

26<sup>th</sup> CSTD: Highlights of Technical cooperation activities under the CSTD

#### CropWatch-ICP: CropWatch Innovative Cooperation Programme for Crop Monitoring

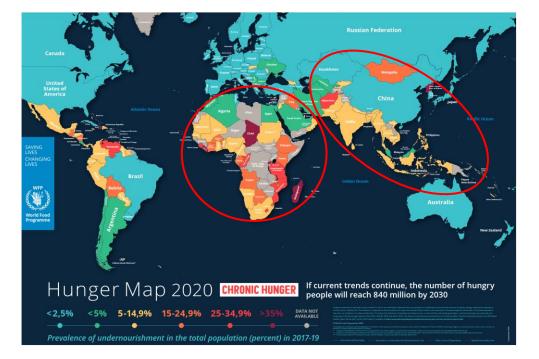
Wu Bingfang Aerospace Information Research Institute, Chinese Academy of Sciences wubf@aircas.ac.cn; cropwatch@radi.ac.cn; March 29, 2023

# Outline

- Background
- CropWatch-ICP Introduction
- CropWatch: capacity building
- Outlook

#### **Issues for Food Security**

- Food security is still a challenge issue over the world, in particular in Africa, south & southeast Asia. COVID-19, Desert Locust, drought, flooding, etc. further threaten food security.
- The paucity of adequate capacity in obtain and accessing up-to-date staple crop production information pose the danger of taking decisions based on delayed and on not easily verifiable information.





## Constraints

- Many countries want to set up their own crop monitoring systems
- Initiative input and operational cost as well as adequate technical skills constrain many countries to set-up, operate, and maintain crop monitoring system, which make
  - most countries in the world do not have an operational crop monitoring system
- Combining of crops, phenology, location makes crop monitoring data streams very complex
  - Existing global systems have limited functions, mainly crop condition assessment
  - Most existing algorithms and methods are not implemented as operational activities



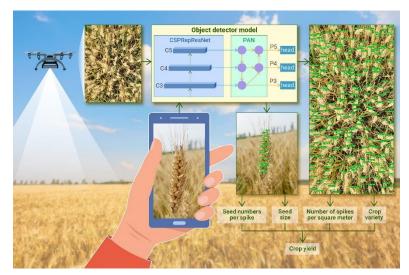
#### **CropWatch Cloud**

- Release quarterly and annually bulletin on global crop monitoring, covering 173 countries and regions down to provincial scales, with special focus on 43 key agricultural countries
- Components: CropWatch-Pro, CropWatch-Explore, CropWatch-Project and CropWatch-Bulletin

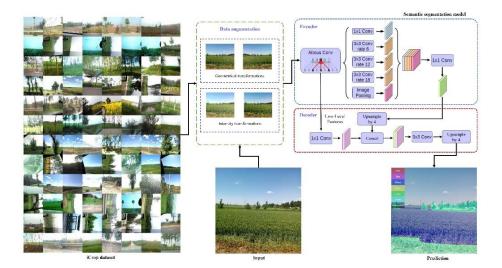


#### **Tools for ground truth data collection**

- The field data collection prevents most systems have crop area and yield components
  - Cost, labor and time consuming
- Two tools developed for free use
  - > GVG app for crop identification and Fieldwatch for yield measurement with image recognition



