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FURTHER ADVANCING THE BLUE REVOLUTION INITIATIVE (FABRI)

QUARTERLY PROGRESS REPORT NO. 11: MARCH 15, 2014 – JUNE 14, 2014

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The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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ACRONYMS

ACWUA	Arab Countries Water Utilities Association
AFR	Africa
AfWA	African Water Association
AWW	Africa Water Week
AfYWP	African Young Water Professionals
AGU	Arabian Gulf University
AMCOW	African Ministers' Council on Water
APS	Annual Program Statement
CCS	Community Counselling Services Ltd
CO	Contracting Officer
COP	Chief of Party
COR	Contracting Officer's Representative
DAI	Development Alternatives, Inc.
DEC	Development Experience Clearinghouse
DP	Development Partner
ELI	Environmental Law Institute
FABRI	Further Advancing the Blue Revolution Initiative
FOG	Fixed Obligation Grant
FPPO	Fixed Price Purchase Order
GIS	Geographical Information System
GMS	Greater Mekong Sub-region
GUWL	Ghana Urban Water Limited
GYGA-MENA	Global Yield Gap Atlas for the Middle East and North Africa
HAB	Harmful Algal Bloom
IAV	Institute of Agronomy and Veterinary Science Hassan II
ICA	Independent Consultant Agreement
ICARDA	International Centers for Agricultural Research in Dry Areas
ICBA	International Center for Biosaline Agriculture
IMU	Interim Management Unit
INRGREF	National Research Institute for Rural Engineering, Water, and Forestry
IRS	Internal Revenue Service
IWA	International Water Association
IWMI	International Water Management Institute
IWRM	Integrated Water Resources Management
JPL	Jet Propulsion Lab
JUST	Jordan University of Science and Technology
MEDRC	Middle East Desalination Research Center
ME	Middle East
MENA	Middle East and North Africa
MENA NWC	Middle East and North Africa Network of Water Centers of Excellence
MOU	Memorandum of Understanding
MRC	Mekong River Commission
NCARE	National Center for Agricultural Research and Extension
NGO	Non-Governmental Organization
NRW	Non-Revenue Water
ONEE – IEA	Office National de l'Électricité et de l'Eau - Institut International de l'Eau et de l'Assainissement (Morocco)
ONEA	L'Office National de l'Eau et de l'Assainissement (Burkina Faso)

OSU	Oregon State University
PI	Principal Investigator
PIP	Performance Improvement Plan
PR&D	Policy, Research, and Development
QNFSP	Qatar National Food Security Program
QPR	Quarterly Progress Report
RDMA	[USAID] Regional Development Mission for Asia
R&D	Research and Development
RFP	Request for Proposals
RSS	Royal Scientific Society
RTi	Riverside Technology, Inc.
SEEG	Société d'Énergie et d'Eau du Gabon
SEI	Stockholm Environment Institute
SODECI	Société de Distribution d'Eau de la Côte d'Ivoire
SQU	Sultan Qaboos University
SWAT	Soil and Water Assessment Tool
TAMU	Texas A&M University
TFDD	Transboundary Freshwater Dispute Database
TOR	Terms of Reference
TOT	Training of Trainers
TWW	Treated Wastewater
UJ	University of Jordan
UNCC	United Nations Compensation Commission
UNICEF	United Nations Children's Fund
UNL	University of Nebraska-Lincoln
USAID	United States Agency for International Development
USG	United States Government
USU	Utah State University
WASH	Water, Sanitation, and Hygiene
WEAP	Water Evaluation And Planning
WEF	Water, Energy, and Food
WHO	World Health Organization
WIF	Water Innovation Fellowships Program
WOP	Water Operators' Partnerships
YWP	Young Water Professionals
YWSP	Young Water Scientist Partnerships Small Grants Program

EXECUTIVE SUMMARY

FABRI's eleventh Quarterly Progress Report provides an implementation update on the six key activity results which support improved management of water in the Middle East and Africa, project management updates, and any major issues faced and how they were resolved.

TECHNICAL PROGRAM

Result 1: Middle East and North Africa Network of Centers of Excellence Established and Operating.

- The MENA NWC Interim Board of Directors met in London from June 21-22, 2014.
- Taoti Creative designed an initial website for the Network as a place to provide information about the Network and post Network documents (www.menanwc.org) while the full website is in development.
- FABRI released a revised Request for Proposals (RFP) to solicit proposals to develop innovative approaches to ensure the financial sustainability of MENA NWC.
- FABRI completed negotiations for the remainder of the Fixed Obligation Grants (FOGs) in the Policy, Research, and Development (PR&D) Grants Program. Research teams held project start-up meetings, prepared project work plans, procured equipment, and commenced research activities.
- The Young Water Scientist Partnerships (YWSP) Small Grants Program Selection Committee recommended two proposals for award and two proposals for provisional award. The proposal deadline is July 31, 2014.
- The Water Innovation Fellowships (WIF) Program Selection Committee recommended two proposals for award and six proposals for provisional award. The proposal deadline is July 31, 2014.
- FABRI started planning for MENA NWC Training and Capacity Building activities to be launched in late 2014. FABRI surveyed the Centers to compile a list of topics that could be offered to strengthen technical and management capacity in other Centers, and developed a draft MENA NWC Training and Capacity Building Plan for feedback from the MENA NWC Board of Directors.
- FABRI started planning for a joint Assembly of Governing Members and Thematic Partnerships Conference to occur in autumn 2014.

Result 2: Integrated Water Resources Management (IWRM) Programming Strengthened.

- The research team for the IWRM project "Mitigating Environmental Risks of Wastewater Reuse for Agriculture" held a project start-up meeting and started field work.

Result 3: Access to Clean Water and Sanitation Improved in Target Countries.

- The Non-Revenue Water (NRW) Task Force Members conducted four audits for the following utilities during this quarter: Bauchi, Nigeria; ONEA, Burkina Faso; GUWL, Ghana; and SODECI, Cote d'Ivoire.

- During this quarter, three more AfYWP proposals were received. Of the proposals submitted in the previous quarter, the Selection Committee members evaluated a second proposal and recommended resubmission.
- During this quarter, FABRI selected Taoti Creative to design a website for the African Water Association (AfWA).
- FABRI supported AMCOW at the 5th Africa Water Week (AWW), held in Dakar, Senegal, 26-31 May 2014.

Result 4: Research and Development Capacities in Irrigation, Groundwater Management, and Drought Risk Assessment and Mitigation Strengthened.

- The research team for the project “Managed Aquifer Recharge Using Treated Wastewater” held a virtual start-up meeting. This project and the other three PR&D projects relating to irrigation, groundwater management, and drought risk assessment and mitigation commenced research activities.

Result 5: Transboundary Water Cooperation Strengthened in Key River Basins.

- The Senior Mekong Affairs Advisor reviewed the mid-term review reports for the Mekong River Commission (MRC) and provided input to discussions among development partners one day prior to the meeting on mid-term reviews (March 20-21) and to a draft development partner statement to the MRC Summit, which was held on April 5.
- The Senior Mekong Affairs Advisor traveled to Washington, DC for two weeks to brief the State Department and USAID DC office as well as key influencers at think tanks on the key issues related to hydropower development in the Mekong and RDMA’s projects developed in response to these concerns.
- The Senior Mekong Affairs Advisor coordinated and helped develop plans for a regional fish database that will bring all key stakeholders together including fisheries administrators in each lower Mekong country, local and international research institutes, and academia.

Result 6: Technical and Outreach Capacity of USAID Staff in Water and Sanitation Programming Enhanced.

- FABRI prepared for several important events, including the International Water Association World Water Congress and Exhibition in Lisbon in September 2014.

Project Management

- FABRI fully executed an additional 6 PR&D grants during this period bringing the total number of fully-executed grants to 22.
- During this period, FABRI issued a subcontract to the University of Nebraska-Lincoln for its partnership on the MENA NWC research project entitled “Managed Aquifer Recharge Using Treated Wastewater in Different Geological Settings of MENA Countries.”

Issues and Remedies

Two issues faced by project management during this quarter include:

1. With the departure of PR&D Grants Manager, the FABRI team has a reduce long-term staff. Rather than recruit a new long-term team member, USAID has agreed to supplement the FABRI in-house team with (1) Lina Sheqem, engineer of ECO Consult, to act grants manager on a number of research projects from her home on Ontario; (2) Sarah Hiller from the DAI staff to help with project logistics. In the coming months, FABRI will be recruiting to fill three Directorate positions – Executive Director, Director of Research, and Office Manager – by January 2015. They will take on many of the tasks that the IMU id doing now.
2. USAID and the Interim Board of Directors has asked FABRI to recruit for all Directorate positions earlier than intended. It has also asked for a six month extension to 31 March 2016. The problem is how to fund these additional costs. FABRI management’s solution was to terminate negotiations with TAMU, Purdue, INRGREF, and UJ on the Water-Energy-Food Nexus research project. That provided roughly \$500,000 in accessible funds. The research proposal will be considered in the future, if considerable changes are made.

1. INTRODUCTION

Water plays a pivotal role in the political, economic and social lives of nations and people. Many countries, including those in the Middle East and Africa, are facing common water challenges- drought, inefficient agricultural water use, groundwater management, inadequate or poor quality water supply, weak or absent mechanisms for sharing transboundary water, etc. Such challenges can lead to conflict within communities and among countries, as well as have negative health, financial and social impacts on populations.

To help respond to these regional water challenges, FABRI is providing technical support to USAID's Middle East and Africa bureaus, fulfilling all requests at the highest technical standards. In this capacity, FABRI has launched and established a new regional water network called the Middle East and North Africa Network of Water Centers of Excellence (MENA NWC), strengthened integrated water resources management programming, improved the long-term viability of water and sanitation service providers, rationalized water allocations and use, encouraged collaboration among riparians in transboundary river basins, and raised USAID visibility in water and sanitation.

Partnerships form the foundation of all aspects of this initiative. FABRI develops partnerships—between and among the scientific community, governments, universities and research institutions, the private sector, and civil society—to achieve the project's goals and to ensure that the water sector in the Middle East and Africa is capable of sustaining, and building on those achievements after FABRI has closed. We are forging intellectual and financial partnerships among the water sector's major players to create an integrated process that spans the identification and design of new approaches and technologies to their production and adoption. Continued investments and advances in the water sector will improve economic output, agricultural returns, and public health and ease economic burdens and alleviate human suffering.

FABRI's core result is the launch of the Middle East and North Africa Network of Water Centers of Excellence (MENA NWC). This initiative is an outcome of President Obama's call to establish Centers of Excellence in the Muslim World during his June 2009 "New Beginnings" speech in Cairo. Secretary Clinton also mentioned the initiative during her World Water Day speeches in 2010 and 2011.

