

G20 Global Agriculture Monitoring Initiative

# GEOGLAM

Earth observation for Food Security

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Capacity Development Coordinator

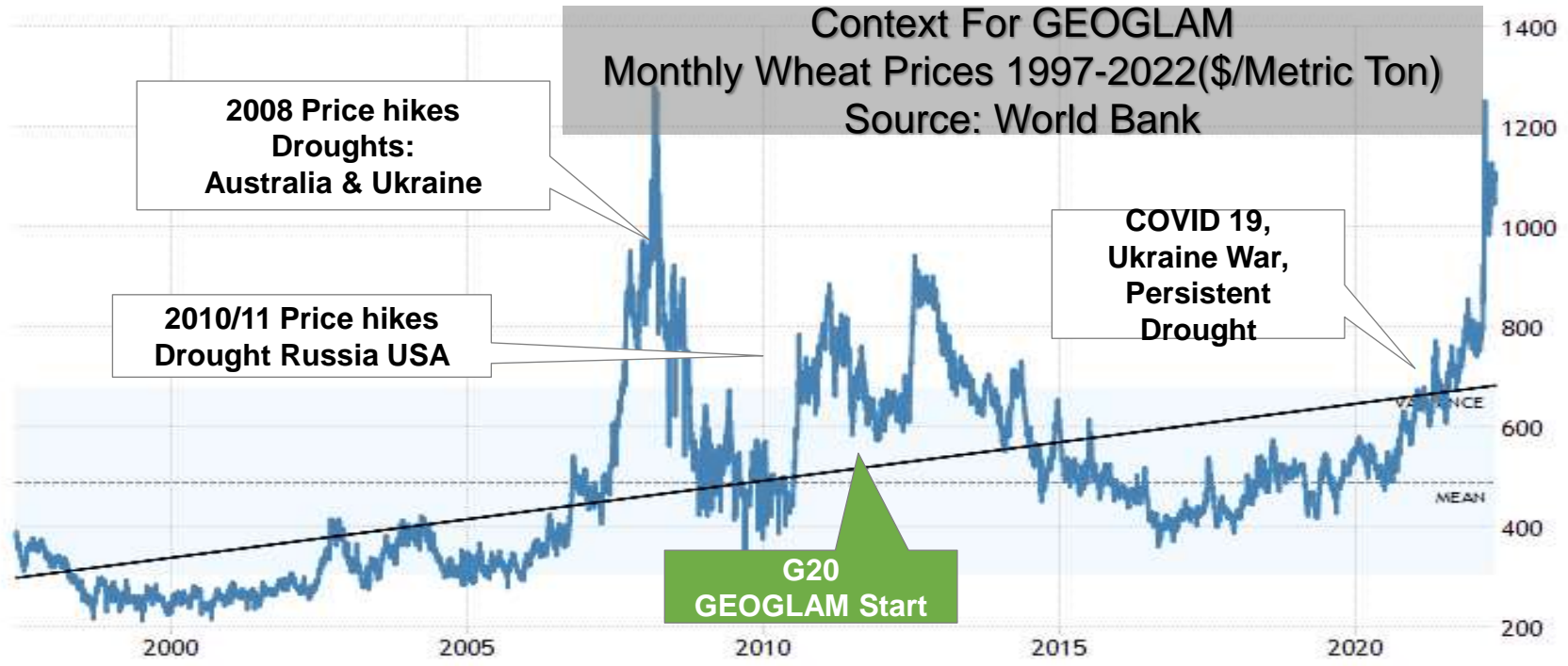


## Outline

- GEOGLAM Overview
- Agriculture Monitoring
  - ASAP - JRC
  - WorldCereal - VITO
  - Sen4Stats - FAO
  - CropWatch - AIRCAS
- Capacity Development
- Research & Development
- Discussion / Q&A



# GEOGLAM Launched by the G20 Agriculture Ministers in 2011



**G20 Final Declaration**

44. We commit to improve market information and transparency in order to make international markets for agricultural commodities more effective. To that end, we launched:

- The "Agricultural Market Information System" (AMIS) in Rome on September 15, 2011, to improve information on markets ...;
- The "Global Agricultural Geo-monitoring Initiative" (GEO-GLAM) in Geneva on September 22-23, 2011. This initiative will coordinate satellite monitoring observation systems in different regions of the world in order to enhance crop production projections and weather forecasting data.



## Objective:

- Support markets and informing early warning for proactive response to emerging food emergencies
  - Increase market transparency
  - Enhance Early Warning
  - Improve food security

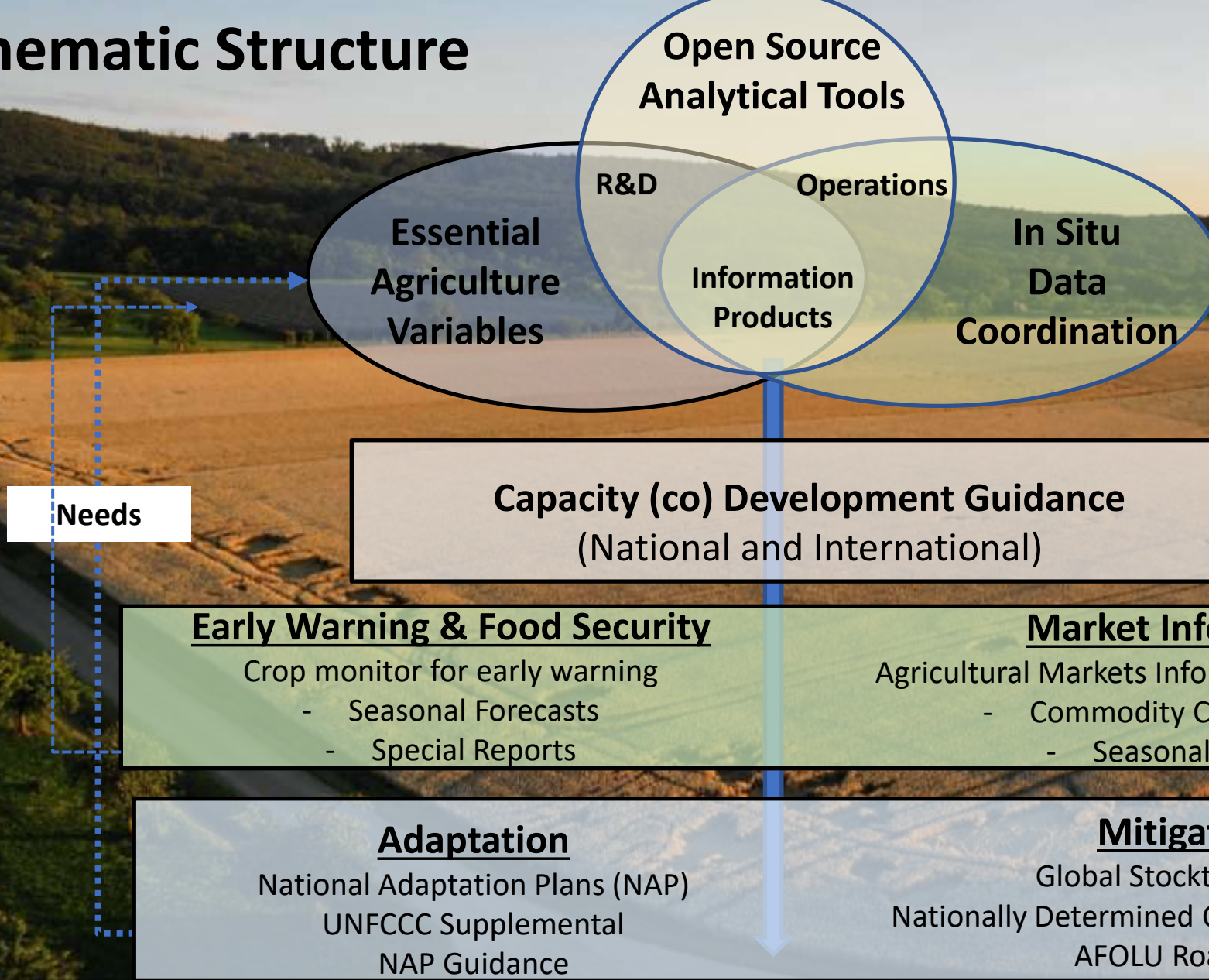
By producing and disseminating relevant, timely, and actionable EO-based information on agricultural conditions at national, regional, and global scales



- **Vision:** the use of coordinated, comprehensive and sustained Earth Observations to inform decisions and actions in agriculture... through a system of agricultural monitoring systems
- **Aim:** strengthen the international community's capacity to utilize Earth Observations to produce and disseminate relevant information on agricultural production at national, regional and global scales
- **Approach:** Identifying information gaps, building on existing monitoring systems
  - Strengthening international and national capacity
  - Emphasis on: producer countries, countries-at-risk
  - Fostering international cooperation and collaboration



# Thematic Structure



## Ongoing Operations – Continue and Enhance:

- AMIS Crop Monitor
- CM4 Early Warning
- GEOGLAM Knowledge Hub
- JECAM

**Food Security**

**Climate**





# Agriculture & Food Security Monitoring





**Overview:**

At the end of April, conditions are mixed for soybeans, while favourable for wheat, maize, and rice. Winter wheat is under generally favourable conditions in the northern hemisphere. Maize sowing is ramping up in the northern hemisphere as harvesting is continuing in the southern hemisphere. Rice conditions are generally favourable, albeit with dry conditions impacting crops in southern India and northern Southeast Asia. Soybean conditions remain mixed due to the impacts of earlier hot and dry weather in Brazil, northern Argentina, and South Africa.