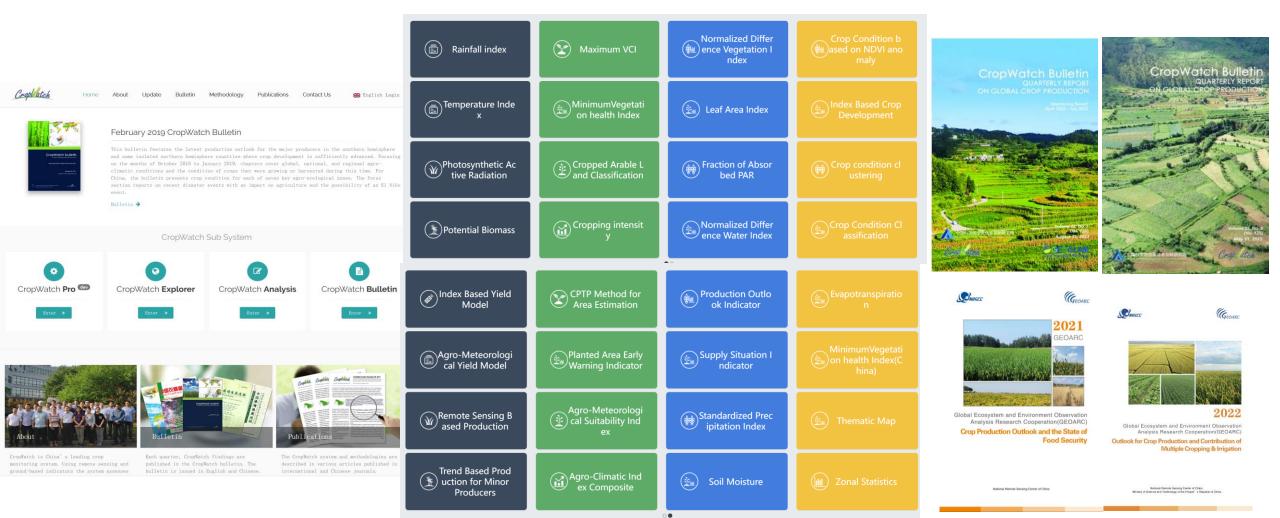
**FieldWatch for yield data measurements** 



**GVG Crop type identification from geo-tagged photos** 

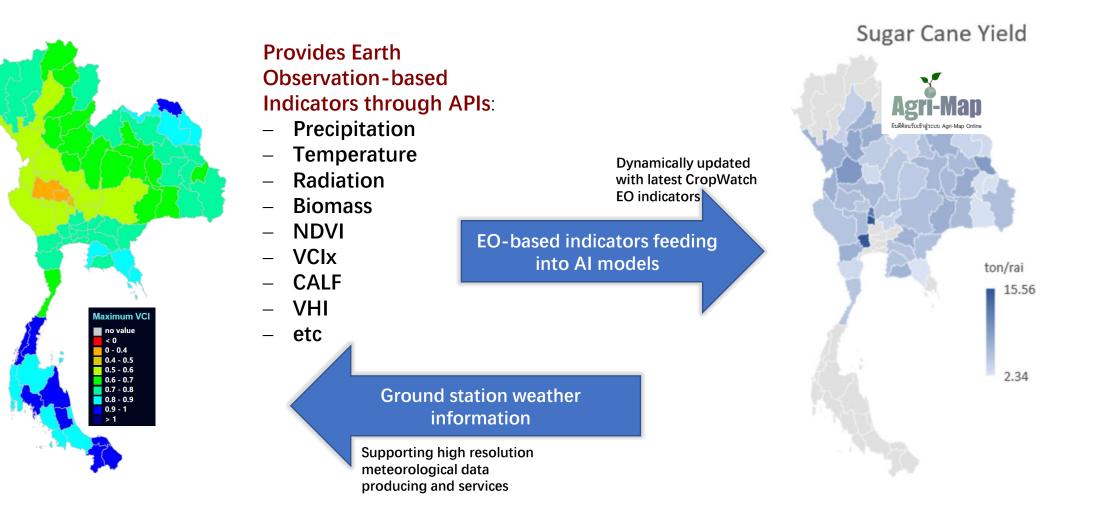
#### **CropWatch Cloud**

- CropWatch is a satellite-based hierarchical method of crop monitoring, including 4 agro-climatic indicators and 13 agronomic indicators, area, yield and production at different scales
- CropWatch Cloud provided APIs access to all functions of crop monitoring indicators and thematic maps.

