

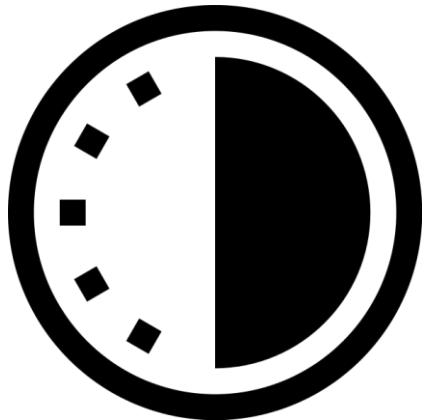
Se: GeoHumanitarian Action

WEATHER OBSERVATIONS FOR FOOD SECURITY

Benjamín ŠRAMO

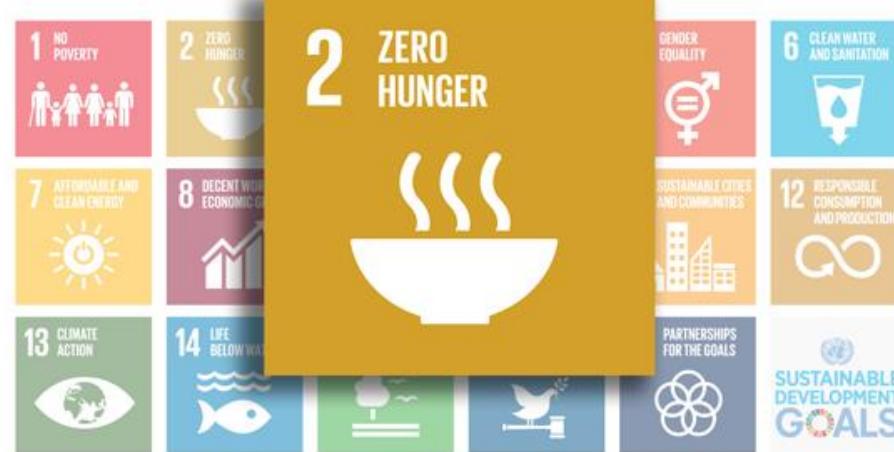
1. 12. 2021

OUTLINE



- I. Introduction to Food Security
- II. Humanitarian Actors
- III. Data Collection, Analysis, Application
- IV. Case Study of Cabo Delgado (Mozambique)

SUSTAINABLE DEVELOPMENT GOALS



 **9.5M**

Chronic hunger
(undernourishment)
(SOFI Report, 2021)¹

 **29.5M**

Population
(World Bank, WFP, 2020)

 **0.4M**

Acute hunger
IPC Phase 3+
(IPC, Oct 2021 - Feb 2022)²



Metuge district, Cabo Delgado,
where over 33 000 displaced
people now live.

Photos: WFP, Nuno Rebocho



WEATHER OBSERVATIONS → Sustainable Agriculture (Selvaraju et al., 2011)



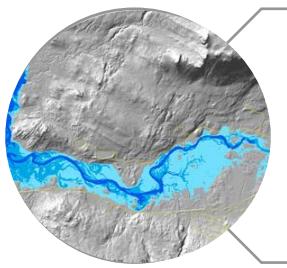
MANAGING RESOURCES

- Climate as a resource: enhance agricultural livelihoods, reduce causes of vulnerability



MANAGING RISKS

- Climate as a risk: time scale incorporation, risk assessment

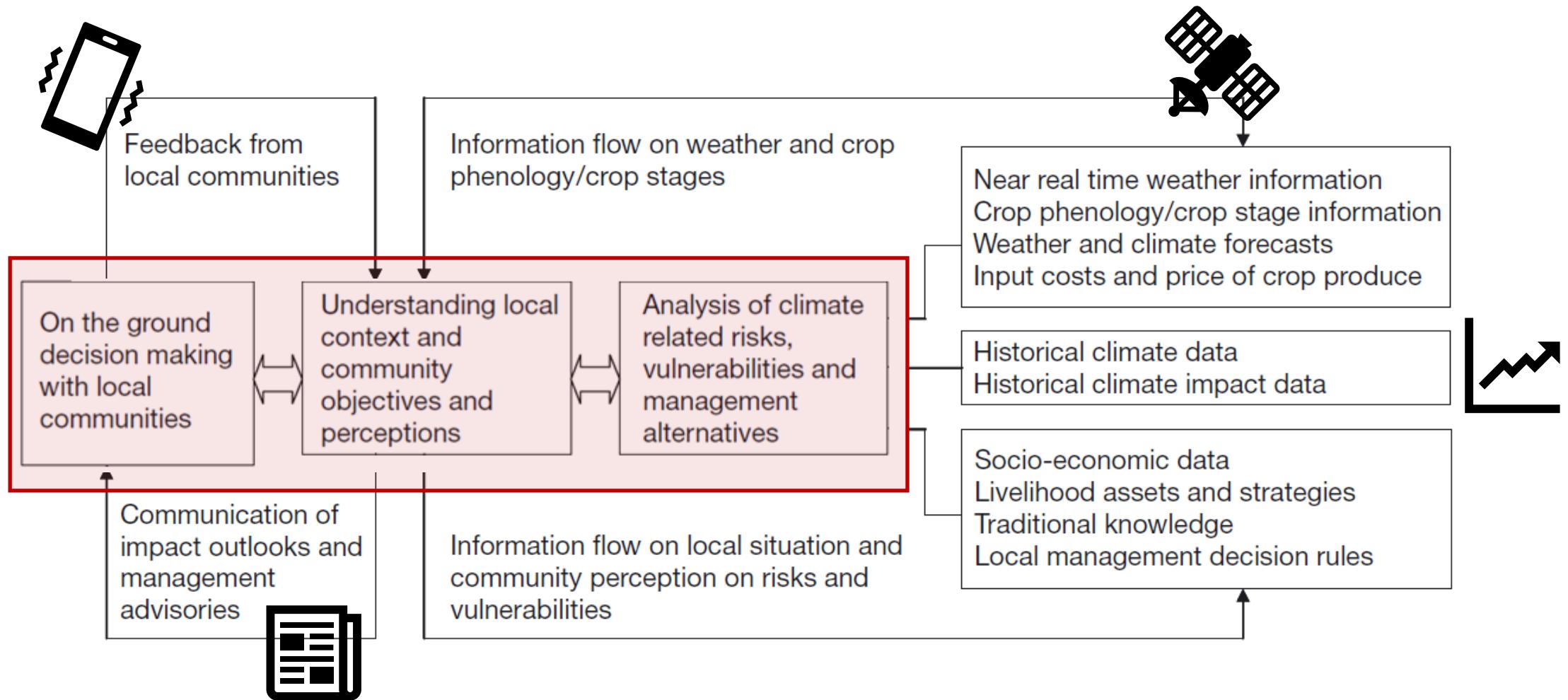


ENHANCING RESILIENT ADAPTATION

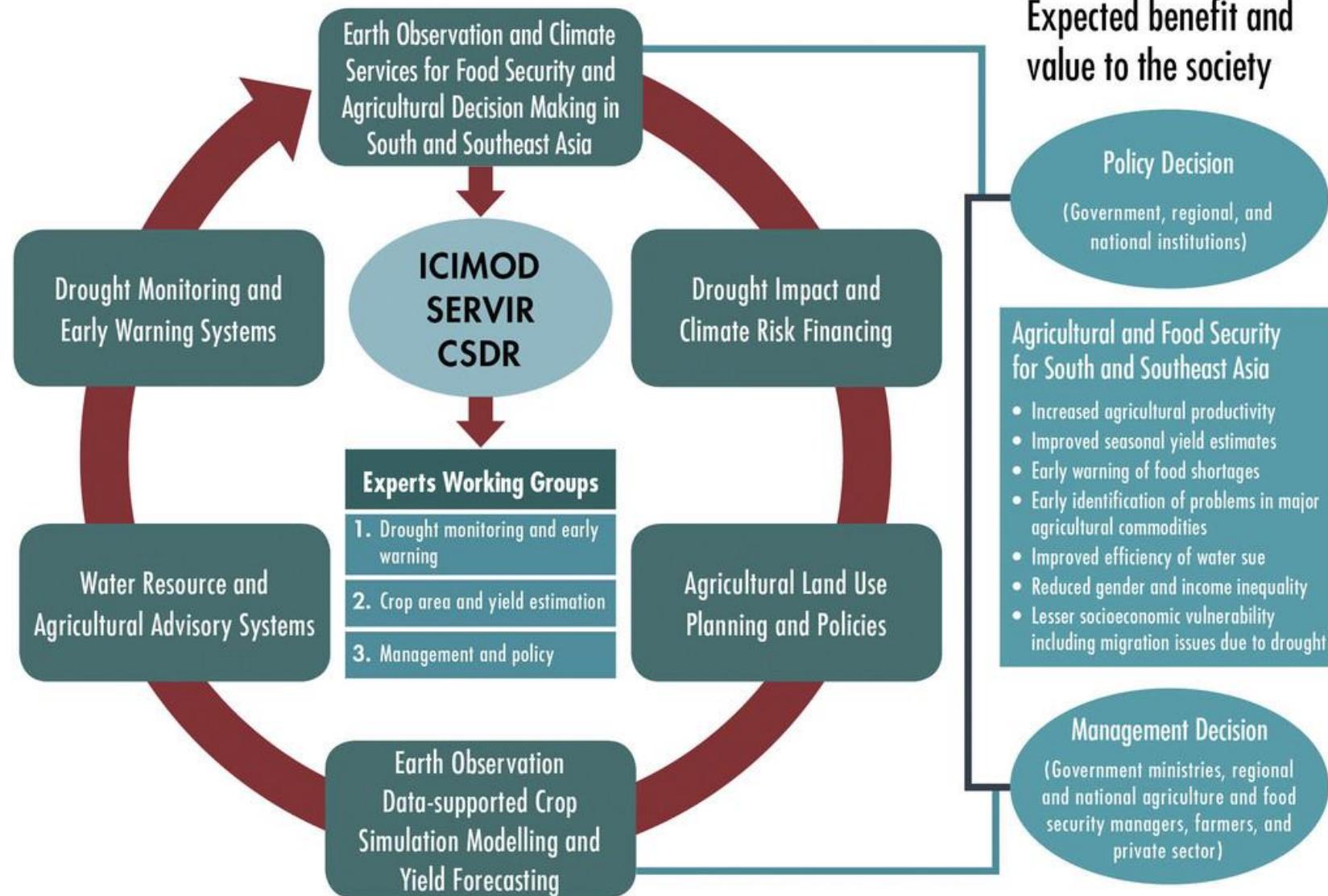
- Climate as a scenario: future or short-term scenarios for adaptation and mitigation strategies

„Efficient management of water resources requires exploring the linkages between climate, soil and plant interactions. Water harvesting, techniques to increase soil moisture content and reservoirs for irrigation contribute to reduce the uncertainty of water availability.“

INFORMATION FLOWS (Selvaraju et al., 2011)



INFORMATION FLOW (Quamer et al., 2019)



HUMANITARIAN ACTORS



**GLOBAL
FOOD SECURITY CLUSTER**
Strengthening Humanitarian Response

WFP

wfp.org

World Food Programme

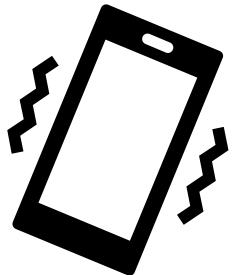
Food and Agriculture Organization of the United Nations



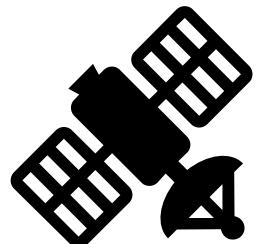

WFP: Arif Husain (22. 10. 2021)



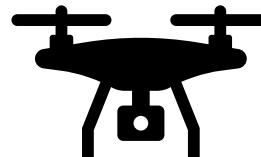
- Automated processes and custom-built systems **shrinking the time** from data collection to publication from months to days.
- Introducing interoperability between our tools and systems has allowed us to seamlessly **mix and match digital solutions**.
- We embark on mass standardization to ensure that our data, tools and systems **can be used and reused, available** to anyone, anywhere and at any time.
- In Mozambique, a country highly exposed to climate shocks, we are **working with the government** to develop tools and systems for forecasting and monitoring drought, transforming geospatial data and a variety of satellite and imagery into actionable information that will strengthen disaster preparedness and resilience to climate shocks.



