

**Report on Sabbatical
September 9, 2012**

**A Comparison of Water Management and Policy Approaches of Three Water-Stressed Regions:
Arizona, Israel and Australia**

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Description of objectives of Sabbatical Project as described in the Proposal submitted in Fall 2010

My Sabbatical Project was designed to enhance my research, teaching and outreach/engagement work related to comparative policy analysis, with a specific focus on how to achieve desired water policy objectives. My November, 2010 proposal described the project in the following manner:

As populations and economies grow, the challenges of meeting the water needs of arid and semi-arid regions become more complicated. Accommodating the competing water requirements of the municipal, industrial and agricultural sectors, while preserving natural ecosystems, is difficult. Innovative solutions are required. As water scarcity challenges grow, it is important that strategies for addressing them are explored so that best practices can be identified and the transferability of these practices understood. The goal of my sabbatical project are (1) to develop a better understanding of the water management approaches of two other regions, Israel (possibly including Jordan and the Palestinian Territories) and Australia, and (2) to share my knowledge of Arizona and Lower Colorado River Basin water policy and management with experts in these two regions. Through travel to the regions and focused in-person discussions with academic and water sector experts, multi-directional learning will be accomplished. In addition to conducting interviews, I will arrange to give seminars at universities and agencies I visit. The first part of the 21st century provides fertile grounds (or waters!) for inquiry. In addition, it is expected that the foundation for joint efforts will emanate from the interactions.

The two geographic regions were strategically selected for study and comparison because of similarity of water scarcity problems related to aridity, climate variability and growth patterns and dispersion of people and economic activity.

Arizona (as part of the Lower Colorado River Basin), Israel and Australia are recognized leaders worldwide in water policy and management. Yet, it is also acknowledged that each region faces significant water management challenges. This sabbatical work will provide me with an opportunity to do a comparative analysis of the status and likely futures for the three regions. This unique, three-region inquiry will be informed by my economic training as well as my broad base of experience. The work of this sabbatical will represent an addition to the scholarly literature and should be of great interest to water professionals and decision makers.

The summary of outcomes/results below will demonstrate that I have achieved my objectives.

Results of the Sabbatical Project

Significant two-way learning and exchange of information occurred during the Spring semester sabbatical period. During the month of March 2012, I served as Lady Davis Visiting Professor at the Hebrew University of Jerusalem, where I was hosted by both the Geography faculty of the Mt. Scopus Campus and the Resource Economics faculty of the Rehovot (agricultural) campus. I received a supporting grant from the Lady Davis Fellowship Trust. I was based in Jerusalem during this period. The month was rich with seminars, meetings, and site visits. I gave four different seminars in Israel during this period: (1) “Arizona and Israeli Water Policy: Some Similarities and Differences,” Department of Agricultural Economics and Management Seminar, The Hebrew University of Jerusalem, Rehovot, Israel, March 18, 2012; (2) “Competition for Water Resources in Arizona: Shared Waters and Shared Borders,” Department of Geography, The Hebrew University of Jerusalem, Mt. Scopus, Jerusalem, Israel, March 21, 2012; (3) “Introduction to Arizona Water Resources,” Massar High School Environmental Science Class, Lilian Daniel, Instructor, Nazareth, Israel, March 22, 2012; and (4) “Overview of Arizona Water Management, with a Focus on Transboundary Water Issues,” Arava Institute, Israel, March 26, 2012. As can be seen from the titles, a variety of subjects was covered, demonstrating the interest in the audiences in learning about Arizona and Colorado River water management and also reflecting the expertise I have gained in Israeli water management. In addition to interacting with faculty and experts at campus lectures and meetings, I also met one-on-one with many water experts, including Daniel Hillel, winner in 2012 of the World Food Prize.

