Food and Agriculture Organization of the United Nations

WaPOR

FAO's portal to monitor Water Productivity through Open-access of Remotely sensed derived data

Creating a WaPOR community of practice in Pakistan

Marloes Mul, Seleshi Yalew

IHE Delft Institute for Water Education

Ministry of Foreign Affairs of the Netherlands

IWMI International Water Management Institute

IHE DELFT Institute for Water Education under the auspices of UNESCO

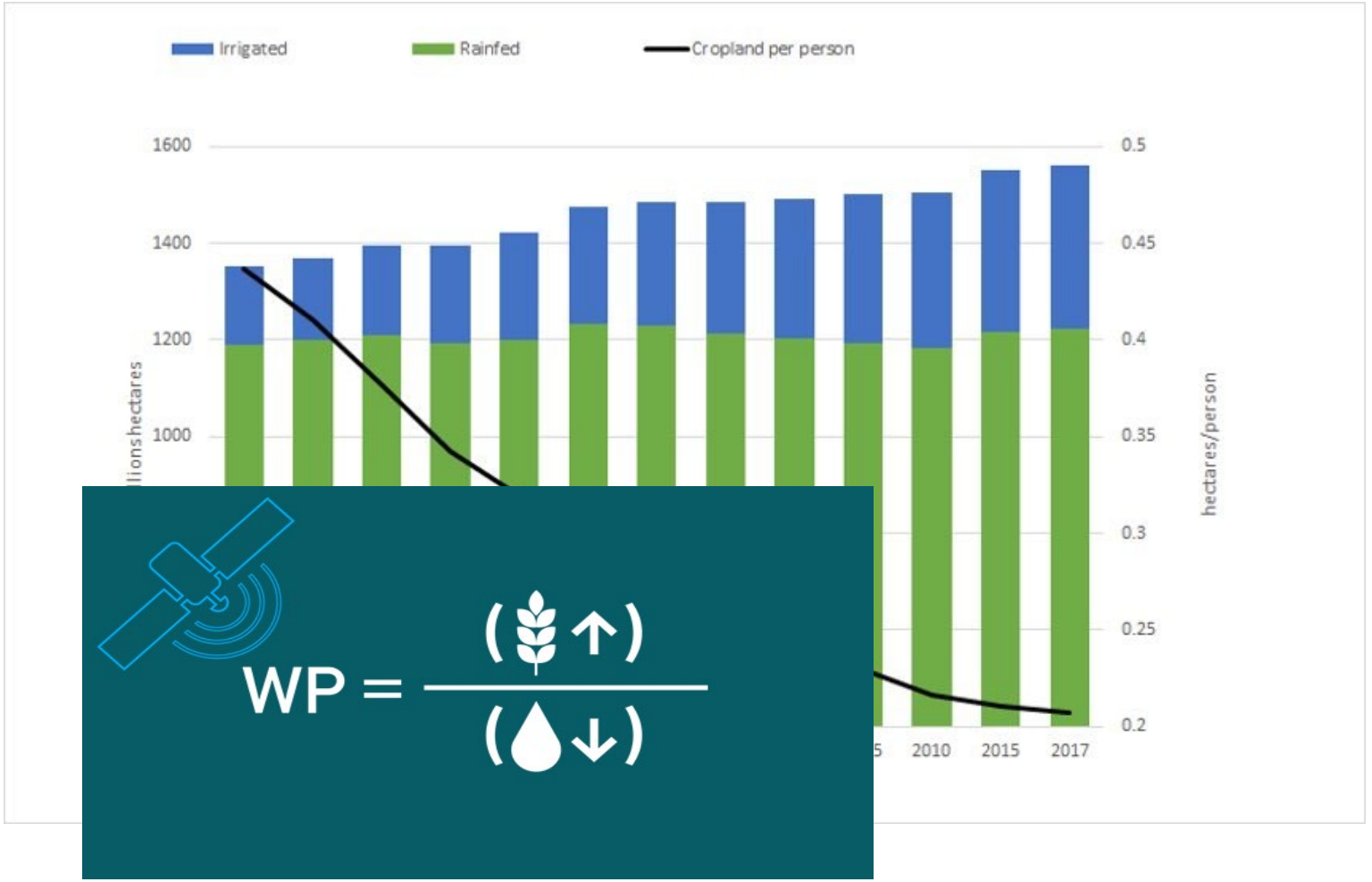
We need to produce our food more efficiently…

