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**Know your water:**  
establishing robust water accounting systems

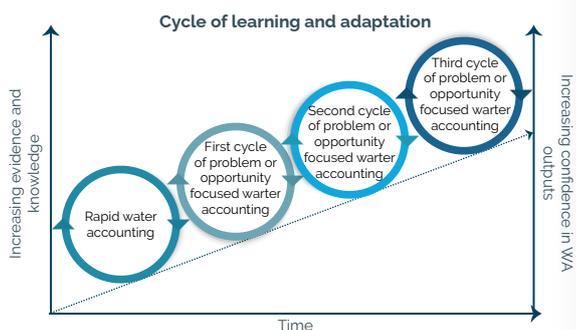
# RAPID WATER ACCOUNTING for Malawi Site in Al Minya, Egypt

Water accounting (WA) is the systematic study of the current status and trends in water supply, demand, accessibility and use in domains that have been specified (FAO 2012).

It is recommended to carry out WA in cycles of increasing focus and complexity starting with an initial Rapid Water Accounting (RWA) using readily available data. RWA for Malawi aims to:

- Quantify water resources, demands, and uses and assess their trends;
- Try to answer key questions such as:
  - What is the water balance;
  - What is the supply and demand gap;
- If tasks above are not feasible with available data, assess the data gaps and uncertainties and provide recommendations on additional studies;
- Gain experience in water accounting;
- Becomes a starting point for stakeholder dialogue to prepare for the next round of WA.

Figure 1. Cycle of learning and adaptation



## STUDY AREA

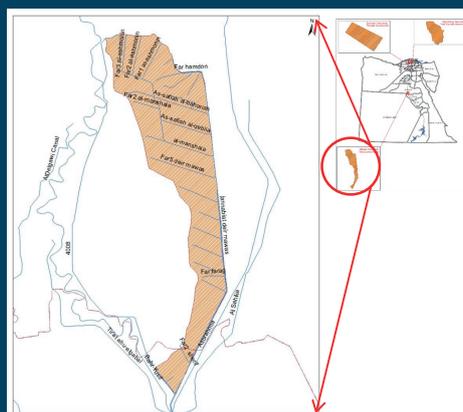
Malawi study area is located in AL-Minya governorate in the southern part of Egypt. The site belongs to east Dayrout irrigation department. The selected study area is around 21 420 ha including 94 canals and 16 drains.

**Main crops:** wheat, sugar cane, maize and clover.

**Water supply sources:** water from Ibrahimia Canal (originally from the Nile) and its branches, drainage, unconfined aquifer connected to the Nile River, limited amount of rainfall; and treated water coming from outside the study area.

**Demands:** mainly agriculture and towns.

### Selected sites description



Source: Developed under one of the project components (2020).



## DEMAND AND USES: Agriculture as the main water users

Agriculture is the main water user at the site, and most farms conduct double cropping. Provided training from the WEPS-NENA project, the Ministry of Agriculture and Land Reclamation produced crop maps of the study area.

Calculation of the water demand based on these crop areas is on-going. Estimation of municipal water supply is also ongoing using the population information.

Estimating water use is difficult as there are so many unmonitored water abstraction by farmers. Consumptive water use as actual evapotranspiration (ETa) was obtained from WaPOR Ver.2.0 as shown below. The spatial resolution of ETa map (100 m) from WaPOR was too coarse to calculate ETa from each crop hence only ETa from Agricultural land was estimated. The total ETa from agricultural land (about 13.5 million ha) was 1 027 million m<sup>3</sup>.

Figure 2: Evapotranspiration from Agricultural land in 2019





# WATER RESOURCES AND SUPPLIES

In order to understand the water resources and supplies in the study area, hydrological conceptual model shown on the left was developed with the stakeholders in a workshop held in Al-Minya in 2020.