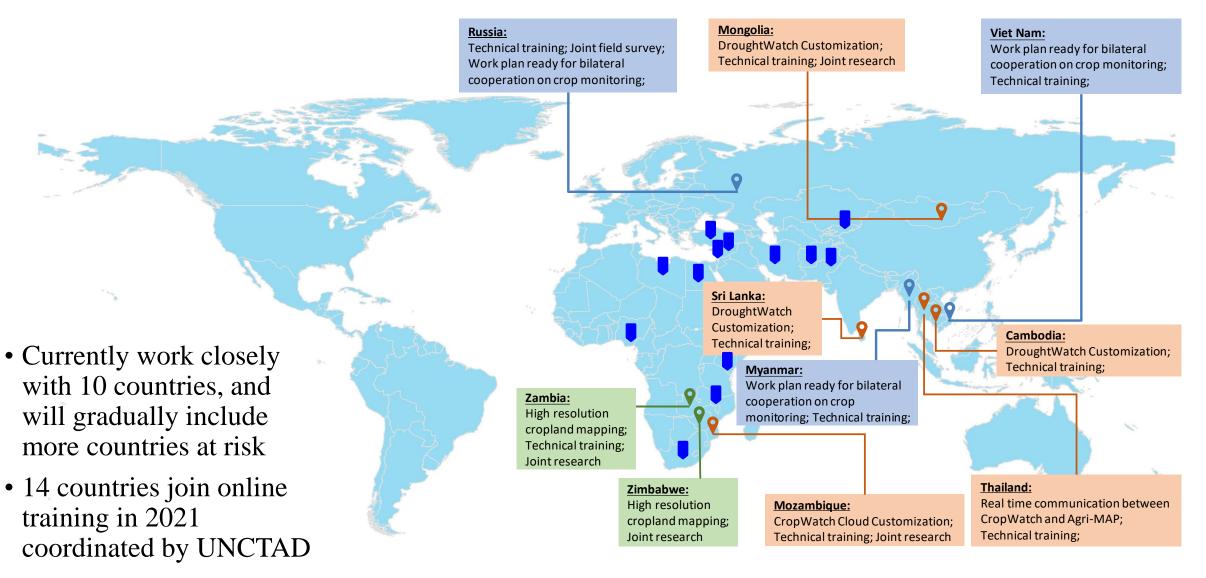


#### CropWatch acting data processing engine

CropWatch and AGRI-Map of Thailand develop data access portal through APIs to share the indicators and data to each other



#### Capacity building activities across the globe



# Outline

- Background
- CropWatch-ICP Introduciton
- CropWatch: capacity building
- Outlook

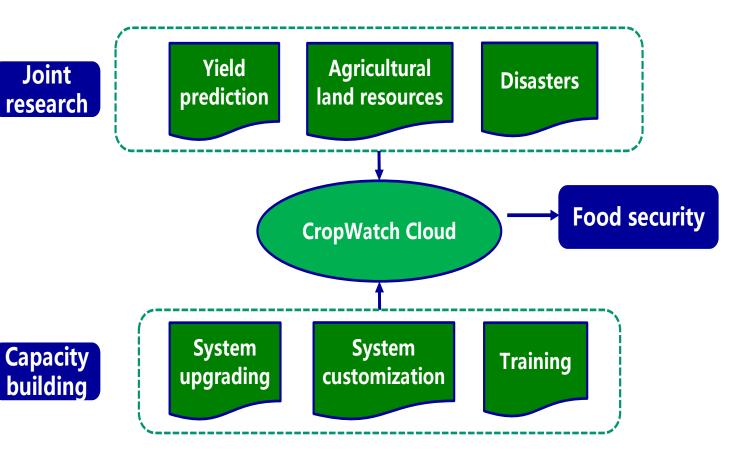
#### **Project Objectives**

Under coordination of UNCTAD, CropWatch Innovative Cooperation Programme for Crop Monitoring (CropWatch-ICP) is to facilitate and stimulate crop monitoring at developing countries for the advancement of the SDG goal of zero hunger through joint research and capacity building

- To enable pilot countries to do respective national or subnational crop monitoring on their own in real and near time
- To promote resilient agricultural practices by integrating geospatial information for crop monitoring

### Key Actions on Capacity Building

- Training workshops
- On-job training in Beijing and in the field for verification
- CropWatch customization for Specific requirements
- Regional workshops on food security



#### Expectations

- Trained staff of the participating country will have the capacity to use the cloud based crop monitoring system. And they can perform as trainers for sub-national officials to empower more technical staff for crop monitoring
- Participating country to produce regular bulletin with support of CropWatch cloud to inform policy-making at national and provincial levels on the food market, annual food import-export prospects and disaster relief.