…using less water

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

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

Increasing water productivity is now a globally recognized target (SDG 6)



FAO Aquastat 2020

WaPOR global database

Data sets:

- Actual evapotranspiration and interception (AETI)
- Net primary production (NPP, for biomass estimations)
- Interception (I), Transpiration (T), Evaporation (E)
- Precipitation (from CHIRPS) (PCP)
- Reference Evapotranspiration (RET)
- Relative rootzone soil moisture (beta product)

Temporal resolution: daily (PCP and RET), decadal, monthly, annual

Temporal availability: 2018-present (near real time)

The global level (300m resolution) that covers the entire globe.

The continental and national / river basin level (100 m ground resolution) Northern and sub-Saharan Africa and the Near East (roughly a square of -30W, -40S, 65E, 40N)

The irrigation scheme and sub-basin (20 m ground resolution) available for these areas:

- **Pakistan: Khanewal & Sanghar**

How WaPOR works

Ministry of Foreign Affairs of the Netherlands

UNESCO IHE DELFT

IWMI International Water Management Institute

Consortium:

eleaf FEED THE WORLD

vito

ITC UNIVERSITY OF TWENTE.

WATERWATCH FOUNDATION

WaPOR Phase 2: demand driven applications

Ministry of Foreign Affairs of the Netherlands

IWMI International Water Management Institute

Capacity Development

Training of stakeholders at different levels to enable use of the WaPOR database for practical applications to increase land and water productivity as well as for policy relevant applications to support sustainable water management, governance and agricultural policies.

Implementable solutions, tools and policy recommendations

Co-design and co-development of user-centered solutions and practical tools to improve land and water productivity, including to address specific policy requests

Database expansion

Continuation of WaPOR DB, expansion towards global coverage, open access, quality assessment and feedback process

2 main international partners, 3 components
5 years, 13 countries (incl Pakistan)
2021-2026

WaPOR repository for showcasing use of WaPOR data:
https://www.fao.org/in-action/wapor-uses-applications-catalogue/en/

Component 2 Capacity building

Objective

Enhanced capacities of stakeholders to use the WaPOR database for practical applications to increase land and water productivity as well as for policy relevant applications to support sustainable water management and governance and agricultural policies.

Component 3 Compendium of solutions

Objective

Compendium of implementable solutions and tools, co-developed with various stakeholders at different operational scales, from farm to the national level, to effectively increase land and water productivity in agriculture sustainably at field level as well as to support water management, water governance and agricultural policies

On the job training

Linked to specific country activities/ application development

- Target audience: technical experts

Development of apps, dashboards etc by WaPOR team

- Training on how to replicate the analyses/ adapt and co-design
- Training on how to maintain tools
- Training on how to use the tools (end user training)

Training of trainers

- General concepts
- Standard analyses for selected case study
- Interpretation of analyses
- Identify tailored analyses, adapt scripts and implement analyses

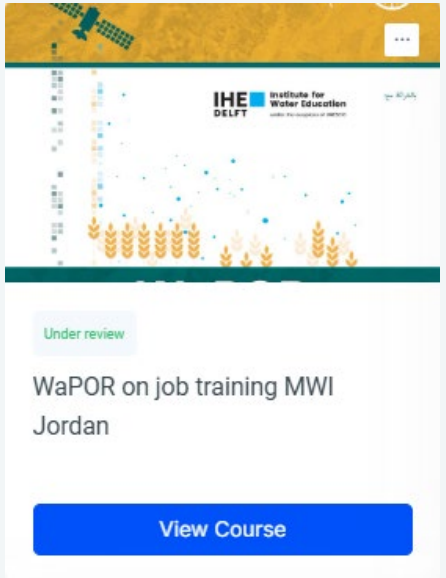
Steps:

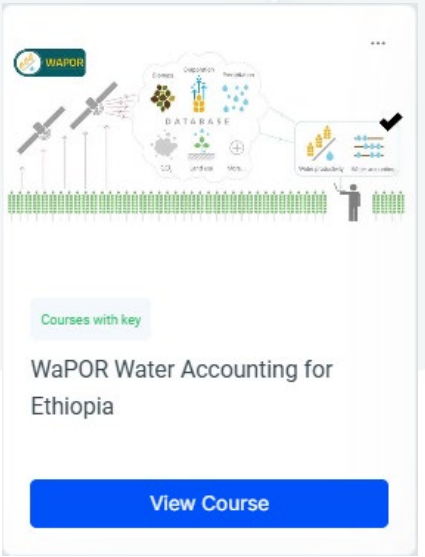
- Identify suitable candidates
- Regular online meeting (supported by dedicated platform)
- Possible face to face meeting (after sufficient progress made)

Country trainings - On the job training

- Various topics covered focussing on application development (output 3a)
  - Irrigation Performance Assessment (Kenya, Sudan, Egypt, IWMI – Jordan/Iraq/ Mozambique)
  - Irrigation scheduling (IWMI – Algeria/Tunisia)
  - Supporting integration WaPOR into WIS (Palestine, Jordan)
  - Drought monitoring (Sudan, Mali, **Pakistan**)
  - Groundwater assessment (Iraq, Jordan, Palestine)
  - Water use assessment/WA+ (Egypt, IWMI – Kenya)

- Or creating community of practice (CoP):
  - Water Accounting plus (Ethiopia - completed)
  - **CoP in Pakistan (academia – starting in 2025)**
  - CoP in Colombia (various government departments- starting in 2025)

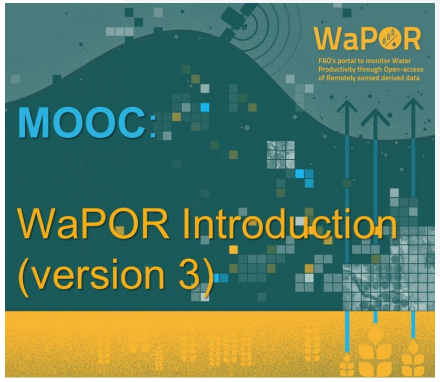


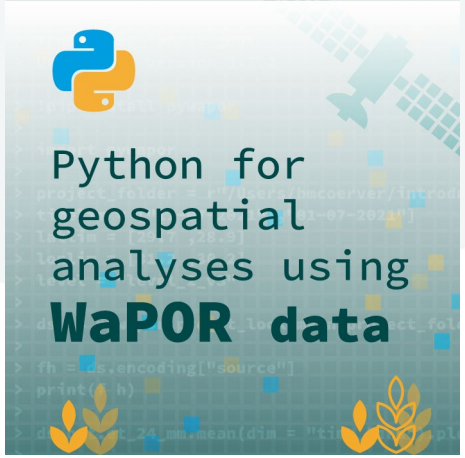


Capacity building (global)

- **Also used to support the on the job training and creating community of practice**

Water Productivity and Water Accounting using WaPOR (phase 1) (also in French and Arabic) - 3 modules
WaPOR concepts and validation
WaPOR v3 Introduction (also available in French and Spanish)
Python for geospatial applications using WaPOR data





Topics of interest in Pakistan

Ministry of water resources/ Ministry of national food security and research

- Crop mapping; Crop water demand and consumption estimates; Ground water fluctuation

Pakistan Meteorological Department

- Drought monitoring; meteorological analyses; collaborative research

Provincial Government's Irrigation and Agricultural departments

- AETI modeling for flood irrigation; water consumption per crop type; soil moisture based irrigation scheduling; water productivity per canal command area/ identifying crop productivity gaps

Academia

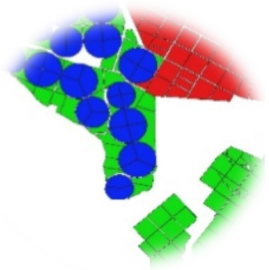
- Developing educational materials on WaPOR; validation of WaPOR research; capacity building of staff and students; development of case studies and practical applications

