

# Policy Brief – Jordan

## Increasing water productivity in Jordan

The aim of this policy brief is to communicate the outcomes and recommendations of the policy review and dialogues in Jordan. The policy brief reflects on insights from multiple bilateral discussions with stakeholders in Jordan on the agricultural developments in the two agricultural regions and their implications for different national development objectives.

### Outcomes of the policy review<sup>1,2</sup>

Jordan is the second most water scarce country on earth. Water availability is expected to reduce even further in the future due to population growth and climate change. Moreover, Jordan has received large influxes of refugees, effectively increasing the domestic water needs. Agriculture is mainly practiced in two regions; the Jordan Valley and the Highlands. The agricultural production in the Jordan Valley focuses on winter vegetables and citrus trees while the water source is surface water (including treated wastewater (TWW)). As stated in official policy documents, agricultural production in the Jordan Valley provides 70% of the total economic value of agricultural products while it consumes 35% of irrigation water. Production in the Jordan Valley is limited during the summer months but evident the rest of the year, accounting for 85% of the vegetable production of Jordan). The agricultural production in the Highlands focuses on summer vegetables and olive trees (half of irrigation demand goes to olive cultivations) while the water source is groundwater. In the Highlands, there is also rainfed production of staple crops. Part of the groundwater extractions in the Highlands involve unregulated groundwater. Agriculture is the largest water user in the country, using 60% of the total water budget of 2014 (including unregulated groundwater use in the highlands). Agriculture indirectly contributes around a quarter of Jordan's GDP, by providing job opportunities along the value chain.

Considering the water scarcity of the country, it is unsustainable to maintain or increase agricultural water use in order to meet the growing domestic demands of the increasing population. As freshwater resources are limited, Jordan aims to increase the use of treated wastewater (TWW) for agriculture. However, this inflates the estimated water budget of the country as TWW, if not allocated, might be used to recharge the groundwater or go to environmental flows.

The Jordan river is a closed basin, leaving no water unutilized and thus making efficiency improvements a matter of reallocation among the different users and uses rather than a real water saving. Considering that the Jordan river basin is an internal drainage basin which drains to the Dead Sea and that the Dead Sea is affected due to reduced river flows, reallocation of water for environmental flows is necessary.

Under this context, Jordan has the following specific agricultural water management policy objectives:

- Prioritizing sectors based on economic water productivity (Domestic, Industrial, Agricultural).
- Water deficit of 409 Mm<sup>3</sup> for 2014 will be reduced to 88 Mm<sup>3</sup> by 2025.
- Increase total water supply by 467 Mm<sup>3</sup> between 2015 and 2025 from surface water (Lake Tiberias, water harvesting projects and dam constructions) (57.5 Mm<sup>3</sup>), desalination (165 Mm<sup>3</sup>), groundwater over abstraction (115 Mm<sup>3</sup>) and TWW (130 Mm<sup>3</sup>).
- Maximize economic benefits on irrigated agriculture and increase agricultural share of GDP by 0.5%.
- Capping agricultural water supply at 700 Mm<sup>3</sup>/year (2014 water use was at 722.5 Mm<sup>3</sup>/year).
- Prioritize TWW use and surface water use in agriculture and reduce groundwater use in agriculture (currently 56%, including illegal groundwater wells).