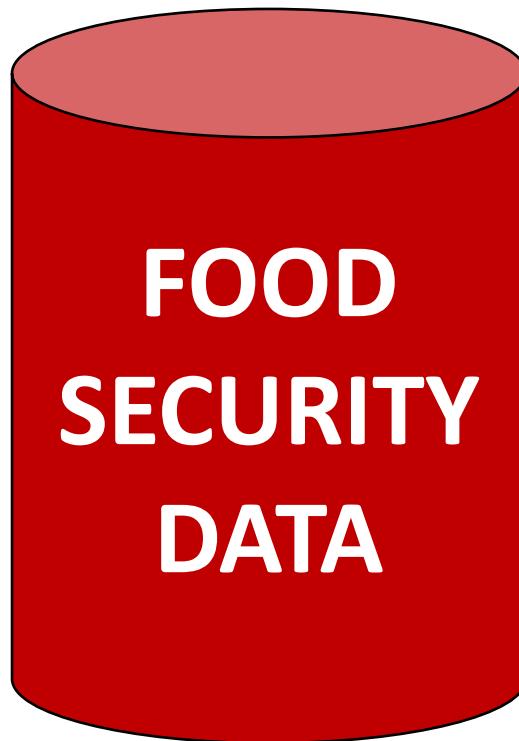
Tracking the needs
of affected
communities



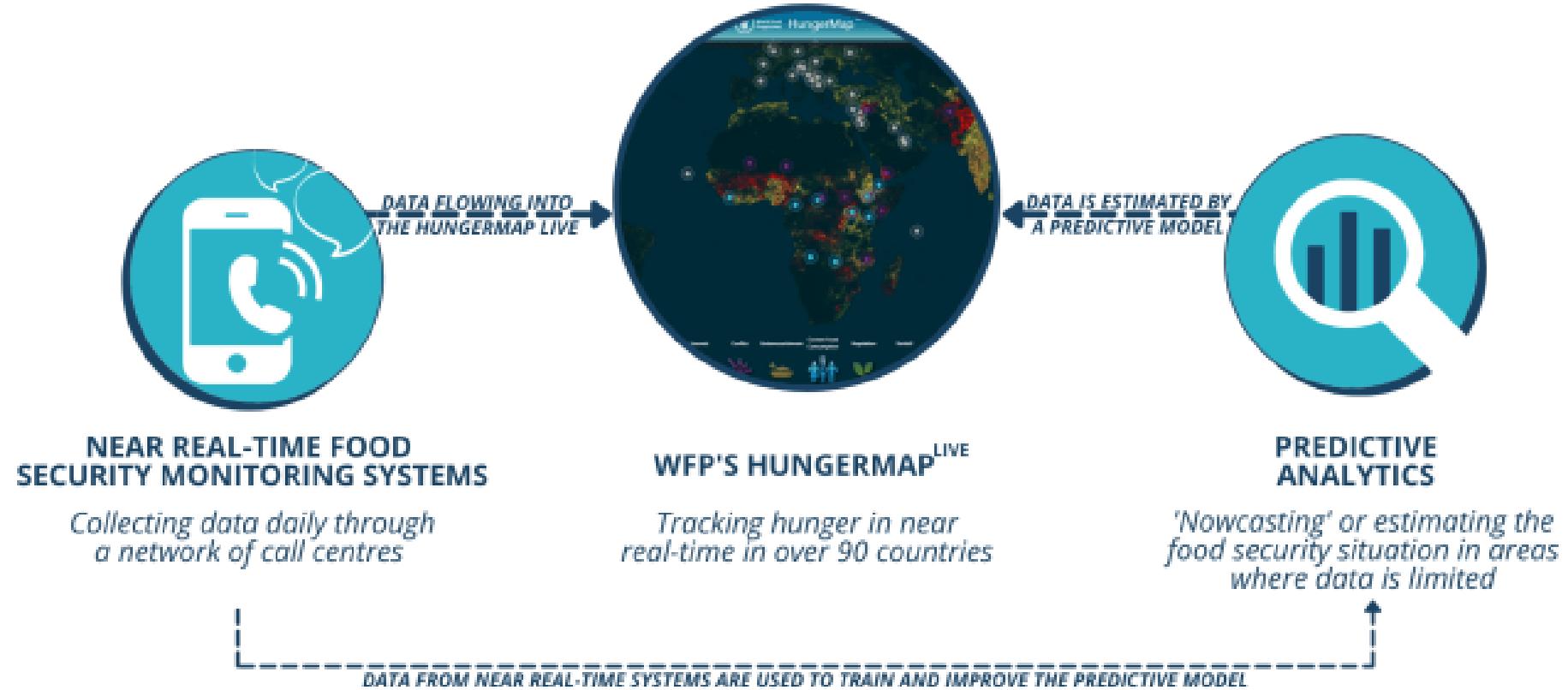
Crop production
prediction



Rapid damage
assessment



WFP Southern Africa Seasonal Update
Regional Bureau for Southern Africa (RBJ)



