

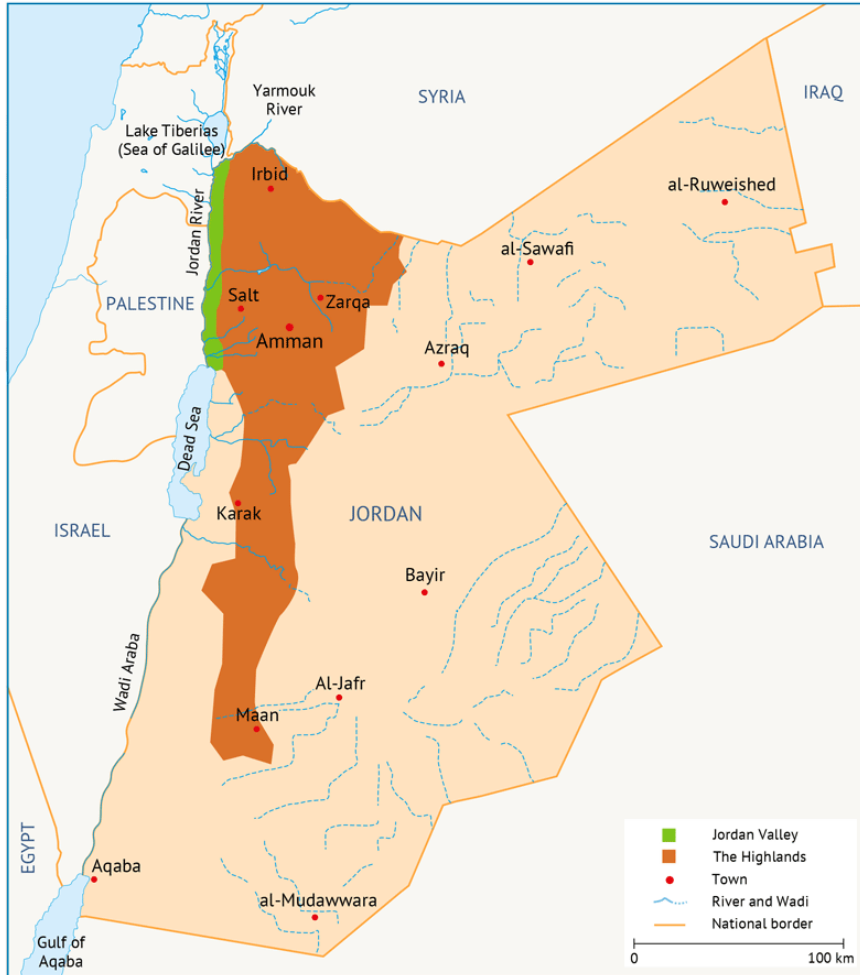


Regulatory aspects of wastewater reuse and SSPs

The case of Jordan

Ghada Kassab
The University of Jordan

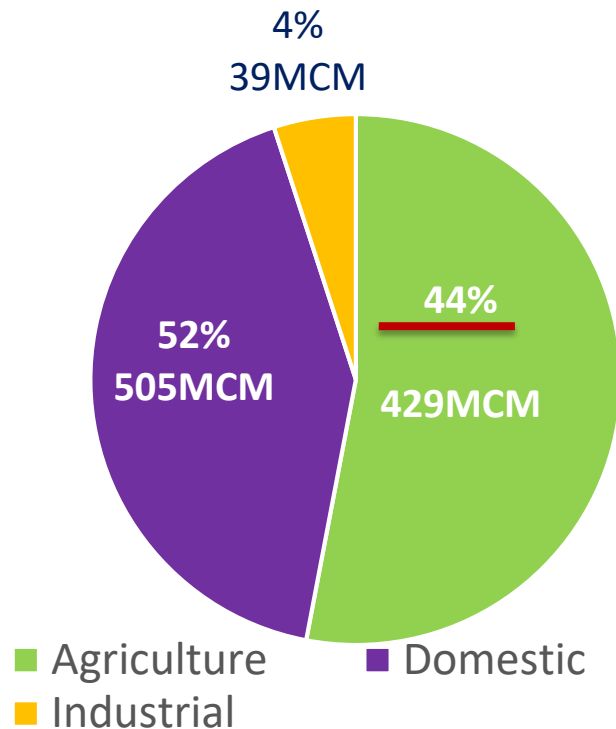
The Hashemite Kingdom of Jordan



Annual renewable resources of 145 cubic meters per capita

Current total uses exceed renewable supply. The deficit is covered by non-renewable and fossil groundwater extraction and the reuse of reclaimed water

If supply remains constant, per capita domestic consumption is projected to fall to approximately 90 cubic meter per person per year by 2025 (*Jordan water sector assessment, 2012*)



Taking into consideration that the agricultural use is of low economic return (3.2% of the GDP for use of 44% of total water supply)

several studies have concluded that large scale reallocation to municipal and industrial use is feasible.