In addition to the time spent in Israel, in early March, 2012 I visited Jordan to continue collaborative efforts on a demonstration grey water project in the Jordan Valley. In Jordan, I have been collaborating with researchers at the Royal Scientific Society. During our visit to the project site, I suggested we write a paper on the results of survey conducted on attitudes toward grey water use in this rural, agricultural region of the Jordan Valley. I assisted in the development of the survey questions. Our co-authored paper has been published: “Grey Water Reuse for Agricultural Purposes in the Jordan Valley: Household Survey Results in DeirAlla,” Al-Mashaqbeh O.A., Ghrair A.M., Megdal S.B., *Water*, 2012; 4(3):580-596. Available: <http://www.mdpi.com/2073-4441/4/3/580>. Another outgrowth of the successful collaboration was my successful submission of a proposal to the International Arid Lands Consortium in response to their “Program Development Opportunity Seed Fund Small Grants” call for proposals. A workshop to develop collaborative grant proposals will be hosted at the Water Resources Research Center (WRRRC) in early October 2012. Joining me for this workshop focusing on grey water will be CALS faculty members Dr. Jean McLain and Dr. Channah Rock. We also will collaborate with a grey water expert Mr. Chuck Graf, who works for the Arizona Department of Environmental Quality. To kick off the workshop, we are hosting an information exchange, which will involve presentations by several UA faculty members and others.

During my stay in the Middle East, I interacted with personnel from other Israeli universities, a major environmental trans-border NGO, an Arab high school teacher of environmental studies and her students, high-level government agency personnel from the Israeli Water Authority, and others. I attended a high-level event hosted by the Australian Embassy in Tel Aviv, which focused on the Murray-Darling Basin, a focus of my later visit to Australia. I also spent time in Ramallah in the West Bank, at meetings with senior personnel at the Ministry of the Environment and the Palestinian Water Authority. I was hosted that day by a professor from Birzeit University. Through interacting with him and a Palestinian student, I became more familiar with trans-border wastewater treatment plant issues. (I serve on the Ph.D. Committee for the student, who is enrolled in the Environmental Engineering program at University of Cincinnati.) These many meetings and interactions were often two-way exchanges, with our comparing our water management challenges and solutions. These types of interactions are absolutely necessary to understanding and evaluating options for improving the water management of a region.

From my base in Jerusalem, I traveled in mid-March to the triennial World Water Forum, which was held in Marseille, France. There, I was an invited speaker and roundtable discussion leader as follows: (1) “Water banking in Arizona and the Lower Colorado River Basin,” Session on IWRM Through the Lens of Water Security, Adaptive Water Management and International Legal Instruments for Good Governance, also serve as leader for discussion table, March 14, 2012; (2) Table Discussion Leader, “U.S.-MX Transboundary Aquifer Assessment,” Session on Why does Water Law matter to you? – Exploring Local to Global Perspectives, March 14, 2012; (3) Commentary on “Groundwater Governance: From National and Regional Needs to Global Solutions,” Side Event on the Good Groundwater Governance GEF-FAO-UNESCO international project, March 15, 2012; and (4) “Transboundary Aquifer Assessment along the United States-Mexico Border as an Opportunity for Water Cooperation,” Session on Strengthening International Cooperation for the Sustainable and Peaceful Management of Transboundary Aquifers, March 15, 2012. In addition to the formal sessions, much information exchange on water policy and management occurred at and between sessions and at the exhibits.

As planned, I spent time in Australia as well, although I did not spend a full month there due to funding and time constraints. Between returning from the Middle East and travel to Australia, I spent a work week in Montevideo, Uruguay attending the first regional consultation associated with the global Good Groundwater Governance Project, which is examining groundwater governance practices around the world in order to identify best practices. I became involved in this project many months after the sabbatical proposal was submitted and served as a co-author for the project’s thematic paper on groundwater governance policy. My involvement in this project continues.

My visit to Australia was hosted by the University of South Australia and CSIRO, the highly-regarded national research agency. Again, extremely valuable information sharing occurred. As requested and planned, I made three presentations for my hosts: (1) “Meeting Arizona’s future water demands under decentralized governance,” CSIRO, Adelaide, South Australia, April 26, 2012; (2) “The Importance of Institutional Asymmetries to the Development of Binational Aquifer Assessment Programs: The Arizona-Sonora Experience,” The Centre for Comparative Water Policies and Laws, The University of South Australia, Adelaide, South Australia, April 27, 2012; and (3) “Water Banking and Groundwater Management in Arizona,” CSIRO, Canberra, ACT, Australia, May 1, 2012. At the request of the Murray-Darling Basin Authority, I made a (fourth) presentation to their staff on water banking in Arizona. When in Canberra, Australia’s capital, I also met with staff at the National Water Commission. The time spent there led to immediate collaboration with a prominent groundwater hydrologist, Peter Dillon. I assisted him with preparing an inset on Arizona water banking for a paper, which, coincidentally, he was preparing as a thematic paper for the Good Groundwater Governance Project. I also will be hosting a seminar by him in late September and we have both joined in on a pre-proposal with a member of the UA Engineering faculty. In advance of the visit to University of South Australia, the WRRC facilitated the UA-side of a now-signed Memorandum of Understanding for faculty and possibly student exchanges between the two universities. Professor Jennifer McKay was my main contact there. Not only did I gain better understanding of Australian water management practices and challenges, they gained better understanding of Arizona water management and policy. I am confident that the information gathered while there and the relationships developed will lead to future collaborations.

