MIRRA

Methods for Irrigation and Agriculture

لتطوير أساليب الري والزراعة

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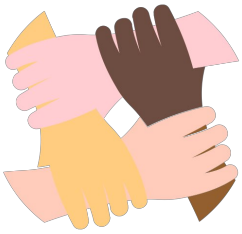
WHO ARE WE?

MIRRA is a Jordanian non-governmental organization established in 2007. We aim to support research & development in Jordan's agricultural and water sectors through cooperation with farmers, private sector entities, governmental sector and international research institutions. **MIRRA** operates developmental projects, building capacities & consultative missions in agriculture, irrigation, water, sanitation and hydro-modelling.

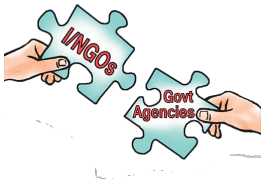
Our Features



From Irrigation to Wastewater Treatment Improving Livelihoods and Community Development

Advancing Greywater Treatment and Reuse Systems

Advancing the Profession of Agricultural Engineering Jordan



MAKE ROOM FOR NGOs and SCIENCE in the WATER SECTOR

APRIL 2021

New year – New logo

From Irrigation to Wastewater Treatment, Improving Livelihoods and Community Development

By: **Eliza Paterson**

OLD LOGO

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The **MIRRA** logo from its inception in 2007 until 2020, as it reflects **MIRRA's** inception orientation towards interventions that contribute to water conservation and efficient use in the field of irrigation, improvement of agricultural systems and productivity, and capacity building of various stakeholders.

NEW LOGO

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MIRRA's logo since 2021 where in recent years, the scope of **MIRRA's** work has expanded and moved from working to develop irrigation and agriculture only to become today integrating climate change adaptation measures through water, sanitation and hygiene initiatives, the use of treated wastewater for multiple purposes, and the incorporation of renewable energy and energy-efficient technologies. Energy.

For many people, the start of the new year represents a time of transition. Throughout the world, people have seen the year 2021 as a new beginning, as a time to move past and regroup from one of the most challenging times in recent history with the coronavirus pandemic. The pandemic has taken a toll on a global scale, impacting economies, societies,

and health. The interconnectedness between humans and the planet has become clearer now more than ever.

With its establishment in 2007, **MIRRA** has been dedicated to improving water resource use efficiencies within the agriculture and water sectors through research and development efforts of agricultural and irrigation systems. However, starting in 2018, **MIRRA** began to broaden its scope by integrating new dimensions into our initiatives in order to address the growing importance of the interrelationship between society, health, and the environment.

Working through the pandemic, **MIRRA** not only has continued its positive impacts in the areas of agriculture and irrigation efficiencies, but has also incorporated other areas essential to the sustainable development of Jordan and the country's inhabitants. **MIRRA**'s broadened focus has led to the design and launch of our organization's new logo, demonstrating **MIRRA**'s full range of work and potential.

The scope of **MIRRA** has transitioned from being solely on-farm practices and irrigation systems optimization and management. Today, **MIRRA** also incorporates climate change adaptation measures into our projects through Water, Sanitation, and Hygiene (WASH) initiatives, the use of treated wastewater for multiple purposes, and the incorporation of renewable energy and energy-efficient irrigation technologies. This broadened approach is a reflection of the increasing interrelationships and nexus between on-farm irrigation management, food production, energy footprints, environmental sustainability, and improved livelihoods of communities and refugees.

The new scope of **MIRRA**'s work has also led to the establishment of two departments within the organization: The Agriculture and Irrigation Department (AID) and the Water and Environment Department (WED). The AID and WED are specialized departments and are comprised of experts within each area of work in order to maximize **MIRRA**'s impact within these fields.

MIRRA dedicates its work to contributing to specific Jordanian strategies and policies that aim to address sustainable development initiatives within the country. These include the National Water Strategy (2016-2025), Jordan's National Vision and Strategy 2025, various ministries' plans, such as the Ministry of Water and Irrigation, the Ministry of Agriculture, the Ministry of Environment, and the Ministry of Education, the Jordan Economic Growth Plan 2018-2022, and Jordanian National Standards for wastewater reuse. By targeting Jordan's national strategies, **MIRRA** helps to initiate a positive impact in all of the country's sectors, taking into great consideration the wellbeing of its people, economy, and environment.

