Sustainable Water Integrated Management and Horizon 2020 Support Mechanism
This Project is funded by the European Union

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. 1

Technical training on drought monitoring and early warning system in Amman-Zarqa Basin (AZB)

23-26 July, 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, a training on drought monitoring and early warning system will be conducted.

Introduction

This task will involve a four-days technical training (offered by the Consultant) for the stakeholders of the Amman-Zarqa catchment and officers of MWI (and/or other relevant institutions such as the Drought Management Unit (DMU) of the Ministry of Agriculture (MOA)) involved in drought monitoring, to improve the existing drought monitoring practices, their capacity to run the Drought Monitoring System (DMS) and to calculate the drought indicators in other basins/ areas.

The training will build on the results of the work that has been carried out so far, namely; the drought indicators/indices proposed to be used for drought identification and characterization, tailored for the Amman-Zarqa catchment, and the Drought Monitoring System (DMS) which has been elaborated by the project with a focus on the Amman – Zarqa catchment, including guidelines for calculating the indicators, for operating the system and conducting periodic assessments of drought conditions (e.g. drafting a drought bulletin) in the Amman-Zaqa catchment.

The Ministry of Water and Irrigation will provide the facilities where the training will be held and will also handle the invitations, organization and the workshop logistics.

Objectives of Training:

1. Introduce the relevant MWI staff to the general hydrological and meteorological context regarding droughts including drought definitions.
2. Introduce the relevant MWI staff to the main drought indicators which can be used for drought identification and characterization, incorporating different hydrological elements, (surface water flows, spring discharge, groundwater level and level of water reservoir).
3. Train the relevant MWI staff on the statistical process of rainfall and the meteorological variables that lead to the calculation of the potential evapotranspiration.
4. Hands on FAO (ETo Calculator) model.

5. Train the relevant MWI staff on the software (DrinC model and WMO model) for the computation of Standardized Precipitation Index (SPI), Reconnaissance Drought Index (RDI), and Streamflow Drought Index (SDI). Hands on the DrinC software.
6. Train the relevant MWI staff on simulating the water budget for the Palmer's Drought Severity (PDS) Index with the HEC-HMS Soil Moisture Accounting (SMA) Model.
7. Hands on training for setting up a HEC-HMS model. The HEC-HMS (developed by the US Army Corps of Engineers is used for Hydrologic Modeling, in order to compute the variables for the Palmers Drought Severity Index (PDSI).
8. Train the relevant MWI staff on Drought Early Warning Systems regarding segmented rainfall values from the commencement of the wet period. The findings from the Expert Facility Activity regarding the simplified drought early warning system for the A-Z catchment will be presented.
9. Train the relevant MWI staff on Drought Hazard Mapping in GIS platform.

Expected Results:

After successful completion of the training, the participants will:

1. Have specific understanding and skills for the meteorological data processing.
2. Have a general understanding on drought monitoring indices.
3. Acquire specific skills for the computation of the most widely used drought indices.
4. Familiarize with specific freeware mathematical modelling regarding drought indices
5. Acquire specific skills for the drought hazard mapping.
6. Acquire specific skills for the water budget modelling in the soil strata.

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).

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 Pre-training Assessment	
10:00	• Introduction to hydrology and droughts • Principles • Rainfall (spatial & temporal distribution). • Statistical process of rainfall data (definition of outliers, double mass curves, correction, gap filling). • Computation of Potential Evapotranspiration (Penman-Monteith, Priestley-Taylor, Hargreaves, Thornthwaite, Blanney – Criddle methods)	
11:30	***Break***	
12:00	Hands on Potential Evapotranspiration Calculation 1. FAO ETo Calculator 2. DrinC Model	
13:30	***Break***	
14:00	• Definitions of Drought, Water Scarcity and Aridity. • Setting the Concept of the Drought Indices	
15:00	**Wrap up of Day 1 - Discussion**	

DAY 2: Drought Meteorological & Hydrological Indices		
9:30	Recap from Day 1	All participants
10:00	• The Standard Precipitation Index (SPI). Theory and Calculation • Hands on: Using DrinC software for SPI calculation	
11:30	***Break***	
12:00	• The Standard Precipitation – Evapotranspiration Index (SPEI). Theory and Calculation • The Reconnaissance Drought Index (RDI). Theory and Calculation • Hands on: Using DrinC software for RDI calculation	
13:15	***Break***	
14:15	• The Streamflow Drought Index (SDI). Theory and Calculation • Hands on: Using DrinC software for SDI calculation	
15:00	Wrap up of Day 2 - Discussion	
Day 3: Drought Mapping & Early Warning Systems		
9:30	Recap from Day 2	All participants
10:00	• Mapping Drought with GIS • Inverse Distance, Kriging, Universal kriging, etc	
11:15	***Break***	
11:45	Early Warning Systems for Drought – General Theory	
12:30	***Break***	
13:30	• Early Warning System in A-Z basin using segmental rainfall analyses using rainfall percentiles and probabilities of transition	
15:00-1530	Wrap up of Day 3 – Discussion	
15:30-15:45	Post-training Assessment Evaluation of the Training Workshop	

Day 4: Hydrologic Simulation		
9:30	Recap from Day 3	All participants
10:00	• The Palmer's Drought Severity Index (PDSI). Theory and Calculation. • The Soil Moisture Accounting (SMA) Method for calculation of the hydrologic budget.	
11:15	***Break***	
11:45	Hands on: HEC-HMS SMA method • Setting up the model. • Understanding physical conditions to model parameters. • Input data, visualizing data and processes.	
12:30	***Break***	
13:00	Continued… • Changing the model and understanding outputs • Viewing and understanding the outputs • Discussion	
15:00	Wrap up of Day 4 - Discussion	
15:30	Training Closure – Final Remarks	

Software Models:

1. SPI model by the World Meteorological Organization (WMO).
2. ETo Calculator by the Food & Agricultural Organization (FAO)
3. DrinC – Drought Indices Calculator by the Lab. Of Reclamation Works and Water Resources Management, & Centre for the Assessment of Natural Hazards and Proactive Planning.
4. ArcGIS 10.x with Spatial Analyst.
5. HEC-HMS by the United States Army Corps of Engineers.
6. HEC-DSSVue by the United States Army Corps of Engineers.