**Contents:**

Conditions and Forecasts at a Glance.....	2
Feature Article on La Niña & Extreme Global Temperatures...	3
Wheat Conditions.....	5
Maize Conditions.....	6
Rice Conditions.....	7
Soybeans Conditions.....	8
Climate Forecasts.....	9
Appendix I – Terminology & Definitions.....	14
Appendix II – Crop Season Specific Maps.....	15

# The Crop Monitor for AMIS

## Flagship Initiative - Launched 2013

- Covers **Wheat, Maize, Soybean, and Rice** across multiple seasons
- Covering between 80-95% of global crop production (main production/export countries)
- Provision of timely and transparent consensus based monthly crop condition assessments in the primary agricultural production countries
- Over 40 contributing partners
- Short and mid-term weather forecasts in countries/regions of interest
- Monthly reports



# Synthesis Conditions

Conditions as of April 28th, 2024



## Conditions:

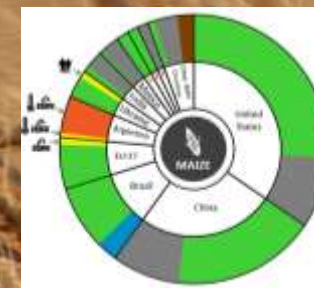
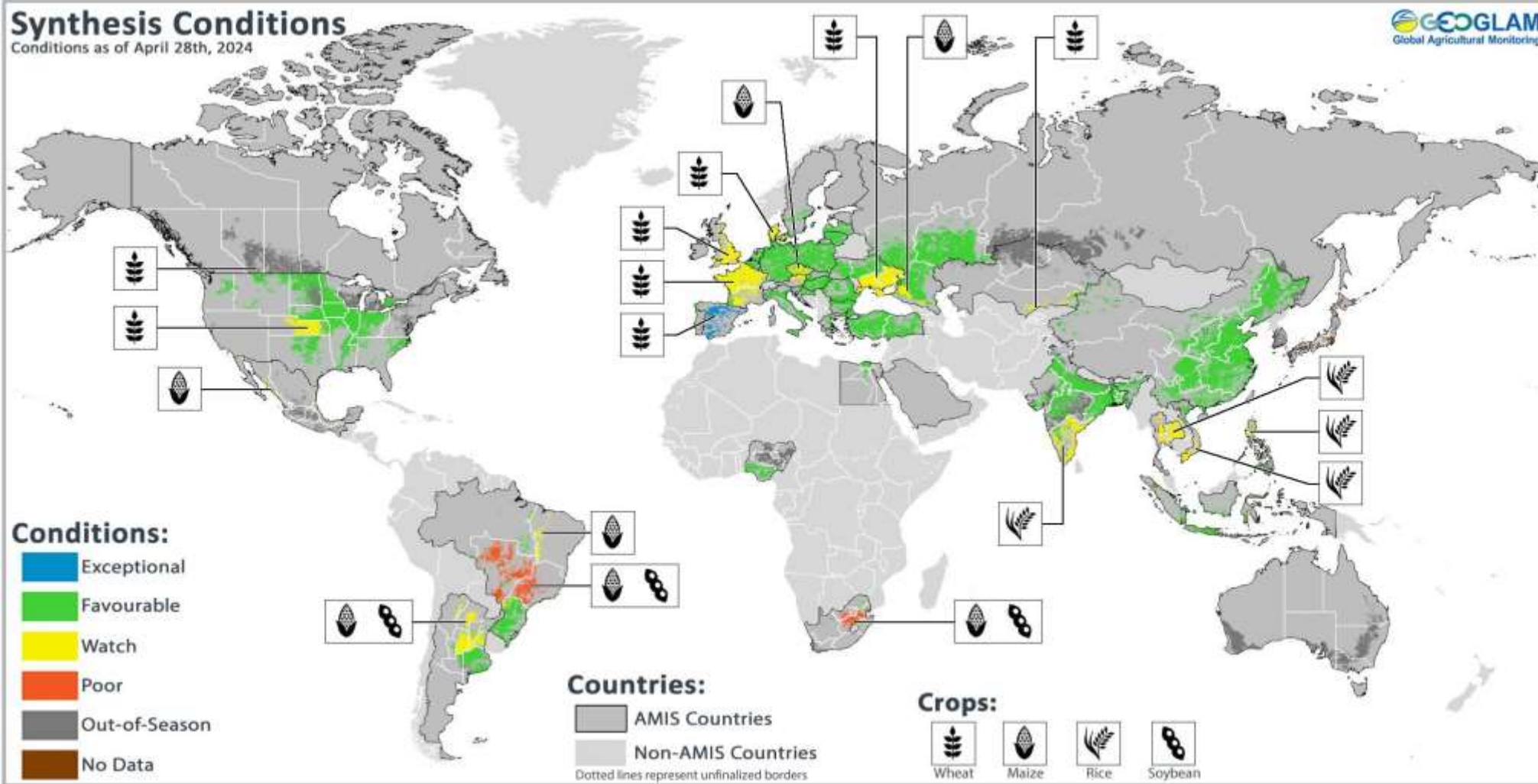
- Exceptional
- Favourable
- Watch
- Poor
- Out-of-Season
- No Data

## Countries:

- AMIS Countries
- Non-AMIS Countries
- Dotted lines represent unfinalized borders

## Crops:

- Wheat
- Maize
- Rice
- Soybean







# Crop Monitor EARLY WARNING

**Overview:**

In northern **East Africa**, a combination of delayed rainfall onset and early season dryness is impacting planting in South Sudan while recent rains have mitigated dry concerns for Belg planting in most parts of Ethiopia. In the south, conditions are mixed for main season cereal development. While recent heavy rains have offset dry conditions in most areas, the rains have also resulted in flooding in some countries, and above-average precipitation is forecast to continue through the coming months (See Regional Outlook Pg. 7). In **West Africa**, planting of main season cereals is ramping up along the Gulf of Guinea countries while harvesting of second season rice is nearing completion in Mali and Mauritania, and agro-climatic conditions are generally favourable. In the **Middle East and North Africa**, wheat harvesting is just beginning, and conditions remain generally favourable in the east and below-average in the west as a result of prolonged dry and hot conditions throughout the growing season, although recent rains have brought minor crop recovery to parts of North Africa. In **Southern Africa**, harvesting of main season cereals is nearing completion under mostly poor to failure conditions due to El Niño-induced drought and high temperatures. In **Central and South Asia**, concern remains for winter wheat crops across parts of the region due to dry conditions earlier in the season, and planting is just beginning for spring wheat. In southern **Southeast Asia**, harvesting of wet-season rice continues with favourable yield outcomes. In the north, harvesting of dry-season rice reached its peak in April. Conditions are favourable in areas with abundant irrigation water, though some concern remains in areas where limited rainfall has been received. In **Central America and the Caribbean**, land preparation for Primera season cereals is underway, and farmers are mostly still awaiting the start of seasonal rains to begin planting.

