



Randolf Rausch, Christoph Schüth, Thomas Himmelsbach (eds.)

Hydrogeology of Arid Environments

Proceedings

2012. I-X, 283 pp., numerous coloured figures and tables,
21 x 27.6 cm.

ISBN 978-3-443-01070-6, bound € 49.90
www.borntraeger-cramer.de/9783443010706

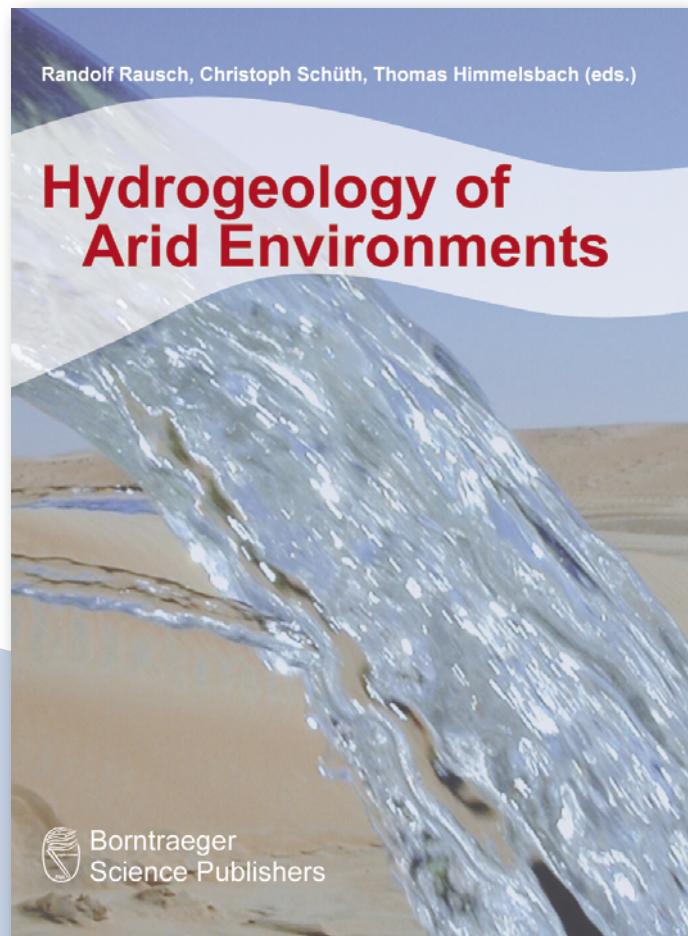
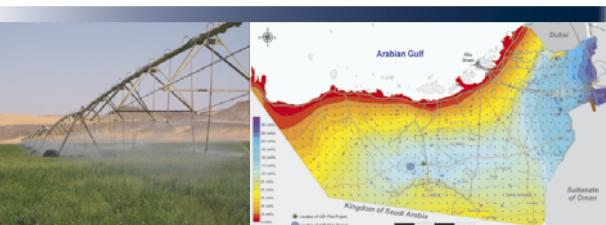
In arid and semi-arid regions groundwater is often the only natural resource for water supply. Therefore, stakeholders face great challenges in managing this resource in a responsible way. The problem is further amplified by population growth, increase in agricultural, industrial and municipal water consumption, and the threat of climate change. Therefore, an optimal use and management of the scarce groundwater resources is imperative. A precondition for this is a sound understanding of the particularities of the hydrogeology of arid and semi-arid regions as well as a proper knowledge of the water budget, water resources in storage, and water quality.

This book summarizes the results of the conference "Hydrogeology of Arid Environments", which was held in March 2012 in Hannover (Germany). It gives an overview about current research on this topic with examples from arid and semi-arid areas from all over the world.

The book is intended for scientists, engineers, hydrologists, hydrogeologists, and political decision makers interested in the water resources of arid and semi-arid environments.

Scientific committee

Mohammed Al Saud, Riyadh; András Bárdossy, Stuttgart; Matthias Hinderer, Darmstadt; Thomas Himmelsbach, Hannover; Heinz Hötzl, Karlsruhe; Andreas Kallioras, Athens; Wolfgang Kinzelbach, Zürich; Ralf Klingbeil, Beirut; Alan McDonald, Edinburgh; Broder J. Merkel, Freiberg; Randolf Rausch, Riyadh; Johannes Rieger, Stuttgart; Martin Sauter, Göttingen; Christoph Schüth, Darmstadt; Wilhelm Struckmeier, Hannover; Georg Teutsch, Leipzig; Stefan Wohnlich, Bochum