Seasonal Explorer

Rainfall and Vegetation

Visualizations

How it works

River Basins

Reports

Mozambique

Cabo_Delgado

Please Select Admin 2

[Home](#) / Seasonal: Rainfall & Vegetation: Visualizations

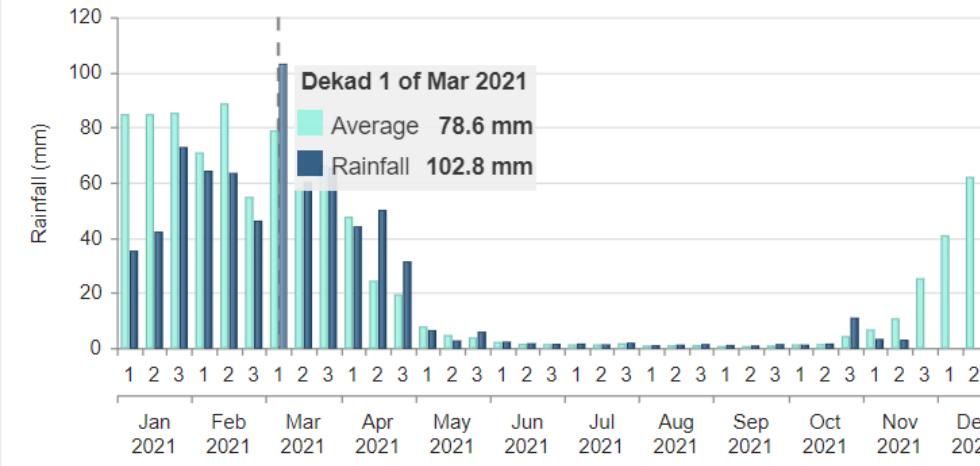
Cropland All Pasture



Rainfall



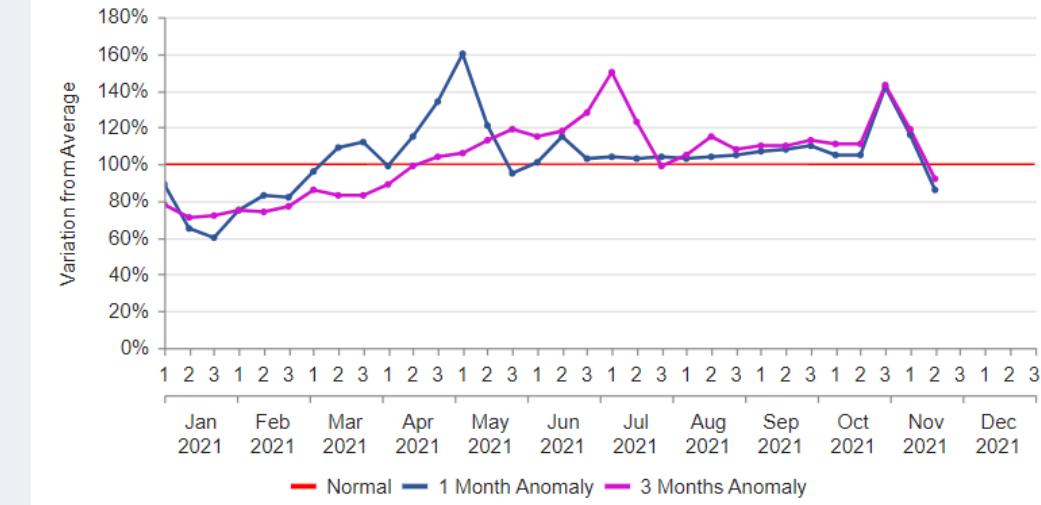
Mozambique - Cabo_Delgado - 2021



Rainfall Anomalies



Mozambique - Cabo_Delgado - 2021



NDVI



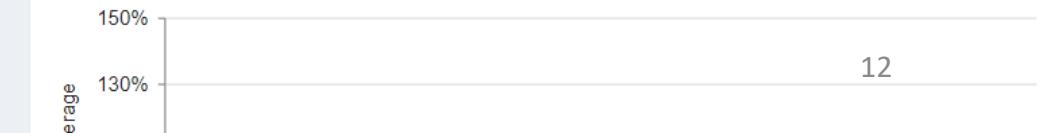
Mozambique - Cabo_Delgado - 2021



NDVI Anomaly



Mozambique - Cabo_Delgado - 2021



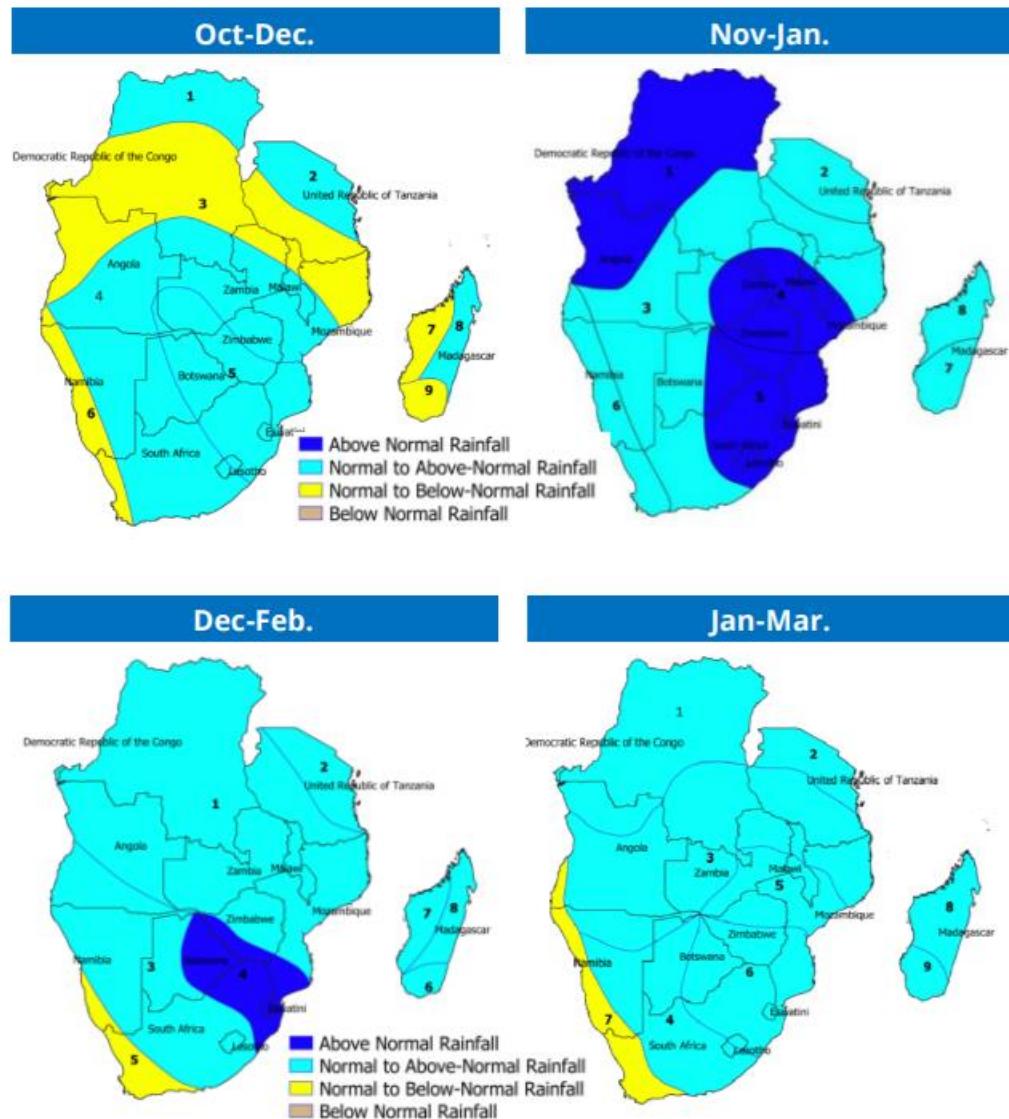


WFP Southern Africa Seasonal Update

Regional Bureau for Southern Africa (RBJ)

- La Niña monitoring (ENSO forecasting). Latest official forecast indicates 87% chance of La Niña.
- Characterized by tropical cyclones causing severe weather and flooding for the season 2021/2022.

Figure 2 SARCOF Rainfall Outlook 2021/2022



Source: [Statement from the 25nd Annual Southern Africa Regional Climate Outlook Forum \(SARCOF-25\), September 2021](#)

WFP Southern Africa Seasonal Update

Regional Bureau for Southern Africa (RBJ)

Figure 9 Mozambique: Rainfall Outlook 2021/22

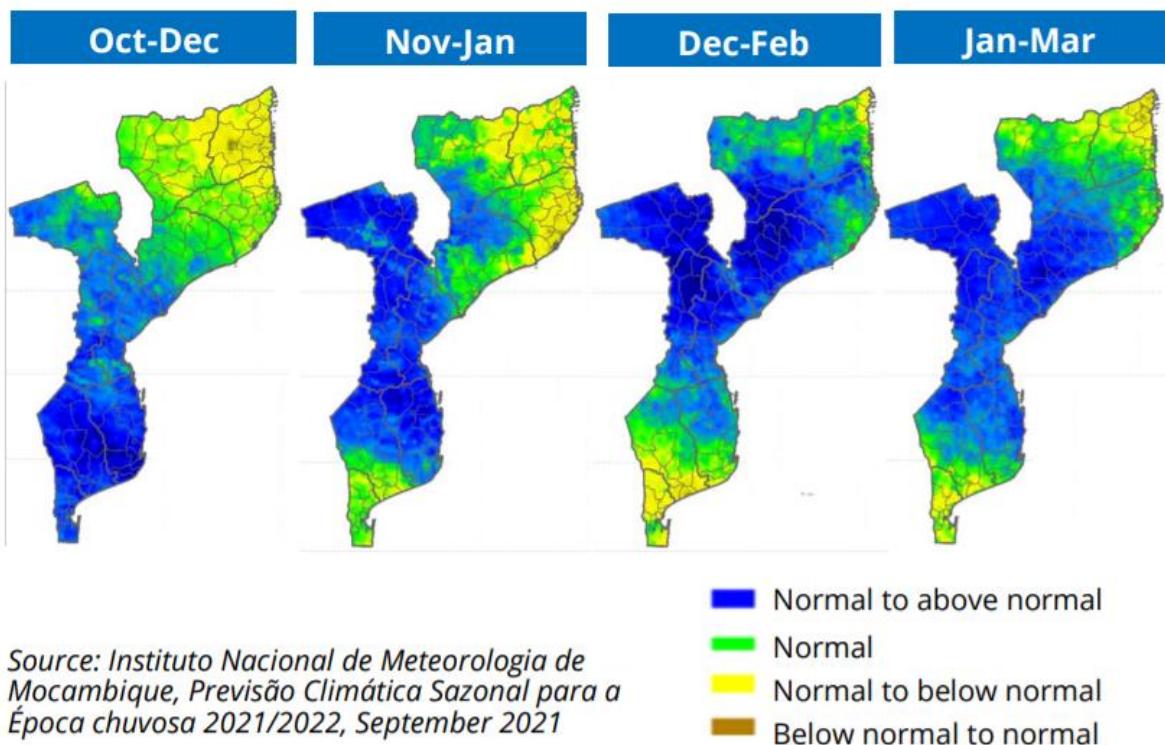
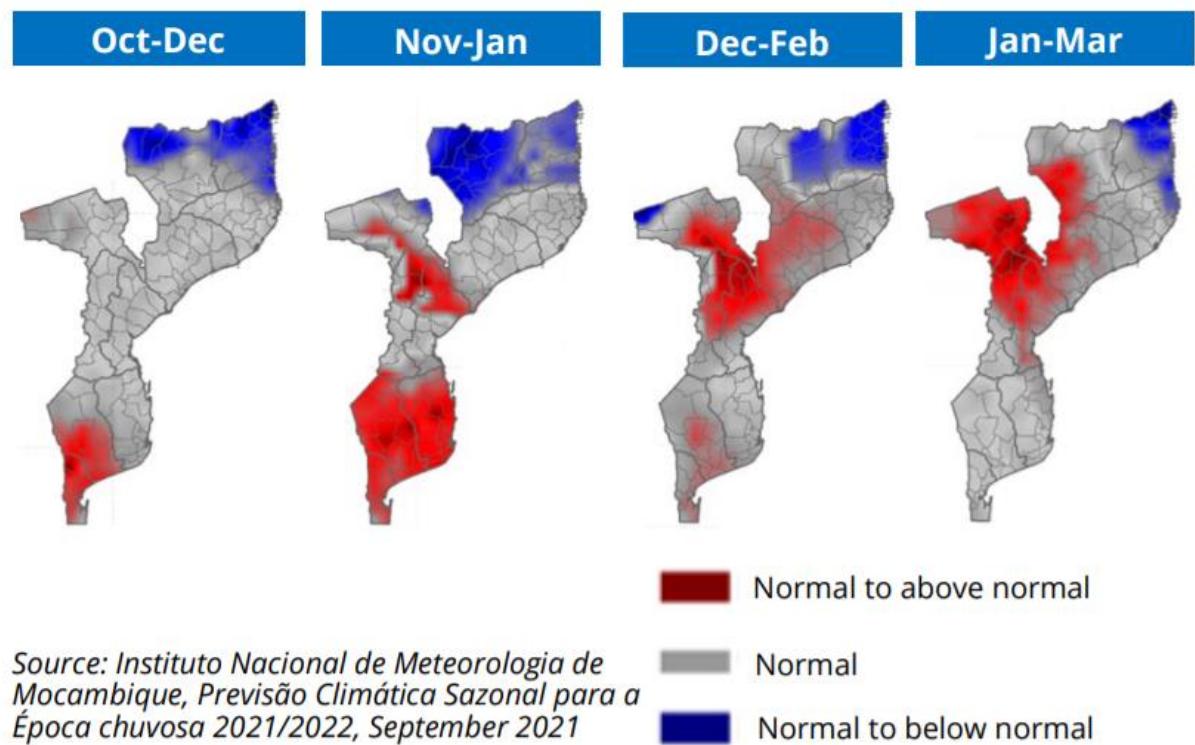
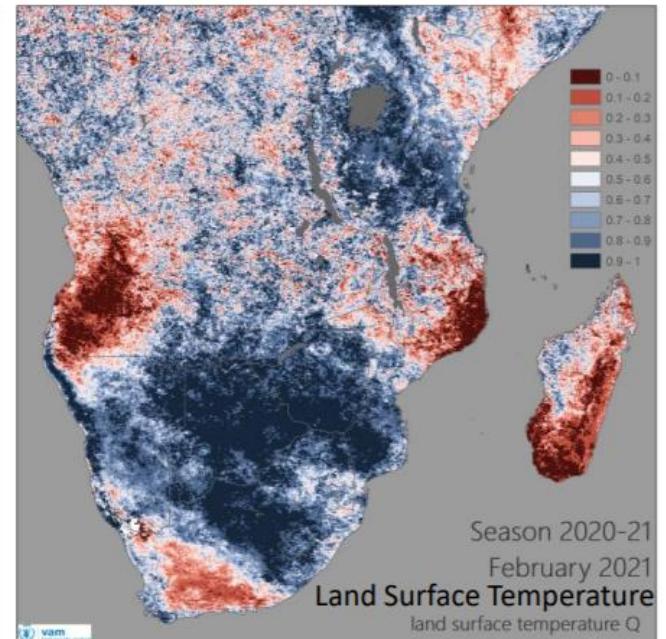
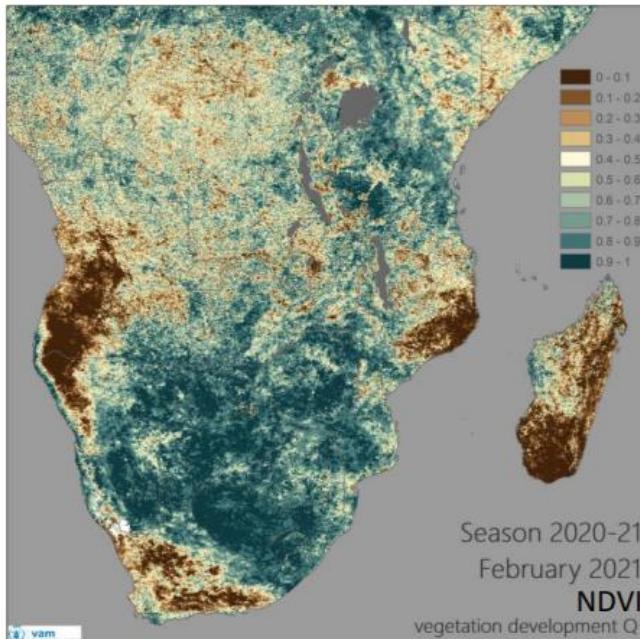
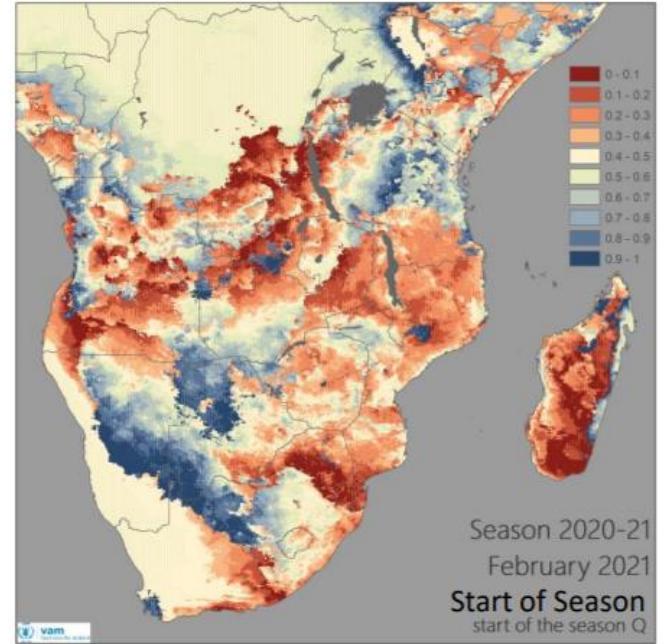
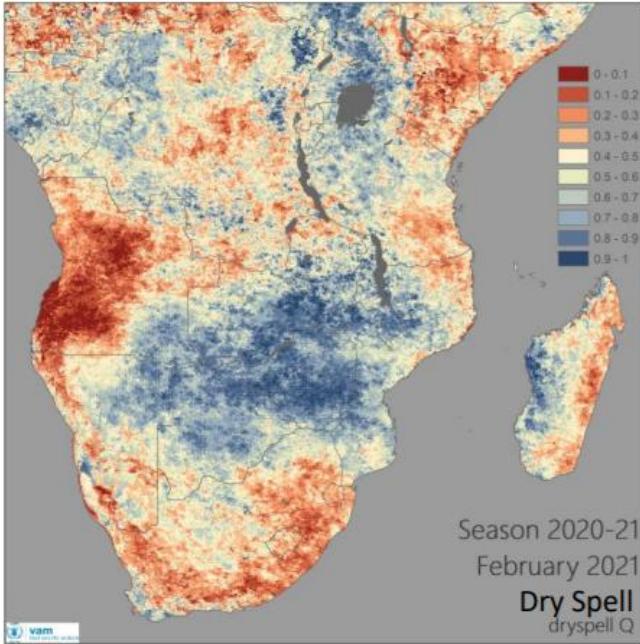
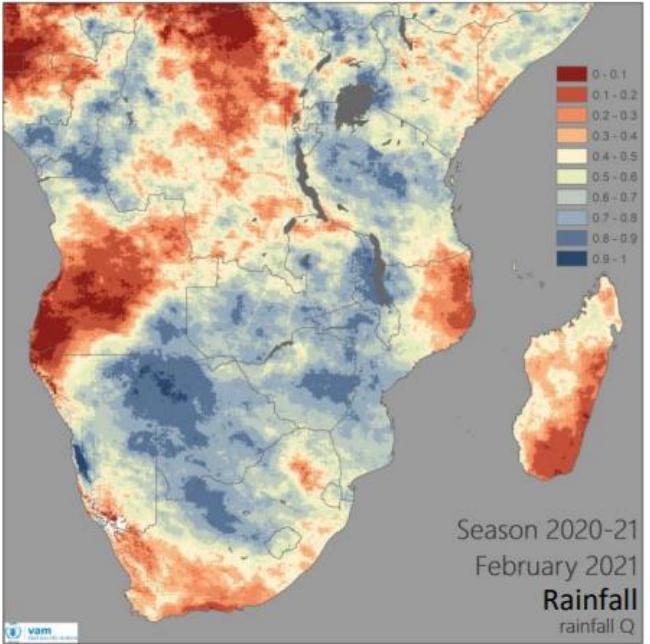


