More crop per drop: from information to action

Did you know that?

Due to rapid population growth and climate change, global pressure on water resources is increasing. In the future, less water will be available for agricultural production due to competition with industrial and domestic sectors, while at the same time food production must increase to feed a growing population. It is inevitable that crop production per unit of water consumed, the **Water Productivity (WP),** must be increased to meet this challenge. At the same time, through reduced resource use and increased income, enhanced WP will improve farmer livelihoods.

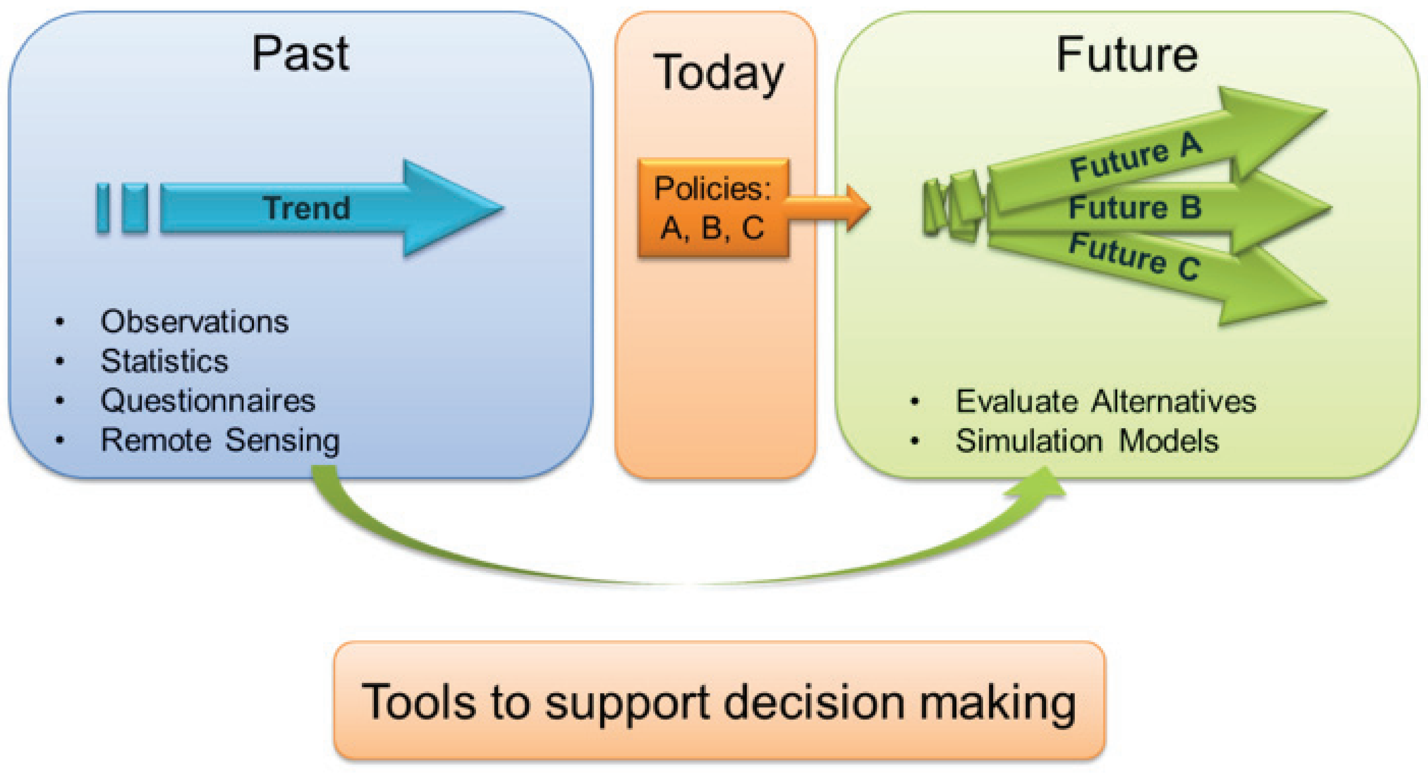
How to improve Water Productivity?

There are a range of potential interventions that could improve WP, from field level measures such as enhanced irrigation management, land levelling or fertilization, to regional or national-scale policies such as water allocation or promoting certain crop varieties. Similarly, the range of stakeholders is broad; from individual farmers to national governments.

