

Qasem Abdelal, PhD, PE

German Jordanian University

Amman, Jordan

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CURRENT POSITION

Assistant professor, Department of Civil and Environmental Engineering, German Jordanian University, Previously: head of the Civil and Environmental Engineering, German Jordanian University.

EDUCATION

PhD Civil and Environmental Engineering, Virginia Polytechnic Institute and State University, VA, USA, Dec. 2006. Concentration: *Ground water quality, Modeling and applications*

M. S. Environmental Engineering. The University of Akron, OH, USA, May 2002
Concentration: *Water treatment; testing and technologies.*

B. S. Civil Engineering, University of Jordan, Amman, Jordan, January 1999

Diploma, Certified Trainer, Noor Al Hussein Foundation, 2017

PROFESSIONAL REGISTRATION

Professional Engineer, TX, No. 104875, 2009 (current status: inactive)

CURRENT AND PAST MEMBERSHIPS/ASSOCIATIONS:

- American Water Works Association (AWWA)
- AWWA, Texas Chapter
- International Water Association (IWA)
- North America Lake Management Society (NALMS)
- Arab American Engineers and Architects Association (AAEAA)
- Jordan Engineers Association (JEA)

SUMMARY OF KNOWLEDGE AND SKILLS

- Certified professional trainer (Diploma in Train of Trainers TOT)
- Management skills at various capacities, people and projects.
- Public awareness program development
- Comprehensive knowledge in integrated water resources management
- Comprehensive understanding of ground and surface water quality issues
- Groundwater quality and quantity modeling
- Surface water quality and quantity modeling
- Proficiency in statistical data analysis, display, and visualization
- Design, manufacturing and installation of
 - A Pilot plant, fifteen feet, fixed bed reactor for water filtration
 - Various engineering products, including electrical and directional signage systems.
- Knowledge of operating environmental / chemical lab devices and materials, as well as surveying equipment
- Sales, marketing and people communication skills
- Teaching university level courses in environmental engineering and water resources and its management

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RESEARCH EXPERIENCE

**Academic
research/ funded
projects
2012-Now**

German Jordanian University

- **The hydrological impacts of ancient terracing practices in Jordan.** A European Union funded research project involving investigation of ancient techniques for water management used by the Nabateans in the southern city of Petra, Jordan. A numerical model was used for quantifying the water balance.
- **Hyperspectral imaging utilization for water quality evaluations.** A European union and locally funded (GJU) project that investigates a remote sensing technique to evaluate key water quality parameters in natural waters.
- **Water budget analysis for the Zarqa River.** This non-funded research quantifies at the various sources and sinks of water for the Zarqa river and estimates the groundwater recharge at the river bed.
- **Model based development of strategies for sustainable water resources management in Jordan,** a five year joint project with the research center in Julich, Germany, that investigates Jordan's water resources and utilizes a very sophisticated numerical model to assess Jordan's water budget.

**Doctoral research
2003-2006**

Virginia Tech

- Applied non-linear programming to groundwater and contaminant transport models. This application was intended to estimate essential model parameters needed for producing well calibrated models. The research included:
 - Designing synthetic setup to serve as a platform for testing the proposed methodology
 - Applying the methodology to models of multiple real world sites, to further test and verify its applicability
- Performed model sensitivity analysis on a well known reactive solute transport model (SEAM3D)
- Tested and evaluated new added packages to the Groundwater Modeling Software (GMS)

**M.S. Research
2000-2002**

The University of Akron

- Designed, built, and installed a 15-ft pilot scale polyester polyurethane foam filter to test the use of this new material in the filtration process in drinking and wastewater treatment plants
 - Built from scratch; included various components like online turbidimeters, pressure transducers, data acquisition system and sampling solenoid valves
 - Filter tested in the drinking water treatment plant in Akron, OH, as well as in Summit County's Fishcreek wastewater treatment plant, OH
- Performed lab analysis on the polyester polyurethane material in conjunction with activated carbon and tested its use as a carbon contactor
 - Setup a bench scale foam-carbon contactor and analyzed its efficiency, the parameters used to monitor performance were UV254, trihalomethanes, and turbidity
 - Equipments used included turbidimeter, UV spectrophotometer, TOC analyzer and Gas Chromatograph

