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@FAOWATER

Open, big data on water and agriculture in support of monitoring and obtaining the Sustainable Development Goals



Jippe Hoogeveen, Land and Water Division, FAO | 04 October 2022



Water and agriculture in a changing climate



“Number of undernourished people continues to increase slowly”
(690 M)

[FAO Status of Food Insecurity 2020]

“Achieving sustainable development faces a key challenge: 3.2 billion people live in agricultural areas with high to very high water shortages or scarcity.”

[FAO Status of Food and Agriculture 2020]

“From 2000 – 2019 total cropland increased with 63 M ha, almost 85% of this increase is irrigated.”

[FAO State of Land and Water 2022]



FAO and the SDG's

- 17 Sustainable Development Goals;
- Global indicator framework includes 231 unique indicators;
- FAO custodian agency of 21 SDG indicators and is a contributing agency for a further 5;
- FAO's Chief Statistician leads the monitoring.





FAO and the SDG's



- SDG 2 indicators:
Custodian agency for **10** indicators
- SDG 5 indicators:
Custodian agency for **2** indicators
- SDG 14 indicators:
Custodian agency for **4** indicators
Contributing agency for **1** indicators
- SDG 12 indicators:
Custodian agency for **1** indicators
- SDG 1 indicators:
Contributing agency for **2** indicators
- SDG 15 indicators:
Custodian agency for **3** indicators
Contributing agency for **2** indicators
- SDG 6 indicators:
Custodian agency for **2** indicators



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We need to produce more food with less water

Water productivity in agriculture measures the yield (kg/ha) per unit of water consumed (m^3/ha).

Measuring these two variables is not easy at appropriate scales for decision making





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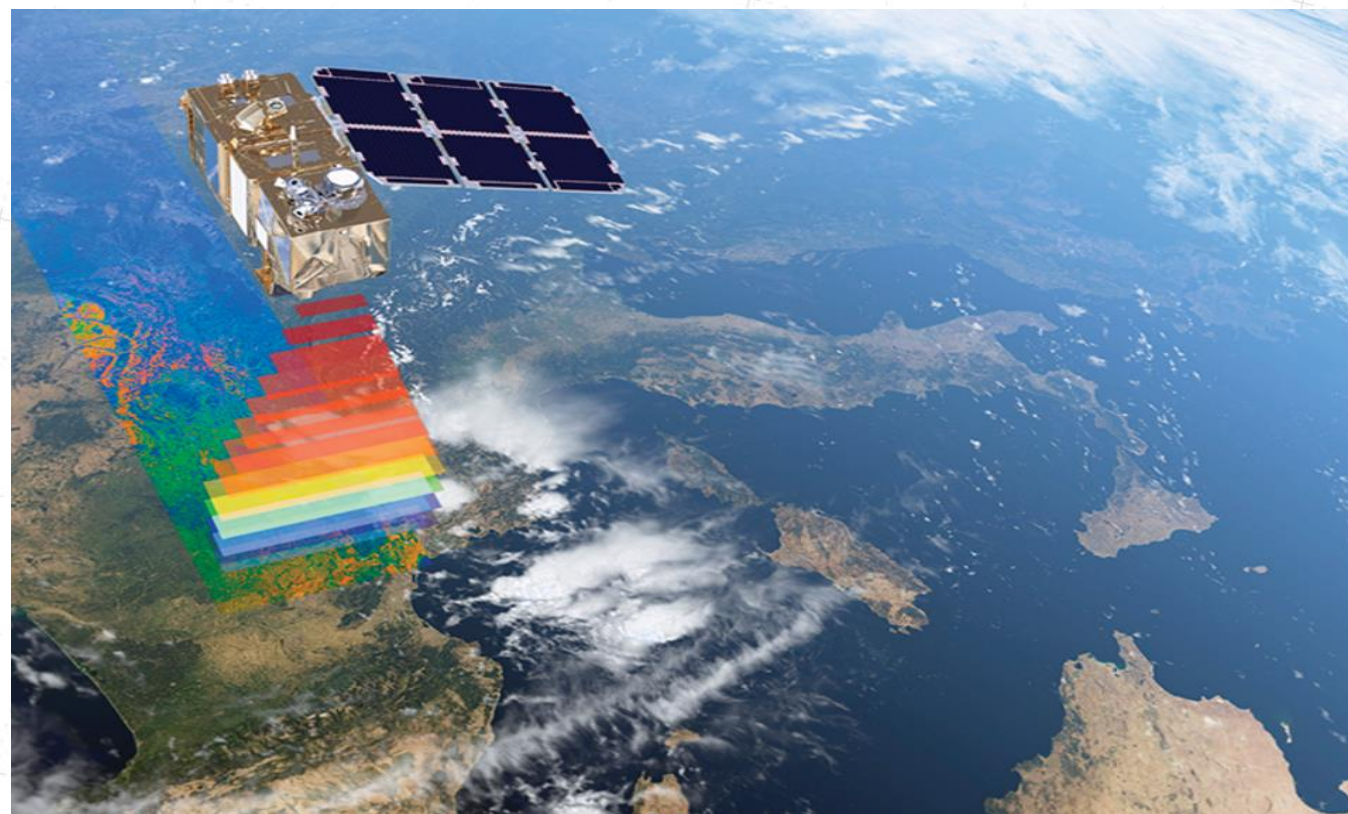
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Satellites can help monitor water productivity in cost-effective ways.

