Water on the edge: climate change, agriculture, and the future of Irbid

By Isra Al-Kharabsheh

In a world increasingly shaped by climate change, Jordan, considered as one of the most water-scarce countries in the world, has long struggled to meet the water needs for domestic and agricultural use. Rising temperatures and reductions in rainfall are making water availability more erratic, especially when finding renewable water resources.

Irbid plays a crucial role in Jordan's agricultural production, particularly for crops like wheat and barley, as well as fruit trees and vegetables. The region's fertile soils and moderate climate have historically made it productive. However, climate projections suggest this productivity will decline by mid-century. Irbid is expected to experience significant increases in average temperatures, slight reductions in rainfall, droughts, and increased evapotranspiration, all of which contribute to rising crop water demand.

These changes have major implications not only for Irbid's farmers but also for Jordan's national water strategy. The agricultural sector currently consumes more than half of the country's available water. If farmers respond to climate stress by increasing their use of groundwater to maintain yields, this will accelerate the depletion of already overexploited aquifers, such as the Yarmouk Basin.

One of the most valuable tools in managing this challenge is crop simulation modelling. Using Computerized models, which allow researchers and policymakers to test different scenarios and strategies, including changes in water requirements, management practices, and crop yield quantity and quality. Simulations have shown that strategies such as shifting planting dates, using organic mulching, and switching to more drought-tolerant crop varieties can reduce water demand by up to 15% in some cases. However, the real application of these solutions depends

heavily on farmer awareness and the availability of agricultural extension services, which are distributed across Irbid and Jordan. This highlights that climate vulnerability is not just about exposure; it is about the capacity to respond.

In Irbid, many smallholder farmers lack access the efficient irrigation systems and advanced technology, while big farmers or agribusinesses may have the resources to adapt quickly, which creates inequality in water amount distribution. To address this, raising awareness among local communities about the safe and effective use of different water resources to face the drought, like the use of treated wastewater, especially for restricted agriculture, becomes crucial. Reusing treated water can reduce the pressure on freshwater resources and support a more sustainable water cycle. But this requires both public acceptance and strong regulatory frameworks to ensure health and environmental safety. Training programs by specialists and technical support will be vital in promoting the safe reuse of treated wastewater effectively.

Yet this poses a challenge for small-scale farmers who may lack the financial capacity to afford water treatment equipment for access to treated wastewater. Therefore, government support mechanisms are essential. Filtration technologies may offer some relief, but the economic feasibility of using treated wastewater or desalinated water remains low for much of the agricultural sector.

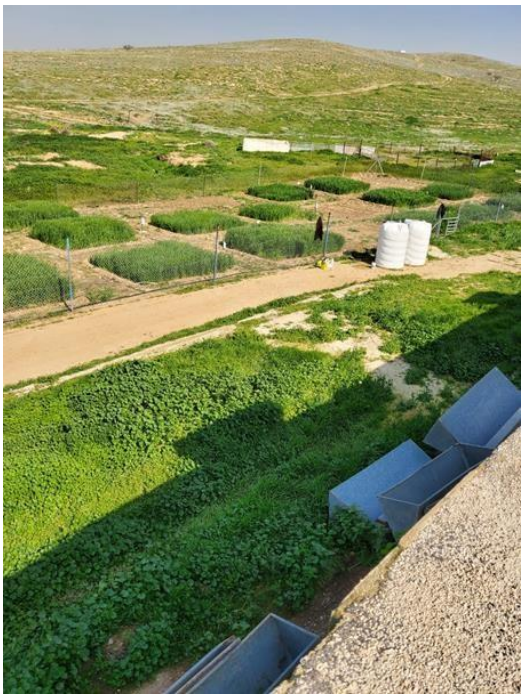
In many communities, water habits are shaped more by tradition than necessity. Public awareness campaigns, transparent water pricing, and real-time monitoring systems can help foster a more conservation-oriented mind set. Climate change will make water scarcer, but smarter and more equitable water management ways can make it go further.

Finally, as researchers, we must go beyond our datasets. One of the key lessons from modelling Jordan's water situation under climate change is that scientific tools must inform policy, but also be translated into action.

This means engaging with decision-makers, sharing findings with researchers and farmers, and

participating in public discourse. Climate adaptation in water-scarce countries like Jordan cannot afford to be top-down or purely academic; it must be local, inclusive, and immediate.

In Irbid, as in much of Jordan, the future of water is unstable. But with the right tools, policies, and public engagement, it is not hopeless. Water demand is not fixed; it is shaped by our choices. And if we make the right ones now, we can build a more resilient and water-secure Jordan for generations to come.



Resources to read

PCC – *Climate Change 2022: Impacts, Adaptation & Vulnerability*
Comprehensive overview of climate-driven changes in water scarcity, river flows, groundwater, and sectors like agriculture and energy

Water for Food, Water for Life" (2007, IWMI/Earthscan)
Landmark assessment on agricultural water use, scarcity, and adaptation—including early climate change considerations.

Jordan's National Water Strategy 2023–2040
States that climate change and overuse will reduce groundwater/surface water, leading to water demand–supply gaps—especially critical for smallholder irrigation in the north