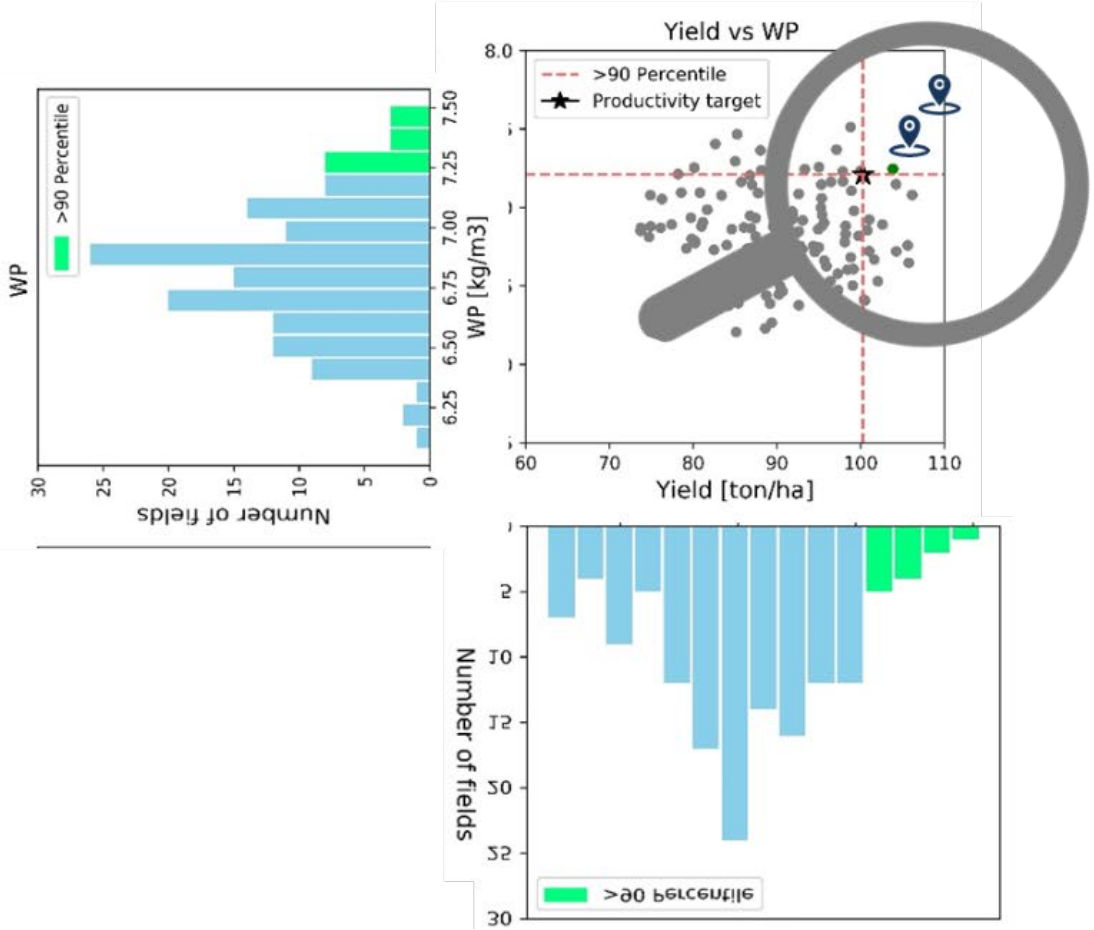
Punjab irrigation department

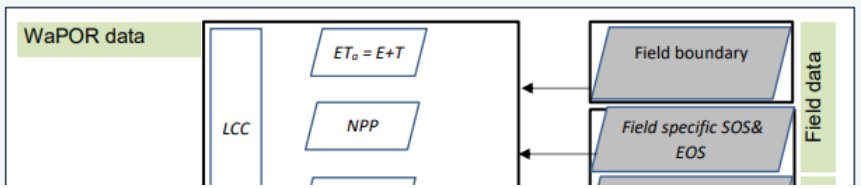
- Water Budgeting and Agricultural Productivity Assessment in the Indus Basin Irrigation System