Making decisions that will improve water productivity essentially requires two types of information:

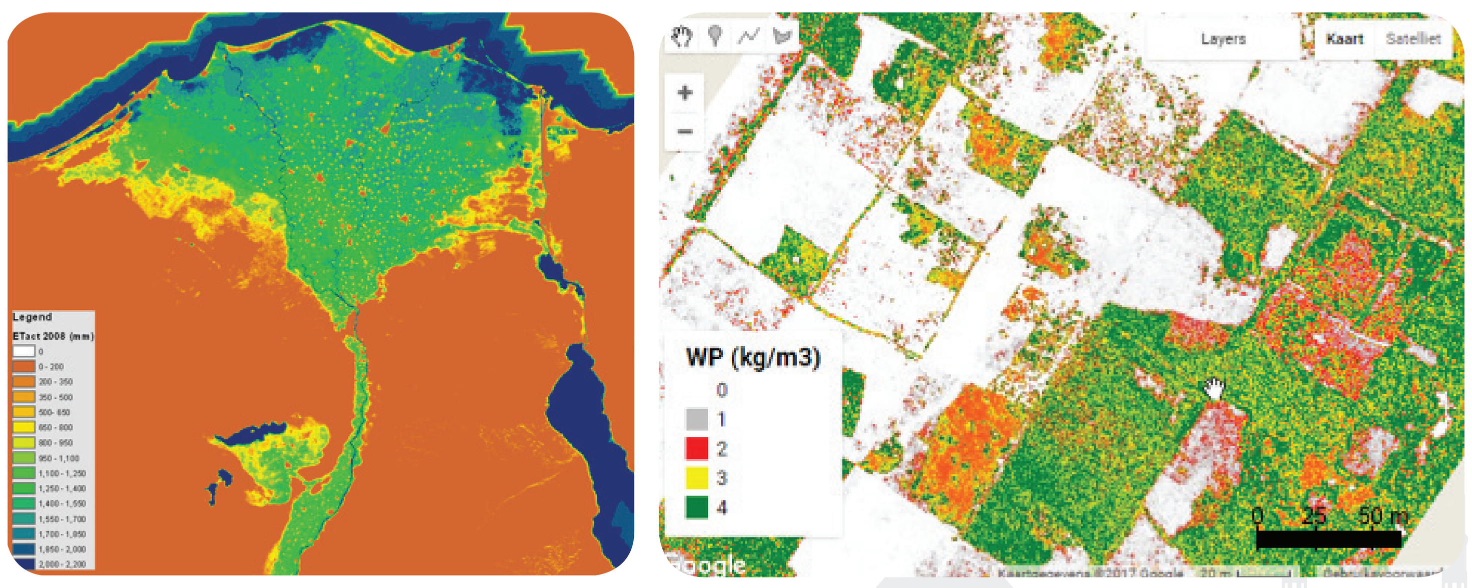
- Knowledge of the level of current WP in kilograms of crop per cubic meter of water consumed, as a benchmark: Monitoring
- Timely insight in which measures will likely enhance WP, taking into account the local context: Modelling

These methods are highly complementary:



Monitoring

After many years of development by the scientific community, there are now technologically mature methods to quantify water consumption and crop production based on observations from sensors on board of satellite or Unmanned Aerial Vehicle (UAV) platforms. Monitoring based on remote sensing allows for the identification of strongly and weakly performing farms in terms of WP. Moreover, trends can be identified and the impacts of past interventions and climate can be evaluated. The level of spatial detail can range from 3 cm to 1 km, and area of coverage from individual fields to countries. The specific application determines which technology is appropriate.