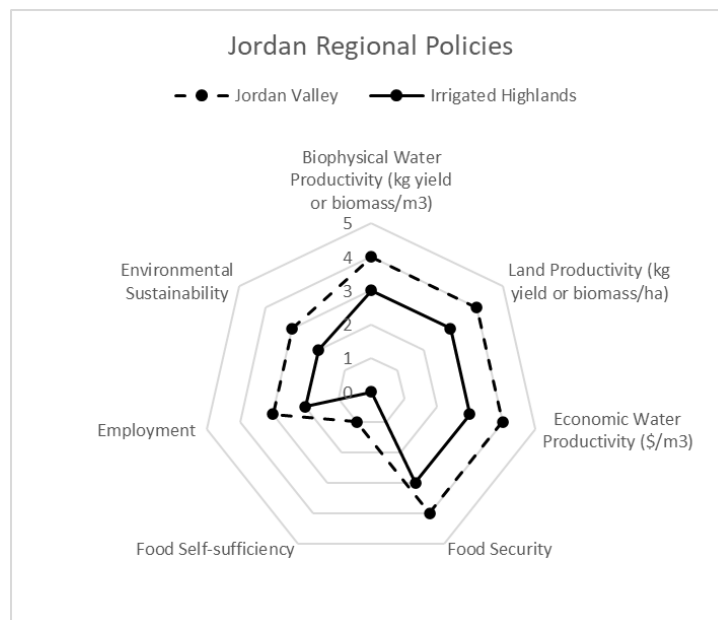
<sup>1</sup> One page report available at WaterPIP website: [https://waterpip.un-ihe.org/sites/waterpip.un-ihe.org/files/jordan\\_1pager\\_final.pdf](https://waterpip.un-ihe.org/sites/waterpip.un-ihe.org/files/jordan_1pager_final.pdf)

<sup>2</sup> Full report available at WaterPIP website: [https://waterpip.un-ihe.org/sites/waterpip.un-ihe.org/files/jordan\\_policy\\_review\\_final\\_comp.pdf](https://waterpip.un-ihe.org/sites/waterpip.un-ihe.org/files/jordan_policy_review_final_comp.pdf)

- Increasing water efficiency in agriculture (expand area with drip irrigation).
- Increase number of greenhouses.
- Prioritize water supply to the Jordan Valley over irrigated Highlands.

## Policy dialogues

Bilateral policy dialogues with different stakeholders (Embassy of the Netherlands in Amman, INWRDAM, FAO, Wageningen Research, Straight light consultants) were conducted between December 2020 and June 2021. During these online meetings, the team fine-tuned the findings of the policy review and presented an analysis based on the framework developed by Hellegers and Davidson (2021)<sup>3</sup>. The team applied the framework to compare the two agricultural regions, the Valley and the Highlands (Figure 1). Different policies have been identified for the two regions (increase TWW in the Valley and reduce groundwater use in the Highlands), following the national objectives to increase TWW re-use and reduce groundwater use in agriculture. The team’s assessment was then discussed with the participants of the bilateral dialogues and valuable insights were gained. As such, the assessment functioned as a platform for discussion rather than an absolute assessment of the agricultural performance of each region. The scale of assessment ranges between 1 (indicating very low scoring to the related indicator) and 5 (indicating very high scoring to the related indicator). The results of the assessment of the strategies is shown in Figure 2.



**Figure 1: Results of the assessment of two agricultural regions of Jordan (very low score, 1, and very high score, 5, are in the center and periphery of the spider diagram respectively)**

The following issues regarding the different indicators were raised during the dialogues:

- Biophysical water productivity is hard to assess without field data. Participants expect that biophysical water productivity in the Jordan Valley is already high for most crops due to the water scarce conditions. As such, improvements in water productivity are hard to make. Participants indicated that with the increased use of TWW in the Jordan Valley, salinity will increase, reducing the yield and thus the biophysical water productivity. In case that farmers in the Jordan Valley use additional water resources to leach the salts out of their soils, more water has to be allocated to agriculture, effectively reducing the availability for other sectors. For the Highlands, in absence of clear figures on groundwater use, it is hard to assess the biophysical water productivity.

<sup>3</sup> Hellegers, P., & Davidson, B. (2021). Resolving the problems of commensurability in valuing water. *Water International*, 46(5), 637-651.

- Land productivity is generally higher in the Jordan Valley compared to the Highlands. The use of TWW is also expected to affect land productivity in the Jordan Valley.
- Economic water productivity is higher in the Jordan Valley compared to the Highlands. As stated in the official policies, the value of agricultural production of the Jordan Valley provides 70% of the total economic value of agriculture while it consumes 35% of irrigation water. Thus, this indicator scores higher in the Jordan Valley. Even if high-value crops are already grown in the Jordan Valley, opportunities for increased economic benefits exist in, among others, the Medjool date palm. Considering that date palms are also saline tolerant, TWW use might not reduce yield production.
- Food security for staple foods in Jordan is obtained through food imports. This strategy is sensible considering the limited water resources. Such a strategy requires purchasing power for obtaining the food imports. This purchasing power needs to be gained through productive economic sectors. Jordan has been successful in exporting high-value vegetables to obtain the purchasing power necessary for food imports. Following again the official policies (70% of total agricultural value coming from the Jordan Valley), the Jordan Valley contributes more to attaining food security compared to the Highlands.