Our work at **MIRRA** is not only focused on Jordan and the MENA region, but also aims to have a positive impact on an international scale through transcontinental partnerships, making **MIRRA** a contributor to local, regional, and international sustainability goals. We have a strong emphasis on addressing the United Nations Sustainable Development Goals (SDGs) within our initiatives in order to ensure that international aims and agendas are incorporated into Jordan's development efforts. Specifically, **MIRRA**'s initiatives aim to have a direct impact on achieving SDG 6 – Access to water and sanitation for all; SDG 13 – Urgent action to combat climate change and its impacts; and SDG 17 – Strengthen the means of implementation and revitalize the global partnership for sustainable development. **MIRRA** also takes into great consideration the following SDGs through its projects and intervention implementation: SDG 4 – Quality education; SDG 5 – Gender equality; and SDG 7 – Affordable and clean energy.

MIRRA is proud to work within such a broad range of areas, all of which being essential to

the sustainable development of Jordan and the surrounding region. The new logo is intended not only to represent **MIRRA**'s scope, but also to represent a time of global transition, positive change, and hope for the future of our global environment, health, and overall wellbeing.

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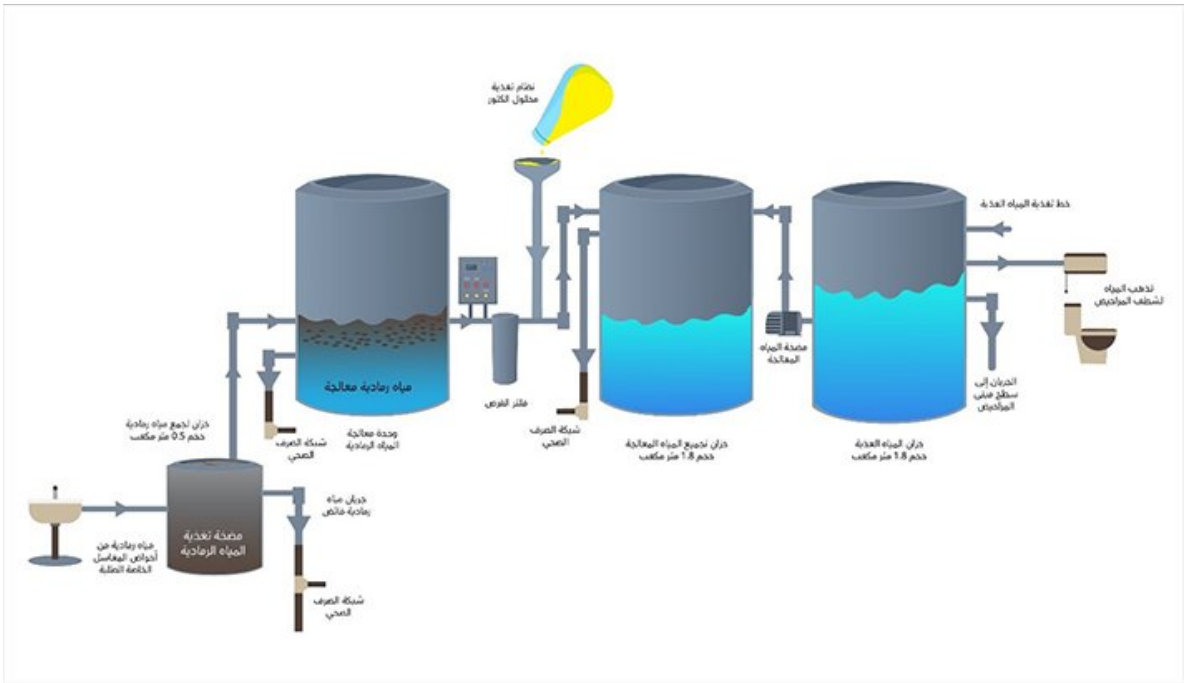
Advancing Greywater Treatment and Reuse Systems

Optimizing Cost, Quality and Operation

By: **Alham Al-Shurafat**



Working diagram of the greywater treatment technique applied at some schools

Strategic plans and previous studies in Jordan showed that the treatment and reuse of greywater is among the most successful interventions for water conservation at the domestic and institutional level. Since 2018, **MIRRA** started developing its own approaches to greywater treatment and reuse in institutions. Schools were the first target to implement greywater reuse, and the base-line assessment showed that the capacity of the system would range from half a cubic meter to two cubic meters per day for different types and capacities of schools in Jordan.

MIRRA started with an advanced approach using complex treatment systems that treat very bad quality raw greywater for the most restricted reuse purpose, toilet flushing. The approach relies on biological treatment by means of trickling filters, air blowers, underground collection tanks, roof tanks for treated water, roof back-up water tanks, Chlorine liquid, pumps, and full automation. The total capital cost includes materials, equipment, construction, installation, labor, etc., with a total cost ranging from $7000 to $8000. The system is very reliable and has been working efficiently and effectively for two years at a school in Mafraq. Despite the success and the significant improvement of the raw greywater quality, this system may be complicated for maintenance and operation for some schools without additional support. The system is also described by many stakeholders as not cost-effective for a school, according to local conditions.

