36th AGUASAN Workshop - Jordan, 5 – 9 June 2022

Water Management in Times of Climate Change

Finding Actionable Solutions for Fragile Contexts in the Middle East

Workshop Report

Executive Summary

For the first time, the AGUASAN Workshop, an annual global learning event of the Swiss water and development community, took place outside of Switzerland from June 5 to 9, 2022. The aim was to foster actionable solutions by water practitioners directly in a highly topical and relevant context. With a focus on "*Water Management in Times of Climate Change: Finding actionable solutions for fragile contexts in the Middle East"* the workshop, hosted by the SDC regional office in Jordan, gathered 35 participants at the Dead Sea in Jordan. During 5 days the participants, including SDC staff and key partners from Jordan, Iraq, Lebanon, Türkiye and Switzerland, intensively collaborated in 5 thematic working groups to co-create potential actionable solutions for the following water-climate issues, highly relevant for the region:

- Groundwater resources management
- Wastewater treatment and reuse
- Water-Energy-Food-Ecosystems (WEFE) nexus
- Impact of multi-dimensional water scarcity on food security
- Smart WASH approach for refugee camps and host communities

The workshop encompassed field visits, plenary sessions, thematic presentations, group work, and networking events. It was an opportunity for participants to:

- Enable the development of initiatives to address critical regional challenges related to water management and climate change
- Share insights, solutions, and approaches to these challenges
- Spark collaboration amongst sector specialists
- Contribute to the launch of the SDC Sub-RésEAU MENA (water and sanitation knowledge exchange platform)

As a special honour, the participants presented their results at the end of the week to His Excellency, the Secretary-General from the Jordanian Ministry of Water and Irrigation Dr. Jihad Al Mahamid, who demonstrated particular interest in exchanging with other water specialists on the 5 potential solutions and in continuing the work on these pertinent issues.

This workshop was an excellent opportunity for water sector specialists to not only discuss the most relevant and urgent issues in the Middle East but also to immerse themselves and be confronted with Jordan's socio-political, socio-economic, and environmental realities. The intensive exchange on potential actionable solutions provided the space for the participants to deepen their understanding and to refine their current and future projects. The developed solutions were shared with SDC's newly established regional water network, the Sub-RésEAU MENA and will serve as a thematic and strategic foundation in the region in the following years.

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1 About the 36th AGUASAN Workshop

1.1 The AGUASAN Community of Practice

AGUASAN is an interdisciplinary Swiss Community of Practice (CoP) that brings together a broad range of specialists to promote a deeper understanding of water and sanitation issues in developing and transition countries.

Since 1984, the CoP provides an exemplary exchange platform and constitutes an essential link to the innovation and knowledge management strategy of the Swiss Agency for Development and Cooperation (SDC). Besides convening quarterly knowledge sharing events, members of the AGUASAN CoP organize annual international AGUASAN workshops to collectively reflect and exchange experiences on cutting-edge topics of the water sector.

The workshops build on the broad knowledge of the participants to create outputs of practical use for development work and sector interventions at local, national and global level.

1.2 Workshop Features

This year, for the first time, the **AGUASAN workshop** took place outside of Switzerland, intending to foster actionable solutions of practitioners directly in a highly topical and relevant socio-economic context. This included cultural sensitivities, language usage and themes pertinent to the region and the audience. Holding the workshop in the regional context of the **Middle East** allowed participants to gain first-hand insight into real-life conditions and the effects of climate change on regional and local water resources management. It laid the foundations for connecting local challenges to issues practitioners confronted within their respective working environments.

Due to its relevant socio-political and environmentally unique position in the Middle East, **Jordan** was selected as the host country for the face-to-face event. Case studies, field trips, networking events and working groups provided many opportunities for participants to familiarize themselves with the regional/local context and connect with other water and sanitation practitioners from civil society, private sector, public authorities, academia, the Swiss Development and Cooperation (SDC) and partners from the region. As a country facing various development and humanitarian challenges and extreme water scarcity caused by socio-economic and climate/geographical conditions, **Jordan** represents an illustrative example of regional water climate and geo-political issues in the **Middle East**. With its significant advances to address these challenges in the region, the country and its capital Amman have become the regional water knowledge hub for humanitarian and development agencies, including the SDC, and thus provide an excellent basis for organizing this first AGUASAN Workshop outside Switzerland.

The 36th AGUASAN workshop took place over five days from **Sunday June 5 to Thursday June 9 2022** and was jointly organized by the workshop steering committee (made up of AGUASAN members from the SDC, Eawag/Sandec, and Human Right 2 Water), and the implementing organisations (Skat Consulting Ltd. and Helvetas Swiss Intercooperation), and tackled the topic: *"Water Management in Times of Climate Change: Finding actionable solutions for fragile contexts in the Middle East*." An overview with first impressions of the workshop in images is available here.

Link to the Sub-RésEAU MENA launch event of June 11-13, 2022: The RésEAU[1], SDC's water network, is promoting effective sector knowledge management, consisting of staff of SDC and its implementation partners active in water related projects. The Sub-RésEAU MENA (Middle East and Northern Africa) is SDC's regional water network for Lebanon, Iraq, Jordan, Syria, occupied Palestinian Territories, Yemen, Tunisia, Egypt, Morocco and Turkey. Its launch event took place back-to-back with the AGUASAN Workshop to create synergies between the events and people. While the Sub-RésEAU will focus mainly on the networking component in the MENA region as well as on planning and designing the next steps for the development of

[1] For more information on the RésEAU, visit https://www.shareweb.ch/site/Water.

the network, the broader AGUASAN Workshop focused on thematic aspects and on fostering actions by practitioners in the Middle East.

Venue: The AGUASAN Workshop was held in the Mövenpick Resort and Spa Dead Sea, Jordan. A note on water management at the Mövenpick Resort and Spa Dead Sea is available here.

1.3 Topic, Objectives and Guiding Questions

"Water management in times of climate change - Finding actionable solutions for fragile contexts in the Middle East" has been selected by the Workshop Steering Committee as this workshop's topic. In fact, Water and Climate Change remain one of the most relevant and urgent issues in the Middle East, globally, and for the SDC and its partners in particular. The workshop intended to combine not only the challenge of water and climate change from different angles (from WASH to transboundary water cooperation) in a specific region, but aimed especially on finding actionable solutions for context-specific challenges that SDC and its partners can continue working on in the coming years.

Building on this thematic focus, the participants of the AGUASAN workshop and wider thematic learning journey had the following objectives and key questions:

Objectives	Key Questions
1. To enable the development of initiatives to address key challenges in the region related to water management and climate change 2. To share insights and existing solutions and approaches to these challenges 3. To spark collaboration amongst sector specialists around concrete follow up 4. To contribute to the emerging agenda of the MENA Sub-RésEAU	1. How does climate change affect the water management in fragile contexts of the Middle East – on the scale of river basins, regions, countries and households? (The challenge) 2. What are key challenges and action gaps that need to be addressed to integrate climate change adaptation strategies and integrated water resources management in the fragile context of the Middle East? (The opportunities) 3. How should water resources management be adapted to climate change? Which innovative sustainable solutions, approaches and tools could be useful? (The potential solutions)

Relevance of the topic and key questions in the region

The Middle East region faces a **variety of water, development and humanitarian challenges:** It is a global hot-spot of unsustainable water use as in some countries more than half of the current water withdrawals exceed what is naturally available. Shortages of water and all related resources, exacerbated by conflicts, are a reality to 10 million very vulnerable people, including refugees, internally displaced people and migrant communities. 82% of wastewater is not recycled and total water productivity is only about half of the world's average. While spending the highest proportion of GDP (2%) on public water subsidies, it has the world's lowest water tariffs. Risks of floods and droughts are increasing. Around 69% of surface water resources are transboundary and all countries share at least one aquifer.

Above all, **climate change affects the region substantially**, putting great pressure on already scarce water resources. Especially vulnerable groups, like the poor, informal settlers, refugees and internally displaced people, many without access to safe water and sanitation as well as those with water-based livelihoods like farmers, face negative consequences of climate-related water variabilities in their everyday life. Climate change extremes like droughts and floods intensify the pressure on water resources and related infrastructure and livelihoods in all countries of the region. Food production in Syria and Iraq is expected to drop by 40 % in 2022 due to the drought in 2021.[2] In Jordan, climate predictions project an overall decrease of precipitation between 15 - 60 percent from 2011 to 2099 and a rise in annual maximum temperature of up to 5.1°C by 2085.[3]

Huge economic losses are expected in the region from climate-related water scarcity and are estimated at 6-14% of GDP by 2050. At the same time, climate projections show "that 22% of the water shortage can be attributed to climate change and 78% to changes in socio-economic factors."[4] This indicates that socio-economic factors can outstrip and reinforce the impact of climate change. Consequently, it emphasizes the need for much improved governance measures in the region. In the context of this fragile region, prone to conflict and political instability, this seems to be even more challenging and calls for actionable, innovative and context-specific solutions.

Examples of **positive innovations** in Jordan are efforts to harness private sector innovation, financing for recycling wastewater, and to enhance supply through desalination. In addition, it is also one of the most reachable and stable countries in the region, which sustains the rationale of being and remaining a water hub for the region.

[2] wfp syria-food-production-all-time-low

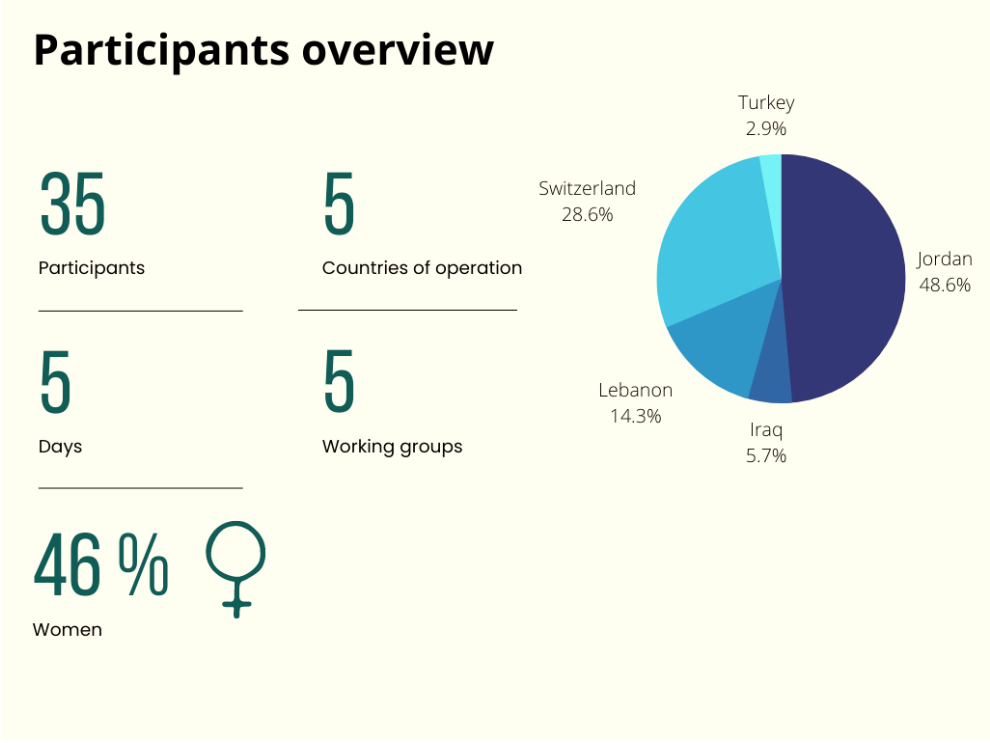
[3] CLIMATE CHANGE RISK PROFILE

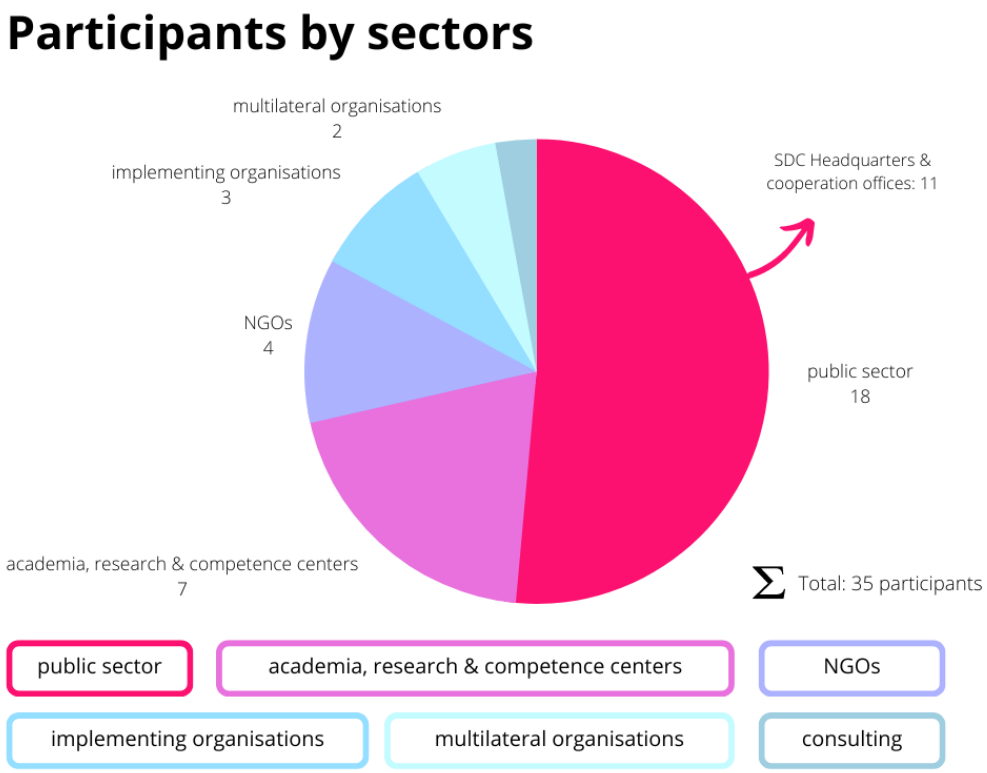
[4] Centre for Sustainable Solutions in Practical Hydrogeology (2021): Rapid Study of the Water Knowledge across the MENA Region in support of launching the MENA RésEAU.