The policy to increase the economic value obtained from agriculture aligns with this strategy. However, exports are vulnerable to external crisis, as it was the case during the Syrian crisis, when exporting routes were disrupted and borders were closed, resulting in reduced exports of Jordan. Despite such disruptions, Jordan was capable to obtain food security utilizing purchasing power obtained from other economic sectors. This offers some buffering capacity to absorb food imports through other economic sectors but agricultural improvements on increasing purchasing power through supply chain improvements are essential.

- Food self-sufficiency is low in Jordan as most of the staple food is imported. Only a small amount of staple crops are grown in the rainfed Highlands and in some areas of the Jordan Valley. No staple crops are cultivated in the irrigated Highlands. As such, the Jordan Valley is considered to score higher in this indicator compared to the Highlands. This is logical, considering that Jordan does not aim at increasing its food self-sufficiency due to the water scarcity.
- Employment is expected to be higher in the Jordan Valley compared to the Highlands mainly due to the differences in the cultivated crops. In the Jordan Valley, the majority of labour-intensive vegetables are grown and production takes place more months in the year compared to the Highlands. As such, employment opportunities are higher in the Jordan Valley.
- Currently environmental sustainability in Jordan is generally low. It is assessed that the Jordan Valley scores slightly higher on this indicator compared to the Highlands due to the unsustainable over abstractions of groundwater in the Highlands, resulting in declining groundwater levels. However, the increased use of TWW in the Jordan Valley and the expected effects on salinity are also expected to decrease environmental sustainability.

Capping of agricultural water use is an important step towards rationing. However, the cap of 700 Mm<sup>3</sup>/year points towards a small water saving from agriculture (22.5 Mm<sup>3</sup> for 2014, considering the official estimations for groundwater use). Moreover, participants indicated that the effective adoption of the cap requires that the groundwater use in the Highlands is also monitored and regulated. Despite the efforts to this end, it is still uncertain whether this will be the case towards 2025.

Lastly, the use of TWW in agriculture was discussed in terms of the overall water budget for Jordan. Current water policies consider TWW as an additional resource that is added to the water budget. However, considering that the Jordan river is a closed basin, different water sources are tightly interdependent through return flows. As such, TWW when not directly used should not be considered as a 'loss' from the system but rather a source that is used elsewhere or as environmental flow to sustaining the Dead Sea levels which decline annually.

## Conclusions

The main conclusions from the dialogues are the following:

- The Jordan river is a closed basin, indicating that there is no real water savings to be made. Moreover, there is a strong environmental need to re-allocate water towards the Dead Sea for environmental flows. Considering these two points, meeting the increased future demand and protecting the Dead Sea will remain a challenge. Tough choices need to be made for water rationing and re-allocation.
- TWW is added in the water budget as a new water source. This inflates the estimated available water resources and thus underestimating the severity of water shortage.
- TWW use in agriculture might reduce yield production. This will have an impact on Jordan's dependency on economic sectors other than agriculture to obtain food security.

## Recommendations

The main recommendations and points for further analysis are the following:

- Communication between different water consuming sectors and ministries should be improved to facilitate a comprehensive water resources management plan with clear targets, utilizing the strengths of each sector.
- Water quality is only limitedly addressed in official policies. Further analysis should focus on how the use of TWW will influence health, yield production, water productivity and economic benefits from agriculture.
- Under the limited water resources and the increased future demand, food security can only be obtained through imports and increase in the purchasing power of Jordan. As other economic sectors compete with agriculture for water, agriculture should focus on increasing its economic water productivity, potentially through improvements in the supply chain and post-harvest losses.
- To further assess the effect of TWW re-use, a detailed water accounting and surface-groundwater analysis needs to be developed.

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