Figure 10 Mozambique: Temperature Outlook 2021/22



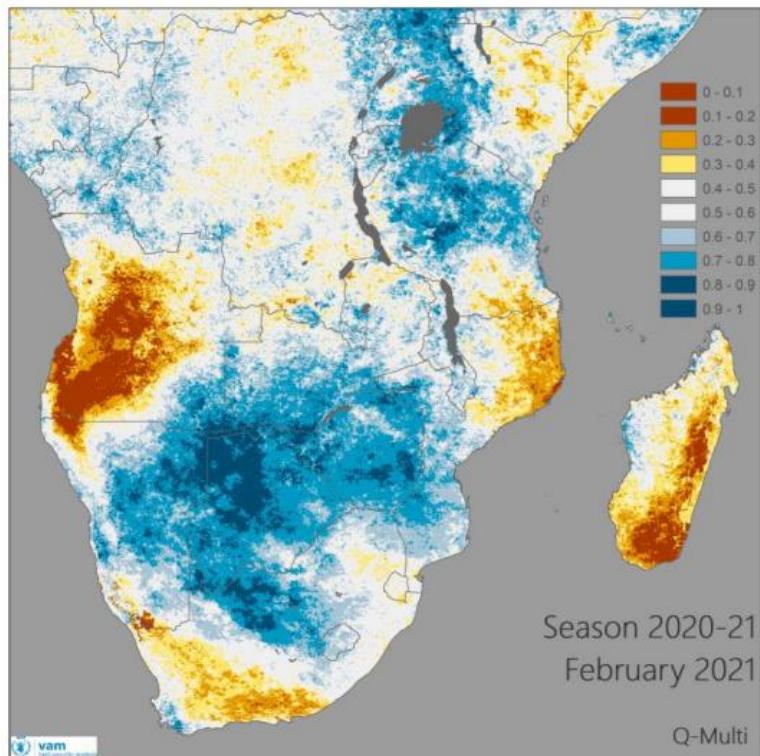
Derivation of Q_{multi} for 2020-2021 (Inputs)



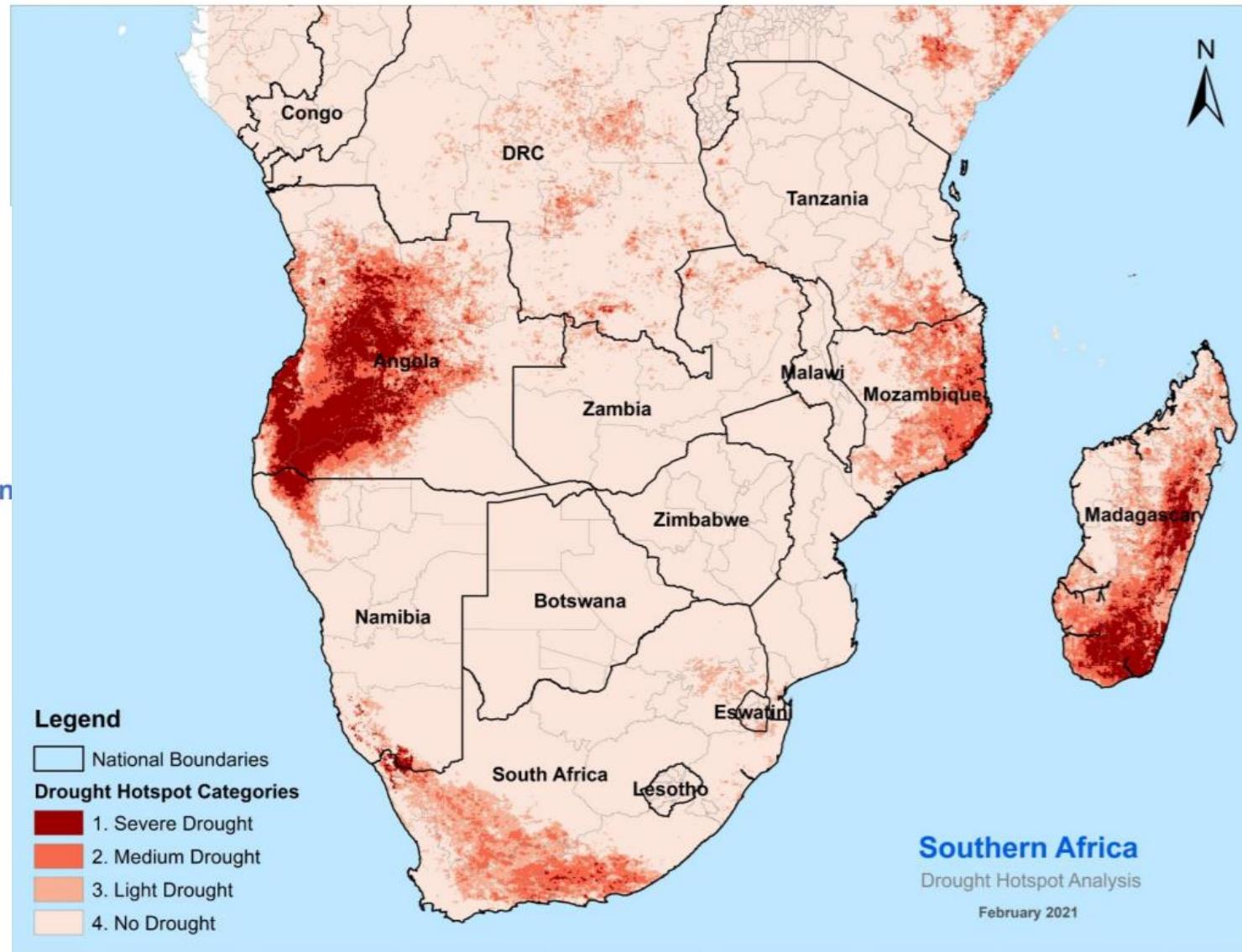
WFP Southern Africa Seasonal Update
Regional Bureau for Southern Africa (RBJ)

