

# MIRRA

Methods for Irrigation and Agriculture

MIRRA and UNDP are Helping Small Farmers in Azraq to Embrace **Agroecological Practices** for more Sustainable Agriculture.



MIRRA and MIT are Testing a Promising and **Innovative Irrigation Controller** in the Jordan Valley.



MIRRA and the University of Manchester Introduce a **Transboundary Rivers Online Modeling** Tool to Stakeholders from Iraq, Syria, Turkey, Egypt, Sudan and Jordan.



MIRRA and FUSE with Relevant Stakeholders Explore the Major Barriers to the Application of the **Food- Water- Energy Nexus** in Jordan.



## MIRRA and UNDP are Helping Small Farmers in Azraq to Embrace Agroecological Practices for more Sustainable Agriculture.

By Leen Ramahi and Samer Talози

MIRRA signed an agreement with the United Nations Development Programme (UNDP) to implement a project entitled "Enhancing Food Security through Piloting Agroecology Practices and Capacity Building."

The initiative aims at promoting sustainable agricultural production among small farmers in Azraq through the adoption of agroecological practices.

The biggest challenges facing farmers in Azraq are groundwater depletion and soil salinization.

These challenges are diminishing crop yields and threatening the sustainability of agriculture. They have even led some farmers to go out of business and abandon their farms.

In Jordan, there have not been many documented applications of agroecology in farming systems. Hence, farmers lack knowledge about agroecology practices that could greatly improve soil fertility and crop water productivity. MIRRA and UNDP aim to raise farmers' awareness on low-cost and replicable agroecology practices such as intercropping, crop rotation and chemical-free agriculture. These provide significant



**SGP** The GEF  
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opportunities for sustainable agricultural production, increased water use efficiency, ecosystem improvement and climate resilience, as well as food sovereignty and economic stability. As part of this project, MIRRA has conducted farm audits at 21 farms in Azraq. The purpose of these audits was to understand current agricultural practices, challenges and opportunities for water conservation, increasing water productivity, and sustaining the soil and groundwater in the area.

Furthermore, MIRRA has conducted a series of workshops with small farmers in Azraq to better understand their needs, challenges, and aspirations.

Finally, MIRRA has selected 4 small farms to implement and pilot several agroecological practices.

Please tune in to our upcoming newsletters for more updates about this project and the 4 pilot studies.



## MIRRA and MIT are Testing a Promising and Innovative Irrigation Controller in the Jordan Valley.

By Fana Cisse and Samer Talazi

This year's fall has taken an exciting turn as the Massachusetts Institute of Technology (MIT) and MIRRA installed a trial irrigation controller in MIRRA's Climate Smart Farm in the Jordan Valley. This field test is part of their partnership project, "Tuning water delivery to evapotranspiration using ultra-low energy drip irrigation and commercializing it in the MENA region," which is funded by USAID.



Carolyn Sheline and Fiona Grant, two PhD candidates in the MIT Global Engineering and Research (GEAR) Lab, are part of the controller development team and have been collaborating with MIRRA on-site over the past year. They explained that the aim with the new controller is to optimize both water and energy use efficiency for a solar-powered drip irrigation system. The controller predicts the weather, estimates the crop water demand, and maps the daily demand to the daily solar power available.



The system then communicates the daily irrigation schedule to the farmer through an easy-to-use, interactive digital interface (mobile application). The goal is to guide the farmer to irrigate with just the right amount of water using drip irrigation, with an



Massachusetts  
Institute of  
Technology

optimally-sized power system. Besides resource-efficiency, affordability stands as a priority for the design team. Carolyn highlighted, "if it's not cost effective, then farmers are not going to adopt it." To enable this integrative precision irrigation system to be low cost, the team intentionally implemented most of the controller's complexity in its software rather than its hardware.

Field-testing of the irrigation controller on a real farm in Jordan will allow the team to measure the performance of the new system under local conditions and compare it to conventional farmer practices. "We need to see how it operates at a full-scale," Fiona said, adding, "we just can't do that in our lab."



The results generated from these trials will allow the team to see what parts of the controller system need further refinement. Ultimately, the goal is to put the product on the market, so that farmers who need it everywhere can start reaping the benefits of this promising innovation. MIRRA's Climate Smart Farm is home to several other innovations that are being tested and adopted to real farm conditions in the Jordan Valley. MIRRA has been helping international partners to assess and pilot various innovative technologies in real farm settings since 2007. Subscribe to our newsletter to continue receiving updates about the new MIT-designed Irrigation Controller and other innovations.



# MIRRA and the University of Manchester Introduce a Transboundary Rivers Online Modeling Tool to Stakeholders from Iraq, Syria, Turkey, Egypt, Sudan and Jordan.

