



## Mainstreaming Drought Risk Management, with a focus on proactive measures

### SWIM-H2020 SM, Expert Facility Activity No. EFS-JO-1-WP1

#### CONCEPT NOTE AND AGENDA TRAINING No. 2

### Assessment of Drought Using WEAP-ArcSWAT Hydrological Modeling in Amman-Zarqa Basin (AZB)

2-6 September 2018

Ministry of Water and Irrigation, Amman – Jordan

## Background

Within the scope of work of the EU funded SWIM-H2020 SM, the project is undertaking an activity titled: *"Mainstreaming Drought Risk Management, with a focus on proactive measures"* (Activity no. (EFS-JO-1)). The activity aims to support Jordan in enhancing preparedness & response to drought-related natural disasters and boost the resilience in the water sector through a series of interrelated activities that include training of the MWI staff and relevant stakeholders on the application of the "Water Evaluation and Planning" (WEAP) system in drought risk management. In order to achieve that, second training session will be conducted:

**Training no. 2:** Demonstrating application of the "Water Evaluation and Planning" (WEAP) system in drought risk management in AZ-Catchment. On the other hand, utilizing SWAT hydrological outputs with WEAP simulation at catchment level.

## Introduction

WEAP was selected as an appropriate tool to fulfil all the requirements to enable the water policy-directorate at Ministry of Water and Irrigation – Jordan (MWI) in order to enhance strategic water resource planning. As part of task 5 of the above mentioned activity, SWIM-H2020 SM undertook a review and assessment of the current capacity of the WEAP model available at MWI for Amman Zarqa Basin (AZB), with a view to identify any gap in the current simulation and existing conceptual model and in the data needed for adequate simulation; again focusing on the pilot area of Amman-Zarqa Basin and indicating the required model enhancements. To this effect, a demo model covering the said gaps was built aiming to improve the WEAP results to show the complete hydrological processes. The demo model has been built for AZB, and was populated with relevant data. The conceptual design of the model included the calculation of irrigation demand requirements, hydrological analysis for AZB, water balancing. The model will integrate hydrological input data from ArcSWAT and crop yield requirements together with environmental and other restrictions that follow the sustainability context. Available data actually should allow more complex approaches on rainfall – runoff mechanisms in dry climates.

## Objectives of Training no. 2:

Raise capacity at Ministry staff on using WEAP as a tool for drought management and enabling them to simulate the water budget for cases in AZ-basin using hydrological approaches. In the Next steps, improving WEAP results to show the complete hydrological processes and linkages to ArcSWAT. Jointly with MWI staff, calibrate the demo model and establish linkages as necessary with drought management planning. The conceptual design of the model shall include the calculation of irrigation demand requirements, hydrological analysis for Amman-Zarqa Basin, water balancing and the potential use of WEAP output for drought management. The model must integrate hydrological input



data from ArcSWAT and crop yield requirements. Available data actually should allow more complex approaches on rainfall – runoff and Supply – Demand Models. After successful completion, the participants will: Have a general understanding of how water resources assessment tools can be used to determine water demand and availability at the basin and sub-basin levels. Understand and use the WEAP-ArcSWAT tool for Amman-Zarqa Basin. Make changes and build additional scenarios on the WEAP system

### **Expected Results:**

After successful completion of the training, the participants will:

1. Have a general understanding of how water resources assessment tools can be used to determine water demand and availability at the basin and sub-basin levels.
2. Understand and use the WEAP-ArcSWAT tool for AZ Basin.
3. Be able to calibrate and set up the model for other basins
4. Be able to Make changes and build additional scenarios on the WEAP system

### **Target Participants**

The invitees should be directly involved, in drought management/ water resources management and planning, hydrological and water balance modeling (Ex: Water Policy Directorate, Water Modeling Department).

Representatives from MWI, WAJ, and JVA are targeted in this training.



## Agenda

### Day 1: Opening and Overview

Time	Session	
9:00	Registration	All Participants
9:30	Opening Session Welcome Speech from MWI coordinator Opening Remarks Formulation of the Working Groups	Speaker: Mr. Saleh Al Qura'n (SWIM-H2020 SM Non-key Expert)
10:00	Demonstration of WEAP Model for AZ-Basin (Case Study for measuring groundwater over-abstraction) <ul style="list-style-type: none"><li>• Catchment principle in WEAP</li><li>• Data integration of Evapotranspiration (ET), Precipitation (PPT) and Effective rainfall.</li></ul>	Speaker: Mr. Saleh Al Qura'n (SWIM-H2020 SM Non-key Expert)
11:30	<b>Break</b>	
12:00	<ul style="list-style-type: none"><li>• Actual Abstraction VS Simulation</li><li>• Calculating the GW Over-abstraction using Unmet Demand (New model thinking)</li><li>• Estimation of all Water cycle elements (ET, PPT, Runoff, GW-recharge)</li></ul>	Speaker: Mr. Saleh Al Qura'n (SWIM-H2020 SM Non-key Expert)
12:30	<b>Break</b>	
13:30	Exercise for Calculating Water Budget by WEAP <ul style="list-style-type: none"><li>• Simplified Rainfall-Runoff Model</li><li>• Setting up (data and methods)</li><li>• Showing Results and Discussion</li></ul>	Speaker: Mr. Saleh Al Qura'n (SWIM-H2020 SM Non-key Expert)
15:00	<b>Wrap up of Day 1</b>	