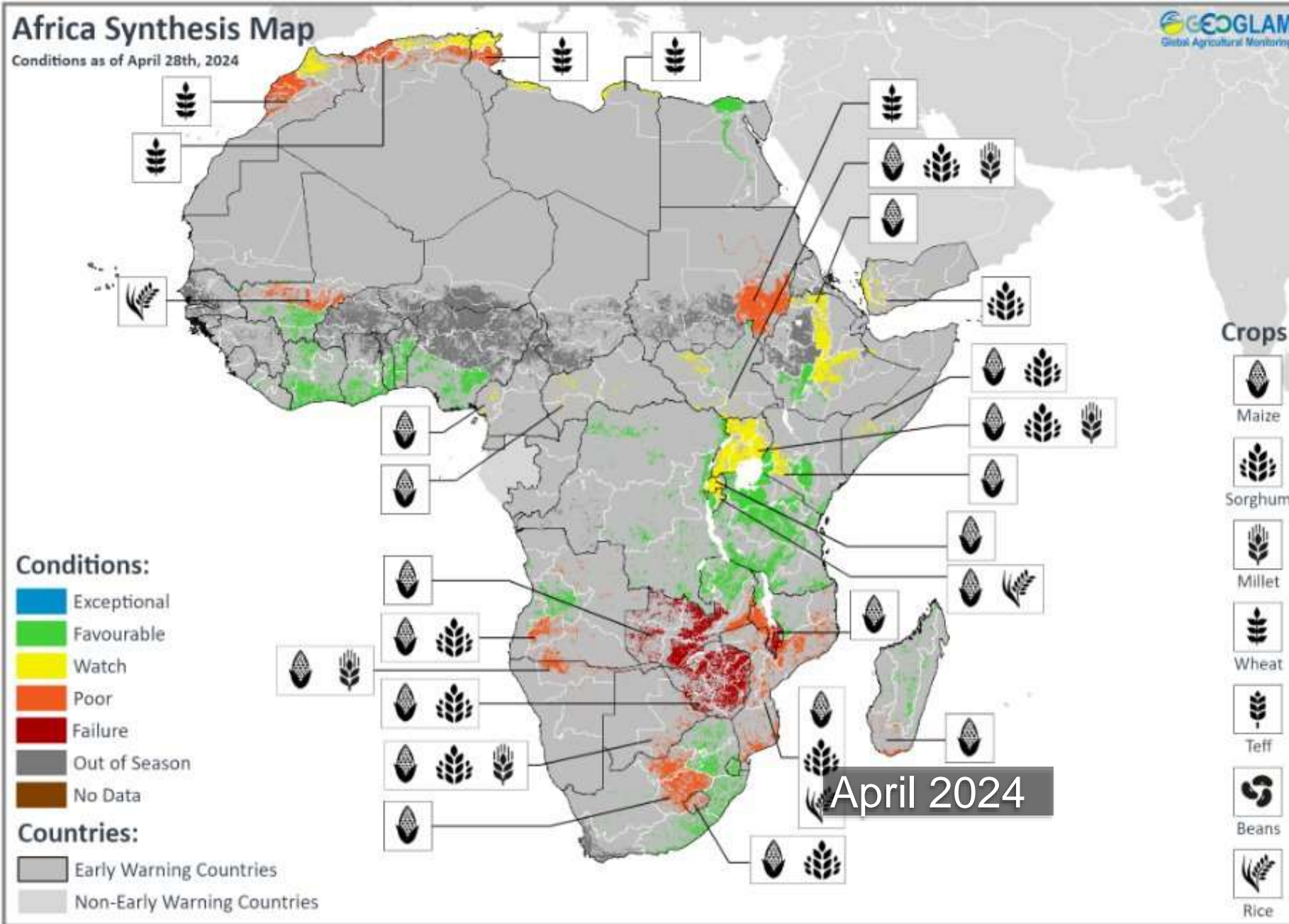
**Contents:**

Conditions at a Glance.....	2
Global Climate Outlook; Climate Influences.....	3
East Africa; Regional Outlook.....	5
West Africa.....	8
Middle East & North Africa.....	9
Southern Africa.....	10
Central & South Asia; Regional Outlook.....	12
Southeast Asia; Regional Outlook.....	14
Central America & Caribbean; Regional Outlook.....	17
Appendix – Terminology & Definitions.....	19

## The Crop Monitor for Early Warning Launched 2016

- Covers **Maize, Sorghum, Millet, Wheat, Beans, Teff, and Rice** across multiple seasons
- Focusing on the countries at risk of famine
- Reflecting an international consensus
- Short and mid-term weather forecasts and seasonal forecast alerts in countries/regions of interest
- Enhancing data and building capacity in support of food security decisions
- Monthly publications





Partnering with the major international agriculture and food security monitoring organizations





Conditions:

- Exceptional
- Favourable
- Watch
- Poor
- Failure
- Out of Season
- No Data

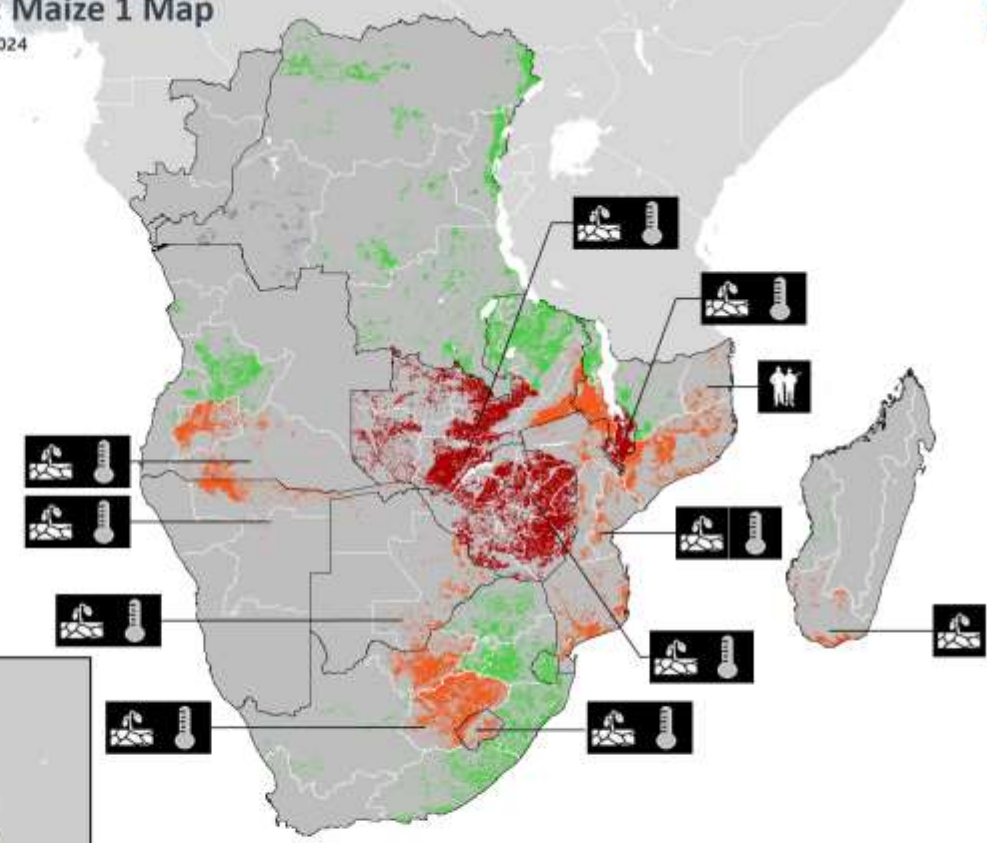
Drivers:

- Wet
- Dry
- Hot
- Cold
- Extreme Event
- Delayed Onset
- Pest & Disease
- Socio-economic
- Conflict

Maize 1 Calendar

Southern Africa: Maize 1 Map

Conditions as of April 28th, 2024

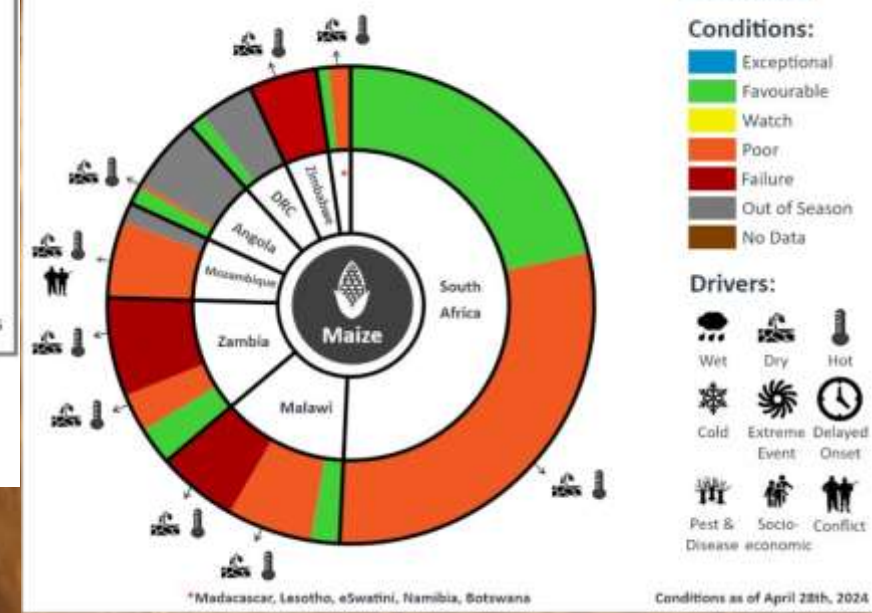


Crop Calendar:

- Planting - Early Vegetative
- Ripening through Harvest
- Out of Season
- Vegetative - Reproductive
- Post Harvest
- Minimal Production



Share of Total Early Warning Production



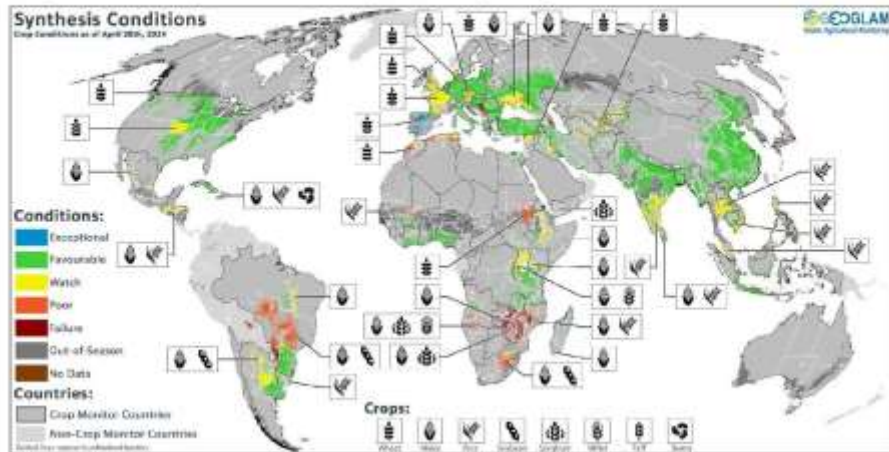
\*Madagascar, Lesotho, eSwatini, Namibia, Botswana

Conditions as of April 28th, 2024



## GEOGLAM Global Crop Monitor

Synthesized from the Crop Monitor for AMIS, the Crop Monitor for Early Warning, and direct submissions from individual countries.