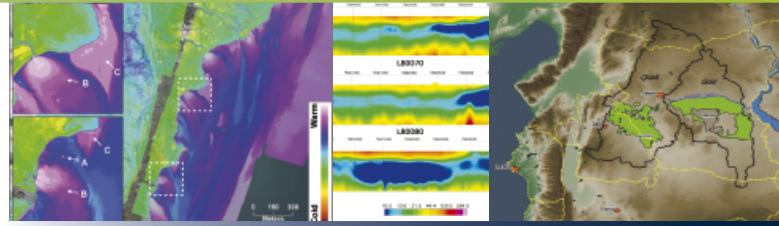


Borntraeger Science Publishers

Johannesstr. 3A, 70176 Stuttgart, Germany Tel. +49 (0)711 351456-0 Fax +49 (0)711 351456-99
order@borntraeger-cramer.de www.borntraeger-cramer.de

Contents

Preface	V
Key Notes	
Al Saud, M., Rausch, R.: Integrated Groundwater Management in the Kingdom of Saudi Arabia	1
Foster, St.: Agricultural Irrigation – A Critical Nexus for Groundwater Resources in More Arid Climates	7
Hötzl, H.: Climatic Caused Variations of Groundwater Recharge in the Middle East and its Consequences for the Future Water Management	10
Kinzelbach, W.: Modelling of the Hydrology and Hydraulics of the Okavango Delta	15
Extended Abstracts	
Abusaada, M., Tamimi, A., Sauter, M.: Demand Management as a Potential Unconventional Source of Water, The West Bank Governorates	21
Arzani, N.: Groundwater Recharges in Dryland Alluvial Megafans: Geomorphology versus Lithofacies Controls, Examples from Central Iran	25
Damtew, A. D.: Integrated Examinations of Hydraulic Conductivity, Apparent Resistivity and Hydrochemical Characteristics of Aquifers in a View to Minimize Failure Rates of Wells in Weybo River Catchment, Southern Ethiopia, East Africa	30
Dirks, H., Holtkemper, S., Al-Saud, M., Rausch, R.: How Much Water is Left? – An Economic Approach to the Quantification of Non-Renewable Groundwater Resources	34
Fadlelmawla, A., Hadi, K., Zouari, K.: Investigations of Recharge to an Arid Zone Freshwater Lenses	36
Fakir, Y., Le Page, M., Aslikh, A., Fanzi, A., Huber, M.: Historical Background of Water Resources and Current Management Initiatives in the Semi-Arid Plain of Souss-Chotouka (Morocco)	40
Gossel, W., Sefelnasr, A., Wyckisk, P.: Saltwater Intrusion Balances in the Nubian Aquifer System	43
Gräbe, A., Rödiger, T., Kolditz, O., Rink, K., Fischer, T., Sun, F., Wang, W.: Development of a 3D Groundwater Flow Model in Semi-Arid to Arid Region: The Western Drainage Basin of the Dead Sea (Israel and West Bank)	48
Grönroft, A., Landschreiber, L., Classen, N., Duijnisveld, W., Eschenbach, A.: Combining Field Measurements and Modeling of Soil Water Dynamics to Quantify Groundwater Recharge in Dryland Savanna, Namibia	52
Jabloun, M., Sahli, A., Hennings, V., Muller, W., Sieber, J., Purkey, D.: Evaluating Uncertainty Introduced to MABIA-WEAP-FAO56 Soil Water Balance Simulation Model by Using Limited Meteorological Data	56
Keim, B., Rausch, R., Al-Saud, M., Pfäfflin, H., Bárdossy, A., Bendel, D., Lorenz, M.: Large Scale Groundwater Recharge Estimation with Hydrological Models in Arid Environments – Case Study Arabian Peninsula –	60
Koeniger, P., Toll, M., Himmelsbach, T., Shalak, K., Hadaya, A., Rajab, R.: Stable Isotope Studies in Semiarid, Karstic Environments Reveal Information for Sustainable Management of Water Resources in Damascus, Syria	65
Koziorowski, G.: Preparatory Hydrogeological Investigations for the Large-Scale Strategic ASR-Project in the Liwa Desert of the Abu Dhabi Emirate	71
Mächtle, B., Ross, K., Eitel, B.: The Khadin Water Harvesting System of Peru – An Ancient Example for Future Adaption to Climatic Change	76
Maliva, R. G., Herrmann, R., Winslow, F. P.: Managed Aquifer Recharge of Reclaimed Water: Storage and Treatment Opportunities in Arid Lands	81
Mallast, U., Siebert, C., Schwonke, F., Wagner, B., Rödiger, T., Geyer, S., Gloaguen, R., Sauter, M., Kühn, F., Merz, R.: Application of Thermal Data for Groundwater Studies in Arid Regions at the Example of the Dead Sea	84
Margane, A., Makki, I.: Water Resources Protection for the Water Supply of Beirut	89
Markovich, K. H., Pierce, S. A.: Integrated Remote and in situ Assessment of a Playa Lake Groundwater System in Northern Chile	92
Menzel, L., Törnros, T.: The Water Resources of the Eastern Mediterranean: Present and Future Conditions	97