1.4 Workshop Participants

AGUASAN Workshops are designed for a **multi-stakeholder audience of practitioners in the water and sanitation sector and beyond**. To allow cross-sectional and innovative learning in the water nexus of humanitarian, development and peace for development contexts, they connect practitioners from all water and sanitation domains (WASH, wastewater, water resources management, water cooperation, etc.) as well as implementers and practitioners in related fields (e.g. from climate, agriculture, environment or energy sectors). The workshops are open to highly interested NGO staff, service providers, consultants, researchers, government representatives, personnel of multilateral organisations and donor agencies, entrepreneurs and other water or climate change professionals.

This 36th AGUASAN Workshop was **especially directed towards practitioners based in the Middle East region**. It was joined by **35 participants from 5 countries** (Jordan, Iraq, Lebanon, Türkiye and Switzerland - 46% women). They contributed to practical insights, presentations, group work, and elaboration of solutions. They represented **SDC** (11 representatives, incl. The headquarter and cooperation offices), **NGOs** (4 representatives), **governmental organizations** (7 representatives), **academia, research institutes and competence centers** (7 representatives), **consultancies** (1 representative), **multilateral organisations** (2 representatives) and **implementing organisations** (3 representatives).





***1** Participants by sectors (35 in total).*

2 Process and Methodology

The AGUASAN Workshop 2022 was embedded into a broader learning journey of several months including **virtual exchanges between working groups** and the **f2f event for regional participants**. The aim of the learning journey has been to co-create **actionable solutions** for water-climate issues by and for practitioners and communities in the region. The solutions have been developed in 5 thematic working groups and presented during the AGUASAN workshop. The final ideas will feed into the practical action of the Sub-RésEAU after the workshop.

2.1 The Learning Journey Process

***2** Timeline and overview of the Learning Journey Process.*

The following steps for the learning journey have been conducted:

1. During the application to the workshop, the participants could indicate a **topic** of their interest or a specific project idea for consideration and potential development.
2. The selected participants have been invited to a virtual kick-off event during which participants formed **working groups** and suggested final joint topics to work on before, during and after the workshop.
3. After the kick-off event, the working groups met 3 times in an independent **virtual exchange** before the workshop. This allowed them to meet, exchange, commence group work, identify challenges, and form questions. They have been guided by working questions to develop a common ground and opening presentations for the f2f event.
4. During the **f2f workshop,** the working groups delved intensively into their project ideas and validated them with other participants and experts at the event.
5. To create **a common understanding on the topic,** introductory and keynote inputs were given:
    a. Riff Fullan and Sandra Fürst: Welcoming, presentation of the workshop format, agenda, objectives, and expected outcomes.
    b. Eng. Adel Alobeiaat, Mme Sabine Rosenthaler, Dr. Daniel Maselli: Welcome address
    c. Dr. Majed Abu-Zreig: Keynote overview of the topic
6. **Learning, exchanging experiences and good practice, and collaboration**: During 5 days the participants, including SDC staff and key partners from Jordan, Iraq, Lebanon, Türkiye and Switzerland, intensively collaborated in 5 thematic working groups to co-create potential actionable solutions for water-climate issues, highly relevant for the region.
7. Embarking on a **field trip** with a focus on water-related solutions for wastewater treatment and reuse and food security and on the decline of the Dead Sea. The working groups were invited to prepare guiding questions, specific to their topic to gain insights that they could feed in their discussions in the following days.
8. Towards the end of the workshop, the **working groups** each developed specific ideas, including a theory of change on how to translate the ideas into action.
9. After the final presentation of the ideas, the working groups were encouraged to further develop action plans on how to implement their **practical ideas** with the support from the Sub-RésEAU, SDC or other funding partners to be identified.

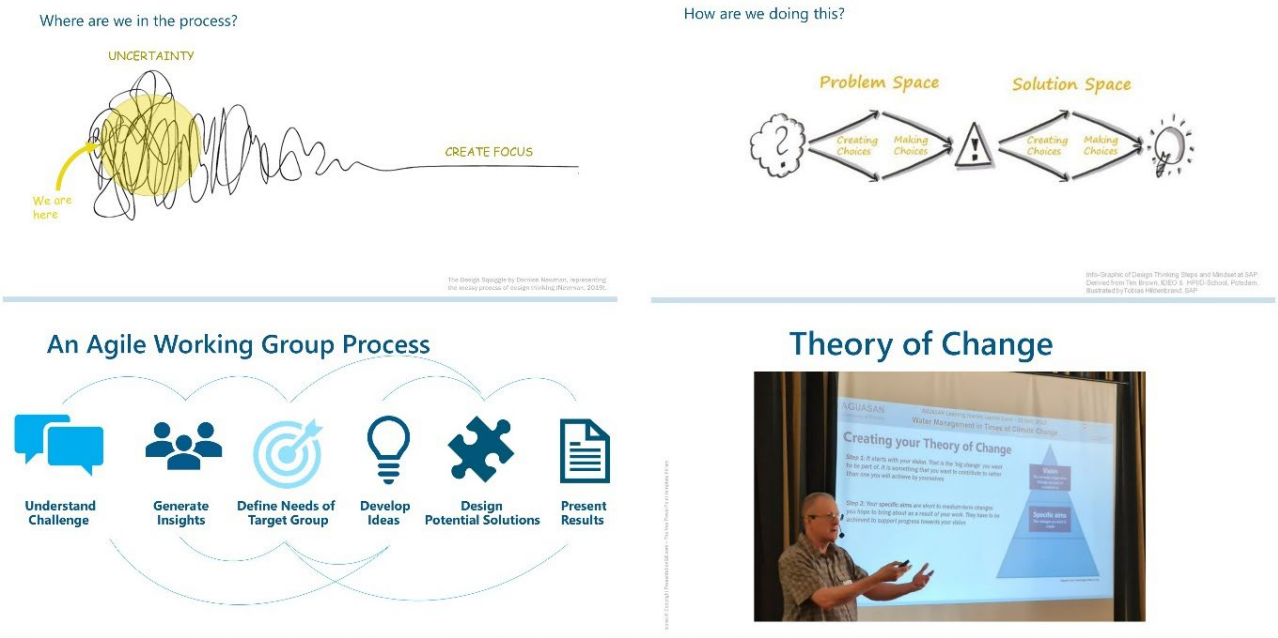
2.2 The Topics of the 5 Expert Groups

Five topics for thematic working groups have been identified based on suggested topics by the participants, the Steering Board as well as by a review of relevant thematic documents of the region:

Topic 1	Topic 2	Topic 3	Topic 4	Topic 5
Groundwater resources management	Wastewater treatment and reuse	Water-Energy-Food-Ecosystems (WEFE) nexus	Impact of multi-dimensional water scarcity on food security	Smart WASH Approach for refugee camps & hosting communities

2.3 Agile Working Group Process

At the heart of the workshop, was the collaborative work and intensive exchange between the water and climate experts within their working groups. This process was based on an agile working group process, from understanding jointly the challenge as a group, generating more specific insights, defining the target groups, developing ideas and potential solutions before presenting them to their peers. The participants were invited to focus first on the problem space to identify the relevant and most urgent challenges in the region, before moving to the solution space to develop concrete ideas how to address them. While the groups were invited to mainly self-organise their group work due to their high level of expertise, they were offered additional guiding questions for each step.



***3** Overview of the Working Group process.*

2.4 Theory of Change

To enable development of initiatives to address key challenges in the region related to water management and climate changearticipants were invited to develop a **Theory of Change,** a methodology for planning, participation, adaptive management, and evaluation. Its aim is to describe why a particular way of working will be effective, showing how change happens in the short, medium and long term to achieve the intended impact. As impacts are broad or longer-term effects of a project or organization's work, it can include effects on people who are direct users of an intervention, effects on those who are not direct users, or effects on a wider field such as government policy.

To create a theory of change, groups were invited to determine a **vision**, identify a target group and its location and the change the working groups aim to happen for the specific target group. In the next step they were invited to establish **specific aims that** are short to medium-term changes the groups hope to bring about as a result of their work and that support progress towards the vision**.** To achieve the specific aims, they were then invited to refine **lines of activity** to achieve their specific aims.

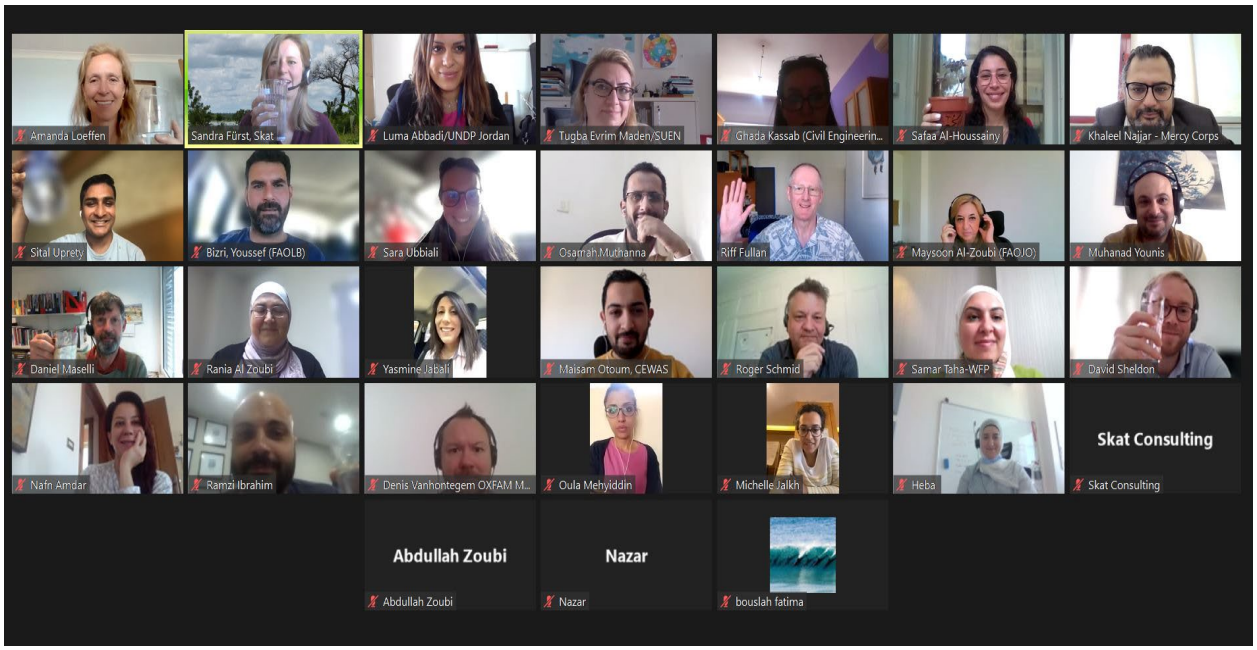
The working groups then were reminded to establish **logical** links between the vision, specific aims, and the lines of activity, so that the ideas are **realistic, achievable** and **clear**.