<b>DAY 2: Hydrological Modeling Using ArcSWAT</b>		
9:30	Day 2 Sessions	Working Group 1
10:00	Working Group 1: ArcSWAT Hydrological Modeling <ul style="list-style-type: none"> <li>• SWAT model overview and applications               <ul style="list-style-type: none"> <li><input type="checkbox"/> Data Requirements, Format and Data Sources</li> <li><input type="checkbox"/> Conceptual Design of Hydrology in ArcSWAT</li> <li><input type="checkbox"/> Utilizing SWAT outputs in WEAP modeling</li> </ul> </li> </ul>	Speaker: Mr. Saleh Al Qura'n (SWIM-H2020 SM Non-key Expert)
<b>11:00</b>	<b>Break</b>	
11:30	ArcSWAT Modeling Procedures (Part 1) <ul style="list-style-type: none"> <li><input type="checkbox"/> Watershed delineation</li> <li><input type="checkbox"/> Land use and soil overlay</li> <li><input type="checkbox"/> HRU delineation</li> <li><input type="checkbox"/> Weather Data</li> <li><input type="checkbox"/> Model Run</li> </ul>	Speaker: Mr. Saleh Al Qura'n (SWIM-H2020 SM Non-key Expert)
<b>12:30</b>	<b>Break</b>	
13:30	ArcSWAT Modeling Procedures (Part 2) <ul style="list-style-type: none"> <li><input type="checkbox"/> Watershed delineation</li> <li><input type="checkbox"/> Land use and soil overlay</li> <li><input type="checkbox"/> HRU delineation</li> <li><input type="checkbox"/> Weather Data</li> <li><input type="checkbox"/> Model Run</li> </ul>	Speaker: Mr. Saleh Al Qura'n (SWIM-H2020 SM Non-key Expert)
<b>15:00</b>		
<b>Day 3: Scenario Building Using WEAP</b>		
9:30	Day 3 Sessions	Working Group 2
10:00	Working Group 2: WEAP Scenario Building and Strategy till 2025 <u>Building list of strategies</u> <ul style="list-style-type: none"> <li>• Drafting Water Security Plan Scenarios</li> <li>• Drafting Optimistic Scenarios</li> <li>• Drafting Future Water Projects Scenarios</li> <li>• Drafting the Business as usual Scenarios</li> </ul>	Speaker: Mr. Saleh Al Qura'n (SWIM-H2020 SM Non-key Expert)
<b>11:15</b>	<b>Break</b>	
11:45	Continued...	
12:30	<b>Break</b>	
13:30	Continued... <ul style="list-style-type: none"> <li>• Population Growth Scenarios</li> <li>• Fluctuations in Per-capita Water Use Scenarios</li> </ul>	Speaker: Mr. Saleh Al Qura'n (SWIM-H2020 SM Non-key Expert)
<b>15:00</b>		



DAY 4: Building WEAP Model (Linking Results from ArcSWAT with WEAP)		
9:30	Day 4 Sessions	Working Group 3
10:00	Working Group 3: WEAP-ArcSWAT Integration Visualization and interpretation of SWAT outputs <ul style="list-style-type: none"> <li>• Reading Results and integration of WEAP-ArcSWAT               <ul style="list-style-type: none"> <li><input type="checkbox"/> Input Data and Integration in WEAP</li> <li><input type="checkbox"/> Scale of Analysis</li> <li><input type="checkbox"/> Utilizing SWAT outputs in WEAP modeling</li> </ul> </li> </ul>	Speaker:  Mr. Saleh Al Qura'n (SWIM-H2020 SM Non-key Expert)
<b>11:00</b>	<b>Break</b>	
11:30	Final WEAP Model Building (Part 1) <u>Catchment Modeling (Water Supply):</u> <ul style="list-style-type: none"> <li><input type="checkbox"/> ETP Data integration with WEAP and ArcSWAT</li> <li><input type="checkbox"/> Calculating GW-Recharge Rates</li> <li><input type="checkbox"/> Calculating Surface Runoff</li> <li><input type="checkbox"/> Model Run</li> </ul>	Speaker:  Mr. Saleh Al Qura'n (SWIM-H2020 SM Non-key Expert)
<b>12:30</b>	<b>Break</b>	
13:30	Final WEAP Model Building (Part 2) <u>Demand Modeling (Water Demands):</u> <ul style="list-style-type: none"> <li><input type="checkbox"/> Identifying Demands (Domestic, Agriculture and Industrial); Defining Activity Level and the water use rate</li> <li><input type="checkbox"/> Linking Demand-Supply Model</li> <li><input type="checkbox"/> Model Run</li> </ul>	Speaker:  Mr. Saleh Al Qura'n (SWIM-H2020 SM Non-key Expert)
<b>15:00</b>		
Day 5: Scenario Building of WEAP		
9:30	Day 5 Sessions	Working Group 3
10:00	Final WEAP Model Building (Part 3) <u>Scenarios Integration (Different Options for Future):</u>	Speaker:  Mr. Saleh Al Qura'n (SWIM-H2020 SM Non-key Expert)
<b>11:15</b>	<b>Break</b>	
11:45	Continued...	
12:30	<b>Break</b>	
13:30	Continued... <ul style="list-style-type: none"> <li>• Model Rrun</li> <li>• Discussion of the Results</li> <li>• Revision</li> </ul>	Speaker:  Mr. Saleh Al Qura'n (SWIM-H2020 SM Non-key Expert)
<b>15:00</b>		