MICHEL EDWARD RAHBEH

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# CAREER PROFILE

* Conducted hydrological modeling and water quality evaluations using the Soil Water Assessment Tool (SWAT) and HYDRUS.
* Devised a methodology for the automatic calibration of SWAT model.
* Developed a GIS-based hydrological model.
* Installation and operation of hydrologic measurement devices, analysis and documentation of hydrologic data, grid soil sampling and soil experiments.
* Supervised terrace buildings to control runoff and prevent soil erosion.
* Evaluated an EPA Superfund site to determine the extent of contamination and the clean up cost.
* Taught the Environmental Water Quality Laboratory.
* Developed a numerical model for soil and ground water remediation by air sparging and soil vapour extraction.
* Wrote a soil and water analysis manual that is still used in teaching an environmental quality laboratory
* Sound working knowledge of numerical modeling, including watershed hydrological modeling, ground water flow and transport modeling using SWAT, MODFLOW/FLOWPATH and MT3D, and site and project assessment using Geographic Information Systems.
* Excellent technical and programming skills, including proficiency with Fortran 90/95, MODFLOW/FLOWPATH, ANSYS (Finite Element), ArcGIS, Mathcad, Mathematica, , Autocad.

# PROFESSIONAL EXPERIENCE

## university of Jordan – Amman, Jordan 2019-present

## Associate professor

* Head of the Land, Water and Environment Department School of agricultural (September 2019-present)
* Taugt graduate and undergraduate courses in hydrological modeling and water resources, hydrology and, filed training in land, water and environment.
* Co-supervisor of an M.Sc student and a Ph.D student

## University of Jordan – Amman, Jordan 2013-2019

## Assistant professor

* Head of the Land, Water and Environment Department School of agricultural (September 2017-2019)
* Taught graduate and under graduate course in irrigation principles, water resources management and hydrology, field training in land, water and environment
* Trained several groups of participants on the “Design, installation and operation of drip irrigation system”, “watershed modeling”, and “water management on farm level”. The training activities were part of the Third Country Training Program (TCTP) offered by Japan International Cooperation Agency (JICA).
* Co-supervisor of two M.Sc students
* Principal Investigator “Evaluating the potential of preferential solute transport in soils near Zarqa river”, funded by Scientific Research Support Fund (Ministry of Higher Education) (total fund 53000 Jordan Dinar)
* Principal Investigator “Assessment of preferential subsurface flow and transport in soils near Zarqa river basin” funded by the “Partnership for the Enhanced Engagement in Research” (PEER/USAID)

(total fund 159950 US dollars)

## University of alberta – Edmonton, AB, Canada 2010-2012

## Research associate

* Team member “Watershed Evaluation of Beneficial Management practices program (WEBs) of Agriculture and Agri-Food Canada”.
* Principal hydrological modeller for the WEBs watershed, the Lower Little Bow, in Alberta.
* Used the soil water assessment Tool (SWAT) for the evaluation of the in-stream processes and the stream water quality or the Lower Little Bow watershed, also the effect of irrigation on the runoff and ground water discharge.

## University of alberta – Edmonton, AB, Canada 2005-2010

## Post doctoral fellow

* Project team member “Watershed Evaluation of Beneficial Management practices program (WEBs) of Agriculture and Agri-Food Canada”.
* Principal hydrological modeller for the WEBs watershed in Alberta.
* Hydrologic modelling using a Geographic Information System (GIS) based Soil water assessment tool (SWAT) model.
* Devised a methodology for the automatic calibration and validation of SWAT model
* Project team member “Effluent irrigation by agro forestry for industries and communities”. Brought a unique expertise in handling the modeling of soil water dynamics and solute transport and distribution within the soil profile.
* .Purdue university - West Lafayette, IN, USA 1998 - 2003

