

Standardized Protocol for Land and Water Productivity Analyses using WaPOR

Introduction

The standardized protocol is aimed at guiding users to utilize the different layers contained in the FAO Water Productivity Open-access portal (WaPOR) to conduct analyses on productivity and other irrigation performance indicators. It provides users with pre-prepared Python scripts, which can be used to calculate land and water productivity and other performance indicators such as uniformity, beneficial fraction, adequacy, relative water deficit as well as estimating productivity gaps.

Scope: The protocol is tailored to biophysical water productivity with respect to consumed water use and land productivity at different spatial scales (fields and schemes) in similar agro-climatic zones. The protocol can be applied to a single crop for the same cropping season within a water management unit to measure changes in productivity and other irrigation performance indicators. The starting date and length of cropping season could vary between years.

Target: The protocol is developed for project leads, irrigation managers and researchers who have a basic understanding of Python and irrigation agronomy.

Structure of the Protocol

The protocol has six modules. For each of module, a Jupyter notebook was developed containing the python scripts. Module 0 focuses on downloading WaPOR data on actual water consumption (AET), actual transpiration (T), reference evapotranspiration (RET), and net primary production (NPP). In Module 1, the pre-processing of the data to match the spatial resolution and remove non-crop pixels using land cover classification (LCC) are conducted. In Module 2, the seasonal water consumption (T , AET , RET and potential evapotranspiration (ET_p)) and seasonal NPP are computed. In Module 3, different performance indicators are calculated. In Module 4, land and water productivity are computed. And finally, in Module 5, bright spots and productivity gaps are calculated.

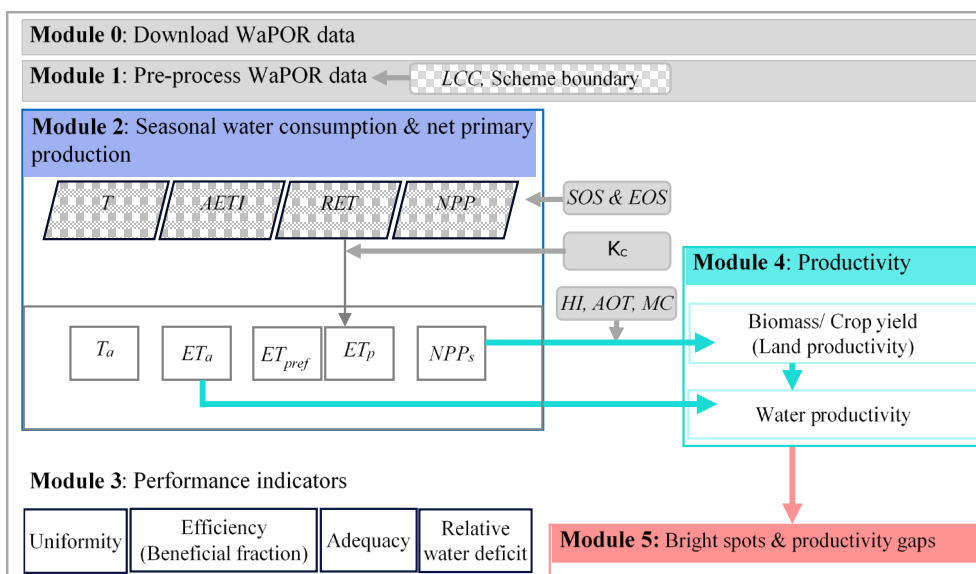
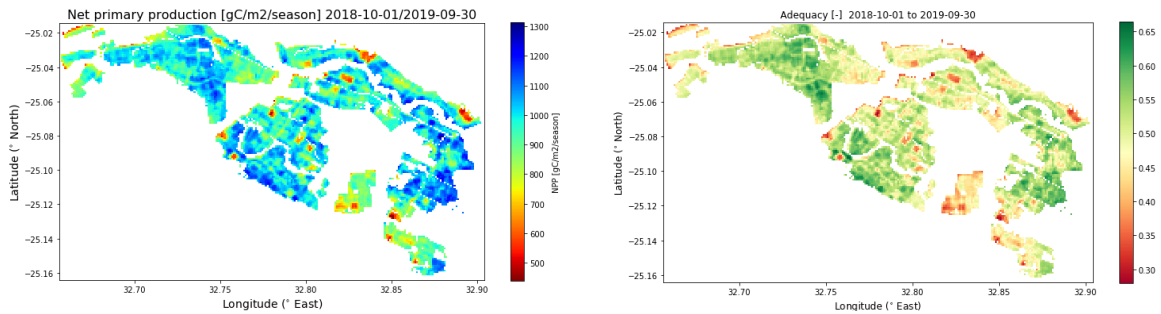