Food Insecurity due to Drought

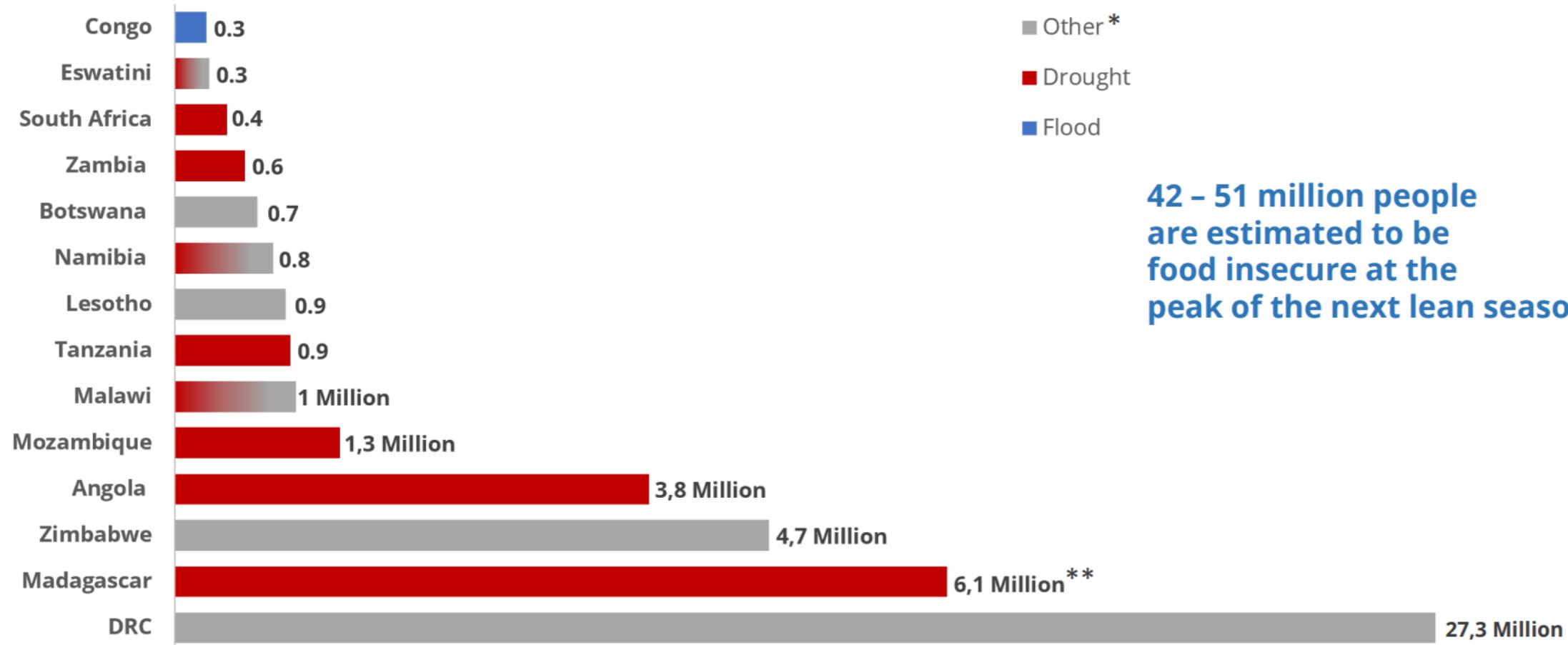
Q_{Multi} (2020/2021)



Reclassification
→



Food Insecurity due to Drought



**42 – 51 million people
are estimated to be
food insecure at the
peak of the next lean season**

* "Other" refers to the cereal adequacy ratio for all countries except DRC. DRC estimates are from the IPC figures.

** In the Grand Sud and Atsimo Atsinanana, 2.4 million people are estimated to be food insecure.



FAO and EO



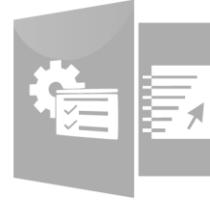
- Land Cover
- Drained organic soils
- Emissions from fires

AQUASTAT

water and agriculture data
(irrigation equipment, water
resources and management)



- monthly cloud-free composites;
- monthly dynamic cropland masks;
- cultivated crop type maps, twice along agricultural seasons;
- periodic vegetation status maps, NDVI and LAI.



AgrometShell



EARTH MAP

Search for locations

Explore Data

Map

Country Boundaries

Land Cover (Africa and Near East - Annual - 100m) - WaPOR

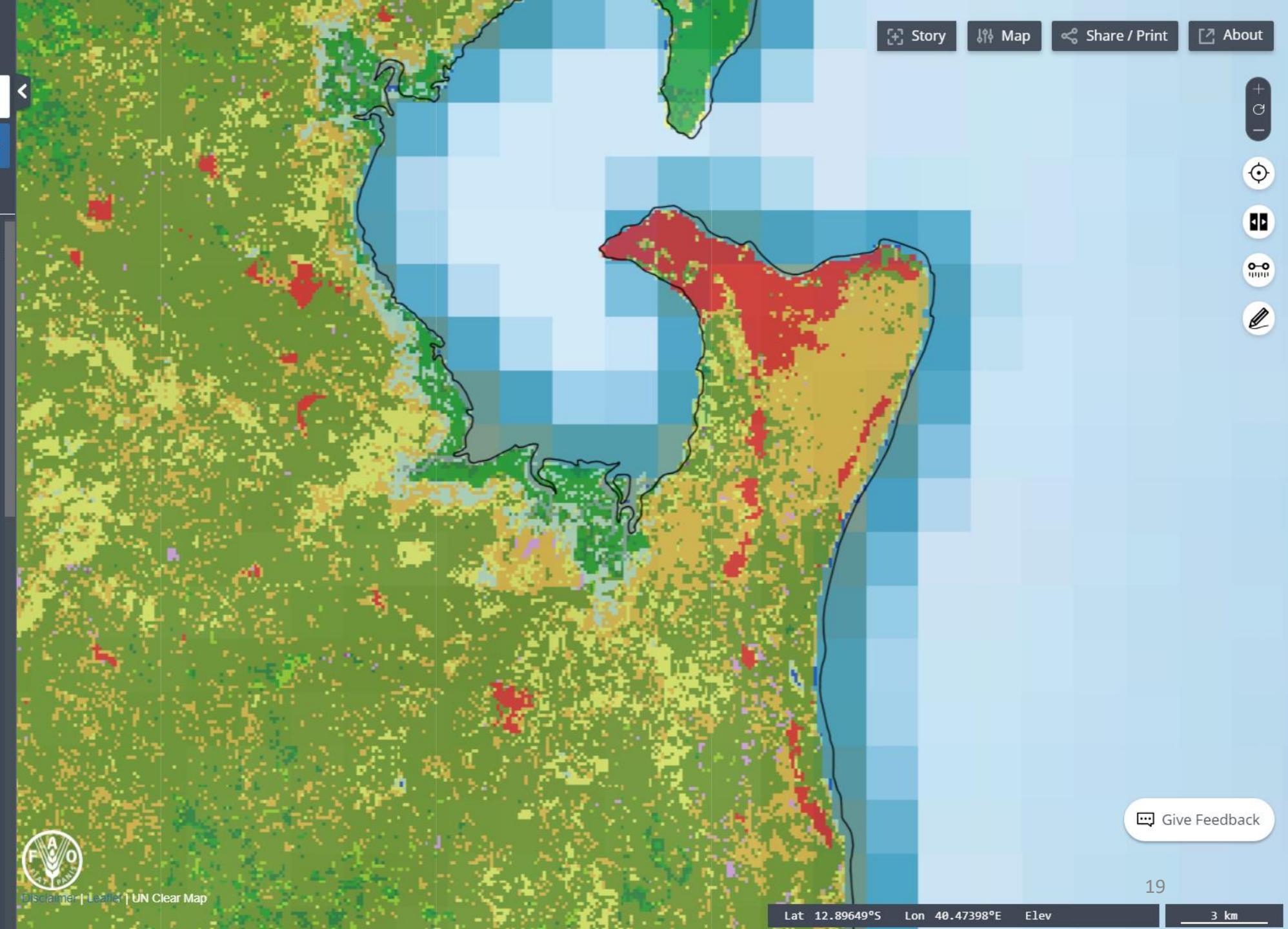
Zoom To Extent About This Data Split Remove

Opacity: 60 %

Time:

01/01/2020, 01:00:00

n.a.
Shrubland
Grassland
Cropland, rainfed
Cropland, irrigated or under water management
Cropland, fallow
Built-up
Bare / sparse vegetation
Permanent snow / ice
Water bodies
Temporary water bodies
Shrub or herbaceous cover, flooded
Tree cover: closed, evergreen needle-leaved
Tree cover: closed, evergreen broadleaved
Tree cover: closed, deciduous broadleaved
Tree cover: closed, mixed type
Tree cover: closed, unknown type
Tree cover: open, evergreen needle-leaved
Tree cover: open, evergreen broadleaved



Geosocial

Hydrology

Land use/ land cover

Land Degradation Neutrality

Satellite images

Soil

Vegetation

NDVI (anomalies) - MODIS NDVI (average) - MODIS NDVI (change) - MODIS PET (anomalies) - MODIS PET (average) - MODIS PET (change) - MODIS

Water



Legend

NDVI (anomalies) - MODIS 20...

Population - World...



-0.03

0.04

NDVI

2020



0.04

Kom...

ARCH...