Crop condition map synthesizing information for all Crop Monitor crops as of April 26th. Crop conditions over the main growing areas are based on a combination of inputs including remotely sensed data, ground observations, field reports, and national and regional experts. Regions that are in other than favourable conditions are labelled on the map with a symbol representing the crop(s) affected.

Current Conditions	Wheat	Maize	Rice	Soybean
Compared to last month	↑	↑	↑	↑
Compared to last year	↓	—	↓	↓

See Appendix I for detailed methodology description

**Legend:**

- Positive (Green)
- Mixed (Orange)
- Negative (Red)
- Better (Up arrow)
- Similar (Horizontal line)
- Worse (Down arrow)

### Global Crop Overview

Global crop conditions at the end of April are favourable for wheat and maize, while mixed for rice and soybeans. For **wheat**, sowing of spring wheat is continuing as trouble spots for winter wheat continue in Central Asia and parts of Europe. For **maize**, areas of concern remain in South America, Southern Africa, and East Africa as sowing speeds up in the Northern Hemisphere. For **rice**, dry conditions are a concern in southern India and northern Southeast Asia. For **soybeans**, hot and dry weather has negatively impacted crops in Brazil, northern Argentina, and South Africa. The remaining crops are covered in the [CM4EW](#) publication.

### Global Climate Influences

The El Niño event has continued to weaken, and neutral ENSO conditions are likely by April to June (85% chance). A quick shift to persistent La Niña conditions is anticipated. The CPC/IRI predicts a 73% chance of La Niña by July to September 2024, and chances remain high throughout the forecast period. For further details, see [page 6](#).

For further analysis of the historical impacts of La Niña events on crop yields, please see the write-up in the [CM4AMIS](#) report.

# The Global Crop Monitor

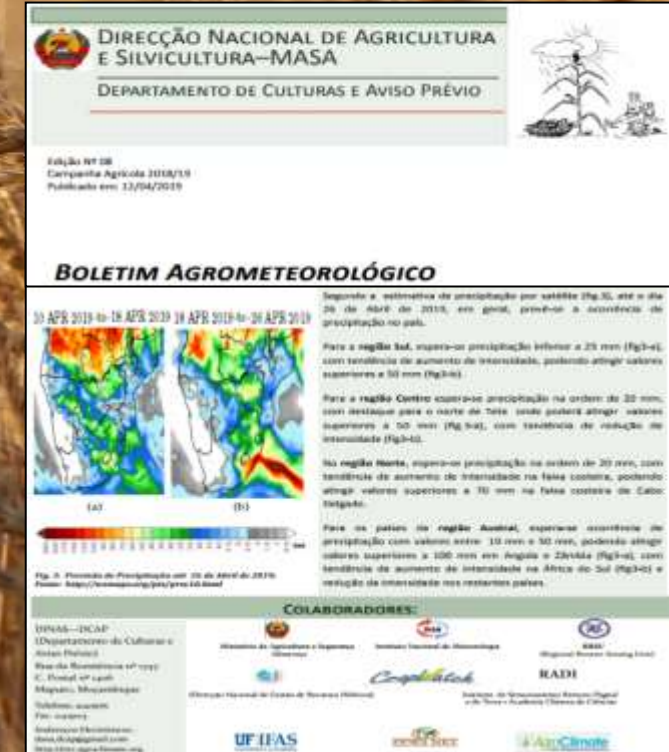
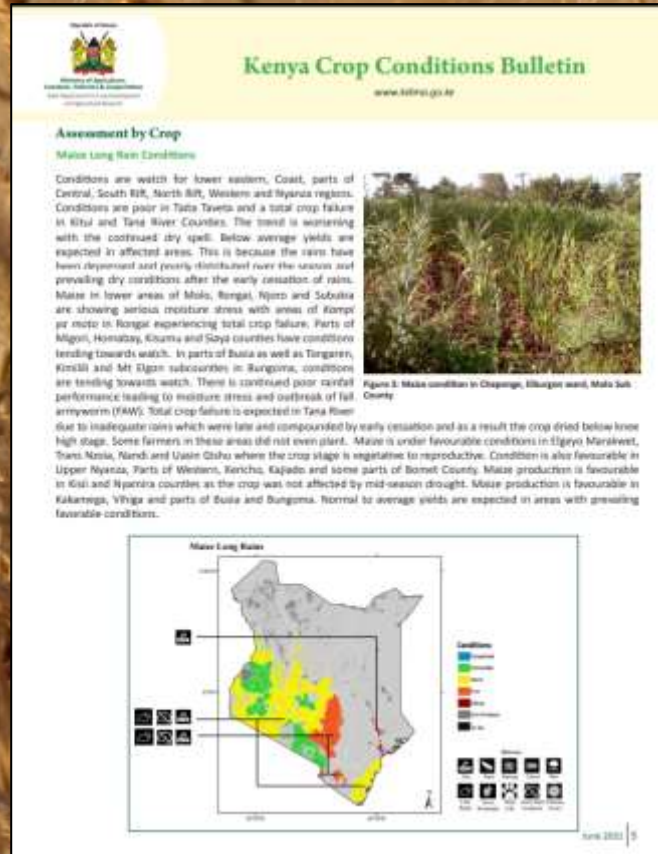
## Launched 2022

- A synthesis of both the Crop Monitor for AMIS and Crop Monitor for Early Warning



# Kenya

# Mozambique



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www.geoglam.org



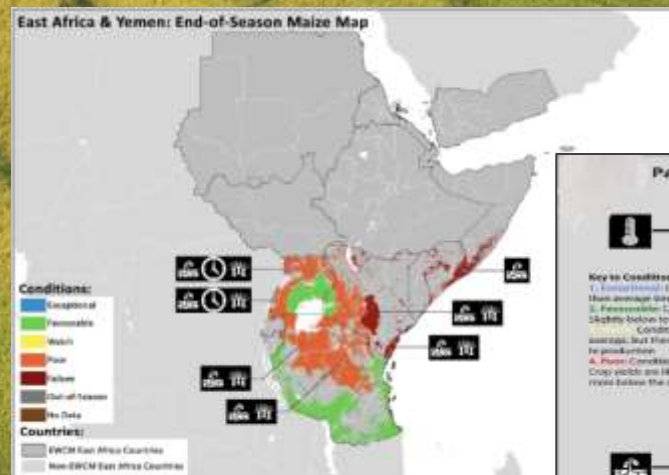
# National Impact Stories: Food Security - Uganda

## Karamoja Uganda, 2017

- GEOGLAM worked with the Ugandan Office of the Prime Minister to develop a crop monitor in 2016
- In 2017 the crop monitor provided **3 months** early warning of a likely crop failure due to drought, time to proactively **mitigate loss and damage**
- Monitoring triggered the Disaster Risk Financing (DRF) fund to scale-up public works projects in Karamoja, off-setting agricultural losses

**End result: USD 2.6 million saved, 150k people helped**

Crop Monitor  
August 2017 for Uganda



Pasture Conditions



**“In the past we always reacted to crop failure, spending billions of shillings to provide food aid in the region. 2017 was the first time we acted proactively because we had clear evidence from satellite data very early in the season”**

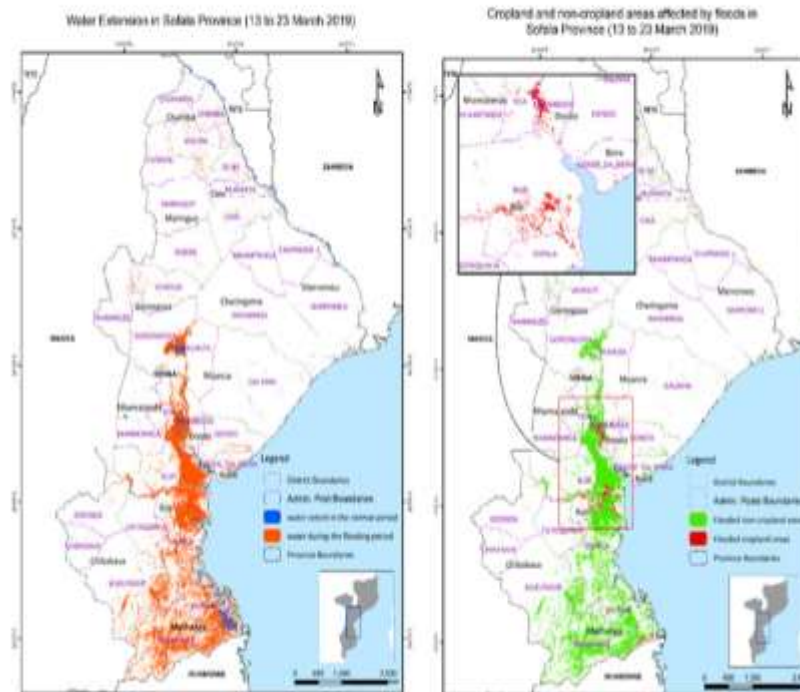
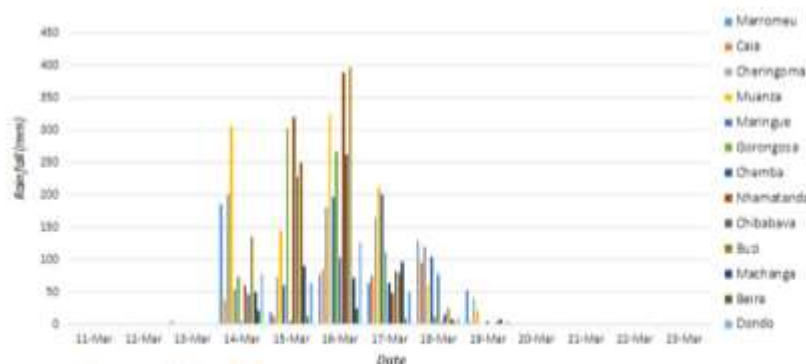
Commissioner, Office of the Prime Minister (OPM)