4 *Impressions from the working groups' discussions.*

3 The Steps and Outputs of the Learning Journey

3.1 Learning Journey Launch Event

Before the face-to-face meeting in Jordan, participants engaged in an online learning journey that enabled the opportunity for first thematic 'deep dives' to be better prepared for the in-person workshop. This allowed the participants to draw on an inclusive, crowd intelligence process related to thematic issues and topics and improve learning sustainability through a higher level of engagement over a more extended exchange period.

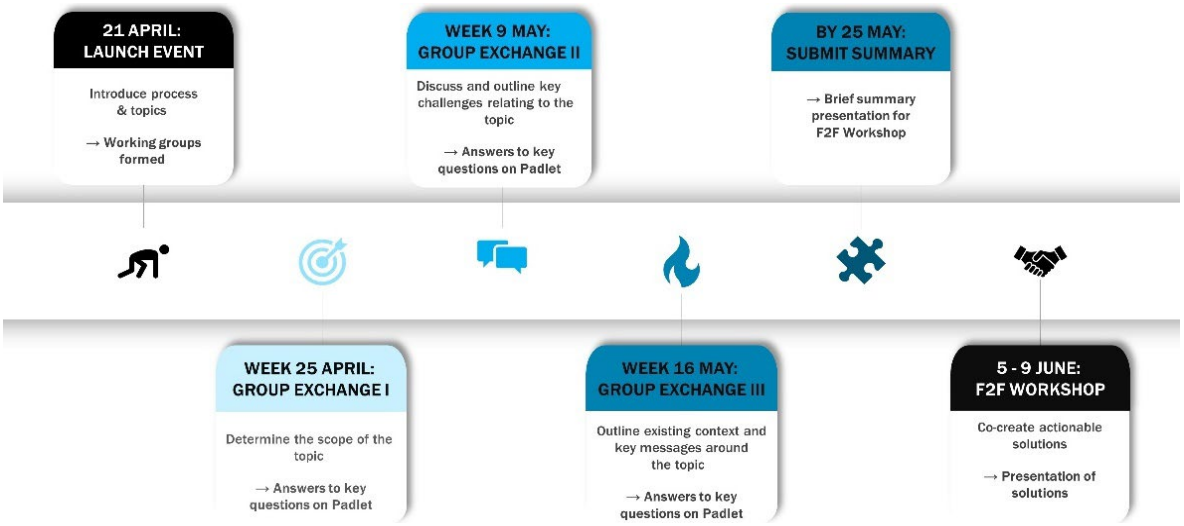


***5** Group picture of the learning journey launch event, 21.04.2022.*

The learning journey launch event occurred on **April 21 2022,** with an introduction of the process and the topics, and forming of the working groups. Three exchanges per working group were scheduled in May 2022:

- The first exchange had the goal of determining the scope of the topic and answering key questions
- The second exchange discussed and outlined vital challenges relating to the topic and answered critical questions
- The third exchange outlined the existing context and critical messages around the subject.

The groups were tasked to prepare a summary presentation of their exchanges in the learning journey (topic understanding, challenge identification, preliminary questions) that would be presented in the face-to-face workshop.



***6** Overview of the preparatory workshop process in 5 thematic working groups.*

3.2 Agenda of Face-to-Face Workshop in Jordan (June 5 – to June 9 2022)

Sunday	Monday	Tuesday	Wednesday	Thursday
Welcome and Introductions *Plenary*	Travel 1st field Visit	Reflection on field visit results *Plenary*	Presentations of concrete cases from the region *Plenary*	Overview of the day's agenda *Plenary*
Workshop Objectives and Agenda *Plenary*	South Amman Wastewater treatment plant	Processing of field visit results *Group work*	Creation of Theories of Change for each topic *Group work*	Welcome of Secretary General of Jordanian Ministry of Water & Irrigation *Plenary*
Keynote overview of F2F topic *Plenary*	Travel 2nd field visit sites	Deepening understanding of the topics *Group work*	Presentations of ToCs *Plenary*	Topic presentations *Plenary*
Topic Presentations *Plenary*	Group 1: Alijabali Hydroponic farm / Um Al Amad-Amman	Identification of co-dependencies across topics *Group work*	Continued ToC construction & action plan development *Group work*	Closing of Secretary Gen segment *Plenary*
Working Group Composition & Establishing WGs for the week *Plenary*	Group 2: Al-Mshaqr Center for Agricultural Research			Feedback on presentations *Plenary*
Lunch				
Report Back *Plenary*	Travel 4th field visit site	Checking in on progress *Group work*	Presentation of results *Plenary*	Anticipated follow-up from workshop *Plenary*
Introduction to field visit *Plenary*	Mount Nebo *1) Explanation of Dead Sea Level Decline* *2) Debrief from field visits*	Sharing of topic group results so far *Fishbowl*	Preparation of action plan presentations *Group work*	Integration of feedback to topic groups *Group work*
Creation of WG-specific questions for field visits *Group work*	Return to Hotel			Workshop evaluation *Plenary*
Closing	Closing	Closing	Closing	Closing
Organising group debrief				

3.3 Workshop Presentations

3.3.1 Introductory presentations and key note on climate change and water scarcity in the Middle East

To familiarize the participants with the Workshop topic, objective, and regional context, they were invited to listen to the welcome address.

***7** Welcome address at the f2f workshop.*

Welcome Address

Eng. Adel Alobeiaat, *Assistant Secretary-General for technical affairs. Ministry of Water and Irrigation – Jordan*

Mme. Sabine Rosenthaler, *Deputy Head of Regional Cooperation, Head of Jordan Cooperation Programme, Swiss Agency for Development and Cooperation.*

Dr. Daniel Maselli, *Senior Policy Advisor & Focal Point, Global Programme Water. Swiss Agency for Development and Cooperation*

***8** Professor Majed Abu-Zreig presenting.*

Introduction to the Middle East Context

Professor Majed Abu-Zreig, *Water Diplomacy Center*

In this introduction, Professor Majed Abu-Zreig provides an overview of climate change and water scarcity in the Middle East, with a focus on Jordan.

The presentation can be downloaded here.

3.3.2 Opening Topic Presentations by the 5 Expert Groups

The groups were invited to prepare a summary presentation of their exchanges in the preparatory phase before the face-face-event (incl. topic, joint understanding, challenge identification, preliminary questions), and have presented it on the first day of the face-to-face workshop. These presentations can be found here.

***9** Different working groups presenting their topic.*

After the opening presentations, the participants have chosen their thematic working group for the coming days. Then they were given time to reflect and understand the topic, review the main elements of the matter, discuss provisional conclusions as summarised in the presentations, clarify uncertainties and define the scale (would a similar approach be feasible in different country contexts?). In the next step, the groups were invited to identify and present their most critical challenge that they would focus on for the next days. Based on the feedback from the other groups, they refined their challenges further and developed guiding questions on their specific topics, that they could pose during the field trip on the next day.

3.3.3 Thematic presentation: An integrated approach to address water scarcity and food security

Oula Mehyiddin, Cooperation without Borders for Tailored Development, presented an excellent input about an integrated approach to address water scarcity and food security. The presentation can be found here.

3.4 Field Visits

The main objective of the field visits was to bring participants to the realities of Jordan, to discuss hands-on water solutions and related issues and to pose their questions relevant to their thematic working group. Therefore, the participants visited the following sites:

- South Amman Wastewater Treatment Plant (Including two plots of reusing treated water)
- Aljabali Hydroponic farm / UM Al amad-Amman
- National Agriculture Research Center (NARC) – Al-Mshaqr
- Mount Nebo

3.4.1 Field Visit Agenda

Time	Topic	Description
07.55 - 08.00	Gathering in Hotel Lobby	Boarding bus outside hotel
08.00 - 09.30	Travel 1st field visit site	South Amman wastewater treatment plant https://goo.gl/maps/MdcpyFonslbA9bYt9
09.30 - 11.00	South Amman wastewater treatment plant	Discussions with plant operators (full group) and with local farmers (split into two groups)
11.00 - 12.00	Travel 2nd field visit sites	Travel to Aljabali Hydroponic farm At Um Al amad https://goo.gl/maps/58YCvjcDzXVPeEbx5 or to Al-Mshaqr Center for Agricultural Research /NARC
12.00 -12.40	Group 1: Aljabali Hydroponic farm / Um Alamad-Amman	Participants learn about farmers' experiences with the use of technology in conserving water and soil uses/ Aquaponic techniques and interact with local community.
12.00 - 12.40	Group 2: Al-Mshaqr Center for Agricultural Research	Overview of centre's activities, discussions with local farmers
12.40 - 13.30	Travel to restaurant	khan Beirut restaurant –Madaba https://goo.gl/maps/Cu 1 x2yfD21 u2Y98D6
13.30 -14.30	Lunch	
14.30 -15.00	Travel 4th field visit site	Mount Nebo https://goo.gl/maps/FZgrkBnLHgMrVsgM
15.00-16.30	Mount Nebo	1) Explanation of Dead Sea level decline. 2) Debrief from field visits
16.30 -18:00	Return to Hotel	Boarding bus outside hotel

3.4.2 South Amman Wastewater Treatment Plant

The trend is moving toward treating wastewater and sludge – the thick material left after wastewater treatment; as a result, treated wastewater is now an integral component of Jordan's water resources. Jordan has now 31 wastewater treatment plants that use processes and technologies. The South Amman Wastewater Treatment Plant consists of bioreactor tanks, settling tanks, thickener grit chambers, grease removal installations, splitter boxes and chambers, a chlorination system, and sludge pumping stations. The Wastewater is used for the irrigation of crops and for industrial uses and cultivating the surroundings of a factory.

Upon arrival, the groups were greeted by the plant director, who presented the functioning of the South Amman Wastewater Treatment Plant. After the presentation, the Workshop participants were split into two groups; each group were accompanied by an engineer from the ministry of water and irrigation. The engineers were presenting the plant while touring the premises and answering the group's questions. Each group visited one plot of reusing the treated wastewater.

***10** Impressions from the visit at the South Amman Wastewater Treatment Plant.*

3.4.3 Farm Visit

After the visit of the South Amman Wastewater Treatment Plant, the group visited a local farm situated nearby the Wastewater Treatment Plant to which the treated wastewater is transferred through midsized pipes and then distributed to the individual farms. The group was welcomed by a local farmer, who explained the irrigation system using the water from the Wastewater Treatment Plant, its financing system (payment of water) and economic viability. Due to lack of acceptance to use treated wastewater for crops to be consumed by human, the farmer explained that they are allowed to produce fodder, so for animal use only. The irrigation techniques have been chosen based on a comparison of water efficiency and initial investment and maintenance costs. The plants have been chosen based on their high nutritious value for animals and potential revenue.

11 *Impressions from the visit at a local farm.*

3.4.4 Aljabali Hydroponic farm / UM Al amad-Amman

One of the groups visited the hydroponic farm, where participants learned about the company's experiences with Hydroponics, a modern technology to conserve water and to reduce the area and soil used. To provide the plants (strawberries) with the necessary nutrition and water, a liquid with a precise concentration of different ingredients, incl. synthetic fertilizer is prepared. It is then transferred through smaller pipes to constantly feed the plants. To avoid using pathogenic soil, the plants are grown on coconut fiber through which the water is channeled. They are currently exploring the possibility to shift to organic production. However, the initial investment costs are still constraining this step.

***12** Impressions from the visit at Aljabali Hydroponic farm.*

3.4.5 National Agriculture Research Center (NARC) – Al-Mshaqr

The second group visited the National Agriculture Research Centre (NARC). The director of the National Agriculture Research Centre (NARC) presented an overview of the Centre, its role, achievements, and the projects it supports. The NARC aims to utilize the outcomes of the agricultural research that is developed locally or devised from other sources to increase agricultural production, both plant and animal production, and improve it and its efficiency; conserving the farming and natural resources and optimizing their use; serving the purposes of agricultural development; and preserving the ecological balance.

The group had the opportunity to visit a farm inside the Centre and examine cactus cultivation, field crops and legumes under climate change conditions and how to deal with them.