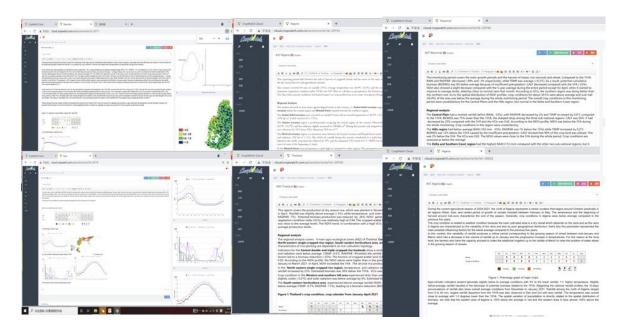
# Outline

- Background
- CropWatch-ICP objectives
- CropWatch-ICP: activities
- Outlook

#### CropWatch technical training for 14 countries

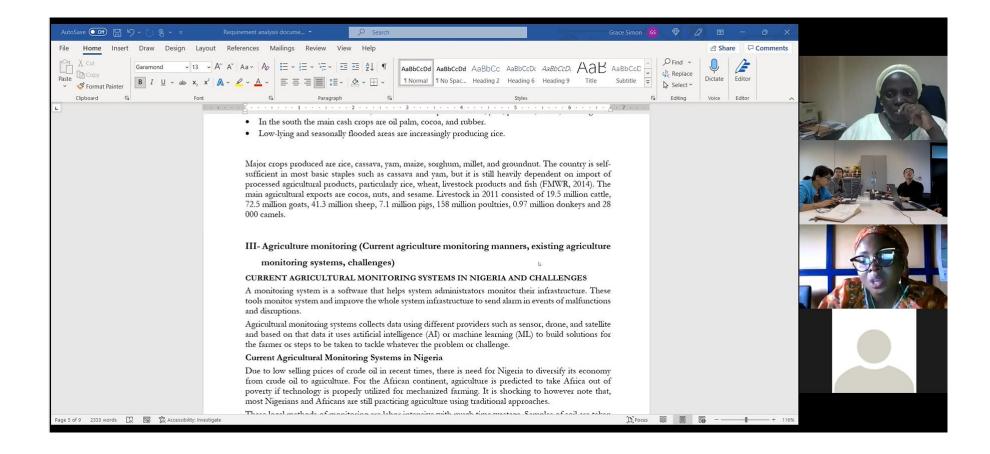
- Online Training Workshop of Earth Observation
   Applications for crop Monitoring, coordinated by CTAD,
   for three months over 23 March- 25 May, 2021
- Participating countries: Nigeria, Zambia, Malawi, Mozambique, Kenya, South Africa, Lebanon, Turkey, Syria, Afghanistan, Iran, Laos, Myanmar, Thailand,
- Theory, Methodology and Application: 12 courses from invited experts and 6 courses from CropWatch team
- Online practices: Participants from Algeria, Myanmar, Nigeria, Syria, Thailand and Mauritius finished the country analysis for May Bulletin 2021





#### Technical support by country

- Work plan and requirement analysis
- Virtual field works and CropWatch data analysis training



## Virtual Joint Field works in Mauritius and Algeria

- Mauritius
- Field work, 3days, October 4-14 2022
- Types : potato, tomato, pineapple
- Collected 320 samples

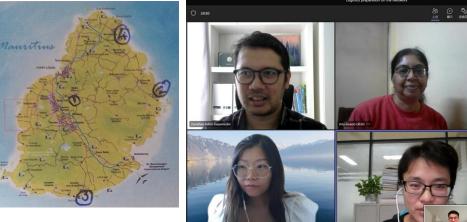
#### ← 推文

UNCTAD Innovation @UNCTADinnovate

#Mauritius completed the first field study on #crop growth monitoring and yield prediction, under the #UNCTAD-#China Academy of #Science #CropWatch #Innovative Cooperation Programme.unctad.org/project/cropwa...



