Asia Water Forum 2022
8–11 August 2022 • Online

Focus Area: Productive water in agriculture and the economy

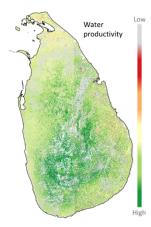**Session Title:** Enhancing the economic value of water

Schedule: [9 August 2022 | 11 a.m. – 12.30 p.m.]

Characterizing water productivity of rice systems in Sri Lanka using remote sensing

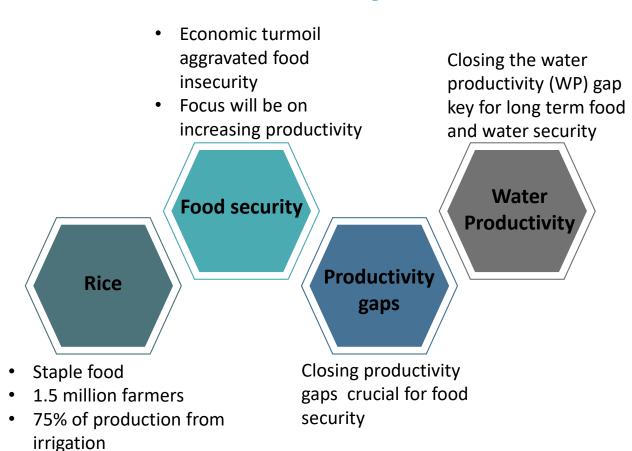Karthikeyan Matheswaran, Mohamed Ahsan, Lal Mutuwatte, and Lisa-Mari Rebelo

Agricultural Water Productivity

- Economic turmoil aggravated food insecurity
- Focus will be on increasing productivity

Closing the water productivity (WP) gap key for long term food and water security

Food security

Water Productivity

Rice

Productivity gaps

- Staple food
- 1.5 million farmers
- 75% of production from irrigation

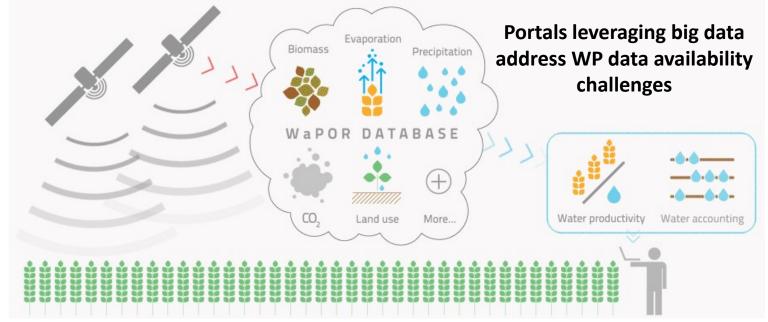Closing productivity gaps crucial for food security

Despite long history, challenges remain on estimating and using WP at multiple levels

ADB

Water productivity – issues and Challenges

- WP remains poorly understood (often confused with efficiency)

- Focus mainly on traditional aspects of production and economic rationale.

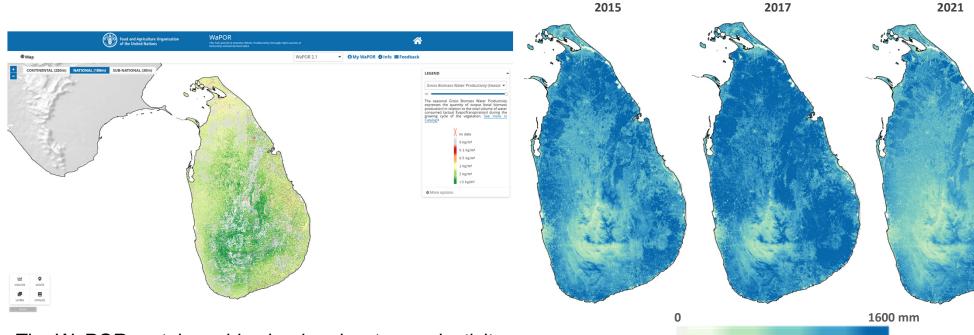- WP - Low priority in the policy hierarchy

- WP data are not readily available or measurable

- Studies focus on narrow geographic area

- WP estimates covering large spatio-temporal scales are complex and not available at scale meaningful to stakeholders
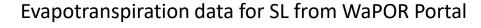
Portals leveraging big data address WP data availability challenges

The WaPOR portal – Sri Lanka

The WaPOR portal provides land and water productivity indicators in near real time for Sri Lanka at 100 m resolution
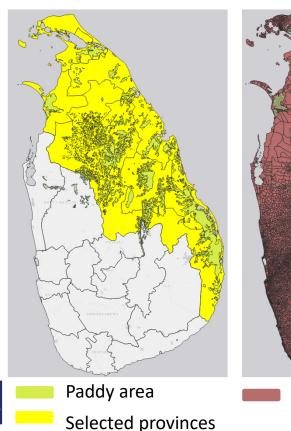
Actual ET