# National Impact Stories: Customized CropWatch - Mozambique

## Monitoring Flooded Cropland

- Daily rainfall for each district was calculated and flooded areas were mapped using Sentinel 1 radar data
- The information was used to identify flooded cropland post Idai, from early March to April
- Analysis generated statistical data to support food security response to the flooding



- High resolution crop type, phenology in Portuguese
- Enabled the leapfrog development of agricultural monitoring in Mozambique
- Proposed as the best rural solution by IFAD





## 1. CROP CONDITIONS ASSESSMENT

THE CROP MONITOR APPROACH BRINGS TOGETHER INTERNATIONAL EXPERTS FROM NATIONAL, REGIONAL, AND GLOBAL MONITORING SYSTEMS.



## 2. OPEN DISCUSSION

PARTNERS DISCUSS ISSUES AND DISCREPANCIES IN THE COLLECTION OF ALL CROP CONDITION ASSESSMENTS.



## 3. SUMMARY REPORT

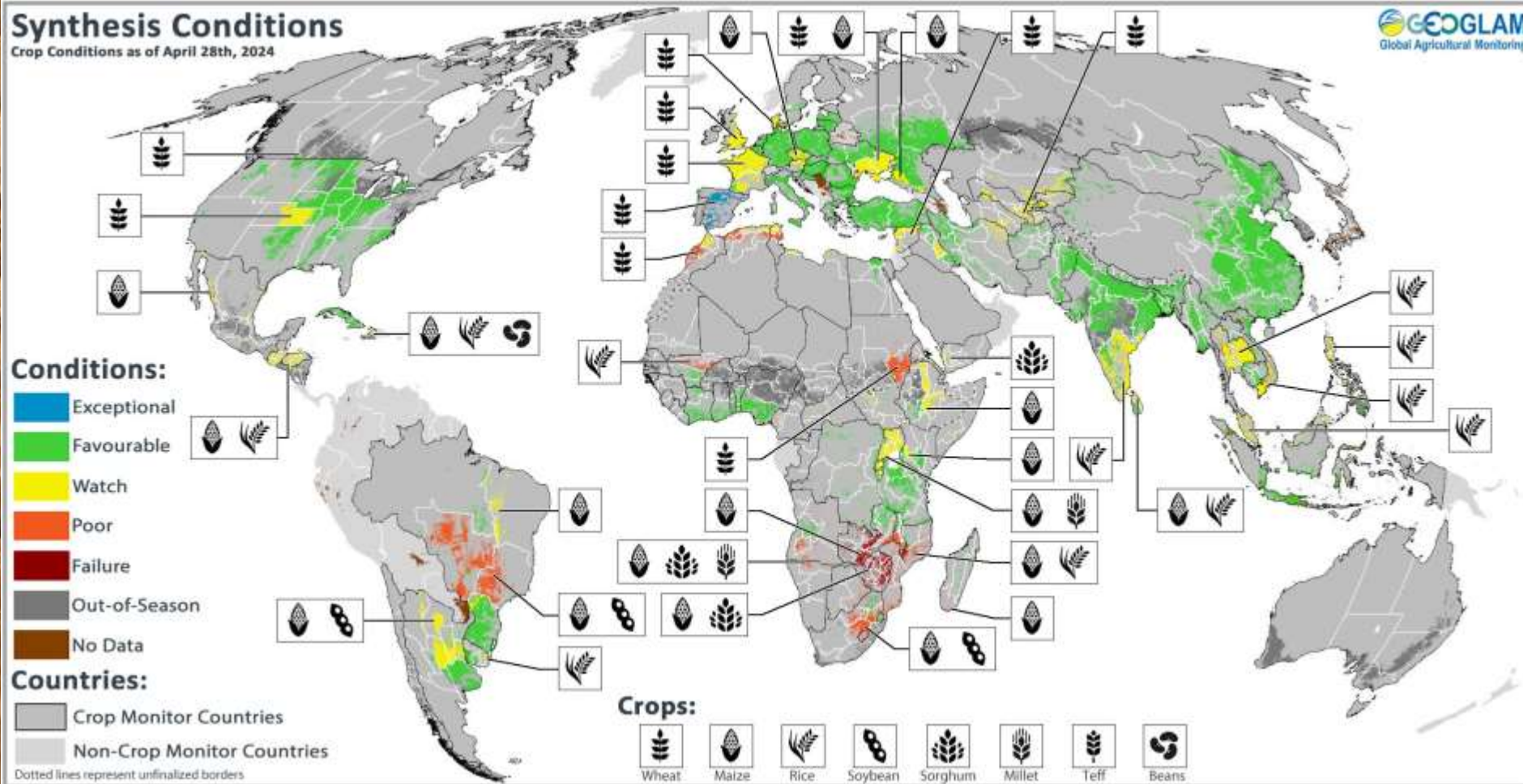
ONCE APPROVED, THE DRAFT IS READIED FOR PUBLICATION IN THE CROP MONITOR FOR AMIS BULLETIN, OR CROP MONITOR FOR EARLY WARNING BULLETIN.

# OPEN, TIMELY, AND SCIENCE-DRIVEN INFORMATION ON CROP CONDITIONS IN SUPPORT OF MARKET TRANSPARENCY AND EARLY WARNING OF PRODUCTION SHORTFALLS.

LATEST CONDITIONS PUBLISHED IN OUR REPORTS

## Synthesis Conditions

Crop Conditions as of April 28th, 2024







# Capacity Development & Resources



**Guidance Document On Good Practices For Designing,  
Implementing, And Evaluating Capacity Development  
Interventions In GEOGLAM**



<https://www.old.earthobservations.org/documents/geoglam/GEOGLAM%20Capacity%20Development%20Guidance%20Document.pdf>

# Developing the institutional capacity to use EO data

*GEOGLAM strengthens its partners' operational monitoring systems which use EO to empower science-based decision making, action taking, and policy for food security.*