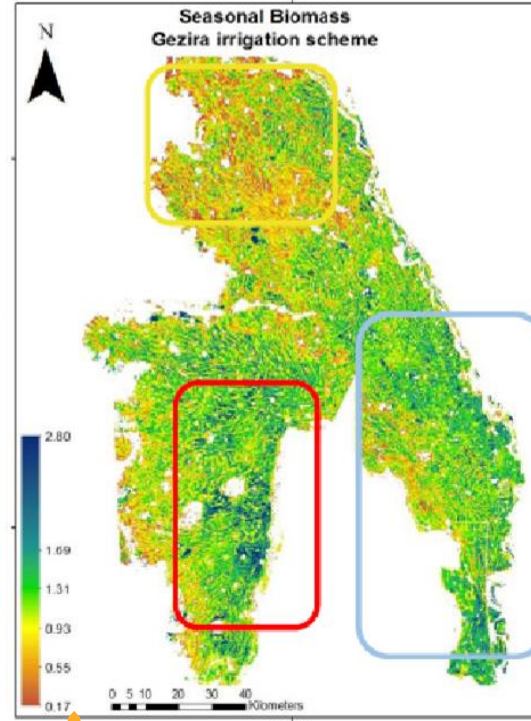
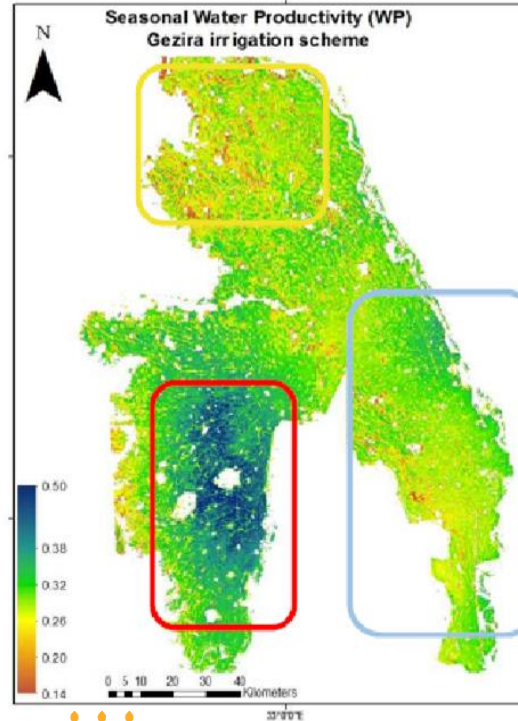




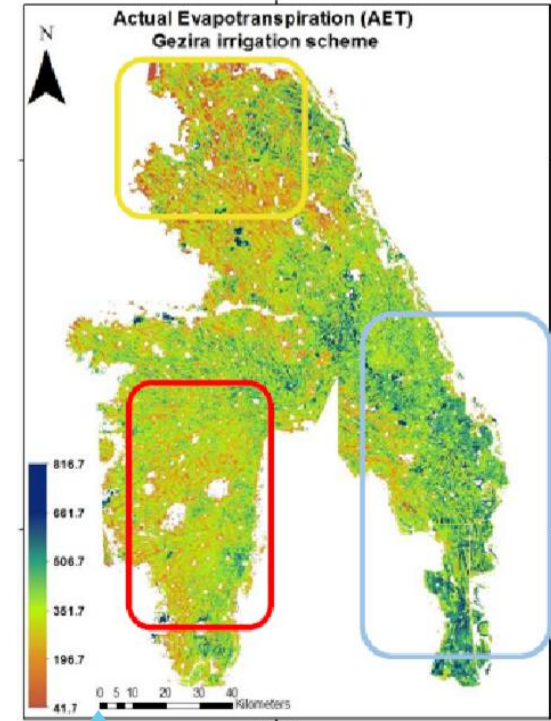
Applications: Performance indicators to understand variability

In the Gezira irrigation scheme (Sudan) WaPOR data helps monitor how different zones are performing.