Nana Yan\_AIR (#2



UNCTAD Innovation @UNCTADinnovate · 2m #Algeria has completed field data collection to advance the crop monitoring and yield prediction under the #UNCTAD – #China Academy of #Science CropWatch #Innovative Cooperation Programme. (unctad.org/project/cropwa...)#cropwatch #food #endhunger #innovation #sdg



2. Objectives of field wor

to the different crop calendar. 3. Field trip implementation 3.1 Participants

3.2 Implementation plan

\* \* \* \* \* \* \*

Definition of an agricultural study perimeter (stratification of the study territory), Field investigations of "prospectors-recommission", agricultural practices in the context of energy source and other estimation (arometeric characteristics). According

Agricultural delegates for different districts of the regimes of Sidi Bel Abbes

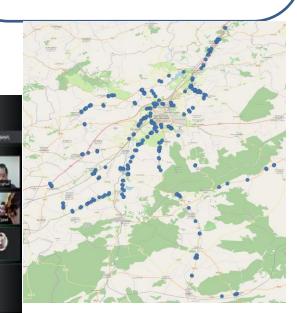
The following firmers visualize the different trainctories, especially the interact-

Arthur - Strate - - -

1. MANSOUR Djamid, Engineer (Algorian Space Agency) 2. THEANI Wahid (ministry of agricolture)

#### Algeria

- Field work, 3days,
   November 15-18 2022
- Types: potatoes, cauliflower, grains, olive and pomegranates
- Collected 279 samples



#### Technical training and national bulletin for Mozambique

- In-situ data collection training
- First CropWatch training for selected experts (3 persons)
- Extended CropWatch training (29 participants)



- CropWatch Cloud supports crop monitoring for food security in Mozambique National Meteorological Bulletin powered by CropWatch
- CropWatch Cloud for Mozambique was included in Rural Solutions Portal by IFAD in 2020.

Activities	Outputs	DIRECCIO NACIONAL DE ÁRRICUITURA E SIRICUITURA HARSÍN DURA MARIE E JA DURA MARIE FARA	Proceeding for the section of a Automative set of Automative Int 2011 74 Marca of the Automative and Automative and Automative set of Automative Automative Control of Automative Automa	For provide the first or a more device time if it is not a close or apply the integrations on a labeled in a comparison of the first or a close. A support of the first or a close or close or a close							
Requirement analysis	Detailed Requirement report	anilyan Tanilyan	A contract product of the second seco	The data is the data is the second	Crophilicia (	Apo-dinati Infenses	Tradactionitades	C and Buzi	Nya Crosp Type	8 Margmont System	English - Mice ()
Discussion and finalize the implementation plan	Detailed implementation plan	BOLETIN ARMONETERSOLÓGICO Fais Faixe - segue ar artistica e marco a meno, en acto a ma aos a marco a segue argente argente meno e meno e mante a marco a como a marco en actorizado e marco e meno e mante a marco a como a marco a marco - segue a marco e marco e mante a marco a marco a marco a marco - segue a marco e marco e marco e marco e marco e marco e marco - marco e marco - marco e marco - marco e marco - marco e	A second se	In a qui casa de la cas En casa de la casa de la casa de la cas Esta de la casa de la casa de la	ES III						
Discussion and <b>joint field</b> <b>trip</b> in Mozambique	In situ data in Maputo and Nampula	<ul> <li>Else Regelland of Halfold Al, Januar Halfold Al, Halfold Halfold AL, Halfold</li></ul>	The second secon	Merid M. System control and a set of the SME control and a set of the S		1			-		
First <b>technical training</b> of CropWatch in Beijing	Agricultural monitoring report done by MOZ experts using CropWatch	Insector some of the source of	A consideration appropriate framework in a second of the s	un faire un faire faire ann ann an Anna ann Anna ann ann ann an	NOVI	Sofia			Badi (mmgyaha 3.55 mmondar 0.56 aaradaa (3.57		63
Second technical training of CropWatch in MOZ	CropWatch based crop condition monitoring included in MOZ national meteorological bulletin	The instructure processing the data to access at 2 is the data of the second	eti errita di Mariana di Antonio				Dagadi		5.5	7	but serving plant
Training for national and provincial office	Mozambicans get some knowledge about crop monitoring on their own	About 100 The second s									
Customize the CropWatch system for Mozambique	Provide system in Portuguese; Include all provinces for MOZ; Yield model calibrated	7		nada at na man nada kana na man na	Jahn day01.0		w w w w		07 80 88 8	- 44 - 14 29 - 20	1967 2008 1448 GAN
		PL, Managering Cold Land				CIU	Jvvalcii i		Uzailiy	ique	