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TEACHING EXPERIENCE

- Assistant professor** **German Jordanian University**
Hydraulics (WEEM 212)
Hydrogeology (WEEM 561)
Hydrology (WEEM 311)
Fluid Mechanics (WEEM 201)
Introduction to Environmental Engineering (WEEM 101)
Water and wastewater reuse (WEEM 563)
Modeling, Simulation and Optimization of Energy and Environmental Systems, (ERE 722)
Hydraulic Structures (WEE 546)
- Instructor** **Virginia Tech, Civil and Environmental Engineering department**
Courses: Fluid Mechanics for CEE (CEE 3304), Co-instructor
CEE Measurements Lab (CEE 2814)
The University of Akron, Surveying & Mapping department
Course: Basic Surveying lab (2980:101)

PROFESSIONAL EXPERIENCE

- Project Consultant**
2014/2015
- World Health Organization (WHO),(UNDP)**
Climate change adaptation to protect human health
- Developed an awareness raising program for college students across Jordan. The program involved developing information, education and communication materials and tools. Utilization of social media to raise awareness.
 - Prepare the material for and a presentation that was given in 12 universities across Jordan which was attended by more than 500 students.
- Project Engineer / Manager**
2007-2012
- Alan Plummer Associates, Fort Worth, TX**
- Worked within the water resources group
 - Performed Initial Distribution System Evaluation (IDSE), a requirement for the stage 2 Disinfectants and Disinfection Byproducts Rule, using the water distribution model WaterCAD.
 - Utilized water distribution models to evaluate system capacity and identify necessary network adjustments / upgrades.
 - Performed multiple open channel flow modeling projects using models such as CE-QUAL-W2 and QUAL-TX. Purpose of the modeling projects ranged from supporting environmental permitting applications for discharge into river systems, to predictive analysis of a river system’s water quality after the completion of flood controlling construction projects (example is the Central City project in the city of Fort Worth, TX, USA)
 - Development of surface water quality numerical models for Lakes and reservoirs. These models were used to analyze the hydrodynamics and water quality of the water body and to predict its response to various stressors (example is the Lake Lavon model in Lavon, TX, USA)

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- Performed multiple studies that involved environmental data analysis and visualization
- Performed a planning study to evaluate the usability of groundwater supplies to augment current surface water resources. The study included an opinion of probable cost.

Sales Engineer

1999-2000

Electro Industries, Jeddah, Saudi Arabia

- Worked with customers to determine their needs, products ranged from standard company products to custom made products
- Designed, manufactured and installed multiple engineering products including but not limited to directional signage of major construction projects (ex. Holyday Inn, Riyadh)
- Prepared pricing and bedding documents of multiple projects

COMPUTER SKILLS

- Groundwater and surface water models
 - Ground water modeling software (GMS)
 - Sequential electron acceptor model, 3D (SEAM3D)
 - Argus ONE GIS
 - Natural attenuation software (NAS)
 - WaterCAD
 - InfoWater
 - EPA net (EPANET)
 - QUAL-TX
 - CE-QUAL-W2
 - CORMIX
- Optimization software
 - Parameter estimation software (PEST)
- Other software and languages
 - MiniTab
 - Visual Basic
 - Fortran
 - Excel Solver and statistical analysis tools
 - Microsoft Access
 - ArcGIS
 - AutoCAD and Microstation

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Selected Publications

Papers

- Utilizing non-traditional data sources for estimating channel seepage losses. M.A. Alsmadi. Q. Abdelal. Environmental earth sciences (2018)77:641
- Taming the torrents: The hydrological impacts of ancient terracing practices in Jordan. Khaldoon Al Qudah, Qasem Abdelal, Catreena Hamarneh, Nizar Abu- Jaber, Journal of Hydrology, Volume 542, November 2016, Pages 913–922.
- Lead Exposure and possible association with violent crimes: a field study in two Jordanian prisons, European Scientific Journal, 2014, October 2014 edition vol.10, No.30
- McDonald, E., Plummer. Efficient 2011, Dead Sea, Jordan, 2011.
- Fort Worth Central City Project: The Confluence of System Operations and Water Quality. Abdelal, Q., McDonald, E., & Young, J. Texas Water, Galveston, Texas, 2009
- Parameter estimation and calibration for modeling the fate and transport of Chlorinated Ethenes using SEAM3D and PEST, Qasem Abdelal, Mark Widdowson, 2006, MODFLOW and More 2006: Managing Ground Water Systems. Section 5, Volume 1.