***13** Impressions from the visit at the National Agriculture Research Center (NARC).*

3.4.6 Moses Memorial – Mount Nebo

Mount Nebo is a peak in Manitoba and has an elevation of 411 meters. The goal of the excursion was to have a brief explanation of the reason for the decline in the level of the Dead Sea and a group exchange.

The Dead Sea surface is the lowest terrestrial point on Earth at 430 m below sea level and is shrinking rapidly. It is known for its unique geographical, ecological and historical characteristics. The Dead Sea occupies the central part of the Jordan Rift Valley, with the Jordan River as the main tributary. The salt concentration is extremely high, estimated at 30%. The Dead Sea is rich in a wide variety of minerals, making it an essential source for salt industries and an attraction point for visitors wishing to benefit from the therapeutic qualities of its minerals. The Dead Sea basin's distinctive cultural and historical heritage makes it a significant place for riparian countries and the entire world. Many historical sites are located in the lake area, such as Mount Nebo. The excessive water consumption and extraction of potassium from the Dead Sea basin causes a rapid drop in the Dead Sea (shrinking by 1 meter per year) with severe environmental consequences.

***14** Impressions from the visit on Mount Nebo.*

3.5 Final Presentations and Potential Actionable Solutions by the 5 Expert Groups

3.5.1 Final presentations

***15** Final presentations at the workshop.*

On the final day, the participants were honoured to welcome **His Excellency Dr Jihad Al Mahamid, Secretary General**, Ministry of Water and Irrigation, Hashemite Kingdom of Jordan, and accompanied by welcoming remarks by Dr Daniel Maselli, Senior Policy Advisor and Focal Point, Global Programme Water, Swiss Agency for Development and Cooperation. His Excellency had the opportunity to assist and discuss the proposed ideas of the 5 thematic expert groups. His valuable expertise was highly appreciated by all participants.

The final presentations of each group can be downloaded here.

3.5.2 Overview of potential actionable solutions as presented by the expert groups

Topic 1	Topic 2	Topic 3	Topic 4	Topic 5
Groundwater resources management	**Overcoming the Resistances and Mobilizing Support for Decentralized Wastewater Treatment and Reuse**	**The Water-Energy-Food-Ecosystems (WEFE) Nexus is a holistic approach to achieve all the SDGs**	**Impact of multi-dimensional water scarcity on food security**	**Smart WASH approach for refugee camps and host communities: harvesting rainwater!**
Improved water information systems for evidence-based decision-making in groundwater management in the MENA region	Pilot-scale Demonstration Plants: Decentralized, cost-effective, and valued wastewater treatment in rural areas of Jordan and Lebanon	A recognised value, incl. a standard of the Water-Energy-Food-Ecosystem Nexus to improve coordination amongst relevant stakeholders and to implement sustainable solutions.	Predictive Food Security Platform: A dynamic and coherent water-climate-crop modelling platform to enable seasonal scenario planning and the selection of high-nutritional, water-saving value crops at country and regional scale in Jordan and Lebanon	Generalised rainwater harvesting and storage at household level, incl. welcoming refugees and host communities, to increase self-reliance and resilience during drought or water supply interruption events in water-scarce countries like Jordan

16 *The Workshop participants with his Excellency Dr Jihad Al Mahamid, Secretary General, Ministry of Water and Irrigation, Hashemite Kingdom of Jordan (centre).*

4 Immediate Outcomes and Outlook

This workshop was an excellent opportunity for water sector specialists to not only discuss the most relevant and urgent issues in the Middle East but also to immerse themselves and be confronted with Jordan's socio-political, socio-economic, and environmental realities. The intensive exchange on potential actionable solutions provided the space for the participants to deepen their understanding and to refine their current and future projects. The developed solutions were shared with SDC's newly established regional water network, the Sub-RésEAU MENA and will serve as a thematic and strategic foundation in the region in the following years.

An immediate short summary of the workshop could be shared in the Newsletter of the Embassy of Switzerland in Jordan, which is available here. As an immediate outcome shortly after the workshop, the results from the WEFE nexus working group have been shared by the SDC representatives with the Jordanian government at a high-level meeting organised by His Royal Highness Prince El Hassan bin Talal. In this context, it is currently being explored to establish a committee at high-level to focus on this topic.

As a last step of the workshop process, the working groups have been invited to create fact sheets with their most important results. These fact sheets will be shared with the professional networks and potential partners, who potentially can make use of the results and can approach them with follow-up questions and activities. This includes that these results will be further discussed in the newly established Sub-RésEAU MENA, which is a thematic knowledge platform on water for the MENA region. The factsheets are available below and will be shared with the AGUASAN Community of Practice. All participants have been invited to join the Sub-RésEAU MENA, as this platform will provide them the pathways to interact with partners and advocate for their working group results. SDC kindly offers to support the integration of these ideas and to engage with potential partners through this knowledge platform.

The Steering Board and implementing team kindly thanks the participants to engaging lively in this valuable AGUASAN workshop, which was an energising and dynamic event, paving the way forward for further exchange on your important water working group topics in the region.

5 Final Results Summaries of the 5 Expert Groups

After the workshop, the 5 experts' groups have continued to collaborate and summarised their current status of results of their respective topic in the following fact sheets, which provide an overview of the developed ideas, specific aims, lines of activities, potential partners, a short roadmap with milestones for the following years, potential outcomes of the implementation of the idea and their contact details.

Groundwater Resources Management

Results summary by the Groundwater Expert Group from the AGUASAN Workshop 2022

The idea in a nutshell

The Challenge Addressed

Foster strategic planning and implementation around groundwater resources

The Vision

Improved groundwater management contributes to water security in a changing socio-economic and climate context in the MENA region

The Potential Solution

Improved water information systems for evidence-based decision-making in groundwater management in the MENA region

Key target group

Water and non-water authorities, key decision-makers, local communities

Region

Middle East and North Africa (MENA)

The idea

Short description

The water regime in water scarce, (semi-)arid areas like the Middle East and North Africa (MENA) is dominated by high pressure on groundwater sources, due to socio-economic and politico-institutional reasons including water governance, population increase, upstream dams and unsustainable development of infrastructure and unregulated withdrawals, and is amplified by the effects of climate change. These reasons have led to the deterioration of the quality of groundwater and partly of its depletion. Despite its key role as central water source in the MENA region, information and data is insufficient for an evidence-based decision-making.

The ideas and results presented have been co-created by one of the five water and climate expert groups during the 36th AGUASAN Workshop **"Water Management in Times of Climate Change - Finding Actionable Solutions for Fragile Contexts in the Middle East"**, taking place in Jordan in June 2022. Through an innovative format, the 5-day workshop supported the five thematic working groups to co-develop potential actionable solutions for water-climate issues, highly relevant for the region.

In order to protect and sustain groundwater resources, on the one hand the information and management systems of groundwater must be further developed, while on the other hand local communities, incl. households, as well as agricultural and industrial key stakeholders must be sensitized and involved in the development and implementation of the solutions to manage and reduce water demand.

For an evidence-based decision-making in groundwater management in the MENA region, the expert group suggests to develop an improved information system management, enhance community awareness, enlarge groundwater storage projects as well as regulate water demand at large scale.

Beneficiaries of these activities will be communities in the MENA region, who mainly depend on groundwater.

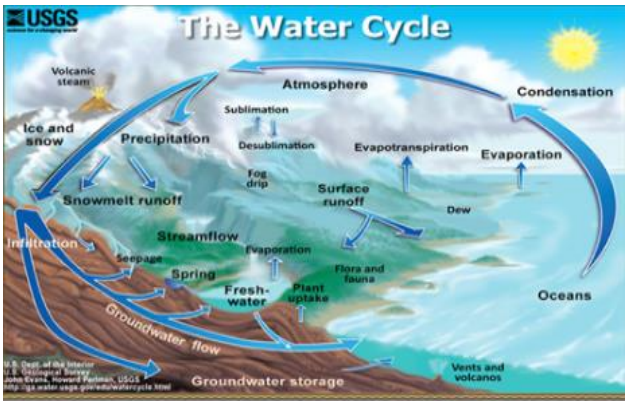


Figure 1: The Water Cycle (source: US Geological Survey)

Specific Aims:

This expert group focused on developing ideas to address several topics related to water resources and water utility management with the goal to support key decision-makers and local communities in the targeted countries in the following regards:

1. Improve the water information base for decision-making, including the full hydrological cycle
2. Improve awareness and understanding of the relevance of groundwater
3. Establish and implement a data-based, actionable, and integrated long-term strategy
4. Support relevant stakeholders to coordinate and cooperate on water resources management

Lines of activities

Activities to address these specific aims have been formulated along the four lines:

1. Improve water information base for decision-making, including the full hydrological cycle
   - Activate/ establish national water information unit with necessary authority.
   - Improve/ establish centralized data collection, processing and sharing system.
   - Data from all relevant sources are feeding in national water information system that provides comprehensive overview.
   - Monitor properly and update regularly the water budget/ balance and make it available for decision-makers.
2. Improve awareness and understanding of relevance of groundwater
   - Raise awareness for local community, water and non-water authorities to adopt key groundwater management challenges and best practices.
   - Conduct awareness campaigns, e.g. on how improved groundwater management contributes to dust storms mitigation
   - Support ministries of education to integrate groundwater and climate change issues in school curricula
   - Inform key decision-makers (e.g. PM, parliament members, etc.) about the groundwater challenges and its relevance for the water security in the countries.
   - Raise awareness that goes beyond traditional methods such as giving advice, as awareness is a societal culture based on an applied approach that is built into the community's culture and the behaviour. This can be reached through methods and means of education, training and the media.
3. Establish and implement a data-based, actionable, and integrated long-term strategy
   - Activate a water strategic advisory unit to steer the implementation of the strategic plans and ensure alignment with national development strategy.
   - Assess the progress and inform coordination based on Key Performance Indicators.
   - Plan water demand, supply, groundwater recharge management in synergies and implement measures using innovative technologies.
4. Support relevant stakeholders to coordinate and cooperate on water resources management
   - National water council is established under the PM/ cabinet.
   - Stakeholders mapping and define communication pathways.
   - Discuss and coordinate actions based on the results of the KPI and changes in the context and needs.

Potential partners

- Water and irrigation ministry
- Education ministry
- Agriculture ministry

Roadmap with key milestones

First stage: Preparation process to develop strategies and work teams concerned with popularizing methods for dealing with groundwater. It includes the preparation of initial documents and the development of applied programs.

Second stage: Outreach to relevant authorities and partners related to groundwater with the aim of developing, improving and involving all parties and finalising the prepared plans and programs.

Third stage: The programs and plans are discussed and implemented with beneficiaries directly on the ground.

Potential outcomes of the implementation of the idea

- Improving the quality of information, its management and circulation
- Improving decisions taken in the field of groundwater and its management
- Improving groundwater management and protection

The Groundwater Management Expert Group

Contacts

To find out more, you can get in touch with the working group members:

- Dalal Elewah, Ministry of Water Resources and Irrigation, Jordan, d_eliwah@yahoo.com
- Abdullah Mohammad Zoubi, Mercycorps, Jordan, azoubi@mercycorps.org
- Alaa AlQaisi, Swiss Agency for Development and Cooperation, Jordan, alaa.alqaisi@eda.admin.ch
- Bassam AlQaisi, Swiss Agency for Development and Cooperation, Jordan, bassam.al-qaisi@eda.admin.ch
- Adrian Stalder, UNICEF, Jordan, astalder@unicef.org
- Mohanid Younis, Ministry of Water Resources, Iraq, mohanid.younis@gmail.com
- André Wehrli, Swiss Agency for Development and Cooperation, Switzerland, andre.wehrli@eda.admin.ch

The Groundwater Team. ©AGUASAN Workshop Team

Overcoming the Resistances and Mobilizing Support for Decentralized Wastewater Treatment and Reuse

Results summary by the Wastewater Treatment and Reuse Expert Group from the AGUASAN Workshop 2022

The idea in a nutshell

The Challenge Addressed

Overcoming the Resistances and Mobilizing Support for Decentralized Wastewater Treatment and Reuse

The Vision

Wastewater in rural areas in Jordan, and Lebanon is treated in a decentralized cost-effective manner and considered as a valuable resource by the community

The Potential Solution

Pilot-scale Demonstration Plants: Decentralized, cost-effective, and valued wastewater treatment in rural areas of Jordan and Lebanon

Key target group

Stakeholders interested in wastewater reuse

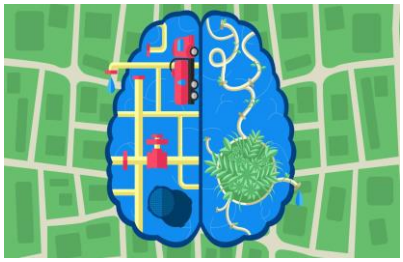
Countries

Lebanon, Jordan, and Iraq

The ideas and results presented have been co-created by one of the five water and climate experts groups during the 36th AGUASAN Workshop **"Water Management in Times of Climate Change - Finding Actionable Solutions for Fragile Contexts in the Middle East"**, taking place in Jordan in June 2022. Through an innovative format, the 5-day workshop supported the five thematic working groups to co-develop potential actionable solutions for water-climate issues, highly relevant for the region.