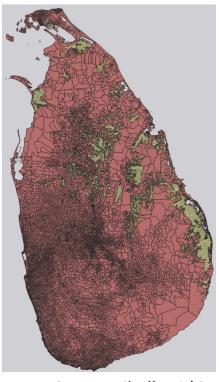2015   2017   2021

0   1600 mm

Evapotranspiration data for SL from WaPOR Portal

Leveraging WaPOR and stakeholder
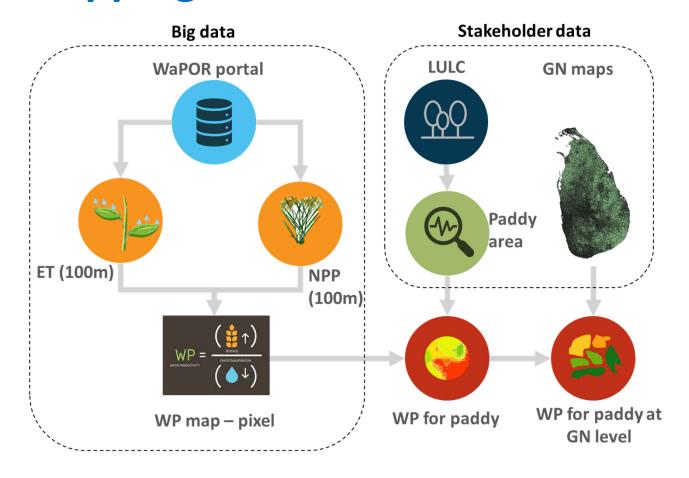

Paddy area
Selected provinces

Grama Niladhari (GN)
boundaries

- Combining in-country data with WaPOR data can provide adequstakeholder required scale

- Available dataset like rice area from LULC 2018 map enables extracting rice-specific indicators.

- GN – lower-level administrative division

- 2162 GN divisions across six provinces selected

- Crop production statistics and agriculture related administration happen at GN level

- Provision of GN level details enable stakeholders to design actions addressing gaps.

WP mapping at GN level

Big data

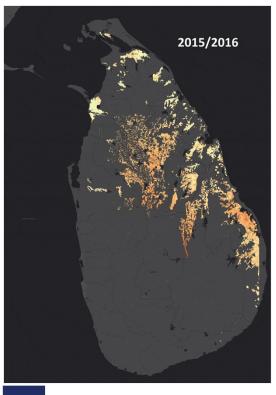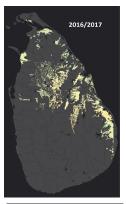WaPOR portal

ET (100m)   NPP (100m)

$$WP = \frac{(\text{BIOMASS} \uparrow)}{(\text{EVAPOTRANSPIRATION} \downarrow)}$$

WP map – pixel

Stakeholder data

LULC   GN maps

Paddy area

WP for paddy   WP for paddy at GN level

Agriculture water use - Paddy

Spatio-temporal ET map of paddy area (Maha season)

2015/2016

2015/2016
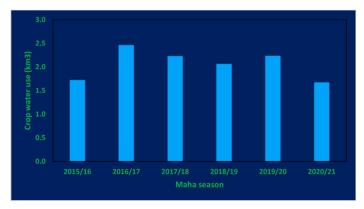

2016/2017

2017/2018

2018/2019

2019/2020

2020/2021

Seasonal paddy water use (Maha)

Water productivity is not static

Wet Zone = > Annual Rainfall **2500**

Intermediate Zone = Annual Rainfall **1750 - 2500**

Dry Zone = < Annual Rainfall **1750**

2015/2016

Biomass water productivity (kg/m³)

- 0 - 1
- 1 - 2
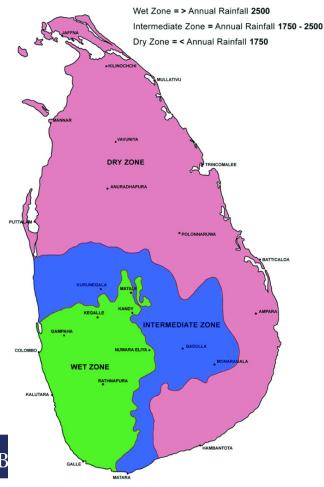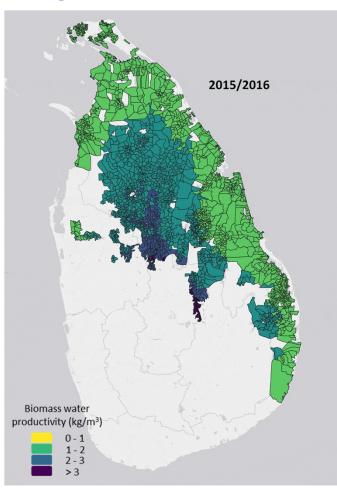- 2 - 3
- > 3

- Paddy mapping focused on dry zone
- All GNs in similar agro-climatological settings (dry zone)
- Yet, clear spatial patterns in WP of GNs
- Potential to bridge the productivity gap in GNs through interventions in land and water management

Water productivity is not static!!

Implications for agricultural water management at the GN level

- Combining productivity data from big data platforms (WaPOR) with in-country data
  - ensures confidence in data
- WP mapping at the spatial level suitable for departments and policymakers
  - List of GNs to target productivity improvements
  - Acceptable alternative in the absence of farm-level WP (still someway in smallholder systems using RS)
- Potential to reduce spatial variability of WP seen among GNs – improved food and water security
- Identify causes and suitable interventions for overall productivity improvements in GNs
- But WP targets also need to demonstrate tangible gains for farmers (recipe for success!!)
- Continued capacity-building programs – key to mainstreaming WP among various stakeholders

What's next?

- How is land productivity (paddy yield) from RS compared with (yield statistics collected at the GN level)?

- Causes for productivity (land and water) gaps among GNs

- Productivity indicators for major vs minor irrigation schemes

- Continued engagements with departments on adopting WaPOR ET (water use) data for targeted applications
  - Scheme performance
  - SDG 6.4.1
  - Water balance studies
  - System of Environmental-Economic Accounts for Water (SEEA-Water)
- Continued capacity-building programs for uptake of RS based crop water use data by government departments

Thank you

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For further information on the project: https://www.fao.org/in-action/knowat/en/

WaPOR data can be downloaded from https://wapor.apps.fao.org/