## Research Assistant

* Key player on “Air sparging for soil and ground water remediation, Agricultural and Biological Engineering” project, designing and conducting experimental air sparging and numerical modeling of soil sparging and soil vapour extraction operations to analyse real field case studies. Wrote several papers on model report findings and presented them at conferences before numerous organizations both in and out of the United States.
* Assisted in teaching the Environmental Water Quality Laboratory.
* Nominated to write a step-by-step manual for university students on the Environmental Water Quality Laboratory; included writing of experimental procedures for soil and water analysis, in addition to exercises and assignments enabling students to learn and understand the basic principles.
* Instrumental in developing and writing a multi-phase numerical flow and transport model using Fortran 90/95 programming language; Model was also adapted to solve general ground water and flow problems.
* Conducted numerical experiments and demonstrations, verified multi-phase contaminant transport model against simplified mathematical analytical solutions; analysed and interpreted information from data provided to assess proposed project.
* Independently performed Watershed Delineation using Geographic Information System (ArcView), and water sampling points identification.
* Evaluated an EPA Superfund site to determine the extent of contamination and the clean up cost.
* Developed a GIS-based hydrological model.

## Water & ENVIRONMENT ResEARCH & STUDY Center (WERSC) - Amman, Jordan 1996 - 1998

Research Assistant

* Prepared representative soil samples for analysis, incorporating both grid sampling and traverse sampling techniques to evaluate and quantify soil spatial variability, while at the same time minimizing the cost of soil analysis by reducing the number of samples.
* Led planning for terrace building project, including supervising and directing project staff; successfully constructed terraces to contain high velocity flood, effectively containing runoff and minimizing erosion.
* Performed rainfall and runoff monitoring within remote areas, successfully recording a continuous and reliable rainfall-runoff record for eight water catchments and sub-catchments; included repair and maintenance on a regular basis to avoid breakdowns; maintained reasonable records without gaps or missing data.
* Successfully performed rainfall-runoff modeling for watershed of an area of 70km2 utilizing Digital Elevation Model (DEM), layer coverages obtained from Geographic Information System (GIS), and Watershed Modeling System; model was used by Water & Environment Research & Study Center to conclude another project..
* Key player in various company projects; including: Water Harvesting Modeling and Simulation Project; Integrated Management of Arid Land Watershed in the Jordanian Badia, and Decision Support System (DSS) for Drought Mitigation in the Mediterranean Region.

**EDUCATION**

Purdue University – West Lafayette, IN Ph.D., Agricultural & Biological Engineering (May, 2004)

University of Jordan - Amman, Jordan **M.Sc.,Soil Science and Irrigation** (June, 1996)

University of Jordan - Amman, Jordan **B.Sc.,Soil Science and Irrigation** (June, 1992)

**TRAINING**

Artificial Recharge of Groundwater • Geographic Information Systems • The 17th International Course on Environmental Hydrology for Arid and semi-arid regions • Hydraulic Engineering for water harvesting in Arid and semi arid environments

**PEER REVIEWER**

Journal of hazardous materials • Journal of hydrology • Agricultural water management journal • Canadian soil science journal • Climatic change • Journal of environmental quality • Journal of environmental quality

**References**

 Available upon requests

**Conferences**

Rahbeh, M. The 18th International Conference on Diffuse Pollution and Eutrophication

Los Angeles, USA, August 13-17, 2017

Rahbeh, M., Srinivasan, R. Mohtar, R. Evaluation of Soil Water Assessment Tool for the simulation of preferential contaminant transport in cultivated lands near Zarqa river. INTERNATIONAL SOIL AND WATER ASSESSMENT TOOL CONFERENCE 2017, June 28 – 30 | Warsaw, Poland

Rahbeh, M. Shammout, M., Ziadat,F, Haddad,M and Qaryouti, L. Evaluating sustainable land and water management practices in Zarqa River basin. Published in 7th conference on Scientific Research in Jordan/ Jordan Society for Scientific Research held on November 14th , 2015.

Rahbeh M. and Mohtar R. 2002. “Modeling Multi-Phase Contaminant Transport in Porous Media Using First Order Mass Transfer Kinetics.” International Conference for Water Resources Management in Arid Regions. (WRMiAR), 23-27 March 2002, Kuwait City, Kuwait.