Water Productivity



field production



water consumption

Struggling area needing intervention:

Low water productivity with a low field production but also a low water consumption

Best performing area:

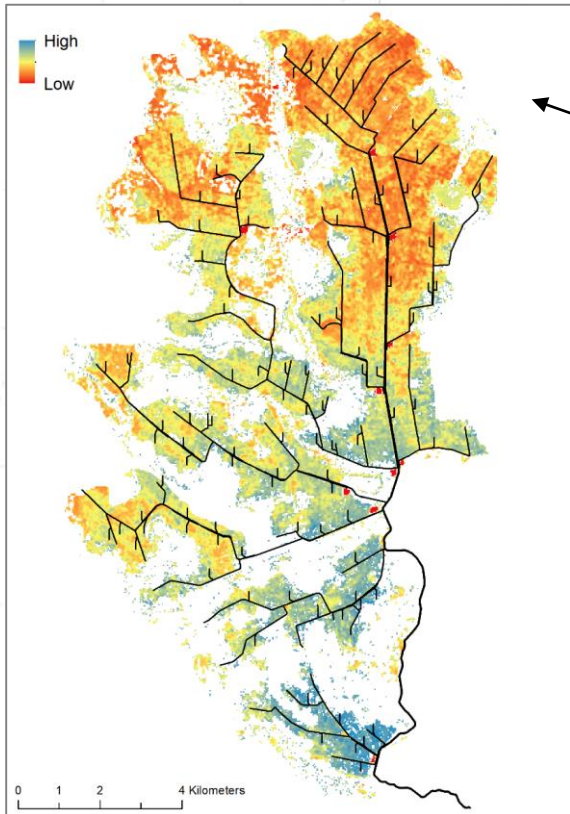
High water productivity fields with a fairly high production and a low water consumption

Mixed zones of high and low productivity



Applications:

Piloting field-level approaches for increasing WP (Koga, Ethiopia)



Distinct spatial pattern between head and tail end;

Tail end has lower Water Productivity;

During both rain-fed and irrigation seasons the head end demonstrates more productive use of the available water

RS data supports targeting of field interventions to improve land and water productivity with farmers

