Agricultural Irrigation in the Heart of Life: water use efficiency, water allocation and price regulation

Summary

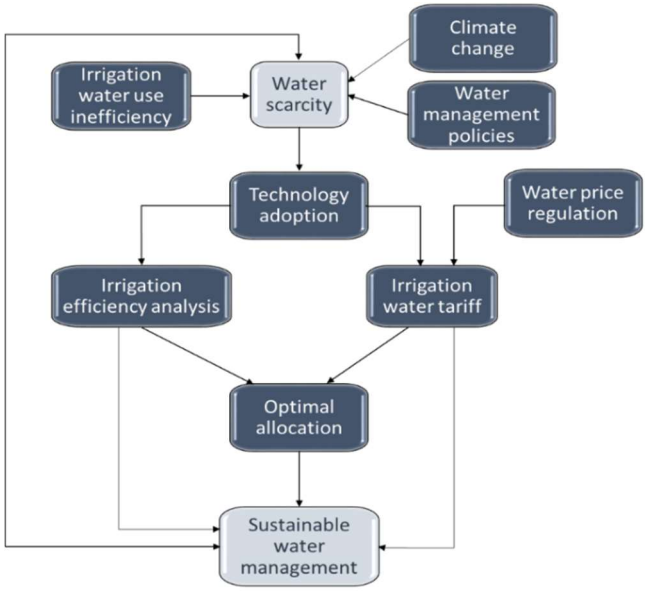
In the course of history, irrigation has become a fundamental component for agriculture, without which it is not possible to increase crop productivity and, consequently, to obtain income levels that fix rural agricultural populations. However, it is important to underline that the need to use irrigation does not preclude the application of measures to ensure the efficient use of water, given that water is an invaluable asset that plays a major role in economic, social and environmental issues, all the more significant as its scarcity is felt. Moreover, the expected climate changes, with the increased temperature and the irregularity of precipitation, will further increase the dependence on irrigation in the future.

This research measured irrigation water use efficiency of several Portuguese irrigated plots through the data envelopment analysis method and concluded that irrigated plots are inefficient and farmers would be able to reduce their actual cost if they adjusted irrigation water to their efficient level. The various components of irrigation water price were also studied and the incentive regulation model was proposed to regulate the irrigation water price of water use associations. It was concluded that the least efficient water use associations will have to reduce their tariffs to achieve the revenue cap and that the most efficient water use associations will transfer the retained surplus to the farmers. An optimal irrigation water resource allocation problem applied to the irrigated plots was solved, considering economic, social and environmental objectives. The results obtained are a commitment between the results achieved in each single-objective model, based on an augmented weighted Chebyshev´s approach.

Results from this study have policy implications. The knowledge of water consumption in real time by farmers leads to a greater awareness of the farmer regarding both the amount of water used and the water bill. The pricing adjustment can be looked at as another option to induce farmers to reduce irrigation water demands. Finally, additional policies are also required to improve water allocation, security and equity of access to both farmers and water use associations.

Keywords

Irrigation water use efficiency, tariff, incentive regulation, water allocation.



Conceptual framework for the study.

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