However, the agriculture sector supports large number of jobs that would be difficult and very expensive to replace.

Source: Jordan Water Sector Facts and Figures (2013)

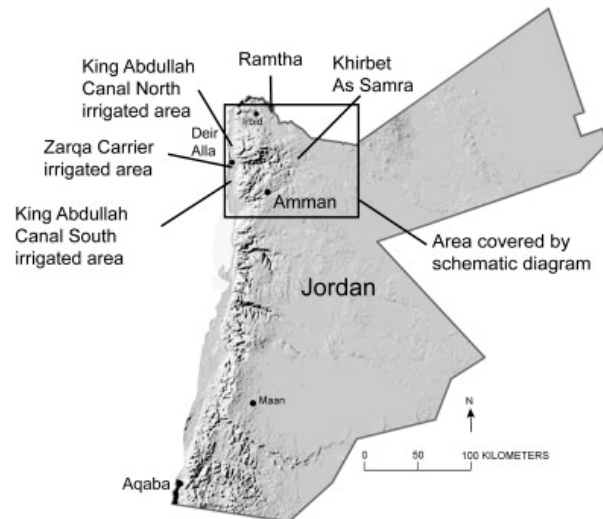
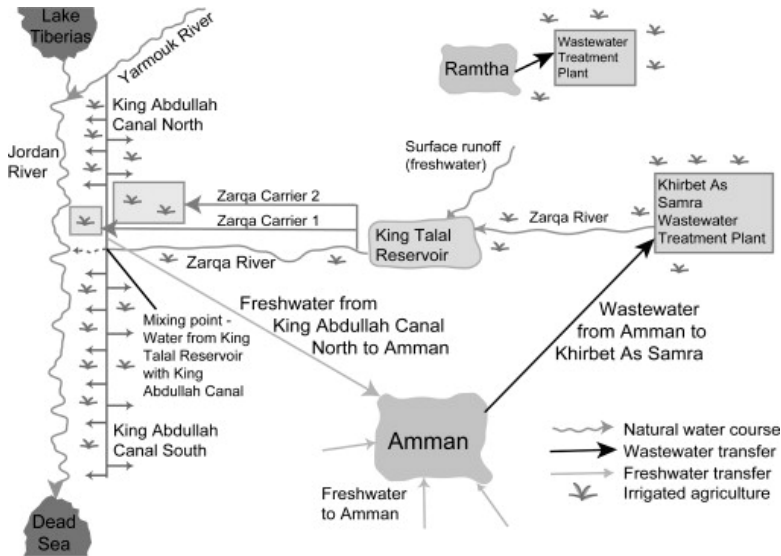
Water Policies

Jordan has formulated and implemented water policies and Legislations that support and regulate diversion of high quality water into higher value uses and intensify the use of reclaimed water in irrigation.

- National Water Strategy (2016-2025)
- Water Substitution and Reuse policy (2016)
- Water Reallocation policy (2016)
- Climate Change Policy for a resilient Water Sector (2016)

“Increase water supply through substitution of fresh water from surface and groundwater resources by treated wastewater from wastewater treatment plants. Through the implementation of the Water Substitution and Reuse Policy (2016) witch will lead to reusing about 240 MCM of treated wastewater” .

Current practice



Direct reuse: Wastewater treatment plants effluent is used in the vicinity of the treatment plants for irrigation of fodder crops and trees.

Indirect reuse: The effluent from Khirbet As Samra WWTP- the largest WWTP plant in Jordan- flows down the Zarqa river to King Talal Reservoir. From the reservoir it is then released as required to the Jordan Valley for irrigation of fruit and vegetables crops.

(with seasonal dilution with natural surface runoff).

