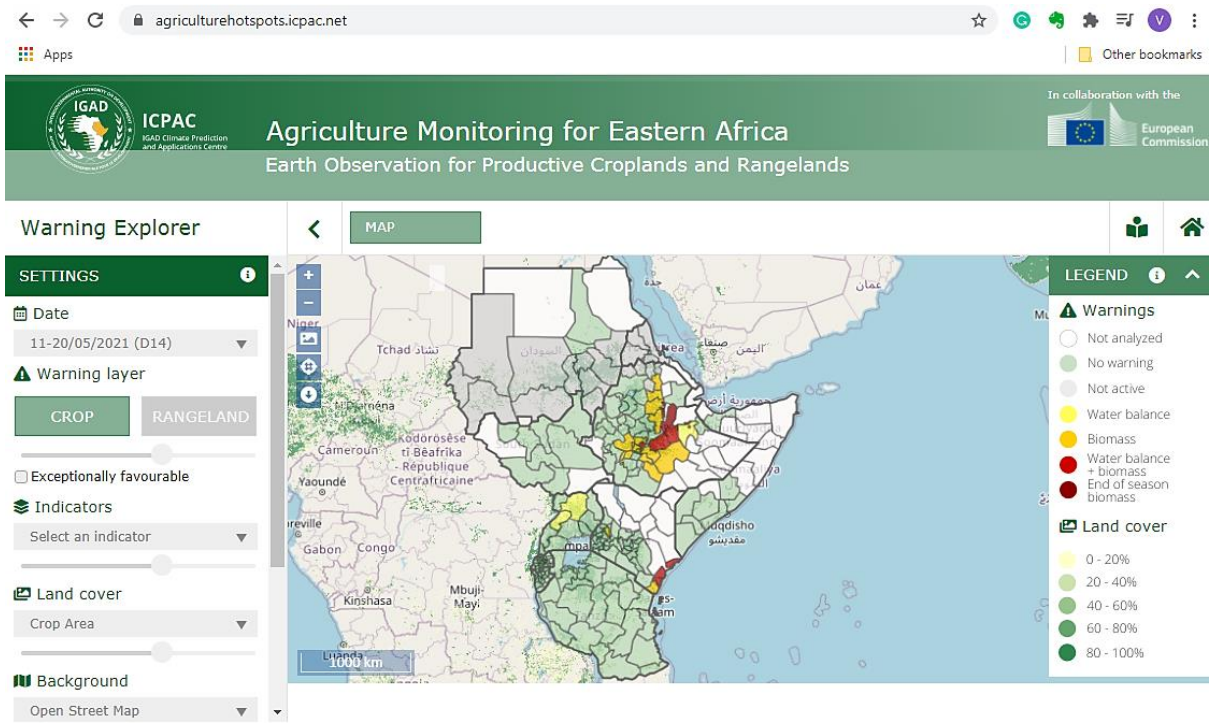
INTRODUCTION TO THE SYSTEM



East Africa Agriculture Hotspots in a nutshell: a complete platform to explore and analyze EO-derived data for agriculture monitoring

A web-GIS environment:

- ❑ **Weather** and
- ❑ **Earth Observation** (EO) indicators
- ❑ Automatic warnings regarding poor or delayed vegetation performance every 10

A statistics dashboard:

- ❑ Indicators statistics aggregated at sub-national level(s)
- ❑ Additional information such as crop calendars, warnings time-series, progress of the season