#### ...the outputs



"We use CropWatch mainly for crop production forecast. Our team has been applying the tool to generate monthly agriculture bulletin during the rain season, which informs policy making at national and provincial-level agriculture departments."

Mr. Hilten, Department of Crops and Early Warning, Ministry of Agriculture and Rural Development, Mozambique

In 2019, CropWatch Cloud for Mozambique was selected as one of the **best "rural solutions"** by the **International Fund for Agricultural Development (IFAD)** due to its contributions in improving the capacities of Mozambique to access domestic and global agricultural information.

Collaborative Crop conditions and Disaster's Updates in Portuguese language





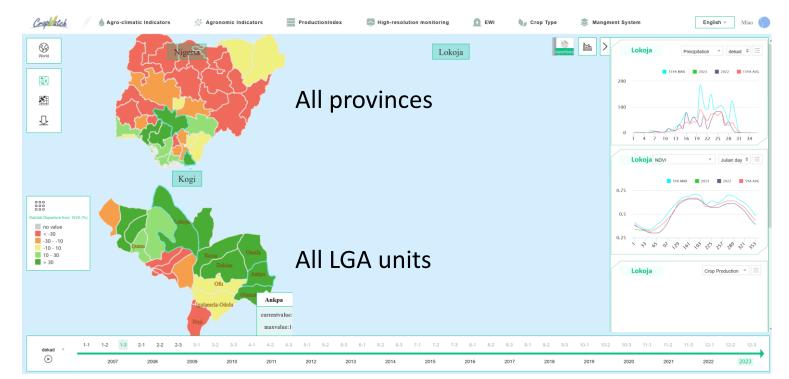
Powered by: Crop

#### Activities in Nigeria NASRDA

- Project implementation team
- All indicators are tailored for three Levels of national, state and local units
- Stakeholder meeting including ministries of agriculture, environment and water resources
- Technical support to regional countries



Online scientific webinars



#### CropWatch customization for Nigeria

# Outline

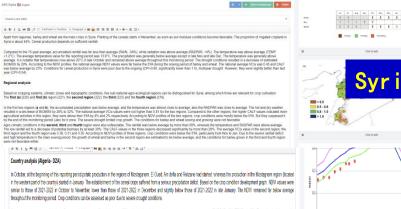
- Background
- CropWatch-ICP introduction
- CropWath: Capacity building
- Outlook

### Next steps

- Regional workshop in Mauritius (August) and Thailand (tbc)
- Food security session at ANSO conference (November, Beijing)
- Hand on training on the field in Cambodia, Thailand, Nigeria, Mauritius
- On-job training in Beijing for pilot countries from May to November
- CropWatch customization for technical transfer
- Upgrading the system to provide high resolution crop monitoring APIs to address the small holder farming systems

### Ongoing system customization for pilot countries

- Specific requirements for function and models: Nigeria, Syria, Mauritius, Algeria, Thailand, Laos
- System languages documents: Vietnamese, Thai, Arabic
- Continuing participation on country analysis for CropWatch Bulletin: Nigeria, Syira, Thailand, Algeria



Compared to the average of the last 15 years, rainfal was significantly lower by 55% while both radiation and temperature were above average (RADPAR +6%, TEMP +1.4°C). The estimated biomass for the country was 33% below the 15W. The crooped arable land fraction (CALF) was below average by 24% and the national average VCIx was 0.53.