EARTH MAP

Cabo Delgado

Lat:-11.992 Long:40.379
20

FAO EO

- Agricultural Stress Index (ASI)
- Drought Intensity
- NDVI Anomaly
- Vegetation condition Index
- Vegetation Health Index
- Estimated Precipitation
- Precipitation Anomaly

METOP-AVHRR, NOAA/FEWSNet, ECMWF

Seasonal Indicators Vegetation Indicators Precipitation Indicators

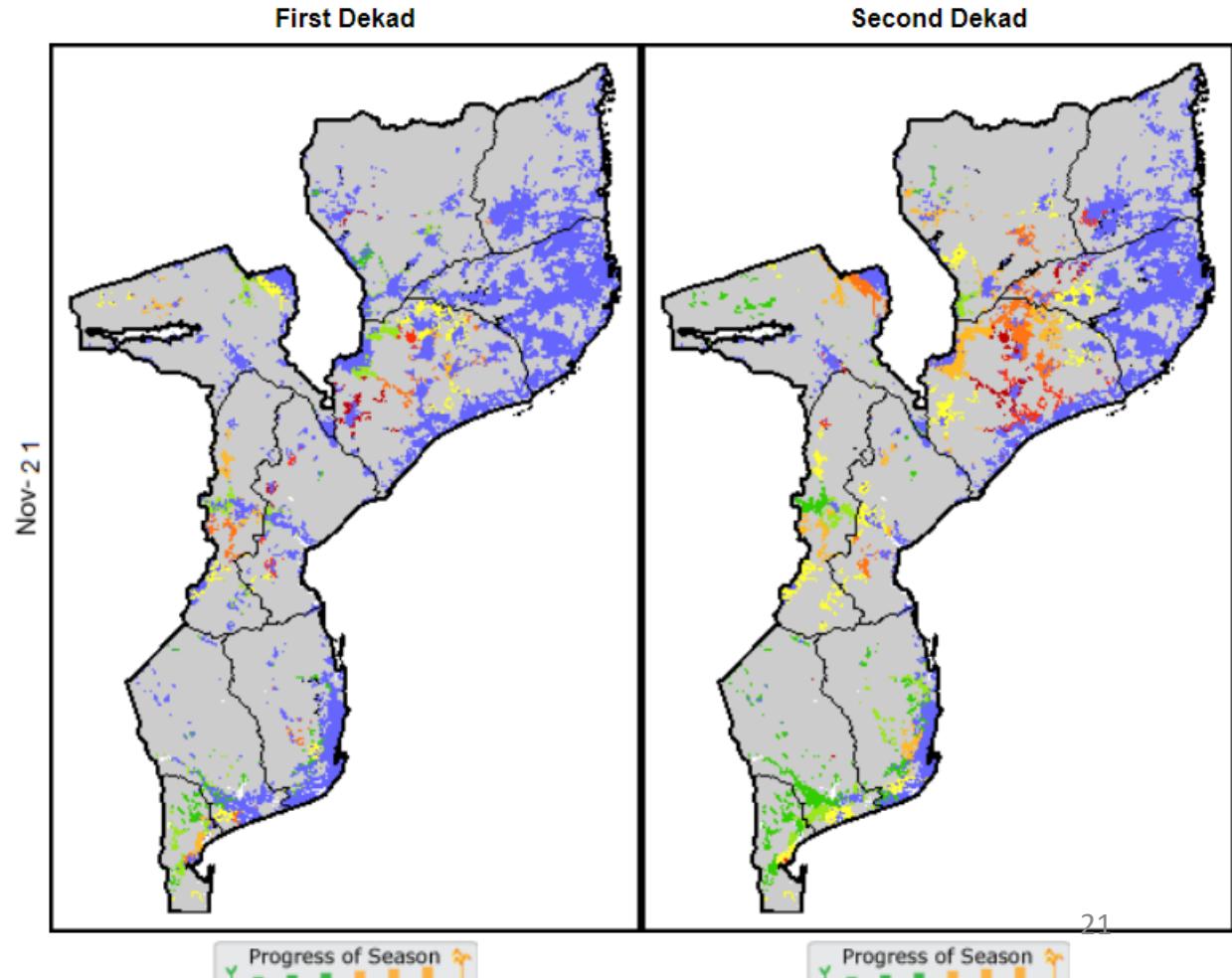
Cropland Grassland

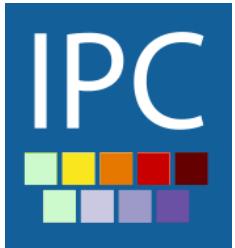
Near Real Time (10 days) Annual Summary Historic Drought Frequency Crop-growing Season

Season 1 Season 2

Agricultural Stress Index Drought Intensity Mean Vegetation Health Index

Agricultural Stress Index  More





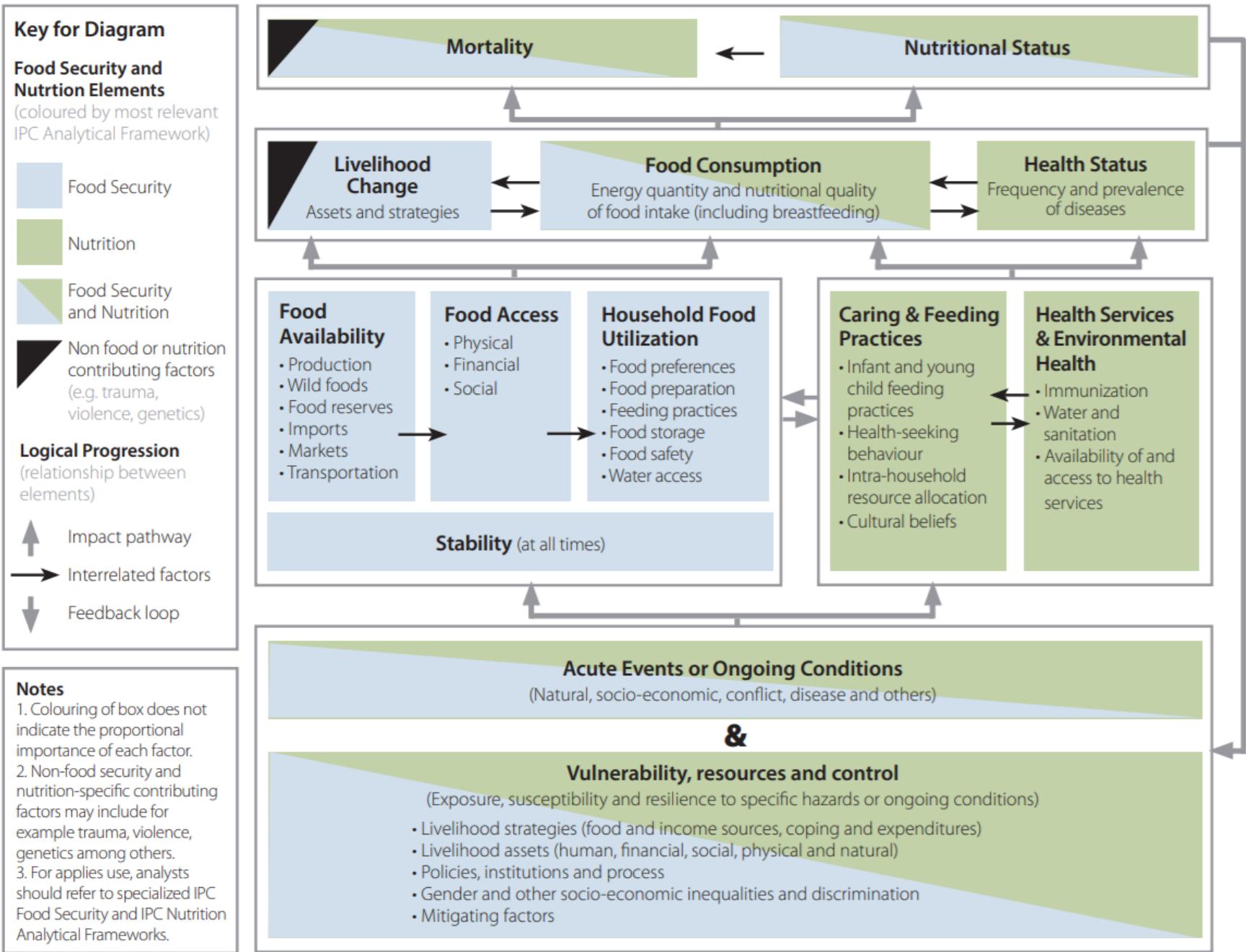
IPC:

Figure 7: The IPC Integrated Food Security and Nutrition Conceptual Framework (Tool 1)

- a rigorous, evidence- and consensus-based analysis of food insecurity

three IPC Scales:

- Acute Food Insecurity (short-term),
- Acute Malnutrition
- Chronic Food Insecurity (mid-, long-term)



