

Location	Tunisia
Contractor	WorldBank
Period	2008

## Scope of the project

Tunisia is affected by limited water supplies and faces a serious water deficit caused by low annual rainfall distributed unevenly over space and time, and increasing water demand. In 1995 the Government of Tunisia adopted the National Water Savings Program (PNEE). The goals of PNEE were i) saving water at system and field scale, ii) increasing the efficiency of water use in irrigated agriculture, and iii) increasing agricultural productivity. To reach these goals, major investments were made in drip irrigation systems, sprinkler irrigation systems and in improved surface irrigation. The major purpose of this study was to analyse the impact of investments in water saving technology during the PNEE.

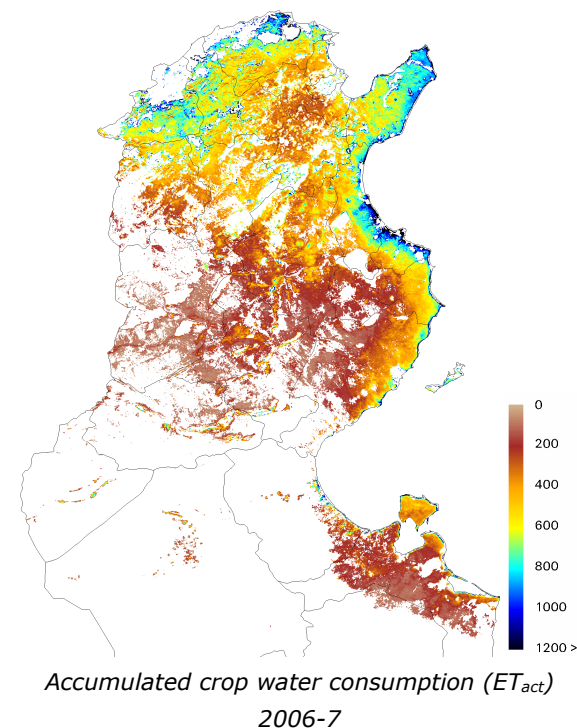
## Study approach

Four indicators that were derived from remote sensing images were defined and used in this study to evaluate the goals of PNEE: (1) total agricultural water consumption ( $ET_{act}$ ), (2) the water consumption that originates from irrigation practices ( $ET_{irr}$ ), (3) yield estimations ( $Y_{act}$ ), and (4) biomass water productivity ( $WP_{bio}$ ). These indicators were provided by the SEBAL algorithm in combination with MODIS images of 2000-01 and 2006-07 (~40 images per year, 250 m resolution). Maps of the indicators were combined with a land-use map, created from the 2000-01 MODIS images, and also with a map of the governorates in Tunisia. In this way, a country-wide view of agricultural water use could be evaluated by crop type and by governorate.

## Results

Irrigation amount to only 13% of the total agricultural water use, though changes in precipitation affect water consumption in both irrigated and rainfed agriculture. It was found that total agricultural water consumption ( $ET_{act}$ ) in Tunisian agriculture was 26% higher in 2006-07 when compared to 2000-01, whereas for irrigated crops an average increase in  $ET_{act}$  of 11% was calculated. This increase can be attributed to higher precipitation in 2006-07.

Irrigated wheat consumed less water in 2006-7, but water productivity remained similar. Water productivity in the oases was lower in 2006-07. Mixed irrigated crops increased water consumption but also biomass production and water productivity was higher.



## Conclusions

The selection of only two years to analyse the impact of PNEE is fairly limiting since precipitation, which can be highly variable in space in time, has strong impacts on agricultural water use and production figures. Here, several goals of the PNEE programme were met: higher water use efficiencies ( $WP_{bio}$ ) and higher yields (Bio) were measured when both years were compared. However in most cases, this was accompanied by an increase in the total crop water consumption from actual evapotranspiration ( $ET_{act}$ ) and therefore no *real* water saving was found. Since precipitation was higher in 2006-07, it is uncertain whether higher water productivity and yields were the result of the investments.