The NDVI departure cluster profiles indicate that: (1) 47.2% of arable land experienced below-average crop conditions, scattered around the central region of the country, the high plateaus, some areas in the sub-Sahara, and the western region. (2) 25.3% of arable land has slightly above-arerage crop conditions, scattered around the highlands and eastern country. (3) 14.8% of arable land, mainly in the western part of the country and some central regions, had below-wegate concorditions before a merked dopodown from November to late January (4) 12.7% of scale and experienced below average con conditions from October to late November before a marked dopo in late November mainly in eastern countries and slightly marked by an increase from December indicating below-average error conditions. The conditions in October and November may have delayed the establishment of careel errors and the crop production index (CPI) was 0.77 according to the CPI time series from 2013 to 2023. Croo conditions were unlaworable due to below-average orecipitation. However, the heavy rains in January may not help alleviate the production conditions for cereal croos. Indeed, supplemental iniciation is a practical way for farmers to salvage this crop





#30 Notria 🛅 Erger

cas 436 Theiland 🖬 Erolen

The regional analysis below for







Cropkatch CropWatch for Nana مؤشر الهطول المطر 🕞 ۷ أعلى قيمة لمؤشر مؤشـر القرينة النباتية 🏽 \* 中文 مؤشـر المساحة الورق الحد الأدنى لمؤشر ص مؤشر درجة الحرارة 🗟 💥 English Ø Portuguese جزء الأشعة النشطة الأشعة النشطة ضوئي حة للزراعة المحصولي 👔 ضوئياً الممتصة 📠 ភាសាខ្មែរ الكتلة الحية المحتمل كثافة المحاصيل 👔 مؤشـر القرينة المائية 🏨 💽 ພາສາລາວ \_\_\_\_ ภาษาไทย 0 · · Instant 📩 Tiếng Việt System B C I U an C / D Forfant - Forfice - Paspagt - E E B B B B A - \* - E (B-This report covers more conditions for maine, wheat, sorbeau and ner between the months of October 2022 to January 2023 in Nigenia, when the country entered the dry season. Roe, millet, and ested in November and December. Harvest of second season maize was completed in Januar العربية 🚥 Rainfull recorded for the country during this period was -32% below the 15YA. The temperature recorded was -0.9% below the 15YA. Solar radiation did not deviate from the 15YA. As a result of Language these factors, the BIOMSS also fell below the 15YA br +13%. The CALF was above the 15YA at 4% while the observed maximum vegetation condition index (VCI) was 0.89. The corp condition development graph based on NDVI shows that the NDVI was mostly below the 5YA throughout the reporting period until January, when it levelled off and approached t 5YA. The Crop Production Index (CPI) for the country was at 1 which indicates normal conditions As shown in the spatial NDVI profiles and distribution map. 48.2% of the coastsy covering the middle beh and parts of the north wave mostly below the 15YA throughout the penod, while 32% em part of the country were above the ISYA. It was observed that a portion of 78% and 74% dropped far below the ISYA is early October, but by mid-October, was back to near the average for the rest of the monitoring period. The same applies to a portion of 4.6% predominant along the Niger and Benze River as well as the southern part of the country which also B E I D M B / " forfant - fortige - Fangant - E E E E E A - . . . From April to July, the main rice and maize crops were sown, and the harvest of the second rice was completed in June. According to the agroctimatic indicators, Thailand expe Online Meeting and codier than usual weather in this monitoring period with above-average sainfall (RAIN +14%) and sanshine (RAIDPRR +5%), as well as decreased temperature (RAIDPRR +5%), as Nigeria Tuesday, 25th May 2021-The NDVI development graph shows that crop conditions were above average before mid-May mainly due to high temperatures and sufficient rainfall. Subsequently, the rainfall and h-ICP Project rperature were generally below average from late-May to mid-to-late June, which led to a decrease in crop conditions. Then, the crop conditions gradually improved close to the 5-ye scars at the and of monitoring neered. According to the NDM denoting clustering may 57 7% of conclused was always slightly alway average from Anril to July widely located in centra seten and southern areas. 15.1% of the cropped area, mostly located in northeast and southwest parts, showed a sharp drop in Max, presumably due to cloud cover in the satellite tive core monitoring ming real time data which facili images, and then reached average levels by the end of this monitoring period. A similar share drop in early july was observed for 13.8% of the monged area. Those areas were located in ckets over most of Thailand, but predominantly in the south. For the remaining 10.4%, a sharp negative departure was observed at the end of thi At the national level, all anable land was cropped during the season (CALF +100%) and had favorable VCIx values of around 0.92. The Crop Production Index (CPI) in Thaland is 1.15 **Requirement analysis** touble and triple-cropped rice lowlands (115). South-eastern horticulture area (116), Western and southern hill areas (117), and the Single-cropped rice north-eastern region (118). or the Central double and triple-cropped rice lowlands, the agroclimatic indicators show that the accumulated rainfall and radiation were above average (RAIN +34%, RADPAR +69%), nd temperature was below average (TEMP -0.62C), which resulted in above-average biomass production potential (BIONSS +11%). According to the NEW development graph, cop fitions were favorable and above the 5-year average for most of the monitori p period, except for July. The crop conditions even reached the 5-year maximum level before late Apri Considering the favorable VChr value of 0.91, the situation is assessed as slightly above average.