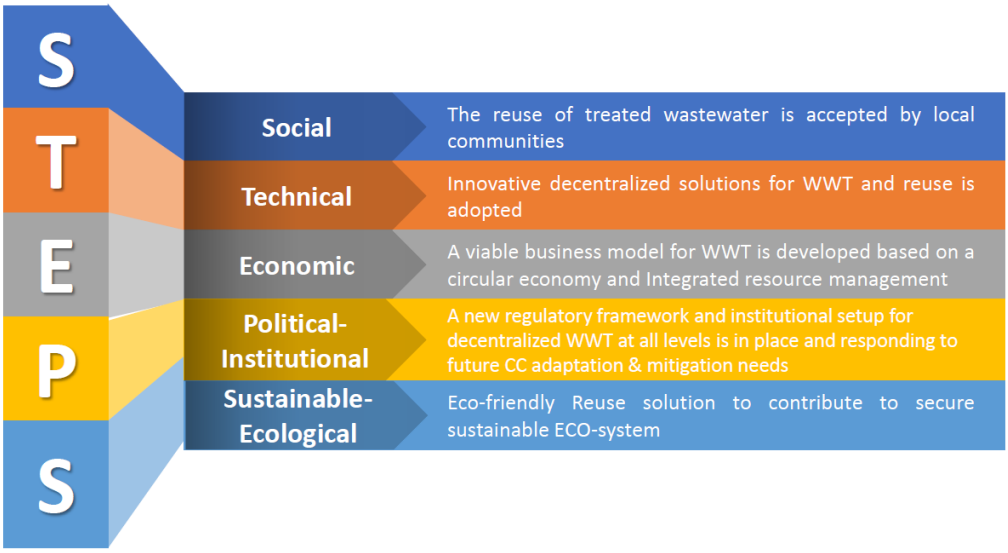
The idea

Wastewater treatment (WWT) has become one of the major environmental challenges worldwide and specifically for developing countries like Lebanon, Jordan, and Iraq. These cases are worth exploring as wastewater management and planning are facing difficulties to be implemented because of the reliance on centralized systems that require a large capital investment in infrastructure and significant yearly operation and maintenance. In this regard, the shift toward a decentralized sanitation strategy offers agility and relatively swift sanitation improvements in high-priority areas that communities and Small to Medium Enterprises can manage themselves. Our solution is divided into three phases and will be explored for the case of Lebanon, as a starting point for piloting sustainable solutions in Jordan and Iraq: The first phase will offer a concept-level understanding of the water and sanitation situation in peri-urban and rural of the three countries. In this phase, vulnerable areas will be identified according to indicators specified by the relevant stakeholders. In the second phase, the performance of different existing pilot-scale wastewater treatment systems in Lebanon will be assessed. The third phase intends for upgrade selected pilot-scale systems to use treated effluent for irrigation purposes. These pilot systems will be used as demonstration sites for continuous improvement, acquiring lessons learned and exchanging them with stakeholders in the countries.



The proposed solution delivers crucial information that can be used to feed the development of an assessment methodology intended to serve as a reference for the improvement of wastewater treatment strategies in Lebanon, Jordan, and Iraq. It will support decision-makers and stakeholders by providing preliminary data and lessons learned needed for the improvement of the daily living of people in the most critical areas in the selected countries. It will eventually improve the accuracy of the interpretation and the design of further solutions for decentralised wastewater treatment.

Objectives



Lines of activities considered

The lines of activities are considered along the dimensions of the 5 objectives:

Social

- Community profiling
- Stakeholder engagement (social scientists)
- Development & validation of a shared vision
- Awareness raising for WWT and reuse
- Community to community interaction and demonstration sites and field visits
- Trust building, ownership, and capacity building with all involved stakeholders

Technical

- Identification of circular and eco-friendly WW collection treatment and reuse systems
- Upgrade existing demonstration sites in Lebanon and piloting sustainable solutions in Jordan and Iraq
- Convincing demonstration and technical examples

Economic

- Conduct studies to evaluate the monetary value of environmental benefits (Cost/benefit analysis)
- Demonstrate multi-win-win economic benefits
- Sustained Circular Economy

Political/ Institutional

- Apply a combined participatory top-down and bottom-up approach including all stakeholders
- Develop & endorse regulatory framework at different level
- Establish a group committee for operation and maintenance (O&M)
- Establish a national steering committee for upscaling with the help of a task force
- Sustaining O&M, organized upscaling and ownership

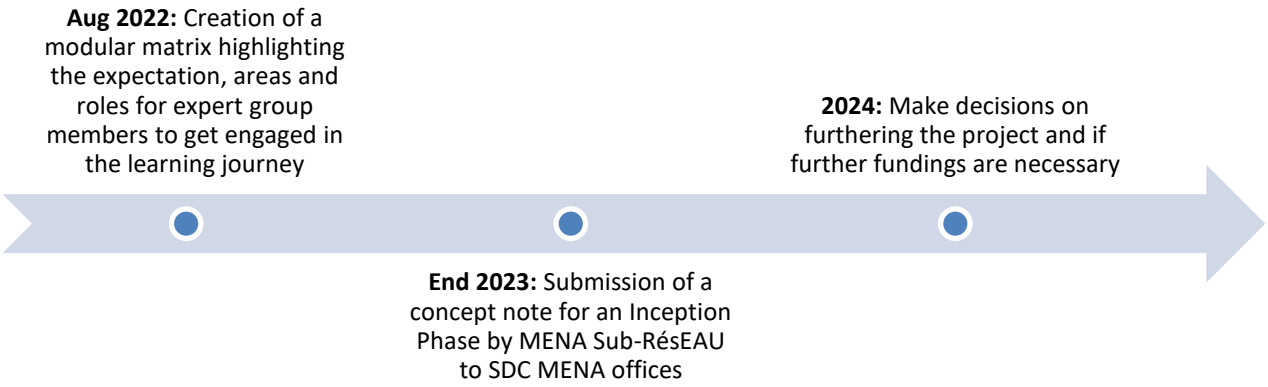
Sustainable-Ecological

Apply a beneficiary's approach to

- Identify needs, opportunities, and risks
- Allocate a percentage of benefits to the ecosystem

Roadmap with key milestones for the period August 2022 – End 2022:

- Compilation of a state-of-the-art report on decentralized/rural WWT in MENA including obstacles and opportunities.
- Upgrading of selected pilot treatment plants in Lebanon as demonstration sites.
- Visits of the demonstration sites in Lebanon by various stakeholders from Jordan, Lebanon, and Iraq.
- Development of a refined concept note on a comprehensive smart approach to decentralized / rural wastewater treatment in MENA.



Potential outcomes implementation the idea

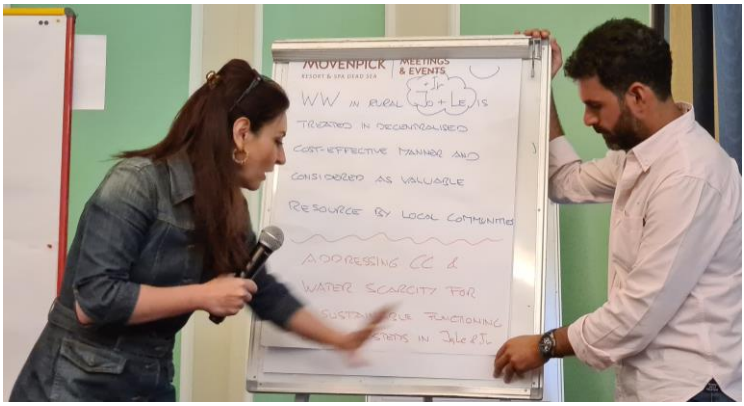
- The project will provide an opportunity for stakeholders from Jordan and Iraq to join the learning journey to exchange with Lebanese colleagues on the importance of wastewater reuse and the value associated with it.
- Potentially it will help with reducing the stigma associated with wastewater reuse in the communities in Jordan and Iraq through a visit to Lebanon, where the agricultural application of reused wastewater is prominent.

The Wastewater Treatment and Reuse Expert Group

Contacts

To find out more, you can get in touch with the working group members:

- Daniel Maselli, Swiss Agency for Development and Cooperation, Lebanon, Switzerland, daniel.maselli@eda.admin.ch
- Mufleh Alalaween, Swiss Agency for Development and Cooperation, Lebanon, mufleh.alalaween@eda.admin.ch
- Nazar Al Saeedi, Ministry of Water Resources and Irrigation, Iraq, nazarkn@yahoo.com
- Sital Uprety, Eawag – Sandec, Switzerland, sital.uprety@eawag.ch
- Yasmine Jabali, University of Balamand, Lebanon, yasmine.jabaly@balamand.edu.lb
- Youssef Bizri, Food and Agriculture Organization of the United Nation, Lebanon, youssef.bizri@fao.org



The Wastewater Treatment and Reuse Team. ©AGUASAN Workshop Team

The Water-Energy-Food-Ecosystems (WEFE) Nexus is a holistic approach to achieve all the SDGs

Results summary by the WEFE Expert Group from the AGUASAN Workshop 2022

The idea in a nutshell

The Challenge Addressed

The main challenge of the Water-Energy-Food-Ecosystems nexus is the coordination amongst relevant stakeholders to implement sustainable solutions emphasizing ecosystems and prioritizing marginalized communities.

The Vision

Capture the interrelationships, synergies, and trade-offs between resources for the WEFE Nexus to ensure a climate resilient world through more sustainable and integrated solutions.

The Potential Solution

A recognised value, incl. a standard of the Water-Energy-Food-Ecosystem Nexus to improve coordination amongst relevant stakeholders and to implement sustainable solutions.

Key target group

Government ministries for water, energy, food and the environment, and regional bodies.

Countries, Region

Selected countries from the Middle East North Africa region, including Jordan, Lebanon, Turkey, Iraq, plus others.

The ideas and results presented have been co-created by one of the five water and climate experts groups during the 36th AGUASAN Workshop **"Water Management in Times of Climate Change - Finding Actionable Solutions for Fragile Contexts in the Middle East"**, taking place in Jordan in June 2022. Through an innovative format, the 5-day workshop supported the five thematic working groups to co-develop potential actionable solutions for water-climate issues, highly relevant for the region.

The idea

A simple step for attracting investment interest in the WEFE Nexus is to demonstrate the socio-economic value of the second 'E' for ecosystems. It counters the belief that protection or improvement of ecosystems has no value and is not taken seriously as an added benefit to development in the water-energy-food arenas. The concept is to select 3-4 existing or new projects in the water/energy and/or water/agriculture sectors and isolate the true monetary value of the ecosystem they support. The impact is widespread, supporting the realisation of many SDGs, and potentially touching all people in the surrounding community, especially the most vulnerable.

Based on this quantitative socio-economic analysis, together with a robust analysis of the current national governance structures of selected countries, the next step will be to bring together the ministries and decision-makers that represent the different sectors and provide recommendations and opportunities for collaboration.

"The WEFE Nexus is a holistic approach to achieve all the SDGs. The Water-Energy-Food-Ecosystem Nexus is an approach that describes and addresses the complex and interrelated nature of the global resource systems, on which we depend to achieve different social, economic, and environmental goals. It is used as a framework that captures the interrelationships, synergies, and trade-offs between resources for water, energy, and food, while protecting our ecosystems; allowing for more sustainable and integrated solutions to achieve a climate secure world." – Definition developed by the expert group.

It will be important to emphasize the impact on marginalised communities by including their representatives in the discussions and decision-making process from an early stage.

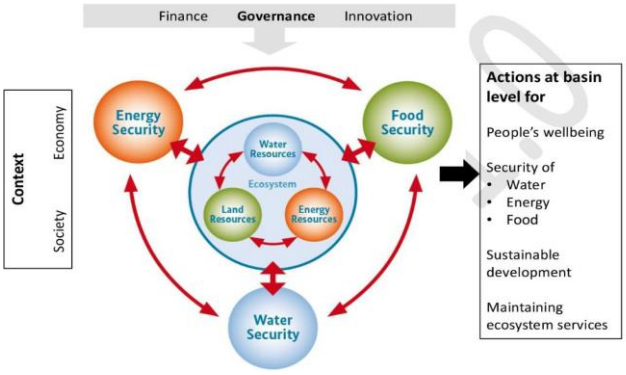
The ecosystem is valued by the following:

1. **Avoided cost** e.g., healthier environment
2. **Replacement cost** e.g., restoration of wetlands cost less than construction
3. **Factor income** e.g., enhance incomes through better water quality -> productivity of fisheries
4. **Travel cost** e.g., demand of tourism
5. **Hedonic pricing** e.g., perceived value of area
6. **Contingent valuation** e.g., alternative uses such as entry to national parks

Specific Aims:

There are four specific aims of the programme. The first two will be built around the results from the demonstration of value provided in the third and fourth aim.

1. Improving the governance environment to enable the WEFE Nexus
2. Improving cooperation between sectors through capacity building, knowledge, sharing and communication
3. Attract financial support by showing the socio-economic value of ecosystems
4. Demonstrate actionable programmes with WEFE Nexus activities



The Water, Food, Energy and Ecosystem security Nexus showing their interdependences: Modified after ©Hoff, 2011

Each of the activities will be inter-related and conducted concurrently rather than sequentially:

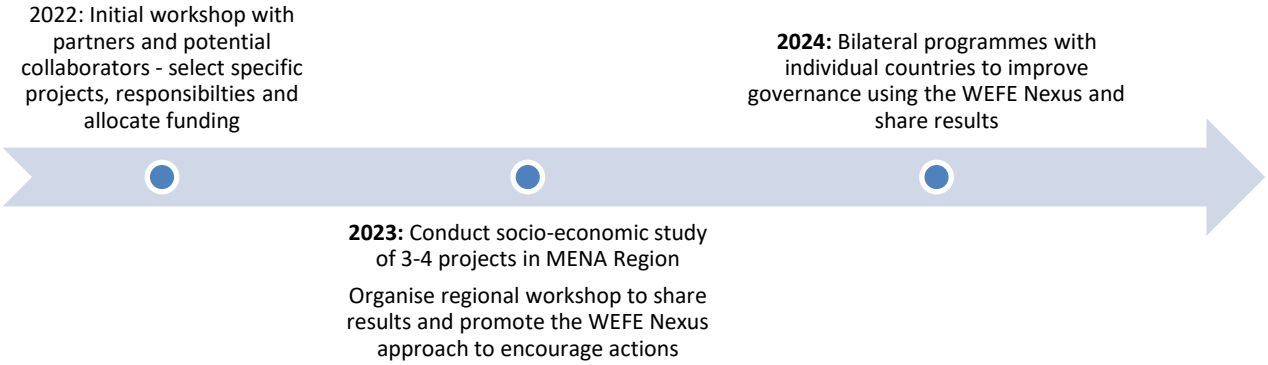
1. Improving the governance environment to enable the WEFE Nexus:
   - Identify gaps on governance (laws, policy, regulations, strategies) to understand the current structure
   - Make recommendations based on the analysis of current governance structure
   - Policy dialogue
2. Improving cooperation between sectors through capacity building, knowledge, sharing and communication:
   - Show ecosystem value by socio-economic valuation of real examples
   - Incorporate this value system into government plans and budget to include in activities for investment in WEFE
3. Attract financial support by showing the socio-economic value of ecosystem:
   - Show ecosystem value by socio-economic valuation of real examples
   - Incorporate into government plans and budget to include in activities for investment in WEFE
   - Attract private financing, e.g. green economy, ESC investment
4. Demonstrate actionable programmes with WEFE Nexus:
   - Research development in technical solutions and innovations
   - Identify projects (existing or new) to provide evidence of WEFE value
   - Develop monitoring indicators for WEFE to a) Create checklist for solution criteria, b) Track performance, c) Define success

Potential partners

Partners will be mainly drawn from the region, including a mix of expertise and project experience. Initial partners include members of the WEFE Nexus team, plus additional interested parties:

- USAid/Jordan WGA, Amman
- Turkish Water Institute, Istanbul
- Lebanese Red Cross, Beirut
- Human Right 2 Water, Switzerland
- UNICEF, Middle East and North Africa
- Blue Peace Program representative from INWRDAM
- The University of Jordan, Amman
- IHE-Delpht Institute
- Mercy Corps
- SDC Regional Offices

Roadmap with key milestones



The project will start in small steps, justifying the value of the ecosystem in projects, analysing existing policy for inclusion of the WEFE Nexus and its coordination across sectors. Once we have some example projects, the next step is to share the learnings in a regional workshop and encourage ministers to adopt a more collaborative WEFE Nexus policy.

Potential outcomes of the implementation of the idea

Collaboration between different ministries to encourage cross-sectoral project thinking that gives priority to the WEFE Nexus rather than individual resources. Specifically:

- There is a value given to ecosystems in all new projects
- Water, Energy and Food projects and investments must consider the best way to optimise all three resources together, and not in isolation, and should include the added value of ecosystems
- There is collaboration between ministries and authorities to optimise the whole WEFE Nexus, and not only their individual responsibilities, with policy incentives to make this happen

It is expected that a holistic WEFE Nexus approach will assist in the acceleration of all the SDGs, and in particular those that support greater welfare, health, and a healthy environment.

WEFE Expert Group

Contacts

To find out more, you can get in touch with the working group members:

- Tarik Hassan, UNICEF, MENA Regional Office, tahassan@unicef.org
- Amanda Loeffen, Human Right 2 Water, United Kingdom, a.loeffen@humanright2water.org
- Tuğba Evrim Maden, Turkish Water Institute (SUEN), Turkey, temaden@gmail.com
- Rania Al Zoubi, WGA, Jordan, ralzoubi@JordanWGA.com
- Safaa Alhoussainy, Lebanese Red Cross, Lebanon, Safaa.alhoussainy@redcross.org.lb

The WEFE Team. ©AGUASAN Workshop Team

Impact of multi-dimensional water scarcity on food security

Results summary by the Water Scarcity Experts Group from the AGUASAN Workshop 2022

The idea in a nutshell

The Challenge Addressed

The lack of socio-economic evidence of the impact of water scarcity on food security

The Vision

Improved Food Security Conditions for Vulnerable Communities in Water-Scarce Contexts

The Potential Solution

Predictive Food Security Platform: A dynamic and coherent water-climate-crop modelling platform to enable seasonal scenario planning and the selection of high-nutritional, water-saving value crops at country and regional scale in Jordan and Lebanon

Key target groups

Key Line Ministries, Development Entities, Small-scale farmers and processors (Small and Medium Enterprises)

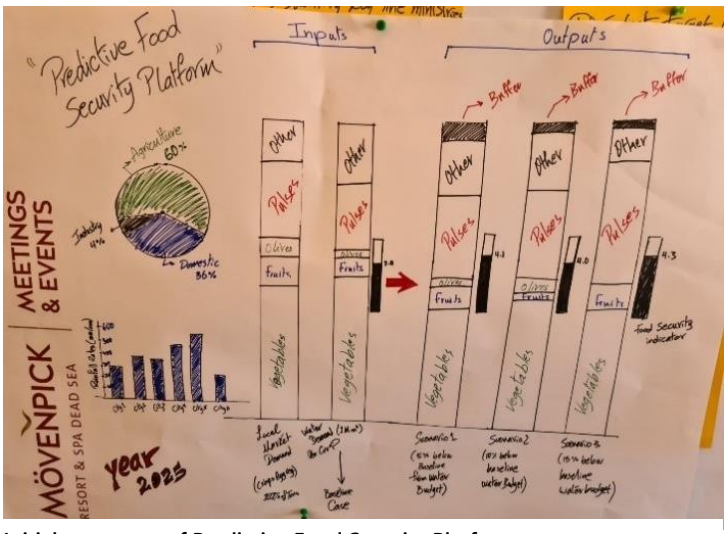
Countries

Jordan, Lebanon

The ideas and results presented have been co-created by one of the five water and climate experts groups during the 36th AGUASAN Workshop **"Water Management in Times of Climate Change - Finding Actionable Solutions for Fragile Contexts in the Middle East"**, taking place in Jordan in June 2022. Through an innovative format, the 5-day workshop supported the five thematic working groups to co-develop potential actionable solutions for water-climate issues, highly relevant for the region.

The idea

Viewing food security from the angle of the country's ability to supply food to its citizens is often lacking if merely considered using a simple supply-demand equation. While food security gaps are often filled by increasing food imports, recent worldwide interruptions to the food supply chain during 2020 (COVID-19 pandemic) and 2022 (Russo-Ukrainian war) have shown how critical it is to invest in food security at the state level. In water-scarce contexts such as in Jordan and Lebanon, fluctuating rainfall rates are significantly affecting local food supplies, and thus, different scenarios for adaptation must be analysed to inform decision-makers on how to strategically reallocate water budgets for critical crops that would maintain a healthy national food security status. The proposed concept leverages the available datasets within governmental, non-governmental, and research institutions (for water, agricultural, food and other indicators) to create a predictive tool for food security using a modelling platform where water, climate, and crop data are integrated to enable scenario planning that would influence crop selection for each season on country and/or regional scales. This topic is also relevant to other topics presented in the AGUASAN



Initial prototype of Predictive Food Security Platform

workshop as it represents one angle to have a practical approach for IWRM, while it can also be adapted to refugee-hosting communities.

The predictive tool is one way to look at food security holistically on a country and regional scale with focus on promoting high-nutritional value crops and/or crop groups that would minimize the virtual water exported to other countries that can be invested locally (e.g. high water demand fruits such as watermelon/strawberry that is grown for the export market).

Specific Aims:

The specific aims as developed as part of a Theory of Change are:

- Enabling the introduction of a dynamic and coherent database for Integrated Agri-Food Management
- Coordinating informed decision-making processes among parties for food security
- Introducing proven and smart models for water-food security at the local level
- Develop the online portal for the tool to allow access to relevant parties
- Develop multiple scenarios for food security using the tool and share them with key stakeholders for feedback
- ***Optional***: Develop a pilot project for one locality where one of the scenarios can be tested with real interventions (e.g. one small city/village can be supported to test the switch in crop production for 1 season)

Lines of activities

- Data collection from several parties (governments, NGOs, research institutions, etc.) including water budgets, food production per group, food balance (imports, exports), consumption per capita, etc.
- Identification of data gaps and how to fill them through partners
- Normalization of data and cross-verification
- Identification of crop groups critical to food security (taken into account local context and nutritional value)
- Create a coordination core group from line ministries and other parties to be custodians of data, advise on tool parameters, and decision gates

Potential partners

Donors and other Development Agencies:

- SDC
- The Netherlands
- FAO
- UNDP

Government:

- Ministry of Agriculture
- Ministry of Water
- Agri Research Centers
- Ministry of Industry

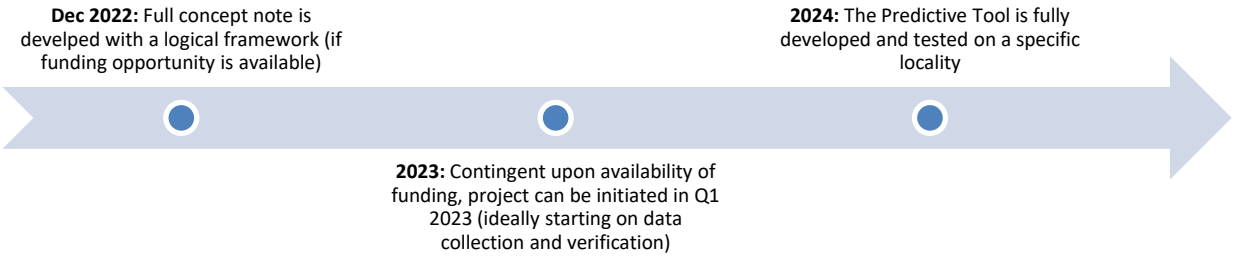
Others:

- Academic Institutions
- Local NGOs and CBOs

Potential Risks and Challenges

- Inadequate decision-making power/government instability
- Backfire from groups affected by changes in crop prioritization
- Challenges to data sharing among key entities
- Engagement of key stakeholders to implement the project

Roadmap with key milestones



Potential outcomes of the implementation of the idea

The proposed concept is expected to produce the following outcomes:

- A fully functional predictive tool for food security in Jordan and Lebanon
- A well-established inter-governmental coordination committee for food security
- Proven models of using scenario planning in improving food security at the local level

Expert Group

Contacts

To find out more, you can get in touch with the working group members:

- Oula Mehyiddin, Cooperation without Borders for Tailored Development, oula_mehyiddin@cwb-lb.org
- Maisam Otoum, CEWAS, Jordan, maisam.otoum@cewas.org
- Michelle Jalkh, Swiss Agency for Development and Cooperation, Lebanon, michelle.jalkh@eda.admin.ch
- Fadi Muaqat, Humanitarian Affairs Officer/Australian Embassy Amman, Fadi.AlMuaqat@dfat.gov.au
- Heba Ababneh, Swiss Agency for Development and Cooperation, Jordan, heba.ababneh@eda.admin.ch

The Water Scarcity Team. ©AGUASAN Workshop team

Smart WASH approach for refugee camps and host communities: harvesting rainwater!

