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PROCEEDINGS 3RD INTERNATIONAL CONFERENCE ON INTEGRATED ENVIRONMENTAL MANAGEMENT FOR SUSTAINABLE DEVELOPMENT

Achraf Ghorbal, Ali Sdiri, Leila Basti, Boubaker Elleuch
Editors

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Preface

The 3rd International Conference on Integrated Environmental Management for Sustainable Development (ICIEM 2018) seeks to create a tradition of a bi-annual gathering of academia, industry and policy makers to build a series of environmental pollution monitoring systems and integrated management strategies. This conference provides an exceptional opportunity for presenting cutting-edge research and fostering discussion amongst scientists, professionals and academics in different areas of the broader themes of environmental engineering and sciences. Scientific exchange in this international meeting continues to be of great benefit to all involved in challenging environmental issues caused by the increase of pollutant loads discharged into the natural environment of ecosystems. These challenges require the building of a regulatory framework and control strategies, a framework that needs to be based on scientific evidence associated with exposure and health risk for pollution prevention and remediation strategies. The application of innovative remedial techniques and new scientific methods is a key step towards sustainable development. It is therefore crucial to address the existing pollution problems and protect public health as well as preserve the welfare of the environment.

The application of cost-effective technologies for waste treatment and controls is much needed for a better implementation of the appropriate regulatory measures that insure the success of a broader policy in pollution prevention.

Engineers and scientists working in this field need to be familiar with a wide range of issues including the physical processes of mixing and dispersion, surface modifications, interfacial phenomena, and photochemical and biological developments. Hence, a continuous exchange of information between scientists in different parts of the world is essential.

In recent years, environmental protection has emerged as a requirement that goes beyond state borders to reach a global dimension. This awareness has resulted in numerous treaties, directives and conventions and has even changed the way we do business. Indeed, it is now generally accepted that country's economic growth strategies must be compatible with environmental goals.

Protection of the environment, one of the pillars of sustainable development, is an absolute priority for the international community. In this context, the 3rd ICIEM conference aims to focus on relevant experiences, up-to-date scientific research and findings carried out all over the world to protect and preserve the environment. In addition, attendees will benefit from the participation of a number of well-known specialists in the field and from the exchange of experiences to come up with solutions to complex environmental problems and to develop environmental protection strategies and pollution management tools.

We sincerely thank all authors for their involvement and efforts in preparing their papers.

Achraf Ghorbal, Ali Sdiri, Leila Basti, Boubaker Elleuch

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EFFECT OF EXCESSIVE IRRIGATION ON GROUNDWATER LEVEL AND SALINITY IN A SEMI-ARID BASIN

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Abstract

Excess irrigation is responsible for the groundwater salinity in semi-arid regions. Deficiency of drainage network in the farmlands with uncontrolled irrigation was the most important factor on the salinity of soil and groundwater. Moreover, surface irrigation with these waters (saline groundwater) on heavier textured soil of the area usually leads to build up of salinity and sodicity problems. Therefore, there was need to research the groundwater level and quality in the excessive-irrigated semi-arid basin. The aims of the research were; to compare the groundwater levels before and after irrigation periods (before 1994 and after 1994) and to evaluate the salinity of groundwater before and after the irrigation in a year.

1. Introduction

Saline groundwater is often found at shallow depth in irrigated areas of arid and semi-arid regions and is associated with the problems of soil salinization and the land degradation. Salt deposits resulting from excess irrigation with the high evaporation rates and the poor drainage conditions accumulate in shallow aquifer and migrate down in the course of time and then reach the ground water.^{1, 2} The aims of the research were; to compare the groundwater levels before and after irrigation periods (before 1994 and after 1994) (Figure1), to determine SAR (Sodium Adsorption Rate) and EC (Electrical Conductivity) levels of groundwater in excessive irrigated Harran Plain and to evaluate the salinity of groundwater before (March 2016) and after (October 2016) irrigation in a year by US Salinity Diagram classification.