**The study area has numerous inflows and outflows. The confirmed and potential inflows include:**

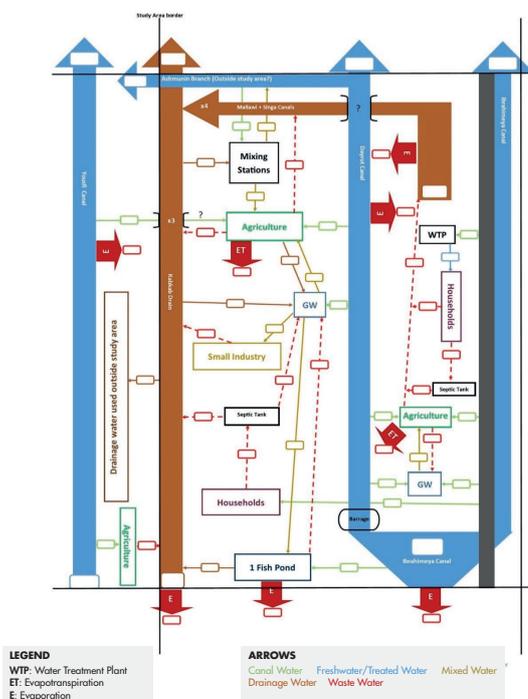
- Canal inflows mainly through Ibrahimiya and Dayrut Canals.
- Contribution of agricultural return flow from the adjacent irrigation scheme to the drain at the boundary of study area (Kabkab Drain on the left diagram).
- Treated water imported from the outside the study area. Groundwater inflow.

**Confirmed and potential outflows include:**

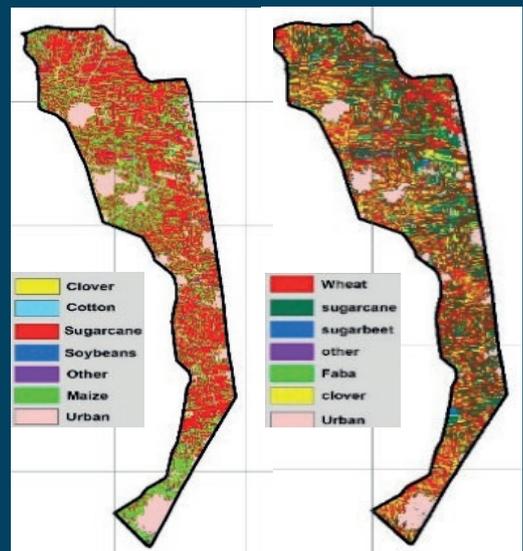
- Evapotranspiration or evaporation.
- Outflow through canals and drains to outside the study area.
- Groundwater outflows.

Data on the canal inflow, outflow from the main drain, and mixing of canal and drain waters are available for limited periods, and the WA team of Egypt working on quantifying them. Some parameters affecting inflows and outflows are not monitored, such as flows in canal branches that extend to outside the study area, contribution of drain water from the adjacent irrigation scheme to the drain at the boundary of the study area, groundwater inflows and outflow, and interaction of surface (canals and drains) water and groundwater.

**Figure 3:** Water distribution along branch canals in Al-Minya governorate.



Mallawi crop mapping results for winter (left) and summer (right) 2020 (MWRI 2020)



**Source:** Developed under one of the project components [2020].



## RESULTS

- Some data will be collected and added in the next couple of months, however, it is clear that existing data is not sufficient to track all the inflows, outflows and uses in the study area. Therefore, developing water budget and quantifying supply-demand gap are not feasible with readily available data.
- According to the discussion with stakeholders, there are many unlicensed agricultural wells. Though we do not have quantitative information on supply-demand gap, this indicates farmers are experiencing insufficient supply from the canals.



## RECOMMENDATIONS

- Intensive flow monitoring/measurements covering both canals & drains if we want to make a good water accounting for this study area, or
- Expand study area boundary where number of required inflow and outflow monitoring points are reduced.
- Increase in number of water quality monitoring if the stakeholders want to understand the level of salinity increase in upper Egypt.
- Local stakeholder's engagement was confirmed to be very useful in understanding the system. It should be repeated in the next cycle of water accounting.
- According to the discussion with stakeholders, there are many unlicensed agricultural wells. Though we do not have quantitative information on supply-demand gap, this indicates farmers are experiencing insufficient supply from the canals.

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