Thus, **MIRRA**'s approach transitioned to the use of physical treatment rather than biological treatment using a series of filters, fewer and smaller pumps, and Chlorine tablets instead of Chlorine liquid. Filters may be advanced technologies, such as Reverse Osmosis (RO), and they may be as simple as a Disk Filter. However, rooftop tanks and back-up tanks, as well as the full automation approach, was kept. The physical treatment approach reduces the total cost to $4000 to $5000. This system has been installed and monitored in more than 25 schools for toilet flushing, as well as irrigation, and has shown impressive results. However, by some, the system is still considered expensive and requires changing filters regularly, which means there is still a need to have reliable cadres and some minimal annual recurring costs.

MIRRA is now heading toward a physical approach based on filters that do not need to be changed and with fillings that can be cleaned automatically through back washing within a simple scheme, meeting the Jordanian specifications for the reuse of treated greywater JS 1776:2013. Such an approach has a total cost of $2000 to $4000.

MIRRA will continue to develop its approach to treating and reusing greywater and will be keen on the standard-quality, efficient reuse, safety and simple operation and maintenance. The door is always open to adopt any innovative system that guarantees these conditions.

The greywater treatment system installed on the roof of one of the beneficiary schools.

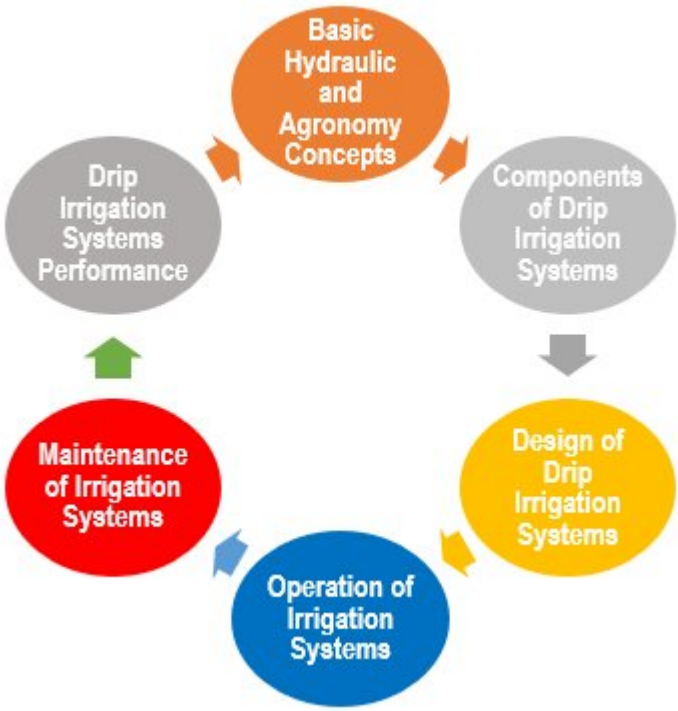
APRIL 2021

Advancing the Profession of Agricultural Engineering Jordan

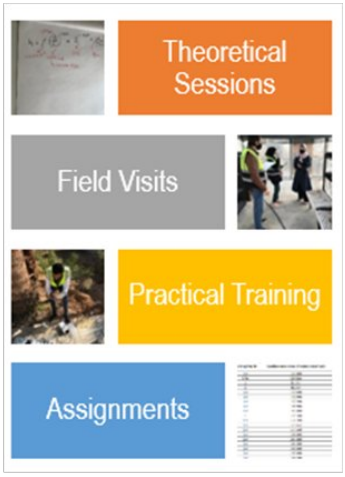
An Apprenticeship Program for Agricultural Engineers Completed

By: **Maram Zaid**

MIRRA completed the first cycle of the apprenticeship program on **Advancing Water Innovative Technologies,** which targeted young agricultural engineers. The 6-month long program aim is to equip engineers with the knowledge and tools to become specialized in Irrigation Systems Design, Operation and Management.



The training modules included in the vocational WIT training program



Learning curricula and tools included in the WIT vocational training program

The training included theoretical and practical training. Theoretical knowledge has its importance in learning. Theoretical knowledge is the basis of doing anything practically. Anything done practically without theoretical knowledge will be dangerous sometimes. Theoretical knowledge explains the why factor at the back of any situation and technique of working.

The trainees conducted several visits. These visits included visits to farms, irrigation system suppliers, and **MIRRA's** pilot sites. The objective of the field visits to make concepts more memorable. Additionally, field visits are essential because trainees can engage with content in a variety of ways. Concepts are presented through various media and modalities, so trainees who struggle with traditional learning can feel competent and confident. They can access the content better when they can learn holistically.

The trainees got the practical knowledge that assists in attaining the exact techniques that

become the tools of the job. It is much closer to actual daily tasks.