Technical Memorandums and Reports

- Evaluation of the benefits if revised seasonal flow based effluent limits. A report submitted to the Upper Trinity Water Quality Compact. January 2011
- City of Greenville, City Lakes Water quality Evaluation, A technical memorandum submitted to the City of Greenville. September 2010
- QUAL-TX Current system modeling: Results and Analysis, Trinity River Vision Central City project, Systems operation water quality model. A technical memorandum submitted to the US Army Corps of Engineers and Tarrant Regional Water District. March 2010
- Dallas Fort Worth International Airport Third Potable Water Source Evaluation. A report submitted to the DFW administration. October 2009
- Presentation and analysis of historical water quality data, Trinity River Vision Central City project, Systems operation water quality model. A technical memorandum submitted to the US Army Corps of Engineers and Tarrant Regional Water District. October 2007

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PERSONAL DEVELOPMENT ACTIVITIES

- Presented at various conferences in technical topics. In addition, I was the formal representative of the German Jordanian University at the 2nd Hamburg Water Forum for the EMA-Region held in September 2012
- Held a one and a half month research camp at Juelich research center (Forshungszentrum Julich) in August and September of 2012
- Member of the board of directors of Al-Hedayah Institutions, Fort Worth, TX, 2010- 2011
- Organizer and presenter of a series of discussion meetings under the name of ‘ The intellectual meeting’ held at the Blacksburg public library, VA, 2004-2005
- Student council member and vice president of the Engineering Committee, University of Jordan, 1998
- Engineering training in the ‘Royal Scientific Society’ , Amman, Jordan, 1998
- Head of the ‘Public relations and Media committee’, a sub committee of the student council, University of Jordan,1998
- Chief editor of the ‘Engineering sense’ magazine in the college of engineering, 1997-1998
- Fourth mass media qualification course, University of Jordan, 1997
- Editor of the ‘Minbar Tollabi’ magazine, University of Jordan,1997

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SUPPLEMENTARY DETAILS

Following are further details that illustrate the experience I acquired during my work at Alan Plummer Associates, Inc (APAI). A selection of the projects I worked on are listed and details on the tasks performed are presented.

Regional Water Supply Study, Enprotec/Hibbs & Todd, Inc.

The purpose of this study was to evaluate the use of the treated effluent from the wastewater treatment plants to augment the City of Abilene's water system. Using treated effluent from a wastewater treatment plant to augment raw water supplies is becoming an accepted practice. My contribution to the study was to analyze the available information and data. Some of the information included water quality data from the Fort Phantom Hill Reservoir, the City of Abilene Water Treatment Master Plan, quality and quantity of Reverse Osmoses reject water, and the evaluation of the potential of discharge to various alternatives of receiving streams. During the analysis, I built a database for the available water quality parameters at several locations in the area of interest. My analysis also involved investigating the status and location of potential discharge streams around the area of interest. The results were conveyed to the project manager, who then made further analysis, prepared the study, and compiled the final report.

Pump System Evaluation, Lockwood, Andrews & Newnam, Inc.

As project engineer, I designed a water distribution model to aid in site selection for the sampling of Total Trihalomethanes (TTHMs) and Haloacetic Acids (HAA5s) in the water distribution system. This project was for the fulfillment of a System Specific Study (SSS), in which the use of a water distribution model (in this case, WaterCAD) was used as an alternative to full-scale sampling for sample location identification. The SSS is part of the requirements of the Stage 2 Disinfection By-Products Rule.

TRA CRWS Phase IV Additional Services, Freese & Nichols, Inc.

The Central Regional Wastewater Treatment Plant of the Trinity River Authority of Texas (TRA Central) has a complex system of potable and service water distribution piping to various buildings and facilities. TRA Central was expanded to a total capacity of 189 mgd in a Phase IV expansion. As a project engineer, My work included evaluating both the potable and service water systems using numerical model simulations. I analyzed the pipe network layout and verified / updated system demands. Because the next expansion will increase demand, I also analyzed system pressure and identified locations of low system pressure or high head loss gradient. Alternative pipe sizes were proposed for problematic pipes. The study involved evaluating the possibility of supporting the service water needs using potable water supplies. Therefore, the service water demands were added to the potable water system model, and the system was then analyzed. It was observed that the majority of the pipes in the potable water distribution system needed to be upsized to satisfy the extra demand and to eliminate excessive head loss gradients.

