



Irrigation Water in Agriculture: Challenges and Interventions in an Era of Global Boiling

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One of the most important engines for a country's economic development is agriculture.¹ An asset of agriculture is irrigation water whose contribution to agricultural production and human wellbeing is extremely noticeable. Apart from its capacity to increase land productivity, irrigation water strengthens food security, rural livelihoods and the support of agroecosystems.² Nowadays, irrigation water faces numerous complex challenges and one of the main reasons is global boiling, a very unpleasant situation in which the Earth experiences not only an increase in average temperatures but also a heightened occurrence and severity of heatwaves that pose significant burdens to ecosystems, society, and economy.³

A serious consequence of global boiling with visible negative results is the larger increase in evapotranspiration, which drastically reduces surface water and dries out soils and vegetation. Therefore, the resulting more intense drought and desertification in several places on our planet leads to increasingly scarcity of irrigation water and possibly inevitable and irreversible negative impact on agriculture. Also, it is estimated that the flow of the rivers will continue to decrease due to the rising of the temperature in certain regions of the planet, like the Mediterranean region, resulting in worsening situations, concerning the supply of water for human needs, especially for agricultural and urban uses. Nevertheless, there is still time to act providing that the needful interventions will have a strong basis for a satisfactory outcome.

Within this framework, determining irrigation requirements for each area and hydrological basin is critical, utilizing pertinent meteorological and soil data, along with understanding the extent of farmland, types of crops grown, and agro-ecological classifications.⁴ In this regard, the implementation of more efficient irrigation systems for certain crops, such as drip irrigation or underground irrigation, combined with the use

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of organic matter which improves the soil structure and increases soil water holding capacity has obvious advantages towards a better water management and reduction of irrigation costs. Water savings can reach up to 65% in tree cultivations when drip irrigation is the case.

On the other hand, minimizing water losses in irrigation networks is non-negotiable. Thus, the modernization of the pumping stations (electromechanical equipment) of the boreholes and their irrigation networks is required. Both the open networks - water transport canals, as well as the surface closed networks must be replaced with modern underground networks. Also, the use of additional components in the electric motors of the pumping units is essential. By adding components to control the rotations of the electric motor of the pumping unit, a significant reduction of the electrical energy is achieved, since its operating rotations are adjusted according to the requirements of the irrigation system in terms of water supply and pressure.⁵

Taking into account the above information, assessing the water balance, the methods, projects, and their prioritization that will deliver the necessary irrigation water need to be established. Among various relevant actions, it could be beneficial to carefully plan and create multiple reservoirs close to the locations where there is a noticeable need for irrigation water in order to lower transportation costs. The collection and storage of rainwater, which can be collected from the roof of a livestock or greenhouse unit during the rainy season, can provide significant savings in the use of underground and surface water. Also, the enhancement of water levels in aquifers, along with the establishment and completion of an agricultural meteorology network for the adoption of efficient irrigation and deficit irrigation techniques may be another effective measure towards irrigation water savings.⁶

The utilization of renewable energy sources, in order to achieve an energy balance for the required energy, and the strengthening of farmers and energy communities is necessary to be included in the planning. Another effective intervention would be the use of local traditional varieties, that have lower water requirements, and drought-resistant varieties in general. It is important to note that in several crops, varieties with high yield and resistance to drought have already been created.⁵ In addition, the preparation and implementation of seawater desalination is another intervention, preferably with the aid of wind and solar power,⁴ especially in particular cases of very acute shortage of water.

Conclusion

Global boiling, leading to more intense drought and desertification in many regions of our planet, contributes dramatically to an increasing lack of irrigation water which, in turn, broadens the negative experiences of the farmers and not only. The irrigation water problem is long overdue and time pushes. Every drop of irrigation water counts and now even more, bearing in mind that the emerging technologies for its saving, especially with the aid of artificial intelligence and renewable energy sources, may not be enough without a positive mindset. There is still a way to deal with the problem but proper actions must be taken now.

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