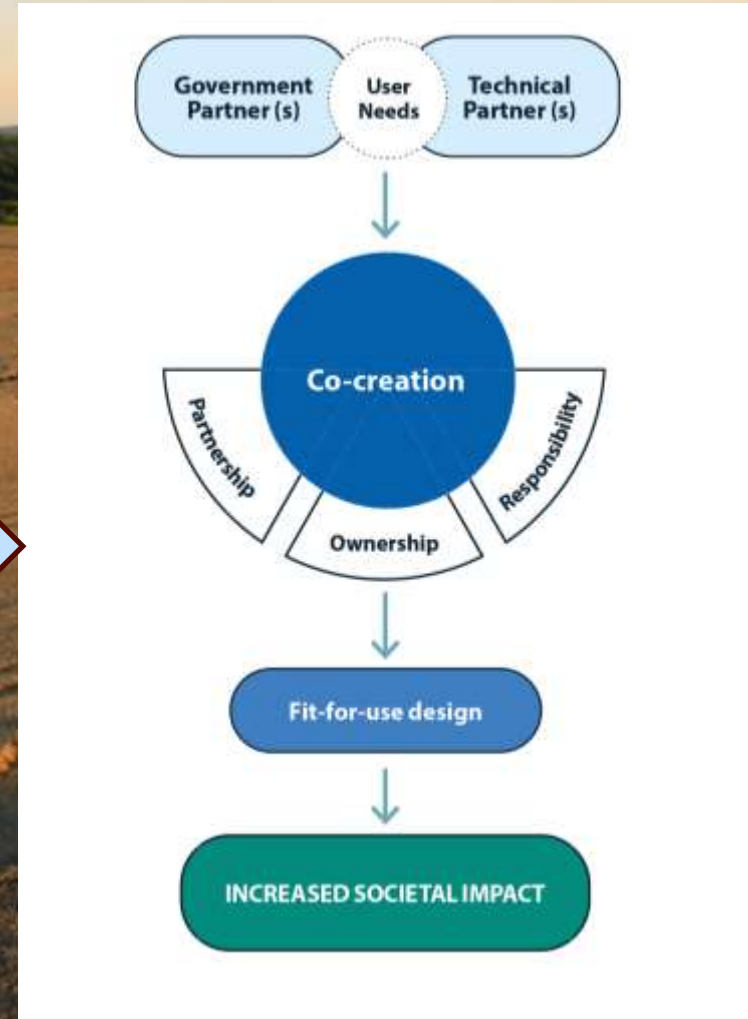
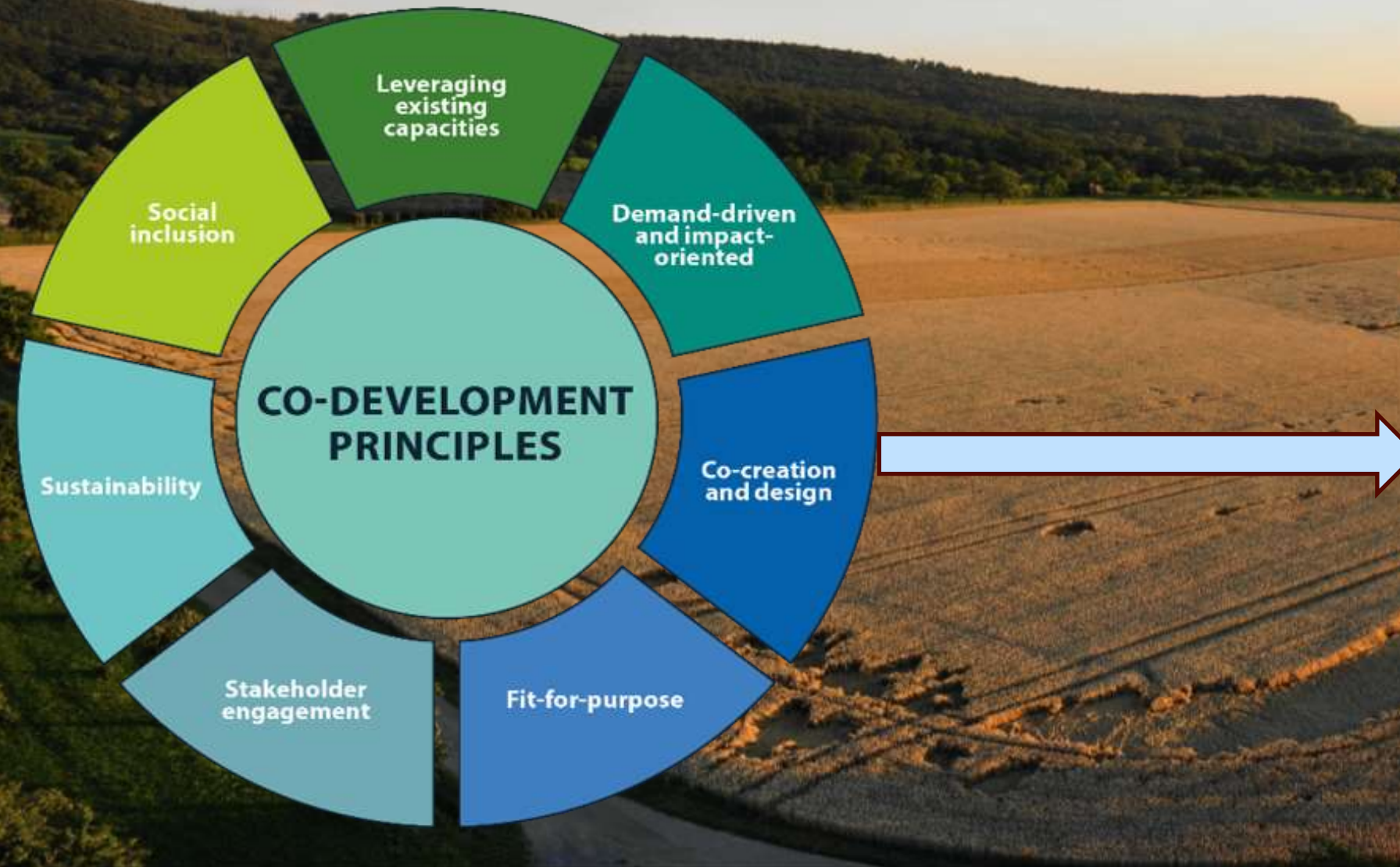
# Strengthening capacity at scale...



- Fully utilizing/leveraging EO capabilities in agriculture-related decision-making
  - e.g. Reading and Interpreting Ready EO information and products
- Adapting organizational workflows to exploit or improve the use of EO in agriculture monitoring
  - Identify the best EO Data Applications to use according to your needs and existing resources
  - Develop ground data collection applications and workflows (where none exist)
  - Integrate and adapt workflows for RS and in-situ data



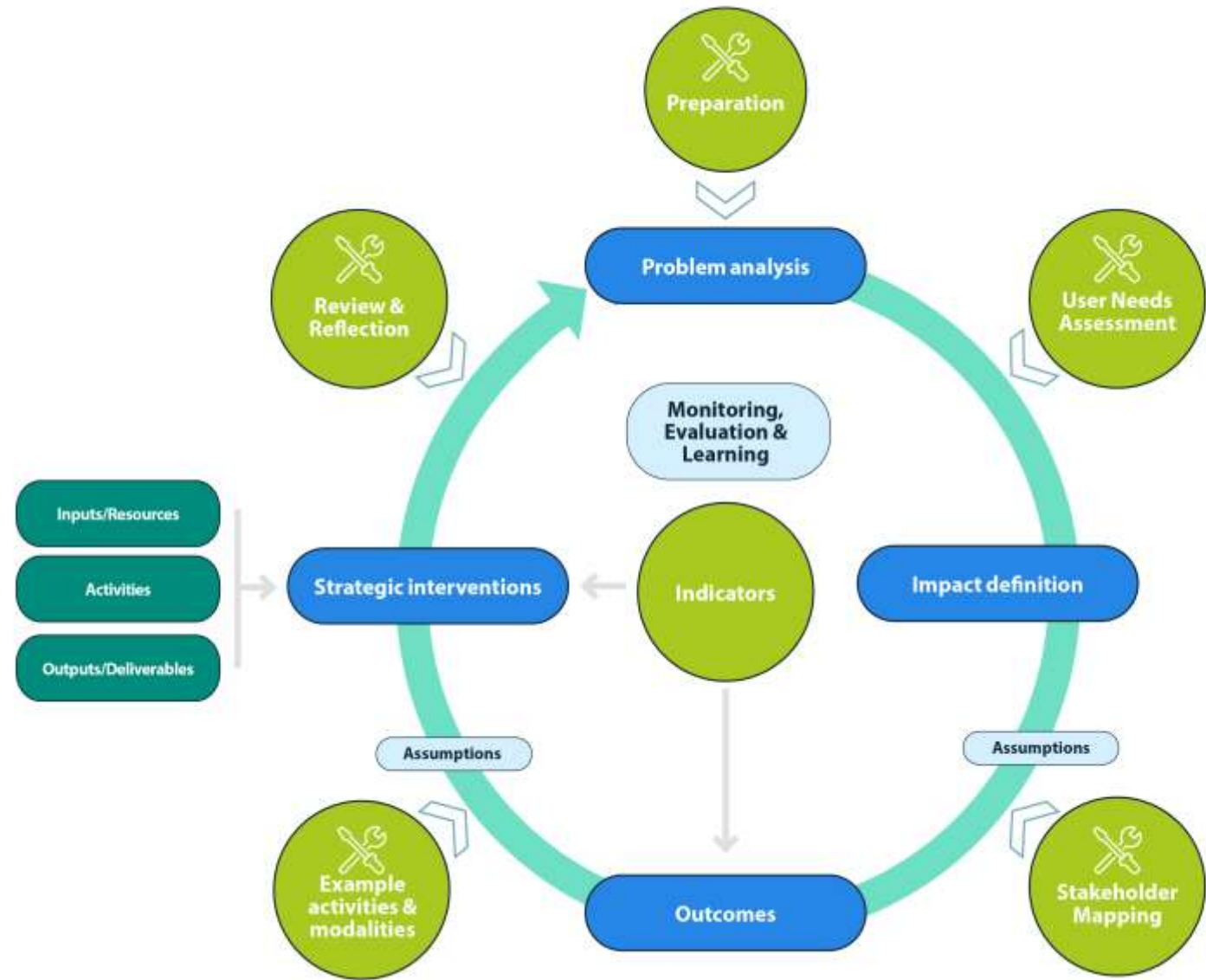
# Guiding Principles





# Designing your Impact and Theory of Change

- Starts with a **problem analysis** and then develops a **strategic pathway** towards the desired change/impact
- **Tools** to design, implement, and monitor a project



