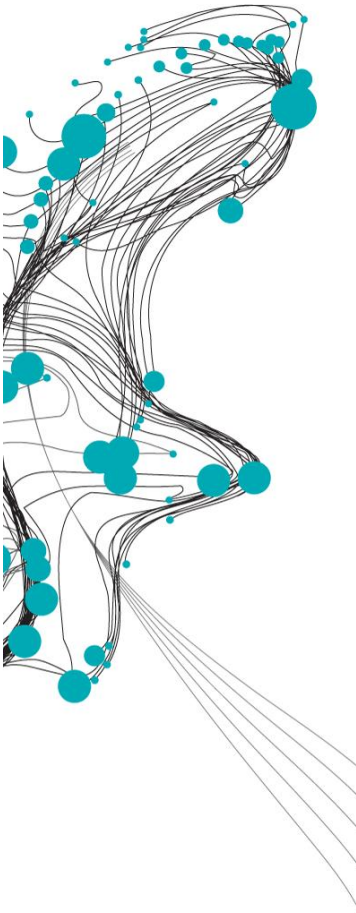


THE WATER FOOTPRINT OF MOROCCO

AND ITS ADDED VALUE FOR NATIONAL WATER POLICY



Morocco is a semi-arid country in the Mediterranean that faces water scarcity and deteriorating water quality. The limited water resources constrain the activities in different sectors of the economy of the country. Although the national water strategy considers options to reduce water demand in addition to options to increase supply, it does not include the global dimension of water by considering international virtual water trade, nor does it consider whether water resources are efficiently allocated based on physical and economic water productivities of crops (the main water consumers).

The overall objective of the study was to find out the added value of knowledge on the water footprint of activities in Morocco and the virtual water flows from and to Morocco in formulating national water policy. The study includes an assessment of the water footprint of activities in Morocco (on the river basin level on a monthly scale) and the virtual water balance of the country and, based on this, response options are formulated to reduce the water footprint within Morocco, alleviate water scarcity and allocate water resources more efficiently. Results and conclusions from the water footprint assessment are compared with the scope of analysis of, and action plans included in Morocco's national water strategy and river basin plans in order to address the added value of water footprint assessment relative to these existing plans.

The major findings of the study are that: (i) evaporation from storage reservoirs accounts for the second largest form of blue water consumption in Morocco, after irrigated crop production; (ii) in the period 1996-2005, Morocco's water and land resources were mainly used to produce relatively low-value (in US\$/m³ and US\$/ha) crops such as cereals, olives and almonds; (iii) most of the virtual water export from Moroccan resources relates to the export of products with a relatively low economic value per m³ water exported (in US\$/m³); (iv) blue water scarcity on a monthly scale is severe in all river basins and pressure on groundwater resources by abstractions and nitrate pollution is considerably in most basins; (v) the estimated potential water savings by reallocation of crops to basins where they consume less water and by lowering water footprints of crops down to benchmarks are significant compared to demand reducing and supply increasing measures considered in the national water strategy of Morocco. On the basis of these new insights and response options it is concluded that water footprint assessment has an added value for national water policy in Morocco.

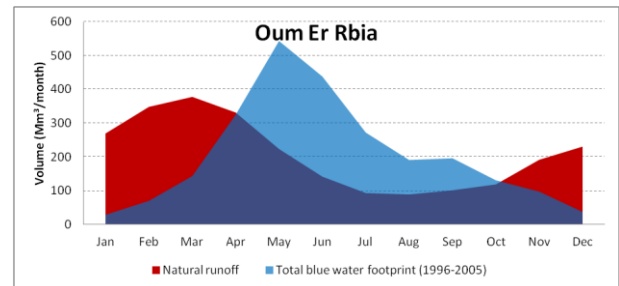


Figure 1: Total blue water footprint and natural runoff in Oum Er Rbia basin

Joep Schyns

Graduation Date:
September 25, 2013

Graduation committee:
University of Twente
Prof.dr.ir. A.Y. Hoekstra
Dr. M.M. Mekonnen

Deltares
Dr. ir. K.S. Meijer

Ecole Mohammadia d'Ingénieurs
(Morocco)
Prof.dr.ir. A. Larabi

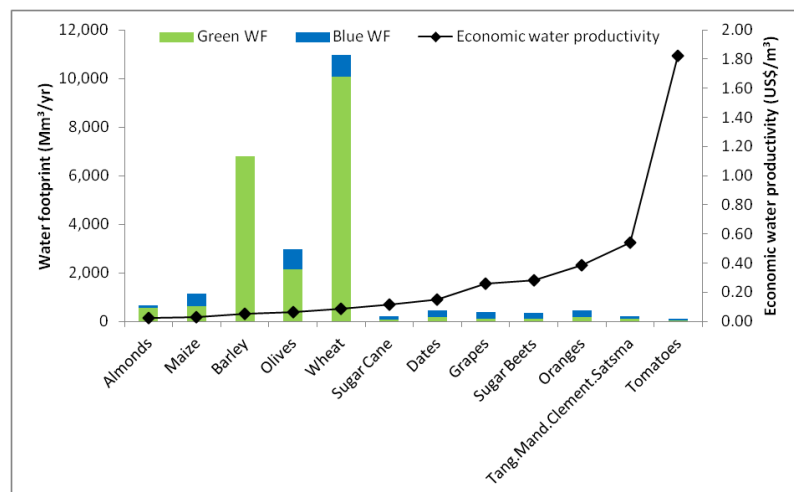


Figure 2: Economic water productivity (in US\$/m³) and green and blue crop water use (in Mm³/yr) of main crops in Morocco. Period: 1996-2005.