https://agriculturehotspots.icpac.net/

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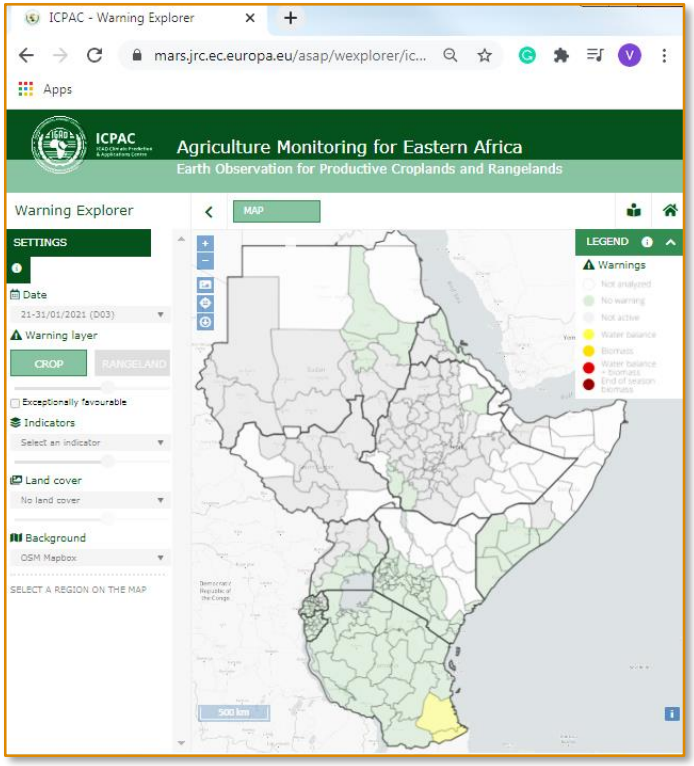
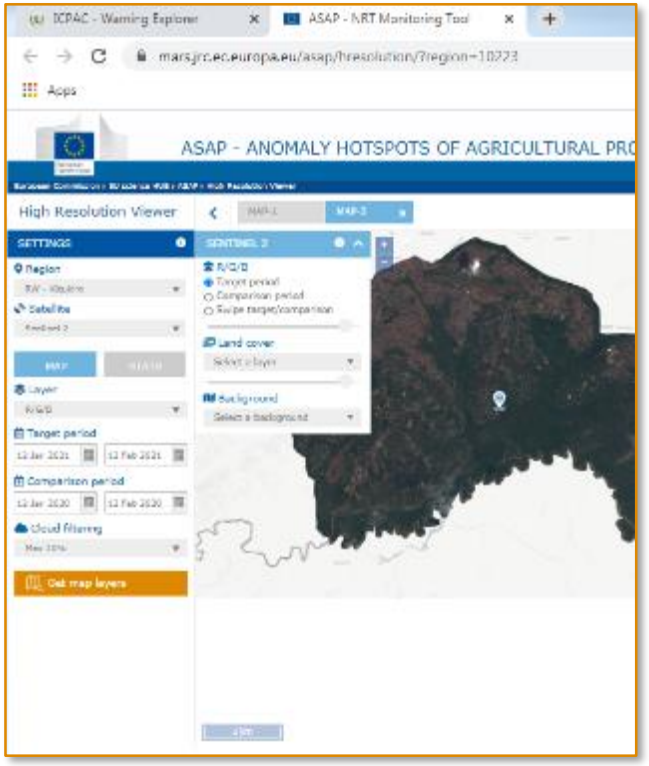
WHAT CAN YOU DO IN THE SYSTEM?

1 Automatic warning classification



2 Statistics dashboard

3 High Resolution Viewer (JRC)



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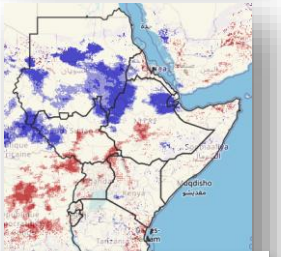
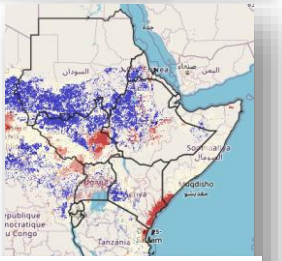
WARNING CLASSIFICATION