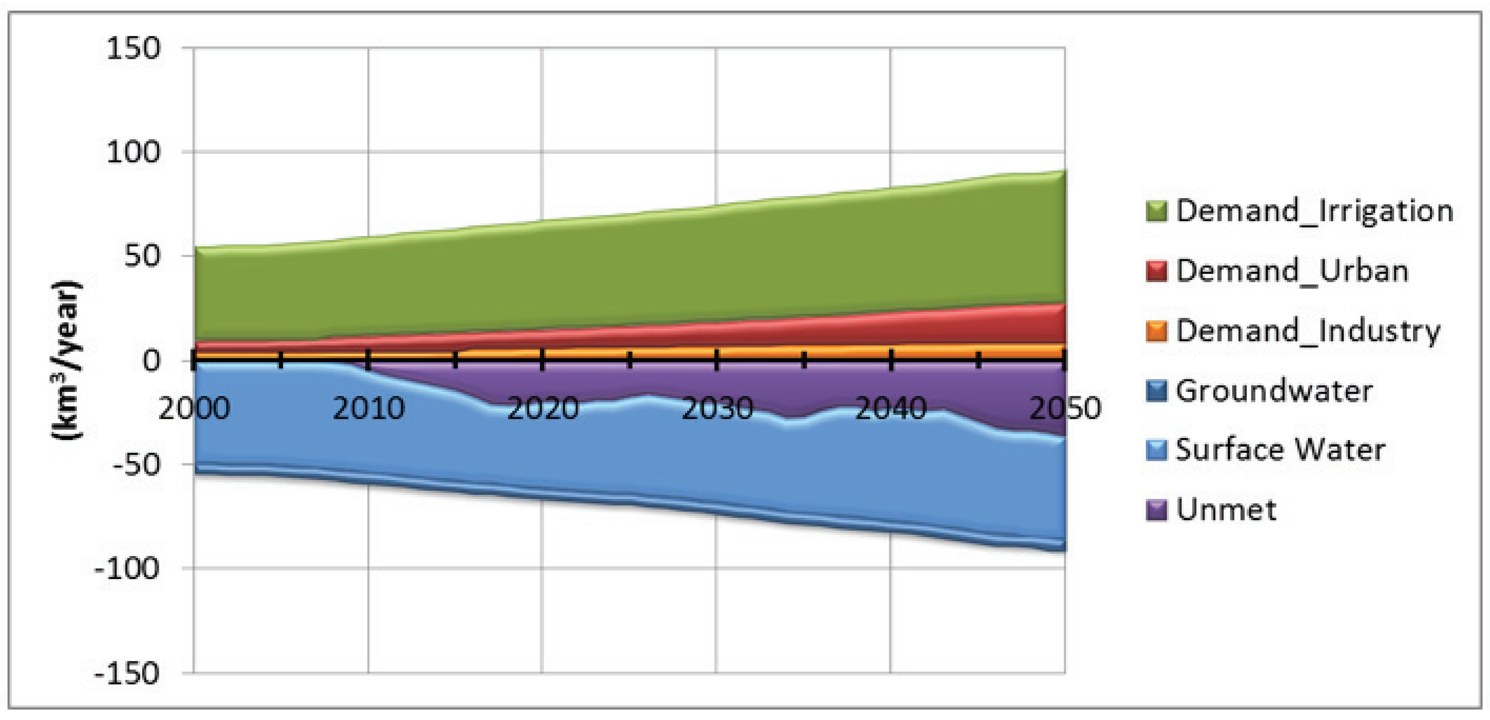


Different scales of WP analysis

Left: Water consumption of the Nile Delta in mm/yr, Right: WP of smallholder fields in Mozambique.

Modelling

Weakly performing farms have a large scope for improvement of WP. However, whether a certain farm management action at a given time will really lead to improvement is uncertain. Next to that, there are several processes that the farmer cannot control, such as climate, which will impact both crop production and water consumption. For national analyses, it is relevant for policy makers to anticipate on likely impact of different water allocation strategies across different sectors. Scenarios can be developed, which are coherent storylines of different futures. These can be evaluated using simulation models to support decision makers in taking well-informed decisions. Typical types of models used in these analyses are physically-based crop models, hydrological models, and conceptual water allocation models.



Impact of climate change on water resources in Egypt for an average climate projection.

Crop	Interme-diate	Coastal Lowlands	Northern Mountains	Southern Highlands
Alfalfa irrigated	2%	2%	4%	8%
Alfalfa non irrigated	-1%	-1%	4%	0%
Grapes	-8%	-10%	-6%	-10%
Grassland	-2%	1%	3%	1%
Maize	-1%	-2%	-4%	7%
Olives	-1%	-8%	-5%	-5%
Tomatoes	0%	-2%	-3%	-1%
Watermelons		-1%		
Wheat	4%	3%	11%	8%

Future crop yield changes towards 2040 (%/10yr) assuming current irrigation applications - example from Albania

From information to action!

Using state-of-the-art technology, agricultural water productivity can be measured, monitored and even projected under a range of scenarios. This data is available on different spatial and temporal scales, each suitable for a different type of application. The information is available: now is the time to develop applications based on this information to truly enable decision makers to improve Water Productivity in water-scarce regions!

Useful resources

The FAO WaPOR database:

http://www.fao.org/in-action/remote-sensing-for-water-productivity/wapor/en/

Resources from masterclasses organized by the 25% alliance: http://www.thewaterchannel.tv/waterproductivity

Cai, X., Molden, D., Mainuddin, M., Sharma, B., Ahmad, M.-D. and Karimi, P. (2011): Producing more food with less water in a changing world: assessment of water productivity in 10 major river basins, Water International, 36(1)

Zwart, S.J. (2010): Benchmarking water productivity and the scope for improvement, PhD thesis, TU Delft

The Great Egyptian Water Productivity Hackathon

Team up, hack out solutions to get more per drop

25 alliance
Ministerie van Buitenlandse Zaken