SMART AND WISE GOVERNANCE OF WATER SUPPLY ALLOCATION USING WATER FOOTPRINT ASSESSMENT

This research evaluates to what extent the water footprint approach can be helpful for policymakers for water allocation and water planning. In the study, the Milas-Bodrum sub-basin (Turkey), which experiences water shortages during summer months, was evaluated, and the water footprints of the sectors in which water demand is high were calculated. Subsequently, scenarios were investigated for the reduction of the blue water footprint of the sector with highest water consumption, considering the water use priorities in the sub-basin.

According to the calculations, the agriculture sector, which is responsible for around half of the total water consumption in the sub-basin, is the main water consumer. The other sectors are industry, household, tourism, and livestock, respectively. Therefore, the agriculture sector was particularly evaluated in the perspective of smart and wise use of water in the sub-basin. To reduce blue water footprints of the agriculture sector, six crops (tomato, maize, alfalfa, watermelon, olive, and citrus) which are intensively grown and have high economic value in the basin were selected, and FAO's AquaCrop model was used to simulate water consumption and yields under different practices, including full and deficit irrigation; no mulching and organic and plastic mulching; and furrow, sprinkler, and drip irrigation. Compared to full irrigation, deficit irrigation can provide a water saving up to 40%, depending upon the crop type, with a maximum of 10% loss in yield. Mulching, which prevents water evaporation from the soil, makes a positive contribution on water saving. According to the scenarios considered, the blue water footprint can be decreased around 27 m^3 for per tonne of tomato production, 44 m^3 per tonne for maize, 65 m^3 per tonne for alfalfa, 20 m^3 per tonne for watermelon, 264 m^3 per tonne for olive, and 36 m^3 per tonne for citrus. These figures refer to the case of drip irrigation accompanied with deficit irrigation and plastic mulching. The model provided the highest value of water productivity (ET_{wp}) with this scenario. Alfalfa, however, is not a suitable crop for drip irrigation and mulching according to FAO.

In terms or water saving, up to 26 million m^3/y of blue water could be saved with only a maximum of 10% loss in yield in the sub-basin if the scenario having the highest ET_{wp} would have been implemented. Despite the substantial amount of blue water saving in the sub-basin in the most effective scenario considered, alleviating water shortage in the sub-basin, the water shortage would not totally be solved. It is concluded that water footprint assessment can be a useful approach for analysing scenarios for water allocation and basin planning by policy-makers. It may help to identify to possible reduction of the water footprint of a crop production and assess the possible alleviation of water scarcity especially during summer months.

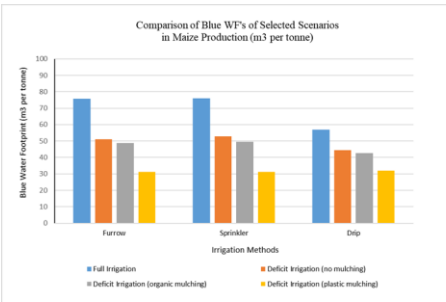

Figure 1: The blue water footprints of maize production according to selected scenarios.

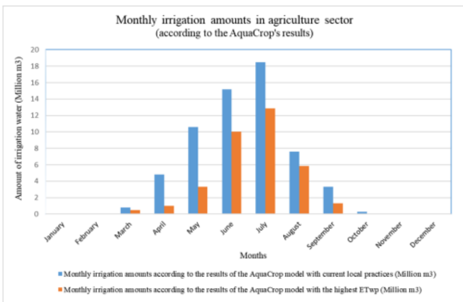

Figure 2: Monthly irrigation amounts according to the results of both the reference scenario and the most effective scenario.

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