Certainly adopted policies accentuate on the;

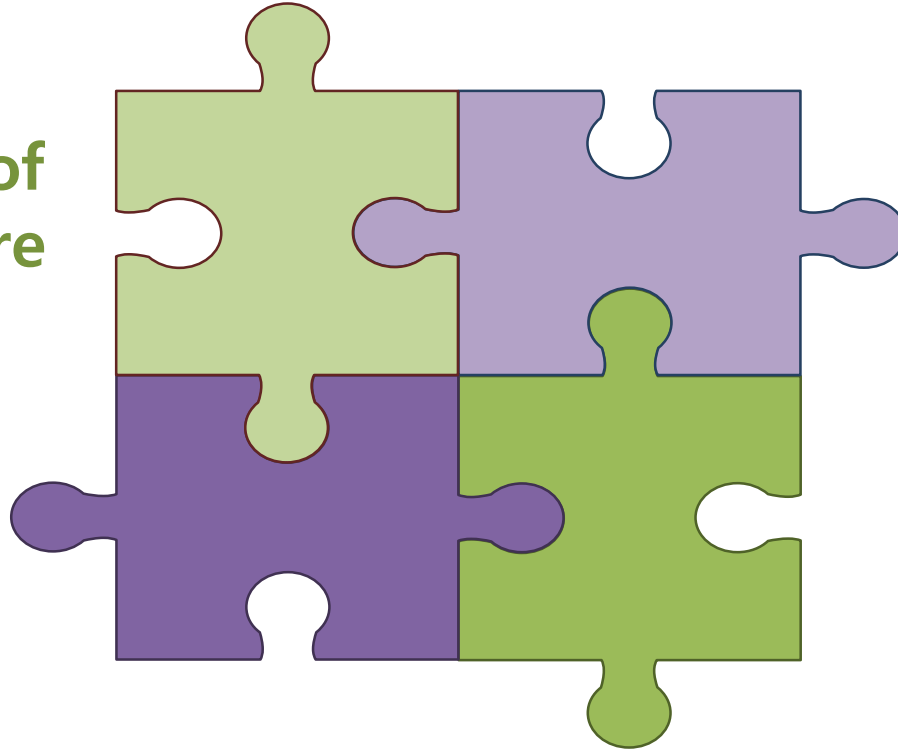
- Implementation of strict regulatory measures to manage the use of reclaimed water for agriculture, ensuring safe reuse and production of high economic return
- Applying the IWRM approach, combined with appropriate and sustainable risk reduction measures,
- Public acceptance and awareness
- Institutional and administrative coordination (the active involvement of stakeholders from difference sectors)