Mozambique

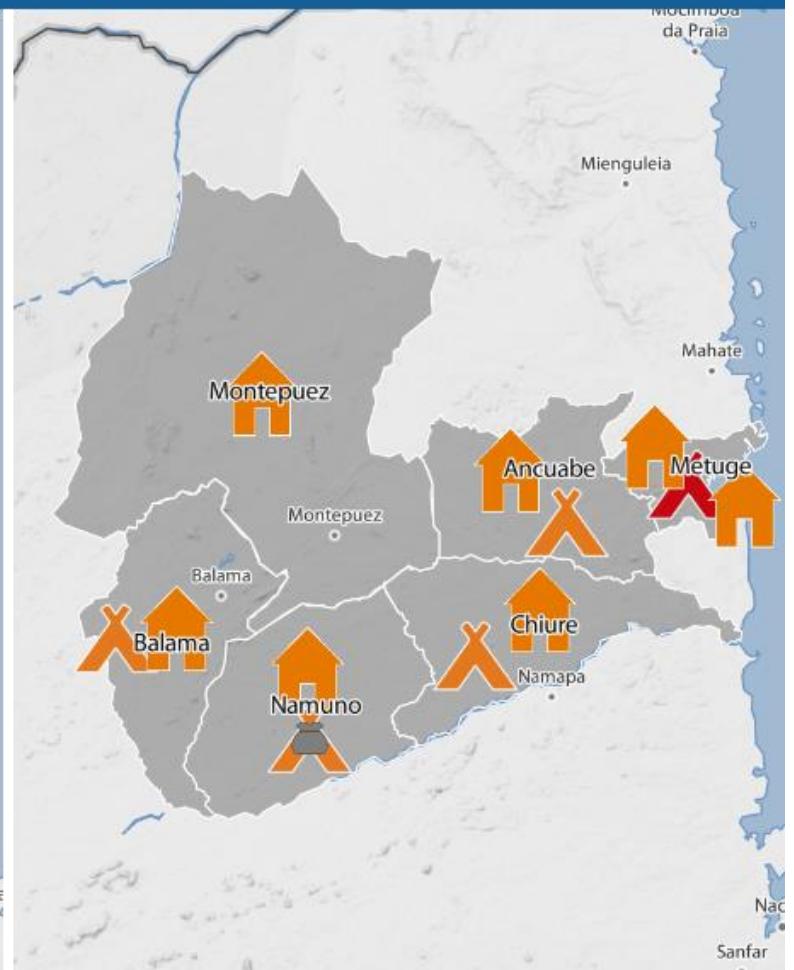
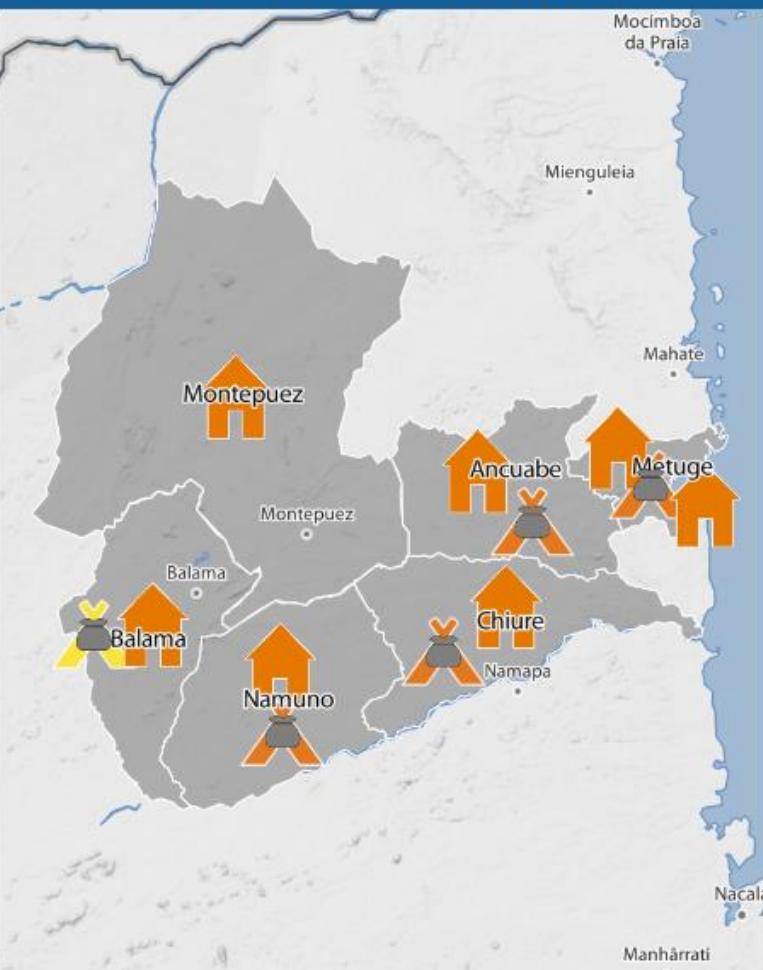
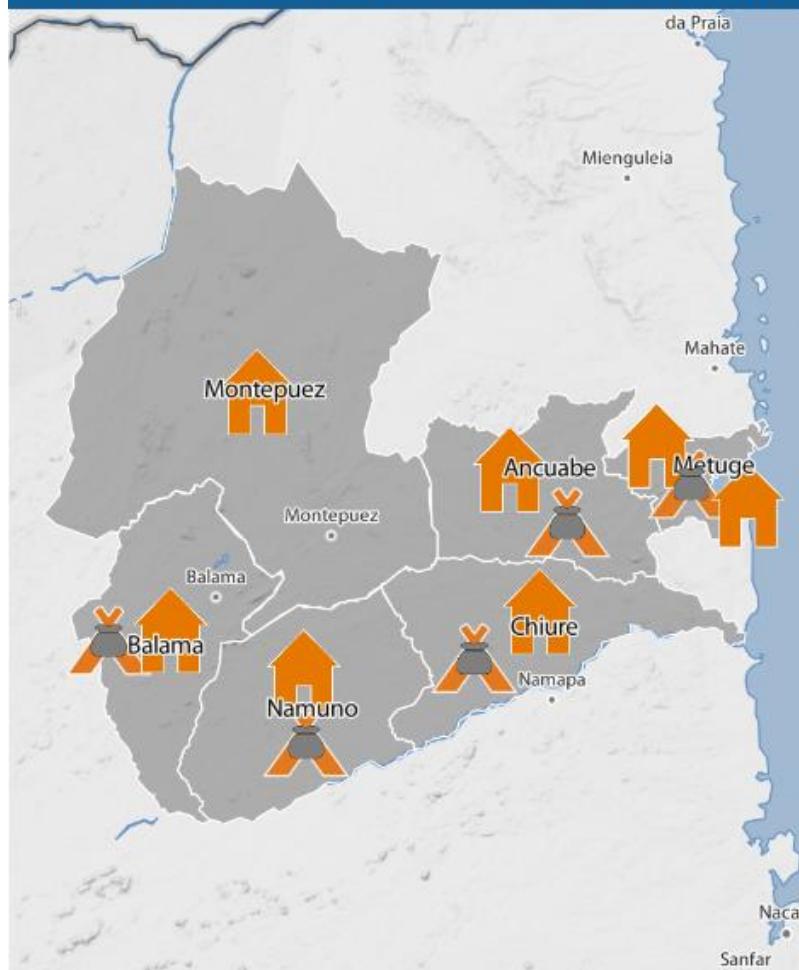
Acute Food Insecurity April 2021 (Cabo Delgado)

Current: From Oct 2020 - Mar 2021

Projected: From Apr 2021 - Sep 2021

Second Projected: From Oct 2021 - Feb 2022

IPC



IPC Map Key: Acute Food Insecurity

- | | | | | | | | | | | | | | | | |
|---|-------------|---|--------------|---|------------|---|---------------|---|------------|---|---------------|---|--------------------------------|--|--------------------|
| | 1 - Minimal | | 2 - Stressed | | 3 - Crisis | | 4 - Emergency | | 5 - Famine | | Famine Likely | | Areas with inadequate evidence | | Areas not analyzed |
|---|-------------|---|--------------|---|------------|---|---------------|---|------------|---|---------------|---|--------------------------------|--|--------------------|

Disclaimer: The information shown on this map does not imply that the IPC and CH officially recognizes or endorses physical and political boundaries.

Source: Integrated Food Security Phase Classification

↗ IDPs/Other Settlement Classification

⬆ HouseHold Group Settlement Classification

袱 At least 25% of households meet over 50% of caloric needs from humanitarian food assistance

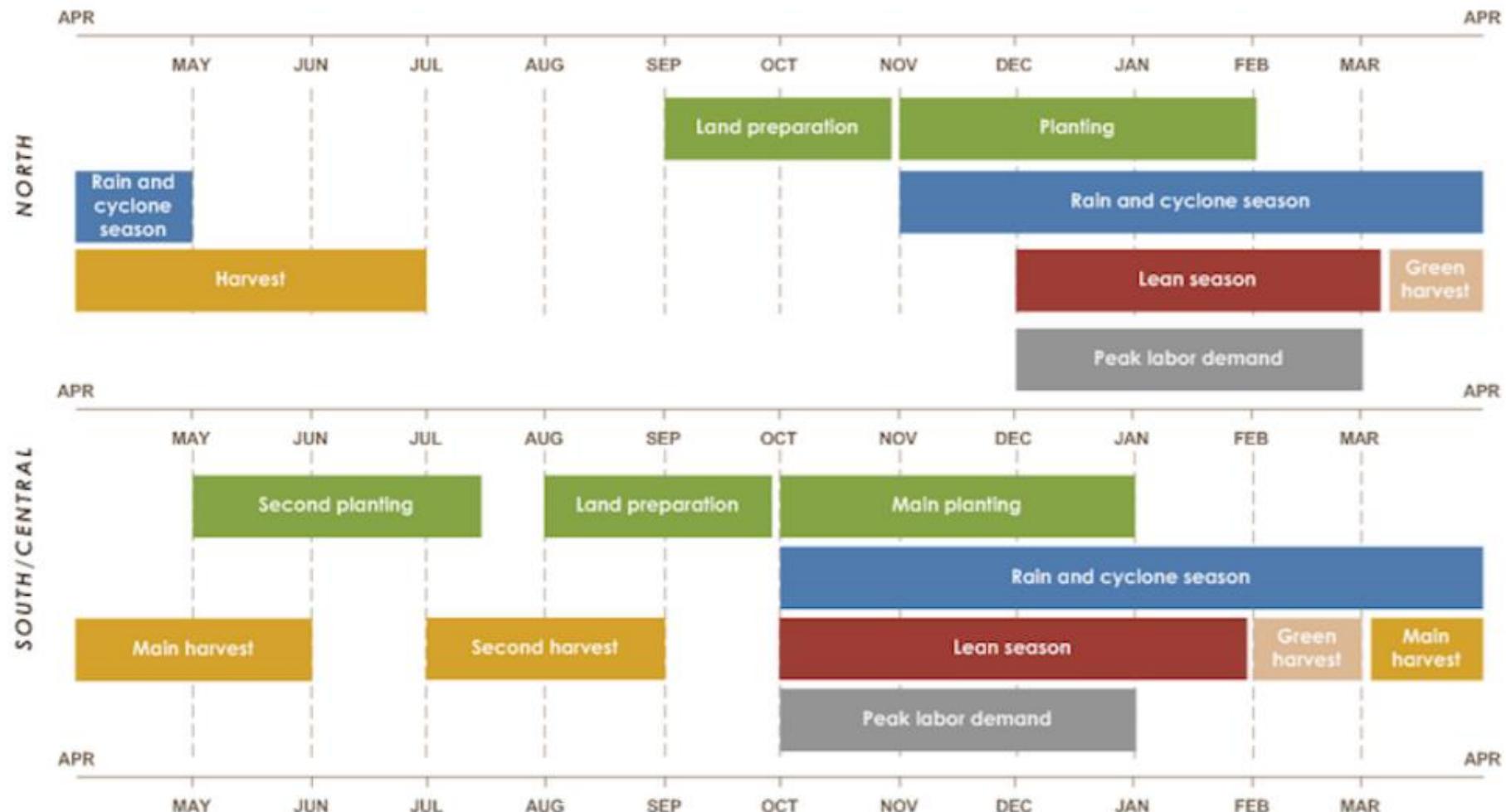
FEWS NET

- since 1985, the United States Agency for International Development (USAID)
- evidence-based analysis to governments and relief agencies who plan for and respond to humanitarian crises
- monthly reports