URS DFW Sustainable Water Supply Evaluation, LopezGarcia Group

Dallas / Fort Worth International Airport (DFWIA) contracted with APAI to update DFWIA's utility master plan. Part of that effort involved evaluating groundwater as a potential supplemental water source. The scope of APAI's services included evaluating the potential of using groundwater as a supply to the DFWIA. This was performed by reviewing the available

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reports and data related to the quantity and quality of groundwater in the area. It also included evaluating the existing TRA water supply system and water supply availability. As project engineer, I developed a conceptual water supply delivery system, integrating the water system master plan to identify potential points of entry to the distribution system. An opinion of the probable cost of the system was also a part of the scope of this project.

Fort Worth Trinity River Vision Phase II, US Army Corps of Engineers

The Central City Project is a major project in the Fort Worth, Texas area. It involves constructing a flood control bypass channel on the Trinity River near downtown Fort Worth. This bypass channel diverts flood flows away from the downtown area when necessary. The construction involves flow-controlling structures like flow gates and the construction of a new dam downstream of the bypass channel. As a project engineer, I was responsible for gathering information about the river system and performing historical data analysis. This task involved reviewing the objectives of the project and studying the conceptual design of the bypass channel and the various other project components. I analyzed the data for temporal trends and for relations and interactions between different constituents. The analysis also included preparing a recommended sampling program to be implemented as a part of the project. I also utilized a QUAL-TX model to analyze the available bathymetry data. This was important for creating appropriate model segments and obtaining essential model parameters. I analyzed the available flow and water quality data and selected a suitable model boundary and initial conditions. Flow and water quality constituents were properly simulated in the QUAL-TX model. Two flow conditions were simulated: low flow and intermediate flow conditions. In addition to the QUAL-TX model, I developed a CE-QUAL-W2 model for the existing and future river systems. The CE-QUAL-W2 is a more elaborate model than the QUAL-TX model. The existing system models were calibrated and used for evaluating the system performance. The future system model will be used for evaluating multiple operational scenarios.

Lake Tawakoni Reuse Water Quality Studies, Sabine River Authority of Texas

I performed data analysis using MS Access. I then consolidated the data and helped prepare GIS illustrations for a report.

NTMWD Lake Lavon Monitoring and Modeling Update, Phases 1,2 and 3. North Texas Municipal Water District

In 2009, APAI was asked to develop an updated hydrodynamic and water quality model to assess the impacts of discharge from wastewater treatment plants into Lake Lavon. As the project engineer, I created a CE-QUAL-W2 hydrodynamic and water quality model. It was a more advanced model than a previously developed WASP model. This new model included more model segments and layers per segment than the old one. The input to the CE-QUAL-W2 model was very elaborate. It included detailed input bathymetry of the water body, which I constructed from old topographic maps. It was also necessary to input detailed metrological and shading information. Since CE-QUAL-W2 is a hydrodynamic model, it was necessary to provide inflow information, which includes flow, temperature, and water quality information. Phase 2 of this project was completed and work is currently performed to complete phase 3.

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TRA Trinity Compact - Variable Flow-Based Permitting Phase II, Trinity River Authority of Texas

TRA's Trinity Compact contracted with APAI to evaluate the benefit of different permitting criteria in which the permit limits are linked to variable stream flow. I was involved in historical data analysis and performing multiple model runs. A major part of this study involved evaluating travel times between various stations along the Trinity River. This task was performed using a QUAL-TX model.

Variable Flow Permitting, Freese & Nichols, Inc.

As a project engineer, I assessed the impact of an integrated treated effluent discharge for the Dallas Central and Dallas Southside Wastewater Treatment Plants on the Trinity River system. The analysis was made using the existing TCEQ Wasteload Allocation model (WLA). There were two separate discharge permits for the two plants. This evaluation assessed the potential impact on the Trinity River as a result of shifting the wastewater flows between the two Dallas plants. The WLA is a QUAL-TX numerical model used by TCEQ and environmental engineering consultants to investigate the impacts of discharging wastewater into a river system. I performed multiple model simulations to assess the impact of the wastewater discharges on the DO concentration in Trinity River segments downstream of the discharge location. I also made a comparison between the default TCEQ water quality model results and a variety of scenarios utilizing other choices of discharger flow volumes and effluent limits. In addition, I investigated the percentage of increase in the discharge flows that would cause standard violation in the river.