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Remote Sensing-Based Agricultural Water Accounting (AWA) *for the North Jordan Valley*



BACKGROUND

An agricultural water accounting (AWA) was implemented in three cycles that included rapid assessment, detailed mapping and implementation of new techniques to assess water use and efficiency in the North Jordan Valley (NVJ). In these cycles, consolidated procedures have been applied to complement and validate open source data from earth observation systems (EOS) and the open source portal (WaPOR) of the Food and Agricultural Organization. The overall aim of the work was to provide assessment for agricultural water use in NJV and to provide solutions for water deficiency. The ultimate goal of the work was to institutionalize the water accounting (WA) systems at the Ministry of Water and Irrigation, so that open source data and WA tools would be fully utilized for water management in Jordan.



STUDY AREA

WHERE IS THE SITE?

The NJV study area is located in the northwest of Jordan between 32.35 to 32.68° N and between 35.55 to 35.62° E. The area is important as it shares transboundary water uses from Yarmouk River and Peace Water.

CONTEXT

Total Area: 18 200 ha.

Agricultural area: 8 627 ha (irrigated), 2 041 h (rainfed).

Altitude: -200 m to -300 m.

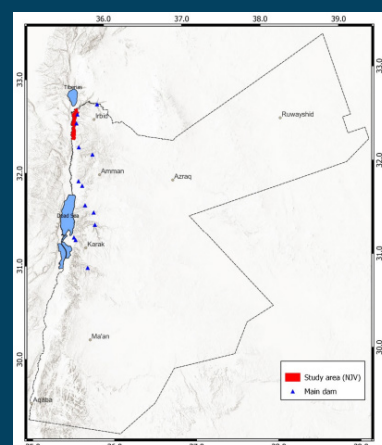
Climate: Sub-tropical (Precipitation = 308 mm/yr, Min. monthly temp. = 13°C (Jan.), max monthly temp. = 32°C (Aug.))

Crops: Citrus, vegetables, date palm, ruit trees and rainfed cereals.

Growing Seasons for vegetables: October - January and February - May.

Water Sources: Surface water delivered by the King Abdullah Canal (KAC) and small amount of groundwater licensed wells.

Figure 1: Location of the study area in the developed areas in Jordan Valley



Source: Al-Bakri et al (2022). <https://doi.org/10.3390/w14081198>.



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METHODOLOGY

- Detailed land use mapping to obtain water use categories.
- Detailed mapping of ET using SEBAL calibrated model.
- Calibration of water outflow data of ET obtained from WaPOR.
- Water data of supply and interbasin transfer from JVA and MWI.
- Full AWA using WA+ system available sheets.
- Hydrological mapping for surface water development.



Figure 2: Methodology

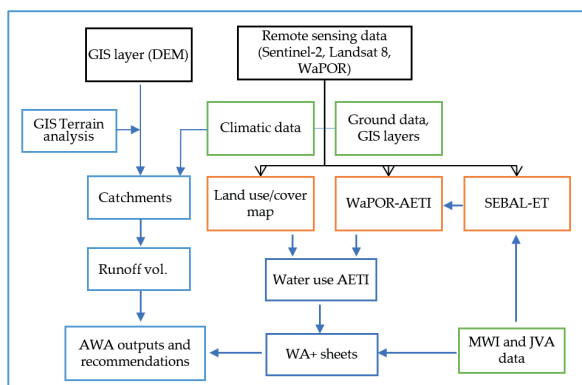
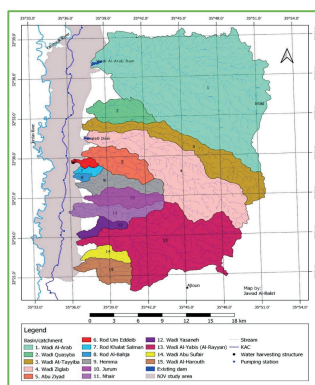
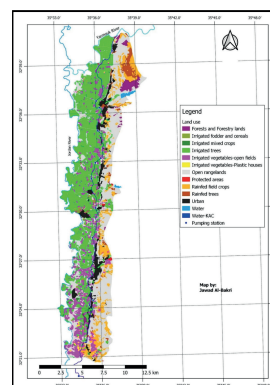


Figure 3: Catchments of the side wadis facing the NJV



Source: Al-Bakri et al (2022). <https://doi.org/10.3390/w14081198>.

Figure 4: Land use of North Jordan Valley during 2019



Source: Al-Bakri et al (2022). <https://doi.org/10.3390/w14081198>.



RESULTS

Remote Sensing based AWA

- Remote sensing and WaPOR data enabled an accurate and full water budgeting and partitioning of water outflows.
- ET formed the main outflow component in NJV.
- WaPOR data was highly correlated with SEBAL calibrated ET.
- WaPOR data provided important sources for AWA.
- Capacity building is needed in the areas of using WaPOR, Remote Sensing data within WA+.

NJV water deficiency problem

- Developing surface water from the side wadis might not provide an efficient solution to water deficiency.
- Return flows estimated from AWA would provide considerable volumes of water that could overcome water deficiency in NJV.

Figure 5: WaPOR-AETI and its components for the different land- and water-use categories in the NJV during 2019

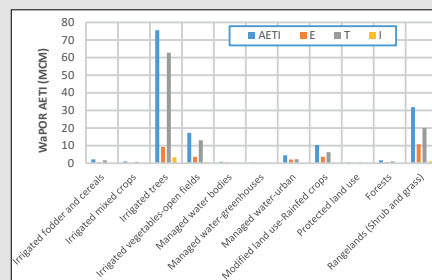
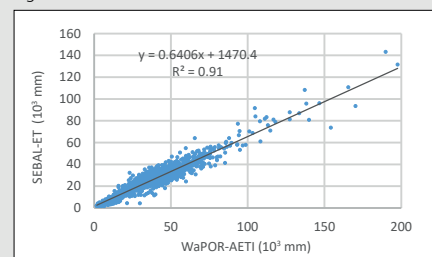


Figure 6: Relationships between WaPOR and SEBAL annual ET in the NJV using the sum of ET for farm units.



Reference:

Al-Bakri J.T., D'Urso G., Batchelor C., Abukhalaf M., Alobeiaat A., Al-Khreisat A., Vallee D. 2022. Remote Sensing-Based Agricultural Water Accounting for the North Jordan Valley. *Water* 14 (8), 1198. <https://doi.org/10.3390/w14081198>.

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