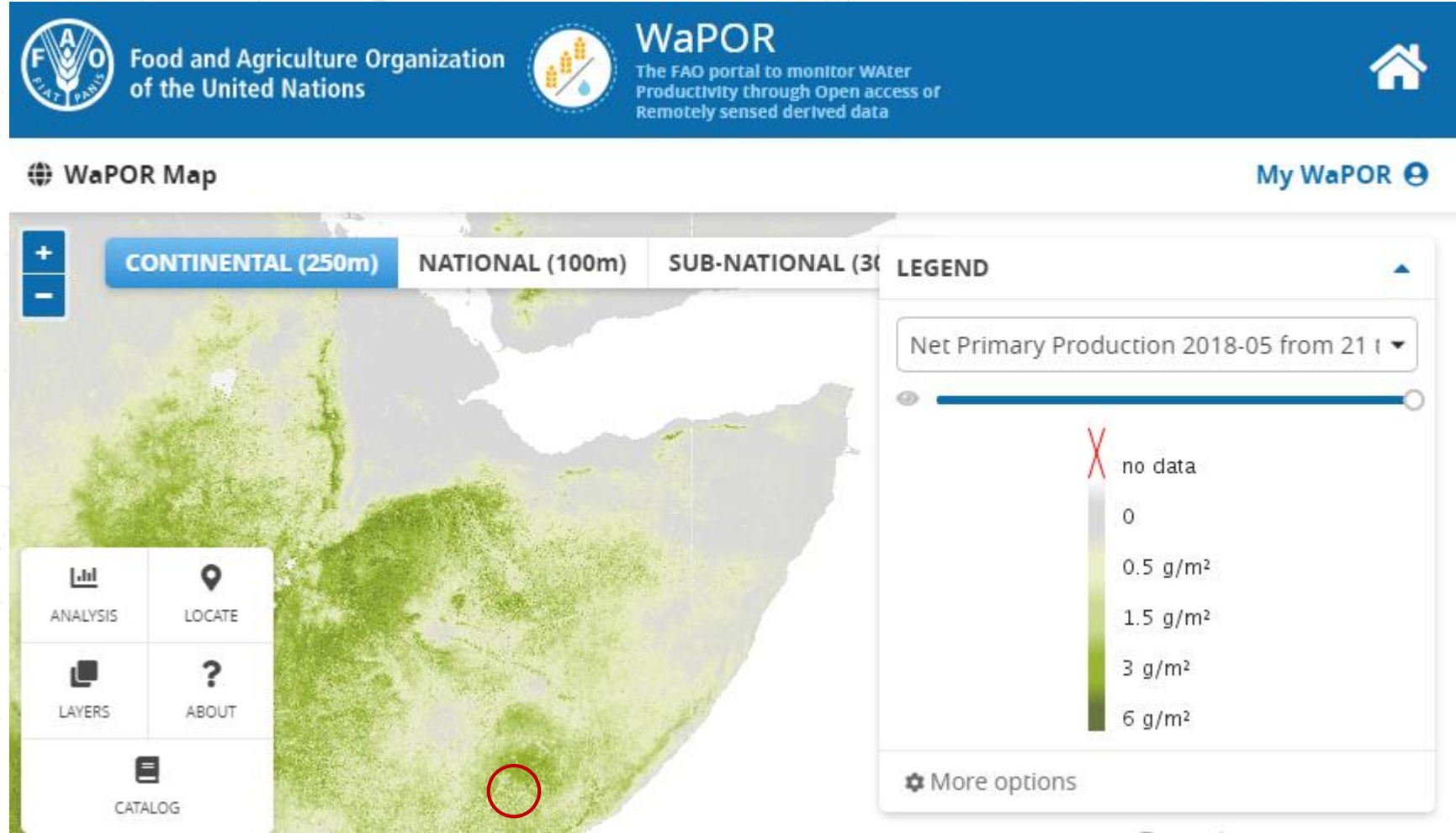




Applications:

Drought impact on current growing season – Somalia

Vegetation development in the last dekad of May 2018 and May 2022

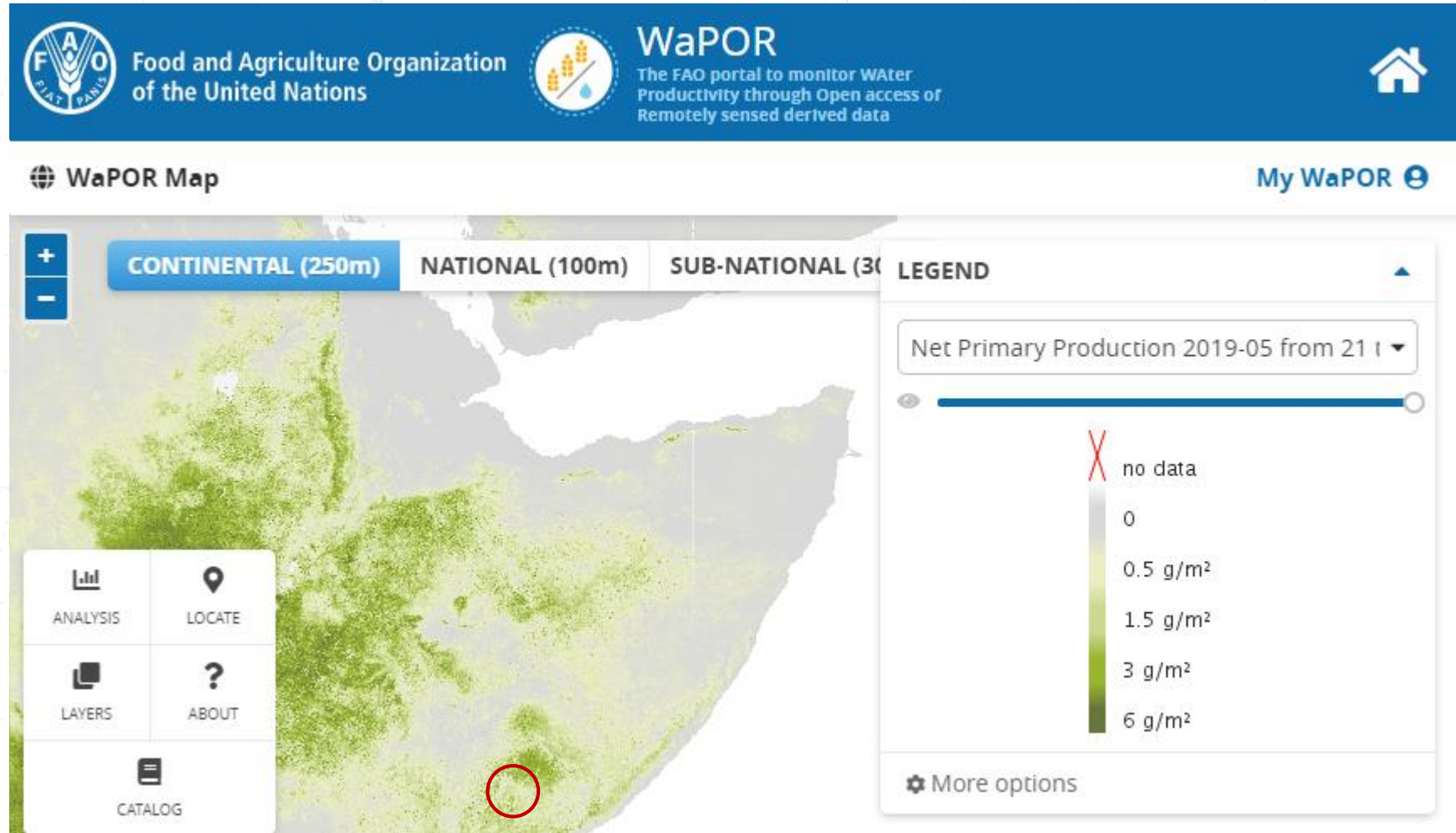




Applications:

Drought impact on current growing season – Somalia

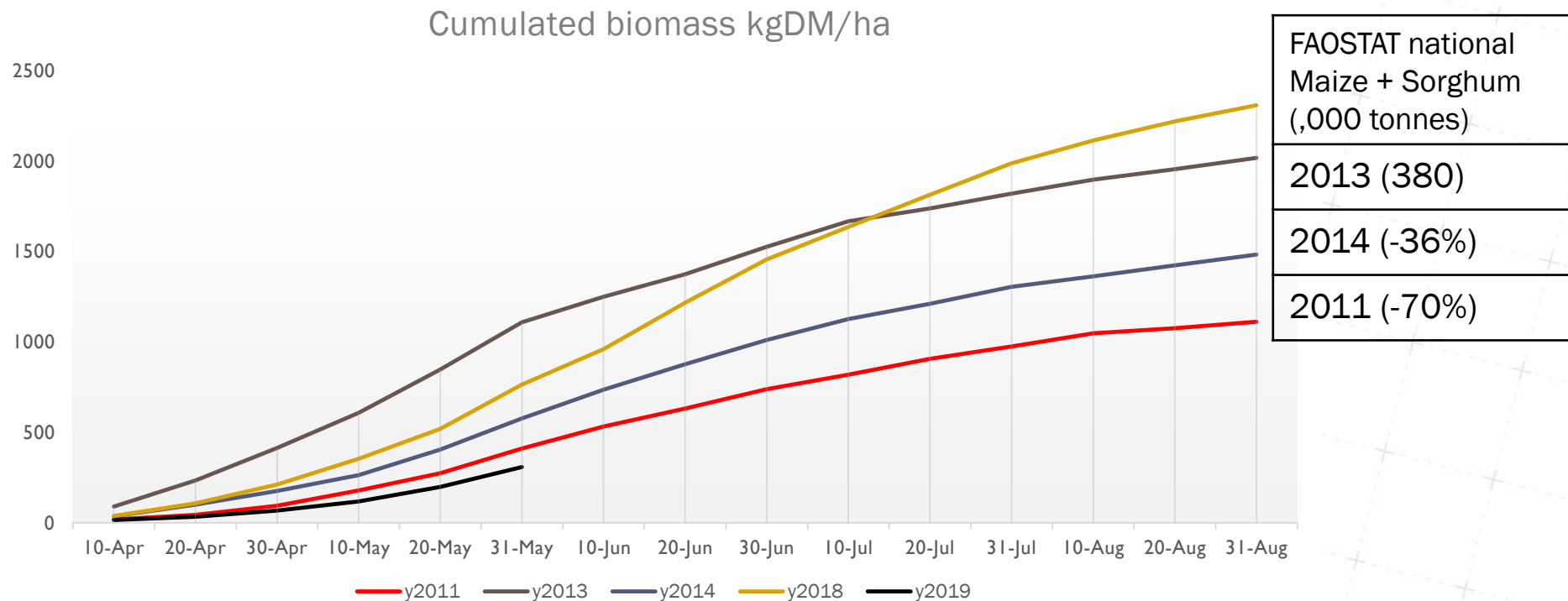
Vegetation development in the last dekad of May 2018 and May 2019





Applications

Drought impact on current growing season – Somalia



Applications

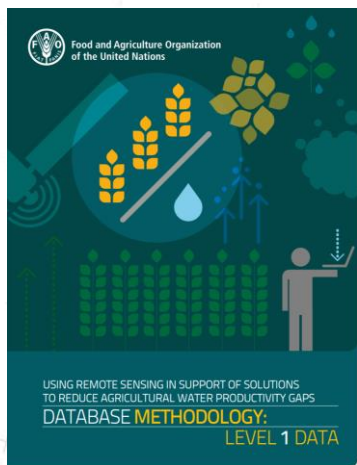
There is a wide range of applications of WaPOR data that go beyond water productivity.

ICT-based solution (app) for irrigation scheduling advice

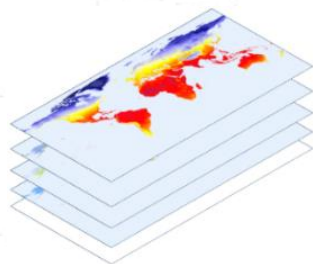
IRWI app helps Egyptian farmers know:

- how much water is required so that they can decide when and how much to irrigate and
- how healthy is the crop and predicted yield during the season.