 **PUBLICATIONS**

Rahbeh M. 2019. Characterization of preferential flow in soils near Zarqa river (Jordan) using in situ tension infiltrometer measurements. PeerJ 7:e8057 <https://doi.org/10.7717/peerj.8057>

Rahbeh, M., Srinivasan, R., Mohtar, R. 2019. Numerical and conceptual evaluation of preferential flow in Zarqa River Basin, Jordan. Ecohydrology and Hydrobiology. 19(2): 224-237

Yousef, K. I., Abu-Awwad, A. M., Rahbeh., M. (2018) Effectiveness of Continues Contour Ridges and Intermittent Trenches Constructed Using the Vallerani in water Harvesting in Arid Regions." Vol(9), No.(3), page 167-174 2018. Jordan Journal of Earth and Environment Sciences JJEES

Rahbeh M, Chanasyk D, Patterson S. (2014) Modeling the irrigation requirements for an experimental site in Northern Alberta, Canada. PeerJ PrePrints 2:e696v2 <https://dx.doi.org/10.7287/peerj.preprints.696v2>

Rahbeh, M., Chanasyk D. and Miller J. 2013. “Modelling the effect of irrigation on the hydrological output from a small prairie watershed ”. Canadian Water Resources Journal. 38(4): 280-295.

Shatanawi K., Rahbeh M. and Shatanawi M. 2013.” [Characterizing, Monitoring and Forecasting of Drought in Jordan River Basin](http://eacademic.ju.edu.jo/m.rahbeh/_Layouts/listform.aspx?PageType=4&ListId=%7b23ED5213-44B8-4910-A3D8-0D55C8AFF3D1%7d&ID=7)”. Journal of Water Resource and Protection 5:1192-1102

Rahbeh, M., Chanasyk D. and Miller J. 2011. “Two-Way Calibration-validation of SWAT model for a Small prairie watershed with short observed record”. Canadian Water Resources Journal. 36(3):247-270.

Rahbeh, M. and Mohtar R. 2007. “ Application of multiphase transport models to field remediation by air

Rahbeh, M. and Mohtar. R. 2006. “Modeling Multiphase contaminant transport in porous media using first order mass transfer kinetics”. ASAE, Vol 49, No. 6, pp 1935 -1945.

Shatanawi, M., Rahbeh, M. and Kharabesheh. 1999. “Rainfall-Runoff Relationship & Water Budget for Zarqa River Basin” Dirasat, Vol 26, No. 1 pp. 74-97.

Rahbeh, M. and Shatanawi, M. May 1997. “Reservoir Management & Capacity for Zarqa River Basin Using the Linear Decision Rule (LDR) in Reservoir Management and Design”, Dirasat, Vol 24, No. 2. pp. 135-145.

Mohtar R. and Rahbeh M. 2004. “Mass transfer processes during advective air movement in contaminated soil”. International conference on thermal engineering. May 21 –June 4, 2004, Beirut, Lebanon.

Rahbeh E. and Mohtar R. 2003. “Numerical Analysis of field scale air sparging remediation ”, ASAE Meeting Paper No.037041. Las Vegas, NV.: ASAE.

Rahbeh E. and Mohtar R. 2002. “Enhancing the Convergence of Finite Element Solution for Air Sparging Using Upstream Galerkin Technique”, ASAE Meeting Paper No.023123. Chicago, IL.: ASAE.

Rahbeh E. and Mohtar R. 2001. “Modeling Multi-Phase Contaminant Transport in Porous Media Using First Order Mass Transfer Kinetics”, ASAE Meeting Paper No. 013069. Sacramento, CA.: ASAE.

Rahbeh M. and Mohtar R. 2001. “The Influence of Heterogeneity & Air Channelization on Contaminant Removal by Air Sparging.” ASAE Meeting Paper No. 013151. Sacramento, California: ASAE.