Results summary by the Smart WASH Experts Group from the AGUASAN Workshop 2022

The idea in a nutshell

The Challenge Addressed

In water-scarce countries, the need to adapt to the burden of welcoming refugees on water resources in times of climate change is prevailing. As an example, Jordan is hosting more than 2 Mio Palestinians (UNWRA 2022) and 760,000 asylum seekers (UNHCR 2022) mainly from Syria beside its 8 Mio citizens. Optimised harnessing of its water resources thus is needed to ensure the kingdom's sustainable development and prevent communities' tensions.

The Vision

Increase the resilience of the general and vulnerable population to a possible temporary suspension of centralized water supply services.

The Potential Solution

Generalised rainwater harvesting and storage at household level can increase the self-reliance and resilience. It can reduce tensions of refugees and host communities during drought or water supply interruption events.

Key target group

People living in water-scarce countries.

Country

Jordan or other countries facing water scarcity, with limited service capacity and high vulnerability to climate change impact.

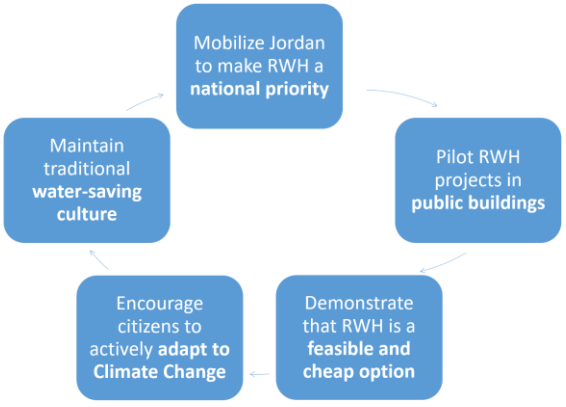
The ideas and results presented have been co-created by one of the five water and climate experts groups during the 36th AGUASAN Workshop **"Water Management in Times of Climate Change - Finding Actionable Solutions for Fragile Contexts in the Middle East"**, taking place in Jordan in June 2022. Through an innovative format, the 5-day workshop supported the five thematic working groups to co-develop potential actionable solutions for water-climate issues, highly relevant for the region.

The idea

Short description

The SMART WASH approach inspires communities in water-scarce countries to play a proactive role in the management of natural resources through innovative, simple, robust, low-energy and water-efficient water & sanitation methods. Fostering sustainable behaviour change through this approach can result in an improvement of public health, a reduced environmental footprint, increasing resilience to climate change and seeding opportunities for livelihoods and economic development. Given Jordan's water balance deficit and foreseen impact of climate change, optimisation of water resource harnessing through rainwater harvesting (RWH) is a promising avenue (with a potential of an average precipitation volume of 9.9 billion cubic meters/ year).

Climate change will result in more erratic rainfall, with prolonged dry spells and heavy rainfalls, and



Systematic multi-stakeholder Rainwater Harvesting (RWH) approach in Jordan

potentially reduction of rain volumes. It is thus advisable to mobilize the population living in Jordan to be the actor of the solution by increasing the portion of rainwater harvested (RWH) and consequently their resilience towards climate change.

Specific Aims

In regard of the above, the experts group envisions fostering public buildings and private owners' willingness to implement rainwater harvesting and water-saving infrastructures. This will complement the already existing Jordanian longstanding water-saving culture and further mobilize people living in Jordan to adapt to climate change.

Lines of activities

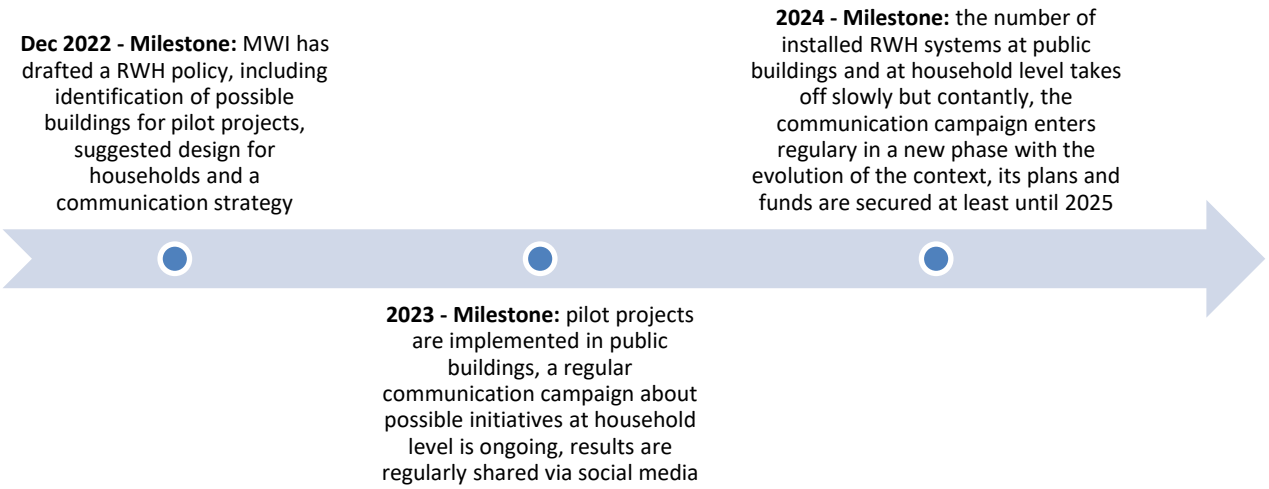
Several complementary steps were identified, such as national policies, piloting rainwater harvest infrastructures in public and commercial buildings, to support behavioural change and generate mentality-tipping points. In addition, promoting water-saving devices can contribute to the adoption of supplementary saving practices.

Potential partners

To reach its full potential, a communication strategy adapted to different stakeholders and reinforcing the complementarity steps needs to be developed:

- The main message should be that "communities need to take a more active role in adapting to climate change effects and increasing actively the ration of water harvested in water-scarce countries". This message can be stated by the **highest possible political authority** in the country and echoed by actors of different sectors.
- The **Ministry of Water and Irrigation (MWI)** can propose designs and tools to help homeowners to install adapted RWH systems and can study the possibility of a supportive legal framework to accelerate the transition.
- The **Ministry of Finances** should consider tax reduction for investments in RWH systems.
- The ministries can identify **public buildings** to implement pilot projects.
- **Private firms** should be encouraged to implement pilot RWH installations.

Roadmap with key milestones



Potential outcomes of the implementation of the idea

Through the awareness that individual action is possible, Jordanian are better equipped to decide how and when they will invest in climate change adaptation. Rainwater harvesting can allow securing drinking water supply. It can also serve to reduce indoor temperatures, thus reducing overall energy consumption. Additionally, it permits to supply water for intensified, small-scale food productions at household level.

This soft measure bets on the intelligence of the people rather than on large investments from the state, coercive measures or intruding dogmatic messages. Besides empowering citizens, it could also pave the way to promote better social cohesion among citizens, facing a climatic issue, which very adversely affect their livelihoods. In urban areas, a significant increase in water harvesting would also significantly contribute to reduce flood risks in low-lying areas, thus adding a welcomed Disaster Risk Reduction component to this vision.

The Smart WASH Experts Group

The original question was how to avoid conflicts between refugees and host communities. As the water resources in Jordan are so scarce, and hospitality in Jordan supports to welcome refugees in need of protection and assistance, the group focused on potential solutions to increase water availability for all.

The expert group worked together with great pleasure during the AGUASAN workshop. While many issues were discussed, the promotion of a simple, robust and culturally adapted approach, the harvesting of rainwater was finally selected and developed as a potential solution to address community tension around access to water.

Contacts

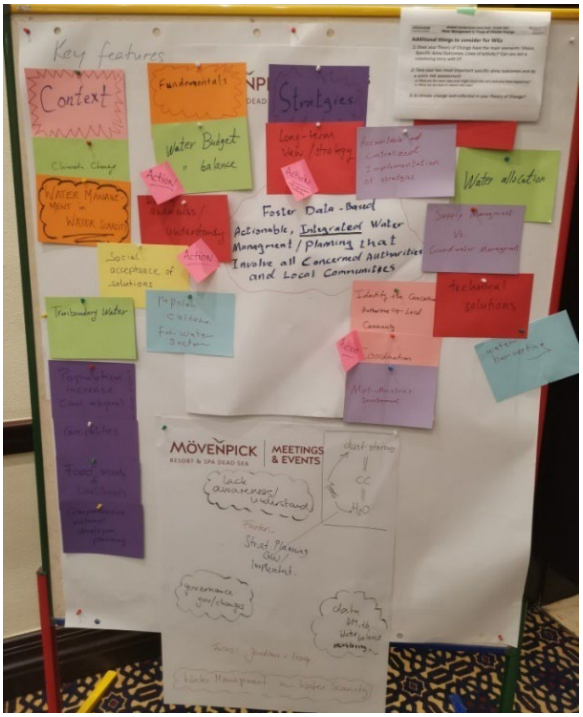
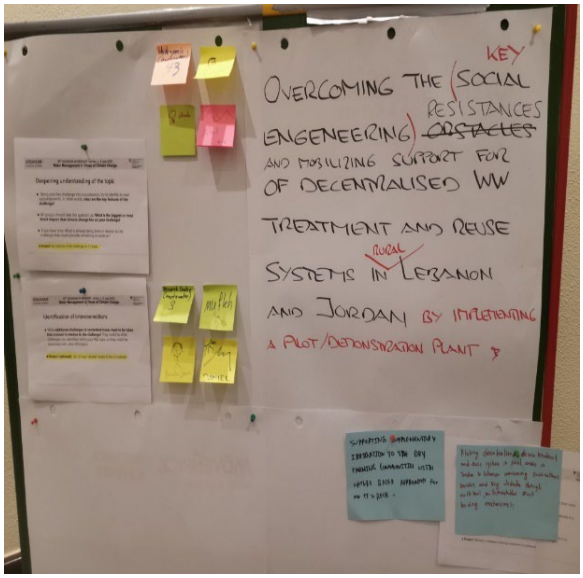
To find out more, you can get in touch with the working group members:

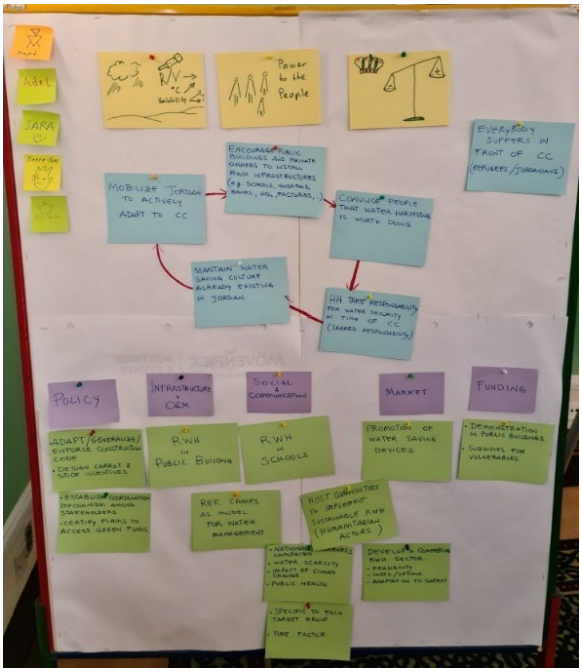
- Adel Alobeiaat, Ministry of Water and Irrigation, Jordan, adel_alobeiaat@mwi.gov.jo
- Pierre-Yves Pitteloud, Swiss Agency for Development and Cooperation, Jordan, pierre-yves.pitteloud@eda.admin.ch
- Prof. Majed Abu-Zreig, Water Diplomacy Center, Jordan, majed@just.edu.jo
- Marc-André Bünzli, Swiss Agency for Development and Cooperation, Switzerland, marc-andre.buenzli@eda.admin.ch
- Sara Ubbiali, Eawag - Sandec, Switzerland, sara.ubbiali@eawag.ch