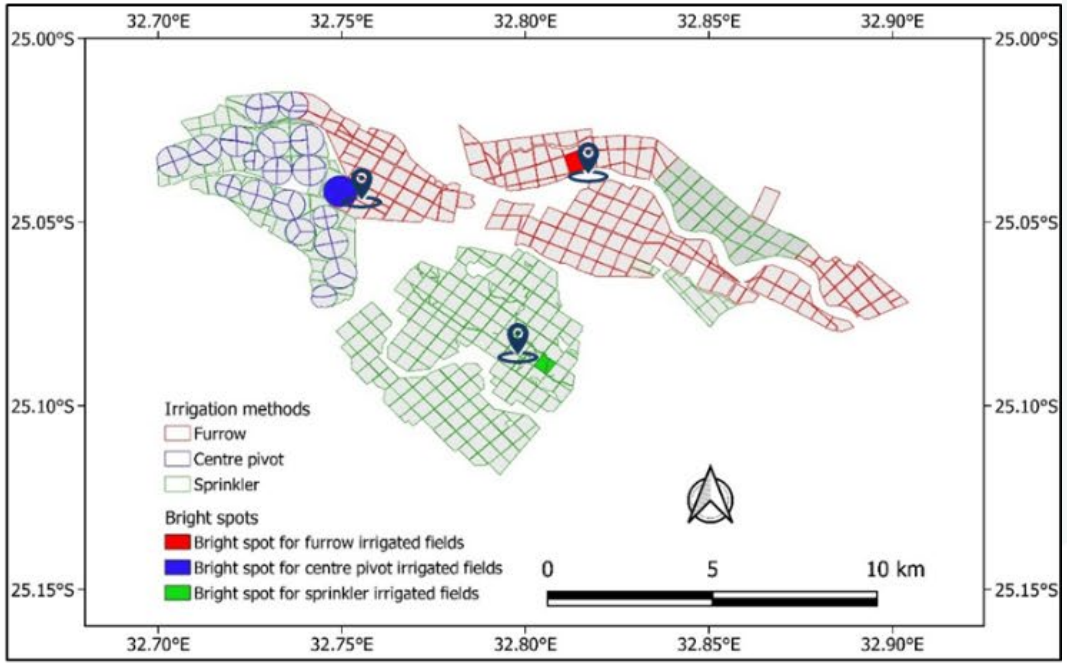
Existing tools and protocols

- **Aligned**
  - **Star**
    asse





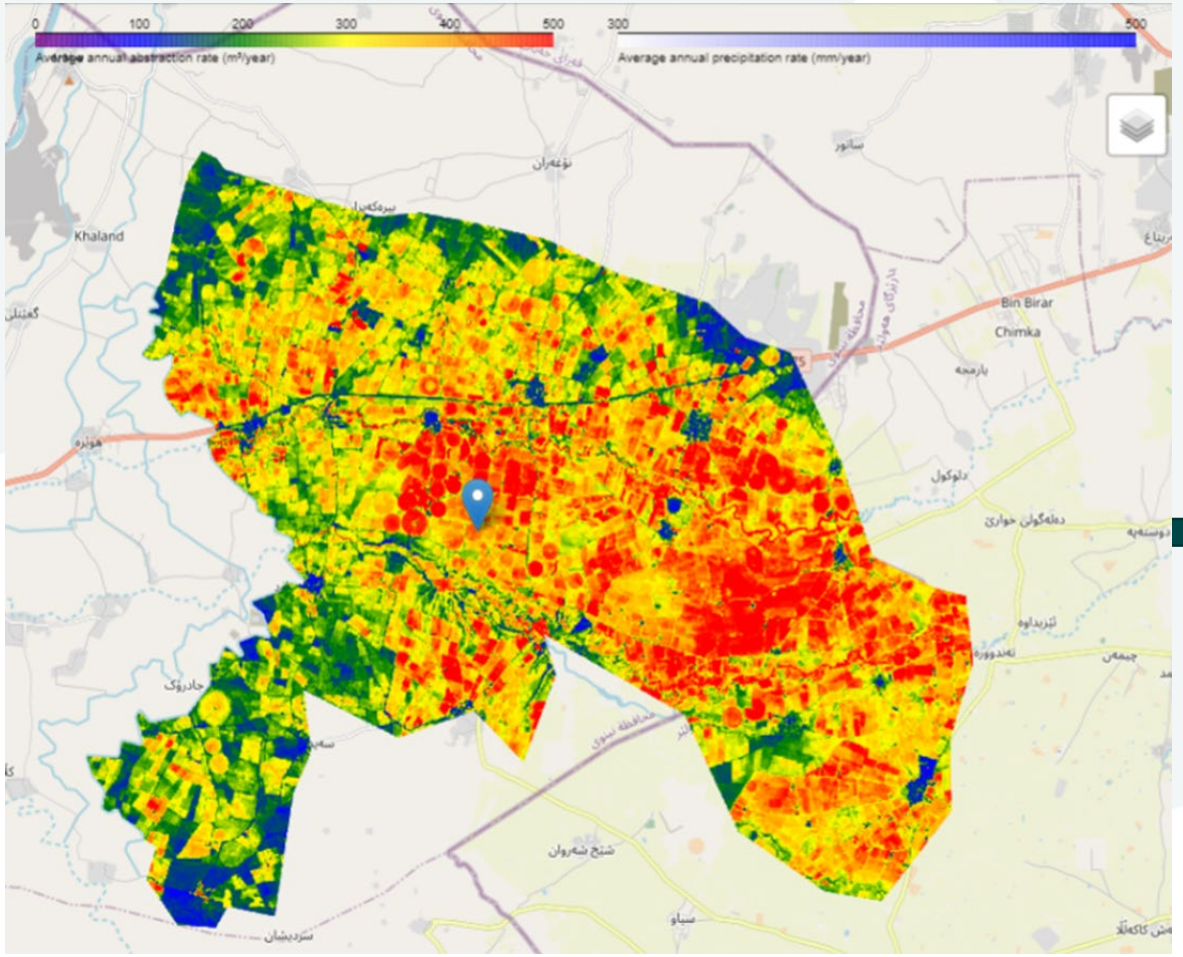




Existing tools and protocols

- **Groundwater recharge and abstraction estimations**
  - Development of a spatial soil water balance model (based on Thornthwaite-Mather method)
  - Creating annual maps (P, ETa, Peff, ETblue/abstraction, recharge) and graphs (Monthly data on recharge, consumption)