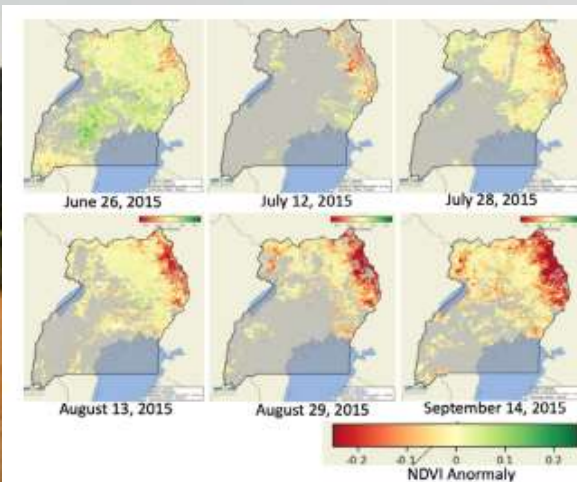


# National and regional case studies in Africa

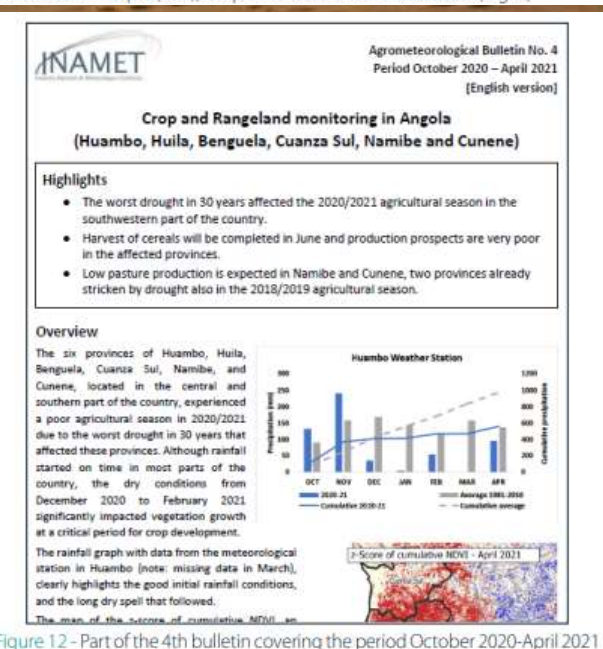
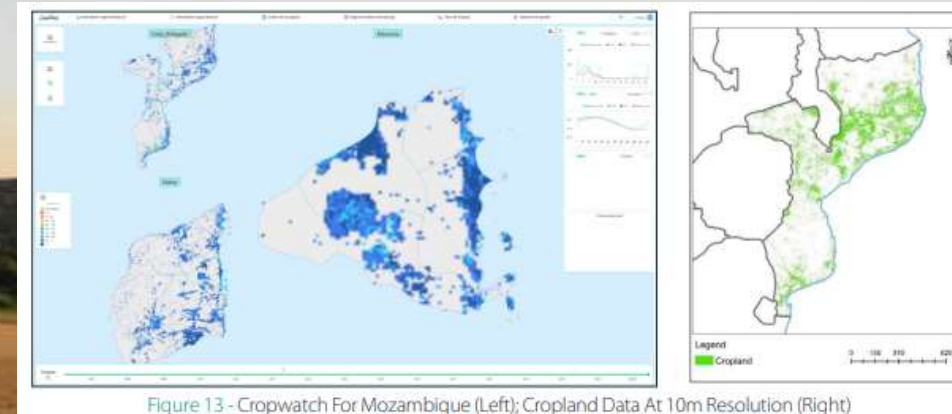
## National crop estimation system In South Africa



## The disaster risk financing program In Uganda



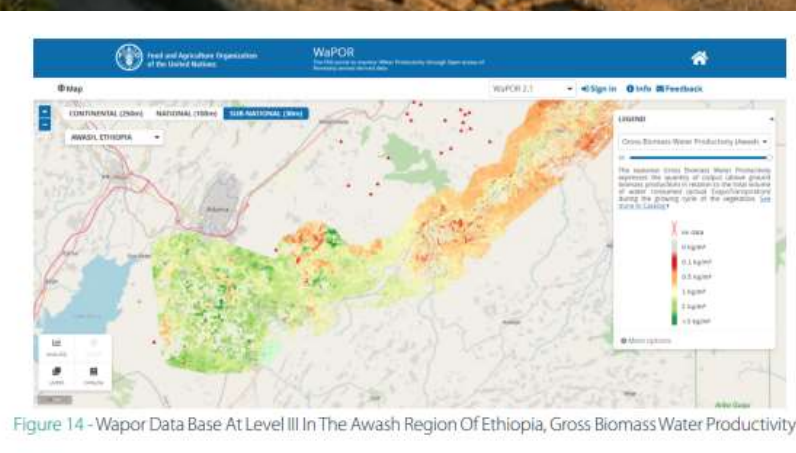
## CropWatch for enhancing food security governance in Mozambique



Capacity development to produce the agrometeorological bulletin for Angola



Development of the agriculture watch platform for East Africa



Development of an online agricultural water accounting platform



<p>LEAST DEVELOPED COUNTRIES</p> <p>NATIONAL ADAPTATION PLANS</p> <p>Technical guidelines for the national adaptation plan process</p> <p>UNE EXPERT GROUP DECEMBER 2012</p> <p>UNFCCC NAP Central</p>	Laying the Groundwork and addressing gaps	<p>A.1. Initiating the NAP process</p> <p>A.2.: Stocktaking</p> <p>A.3.: Addressing Capacity Gaps</p> <p>A.4.: Development Needs and Climate Vulnerabilities</p>
	Preparatory elements	<p>B.1. Analysing Current &amp; Future Climate</p> <p>B.2. Assessing Climate Vulnerabilities and Adaptation Options</p> <p>B.3. Review and Appraisal of Options</p> <p>B.4. Compiling, Communicating NAPs</p> <p>B.5. Integrating NAP into Development, Planning</p>
	Implementation strategies	<p>C.1. Prioritizing CCA in National Planning</p> <p>C.2. Long-term Implementation Strategy</p> <p>C.3. Enhancing Capacity for Planning, Implementation</p> <p>C.4. Promoting Coordination and Synergy</p>
	Reporting, Monitoring, Review	<p>D.1. Monitoring the NAP Process</p> <p>D.2. Assess Progress, Effectiveness, Gaps</p> <p>D.3. Iteratively Update NAPs</p> <p>D.4. Outreach and Reporting on Progress</p>

Focus on technical and institutional resources required for the successful implementation of NAPs

## Key steps needed to establish a National Agriculture Monitoring System based on Earth Observations:

1. Establishing the institutional framework
2. Establishing the technical framework
3. Accessing capacity (co-)development
4. Accessing financial support

## Integrating Earth observations into the Formulation and Implementation of National Adaptation Plans: Agriculture and Food Security

GEO Supplement to the UNFCCC NAP Technical Guidelines





## Additional Capacity Resources



1. Focus on Crop Monitor (October 25, 2023)
2. Focus on ASAP (November 16, 2023)
3. Focus on GLAM (January 24, 2024)
4. Focus on CropWatch (January 31, 2024)
5. Capacity (Co)Development – February 28, 2024

<https://gkhub.earthobservations.org/packages/qb27f-93m16>

## Workshops



Coming soon...

Webinar: Project Proposal Development –  
June 7, 2024





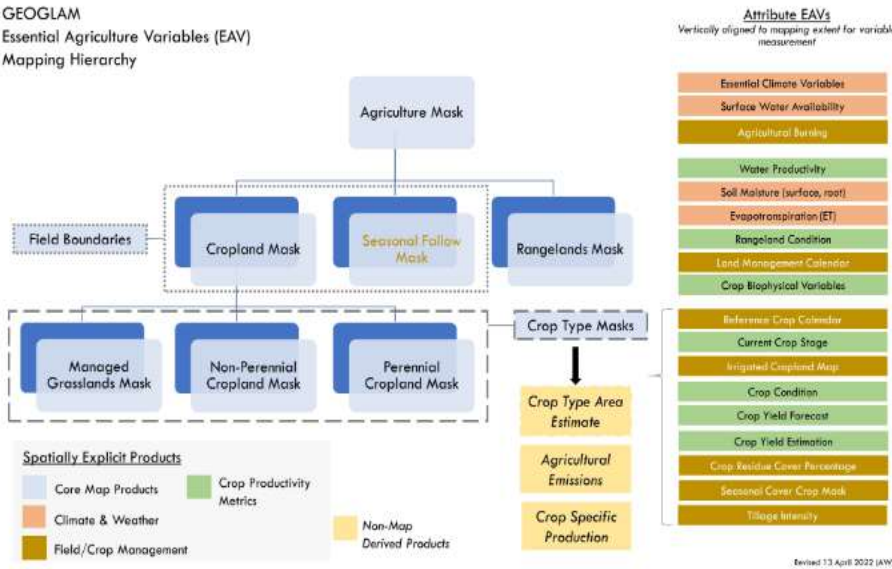
# Research and Development



# Essential Agriculture Variables & Agricultural Indicators for GEOGLAM

Essential Agricultural Variables for GEOGLAM are Earth observation-based “building blocks” that in combination with one another or with other non-EO information provide insight into the “GEOGLAM Agricultural Indicators” – which themselves provide actionable information on the state, change, and forecast of agricultural land use and productivity (Figure 1). GEOGLAM covers land devoted to agriculture, which is defined as the systematic and controlled use of land and livestock to produce food, fiber, and fuel. This includes croplands, rangelands, and short-term fallow lands.