The Smart WASH Team. ©AGUASAN Workshop Team

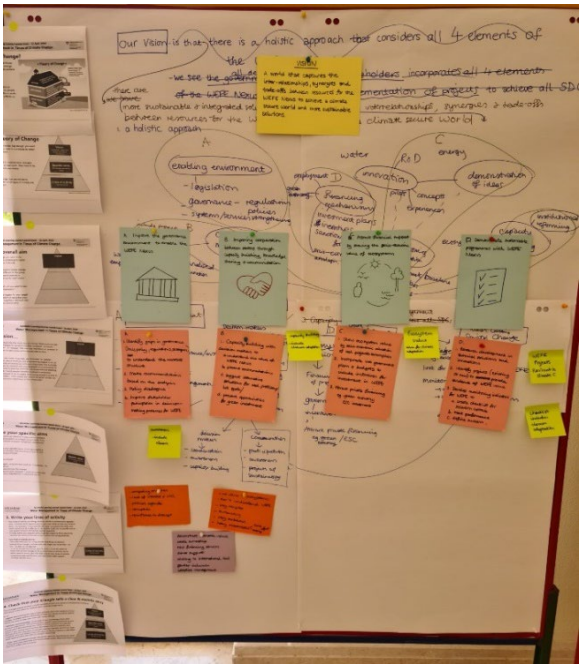
6 ANNEXES

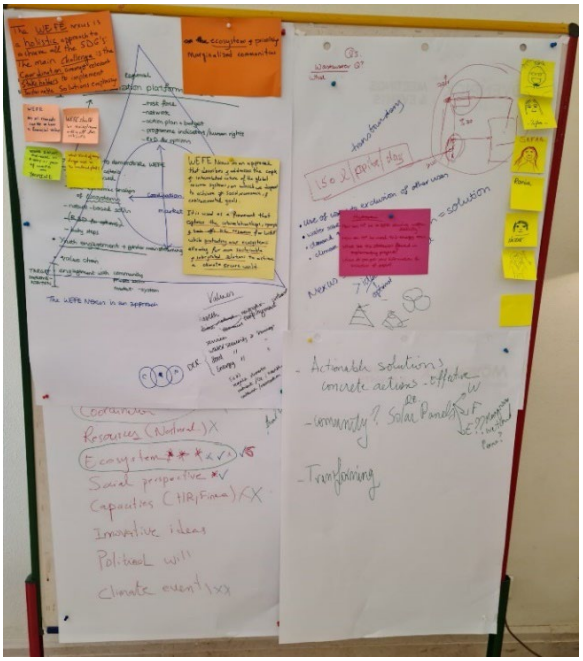
6.1 Annex 1 – Proposal boards

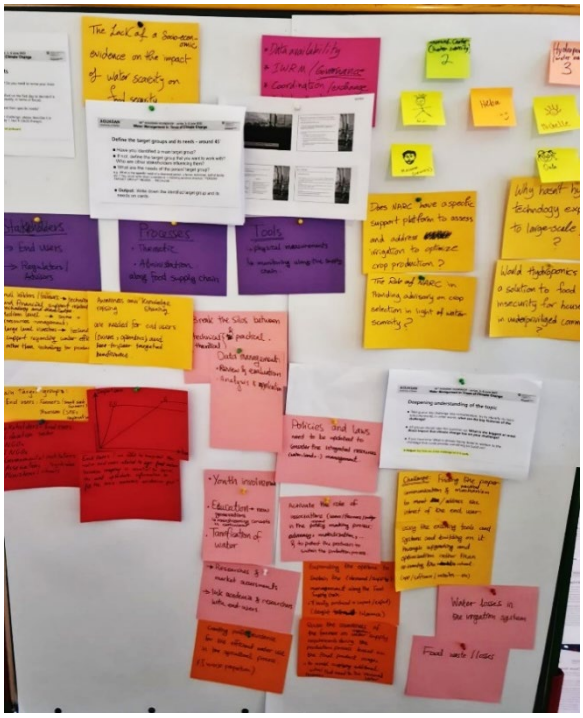
Topic 1	Topic 2
Groundwater resources management	Wastewater treatment and reuse
	

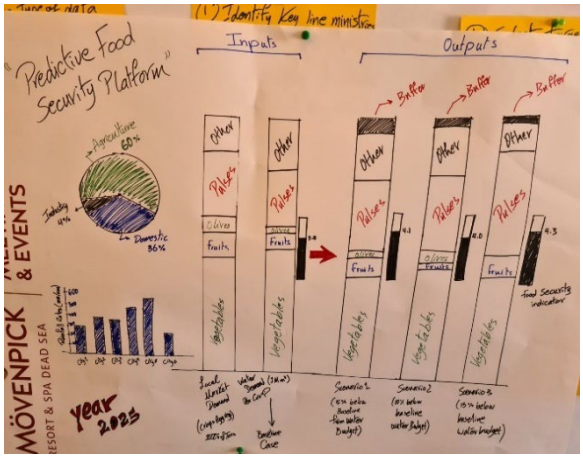
Topic 5
Smart WASH approach for refugee camps & hosting communities


Topic 3	Topic 4
Water-Energy-Food-Ecosystems (WEFE) nexus	Impact of multidimensional water scarcity on food security





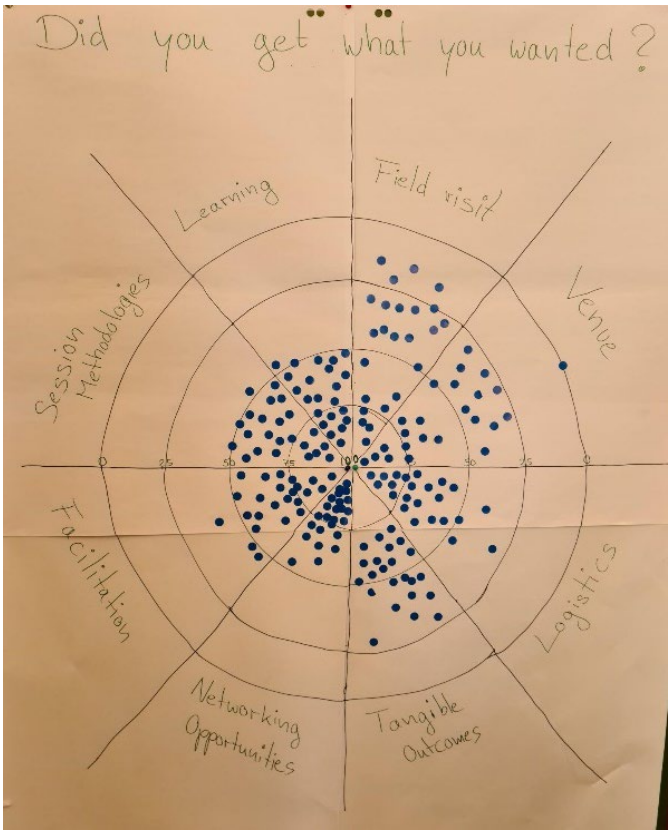




6.2 Annex 2 – Evaluation

Evaluation 1

Below is a visual representation of the evaluation by the participants (Key organizers, facilitators and logistics support did not take part in the evaluation). Each concentric circle radiating out from the center corresponds to a different level of satisfaction. The inner circle represents 100/100, representing the highest degree of satisfaction. The utmost outer circle represents 0/100, which means the lowest degree of satisfaction. The bull's eye diagram is divided into eight different categories: field visit; venue; logistics; program; networking opportunities; facilitation; relevance; learning. Each participant was given a round sticker per category (therefore eight stickers per participant) and evaluated their degree of satisfaction per category.



When examining the diagram above, the overall participant's satisfaction ranges from a satisfactory to very good level. Most of the stickers remain concentrated between 100 and 50 in **Learning, Session Methodologies, Facilitation**, **Networking Opportunities.** The category **Venue and Logistics** has additionally some the stickers penetrating into the 25% circle (Venue has one outlier of one sticker on 0% demonstrating a total dissatisfaction of a participant). The category of **field visits** has stickers evenly spread from 0% to 100% and the category of **tangible outcomes** has some stickers spreading from 75-25% satisfaction circle.

Evaluation 2

The table below shows open feedback from the participants. On the left column are the welcomed aspects and on the right column the aspects to be improved.

☺	☹
Knowledge, strategic thinking (less technical), Meeting great people	Venue is a tourist trap
Organization, group discussions to exchanges ideas and experiences, opportunity to improve capacity in order to reach goals and direct actionable solutions on the right path.	More case studies needed
Engaged people	Meal logistics was not clear. A lot of plastic and paper were used although the theme of the workshop is climate change.
Non-conventional approach: didn't have to listen to so many presentations. Activities and discussions within the working groups.	Some people were not given space to speak Probably forced more Arabic.
Networking opportunities	Lack broader regional presentations and participation from Tunisia, Egypt, and Morocco.
Great regional information exchange that allows for regional thinking.	Recommend more inputs that simply having field visits. Sharing more stories or pilot projects from other regions that work.
Interactive learning method	Guidance before, beginning could have been more concrete.
Networking: great with positive attitudes and excellent attendance. Good small working groups, right number of interventions from the facilitators, excellent location, useful to have preparatory meetings in May	Working groups: not always able to listen to other's opinions.
Sharing ideas, learning opportunities motivation, Gender balance, wide range of experiences	Defensive reactions during the presentations were not properly managed by the facilitators
Field visits were great to understand the context, country, and push on thoughts.	Field visits could have been better facilitated/guided

6.3 Annex 3 – List of Participants

Name	Organization	Country of Operation
Adrian Stalder	Swiss Agency for Development and Cooperation	Switzerland
Abdullah Zoubi	Mercy Corps	Jordan
Adel Alobeiaat	Ministry of Water and Irrigation	Jordan
Alaa Al-Qaisi	Swiss Agency for Development and Cooperation	Jordan
Amanda Loeffen	Human Right 2 Water	Switzerland
André Wehrli	Swiss Agency for Development and Cooperation	Switzerland
Bassam Al-Qaisi	Swiss Agency for Development and Cooperation	Jordan
Dalal Elewah	Ministry of Water and Irrigation	Jordan
Daniel Maselli	Swiss Agency for Development and Cooperation	Switzerland
David Sheldon	Skat Consulting	Switzerland
Enas Albakri	Water Diplomacy Center	Jordan
Fadi Muaqat	Australian Embassy Amman	Jordan
Gabriella Phipps	Australian Embassy Amman	Jordan
Ghada Kassab	University of Jordan	Jordan
Heba Ababneh	Swiss Agency for Development and Cooperation	Jordan
Mahnd A. Nayf Younis	Ministry of Water Resources	Iraq
Maisam Otoum	CEWAS	Jordan
Majed Abu-Zreig	Water Diplomacy Center	Jordan
Marc-André Bünzli	Swiss Agency for Development and Cooperation	Switzerland
Michelle Jalkh	Swiss Agency for Development and Cooperation	Lebanon
Mufleh Alalaween	Swiss Agency for Development and Cooperation	Jordan
Nezar Al Saeedi	Ministry of Water Resources	Iraq
Oula Mehyiddin	Cooperation without Borders for Tailored Development	Lebanon
Pierre-Yves Pitteloud	Swiss Agency for Development and Cooperation	Jordan
Rania Al-Zoubi	USAID	Jordan
Riff Fullan	Helvetas Swiss Intercooperation	Switzerland
Sabine Rosenthaler	Sherman Swiss Agency for Development and Cooperation	Jordan
Safaa Alhoussainy	Lebanese Red Cross	Lebanon
Sandra Fürst	Skat Consulting	Switzerland
Sara Ubbiali	Eawag	Switzerland
Sital Uprety	Eawag	Switzerland
Tarik Hassan	UNICEF	Jordan
Tuğba Evrim Maden	Turkish Water Institute (SUEN)	Turkey
Yasmine Jabali	University of Balamand	Lebanon
Youssef Bizri	Food and Agriculture Organization of the United Nation	Lebanon

5 participants have been sponsored by SDC to support the diversity of professional backgrounds