Validation using data from monitoring wells



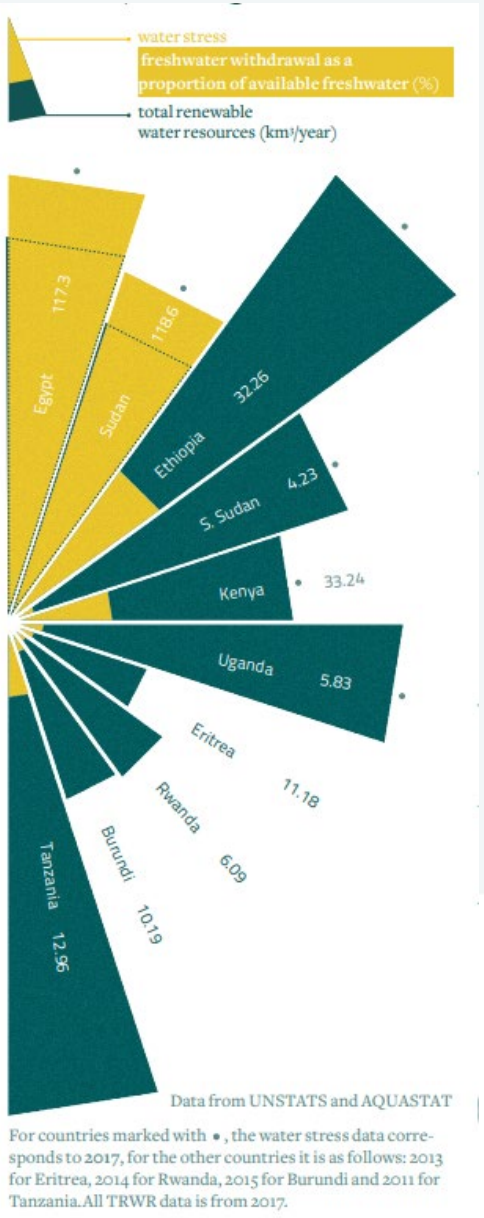
Average annual abstraction rate (2018-2023)

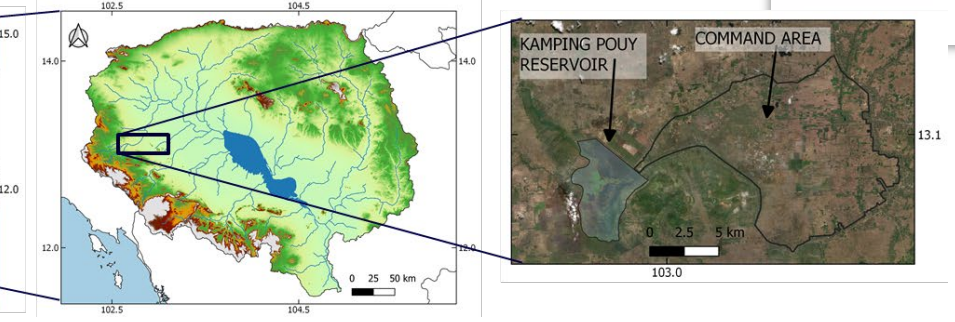
Existing tools and protocols

- **Water Accounting**

  Water Accounting from Remote Sensing aims to complement the lack of routine water resources data collection and incorporates spatially distributed water consumption.