By Mai Nuseir and Samer Talozzi

MIRRA and the University of Manchester, UK, organized, under the patronage of HRH Prince Al Hassan Bin Talal, the last workshop in the FutureDAMS project. This 3-day event brought together researchers, modelers and young academics from six Middle Eastern countries, namely Iraq, Turkey, Syria, Sudan, Egypt, and Jordan. The fifteen participants were introduced to a new online modeling tool for water resource sharing and management designed by the University of Manchester, and a new hydrogeological river basin model for the Euphrates and Tigris rivers basin developed by MIRRA for more informed policy- and decision-making around proposed water infrastructures and allocations.

FutureDAMS, or Future Design and Assessment of Water-Energy-Food-Environment Mega Systems, was launched in 2019 to increase understanding around the far-reaching impact of dams and their operation, cascading through socio-economic, ecological and political systems. With such awareness, stakeholders can develop and negotiate solutions that are not only economically viable, but also socially and environmentally beneficial. Thus, the workshop focused on building capacity in people likely to use the interface and the outputs it provides in future water management applications or research projects in their respective countries.

The program took off with an opening ceremony,



The University of Manchester

during which HRH Prince Al-Hassan Bin Talal delivered a speech stressing the importance of having a regional database accessible for future policy and decision makers in the region of the Levant and East Africa. Dr. Samer Talozzi from MIRRA presented about the region's most pressing issues regarding water resource management and transboundary conflicts; and Prof. Julien Harou from the University of Manchester explained the technical aspects of the model as well as the program's expected outcomes. The group then engaged in a day and a half of technical training on new innovative transboundary rivers management tools, performing hands-on simulation exercises around the Tigris-Euphrates river basins. The third and last day included a field trip to the Jordan River Valley and the Dead Sea. As we wave goodbye to the FutureDAMS Middle East project, we hope that the newly introduced modeling tool will keep fostering a spirit of informed collaboration around shared water resources in the region, on a larger scale. To learn more about this initiative, please visit: [www.futuredams.org](http://www.futuredams.org)



# MIRRA and FUSE with Relevant Stakeholder Explore the Major Barriers to the Application of the Food- Water- Energy Nexus in Jordan.

By Samer Talazi



MIRRA contributed to the implementation of the 4-year Food-Water-Energy for Urban Sustainable

Environments (FUSE). The project is implemented by research and academic institutes including, Stanford University, Helmholtz Centre for Environmental Research (UFZ), Austrian Foundation for Development Research (ÖFSE), International Institute for Applied Systems Analysis (IIASA). The project aim was to create local- adapted solutions to the Food Water Energy (FWE) Nexus challenges by developing multi-agent urban-FWE system



models to capture interactions among users, producers, distribution mechanisms, and resources under changes in climate, demographics, land use, and economics, develop and evaluate policy interventions to identify sustainability options.



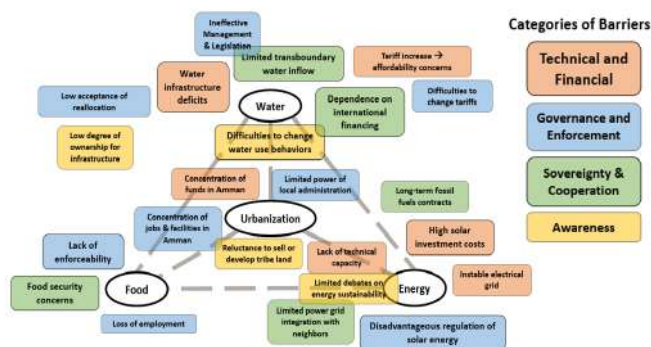
As part of the project, MIRRA organized two series of living lab workshops in Jordan to collect input and feedback from different stakeholders at different levels. The purpose of the first workshop (September 2019) was to identify barriers that impede the implementation of solutions. Detailed analysis



of additional aspects of the urban FWE nexus was conducted to simulate the effects of policy interventions aimed at improving the sustainability of further components of the urban FWE nexus. The analysis of the results is integrated in the development of the system models. The results of the analysis were presented to stakeholders and policy experts in the second series of workshops (September 2021) to get feedback and to be included in the model development.



The major barriers to the NEXUS approach in Jordan were identified and divided into 4 categories, 1) technical and financial, 2) governance and enforcement, 3) sovereignty & cooperation, and 4) awareness as seen in the schematic diagram. To learn more about FUSE visit: <https://fuse.stanford.edu/>



**Schematic Diagram:** Barriers to the implementation of WEF solutions. The barriers are divided into four categories technical and financial, governance and enforcement, sovereignty & cooperation, and awareness



## Announcements Corner New projects!

MIRRA is delighted to announce that it received two additional funds that will contribute to its programs and mission for the coming year. The first is from Nuffic, the Dutch Organisation for Internationalisation in Education, which will support MIRRA's program on the promotion of Climate-Smart Agriculture. This fund will target Jordanian and Syrian youth.



We are also pleased to announce that AICS, the Italian Agency for Development and Cooperation and AVSI, the Association of Volunteers in International Service, have provided funding that will support MIRRA's program on adaptation to Climate Change and enhancing Food Security. Our target in this initiatives are select vulnerable communi-ties in southern Jordan.



People for development

learn more about these two new projects, stay tuned for our upcoming newsletters!



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