Thailand

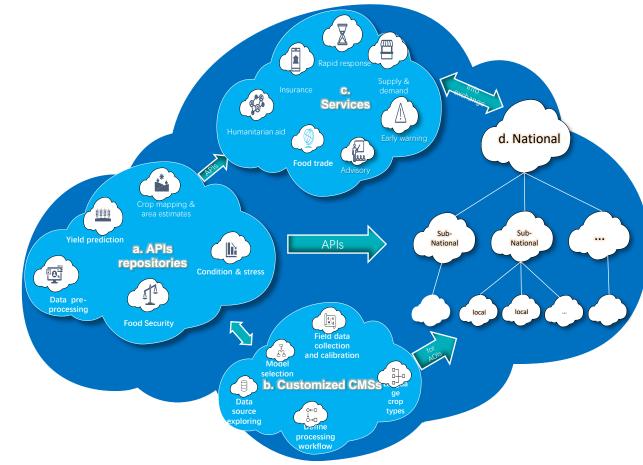
ccording to acro-climatic indicators for the South-eastern horticulture area, temperature was below average (TEMP-0.5 °C), while accumulated rainfall and solar radiation were slightly bove average (RAIN + 3%, RADPAR + 2%), the resulting biomass production potential stayed unchanged (BIOMSS 0%). The NDVI curve as well as a VCIx of 0.92 indicate average conditions modimatic indicators show that the conditions in the Western and southern hills uses slightly above average: accumulated rainfail and radiation were above average (RAIN +4%). ADFRR +4%), and temperature was below average (TEMP -0.1\*C), resulting in an increase of biomass production potential (BDMSS +4%). As shown in NDM development graph, the orop conditions were markedly abow average and even at the 5-year maximum level in early-to-mid April, but dropped to below-average levels after mid-May. VCx was at 1.94. Overall, crep conditions were close to normal.





# Outlook

- CropWatch is flexible to be tailored as their own crop monitoring system, it will enable developing countries have the capacity and ability to complete crop monitoring independently without additional investment on storage and computation.
- More countries are welcome to join us, please contact UNCTAD to express your interests



#### Thank you for your attention! wubf@aircas.ac.cn cropwatch@aircas.ac.cn