An unexpected opportunity arose in March, 2012. While in Israel, I was approached by the Organisation for Economic Co-operation and Development (OECD) to serve as General Rapporteur for their Expert Workshop on Water Security: Managing Risks and Tradeoffs in Selected River Basins. This workshop, held June 1, 2012 in Paris, France, involved presentations and discussion on governance and the use of economic instruments in selected river basins around the world. This experience underscored that both water-scarce and water-rich regions around the world face quite similar challenges in developing water policy for world facing much climate uncertainty as demands for food and water grow. My Rapporteur’s

Report consists of two parts, a summary of the workshop proceedings and an essay, in which I provide perspectives on the two main themes of the workshop, governance and economics.

Finally, a second workshop coincided with the time I was in Paris. I was invited to be a Panelist, for the workshop held on June 4, 2012 on “Science, Networks, Consciousness in the Mediterranean Basin,” organized by the French Academy of Sciences and UNESCO. There I spoke to my efforts regarding water issues of the Israeli-Palestinian region, with a particular focus on challenges to collaboration. A main contributor to the organization of that workshop is the Israeli-Palestinian Scientific Organization (IPSO). I continue to work with IPSO on identification of collaborative research opportunities. At that workshop, I met Ruth Arnon, President of the Israel Academy of Sciences and Humanities, with whom I will meet during an upcoming trip to Israel.

In summary, I pursued my project objectives as intended. In addition to the planned visits to Israel and Australia, I had some additional opportunity to gather information, including reports, papers and other materials, relevant to comparative analysis through participating in the World Water Forum, the Ground Groundwater Governance regional consultation in Uruguay, and two workshops in early June. Site visits and face-to-face contact are absolutely essential for successful understanding of alternative approaches to water management. Regions can and do learn from each other. My Sabbatical has set the stage for additional and enhanced collaboration focused on developing and evaluating options for improving water management in Arizona and other growing, water-scarce regions.

How the results of the Sabbatical Project are of interest to the general public

I preface this section by noting that, when it comes to water management, all of us – academic and non-academic alike – are general public or stakeholders. I share my knowledge, experiences and analyses in many ways. I have already given two presentations summarizing my sabbatical findings on how communities and regions world-wide are searching for solutions to similar challenges. My column for the WRRC’s Spring 2012 *Arizona Water Resource* Newsletter was based on my sabbatical experiences. Entitled “Arizona’s Experience a Model for Groundwater Governance,” it is written for the educated lay audience. The column has generated an invitation to write an article on groundwater regulation in Arizona for a widely distributed water publication called *The Water Report*, which is read by lawyers and many non-academics. While abroad, I spoke to diverse audiences, and I will continue to speak to diverse audiences in the U.S. The work in Jordan has resulted in a publication in an open-access journal, chosen so it could be accessible to any and all who wished to read the article about community attitudes toward grey water use. My written work, research proposals, and other professional activities will continue to rely on the information obtained, interactions and experiences of this period. When nominated for the UA Distinguished Outreach Professor award, which I won in 2010, I wrote about how my outreach and engagement programs, as well as my teaching, are integrally connected to my scholarly research and activity. Water management is a critical concern of people throughout Arizona, the Colorado River Basin, the nation and the world. I will continue to work on comparative analysis of water policy and management, and the results of my efforts will be shared with the academic and non-academic communities through articles, presentations, collaborative project development and other means. Finally, I intend to share this report with some of my non-academic colleagues interested in what I did during my Sabbatical, including members of the Water Resources Research Center’s External Advisory Committee, which is made up of water professionals of a variety of backgrounds.