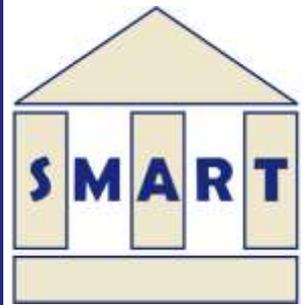


Integrated Water Resources Management in the Lower Jordan Rift Valley

Sustainable Management of Available Water



Environmental Issues of Desalination Technologies in the Lower Jordan Valley

**Compiled by Aysha Abu Alan
(Water Authority of Jordan, Jordan)**

June 29th, 2014

Sponsored by the German Federal Ministry of Education and Research (BMBF):

FKZ 02WM1079-1086 and FKZ02WM1211-1212

Project Coordination:

Main Coordinator:	Assistant Coordinators	
Prof. Dr. Nico Goldscheider & Dr. Jochen Klinger	Prof. Dr. Martin Sauter	Dr. Roland Mueller & Dr. Stefan Geyer
Institute of Applied Geosciences, Karlsruhe Institute of Technology Adenauerring 20b 76131 Karlsruhe Germany Phone: +49 (0) 721 608 43096 Fax: +49 (0) 721 606 279	Department of Applied Geology Göttingen University Goldschmidtstrasse 3 37077 Göttingen Germany Phone: +49 (0)551 39 79 11 Fax: +49 (0)551 39 93 79	Helmholtz Centre for Environmental Research (UFZ) Permoserstr. 15 04318 Leipzig Germany Phone: +49 (0)341 235 30 00 Fax: +49 (0)341 235 2885

<http://www.iwrm-smart2.org/>

Table of contents

- 1 Introduction 4
- 2 Operational Phases 4
 - 2.1 Operation Phase..... 4
 - 2.2 After Operation Phase (Brine Discharge): 5

1 Introduction

Scarcity of fresh water and availability of saline groundwater directed Jordan for using desalination technology. Jordan's experience in brackish water desalination has been fairly limited. All of the plants built to date have been small and built for commercial/industrial use or for agriculture. Most of them RO plants located in the Jordan Valley. Salinity in the Jordan valley on average is about 8000 ppm.

In 2010 a survey was done by private sector¹ that showed the number of desalination units that use RO technology were 50 belongs to farmers (private). The total irrigated areas were 4750 dunums, the resource of desalination water was 85 wells, operates through electricity for about 24 hours in summer and 8 hours in winter. Table (1) shows the water quality of desalination plants.

Table (1): Water quantity and related salinity in ppm of desalination plants in Jordan

Average quantity of desalinated water	1300 m3/hr
Quantity of Brine water	450 m3/hr
Rate of salinity intake water	3000 ppm
Desalinated water salinity rate	250 ppm
Average TDS for water use in irrigation	650 ppm
Average Brine salinity	8000 ppm

There is environmental, social-economic, or technical constraints expected in using saline water resources for agriculture in Jordan, even if this would relief other fresh water resources for domestic uses. These constraints should be regarded by conducting necessary studies of the environmental impact during and after the desalination phases (discharge brine) according the following suggestion:

2 Operational Phases

2.1 Operation Phase

- **Air and Climate:** Dust collection, smoke emission, desulphurization techniques, and greenhouse gases (CO₂ production) that affect air pollution and climate change.
- **Energy Use:** Jordan is a poor country in energy resources and is highly dependent on imported from neighboring countries. Energy efficiency and renewable energy generation should be pursued in order to reduce the plant's overall environmental footprint that contributes to emission of greenhouse gases.

¹ Eng. Nayef Seder, Jordan Desalination and Reuse Association, Water Users association.

- **Noise and vibration:** High pressure pumps (RO) traffic noise and vibration by equipment.

2.2 After Operation Phase (**Brine Discharge**):

Its negative impact is limited to the area between its outlet in wadi and its outlet in the Jordan River, it does not affect the quality of water of the Jordan River, where the salinity of the river water up to 6000 ppm almost South King Hussein Bridge.

- **Hydrology:** Effect of brine discharge may increase the salinity of the aquifer and the effect of any disruption in water column if the water will reach the Dead Sea.
- **Soil Impact:** Any chemicals added to the desalination process for scale and fouling prevention, corrosion reduction and corrosion products flow back into soil. The most significant impact is the contribution of this brine to the salinization process, which is taking place on a wide scale because of poor agricultural practices that effect on plant life ecology.
- **Ecosystem (flora and fauna ecosystem):** Effect on plant life ecology, Eradication of vegetation affects animal ecology (Worms and micro-organisms that live in the soil). And noise affects local bird and Migratory birds.