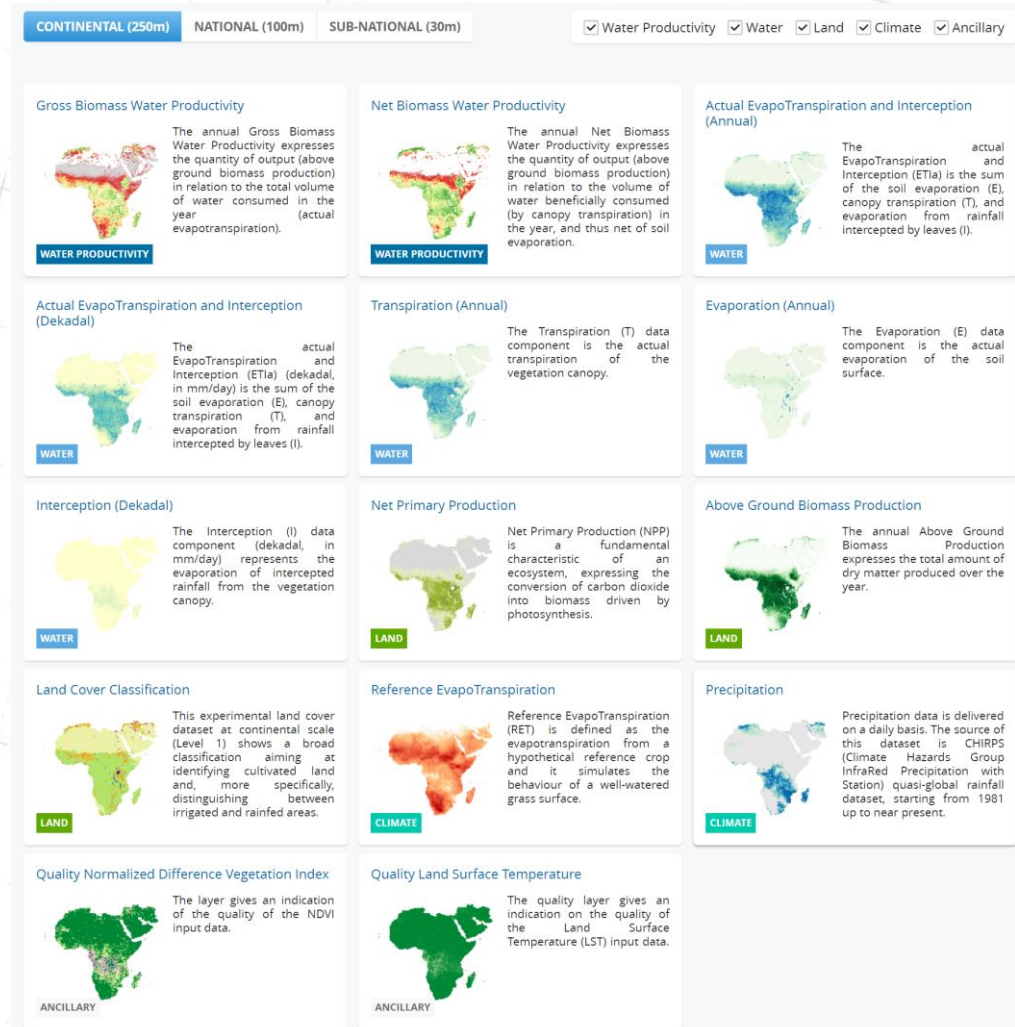




- Methodology and underlying algorithms available;



- Data and metadata available through ReST APIs.



AQUASTAT – FAO’s (and UN-Water’s) Global information system on Water Resources and their use – Core database for “Hand in Hand Initiative”;

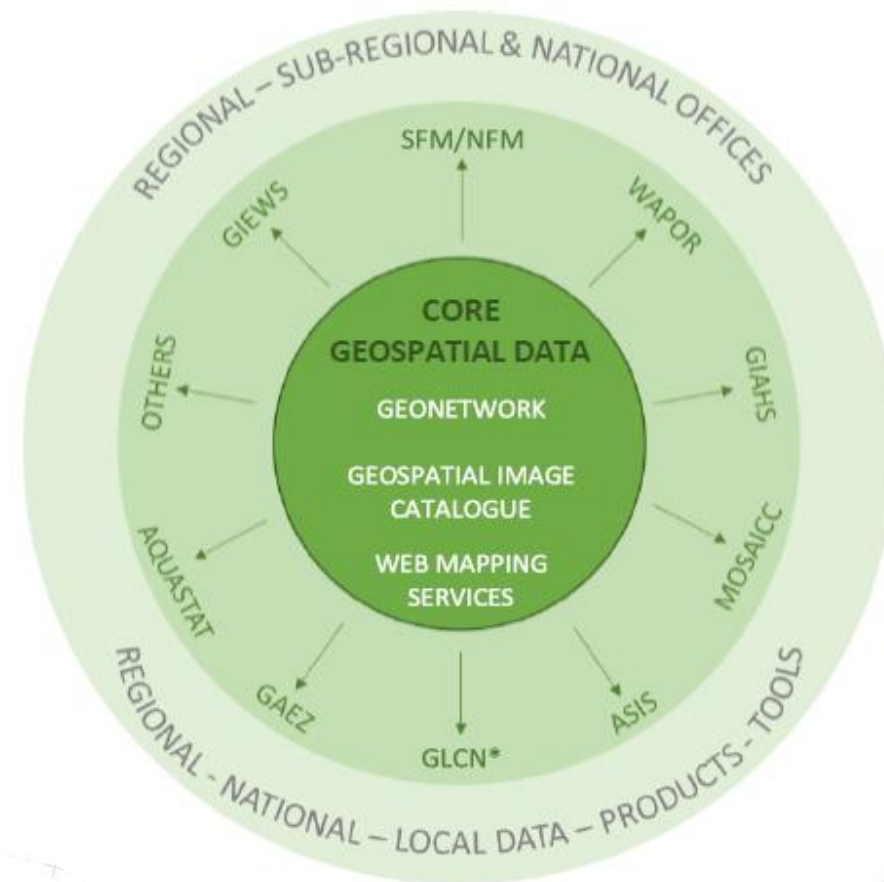
AQUAMAPS – GeoSpatial component of AQUASTAT