Agriculture Warning Indicator

1 **Precipitation Anomalies (SPI)**

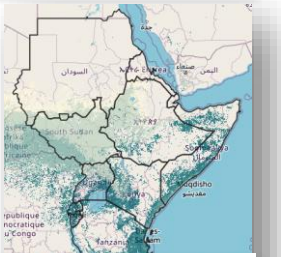


2 **Water Satisfaction Index**



3 **Vegetation (NDVI)**

4 **Phenological Stage**



Expansion, Maturation, Senescence

4 categories of Warnings

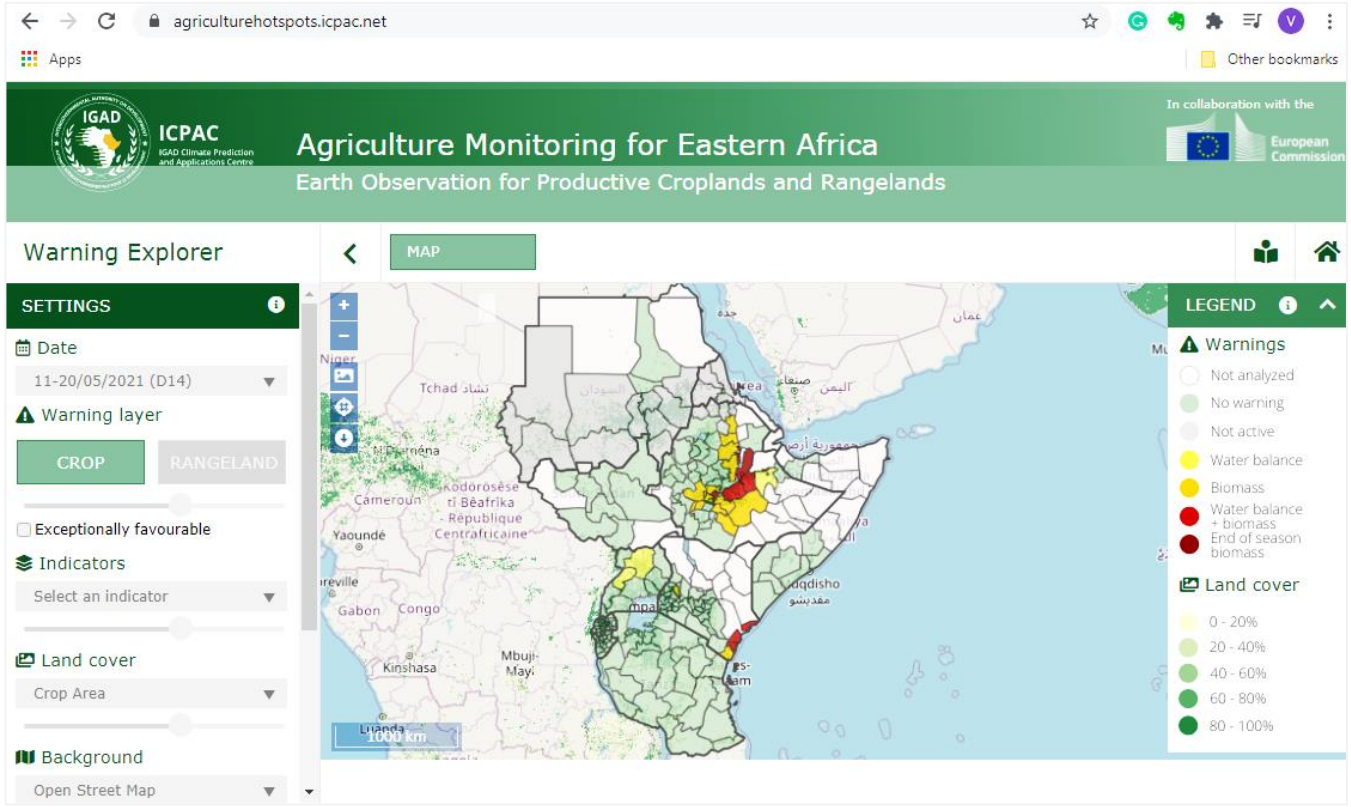
Worsening Situation;
Convergence of evidence;
Progress of season;

- Water balance deficit (rainfall, WSI)
- Vegetation stress (reduced)
- Water balance deficit + Vegetation stress
- End of Season Biomass deficit

NB: Only for active season and crop/rangeland area

- Not active
- No Warning
- Not analysed
- Exceptional

AVAILABLE INDICATORS



- ❑ Visualization of raster layers for selected weather and biophysical indicators and their anomalies
- ❑ Maps can be downloaded as georeferenced png
- ❑ It is possible to retrieve the pixel value
- ❑ Background layers, land cover layers and opacity bars facilitate image interpretation
- ❑ All time series is available from 2003
- ❑ Warning maps available from 2009