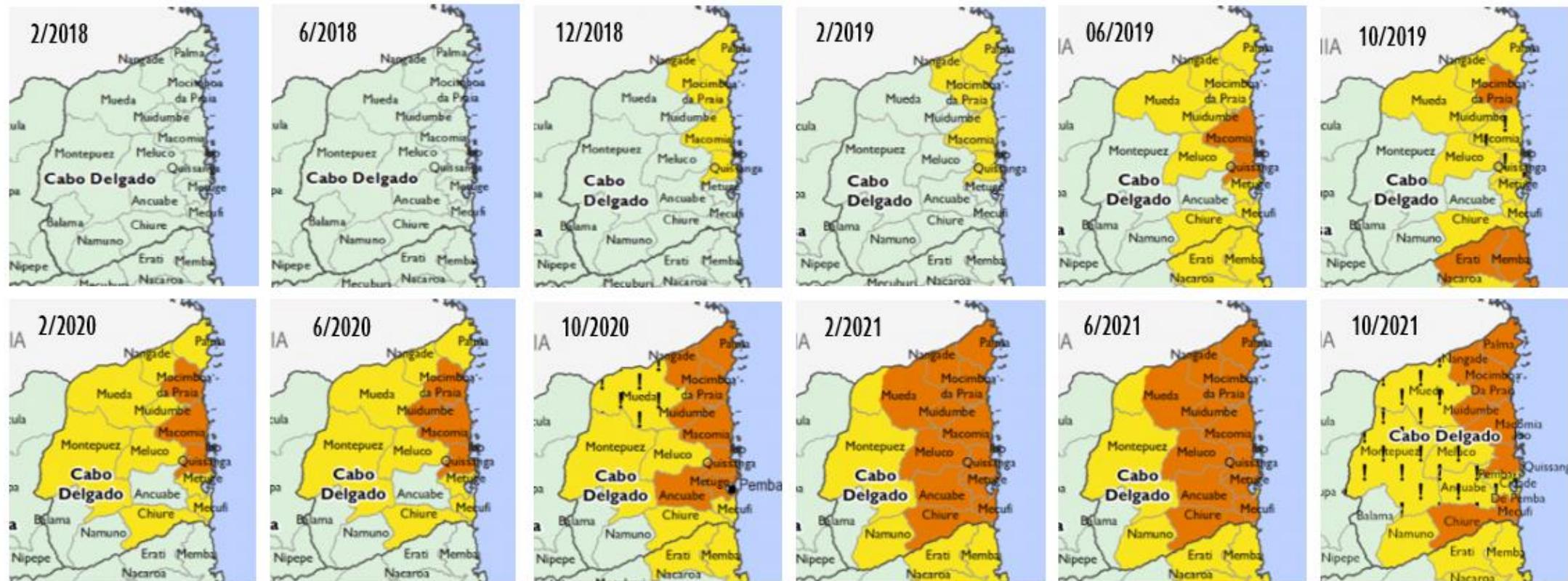


Seasonal Calendar for Mozambique



Source: FEWS NET

IPC over Time



IPC v3.0 Acute Food Insecurity Phase

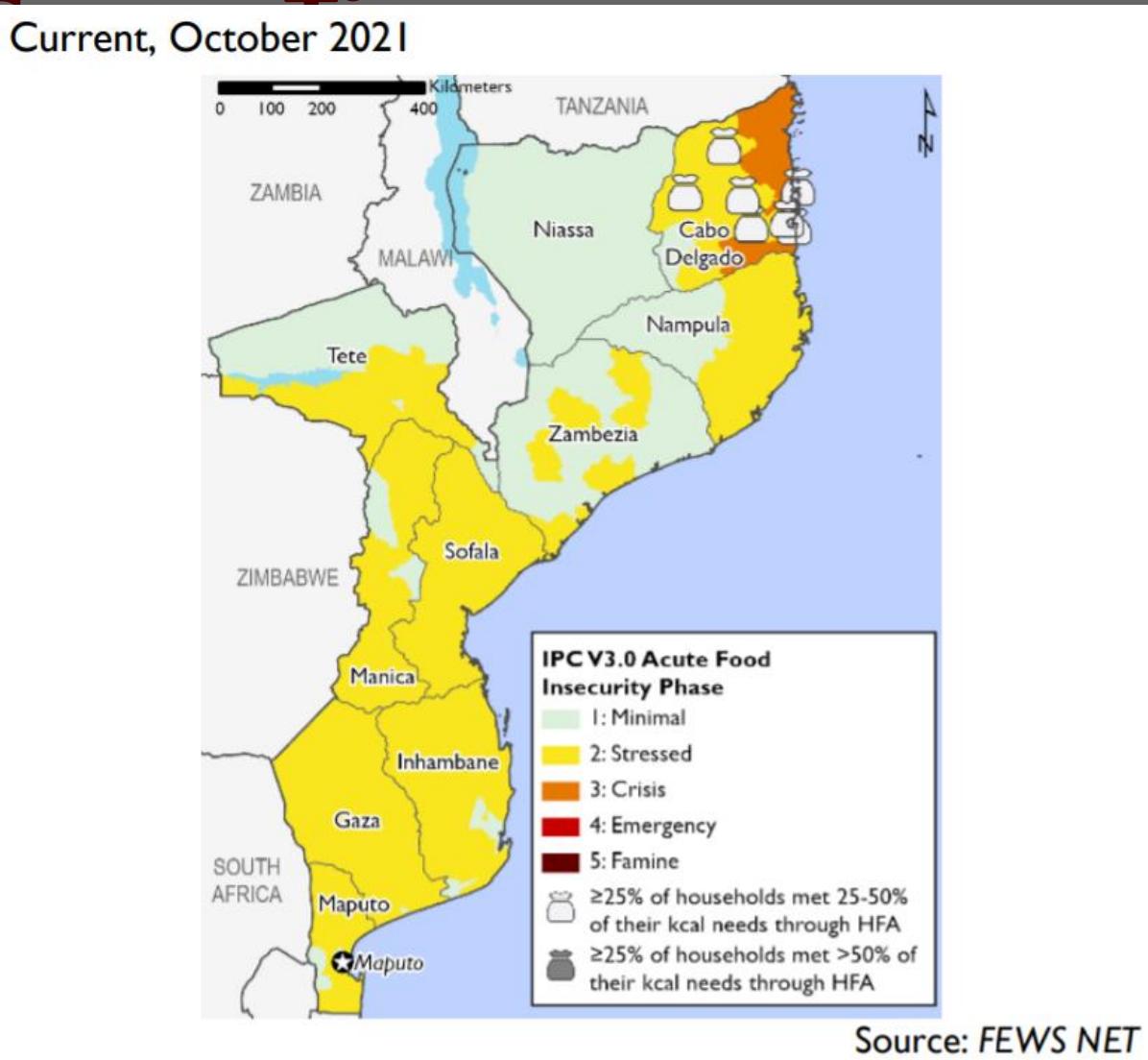
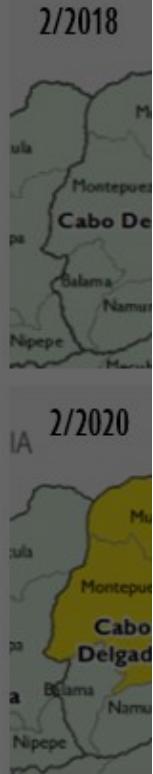
1: Minimal 2: Stressed 3: Crisis

! Would likely be at least one phase worse without current or programmed humanitarian assistance

200 km

IPC

Current, October 2021



! Would likely be at least one phase worse without current or programmed humanitarian assistance



Stressed (IPC Phase 2) outcomes persist in areas that have been impacted by **natural disasters** over the last three years.

Crisis (IPC Phase 3) outcomes persist in conflict-affected areas where the IOM estimates that **around 642 000 IDPs** in Cabo Delgado are living with host families or resettlement areas with little to no access to their basic livelihood activities.

200 km

Migration and Food Security (FEWS NET, 2021)

- Some IDPs returning to their areas of origin to assess livelihood opportunities (agriculture, fishing, trade), the impact of the conflict on their properties, and the possibility of returning with their families.
- Most IDPs are expected to remain in conflict-free areas of Cabo Delgado through the 2021/2022 rainy season due to security concerns.



WFP, Nuno Rebocho

Migration and Food Security (FEWS NET, 2021)

- 29. 9.–12. 10. 2021, around 17 % of IDPs reported a lack of food as a trigger for movement. However, **between October 13–19, around 51 % of IDPs reported a lack of food as a trigger for movement** (IOM, 2021).
- As the **coastal fishing livelihood zone** in Cabo Delgado was the main area of operation for the insurgents for most of the conflict, it is estimated that **only 20 % or less of the original population remains in the area** as most residents are likely living as IDPs in surrounding districts.



WFP, Nuno Rebocho

Humanitarian Food Assistance (FEWS NET, 2021)

- In the non-conflict-affected areas of Cabo Delgado, **high staple food prices**, including maize grain, increased competition for income-earning opportunities, and **limited access to HFA are expected to drive Crisis (IPC Phase 3) outcomes**, while areas where HFA is reaching at least one in four people, will likely face area-level Stressed! (IPC Phase 2!) outcomes.
- In late September, the government approved the Reconstruction Plan for Cabo Delgado (PRCD) to help restore the social and economic infrastructure destroyed by the insurgents. **The PRCD is budgeted for 300 million USD and aims to be implemented between 2021 and 2024.**
- In late October, the government through the Northern Integrated Development Agency (ADIN), with support from the World Bank, have started **distributing 12 000 tonnes of seeds and other agricultural inputs to around 350 000 beneficiaries.**



WFP, 2021

“

Think differently and achieve more with less.

The barriers are there, of course: it is not easy to turn information into usable knowledge. Nor is it easy to set aside our intrinsic fear of change. But we must be bold enough to embrace all the potential with open eyes because one thing is certain: the next new idea is just around the corner and it might just save a life.

Arif Husain, Chief Economist and Director UN WFP

October 22, 2021

REFERENCES

- Detailed description of the SEN2-agri system. (2018). Retrieved November 27, 2021, from <http://www.esa-sen2agri.org/operational-system/system-description/>
- Famine Early Warning Systems Network (2021). *(Publication). Retrieved from https://fews.net/sites/default/files/documents/reports/MOZAMBIQUE_Food_Security_Outlook_October_2021_Final_0.pdf*
- Gitz, V., Meybeck, A., Lipper, L., Young, C. D., & Braatz, S. (2016). Climate change and food security: risks and responses. *<https://www.fao.org/3/i5188e/I5188E.pdf>*
- Husain, A. (2021, October 22). The evolution of data innovation in the fight against hunger [Web log post]. Retrieved November 20, 2021, from <https://unstats.un.org/unsd/undataforum/blog/The-evolution-of-data-innovation-in-the-fight-against-hunger/>
- IPC Global Partners (2021). Integrated Food Security Phase Classification Technical Manual Version 3.1. Evidence and Standards for Better Food Security and Nutrition Decisions. Rome, from https://www.ipcinfo.org/fileadmin/user_upload/ipcinfo/manual/IPC_Technical_Manual_3_Final.pdf
- IPC. (2021). Mozambique: Acute Food Insecurity and Acute Malnutrition Situation February 2021 - February 2022 [Map]. In *. Retrieved from <https://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1154889/?iso3=MOZ>*

REFERENCES

- MVAM Blog. (2021, April 22). Upgrading Our Predictive Model [Web log post]. Retrieved November 17, 2021, from <https://mvam.org/2021/04/22/upgrading-our-predictive-model/>
- Qamer, F. M., Tadesse, T., Matin, M., Ellenburg, W. L., & Zaitchik, B. (2019). Earth Observation and Climate Services for Food Security and Agricultural Decision Making in South and Southeast Asia. *Bulletin of the American Meteorological Society*, 100(6), ES171-ES174.
- Regional Bureau for Southern Africa. (2021). *WFP Southern Africa Seasonal Update* (Rep.). Retrieved from <https://docs.wfp.org/api/documents/WFP-0000133106/download/>
- UN FAO. (2021). Earth Observation. Retrieved November 27, 2021, from <https://www.fao.org/giews/earthobservation/index.jsp?lang=en>
- Use of geo-spatial data in agriculture statistics. (2020). Retrieved November 27, 2021, from <https://www.fao.org/datalab/website/web/use-geo-spatial-data-agriculture-statistics>
- WFP Johannesburg Regional Bureau. (2021, April). *Seasonal Overview and Regional Southern African Vulnerability Analysis (2020/2021)* (Rep.). Retrieved from <https://docs.wfp.org/api/documents/WFP-0000129180/download/>