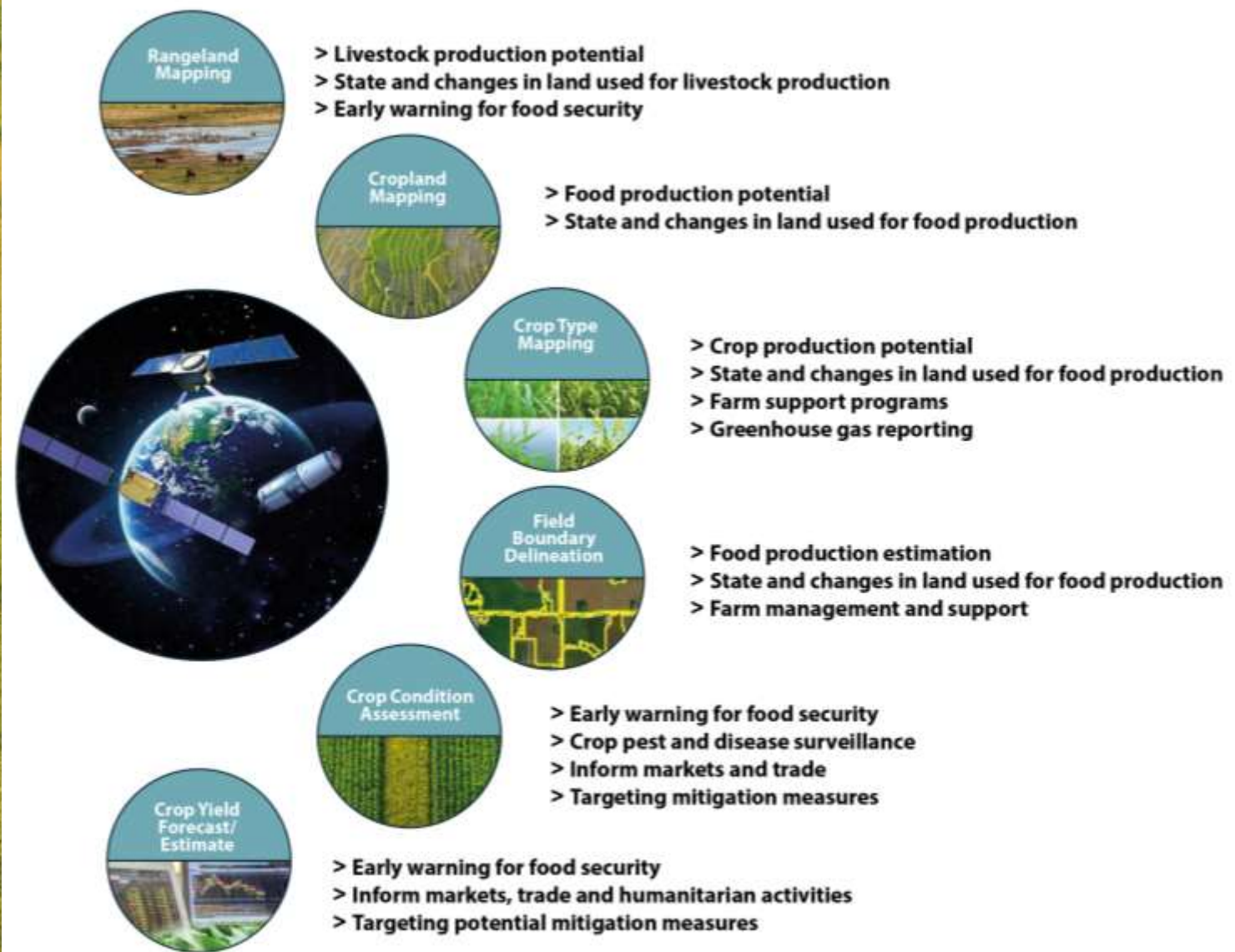
The EAVs can be measured or inferred from satellite data, and are supported through field data for calibration and validation. They support the core work of GEOGLAM and its constituent communities, including supporting national and global policy frameworks (e.g. G20 Action Plan and UN Sustainable Development Goals).





# Monitoring and Measuring Agriculture Land Use & Trends Using Earth Observations

- Better information means better decisions across the value chain
- Improving information from the international to national and farm levels
- Driven by Open Science and Open Data



 Earth Observation Application  
> Policy Application  
@G20\_GEOGLAM  
[www.geoglam.org](http://www.geoglam.org)



# GEOGLAM In Situ Data Coordination

- Why :
  - In situ is a growing priority for many institutions and funders
  - Many activities across the EO for agriculture community focus on some aspect of in situ data
  - Some incremental coordination leveraging our existing activities could have a major impact at relatively low cost

**“the whole can be greater than the sum of the parts”**

**Perhaps the last frontier to bridge:  
Open access to high quality, well managed in situ  
data for training and validation**







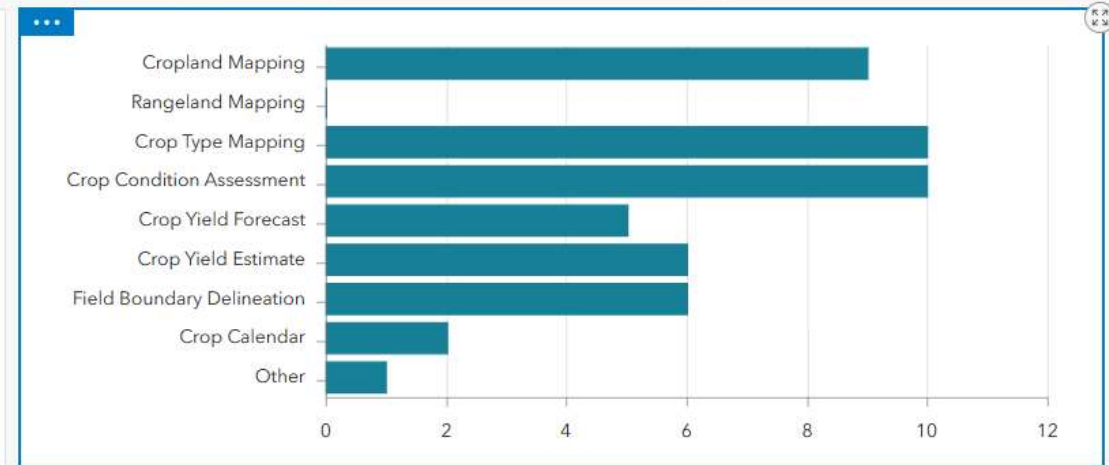
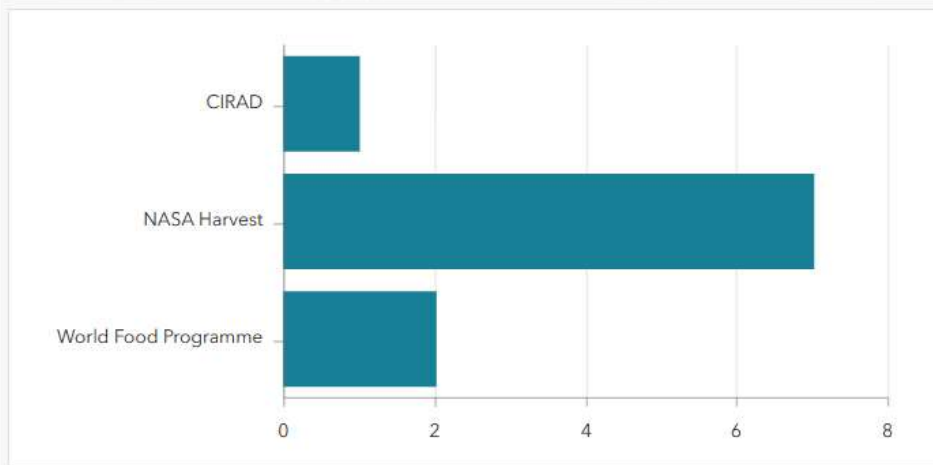
Essential Agriculture  
8

#### Instruments Used

Phone\_tablet 100%

Points 8.33%  
Polygons 8.33%  
Both 83.33%

Polygons 10%  
Points 10%  
Points and Polygons 80%





- Long term well established **global network** of ag. sites often selected for new EO mission priority acquisition
- **Collaborative partnership** of researchers eager to work together

## Why Join?

- ✓ Fast learning curve based on **collaborative research** across JECAM network
- ✓ **Brand visibility** relevant to site managers and space agencies
- ✓ Unique coverage of the **diversity of agricultural system**



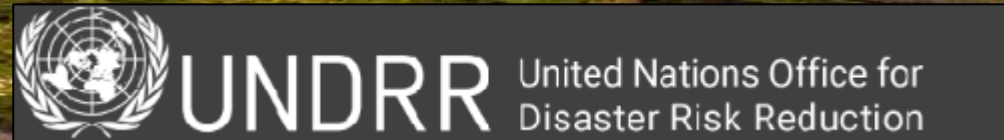
# Global Network of Voluntary Research Sites





# Concluding Thoughts ...

- Challenges for Food Security will only increase
  - Climate Extremes
  - Pest and disease
  - Conflict



... but so are our collective efforts

“the whole can be greater than the sum of the parts”







# Contact us

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