MENA NWC links technical and research institutions across the region, encouraging them to work together and with outside counterpart institutions on critical water challenges. The Network strives to foster partnerships that build and exchange regional science and technology capacity to improve water resources planning and management; and develop and disseminate policy tools and technical and management interventions that expand water supply, manage demand, and dramatically increase its efficient and productive use.

A network of cooperating institutions are facilitating collaborative activities, including competitive grants programs, capacity building, institutional twinings, exchanges, fellowships, communications, and knowledge management. The Network is the main vehicle for FABRI's goal to strengthen the water sector in the Middle East and North Africa.

Additionally, FABRI is supporting innovative WASH activities in Africa, focusing on providing institutional support to two regional associations to test and share successful approaches in non-revenue water and on setting national policies to enhance sanitation programs throughout Africa.

FABRI's eleventh quarterly report outlines the program's achievements and plans to build regional capacity of various actors from the water sector in the Middle East and Africa.

2. PROGRESS DURING THE QUARTER

FABRI has six major objectives:

- **Result 1: Establish an operational Middle East and North Africa Network of Centers of Excellence (MENA NWC).** FABRI is supporting the creation of the MENA NWC by acting as the Interim Management Unit until a Secretariat is established. The initiative will establish MENA NWC organization, leadership, and finances, as well as manage collaborative, technical, and capacity-building activities via Policy, Research, and Development (PR&D) Grants. Through the MENA NWC, FABRI aims to integrate research and development capacity in the member Centers with the development and dissemination of applied technologies and practices for innovative approaches, systems, and technologies to address water issues important to the region. An important piece of this work is the development of a communications and knowledge sharing plan to support the sustainability of the Network.
- **Result 2: Strengthen Integrated Water Resources Management Programming.** FABRI is strengthening the legal and regulatory framework for IWRM and implementing methodologies to improve and promote the efficient use of water resources through the MENA NWC IWRM Thematic Partnership.
- **Result 3: Access to Clean Water and Sanitation Improved in Target African and Middle Eastern Countries.** FABRI is strengthening the performance of water and sanitation service providers by working with regional “platforms” and associations. The goal is to provide them with innovative and tangible support to improve financial, economic, and operating efficiency, including development of association Business Plans, Non-Revenue Water (NRW) initiatives, capacity building, and communications and knowledge sharing programs.
- **Result 4: Strengthen Research and Development Capacities in Irrigation, Groundwater Management, and Drought Risk Assessment and Mitigation.** FABRI is working with one of the MENA NWC Thematic Partnerships to identify the most promising and regionally-relevant technologies and techniques for efficient, productive use of water in agriculture; engaging the leading experts in these technologies to transfer knowledge to MENA NWC institutions; and developing and presenting outreach activities in target countries to encourage government engagement and private sector partnerships around the most successful approaches.
- **Result 5: Strengthen Transboundary Water Cooperation in Key River Basins.** Through Oregon State University, FABRI is conducting an analysis of transboundary cooperation approaches and applying study findings to the Tigris-Euphrates basin. The results will be used to identify, design and implement one or two pilot projects. In addition, FABRI hired a Senior Mekong Affairs Advisor based in Bangkok, Thailand who began work in August 2013.
- **Result 6: Enhance Technical and Outreach Capacity of USAID Staff in Water and Sanitation Programming.** FABRI will strengthen USAID staff capacity in this area by providing materials and insights based on our non-revenue water and sanitation programs in Africa.

The following section describes the progress that FABRI has made on each of these objectives during the quarter.

RESULT 1: MIDDLE EAST AND NORTH AFRICA NETWORK OF CENTERS OF EXCELLENCE ESTABLISHED AND OPERATING

Requirement 1.1: Support Establishment of MENA NWC

This activity is completed.

Requirement 1.2: Design a Trust Fund or Endowment to Help Ensure the Sustainability of the Network

The Interim Board of Directors has discussed the creation of a trust fund or endowment for MENA NWC that could be used for contributions from strategic donors, above covering the projected costs of operation. This activity is likely to see some effort after the completion of the Fundraising Strategy and Action Plan in the fall.

Requirement 1.3: Support Operations of the MENA NWC Secretariat

During the period, MENA NWC made progress in a number of different areas:

Governance: The Interim Board of Directors met in London from June 21-22, 2014 (see Requirement 1.4 for a discussion of the meeting). In preparation for this meeting, the Interim Management Unit (IMU) prepared a briefing book which included:

- 41 nominees for the Board of Directors
- Revised MENA NWC bylaws
- Draft Terms of Reference for Directorate positions, including the Executive Director, Director of Research, and Office Manager
- A plan for institutionalizing MENA NWC, including setting up a regional office and bank accounts
- Updates on MENA NWC's research programs
- An Implementation Framework for MENA NWC Capacity Building CVs of candidates to the Board of Directors
- Update on the MENA NWC website and a design for Communities of Practice
- Selection of Community Counseling Services (CCS) to develop a fundraising strategy for MENA NWC

Knowledge Exchange: Taoti Creative, a Washington, D.C. based website development firm, designed an initial website for the Network as a place to provide initial information about the Network and post Network documents (www.menanwc.org) while the full website is in development. The initial website launched in June and the full website will launch in September 2014.

Capacity Development: The team developed an Implementation Framework for capacity building emphasizing the key role of the Centers in using their experience and excellence to frame the program

Fundraising: In March, FABRI released a revised Request for Proposals (RFP) to solicit proposals to develop innovative approaches to support the financial sustainability of MENA NWC. The successful bidder will develop a realistic strategy, an achievable action plan, and content for effective marketing materials to that end. Three proposals were received in response and Community Counseling Services (CCS), a London-based consulting firm, was selected by the Selection Committee.

Research Program: The research teams held start-up meetings for the remainder of the twelve large research projects funded through the Policy, Research and Development (PR&D) grants program. FABRI convened Selection Committees for the two small grants programs – the Water Innovation Fellowships and Young Water Scientist Partnerships. The WIF program received 27 proposals and the YWSP program received 7 proposals. The Selection Committees recommended thirteen awards for small grants programs: four for the Young Water Scientist Partnerships and nine for Water Innovation Fellowships.

Planned Activities for the Fourth Quarter of Year Three

- Submit a complete package to the U.S. Internal Revenue Service (IRS) for tax exempt status for the MENA NWC as a 501(c)(3)
- Launch the Network's permanent website along with technical and managerial Communities of Practice
- Begin institutionalization of MENA NWC, including establishing a U.S. bank account and advertising for Directorate positions
- Technical and logistical arrangements for MENA NWC's presentation at the International Water Association (IWA) World Congress & Exhibition and MENA NWC's Board Meeting in Lisbon, Portugal in September 2014.
- Facilitate the preparation and signing of the ACWUA-AfWA Cooperation Memorandum of Understanding (MOU) at IWA's World Congress & Exhibition in September.
- Technical and logistical arrangements for a meeting of MENA NWC's Assembly of Governing Members (Center Directors) in October 2014
- Extend the deadline for applications to the small grants programs to December 2014

Requirement 1.4: MENA NWC Founders Committee Established

The Interim Board of Directors met in London from June 21-22, 2014. The following agreements and approvals included:

- To be included in the next quarterly report, as the meeting was held after this period.

Planned Activities for the Fourth Quarter of Year Three

- Orient new Board of Director members to MENA NWC activities and programs
- Prepare briefing book and make logistical and travel arrangements for the September Board Meeting in Lisbon, Portugal

Requirement 1.5: Technical, Demonstration Activities of the Network Launched

Policy, Research, and Development (PR&D) Grants and PR&D Research Projects Started. PR&D research teams held start-up meetings and commenced research activities. Activities on the five projects relating to the Food-Energy-Water Nexus, Non-Conventional Water, and Water Supply and Sanitation Thematic Partnerships are summarized in the table below. PR&D projects relating to Integrated Water Resources Management are presented in Result 2, and projects relating to Irrigation, Groundwater Management, and Drought Risk Assessment and Mitigation are presented in Result 4.

POLICY, RESEARCH, AND DEVELOPMENT (PR&D) GRANT PROJECTS

Project	Participating Centers and External Partners	Project Activities in the Last Quarter	Planned Project Activities in the Upcoming Quarter
<i>Non-Conventional Water</i>			
Use of Green Nanoparticles as a Biofouling- Resistant Agent in Reverse Osmosis Desalination	JUST ONEE University of Rhode Island University of Toledo-Ohio Georgia Tech	Conducted PI training on the equipment and membrane preparation. Held second project team meeting. Procured membrane testing equipment for JUST and ONEE.	Set up JUST and ONEE membrane testing equipment. Start work on nanoparticle production.
Solar Pumping and Desalination	UJ An Najah	Held project start-up meeting.	Develop project work plan. Frame technical and economic models. Gather and analyze data from previous solar desalination projects.
<i>Water Supply and Sanitation</i>			
Expanding Access to Sanitation for Unsewered Communities in Morocco and Jordan	ONEE RSS UJ IAV	Held start-up workshop in Jordan. Conducted field appraisal of pilot sites. Formed local stakeholder committees.	Design pilot projects and issue tenders for construction.
Developing Diagnosis Techniques and Strategies to Reduce NRW in the Middle East Region	ACWUA AfWA	Held project start-up meeting and developed project work plan. Selected utilities for assessment. Es	Establish NRW Task Force within ACWUA. Develop assessment tools and manual and jointly implement first audit in Egypt. Sign ACUWA-AfWA cooperation MOU.

Cancelled the Water, Energy, and Food (WEF) Nexus Project. FABRI cancelled the project “Developing an Integrated Water, Energy, and Food Resource Management Tool for Policy Analysis and Decision Support” with INRGREF, UJ, Purdue University, and Texas A&M University, based on budget limitations and the Lead Principal Investigator’s change in affiliation from Qatar National Food Security Program (QNFSP) to Texas A&M University. FABRI will work with INRGREF, UJ, Purdue, and Texas A&M University to identify outside funding sources to re-start the project.

Young Water Scientist Partnerships (YWSP) Small Grants Program. The Young Water Scientist Partnerships stimulates collaboration between the Centers’ young water research scientists through small grant projects that address a policy, operational, technical, or managerial issue that is identified by stakeholders in government, business, NGOs, or civil society. The small grants program is open to full-time or part-time employees of MENA NWC Centers between the ages of 21 and 40. The proposal deadline is July 31, 2014. The YWSP Selection Committee is represented by USAID and FABRI. During the quarter ending June 14, 2014, the YWSP Selection Committee reviewed seven proposals and recommended two proposals for award and two proposals for provisional award:

Recommended for Award:

- Improving Economics of Using Saline Water in Arid and Semi-Arid Areas Through Integrated Aquaculture Systems (ICBA, IWMI)

- Improving Agricultural Soil Properties Using Soil Amendments to Enhance Water and Nutrient Use Efficiency for Crop Production in Dry Lands and Assessing These Efficiencies Via Remote Sensing Techniques (ICBA, AGU)

Recommended for Provisional Award:

- Applying Green Schools Concept in Jordan (RSS, UJ)
- Minimizing Risk Hazard by using Nanotechnology for Water Disinfection (UJ, ONEE-IEA)

Water Innovation Fellowships (WIF). Water Innovation Fellowships projects must address a policy, operational, technical, or managerial issue that is identified by stakeholders in government, research or academic entities, businesses, NGOs or civil society. Applicants must be citizens of a Middle Eastern or North African country eligible for USAID funding, currently reside in the Middle East or North Africa, and be a full-time employee of an institution or entity based in the Middle East or North Africa. The proposal deadline is July 31, 2014. The WIF Selection Committee is represented by USAID and FABRI. In all, FABRI received 32 proposals. During the quarter ending June 14, 2014, the WIF Selection Committee reviewed sixteen proposals of the 32 that were considered responsive, and it recommended two proposals for award and six proposals for provisional award:

Recommended for Award:

- Decentralized Desalination Stills: Enhancement with Nanotechnology (University of Alexandria, Egypt)
- Treatment of Secondary Effluents to Meet Quality Criteria for Unrestricted Irrigation and Artificial Groundwater Recharge, by using an Innovative Nanotech-based Self-cleaning Advanced-treatment Filter for Effluents (An Najah)

Recommended for Provisional Award:

- Urban Wastewater Systems and Climate Change: Flood Vulnerability and Adaptation Measures (IAV)
- BIG Data for Water Management (IAV)
- Promote Eco-Restaurants at Remote Areas of MAEEN Hot-Spring Water Area (Madian for Smart Green Buildings in partnership with Future Pioneers for Empowering Communities, Jordan)
- Use of Water Retention Polymers to Saving Water in Agriculture (IAV)
- Modeling the Amounts of Recharge to the Groundwater Under the Conditions of Climate Change Variation in a Selected Area in Jordan (UJ)
- Purification of Groundwater from Heavy Toxic Metals Using Suspended Polydentate Supported Ligands (An Najah)

U.S.-Network Research Partnerships. Two of the U.S.-Network Research Partnerships have started research activities, and one Partnership is pending contract signature by the subcontractor:

- **Combatting the Emerging Impacts of Harmful Algal Blooms on Desalination Plants: Bloom Detection, Forecasting, and Strategies for Impact Reduction** (led by MEDRC). During the quarter ending June 14, 2014, the USAID CO approved the subcontract for the project. After personnel changes, MEDRC assigned a new project manager. FABRI is awaiting MEDRC's signature of the subcontract.
- **The Global Yield Gap and Water Productivity Atlas for Jordan, Morocco, and Tunisia** (led by the University of Nebraska). During the quarter ending June 14, 2014, team members participated in the Third Annual GYGA project Workshop at Addis Ababa, Ethiopia. Seven scientists from the three GYGA-MENA teams participated in the workshop held at International Livestock Research Institute

(ILRI) at Addis Ababa, Ethiopia during March 24 to 27, 2014. Besides the plenary sessions, the GYGA-MENA project held its own group meeting to: review project progress, discuss technical issues, provide further training on data preparation and reporting, make decision on unified choice of models for simulation, and plan for regional meetings in 2015. They also finalized crop area maps and reference weather stations. The UNL team used SPAM crop data to produce the first version of crop area maps, identify reference weather stations and delineate the buffer zone for simulation. The maps and identified reference weather stations were subsequently sent to each team for verification and correction. After several round of interactions, the maps and reference weather stations have now been finalized.

Planned Activities for the Fourth Quarter of Year Three

The major activity for the next two quarters is data collection, including:

Weather data at identified reference weather stations

Major soil properties for the buffer zones around the reference weather stations

Crop management data for the buffer zones around the reference weather stations

Actual yield for the buffer zones around the reference weather stations

- **Radar Probing of Groundwater in Hyper-Arid Environments: Understanding Aquifer Dynamics in High Discharge Areas** (led by the California Institute of Technology in association with the Jet Propulsion Laboratory (JPL) in Pasadena). In collaboration with the two USAID-MENA National Water Centers, Caltech proposes to substantially increase knowledge on the distribution and dynamics of the Al-Sharkia aquifer that is Oman's largest strategic water reserve, using satellite and surface radar data to augment the sparse data from the local wells. Specifically, Caltech will use their existing 40-MHz low frequency sounding radar to map the depth of the water table, hydraulic head, and boundaries. That data will be combined with InSAR monitoring by ALOS L-Band SAR to assess the amplitudes and boundaries of the ground deformations induced by the rapid discharge of the aquifer. In addition to mapping the depth of the water table, Caltech will attempt to explore the radar capability to monitor the water freshness from signal decay measurements combined with TEM measurements in the Al-Sharkia Aquifer to understand potential seawater intrusion that can degrade the aquifer water quality.

During this quarter, Caltech has performed the following tasks toward achieving the study objectives listed above:

- Caltech analyzed the ALOS Synthetic Aperture Radar images for the Al-Sharkia site in Oman and mapped shallow buried fractures together with upper ground surface moisture, using polarimetric HH and HV signatures.
- Caltech obtained the digital records already available, on the resistivity data about the Al- Sharkia aquifer, from the Ministry of Water Resources in Oman.
- Caltech elaborated a model of groundwater budget (storage-depletion) in Oman, using Python as programming language. The aim is to observe and understand the possible depletion patterns for the next 100 years. The data improved in the model are a combination of well logs data available in published reports and the pumping rates are obtained by the Food and Agricultural Organization (FAO)-Aquastat database.
- Caltech performed a primary desktop analysis of the principal groundwater resources in Oman and the surrounding areas. A summary report has been generated, describing the current state of knowledge on the Oman aquifer systems, to be used in the study science write up and as basic knowledge for further water policy analysis.
- Caltech continued to update training courses for both IAV and SQU to be delivered with the two

processing stations for each center.

- Caltech acquired three academic books on groundwater hydrology and geophysical field survey methods, to be donated to IAV during the training planned for July. The donated books will be used as academic references supporting and complimenting the training to increase IAV's readiness for the September survey.
- Caltech visited QEERI and discussed their implications in the project. QEERI will support a survey in Qatar in spring 2015 after the primary survey in Oman.
- IAV, SQU, and Caltech agreed to undertake the field survey in Oman during the last week of September.
- IAV, SQU, and Caltech agreed to perform the first training on Radar Remote Sensing in Morocco from July 20th to 26th, 2014. Dr. Essam Heggy, from Caltech, will perform the training. Dr. Mohamed Rouchdi from IAV will be responsible for the selection of the participants from IAV and other Moroccan national partners interested in the topic.

Planned Activities for the Fourth Quarter of Year Three

- SQU, IAV, and Caltech will prepare the survey setup and the logistics for the Ground Penetrating Radar survey in Oman involving the teams from the three Institutions.
- Caltech will work with Oman to define the dates for the Radar Remote Sensing training to be held in Oman for SQU. Dr. Ali Al-Maktoumi will be responsible for the selection of the participants from SQU and other Omani national partners interested in the topic. The course is forecasted for the last week of August 2014.
- Caltech will perform an assessment of the trainees' knowledge level in radar remote sensing after each class, and evaluate if more trainings are needed.
- Dr. Essam Heggy from Caltech will visit IAV in Morocco on July 20 to deliver the SAR processing station and perform L-Band SAR training and data analysis. IAV will be responsible for performing the inSAR deformation analysis, the temporal SAR backscatter variation study, and for the polarimetric mapping of the Al-Sharkia survey site in this project.
- In mid-August, Caltech will test the newly acquired sounding radar equipment in a large dunes field in the US (either the Sleeping Bear dunes field in Michigan or the Yuma dunes field in California) to prepare for the fieldwork in September.

Planning for Training and Capacity Building Activities. FABRI started planning for MENA NWC Training and Capacity Building activities to be launched in late 2014. Capacity building will take three forms:

- **Training**, which will include proposal writing and research project design and management; skills for reaching out to partners in the private sector; and technical and policy topics.
- **Virtual knowledge sharing**, which will include communities of practice and a knowledge and information clearinghouse.
- **Hands-on experience**, which will include a secondment program and an internship program to allow scientists to gain practical research experience at MENA NWC Centers and with the Network's Directorate.

FABRI will lead the first two areas, while the third area will grow out of the Centers' existing training and capacity building curricula. FABRI surveyed the Centers to compile a list of topics that could be offered to strengthen technical and management capacity in other Centers, and developed a draft MENA NWC Training and Capacity Building Plan for feedback from the MENA NWC Board of Directors.

Planning for Thematic Partnerships Conference. FABRI started planning for a joint Assembly of Governing Members and Thematic Partnerships Conference. Initially, the meeting was planned for

Marrakech, Morocco, in late June 2014. However, based on feedback from the Centers, this meeting is now planned as a meeting of Center Directors in October 2014 and the first Network Congress in April 2015.

Planned Activities for the Fourth Quarter of Year Three

- Anticipated project activities for PR&D Grants Projects relating to the Non-Conventional Water and Water Supply and Sanitation Thematic Partnerships are summarized in the table above.
- FABRI will design specific MENA NWC training and capacity activities for research project design and proposal writing, private sector engagement, and technical and policy topics.
- FABRI will continue planning for the meeting of Center Directors in October 2014.
- FABRI will issue a subcontract to MEDRC under the U.S.-Network Research Partnerships and the project will begin research activities.
- FABRI will negotiate grant awards with the selected grantees under the WIF and YWSP small grants programs.

Requirement 1.6: Network Strengthening Through Private Sector Participation

During this quarter, FABRI provided support to the University of Jordan on establishing a partnership with the private sector for their research proposal “Prospects of Utilizing Solar Energy for Water Pumping and Brackish Water Desalination.” FABRI facilitated meetings between the University of Jordan and Kawar Energy to discuss potential collaboration. The discussions concluded with an official letter of interest that expressed Kawar Energy’s interest in partnering with the project team on this research project.

As part of the program’s continuous communication and outreach activities, FABRI conducted presentations at Jordan University of Science and Technology (JUST) on the Network’s small grants programs as part of the University’s “Jordan funded Peer-Science Projects” Workshop to encourage participants to submit proposals for funding.

FABRI will design an interactive awareness and outreach program to enhance the Centers’ knowledge on public private partnerships. The program will develop interactive materials such as story telling videos that will be posted on the website of successful partnerships that were established between the members of the Network and the private sector. The videos will feature speakers from the private sector partners and the member centers.

Planned Activities for the Fourth Quarter of Year Three

- Develop and design an interactive awareness and outreach program for MENA NWC Centers on public private partnerships
- Continue facilitation of meetings between the Centers and the private sector on specific research projects and topics
- Provide continuous support to the member Centers that have established partnerships with the private sector, such as ACWUA, JUST, the University of Jordan, and NCARE

RESULT 2: INTEGRATED WATER RESOURCES MANAGEMENT PROGRAMMING STRENGTHENED

FABRI is implementing Result 2, Integrated Water Resources Management (IWRM) Strengthening, through MENA NWC research projects. Activities for the IWRM project “Mitigating Environmental Risks of Wastewater Reuse for Agriculture” are summarized in the table below.

POLICY, RESEARCH, AND DEVELOPMENT (PR&D) GRANT PROJECTS RELATING TO INTEGRATED WATER RESOURCES MANAGEMENT

Proposal Topic	Participating Centers and External Partners	Project Activities in the Last Quarter	Planned Project Activities in the Upcoming Quarter
Mitigating Environmental Risks of Wastewater Reuse for Agriculture	SQU INRGREF UJ University of Florida	Selected experimental crops and started crop experiments. Gathered data on pharmaceuticals used in each country and identified compounds for testing in wastewater. Characterized treated wastewater. Designed surveys to evaluate farmers practices with wastewater. Identified and characterized sites for groundwater vulnerability assessment.	Perform crop experiments. Sample and analyze fresh water and treated wastewater sources for study area. Perform surveys of farmers practices with wastewater. Gather geospatial data for groundwater vulnerability assessment.

Planned Activities for Fourth Quarter of Year Three

- Anticipated project activities for the IWRM project “Mitigating Environmental Risks of Wastewater Reuse for Agriculture” are summarized in the table above.

RESULT 3: ACCESS TO CLEAN WATER AND SANITATION IMPROVED IN TARGET COUNTRIES

Requirement 3.1: Water and Sanitation Service Provider Performance Strengthened

Non-Revenue Water Program. The Non-Revenue Water (NRW) Task Force Members conducted four audits for the following utilities during this quarter: Bauchi, Nigeria; ONEA, Burkina Faso; GUWL, Ghana; and SODECI, Cote d'Ivoire. The next step is the completion of the final audit in SEEG, Gabon, then initiating Phase 2, the development of the Performance Improvement Plans (PIPs). After the completion of the PIPs, FABRI will begin the implementation of some identified short-term actions, but not capital investments or equipment.

African Young Water Professionals Small Grants Program (AfYWP). During this quarter, three more AfYWP proposals were received, but they all require some additional revisions. Of the proposals submitted in the previous quarter, the Selection Committee members evaluated a second proposal and recommended resubmission, as the proposal's objectives were not fully aligned with those of the program. About three more proposals are expected to go through Selection Committee evaluation during the next quarter.

During this quarter FABRI decided to support the recruitment of a regionally based YWP Program Officer based in AfWA for 20 months. This person would be responsible for the grant payment disbursements and monitoring of the small grant activities. Other advantages of a regionally based YWP Program Officer include that they can: serve as point of contact for all applicants; oversee financial aspects of the grants; attend YWP conferences and other events and publicize the program; and serve as a liaison between all existing chapters and young water professionals in the process of forming a chapter, and IWA YWP members, leading to a more cohesive program. This is an institutional strengthening grant to AfWA, to build its grants management capacity, which could lead to the extension of the YWP grants program beyond FABRI and also attract future outside funding.

Communications and Knowledge Exchange. During this period, FABRI received two proposals for the AfWA website design RFP. Of these, FABRI evaluated and selected Taoti Creative, primarily based on cost, as they were technically comparable, but the one not selected was \$52 less than the contract ceiling amount and \$52,202 more than selected proposal. FABRI expects to complete the contracting process during the next quarter and begin the website design process.

Fifth Africa Water Week. During this quarter, FABRI supported AMCOW at the 5th Africa Water Week (AWW), held in Dakar, Senegal, 26-31 May 2014. FABRI hosted the technical sub-theme, Water, Sanitation, and Hygiene: Partnerships, Innovations, and Investment Post-2015. Working closely to support USAID's Water Team and under its direction, FABRI functioned as the event secretariat, helping to determine the eight technical sessions and coordinate with the lead conveners. This task required FABRI to interact with the principal global players in the WASH sector, including the Bill & Melinda Gates Foundation, WaterAid, the World Bank's Water & Sanitation Program - Africa, the International Sanitation Center, UNICEF, and WHO. Jeremy Hagger was brought in short-term as an independent consultant to oversee the activity and both he and the FABRI Senior Project Coordinator, Megan Delph, traveled to Dakar to attend the event.

Planned Activities for the Fourth Quarter of Year Three

- Complete the final NRW utility audit in Gabon for the SEEG utility

- Complete the PIP phase of the NRW Program
- Sign the institutional strengthening grant with AfWA and award the first round of AfYWP Small Grants
- Select additional Task Force Members
- Award the AfWA website design contract

RESULT 4: RESEARCH AND DEVELOPMENT CAPACITIES IN IRRIGATION, GROUNDWATER MANAGEMENT, AND DROUGHT RISK ASSESSMENT AND MITIGATION STRENGTHENED

Requirement 4.1: Conduct Identification and Analysis of U.S., Regional, and International Water Programs Aimed at Promoting Efficient, Productive Use of Water in Agriculture in the MENA Region

FABRI will implement Result 4 through MENA NWC research projects. Projects relating to irrigation, groundwater management, and drought risk assessment and mitigation are summarized in the table below.

POLICY, RESEARCH, AND DEVELOPMENT (PR&D) GRANT PROJECTS RELATING TO IRRIGATION, GROUNDWATER MANAGEMENT, AND DROUGHT RISK ASSESSMENT AND MITIGATION

Proposal Topic	Participating Centers and External Partners	Project Activities in the Last Quarter	Planned Project Activities in the Upcoming Quarter
Efficient Treatment and Provision of High-Quality Reclaimed Effluents Suitable for Irrigation	Technion NCARE Al Quds University	Established database for the effluent and influent parameters at the existing Al Quds treatment plant. Experimented with ultrafiltration operations at The Technion to improve permeate recovery rates. Repaired NCARE membrane plant. Performed baseline soil and water monitoring at The Technion lysimeters. Developed framework for decision support system.	Continue ultrafiltration operations experiments at The Technion to improve permeate recovery rates. Bring NCARE membrane plant back online. Perform crop experiments and soil and water monitoring with The Technion lysimeters. Refine decision support system and gather data.
Application of Near-Real Time Monitoring Systems for Irrigated Agriculture	ICBA INRGREF SQU NCARE	Planned experimental trials. Procured and installed soil, plant, and weather monitoring equipment. Developed sampling protocols and forms for agronomic diagnosis, farm survey, and economic impact and adoption studies.	Continue to procure and install soil, plant, and weather monitoring equipment. Start experimental trials.
Developing Partnerships and Innovative Technologies to Improve Water Use Efficiency at River Basin Scale in Jordan, Morocco and Tunisia	INRGREF NCARE IAV UC Davis	Developed stakeholder engagement plan. Engaged stakeholders. Gathered data.	Gather data and characterize hydrology in the pilot catchments.
Managed Aquifer Recharge Using Treated Wastewater	SQU UJ RSS	Held project start-up meeting. Developed project work plan. Identified data	Gather and analyze data. Conduct field visits and collection of data. Conduct

Proposal Topic	Participating Centers and External Partners	Project Activities in the Last Quarter	Planned Project Activities in the Upcoming Quarter
	UNL	for existing managed aquifer recharge projects.	literature review. Develop framework for 2-D and 3-D groundwater models.

Planned Activities for Fourth Quarter of Year Three

- Anticipated project activities for the Projects relating to the Food-Energy-Water Nexus, Non-Conventional Water, and Water Supply and Sanitation Thematic Partnerships are summarized in the table above.

RESULT 5: TRANSBOUNDARY WATER COOPERATION STRENGTHENED IN KEY RIVER BASINS

Requirement 5.1: Conduct Analysis of U.S. and Regional Transboundary Water Cooperation Programs, with a Focus on the Euphrates, Tigris, and Nile Basins

Oregon State University's Program in Water Conflict Management and Cooperation led by Prof. Aaron Wolf submitted a third draft of an assessment of regional transboundary water cooperation programs. The Program houses the Transboundary Freshwater Dispute Database (TFDD), the largest collection of information on transboundary conflict and cooperation in the world.

Planned Activities for Fourth Quarter of Year Three

- Finalize the final report from Oregon State University for submission to USAID and for widespread dissemination.

Requirement 5.5: Launch Pilot Project in Key River Basin

The Mekong River Commission (MRC) is the only regional intergovernmental body in the lower Mekong basin that acts as a forum for member countries to discuss transboundary water resources management. The US government has a strong interest in strengthening the MRC. USAID asked FABRI to provide a full-time expert to assist it with Mekong River Commission (MRC) support and to prepare a comprehensive long-term, external engagement strategy for the USAID Regional Development Mission for Asia (RDMA) to promote fair and effective governance of water, food, and energy in the Greater Mekong Sub region (GMS) as it relates to development of hydropower on the Mekong River.

The reporting period coincided with key events at the MRC and follow on work by key stakeholders focusing on hydropower development on the Mekong mainstream, impact on regional cooperation, and MRC's role and relevance.

During the second half of March, the MRC held a meeting for independent consultants who conducted a mid-term review of MRC to report to member countries and development partners (DPs). Under review was implementation of the current MRC Strategic Plan of 2011-2015 and 8 of the 12 MRC technical programs (which were reviewed because they were part of the conditions set under financial agreements with DPs).

The review assessed implementation against the goals, outcomes, and milestones set forth in the overall MRC Strategic Plan and assessed the collective contribution of MRC programs towards the achievement of the outcomes and desired results as specified in the Strategic Plan, with a special focus on how MRC has responded to the emerging issues in its role and functions as required for the implementation of the 1995 Mekong Agreement.

The Senior Mekong Affairs Advisor reviewed the mid-term review reports and provided input to discussions among development partners one day prior to the meeting on mid-term reviews (March 20-21) and to a draft development partner statement to the MRC Summit, which was held on April 5. The Summit was preceded by an international conference on "Cooperation for Water, Energy, and Food Security in Transboundary Basins under Changing Climate," in Ho Chi Minh City, Vietnam.

The discussions among DPs were focused on how to provide the appropriate level of support to MRC and to each individual country to enhance regional cooperation. This was critical as recommendations from the review and organizational reform at the MRC point towards MRC being more focused on its role as convener and facilitator of dialogues among members while member countries would take on tasks related to regional cooperation utilizing their own resources. Other key issues include what mechanisms can facilitate development partners' support to MRC. Many donors indicated that they would still financially support MRC as a platform for regional cooperation but at a reduced level. Many support pool funding as planned by MRC. However, some DPs, due to their policies and regulations, would need to specify how funds could be used. These discussions and possible actions were delivered to MRC in joint DP statements.

From the MRC side, Prime Ministers (except Thailand which, due to its tense political situation, sent the Permanent Secretary of Foreign Affairs) recommitted to regional cooperation on the sustainable use and management of water and related resources.

Towards the end of the reporting period in early June, USAID/RDMA sent the Senior Mekong Affairs Advisor to Washington, DC for two weeks to brief the State Department and USAID DC office as well as key influencers at think tanks on the key issues related to hydropower development in the Mekong and RDMA's projects developed in response to these concerns.

The Senior Advisor also coordinated and helped develop plans for a regional fish database that would bring all key stakeholders together including fisheries administrators in each lower Mekong country, local and international research institutes, and academia. However, a planned USAID and MRC's Fisheries Program planning workshop to try to reach agreement on the scope and design of the database was postponed to allow MRC members to have internal discussions before including other stakeholders.

Planned Activities for Fourth Quarter of Year Three

- As the Senior Mekong Affairs Advisor's contract ends at the end of September, the last three months will be dedicated to finalizing a plan on how the US government, particularly USAID/RDMA, could support and strengthen MRC to promote fair and effective governance of water, food, and energy in the Greater Mekong Sub region (GMS) as it relates to development of hydropower on the Mekong River.

RESULT 6: TECHNICAL AND OUTREACH CAPACITY OF USAID STAFF IN WATER AND SANITATION PROGRAMMING ENHANCED

Requirement 6.2: Increase USAID's Visibility and Outreach on Water Issues

The MENA NWC Interim Board of Directors has asked FABRI to design and convene several major meetings over the next 18 months, including the following:

- IWA World Water Congress and Exhibition in Lisbon on September 2014
- Meeting of Center directors in October/November 2014
- MENA NWC First Congress and two Thematic Partnerships meetings in Oman in April 2015
- IWA Development Congress in Jordan in October 2016

FABRI has begun planning for the IWA Congress in meetings with IWA and ACWUA. The following is a brief summary of the session that would be held jointly by the three parties.

MEDITERRANEAN and MENA FORUM IWA WORLD WATER CONGRESS AND EXHIBITION, LISBON 22-25 SEPTEMBER 2014

More than ever, significant improvements in water use and management across the Mediterranean, Middle East and North Africa regions require resource mobilization, leveraging funds, and commercialization, built on partnerships between the sector's traditional stakeholders and the private sector. The U.S. Agency for International Development (USAID), the Arabic Countries Water Utilities Association (ACWUA), the Mediterranean Water Institute (IME) and the International Water Association (IWA) will jointly convene a Mediterranean & MENA Forum.

The Forum will explore the challenges faced by water and wastewater utilities and the competing demands on water resources. Specifically there will be a focus on how to create and expand "water smart technologies" in the region. We welcome private sector partners based outside the region who want to gain a foothold or expand existing markets in the region. Also welcome are firms based across the Mediterranean and MENA regions that seek to expand their regional presence or want to form strong ties with new internal or external partners. The workshop will bring together the private sector with donors, governments, researchers, and other key water sector stakeholders to initiate a dialog that leads to concrete actions, partnerships, and eventual deal making.

THURSDAY, 25 SEPTEMBER 2014

Session 1: Challenges and Opportunities across the Mediterranean and MENA (1030- 1200)

- Introduction from Chair 5 min
- Transformational Change for Utilities in Arabic Countries: What is needed? Khaldon Khashman, General Secretary, Arabic Countries Water Utility Association (ACWUA) 15 min (TBC)
- Opportunities for greater collaboration across the Mediterranean region Hachmi Kennou, Mediterranean Water Institute (IME) 15 min (TBC)
- Panel discussion (20 min)

Lunch for Congress Attendees (1200-1330)

Session 2: Research, Innovation and Investment: Market Dynamics for Large Scale Applications (1330-1500)

- Scene setter: Middle East and North Africa Network of Water Centers of Excellence (MENA NWC) 15 min (TBC)

- Scene setter: Financial Instruments for Transformational Change (TBC) 15 min
- Table discussions 30 min
- 5-7 thematic tables discussing bottlenecks and opportunities for accelerating innovation cycle (matched to MENA NWC research priorities: water use efficiency and productivity; groundwater; non-conventional water; water/energy/food nexus; water supply and sanitation; non-revenue water)
- Tables report out this discussions 30 min

Session 3: Building on the Forum (1500-1545)

- Scene setters: MENA NWC and IWA
- Discussion of using MENA NWC Congress 4/2015 and IWA Development Congress, Jordan Dead Sea, 10/ 2015 to advance the continuing dialogue
- Identification of aspirational outputs and results from the effort

Planned Activities for Fourth Quarter of Year Three

- Prepare for and hold the IWA session

3. PROJECT MANAGEMENT

The period of performance for the FABRI task order is September 15, 2011 through September 29, 2015. FABRI has received \$19,324,837 in obligated funds (\$15,004,837 from the Middle East Bureau and \$4,320,000 from the Africa Bureau). This constitutes 96.6 percent of the \$20,000,000 contract ceiling. FABRI has spent \$8,395,630 as of May 31, 2014, which represents approximately 43 percent of the current obligation.

During the next period, FABRI will request an additional six month no-cost extension which would extend the contract's completion date from September 29, 2015 to March 31, 2016. Extending the contract for an additional six months will allow additional time for targeted fundraising for the MENA NWC, staffing of the MENA NWC Directorate, and completion of grant activities.

During this period, FABRI issued a subcontract to the University of Nebraska-Lincoln for its partnership on the MENA NWC research project entitled "Managed Aquifer Recharge Using Treated Wastewater in Different Geological Settings of MENA Countries." Nebraska will be partnering with Sultan Qaboos University in Oman and the University of Jordan on this project.

The subcontract agreements with the University of Toledo and the Middle East Desalination Research Center (MEDRC) are presently pending signature. The University of Toledo will serve as a U.S. partner for a research project under the PR&D Grants Program entitled "The Use of Green Nanoparticles as a Biofouling- Resistant Agent in Reverse Osmosis Desalination." MEDRC will be leading a research project entitled "Combating the Emerging Impacts of Harmful Algal Blooms (HABs) on Desalination Plants: Bloom Detection, Forecasting, and Strategies for Impact Reduction."

FABRI cancelled the project "Developing an Integrated Water, Energy, and Food Resource Management Tool for Policy Analysis and Decision Support" with INRGREF, UJ, Purdue University, and Texas A&M University, based on budget limitations and the Lead Principal Investigator's change in affiliation from Qatar National Food Security Program (QNFSP) to Texas A&M University. FABRI will work with INRGREF, UJ, Purdue, and Texas A&M University to identify outside funding sources to re-start the project.

During the next period, FABRI will issue several new subcontracts. FABRI will issue a Firm Fixed Price subcontract to Utah State University for work on the research project entitled "Prospects of Utilizing Solar Energy for Water Pumping and Brackish Water Desalination in Agriculture." FABRI will issue a Fixed Price Purchase Order (FPPO) to Taoti Creative to design a website for the African Water Association (AfWA). FABRI will issue an FPPO to Community Councelling Service Ltd (CCS) based in London to design a fundraising strategy for the MENA NWC. FABRI will also issue an Independent Consultant Agreement to Etienne Tchagole to serve as a Senior Non-Revenue Water Expert on the Africa program.

As of June 14, the total number of fully executed PR&D grants was 22. FABRI plans to issue two additional PR&D grants in the next period. In addition, FABRI plans to begin issuing grants under the three small grants programs in the next period; the African Young Water Professionals Small Grants Program, the Young Water Scientist Partnerships Small Grants Program, and the Water Innovation Fellowships Small Grants Program.

4. ISSUES AND PROPOSED REMEDIES

Issue 1: With the departure of PR&D Grants Manager, the FABRI team has a reduce long-term staff.

Remedy: Rather than recruit a new long-term team member, USAID has agreed to supplement the FABRI in-house team with (1) Lina Sheqem, engineer of ECO Consult, to act grants manager on a number of research projects from her home on Ontario; (2) Sarah Hiller from the DAI staff to help with project logistics. In the coming months, FABRI will be recruiting to fill three Directorate positions – Executive Director, Director of Research, and Office Manager – by January 2015. They will take on many of the tasks that the IMU id doing now.

Issue 2: USAID and the Interim Board of Directors has asked FABRI to recruit for all Directorate positions earlier than intended. It has also asked for a six month extension to 31 March 2016. The problem is how to fund these additional costs.

Remedy: FABRI management’s solution was to terminate negotiations with TAMU, Purdue, INRGREF, and UJ on the Water-Energy-Food Nexus research project. That provided roughly \$500,000 in accessible funds. The research proposal will be considered in the future, if considerable changes are made.

● STANDARDS AND DELIVERABLES SUBMITTED

Requirement	Standard or Deliverable	Date of Submission to USAID
1.1	<ul style="list-style-type: none"> Acceptance letter from Sultan Qaboos University and other Centers 	During first period
1.1	<ul style="list-style-type: none"> Workshop to launch implementation of MENA NWC 	12/5-8/11
1.3	<ul style="list-style-type: none"> Conference proceedings and technical reports prepared and distributed to Network members 	1/6/12
1.4	<ul style="list-style-type: none"> List of candidates for Founders Committee prepared 	2/21/12
1.4	<ul style="list-style-type: none"> CVs compiled for each candidate and shared with nominating committee 	2/21/12
1.4	<ul style="list-style-type: none"> Founders Committee established 	6/17/14
1.5	<ul style="list-style-type: none"> Call for small research grants proposals developed and released 	8/3/12
1.5	<ul style="list-style-type: none"> Research grant proposals selected and funded 	Multiple in 2014
2.1	<ul style="list-style-type: none"> Plan for strengthening legal and regulatory framework for IWRM in target countries 	3/14/12
2.1	<ul style="list-style-type: none"> Draft plan for capacity building in IWRM for target institutions submitted within six months after award 	3/14/12
2.2	<ul style="list-style-type: none"> Plan for evaluating and testing methodologies to promote efficient use of water resources 	3/14/12
3.1	<ul style="list-style-type: none"> Draft plan for strengthening capacity and performance of water and sanitation providers in AFR and MENA target countries 	8/15/12
3.2	<ul style="list-style-type: none"> Draft plan for improving operating environment for water and sanitation providers in AFR and MENA target countries 	In process
3.3	<ul style="list-style-type: none"> Draft plan for improving financial sustainability of water and sanitation sector in AFR and MENA target countries submitted within nine (9) months after award 	Delayed at request of USAID/AFR
4.1	<ul style="list-style-type: none"> Plan for conducting the identification and analysis provided within thirty 30 days after the award 	10/14/11
5.1	<ul style="list-style-type: none"> Plan for conducting the analysis provided within 30 days after award 	10/19/11
5.1	<ul style="list-style-type: none"> Assessment of transboundary water cooperation programs 	Delayed due to political turmoil
5.4	<ul style="list-style-type: none"> Pilot project design for transboundary water activity 	Delayed due to political turmoil
Section F.2(b) Deliverables	<ul style="list-style-type: none"> 90 day work plan completed within 30 days of Task Order award 	10/14/11
	<ul style="list-style-type: none"> First annual work plan completed and delivered within 60 days of task order award 	11/11/11
	<ul style="list-style-type: none"> Performance Monitoring Plan 	3/15/12
	<ul style="list-style-type: none"> FABRI Year One Annual Progress Report 	11/1/12
	<ul style="list-style-type: none"> FABRI Year Two Work Plan 	11/1/12
	<ul style="list-style-type: none"> FABRI Year Two Annual Progress Report 	10/24/13
	<ul style="list-style-type: none"> FABRI Year Three Work Plan 	10/24/13

	• Quarterly Progress Report No. One	1/18/12
	• Quarterly Progress Report No. Two	4/10/12
	• Quarterly Progress Report No. Three	7/15/12
	• Quarterly Progress Report No. Four	10/19/12
	• Quarterly Progress Report No. Five	1/10/13
	• Quarterly Progress Report No. Six	4/8/13
	• Quarterly Progress Report No. Seven	7/10/13
	• Quarterly Progress Report No. Eight	10/17/13
	• Quarterly Progress Report No. Nine	01/11/14
	• Quarterly Progress Report No. Ten	04/23/14

ANNEX A: FABRI SUBMISSIONS TO THE DEVELOPMENT EXPERIENCE CLEARINGHOUSE (DEC)

Deliverable	Date Submitted
Quarterly Progress Report No. One	12/11/12
Quarterly Progress Report No. Two	12/11/12
Quarterly Progress Report No. Three	12/11/12
Quarterly Progress Report No. Four	12/11/12
Quarterly Progress Report No. Five	3/12/13
Final Event Report - Nairobi Non-Revenue Water Conference	12/11/12
Final Event Report – FABRI/PEER Proposal Writing Workshop	12/11/12

ANNEX B: UPDATED PERFORMANCE INDICATORS

Intermediate Result (IR)	Sub IR	Indicator	ME or AFR	Standard Indicator Number	2014 Target	Final Target	Actual (Cumulative) as of March 14, 2014
1. Regional Science and Technology Capacity in Water Management Increased through Establishment of MENA NWC	1.1 MENA NWC Governance Structure Established	1.1.1 MENA NWC legally registered	ME	NA	yes	yes	Yes
		1.1.2 Number of essential governance structures established and operative (Founders Committee, Steering Committee, Board of Directors, Secretariat)	ME	NA	4	4	3: Founders Committee, Interim Board, Interim Management Unit
	1.2 MENA NWC Financially Sustainable	1.2.1 Business plan developed and approved	ME	NA	yes	yes	Business Plan developed and submitted to Founders Committee
		1.2.2 Financial support pledged from donors, private sector, and other sources	ME	NA	\$25M	\$25M	\$72,083 from Government of Oman
		1.2.3 Number of types of pledged donors (bilateral, multilateral, foundations, corporate, government, individual) demonstrates diversity of funding sources	ME	NA	4	4	2: Government, Foundation
	1.3 MENA NWC Technical Program Addressing Critical Regional Water Issues	1.3.1 Number of technologies or management practices under research as a result of USG assistance	ME	4.5.2-39a	10	10	13: As part of 9 PR&D Research Projects and 3 U.S.-Network Research Partnerships
		1.3.2 Number of technologies or management practices under field testing as a result of USG assistance	ME	4.5.2-39b	10	10	6

Intermediate Result (IR)	Sub IR	Indicator	ME or AFR	Standard Indicator Number	2014 Target	Final Target	Actual (Cumulative) as of March 14, 2014
		1.3.3 Number of technologies or management practices made available for transfer as a result of USG assistance	ME	4.5.2-39c	4	4	0
		1.3.4 Number of government agencies, private sector firms, and/or civil society organizations partnering with Network Centers on research and development projects	ME	NA	20	20	40 engaged in submitted proposals
		1.3.5 Number of young and women researchers engaged in MENA NWC supported research activities	ME	NA	40	40	53 on 9 PR&D Research Projects, 3 U.S.-Network Research Partnerships, 7 Young Water Scientists Partnership proposals, and 16 Water Innovation Fellowships Proposals
		1.3.6 Number of private enterprises, producers organizations, water users associations, women's groups, trade and business associations and community-based organizations that applied new technologies or management practices as a result of USG assistance	ME	4.5.2-42	12	12	0
		1.3.7 Number of visits to the MENA NWC website	ME	NA	25,000	25,000	Website development initiated. Expected launch in Third Quarter of Year Three.
		1.3.8 Number of fans on the MENA NWC Facebook Page	ME	NA	5,000	5,000	0

Intermediate Result (IR)	Sub IR	Indicator	ME or AFR	Standard Indicator Number	2014 Target	Final Target	Actual (Cumulative) as of March 14, 2014
	1.4 MENA NWC Strengthened through Private Sector Participation	1.4.1 Number of private sector partners participating in MENA NWC	ME	NA	15	15	3
2. Integrated Water Resource Management Programming Strengthened	2.1 IWRM Legal and Regulatory Frameworks Strengthened	2.1.1 Number of government agencies, utilities, and service providers involved in IWRM research activities	ME	NA	8	8	3
	2.2 IWRM Methodologies Implemented	2.2.1 Number of private enterprises, producers organizations, water users associations, women's groups, trade and business associations and community-based organizations (CBOs) that applied new technologies or management practices as a result of USG assistance	ME	4.5.2-42	6	6	0
3. Access to Clean Water and Sanitation Expanded in Target Countries	3.1 Water and Sanitation Service Provider Performance Strengthened	3.1.1 Number of water operator partnerships facilitated	AFR	NA	9	9	In process through NRW program
		3.1.2 Number of private sector sanitation service providers that have improved management practices as a result of USG assistance	AFR	4.6.2-9	9	9	NRW program underway with audit as Stage I
		3.1.3 Number of service providers implementing water loss programs with USG assistance	AFR	3.1.8.1-2	50	50	26

Intermediate Result (IR)	Sub IR	Indicator	ME or AFR	Standard Indicator Number	2014 Target	Final Target	Actual (Cumulative) as of March 14, 2014
		3.1.4 Number of private sector sanitation interventions started with USG assistance	AFR	NA	15	15	0
		3.1.5 Number of visits to African water associations' newly designed websites	AFR	NA	25,000	25,000	Redesign in process
		3.1.6 Number of fans of the Facebook pages of the African water associations	AFR	NA	5,000	5,000	0
	3.2 Water and Sanitation Service Operating Environment Improved	3.2.1 Number of governments developing national sanitation strategies	AFR	4.6.1-17	15	15	0
	3.3 Water and Sanitation Sector Financial Sustainability Improved	3.3.1 Number of governments developing plans to obtain outside financing for utility investments	AFR	NA	9	9	Stage 3 of NRW program
		3.3.2 Number of innovative solutions or mechanisms for mobilizing financing for non-revenue water and sanitation programs	AFR	NA	5	5	0
4. Research and Development Capacities in Irrigation, Groundwater Management, and Drought Risk Assessment and Mitigation Strengthened	4.1 Best Practices for Efficient, Productive Use of Water in Agriculture Identified.	4.1.1 Number of technologies or management practices under research as a result of USG assistance	ME	4.5.2-39a	10	10	13: As part of 9 PR&D Research Projects and 3 U.S.-Network Research Partnerships
		4.1.2 Number of technologies or management practices under field testing as a result of USG assistance	ME	4.5.2-39b	10	10	6

Intermediate Result (IR)	Sub IR	Indicator	ME or AFR	Standard Indicator Number	2014 Target	Final Target	Actual (Cumulative) as of March 14, 2014
		4.1.3 Number of technologies or management practices made available for transfer as a result of USG assistance	ME	4.5.2-39c	4	4	0
5. Transboundary Water Cooperation Strengthened in Key River Basins	5.1 Analysis of Transboundary Cooperation Identifies Model Programs and Interventions	5.1.1 Number of transboundary water resources sustainability assessments undertaken	ME	4.5.2-41e	2	2	1 by OSU
	5.2 Transboundary Pilot Project Launched	5.2.1 Number of exchanges (government-to-government, non-government-to-non-government; non-government-to-government)	ME	NA	4	4	0
6. Technical and Outreach Capacity of USAID Staff in WASH Programming Enhanced	6.1 WASH Technical and Outreach Capacity of USAID Staff Increased	6.1.1 Number of WASH training events for USAID staff	ME/AFR	NA	3	3	0
		6.1.2 Number of USAID staff trained in WASH	ME/AFR	NA	90	90	0
		6.1.3 Number of WASH guidance materials updated or developed	ME/AFR	NA	6	6	0
	6.2 USAID WASH Visibility and Outreach Increased	6.2.1 Number of conferences and outreach events facilitated or supported	ME/AFR	NA	6	6	3: AWW 2012 AWW 2014 WWW2013

**ANNEX C: MENA NWC RESEARCH PROJECT START-UP
MEETING SUMMARIES**

MENA NWC

Middle East and North Africa Network of Water Centers of Excellence

RESEARCH PROJECT START-UP MEETING

PARTICIPATORY PLANNING FOR IMPROVING WATER USE EFFICIENCY IN RIVER BASINS

March 18-19, 2014

Tunis, Tunisia

Participants

National Researches Institute for Rural Engineering, Water and Forestry (INRGREF), Tunisia

BEN ABDALLAH Mohamed Ali, Director General

JEBARI Sihem, Lead Principal Investigator, Researcher, Water Resources

BEN NOUNA Bechir, Researcher, Irrigation

EL AMAMI Hacib, Researcher, Socio-economy

HANAFI Salia, Engineer, Rural Engineering

HERMASSI Taoufik, Researcher, Hydrology

MOUELHI Safouen, Researcher, Rural Engineering

Hassan II. Institute of Agronomy and Veterinary Medicine, Morocco

IMANI Yasmina, Co-Principal Investigator, Researcher, Water Resources

LAHLOU Ouïam, Researcher, Agronomy

National Center for Agricultural Research (NCARE), Jordan

SABA Muna, Co-Principal Investigator, Researcher, Drought Management

NAOUM Sireen, Researcher, Agronomy

Stockholm Environment Institute (SEI), California Center, US

JOYCE Brian, WEAP Modeling Expert

Stockholm Environment Institute (SEI), Boston Center, US

PURKEY David, Co-Principal Investigator/ External Collaborator, US Water Group Leader

Farmland Conservation and Management Department (DG/ACTA), Tunisia

BEN HAHA Naoufel, Assistant Director, Planning

HAMDI Salah, Chief Service, Socio-economy

LAOUINI Sana, Engineer, Rural Engineering

MAALOUL Fatma, Engineer, Water Resources

Dams and Large Hydraulic Works Department (DG/BGTH), Tunisia

JEMMALI Khelil, COO, Dams

Rural Engineering Department (DG/GR), Tunisia

MNEJJA Abdel Hamid, Director, Irrigation Associations and NGOs

SECADENORD, Tunisia

BEN CHEIKH Ezzeddine, COO, Hydraulics

BEN ZID Chaker, Engineer, Hydraulics

The Regional Office of Agricultural Development CRDA Manouba, Tunisia

BEN AMOR Thouraya, Divisional- Irrigation Regional Office

Water Resources Department, DGRE, Tunisia

FRIGUI Hassen Lotfi, Director, Surface Water Department

REJEB Mondher, Director, Hydrological Network

TRIKI BELGHITH Lobna, Chief Service, Groundwater Resources

LAZRAK Ayman, Engineer, Hydrology

The Regional Office of Agricultural Development CRDA Siliana, Tunisia

MANTOUCH Salah, Director-regional office, Water Management

CHENNOUFI Med Nejib, Chief service-regional office

ALOUANE Yosra, Engineer, Farm Land Conservation and Management

National Center for Agricultural Studies (CNEA), Tunisia

JLASSI Nabil, Engineer, Rural Engineering

Office of Planning and Water Balance (BPEH), Tunisia

SOUISSI Abderrazek, General Director

GAFSAOUI Yousri, Engineer, Rural Engineering

Group for Agricultural Development (GDA), Tunisia

AYARI Lotfi, Farmer and member in the association

Other

Razan Quossous, ECO Consult/ Further Advancing the Blue Revolution Initiative,
Jordan

Agenda

DATE	SESSION	LEADER
March 18	<ul style="list-style-type: none"> • Welcome and introductions • Overview of FABRI Network • Overview of overall project objectives • Integrated water planning, an opportunity for the MENA region • Partners' presentations and research activities • Discussion of the project hopes and fears at the start of the project • Discussion of the project work-plan, milestones, timing and roles • Project management and communications • Discuss future meetings 	BEN ABDALLAH Mohamed Ali QUOSSOUS Razan JEBARI Sihem PURKEY David IMANI Yasmina SABA Muna BEN NOUNA Bechir JOYCE Brian
March 19	Full day field trip to Mejerda River Basin. The field trip covered seven sites related to hydraulic infrastructures, (dam, canal, lake) as well as an irrigated perimeter and an association. Participants had the opportunity to talk to officials in charge of the visited stations in addition to farmers' representatives and get an understanding the main context of water resources management. The field trip covered: <ul style="list-style-type: none"> • Water management in Mejerda downstream, Hydraulic infrastructure and transfer channel. • Waterworks and irrigated perimeter • Meeting with stakeholders • Sidi Salem Dam 	JEBARI Sihem, JEMMALI Khelil BENCHEIKH Ezzeddine BEN HAHA Naoufel EL AMAMI Hacib BEN NOUNA Bechir LAZRAK Aymen AYARI Lotfi

Background

The project will develop an innovative approach to decision making under uncertainty that integrates climatic, hydrologic, agricultural and socioeconomic information to enhance catchment scale water system performance. This will be done through working in pilot systems in Jordan (Wadi Al-Taibeh), Morocco (Souss-Massa Basin) and Tunisia (Mejerda Catchment). These systems benefit from long-term observations and mapping that have produced databases to serve as input for water management scenario analysis and ultimately decision making. Decision support in these basins will involve the application of the WEAP system which has been under development for over 20 years within Stockholm Environment Institute (SEI), the project's primary external collaborator. Using WEAP as an analytical engine, the project will focus on:

- 1- Analyzing water system performance based on current climate variability and water use patterns,
- 2- Developing water decision support tools to identify strategies to improve future system performance under conditions of change, and
- 3- Disseminating the conclusions of the effort both nationally and internationally.

Major Observations and Decisions

1. The WEAP Modeling Software

There was a discussion among the participants about the suitability of the WEAP Modeling Software for the analysis purpose of the project, and whether it is an appropriate and reliable tool for this research. It was clarified by David from Stockholm Environment Institute (SEI) that the model is a very useful tool in certain contexts. For example, it's much known in Jordan and has been used by the Ministry of Water and Irrigation for Jordan's National water master plan. The model was developed 20 years ago, is available in 24 languages, and is downloaded from the internet on a daily basis from all around the world. Participants mentioned different other tools (e.g., SWAT) and asked about WEAP subroutines that consider different crops.

2. Existing Master Plans in Tunisia

The participants pointed out that the project should take into consideration existing master plans in Tunisia that were developed for the North, Center and South parts in addition to all the previous work that was done in this regard to make sure it is reflected in the project and that work is not duplicated.

3. Demand and Supply Sides

Demand management is a key aspect of this project. In terms of financial implications, the project can include activities to consider it. It was well explained by the different partners that besides the management of supply, the water demand management is included within the different activities of the project. In fact, former research outputs help set best practices and make them available to integrate. Information on water requirements and crop productivity will be emphasized in the research. Finally, different irrigation management options with the integrated systems models will also be considered.

4. Hopes for the project:

The core team members discussed their hopes from the project. These were as follows:

- Have empirical results that can be used by planners
- Related Ministries use the outcomes of the research project
- Establishment of strong partnerships among stakeholders
- Help advance and expand new tools and technologies
- Developed tools have a home after the project is completed
- Project will help improve livelihoods in the river basins
- Enhancing cooperation between the researchers and the water use community in the region
- Share data and produce papers
- Innovation at different scales- project results are applicable at local, central and national levels.

5. Project Fears

After discussing the hopes from the project, the core team members discussed their fears. These are summarized as follows:

- Lack of access to data
- Meeting the project deadline due to the extensive data collection requirements in a very limited timeframe
- Failure to motivate key stakeholders and water management communities which will affect their interest to participate and cooperate in the project.
- Fear that the project may not be relevant- gap between analysis and reality.
- Scales of analysis do not match up across countries- catchment scales
- Project requires long time to introduce social change.
- Developed tools may not find a home at the end of the project.

The results of the exercise (hopes and fears) were extremely useful and interesting and indicated very similar expectations as well as a high level of consensus on the problems that may arise during the project life. These aspects were discussed all along the workshop in order to be tackled properly in the project.

6. Watershed Hydrology

If the teams have previously developed a watershed hydrology model, then it can be used. If not, the team will need to develop it from scratch. In the project case, the model will need to be developed from for all the partners in Jordan, Morocco, and Tunisia to represent rainfall run off hydrology. If all the teams use the same model, it can be compared across the different regions and geographies. If data is not available, the team will need to make assumptions. If the teams find that they have 80% of the data already, then it is considered that data is available and very good to use.

7. Data collection

NCARE Team mentioned that in Jordan, most of the data will be available at the administrative level and not the water shed level. It's not clear to the team how they will disaggregate the data to smaller units to cover the agricultural watershed. It was clarified by Stockholm Environment Institute that the team will need to estimate the disaggregated data to cover the watershed. The team will need to document all the assumptions that they made and make sure they are comfortable with these assumptions. The teams will then integrate the data into the WEAP model, identify additional data needed to run the scenarios, and develop common data base.

8. Modeling Timeline

It was discussed that Stockholm Environment Institute will develop a timeline for the work activities that they will do for the modeling so that the team members can provide the needed data in a timely manner.

9. Work plan

It was mentioned that the project partners were not aware of each others' work plans at the proposal preparation phase, therefore, could not coordinate well the activities. It was agreed at the meeting that now since the project has started, partners need to collectively develop an integrated work plan for the project and revise and align activities as needed. This was agreed as a top priority now since it will be the second deliverable for the project, and to provide clear and complete information on the dates of the deliverables and milestones. Of specific importance are the activities that will be engaging all the centers at the same time like the training to be provided by Stockholm Environment Institute to the project team members.

10. Pilot Site Location in Jordan

The Team Members from NCARE raised a point about the project site location in Jordan "Wadi Al-Taibeh". It was mentioned that this site may not have sufficient existing data that can be used for the project analysis. It was agreed that the project team will check on the availability of data and see if there is a need to change the site location to another location that will have more readily available data. A much larger catchment is preferable.

11. Modeling Activity

It was mentioned that it's important to identify the staff members in each partner institutions that will be involved in the modeling activity in the project. These staff members can receive online tutorials and training on how to use the software. These staff members have to be identified and introduced to Brian

from Stockholm Environment Institute who will be working closely with them on the modeling requirements so that when the team gets to the training they will be familiar with the software and its uses. Each partner should name a modeling team in each country so that Brian can reach out to this team. It was agreed that within two weeks, the team will nominate the modeling team in their institution.

12. Date for Training on WEAP

The training on the WEAP software was supposed to happen by July 1st but that is not possible for all the partners. Several options were discussed for doing the training, including the option of having the partners get together and meet in person for the training and invite other stakeholders to participate in the training so they get involved in the project and have their buy in. Finally it was agreed that INGRES and IAV II will do the training together either in Tunisia or Morocco, and Brian will travel to Jordan to deliver the training to NCARE staff members. The training will be at least three days. It was discussed that it will be more useful to do the training when the data has been collected. It was agreed that the most suitable time is the week of the 16th of June to deliver the training.

Brian may be in Jordan in May for another project. He will see if it will be possible for him to extend his stay in Jordan to deliver the training to NCARE around that time.

Brian and David will lay out the steps needed and requirements from the partners to get to week 16th of June. By that time, the core modeling team should have been defined, and by that time they should know Brian very well electronically and create a community of practice between the group. If Brian is going to go back to the countries at a later point, he can do targeted raising awareness to stakeholders in the different countries.

Brian will be giving a presentation in Marakesh in September, which is another opportunity to give training to stakeholders in Morocco.

13. Data Type and Quality

It was agreed that Stockholm Environment Institute will provide continuous feedback to the project partners during the data collection process on the collected data type, quality and sufficiency. It was mentioned that the team will stay in close contact with Brian Joyce from Stockholm Environment Institute to provide advice to the team and make sure that data collection is progressing well.

14. Communication

The team agreed to do weekly meetings on “go to meeting” software or skype or use other tools for communication and provision of feedback. They also agreed to use “dropbox” for file sharing. The team needs to meet weekly with Brian to make sure that the work activities related to the modeling are moving well.

15. Holding a Participatory Meeting

David from Stockholm Environment Institute suggested that the team members do a participatory meeting with decision makers to have structured interactions around the project outcomes. It was mentioned that if interested, the team will need to put resources and effort to organize a structured workshop with decision makers and possibly raise funds for it. David offered to deliver training for the centers on how to engage decision makers/stakeholders in a structured way to identify problems and solutions. He offered to write a proposal on a TOT for a problem formulation workshop in each of the three countries.

16. Data on Climate Change

The team will need to collect data and information on climate change in each country. Stockholm Environment Institute advised the team that they need to engage entities in their countries that do climate change predictions. It was mentioned that different countries report to UNCC and should have the info available. The data should be provided at the basin scale and/or disaggregated to basin scale level. It was mentioned that the team will be exposed to techniques that will allow them to downscale the data to the basin level. It was mentioned that the more data, specifically historical, is provided the better for each country. If there is regional hydraulic model, it will be even better.

19 March 2014

RESEARCH PROJECT START-UP MEETING

MITIGATING ENVIRONMENTAL RISKS OF WASTEWATER REUSE FOR AGRICULTURE

APRIL 1-3, 2014

SULTAN QABOOS UNIVERSITY
MUSCAT, OMAN

Participants

<ul style="list-style-type: none">• Dr. Ahmed Al-Busaidi, Associate Researcher, Sultan Qaboos University (SQU)• Dr. Osman Abdalla, Director (Water Research Center), SQU• Dr. Mushtaque Ahmed, Associate Professor, SQU• Dr. Slim Zekri, Associate Professor, SQU• Dr. Rashid Al-Yahyai, Assistant Professor, SQU• Mr. Saif Al-Khamisi, Director of plant research, Ministry of Agriculture• Ms. Zayana Al-Hashmi, Young Researcher, SQU	<ul style="list-style-type: none">• Ms. Nawal Al-Wihabi, Young Researcher, MSc student, SQU• Dr. Marwan Alraggad, Groundwater and water quality, University of Jordan• Dr. Olfa Mahjoub, Researcher, National Research Institute for Rural Engineering, Water, and Forestry (INRGREF)• Dr. Jeff Ullman, Associate Professor, University of Florida• Mr. Kenneth Ludwa, Grants Program Manager, FABRI
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SQU College of Agriculture Laboratory Manager Jamal Sabahi (on left) explains the lab's analytical capabilities to the project's four principal investigators: Ahmed Al-Busaidi (SQU), Marwan Alraggad (UJ), Olfa Mahjoub (INRGREF) and Jeff Ullman (University of Florida).

Agenda

Day 1 April 1, 2014

• Time	• Activity	• Chair
• 9-10	• Welcome • Teams presentations	• Osman and Ken • Ahmed • Marwan • Olfa
• 10-10.20	• Coffee break	•
• 10.20-12.30	• WP 2 Identification of crops irrigated with wastewater and groundwater and crops to be grown with treated wastewater and groundwater during the year • <i>Involved partners: SQU, UJ, INRGREF.</i> • <i>Start date: month 1</i> • <i>End date: month 2</i> • WP 3 Assessment of the performance of identified crops • <i>Involved partners: SQU</i> • <i>Start date: month 2</i> • <i>End date: month 12</i>	• SQU
• 12.30-14	• Lunch and Prayer	•
• 14-16	• WP 4 Monitoring the impact of irrigation with reclaimed water and conventional water resources on soil physicochemical properties and groundwater • <i>Involved partners: SQU, UJ, INRGREF</i> • <i>Start date: month 2</i> • <i>End date: month 12</i> • WP • 4.1. Treated wastewater quality assessment • <i>Involved partners: SQU, INRGREF, UJ</i> • <i>Start date: month 2</i> • <i>End date: month 12</i> • WP • 4.2. Groundwater and soil quality assessment • <i>Involved partners: SQU, INRGREF, UJ</i> • <i>Start date: month 2</i> • <i>End date: month 12</i>	• SQU
• 19.00	• Group Dinner	•

Day 2 April 2, 2014

• Time	• Activity	• Chair
• 8.30-10	• WP 4.3 Assessment of farmers practices during the use of TWW • <i>Involved partners: INRGREF</i> • <i>Start date: month 2</i> • <i>End date: month 12</i> • WP 6.2 Groundwater vulnerability.	• INRGREF

		<ul style="list-style-type: none"> Involved partners: UJ, INRGREF with the help of UJ Start date: month 6 End date: month 12 	
• 10-10.20		<ul style="list-style-type: none"> Coffee break 	•
• 10.20-12.30		<ul style="list-style-type: none"> WP 5 Study the impacts of using TWW in irrigation on environment and potential risks for human health Involved partners: SQU, INRGREF, UJ Start date: month 2 End date: month 12 	• INRGREF
• 12.30-14		<ul style="list-style-type: none"> Lunch and Prayer 	•
• 14-16		<ul style="list-style-type: none"> WP 6.1: Develop decision support system for policy makers and stakeholders based on the optimization of wastewater reuse and farmer's income Involved partners: SQU, INRGREF, UJ Start date: month 6 End date: month 12 	• INRGREF

Day 3 April 3, 2014

• Time	• Activity	• Chair
• 8.30-10	<ul style="list-style-type: none"> WP 7: Knowledge dissemination and Capacity building Involved partners: SQU, INRGREF, UJ Start date: month 2 End date: month 12 Training of Trainers (TOT). Decision makers (managers and planners). Outreach to farmers (Workshops, posters, flyers, etc.). 	• UJ
• 10-10.20	<ul style="list-style-type: none"> Coffee break 	•
• 10.20-12.30	<ul style="list-style-type: none"> WP 7: Knowledge dissemination and Capacity building Involved partners: SQU, INRGREF, UJ Start date: month 2 End date: month 12 MENA NWC network Broader audience and general public (E-Learning module, videos ...). 2.B.iv. External Collaborator Participation 2.B.v. Stakeholder Participation 	• UJ
• 12.30-14	<ul style="list-style-type: none"> Lunch and Prayer 	•
• 14-16	<ul style="list-style-type: none"> 2.D. Management Plan 2.E. Knowledge Management Plan 2.B.vii. Travel and Meetings The scientific community 	• UJ

Background

Low rainfall and overexploitation of conventional water resources present a critical problem in many regions of the Middle East and North Africa. There exists a dire need for judicious management of existing water supplies, including the use of non-conventional water resources. With appropriate safeguards, treated wastewater can be reused in agricultural production, thereby reducing consumption of surface water and groundwater resources. Agricultural irrigation with treated wastewater is an age-old practice in Tunisia and Jordan while in Oman it is relatively new. Treated wastewater reuse presents human health and environmental risks, some of which are well-documented (pathogens, soil salinization), and some of which are still emerging (trace organic pollutants). Additional research is needed to characterize these risks and develop safeguards, particularly in the Middle East and North Africa.

This project aims to identify means/tools to optimize treated wastewater reuse in conjunction with other available water resources by taking into consideration their quantity and quality, in addition to the agronomic, environmental, human health and economic components. As a result, a model (decision support system) will be developed to recommend best management practices, tailored to local conditions, to increase production and reduce risks when using treated wastewater for irrigation.

Specifically, the project aims to:

1. Evaluate the extent of the conjunctive use of treated wastewater and conventional water resources and its potential impacts on soil and groundwater quality while minimizing the risk of their degradation.
2. Evaluate the agronomic and environmental impacts of the reuse of treated wastewater on irrigated crops considering quality and quantity and the availability of conventional water resources .
3. Develop a decision support system for policy makers and stakeholders to optimally use treated wastewater for irrigation, maximizing farmers' income while maintaining human and health risks at an acceptable level.

Major Observations and Decisions

1. Work plan

- **Crop study:** Each partner will provide a list of potential crops to study. Saif Al-Khamisi, Director of Plant Research, Oman Ministry of Agriculture (and SQU researcher) will advise each partner on the selection crops to be irrigated with wastewater and groundwater, for analysis of crop performance, and to be analyzed chemically (heavy metals) and biologically (bacteria) to evaluate potential risk from consumption.
- **Emerging pollutants and pharmaceuticals:** The team discussed sampling and analysis of emerging pollutants and pharmaceuticals. Each partner will consult with local hospitals to see what pharmaceuticals are routinely prescribed. Then they will look for overlaps in drugs used in the three countries, and target these drugs for analysis in wastewater. Jeff Ullman, University of Florida, will develop sampling protocols and provide training. Each partner will collect treated wastewater samples and send the samples to Dr. Ullman for analysis.
- **Soil and groundwater analysis:** The three centers will check their field and laboratory methods and communicate them to each other to ensure that they will produce comparable data.
- **Survey of farmers' practices:** INRGREF will perform a survey to diagnose farmers' practices with regard to water sources (quantity and quality) and application during drought and non-drought periods. The survey will also explore health, environmental, economic, and sustainability issues related to working with wastewater.

- **Groundwater vulnerability modeling and mapping:** UJ will lead the groundwater vulnerability modeling and mapping, using the DRASTIC model applied with GIS.
- **Decision support system:** Programming of the DSS will be led by SQU. The DSS will be developed first for Oman's case study, and then adapted to each country. The DSS for each country will use the same algorithms, but the user interface may be customized to each country, depending on the targeted end-users.
- **Knowledge dissemination:** The knowledge dissemination plan includes outreach and workshops targeting farmers, policy makers, students, and training of trainers.
 - **Jordan** includes training for the groundwater vulnerability mapping. Ideally, this would include an attendee from Tunisia as well. March 2015. Jordan will also develop an online e-learning course for students, end-users, and any other interested persons (publicly accessible).
 - **Tunisia** will have two or three workshops for farmers. These will be two-way interactive workshops, to provide training to farmers and to take feedback from farmers on implementation of the best practices. Regional policy makers and water user association representatives will also attend. Starting September 2014.
 - **Oman** will develop online videos, hold outreach events with farmers' associations, incorporate project results into SQU courses, and develop written bulletins for stakeholders.

2. Schedule

For internal purposes, the team adjusted its expected dates to complete some milestones. FABRI Grants Program Manager Ken Ludwa explained that there is no penalty for submitting milestones later than the submission dates stated in the Grant Agreement, but grantees only receive payment when submitting complete milestones. Ken Ludwa also explained that FABRI would ask for Progress Reports on the 1st of each quarter per the original schedule of milestones and deliverables, even if other deliverables will not be submitted on these dates.

3. Research Team

The kickoff meeting included several members of SQU's research team, including the Lead PI Ahmed AL-Busaidi; Saif Al-Khamisi, an SQU researcher who also works for the Oman Ministry of Agriculture; and two young women master's degree students. PI Olfa Mahjoub attended from INRGREF and PI Marwan Alraggad attended from UJ. Jeff Ullman from the University of Florida attended and provided guidance on water sampling plans, emerging pollutants, and outreach.

4. Future Meetings

The team tentatively scheduled future meetings in November 2014 (Tunisia) and June 2015 (Jordan).

Outstanding Issues and Resolution

FABRI needs to advise the team on two issues relating to the project schedule:

1. As the team has been developing its work plan, they project that certain deliverables would be completed later than indicated in the schedule of milestones and deliverables. For example, they think two out of three deliverables for a certain milestone would be done close to the date expected, but one of the deliverables would be done several months later. Since each milestone must include all of the named deliverables, they would not be able to submit the complete milestone until the final deliverable is done.

2. On a related note, SQU's and INRGREF's grant agreements were executed in late March, and UJ's grant agreement was not executed as of the project start-up meeting. However, the first three milestones were due February 15, March 15, and April 1. The team will be submitting these milestones later. For example, they will probably send Milestone 3 (originally due April 1) closer to the next quarterly cutoff of July 1. The issue is that Milestone 3 specifies a progress report with a reporting period of January 1 - March 31. This will probably carry on for another quarter or two until they catch up.

Ken Ludwa
3 April 2014