

**IALC-USAID Sustainable Development of Drylands in Asia and  
the Middle East  
Trip Report -Visit to Jordan  
Robert J. Freitas, Project Director  
November 16-23, 2002**

**Purpose of Trip:**

To begin IALC USAID funded cooperative agreement activities in Jordan on Component 2: Wastewater & appropriate re-use of treated wastewater.

**Summary of Findings:**

USAID-Amman has definite project sites identified and has contracts or grants with the Badia Programme, PA Consulting and the Jordan University of Science and Technology to work on various aspects of wastewater re-use. They (USAID and Badia) have chosen project sites which are very distinctive -- with different organizations involved, different qualities and quantities of wastewater and different climate and soil variables. A "one solution fits all approach" is unlikely to work, so the intention to bring a single team of 5-6 experts from the U.S. to provide technical assistance (formerly, assessment team) is judged to not be appropriate. Likewise plans to bring one group of 12-15 participants for a study tour is not likely to be appropriate. Breaking both the TA and the study tour into 3 smaller groups is more likely to deliver the types and quality of assistance which will be most needed and effective.

**Summary of Activities:**

Day One, November 17, 2002.

Arrived in Amman at 11:00pm on Sunday, November 17, 2002. I was picked up by the BADIA Programme driver Saleh, and delivered to the Sheraton where John Wilson (USAID-Asia Near East Bureau, Washington) was waiting. Coordinated schedules.

Day Two, November 18, 2002.

1. Meetings with the BADIA Programme and USAID-Amman began on Monday morning, the 18th. John Wilson (JW), and Robert Freitas (RJF) met with HH Sharifa Zein bint Nasser, Mr. Mohammed Shahbaz, and Dr. Muhammad Shatanawi of the Badia Programme.

Discussions revolved around potential sites and approaches to encouraging treated wastewater re-use. Badia, in consultation with USAID-Amman is recommending two pilot project locations. One is Wadi Mousa, located near the world cultural resource of the ancient city of Petra, and the second is located in Aqaba. Wadi Mousa has

the newly constructed and financed by USAID wastewater treatment plant. Aqaba has a USAID rehabilitated wastewater treatment plant with a major upgrade to the plant in the planning stages.

HH Sharifa stated that she knows the two tribes who will be using the re-water and farming the designated land near the Wadi Mousa wastewater treatment plant. She has spoken to the respective Sheiks of the tribes and provided assurances that they would be treated fairly with respect to the use of the land.

Also, discussed was that Jordanian University of Science and Technology is considered to be a good collaborator and has begun its own wastewater treatment project (more on this subject later in the report, see Thursday the 21<sup>st</sup>).

New regulations for the use of wastewater have been formulated, Jordanian Water Reuse Standards, JS893:2002. Dr Shatanawi was part of the committee writing the regulations. (**Note:** Dr. Shatanawi promised to provide RJF a copy of these regulations).

Cultural acceptance of irrigating with wastewater was discussed and must be addressed as an important concern for the successful use of treated wastewater. It is a fact that poorly treated or untreated wastewater is currently being used by farmers – especially in times of drought, as has occurred for the last few years in Jordan. However, such wastewater has often been withdrawn from streams that are effluent dominated but may not be identifiable as having originated from a specific source -- as in the case of a wastewater treatment plant. Although the water coming from the Wadi Mousa plant is of much better quality than most post-plant effluent in Jordan, perception is very important and will guide the permissible uses along with the regulations.

Also discussed was the value (cost of production) of the treated water versus the use on forage crops. Rationale for such use should be expanded: irrigated pasture or forage production increases animal quality, may decrease over-grazing on rangeland, substitution of imported. There will be a cost of the delivered water to the people doing the irrigating. Badia will charge an increment above its cost for the water. Question: for what purpose will this revenue be used?

When asked if this was a new initiative and area for the BADIA project, HH Sharifa stated that the Badia had been repeatedly asked by the people to expand its operational area.

2. Meeting with H.E. Taher H. Kanaan, PhD, Secretary General of the Higher Council of Science and Technology, plus the above noted persons from earlier morning session. **Note:** during meeting, Dr. Kanaan introduced the engineer and administrator who is responsible for setting up the 13 monitoring water quality monitoring stations funded by the Japanese govt (Question: Could real-time monitoring be a possible avenue for the future for the USAID projects?). Dr. Kanaan welcomed the joint activities proposed under this funding.

It was noted that the Islamic Network has been involved in funding or exploring activities in treatment of graywater – for the household but on a fairly large scale. USAID appears reluctant to become too closely tied to them, however.

3. In the afternoon JW and RJF met with USAID-Amman's Paul Grohs (Acting Mission Director), James Franckiewicz (Director, Office of Water Resources & Environment), Setta Tutundjian (Water Resources & Environment), and Amal Hijazi (Project Mgmt Specialist and Mission Environmental Officer, Water Resources and Environment Office) and Paul Malik (US State Dept-Environmental Officer). JW gave brief overview of genesis of the project. RJF gave brief overview of IALC capabilities and success of the last 10 years.

Amal Hijazi asked about IALC's willingness to work from USAID's perspective vis a vis BADIA's pastoral emphasis. As Badia is well connected to the Ministry of Agriculture, there may be some differing views between USAID and Badia on the government agency counterparts chosen. USAID indicated a preference to work with the Ministry of Irrigation and Water, versus the Ministry of Agriculture. Dr. Hijazi indicated that the term "Assessment Team" should be replaced with "Technical Assistance Team" to better indicate action or implementation orientation.

Although there is an irrigation advisory service, it appears that the preference is to work in conjunction with Jordan Valley Authority and the Water Authority of Jordan. Setta Tutundjian is involved in training and possibly setting up irrigation advisory service. (**Note:** An RFP will be issued asking for assistance, possibly by the end of the year).

Jim Franckiewicz explored aloud the possibility of additional funding for implementation projects and appeared interested in using the IALC Cooperative Agreement as a vehicle. (**Note:** Jim would like a copy of IALC's 10 year review of its projects).

Paul Malik mentioned that MERC, the MidEast Regional Cooperation Joint Working Group has been working with USGS-USDA-EPA in the wastewater re-use area and on water resources in the region. There is a wastewater re-use workshop in February that is to be scheduled. ICARDA appears to be somewhat involved. Paul was going to try and set up an appointment with RJF and the ICARDA-Jordan representative, but this did not occur prior to departure. Some discussion whether Cyprus was appropriate location for the workshop as all wastewater in Cyprus is treated to tertiary standards.

Mission Director Grohs was positive about the activity, but would like to see rapid implementation.

Iftar (breaking the fast of the Ramadan day) was held at the Marriott-Amman and hosted by the Badia Programme. HH Sharifa, Mohammed Shahbaz, Amal Hijazi, Paul Malik, Dr. Shatanawi, Jim Franckiewicz, John Wilson and RJF attended and discussed numerous points. Disi aquifer discussed with respect the Saudi and Jordanian sharing of the joint aquifer – conclusion: Saudis are not too responsive to Jordan's needs.

Day Three. November 19, 2002.

Tuesday, the 19<sup>th</sup>, M. Shahbaz, A. Hijazi, Gabe Delkeny (PA Consulting), JW and RJF left for Wadi Mousa wastewater treatment plant. The town of Wadi Mousa is approximately 2 ½ hours from Amman via the Desert Highway. Highway conditions were excellent – 4 lane divided. The turn-off to Wadi Mousa is shortly after passing the town of Ma'an. The hotel was the Marriott above Wadi Mousa.

We met to discuss Wadi Mousa project objectives. Attending the meeting were Fraser Parsons (Morganti Group, Inc – Contracting, Construction Mgmt, Design-Build), the persons traveling together plus Professor Shatanawi who joined us at the site. Fraser Parsons is finalizing expatriate project management and training prior to turning the Wadi Mousa wastewater treatment plant operation over to the Water Authority of Jordan (WAJ) who will be the owners of the plant under a build-own-transfer (BOT) arrangement. PA Consulting has been contracted by USAID for expertise in implementing wastewater re-use projects. Discussed were how the IALC USAID-funded technical assistance could help the implementation of wastewater re-use in Wadi Mousa which is about to get under way. While no definitive arrangements were made, possible avenues of assistance may lie with: (1) an agronomist examining the possibilities of crop selection, and (2) a marketing expert (who seems to be desired for this, as well as part of the Aqaba project component).

An important point is that the BADIA Programme will purchase the treated water from WAJ and re-sell it to the farmers who will farm the project land. Initially 6.9 ha (69 dunums) will be farmed with the eventual expansion projected by an additional 90 to 100 ha. (900 – 1000 dunums). Double cropping is planned and initial crops are likely to be berseem (alfalfa), wheat, barley & oats. Perennial tree crops were also discussed to include date palm, nut trees and fuel wood/wind break variety. (**Note:** Mohammad Shahbaz pointed out a tree which looks like an acacia or *Prosopis* variety - *ask M.S. for the local name*).

It is evident that USAID would like to see a rapid start-up of this project and a “greening” approach is probably warranted using alfalfa as an initial crop for fodder consumption. Later, RJF discussed this with M. Shahbaz regarding the fact that the cool season is under way already and no crop will be planted for some time until irrigation piping and related items can be procured and installed. This implies that a rapid growth crop with some tolerance to seasonal changes may be needed initially, such as alfalfa. Justification include rapid greening, import substitution, income generation through improved livestock nutrition and (following a number of cuttings) there is a possibility of turning the crop under as a “green manure” crop to contribute organic matter for the follow-on crop.

It is interesting to note that the Government of Jordan owns all the range and farmlands traditionally used by the Bedouin people, but the Bedouins have rights to use the land’s resources -- including the right to use the land proposed for the wastewater re-use project. The BADIA Programme understands these land rights issues, has held discussions with the tribes who have been the traditional users of this land and has received their support to proceed. A social study of the tribes and needs has recently been completed of the Programme (**Note:** request a copy).

We were hosted for Iftar by Shhadeh Abu Hdaib, Director General, Petra Regional Authority, Government of Jordan, which has authority over the land on which the crops will be grown.

Day Four. November 20, 2002

Wed. 20<sup>th</sup> of November, RJF made a brief and very worthwhile trip to ancient city of Petra which is carved in rock and adjacent to the town of Wadi Mousa. The world class cultural and archaeological resource of Petra and its tourism potential is the reason for the major investment in the Wadi Mousa wastewater treatment plant.

The team continued to Aqaba, a trip of approximately 1½ hours over very good roads, mostly divided highway with some road improvement under construction. Lodging was at the Movenpick. Aqaba is a Special Economic Zone, and the creation as a free trade zone received and continues to receive USAID financing. USAID funding has also including master planning and industrial zone development.

The team met with Bilal Bashir, PhD, Commissioner for Environment, Regulation and Enforcement, Aqaba Special Economic Zone Authority (ASEZA) and his staff members Samir Fouad Dweiri, Head Studies and Envir. Monitoring Div; Murad M. Za'atreh, Head Standards and Codes Div; Salim M. Al-Moghrabi, PhD, Head of Permitting, EIA, and Environmental Planning Directorate.

Discussed in the meeting were the objectives of the use of treated effluent and the goals of ASEZA with respect to using such water. It appears that there is a lack of clarity about specific projects or uses of the water. There was an expressed interest in a desire to use the future advanced secondary treated water to “green” Aqaba and to continue to use the secondary quality water to grow date palms at two farms, one, Al Nakhil Farm, involving a women’s cooperative, funded by the Hashemite .....Development Fund (**Note:** ask M.Shahbaz for proper name), the second, Al Haq Farms, owned by the Jordanian security service. Additionally receiving wastewater is the “Peace Forest”, managed by the Ministry of Agriculture which is planted in a variety of trees.

During discussions, the subject of laboratory analysis came up. Currently the Royal Scientific Society’s Marine Science Center’s lab is being used for analysis of samples. No results were provided, but there is a question about whether this lab is adequate for the future task of wastewater quality assurance and will it require some investment in instrumentation, as well as training of personnel.

Discussed during this meeting as well as later in the evening with team members were project possibilities to use the treated wastewater for:

- a. high value recreational projects with economic benefit such as a golf course tied to one or more resort hotels,
- b. greening around the airport to mitigate blowing sand and dust,
- c. greening around the industrial zone (a plume of dust was observed rising from the zone)

d. establishing a green belt around Aqaba to diminish blowing sand and dust and improve its livability.

Also discussed was the supply of treated effluent to the fertilizer company to diminish its use of potable water. However, this requires approximately 20km of piping to bring the wastewater to the plant.

Following the meeting, we toured the two farms and the “Peace Forest” which is literally on the boarder with Israel. PA Consulting and the Badia Programme will be closely coordinating in the implementation of project activities relating to the Al Nakhil farm and the women’s cooperative. Amal Hijazi remarked that the processing and marketing aspects for the production of the Al Nakhil farm needed technical assistance.

Day Five. November 21, 2002.

1. Departure from Aqaba by JW and RJF via Royal Jordanian Airline to Amman. Approximate flying time was less than one hour by turboprop. Visible was the Wadi Araba grading into the Dead Sea. Some agriculture was evident on both sides of the border between Jordan and Israel, with an apparent potential for much more if an assured supply of water were available at a reasonable cost. The Wadi Araba shares many characteristics of the high agricultural productivity of the Yuma and Imperial Valleys of the Southwestern U.S. but lacks the water resource equivalent to the Colorado River.

JW returned to Washington and RJF headed to Amman and then to the northern part of Jordan for a meeting arranged by Amal Hijazi with members of the faculty and administration of Jordan University of Science and Technology (JUST).

2. Dr. Ziad Al-Ghazawi, Assistant Professor of Environmental Engineering, Department of Civil Engineering met RJF at the hotel with a driver and we traveled to JUST. Due to the short notice given to Dr. Ghazawi and to Ramadan, we were not able to meet with many faculty. We met Dr. Wajih M. Owais, V.P. JUST, and Dr. Attol (sp?), Head, Department of Civil Engineering, and attempted to meet with Dr. Bassam Snober, Dean of the College.

However, Dr. Ghazawi’s enthusiasm for the wastewater treatment demonstration project at JUST was very evident. This project currently has access to wastewater generated on site by the campus and by the newly constructed teaching and research hospital. Within the near future, although probably outside the timeframe of the initial USAID funding, the re-use pipeline from the German government

funded wastewater treatment plant will be constructed to the campus and available for irrigation.

USAID has funded the demonstration project for one year. Dr. Ghazawi is quite concerned about sufficient preparatory steps being taken to properly characterize the site. He also has decided to use the Ministry's of Agriculture's National Labs (Note: specific reference promised by Dr. Ghazawi to be sent to RJF) for the analytical work. This may also prove beneficial to Wadi Mousa project as there is a branch nearby, but it is not clear that branch's capabilities).

From further discussions, there is interest in looking at questions of salinity and about the endocrine disruptors. These may be topics for both TA, as well as participant training during the study tours. In addition, Dr. Ghazawi is quite keen on obtaining further funding to continue this work once the USAID funding is ended. RJF described the IALC small grants research and demonstration program and there was an enthusiastic response. (Note: send materials describing the IALC grants program to Dr. Ghazawi).

Due to the timing of the visit, vis-a-vis Ramadan, it was not possible to visit the proposed demonstration site for wastewater re-use.

3. Following the return to Amman, RJF met with M. Shahbaz in the evening to examine the sub-contract between IALC and the Badia Programme for local support of the project. By and large there is agreement. Two points were discussed in some detail included: (1) timing of payments to coincide with project phases, i.e. larger payments earlier in order to initiate the activities, (2) greater use of Jordanian resources as consultants to the projects and as counterparts for the expatriate TA. RJF stated that both were possible to modify as needed in order to achieve the project objectives, however, the total amount of the sub-contract was fixed and the line item in the principal budget for consultants was fixed, but that within those amounts flexibility was possible.

Day Six. November 22, 2002.

RJF departs Amman for the U.S.