Figure 1: Flow chart for calculating WaPOR based performance indicators. LCC , T , AET , RET and NPP are WaPOR data, and shapefile of the field, k , MC , ATO , HI , and $SOS\&\ EOS$ are data from ground-based observation and literature.

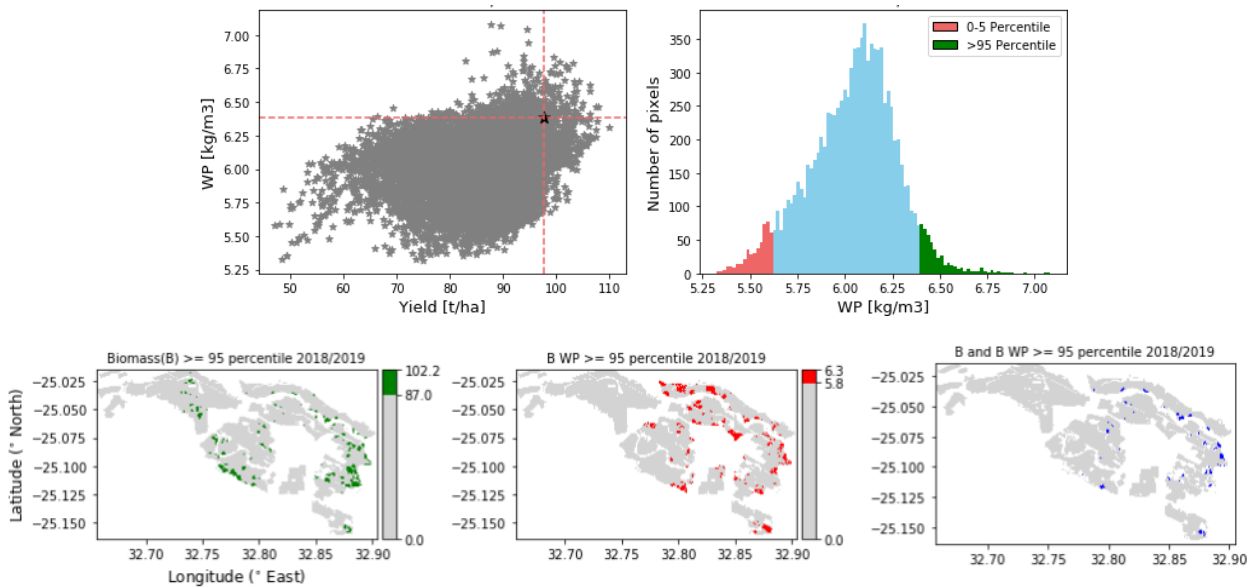
Results

Below are some of the results of the protocol implemented on a case study at Xinavane, a Sugarcane Estate in Mozambique. The analyses show the potential application of the protocol providing the spatial irrigation performance indicators and bright spots derived from the WaPOR dataset. Though the results can be generated cost-efficiently; their accurate interpretation requires validation with ground observation and formulation of practical solutions cannot be made unless the WaPOR analyses are complemented with observed data of field conditions.

Module 2: Seasonal net primary production (Left), and Module 3: Performance indicators



Module 5: Productivity gaps and bright spots



More Information on this case study and water productivity:

- Download the standardized protocol on the Water Productivity GitHub: <http://github.com/wateraccounting/WAPORWP>.
- Learn more about the FAO portal for Water Productivity through Open access of Remotely sensed derived data (WaPOR): <https://wapor.apps.fao.org/>
- Enrol in IHE's free open online course on the assessment of Water Productivity and other irrigation performance indicators using WaPOR: <https://ocw.un-ihe.org/course/view.php?id=92§ion=8>

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