As part of the practical training, the trainees learned how to do collect soil and water sample, how to do soil and water tests. Moreover, they have been equipped with tools such as, CropWat, IrriCAD that make them professional in their field.

Practical knowledge and application skills are essential to become a professional engineer. It is crucial to understand how things work. It is the tool of a deeper understanding of the concepts through doing and personal experience. It helps demonstrate the natural way of working and method of handling. Especially in the professional education scenario, practical knowledge helps in the deep understanding of the concepts and the origin and the importance of the facts learned through theoretical knowledge. Sometimes, some intricate lessons are not easy to communicate at that point, so practically demonstrating the things will be helpful in proper understanding. That's why practical training is beneficial to both the trainer and the learner.

Stages of designing an irrigation system

During the theoretical training of the trainees

One of the trainees is measuring the salinity of water in the field

Footage of the trainees taking soil samples

Footage of the trainees taking soil samples

A summary of the association's most important programs since 2015

By: **Maram Zaid**

Within Jordan, **MIRRA** contributes to specific Jordanian policies and standards, positively affecting the overall sustainable development of the country.

MIRRA's initiatives throughout the period of 2013-2020 have addressed key topics within the National Water Strategy, such as wastewater treatment and reuse, Integrated Water Resources Management (IWRM), Water, Sanitation and Hygiene (WASH) services, water management for irrigated agriculture, for climate change adaptation, and for energy cost optimization, developing water sector capacities, and building partnerships for the water sector and the water-food-energy nexus.

In 2016, **MIRRA** carried out a 36-month project, "Ultra-Low Energy Drip Irrigation for MENA Countries." The main objective of the project was to test and field validate newly designed pressure-compensating drip emitters with an activation pressure of 0.15 Bar. The project results demonstrated that the ultra-low-pressure drip emitters could save 43% of hydraulic energy on the farm level per unit volume of water, which will likely enhance the adoption of the drip irrigation method, thus reducing water consumption. The technology will also reduce energy requirements of drip irrigation systems by almost 50%, thus reducing the energy demand for the agriculture sector. Furthermore, reducing energy requirements of drip irrigation systems by 50% will have a major effect on farmers who are currently using diesel pumps, possibly cutting their fuel costs by half.

In 2018, **MIRRA** implemented the project, “Decentralized Wastewater Treatment and Reuse in Institutions: Mafraq Pilot in 3 Schools”, which lasted a total of 12 months. As a result of these efforts, approximately 1,000 m3 of water and approximately 15,000 Jordan Dinars (the total annual value of electricity bills for the 3 schools) were saved per year. Moreover, 265 new trees were planted and irrigated with the treated wastewater.

In 2019, **MIRRA** designed and implemented the 18-month project, “Realizing Sustainable Agriculture and Efficient Water Management in the Azraq Basin in Jordan through the Adaptation and Integration of Proven Technology and Community Partnership.” The results of the project showed that using drip irrigation instead of surface irrigation can save more than 35% of on-farm water resources.

Also occurring in 2019, **MIRRA** initiated the project, “Future DAMS: Future Design and Assessment of Water – Energy – Food – Environment Mega Systems,” which lasted a total of 18 months. The project aimed to deepen the understanding of how interventions within nexus systems cascade through socioeconomic, scientifically engineered, ecological, and political systems.

MIRRA’s focus on the above issues is effectively, efficiently, and sustainably contributing to making Jordan a leading country in achieving the SDGs, while maintaining social, economic, and environmental wellbeing for all of its inhabitants. **MIRRA**’s broad range of work and expertise covers not only the water and agricultural sectors in Jordan, but also effect the country’s economic stability and social livelihoods through the improvement of water use efficiencies, agricultural production, education, capacity building of communities, and cooperation between sectors.

In 2020, **MIRRA** signed onto new project agreements in order to implement several projects related to wastewater treatment, improving the performance of greenhouses, enhancing youth capacities, and quality assurance of the design, operation, and maintenance of irrigation systems.

In addition to the research and development projects that **MIRRA** conducts, it also provides career development training to young professionals and entry level engineers. From last year until now, **MIRRA** conducted career development training for more than 25 young professionals on different topics including innovation and food production, irrigation systems design and management, and sustainable agriculture.

Moreover, **MIRRA** now has a total of 11 Jordanian employees, eight full-time and three part-time. Therefore, supporting and promoting the NGOs in Jordan will contribute to reducing

Jordan’s unemployment rate.

MIRRA is interested in sharing its achievements and lessons learned with others in the MENA region and beyond, whose mission is to sustainably develop the irrigation, water, agriculture, and environment sectors in order to achieve social, economic, and environmental prosperity for all.

Connect With Us

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