  WA in the Jordan River Basin describes the use of WaPOR data for water rescources assessment, its challenges and opportunities. Scope for improving accuracy with integration of national data sources.





Proposed time schedule (July-December)

		week										
No	Topics	9 Jul	16 Jul	23 Jul	30 Jul	6 Aug	13 Aug	20 Aug	27 Aug	3 Sep	10 Sep – 8 Oct	15 Oct – 12 Dec
1	**Introduction to the on the job training, Remote Sensing and WaPOR**											
2	**MOOC: WaPOR introduction (version 3)**											
3	**WaPOR validation**											
4	**MOOC: Python for Geospatial Analyses using WaPOR Data**											
5	**Topic 1 (tbd)**											
6	**Topic 2 (tbd)**											

Next steps:

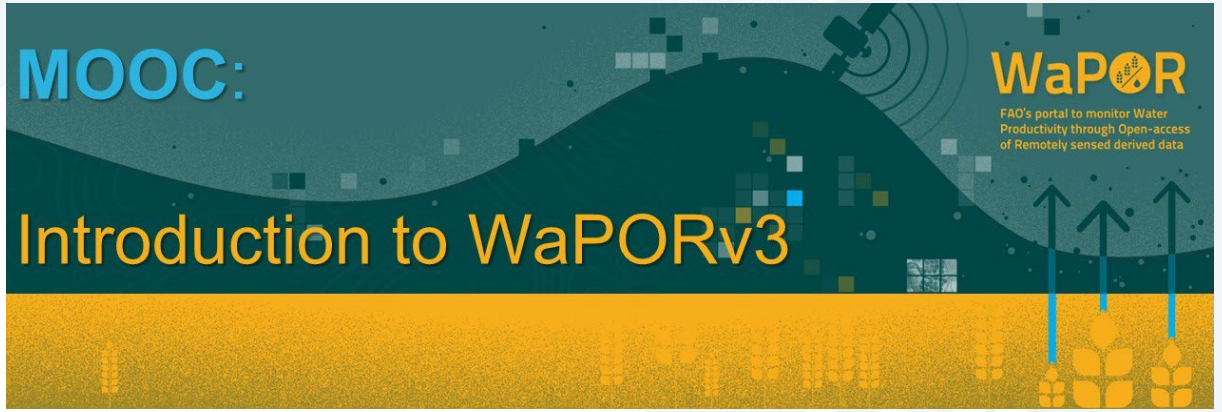
- **Dedicated OCW page has been set up with all the materials and links**
  - List of participants has been provided (incl email address they registered to the OCW)
  - All participants to register in the OCW platform of IHE (a few still missing)
- **Weekly online meetings with the participants**
  - Main focus of the meetings is to provide additional clarifications/ Q&A/ discuss site specific analyses and results (not to repeat presentations)
  - 2-4 hrs work needed in between the sessions
  - Schedule is flexible
  - Meetings will be recorded
- **Certificate will be issued to those participants completing:**
  - MOOC Introduction to WaPORv3
  - MOOC Python for geospatial analyses using WaPOR data
  - Complete the course materials and assignments for the community of practice

Next steps:

- **Start with MOOC Introduction to WaPOR v3 course**

(https://ocw.un-ihe.org/course/view.php?id=263)

  - Q&A 16 July (complete topics 1. Introduction to WaPOR v3 & 2. WaPOR portal v3)



If you do not have an account:

Create a New Account in the IHE Open Education website Click on Create New Account, fill in your username, password etc., an 'account confirmation' email will be sent to you (check also in your spam e-mailbox, particularly if you have a Gmail account), use the 'web address' received to confirm your new account and login using your username and password