2. Material and Methods

The groundwater samples were taken from 11 wells (W1-W11) in Harran Plain and certain physical and chemical properties of samples were analyzed to present salinity effect. Sampling and measurement procedures were carried out in accordance with:

- D4448-01 Standard Guide for Sampling Ground-Water Monitoring Wells³,
- Water Quality-Sampling-Part 2: Guidance on sampling techniques⁴ and
- Groundwater Well Sampling⁵.

3. Results and Discussion

According to US salinity diagram (Figure 2), all wells except W4 have C2 or C3 salinity (medium to high salinity) while W4 has very high (C4) saline irrigation water. When sodium hazard is taken into consideration, it is seen that all wells except W6 have low sodium hazard in March and October. All wells except W4 and W6 were included in the class of "suitable for irrigation". However W4 and W6 wells were found in the class of "suitable for irrigation on some special conditions".

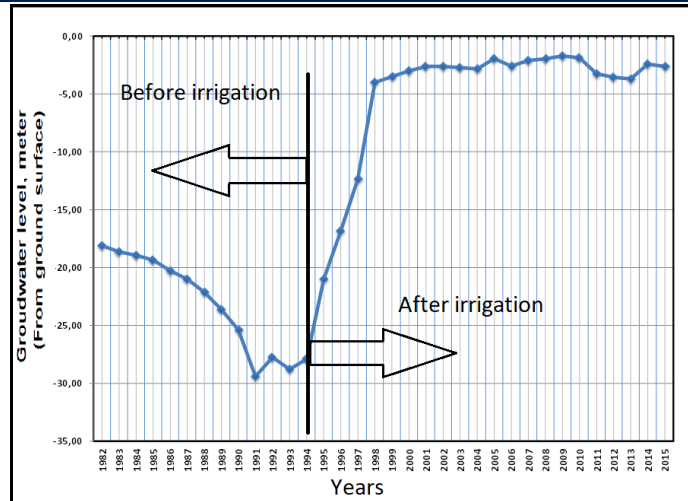


Figure 1. The variations of groundwater level according to years in an observation well representing the study area

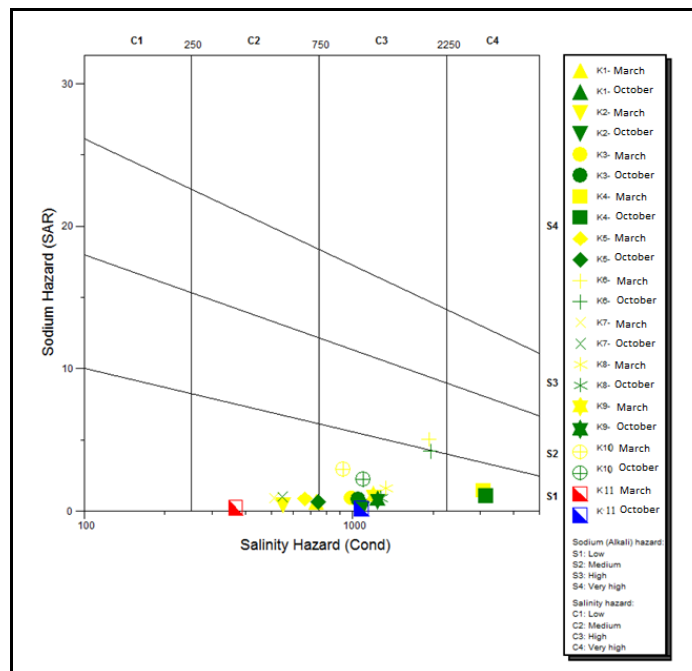


Figure 2. Salinity and Sodium hazard of ground water in USA salinity diagram

4. Conclusion and Recommendations

Consequently, groundwater level increased due to irrigation since 1994 which was the year of irrigated-agriculture first started. Salinity and sodium hazard of groundwater from increased conductivity and SAR values of the drainage water leaching through the unconfined aquifer arised from excessive irrigation in the region for many years.

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