✓ Look for convergence of evidences
✓ Consider correlation among indicators

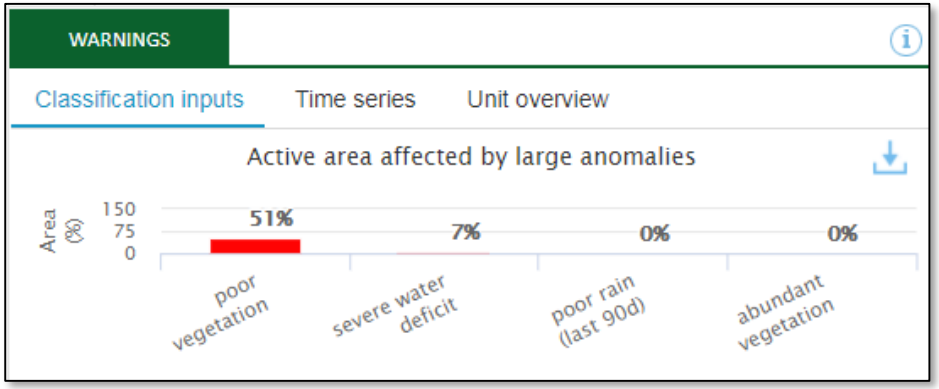
Warning Layer
10day

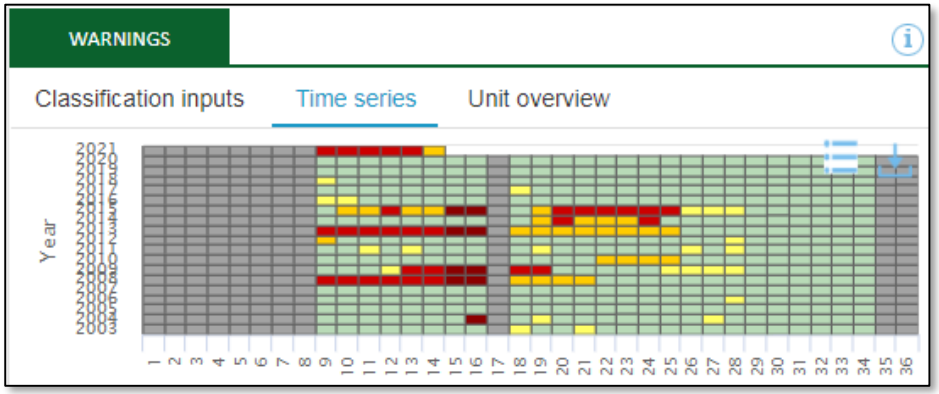
NDVI indicators	Rain indicators
NDVI	Rainfall 10-days
NDVId	Rainfall 10-days difference
zNDVI	Rainfall 30-days difference
mNDVId	Rainfall 90-days % difference
zNDVIc	Rainfall 10-days forecast

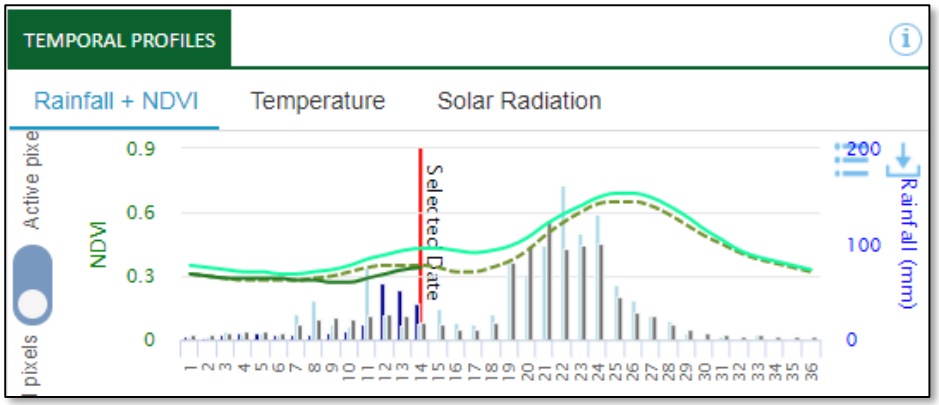
SPI	zWSI	Temperature diff
1 month	Crop	Season progress
3 months	Rangeland	