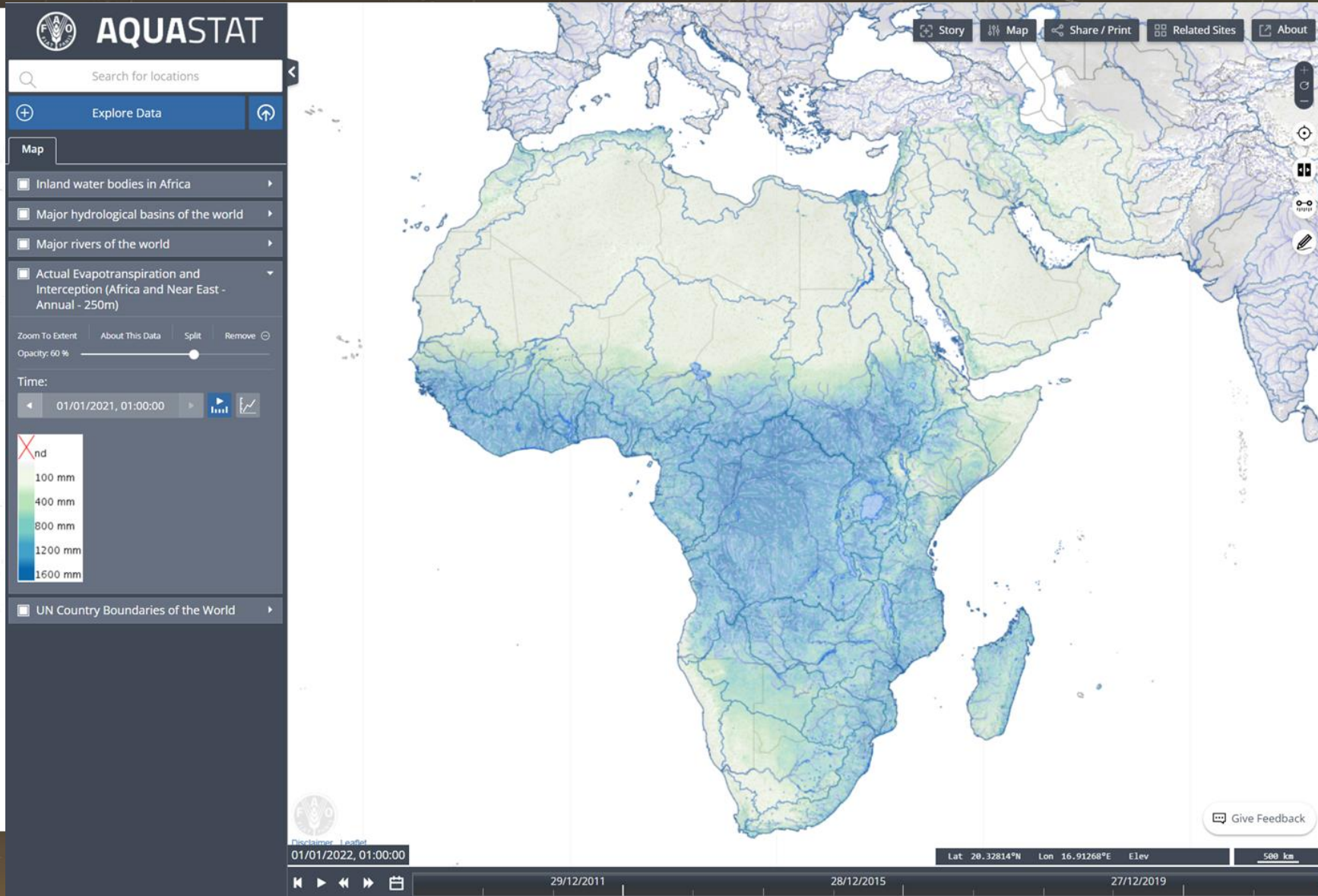
SoLaWiSe – Soil, Land, and Water Information System

WaPOR – FAO’s portal to monitor Water Productivity through Open access of Remotely Sensed data;

Integrated Monitoring Initiative – UN-Water’s programme to monitor progress towards SDG 6, the Water SDG;

Hand-in-Hand Geospatial Platform







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Reference Evapotranspiration - AgERA5 derived (Global - Dekadal - ~10km)

Reference evapotranspiration per decade with a spatial resolution of 0.1 degree. Unit: mm dekad-1. The dataset contains dekadal values for global land areas, excluding Antarctica, since 1979. The dataset has been prepared according to the FAO Penman - Monteith method as described in FAO Irrigation and Drainage Paper 56.