Key players



**Ministry of
Agriculture**

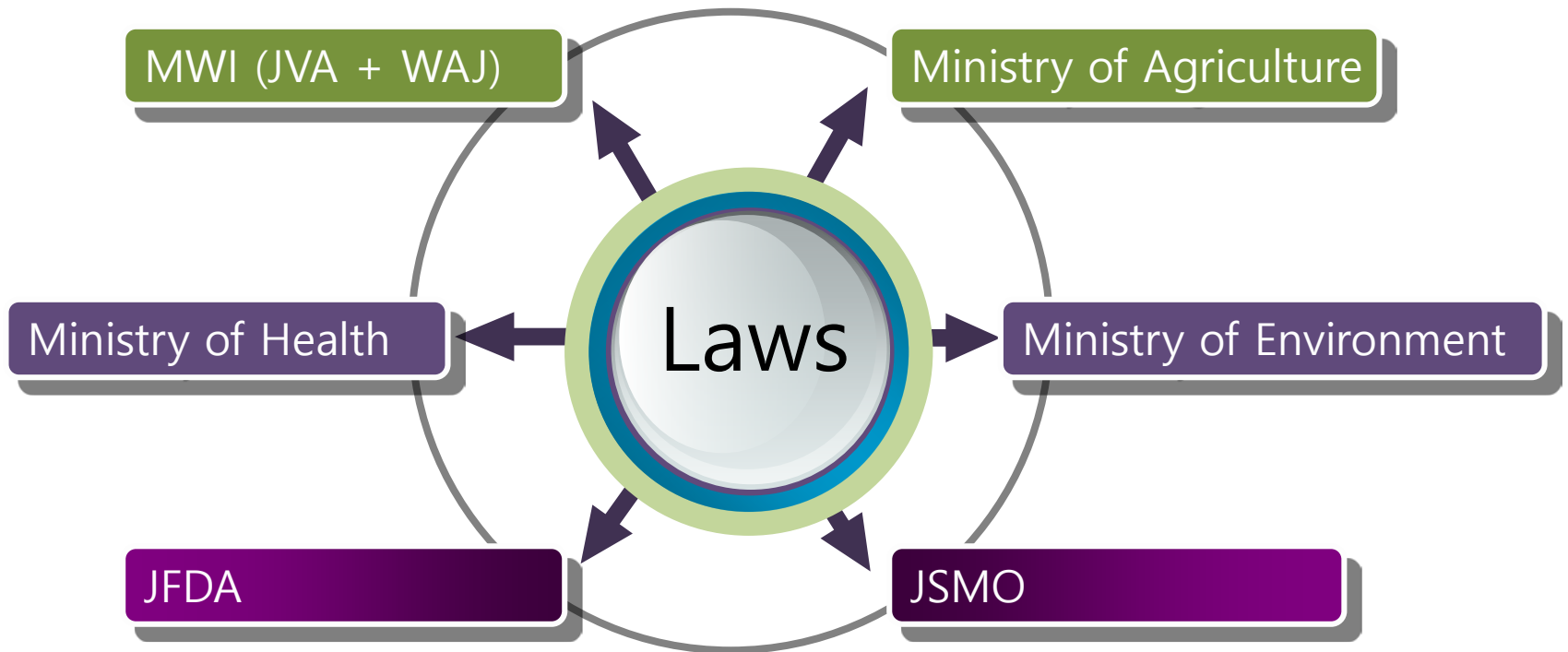
**Ministry
of Health**



**Ministry of Water
and Irrigation**

**Food and Drug
Association**

Legislative aspects



Legislative aspects




Use of reclaimed water in irrigation is regulated by:

"Regulation no. 7 for the year 2016, based on the Agriculture law no. 13 of the year 2015 and its amendments".

General requirements

- I. Each farmer using reclaimed wastewater must obtain a license from the Ministry of Agriculture indicating:
 - the approval of the Ministry of Water and Irrigation to allow him to use treated wastewater for irrigation purposes in his farm
 - A statement of the type of crops to be irrigated with treated wastewater before the beginning of each agricultural season
 - Statement of irrigation system intended to be used



II. **Crops allowed** to be irrigated with reclaimed water as per the Jordanian standard no. 893/2006 " Reclaimed domestic wastewater" and include:

- Industrial crops , field crops, forages, grains, legumes, fiber, oils and sugar
- Vegetables eaten cooked (includes: eggplant, squash, beans, cornflower, potato, okra, pees, broad beans, spinach, Jew's mallow, artichoke).
- Fruit trees and forest trees
- Landscape and sides of roads

III. It is prohibited to use reclaimed water for irrigating vegetables that are eaten uncooked (raw).



Irrigation techniques

IV. It is prohibited to use flood (furrow) irrigation

IV. It is prohibited to use sprinkler irrigation except for irrigating golf courses and in that case irrigation should be practiced at night

Workers and consumers health protection measures

JS 893/2006

Health protection measures approved are

Crop restriction

Water quality requirements (i.e. wastewater treatment level)

Although;

In 2014 Irrigation Water Quality Guidelines were issued at which the concepts of risk assessment, health based targets and health protection measures were adopted.

Nevertheless, neither the Ministry of Agriculture nor the Ministry of Water and Irrigation adopted these guidelines while developing the 2016 regulations for use of treated wastewater in irrigated agriculture



Operational monitoring, validation and verification aspects



- Monitoring programs still need to be developed and implemented
- Clarifying the roles and responsibilities of different governmental bodies is still needed.

In regard of:

- ❖ Quality of treated effluent (MWI)
 - ❖ Ensuring compliance with licenses and terms of use, including types of cultivated crops and irrigation techniques. (MoA)
 - ❖ Ensuring the implementation of good agricultural practices including on farm post harvesting practices viz. packaging, storage, transportation) . (MoA)
 - ❖ Quality of produce. (MoH and the JFDA)
- Technical, financial, economic and legal capacities should be rebuilt

On the ground

Due to the lack of a supportive and coherent framework for water reuse control and monitoring (other than the quality of treated wastewater)

Direct use of treated wastewater is regulated by agreements held between farmers and the Ministry of Water and Irrigation that restricts types of crops allowed to be irrigated with reclaimed water to fodders and fruit trees.



Concluding remarks

Coordination between different governmental organizations (holistic approach) for control of crop quality is essential for optimized use of reclaimed water (**optimization: food safety, food security and economic feasibility**)

Private sector participation in reuse plans need to be Intensified.

Also, the role of community based initiative organizations (CBO's) and Nongovernmental Organizations (NGO's) need to be strengthened.





شكراً

Thank you