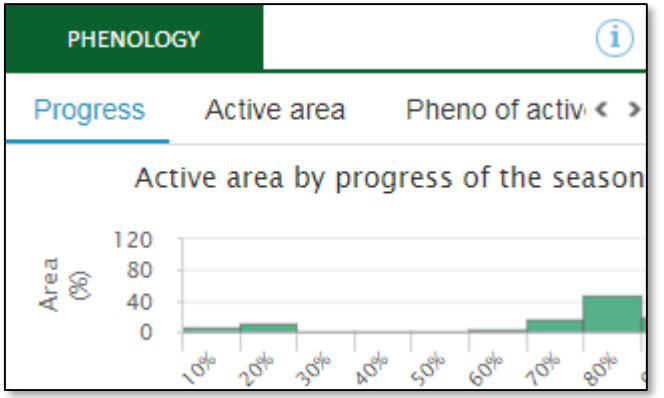
STATISTICS AT ADMINISTRATIVE 2 LEVEL

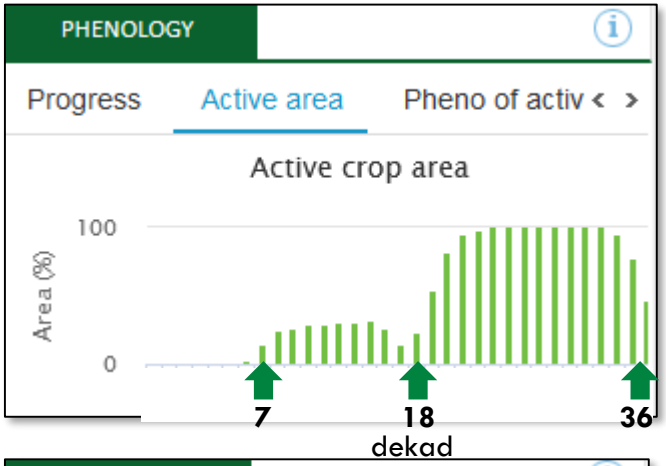
South Wollo, Ethiopia

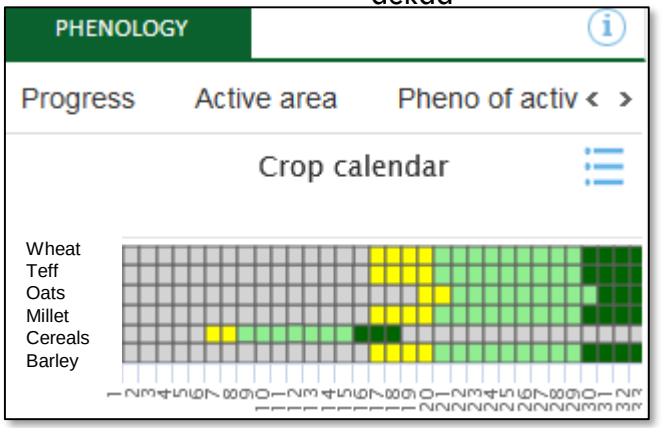












THE PLACE OF EA AGRICULTURE HOTSPOTS SYSTEM IN REGIONAL MONITORING

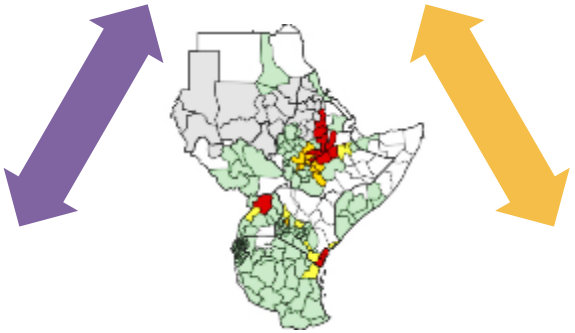
Regional Food Security & Agriculture Assessment

Quick and near-real time **identification of areas of concern**

Provide alternative or complimentary **analysis of crop areas & rangelands**

Continuous Monitoring of crop areas and rangelands

User derived **reports** in area of interests at desired seasons



A potential tool to **support the Livestock and Agriculture sub-sectors** of FSNWG with data and information

Crop and Rangeland Monitoring

Food Security Nutrition Working Group

Combine with IPC and other information to **call for action**

Initiate the reporting of anomalies in areas of warning by countries & partners

ICPAC

USEFUL LINKS

- ICPAC Agriculture Hotspots

  visit: https://agriculturehotspots.icpac.net/

- More detailed information on methodology

  visit: https://mars.jrc.ec.europa.eu/asap/documentation.php

- For global conditions visit

  visit : https://mars.jrc.ec.europa.eu/asap/wexplorer/

Upcoming capacity building on use and interpretation

ICPAC

Q&A Session

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Thank you!
Merci !

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FROM THE AMERICAN PEOPLE

SCALE
Strengthening Capacity in Agriculture Livelihoods and Environment

PRO-WASH
Practices, Research and Operations in Water, Sanitation and Hygiene