The input variables are part of the Agrometeorological indicators dataset produced by the European Centre for Medium-Range Weather Forecasts (ECMWF) through the Copernicus Climate Change Service (C3S).

The Agrometeorological indicators dataset provides daily surface meteorological data for the period from 1979 to present as input for agriculture and agro-ecological studies. This dataset is based on the hourly ECMWF ERA5 data at surface level and is referred to as AgERA5. References: <https://doi.org/10.24381/cds.6c68c9bb>

The Copernicus Climate Change Service (C3S) aims to combine observations of the climate system with the latest science to develop authoritative, quality-assured information about the past, current and future states of

Overview

Feature Information

Food Security Crops and Vegetation Livestock Trade and Production Land Water Climate Fishery Forestry Done

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Search the catalogue

- Precipitation
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- Global Weather for Agriculture (AgERA5)**
 - Reference Evapotranspiration - AgERA5 derived (Global - Daily - ~10km)
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 - Reference Evapotranspiration - AgERA5 derived (Global - Monthly - ~10km)
 - Reference Evapotranspiration - AgERA5 derived (Global - Annual - ~10km)
 - Precipitation Flux - AgERA5 (Global - Daily - ~10km)
 - Precipitation Flux - AgERA5 (Global - Dekadal - ~10km)
 - Precipitation Flux - AgERA5 (Global - Monthly - ~10km)

Global Weather for Agriculture (AgERA5)

Description

Daily surface meteorological data for the period from 1979 to present as input for agriculture and agro-ecological studies

This dataset is based on the hourly ECMWF ERA5 data at surface level and is referred to as AgERA5. Acquisition and pre-processing of the original ERA5 data is a complex and specialized job. By providing the AgERA5 dataset, users are freed from this work and can directly start with meaningful input for their analyses and modelling. To this end, the variables provided in this dataset match the input needs of most agriculture and agro-ecological models.

Data were aggregated to daily time steps at the local time zone and corrected towards a finer topography at a 0.1° spatial resolution. The correction to the 0.1° grid was realized by applying grid and variable-specific regression equations to the ERA5 dataset interpolated at 0.1° grid. The equations were trained on ECMWF's operational high-resolution atmospheric model (HRES) at a 0.1° resolution. This way the data is tuned to the finer topography, finer land use pattern and finer land-sea delineation of the ECMWF HRES model. (revised: 2021-09-06T14:47:36.655911)

Organization: [Copernicus Climate Change Service](#)

Give Feedback

Earth Engine Data Catalog wapor English

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WAPOR Daily Reference Evapotranspiration

Dataset Availability: 2009-01-01T00:00:00Z - 2021-12-11T00:00:00Z

Dataset Provider: FAO UN

Earth Engine Snippet: ee.ImageCollection("FAO/WAPOR/2/L1_RET_E")

Tags: agriculture fao wapor water

Description Bands Terms of Use Citations

Terms of Use

The Food and Agriculture Organization of the United Nations (FAO) is mandated to collect, analyze, interpret, and disseminate information related to nutrition, food, and agriculture. In this regard, it publishes a number of databases on topics related to FAO's mandate, and encourages the use of them for scientific and research

Weekly Advice Crop Calendar Indices

Northern Province, Rwanda
Lat: -1.656166 - Lng: 29.8815203

- Gross Biomass Water Productivity: 1.722
- Actual EvapoTranspiration and Inter...: 2.8000000000000003
- Above Ground Biomass Production: 15944
- Precipitation (Dekadal): 1.3

Feature Information

- Analysis and Report - Area of Interest
- Epi Units - Site Data
- Geita, Mwanza (United Republic of Tanzania)
- Area of Interest Mask - Area of Interest
- Precipitation (Global, Monthly) - Site Data
- Lat / Lon: 2.93243°S, 32.22818°E

Analysis and Report - Observed Rainfall - Geita, Mwanza (United Republic of Tanzania)

Legend: Long-term avg, 2020, 2021, Long-term min-Long-term max



Conclusions

- Open source and open access methodologies allow flexibility on spatial and temporal resolution;
- Usable for different types of stakeholders:
 - policy makers for example to monitor progress towards SDG6.4,
 - science community,
 - water users associations,
 - extension services
 - farmers,
 - private sector





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Thank you !

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