



## Mixing Ratio Study; Towards Piloting and Strengthening Adaptation Capacity to Water Scarcity in the Jordan Valley

*Eng. Rana Ardah,  
Knowledge Cluster  
Energy, Water and Environment sector.  
Royal Scientific Society  
Amman, Jordan*

*Eng. Tharwa Qotaish  
Knowledge Cluster  
Energy, Water and Environment sector.  
Royal Scientific Society  
Amman, Jordan*

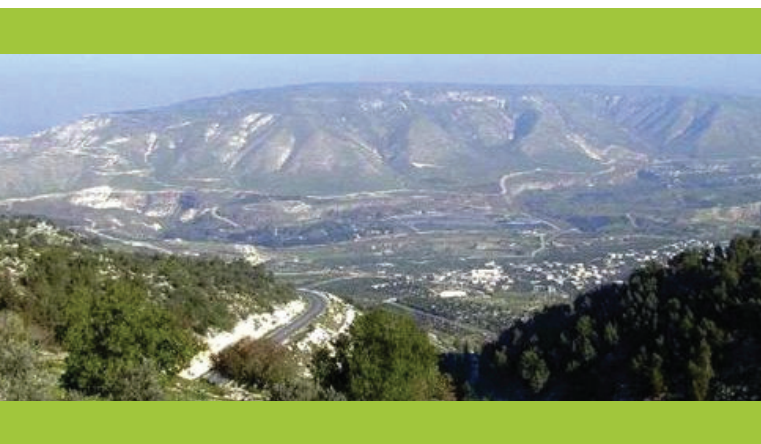
Key words: Treated wastewater reuse, World health organization guidelines 2006, Water demand management, and Risk management system.

Jordan is located in an arid to semi arid region where around 90% of the country's land receives an average precipitation of less than 100 mm/year while only 3% of the land receives an average annual precipitation of 300mm or more. The population growth rate in Jordan is about 2.19%, which is of the highest in the world as indicated by the population growth figures prepared by the Department of Statistics; with such a high population growth rate and fast socio-economic development, water demand and wastewater production are steeply increasing and the gap between water supply and demand is getting

wider. Thus, the importance of reusing reclaimed wastewater, particularly domestic wastewater, emerged, since such water is considered to be an important, renewable and non-conventional water resource in Jordan, where the yearly amount of treated wastewater flowing out of the wastewater treatment plants belonging to the Ministry of Water and Irrigation exceeds (113) MCM and is expected to reach about (240) MCM in 2020 (the website of Ministry of Water and Irrigation (MWI)/ Water Authority - Public sanitation). Therefore and based on the above mentioned facts, MWI has updated the national water strategy for Jordan to control and manage the use of all water resources according to environmental and public health regulations with a great emphasis on encouraging the (direct and indirect) use of treated wastewater, particularly in the Jordan Valley, as one major

resource for agriculture as it is the largest water consumer in Jordan, where 64% of the total water budget is being allocated for irrigation.

The new water strategy comes in line with the new WHO Guidelines for the safe Use of Wastewater in Agriculture (2006), where such guidelines encourage the use of multiple barriers approach which is more flexible and less stringent than the single barrier approach.



This approach combines treatment and post-treatment barriers compared to the old approach (WHO/ 1989), which is adapted by the ministries in Jordan, that relies solely on the treatment plant as the only reliable control measure; The rationale behind this flexibility is based on the understanding of the socioeconomic status of developing countries and the dire need to exploit treated wastewater in dry countries. And regarding that, it should be mentioned that a multidisciplinary working group named the "Steering committee for the risk monitoring and management system for the safe use of treated wastewater"; was formed; such committee comprises environmental specialists of the Royal Scientific Society and all related ministries and governmental institutions including Ministry of Environment, Ministry of Health, Ministry of Agriculture, Jordan Valley Authority, Water Authority of Jordan and Jordan Food and Drug Association. The team worked in close cooperation with the German International Agency (GIZ) in preparing the final proposal of the "National Plan for Risk Monitoring and Management System for the Use of Treated Wastewater in Irrigation for the Irrigated Areas Upstream and Downstream of the King Talal Reservoir".

The national plan was issued in November 2011, at the same time, GIZ and in close cooperation with the relevant institution developed further practical guidelines for the

farmers and extension workers; "Practical Guidelines for the Safe Use of Treated Wastewater in Irrigation". Both the plan and the guidelines serve as a road map and practical steps toward implementing a risk management system that will ensure the safe use of treated wastewater.



Depending on the concept of the safe use of treated wastewater from the perspective of WHO/ 2006 guidelines and the work carried out by the steering committee, a pilot study was conducted in September 2009, funded by the Jordan Valley Authority (JVA), to investigate the possibility of mixing the treated wastewater coming out of Irbid Wastewater Treatment Plant (Eff.), with the fresh water coming out of Wadi Al-Arab dam (W.A.), and using the blended water for irrigation purposes to suit the agricultural patterns (restricted & unrestricted) in the irrigated region; As a result, the mixing ratio of (Eff.: W.A. = 4:1) was recommended, provided that a risk assessment and management plan for the safe use of treated wastewater in agriculture is developed following the steps outlined in the study and with reference to the WHO/ 2006 guidelines in order to protect health and environment, where this figure would mean the use of relatively large amount of treated wastewater compared to the quantity of fresh water of the dam, and thus conserve fresh water.