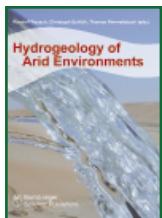
Michelsen, N., Schubert, M., Schüth, C., Rausch, R., Al Saud, M.: Assessment of Natural Radioactivity Occurring in Saudi Arabian Sandstone Aquifers	101
Nesrine, N., Rachida, B.: Hydrological and Hydrochemical Process of the Sebkha Oum El Khiarella, South East of Tunisia	105
Prathapar, S. A.: Constraints for Managed Aquifer Recharge in Arid and Semi-Arid Regions	109
Prein, A., Weiß, J., Makhoul, R. S.: Groundwater Modeling Considering Climate Change and Significant Change in Recharge by Urban Development Along the Western Coast of Saudi Arabia	112
Reuss, R., Zoßeder, K., Maßmann, J., Huber, M., Schelkes, K., Stork, J., Priestly-Leach, O., Subah, A.: Linkage of WEAP and MODFLOW Models for the Azraq Basin	118
Rieger, J., Tourian, M. J.: Characterization of Water Storage Dynamics in Arid Areas by Satellite Gravimetry	124
Roediger, T., Meier, A., Siebert, C., König, F., Kallioras, A., Forestier, P., Fuest, T., Schüth, C., Rausch, R., Al-Saud, M., Dietrich, P.: Identification of Potential Groundwater Recharge Using 3D-Spatial Soil Moisture Observations in the Ad-Dahn Desert, Kingdom of Saudi Arabia	129
Sabri, R., Ghanem, M., Abu Madi, M., Merkel, B.: Groundwater Modeling in Al Malib Basin, Jordan Valley	133
Sarsak, R. F., Almasri, M. N.: Modeling of Seawater Intrusion Due to Climate Change Impacts in North Gaza Coastal Aquifer Using SEAWAT	137
Schlote, A., Hennings, V., Schäffer, U.: Water Balance for the Aleppo Basin, Syria – Implications of Land Use on Simulated Groundwater Abstraction and Recharge	141
Schmidt, S., Fischer, S., Toll, M., Ries, F., Zayed, O., Guttmann, J., Marei, A., Weiss, M., Geyer, T., Sauter, M.: Design and Setup of a High Resolution Hydrometric Monitoring Network in a Semi-Arid Karst Environment – West Bank	147
Sharma, S. K.: Fluoride Problem in Semi-Arid Region – A Case Study from India	151
Siebert, C., Rödiger, T., Rausch, R., Döhler, J., Michelsen, N., Al-Saud, M.: The Upper Mega Aquifer System on the Arabian Peninsula – Delineation of Sub-Aquifer Interaction Using Hydrochemical and REE+Y Patterns	154
Siegfried, T., Kinzelbach, W.: Moving Well Solution to Optimal, Multi-Objective Groundwater Use – Method and Application	158
Sorman, A. U.: Wadi System Components Under Arid Climate to Estimate Transmission Losses and Groundwater Recharge through Analytic/Numeric Solutions	162
Toll, M., Shalak, K., Al-Safadi, M., Hadaya, A., Abdullah, A., Rajab, R., Houben, G., Himmelsbach, T.: Mitigating the Current and Future Challenges for the Drinking Water Supply of Damascus, Syria	166
Vassolo, S.: Groundwater Recharge in the Lake Chad Basin	171
Vogel, K., Döhler, J.: Monitoring of Water Resources in Arid Regions	177
Wang, H., Yang, P., Kinzelbach, W.: Modeling Ecological Water Releases to the Lower Tarim River	180
Weyer, K. U., Ellis, J. C., Tademait Plateau: A Regional Groundwater Recharge Area in the Centre of the Algerian Sahara	185
Poster Abstracts	
77 Poster Abstracts	190–283

Order form

I (we) order from Borntraeger Science Publishers,

Distributor: Schweizerbart Science Publishers, Johannesstr. 3A, 70176 Stuttgart, Germany

Tel. +49 (0) 711/351456-0 Fax +49 (0) 711/351456-99 mail@borntraeger-cramer.de www.borntraeger-cramer.de



Rausch et al., Hydrogeology of Arid Environments, ISBN 978-3-443-01070-6, € 49.90

Name:

Address:

Date:

Signature: