Expert Facility Activity No: EFS-PS-1
Mainstreaming Drought Risk Management

Training Report: Technical training on Drought Risk Management Mainstreaming (DRMM)

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V1	Training Report: Technical training on Drought Risk Management Mainstreaming (DRMM)	Demetris Zarris, Drought Hazard NKE	Suzan TAHA

THE SWIM AND H2020 SUPPORT MECHANISM PROJECT (2016-2019)

The SWIM-H2020 SM is a Regional Technical Support Program that includes the following Partner Countries (PCs): Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Palestine, [Syria] and Tunisia. However, in order to ensure the coherence and effectiveness of Union financing or to foster regional co-operation, eligibility of specific actions will be extended to the Western Balkan countries (Albania, Bosnia Herzegovina and Montenegro), Turkey and Mauritania. The Program is funded by the European Neighborhood Instrument (ENI) South/Environment. It ensures the continuation of EU's regional support to ENP South countries in the fields of water management, marine pollution prevention and adds value to other important EU-funded regional programs in related fields, in particular the SWITCH-Med program, and the Clima South program, as well as to projects under the EU bilateral programming, where environment and water are identified as priority sectors for the EU co-operation. It complements and provides operational partnerships and links with the projects labelled by the Union for the Mediterranean, project preparation facilities in particular MESHIP phase II and with the next phase of the ENPI-SEIS project on environmental information systems, whereas its work plan will be coherent with, and supportive of, the Barcelona Convention and its Mediterranean Action Plan.

The overall objective of the Program is to contribute to reduced marine pollution and a more sustainable use of scarce water resources. The Technical Assistance services are grouped in 6 work packages: WP1. Expert facility, WP2. Peer-to-peer experience sharing and dialogue, WP3. Training activities, WP4. Communication and visibility, WP5. Capitalizing the lessons learnt, good practices and success stories and WP6. Support activities.

Disclaimer:

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ABBREVIATIONS

EF	Expert Facility
PET	Potential Evapotranspiration
SPI	Standardized Precipitation Index
RDI	Reconnaissance Drought Index
FAO	United Nations' Food and Agriculture Organization
WMO	World Meteorological Organization
NTUA	National Technical University of Athens
PWA	Palestinian Water Authority

1 GENERAL INTRODUCTION

Within the scope of work of the EU funded SWIM-H2020 SM, the project is undertaking an activity titled: "*Capacity building on Drought Risk Management Mainstreaming (DRMM)*" (Activity no. (EFS-PS-1). The activity aims to support aspects of mainstreaming drought/water scarcity into the legal framework on Disaster Risk Management (currently under development) and provide capacity building to water service providers and stakeholders.

This task involved a two-days technical training (offered by the Consultant) for the relevant stakeholders of the State of Palestine and officers of PWA involved in drought monitoring and management, 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 main idea was to work closely with the PWA staff and stakeholders towards the development of a drought regulatory framework as an essential element in drought risk management, and its mainstreaming into the legal framework on Disaster Risk Management. This enhanced the capacities to replicate the pilot case studies in other areas (i.e. capacity building on calculating the drought indicators and mapping drought risk).

The workshop was divided in two Parts:

Part 1: Day 1/ (07 November)

An introductory session, as an introduction to hydrologic science with basic data processing techniques. Rainfall data processing (outliers, correlation tests, double mass curves, etc) and calculation of the Potential Evapotranspiration (PET) using the FAO's ETo program.

Following that, basic drought concepts were described as (a) Definitions of Drought, Water Scarcity and Aridity, (b) Setting the Concept of the Drought Indices, (c) The Standard Precipitation Index (SPI). Theory and Calculation, and (d) Hands on: Using WMO software for SPI calculation, (e) The Standard Precipitation – Evapotranspiration Index (SPEI). Theory and Calculation, (f) The Reconnaissance Drought Index (RDI). Theory and Calculation and Hands on: Using DrinC software for RDI calculation

Also, the concepts of water scarcity and drought vulnerability were described and the concept of a Drought Risk profile and the Drought Risk Management Mainstreaming (DRMM) were also analysed.

Part 2: Day 2 (08 November)

During Day 2, an in-depth training for drought hazard monitoring indices based on precipitation (SPI). Precipitation and evapotranspiration (SPEI, RDI), soil moisture (SMDI). SPI and RDI were calculated using two types of software model namely SPI Calculator from WMO and DrinC originally developed at the NTUA. Drought vulnerability issues for Jenin and Tulkarm were also analysed together with the Groundwater Vulnerability Assessment with modelling techniques for calculating groundwater recharge from rainfall.

The training was held on 07-08 November 2018, in Carmel Hotel, Ramallah (Palestine)

2 OBJECTIVES OF ACTIVITY

The general objective of the training workshop (Task 5 in SWIM-H2020 SM, Activity EFS-PS-1) is to enhance understanding and improve the technical and managerial capacity of relevant PWA staff and stakeholders in the drought hazard monitoring sector in Palestine to cope with drought in order to replicate the pilot case studies to other areas, through training on the following themes/issues raised within the Expert Facility and classified into the following 5 categories.

1. Drought & Water Scarcity Hazard Monitoring and Assessment.
2. Drought Vulnerability Assessment.
3. Drought Risk Assessment & Development of Drought Risk Profile for the two pilot Governorates (Jenin & Tulkarem).
4. Guidelines to Drought Risk Management Mainstreaming (DRMM).
5. Definition of Groundwater Protection Zones.

Specifically, the various objectives per category are:

Drought & Water Scarcity Hazard Monitoring and Assessment.

1. Introduce the relevant PWA staff and other stakeholders to the general hydrological and meteorological context regarding droughts including drought and water scarcity definitions.
2. Introduce the relevant PWA staff and other stakeholders to the main drought indicators which can be used for drought identification and characterization, incorporating different hydrological elements, (rainfall, evapotranspiration, springs' discharge and groundwater level).
3. Train the relevant PWA staff and other stakeholders 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 PWA staff and other stakeholders 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. Utilization of GIS procedures to assist Drought Hazard Assessment.

Drought Vulnerability Assessment.

7. Definition of Physical Exposure, Physical Sensitivity and Socioeconomic Characteristics as three types of vulnerability indicators.
8. Utilization of GIS procedures to assist in Drought Vulnerability Assessment.

Drought Risk Assessment & Development of Drought Risk Profile for the two pilot Governorates (Jenin & Tulkarem).

9. Assessment of Drought Risk as the multiplication of Hazard and Vulnerability.
10. Water Scarcity Effects on Drought Risk Profile
11. Utilization of GIS procedures to assist Drought Risk Assessment.

Guidelines to Drought Risk Management Mainstreaming (DRMM).

12. Preparation of the Roadmap and Guidelines for the elaboration and adoption of a drought risk management regulatory framework and for its mainstreaming into the legal framework on Disaster Risk Management.

13. Drought risk management regulatory framework and its mainstreaming into the legal framework on Disaster Risk Management.

Definition of Groundwater Protection Zones.

14. Definition of groundwater protection zones in 2 pilot areas.

15. Development and calculation of groundwater vulnerability.

3 EXPECTED RESULTS OF ACTIVITY

The training's expected outcome are:

1. Have specific understanding and skills for 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. Get familiarized 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.
7. Increased awareness on the socio-economic added-value of drought risk management
8. Enhance technical and managerial capacity to cope with drought
9. Have better knowledge of current drought characteristics impacts and management
10. Get familiar with the guidelines for the elaboration and adoption of a drought risk management regulatory framework

4 PROFILE OF THE PARTICIPANTS

The targeted invitees were directly involved, in drought management/ water resources management and planning, hydrological and water balance modeling. Consequently, the targeted groups represented the following:

1. Ministries

- Ministry of Agriculture.
- Ministry of Local Government.

2. Other services and authorities

- Environment Quality Authority
- Palestinian Water Authority
- Palestinian Energy Authority
- Meteorological Department

3. Other stakeholders
4. Local NGOs

A total of 12 participants attended both days of the training in addition to the two SWIM-H2020 SM Non Key Experts. As per the concept note of the training, the persons invited from the PWA were directly involved, in drought management/ water resources management and planning, hydrological and water balance modeling. More specifically, the institutions involved were the Palestinian Water Authority, the Palestinian Meteorological Department, the West Bank water Department and the Ministry of Agriculture.

5 EVALUATION OF THE EVENT

5.1 RESULTS OF THE EVENT

Two categories of indicators were used to evaluate the workshop: i) evaluation indicators, reflecting the quality of the workshop logistics/ organisational aspects (See section A below) and the assessment of the technical quality of the workshop (See section B below), as perceived by the participants, ii) impact indicators, reflecting the direct impact of the workshop (See Section 6 below). The indicators and associated ratings are presented in Tables 1, 2, and 4. Table 3 provides the specific remarks made by the non-key expert on the workshop (Section C below).

A. <u>Organisational, administrative and planning issues before and during the event</u>

A set of 10 criteria; A1-A10 (See table below) was assessed by the participants, using a qualitative description ranging between “Excellent” to “ Poor”, with an opportunity to provide suggestions for improvement. For the sake of comparison, the qualitative descriptions are given assigned numbers as follows: Excellent = 4 Good = 3 Average = 2 Poor = 1

Table 1: Results of the evaluation of the organization, administrative and planning issues

A. ORGANISATIONAL, ADMINISTRATIVE AND PLANNING ISSUES BEFORE AND DURING THE EVENT (10 forms were filled)		*Number of Replies*					
		EXCELLENT	**GOOD**	**AVERAGE**	**POOR**	**Total Replies**	Average Score (max = 4)
A1	Efficient logistics: location of venue and interpretation (where applicable)	4	5	1		10	3,30
A2	Smooth flow of programme, efficient handling of emerging needs and attentiveness to participants concerns	2	7	1		10	3,10
A3	Planning of the workshop: efficient and effective communication of objectives	2	7	1		10	3,10
A4	Presentations correspond and contribute to the planned objectives and are conducive to enhanced shared understanding and participation on addressed topics	4	6	1		11	3,27
A5	Clarity, coverage and sufficiency of concepts, objectives, anticipated outputs and outcomes	1	7	2		10	2,90
A6	Efficiency and effectiveness of the facilitation	3	6	1		10	3,20
A7	Overall rating of the event	3	6	1		10	3,20

The overall rating of 3.20 out of four indicates that the event was well appreciated

B. Feedback on Technical Aspects

Table 3 below presents the feedback received from the participants on the technical aspects of the event

Table 2: Results of the evaluation of the technical aspects of the training

	B. FEEDBACK ON TECHNICAL ASPECTS	No. of replies
B1	**Coverage of the event** **In your opinion did the event cover (tick one of the following):**	
	All the topics necessary for a good comprehension of the subject nothing more	7
	Some topics covered are not necessary	0
	Some additional topics should be included	1
	No reply	2
	Total Replies	**10**
B2	**Efficient and effective performance and interaction with Experts hosting the training (tick one of the following):**	
	Excellent	2
	Good	6
	Average	2
	Poor	
	No reply	
	Total Replies	**10**
B3	**Length of the meeting** **In your view the workshop duration (tick one of the following):**	
	Longer than needed	0
	Sufficient	3
	Shorter than required	7
	No reply	
	Total Replies	**10**
B4	**Acceptable level of achievement of planned objectives:**	
	Excellent	
	Good	9
	Average	1
	Poor	0
	No reply	
	Total Replies	**10**
B5	**What did you like most about this event?**	
	Model / introducing the calculators for drought but maybe move the time spent on the background files not only seeing the ready files. The lectures are very professional / Analysing the real data and results / the interactive discussion / the topics are very interesting and important to us. The new software models that were used in the event are easy to used and helpful / more details about the subjects with more interaction b/w the participants and the trainers, especially in the experience of the programme / introducing SPI to our knowledge was proactive/ to add new perspective for water management and data organisation for water and water related data / The software to calculate the drought / focus more on drought indexes calculation	9
	No reply	1
	Total Replies	**10**

B6	**What needs to be improved?**	
	Move works in model / Focusing on concept and methodology / Nothing, thank you for the workshop / maybe the performance of the presentations to be easily (day 1) read from the audience (use white background and improve the way of writing/ use black wide line for important information) but it is better the second day / implementation of the programs and work on the data entry and analysis / More time to explain the theory of SPI and RDI is worth to be considered. Also more examples on the application of SPI / practice the software / data quality control methods	8
	No reply	2
	Total Replies	**10**

C. Remarks by the trainer

A set of nine criteria; B1-B9 (See table below) are used hereby by the **trainer** to provide an overall assessment of the event.

Table 3: Assessment by the trainer

B1	**Efficient and effective performance and interaction by participants:** the event was highly interactive with very active discussions on all the topics that were addressed.
B2	**Efficient and effective cooperation and team spirit;** Drought monitoring is gaining increased attention among attendants. Due to the importance of the subject, and the experience that the attendants were bringing with them, there was a lot of exchange which presented a good opportunity for the participants to learn from each other.
B3	**Level of achievement of planned objectives:** All the information and examples presented were received with impressive enthusiasm. See Table 6 below for the level of achievement of planned objectives and outcomes.
B4	**Did the event contribute to helping participants practice skills or gain knowledge related to course concepts:** yes.
B5	**What worked well during the event;** discussions within the group, and with the trainer
B6	**What didn't work well and why:** Filling in the quizzes and evaluation forms. At the end of the workshop fewer people remained, and more response would have been possible if the training was not done in the home base of the participants.
B7	**What components/concepts did participants seem to understand well:** the concept of drought hazard indicators based on rainfall.
B8	**Were there any components/concepts that participants appeared to not understand**: no remarks
B9	**What aspects of the event could be improved and what to be kept:** An improvement would be the inclusion of case studies. What worked well was the discussion between participants and the trainer. This could be the major highlight of the training.

6 ANALYSIS OF THE RESULTS OF THE TRAINING COURSE

The training succeeded to mobilise a significant number of attendants as indicated in Table 4 below.

Table 4: Workshop participation/ demographics

Total No. of participants actually attending	12

Total No. of participants planned to attend	15
Planned/Actual	80%
Number of organisations/agencies/authorities that were represented	4
Gender balance (% of women participants)	50%
NGO representation: No. of participants from NGOs	N/A

Prior to the training workshop, a pre-training assessment questionnaire was distributed to test the level of knowledge of the participants in the various subjects of the training. The quiz was also distributed after the training to test the impact of the training. More questionnaires were completed before the training (7) than after the training (4).

The results of the quiz are summarised in Table 5.

Table 5: Evaluation of the results of the quiz:

Question	Changes in awareness, knowledge and skills	%
Q1	% of participants that answered correctly Question No1 prior to the workshop	57%
	% of participants that answered correctly Question No1 after the workshop	50%
Q2	% of participants that answered correctly Question No2 prior to the workshop	100%
	% of participants that answered correctly Question No2 after the workshop	100%
Q3	% of participants that answered correctly Question No3 prior to the workshop	71%
	% of participants that answered correctly Question No3 after the workshop	25%
Q4	% of participants that answered correctly Question No4 prior to the workshop	57%
	% of participants that answered correctly Question No4 after the workshop	25%
Q5	% of participants that answered correctly Question No5 prior to the workshop	57%
	% of participants that answered correctly Question No5 after the workshop	75%
Q6	% of participants that answered correctly Question No6 prior to the workshop	100%
	% of participants that answered correctly Question No6 after the workshop	100%
Q7	% of participants that answered correctly Question No7 prior to the workshop	100%
	% of participants that answered correctly Question No7 after the workshop	100%
Q8	% of participants that answered correctly Question No8 prior to the workshop	71%
	% of participants that answered correctly Question No8 after the workshop	75%
Q9	% of participants that answered correctly Question No9 prior to the workshop	43%
	% of participants that answered correctly Question No9 after the workshop	75%
Q10	% of participants that answered correctly Question No10 prior to the workshop	29%
	% of participants that answered correctly Question No10 after the workshop	25%
Q11	% of participants that answered correctly Question No11 prior to the workshop	71%
	% of participants that answered correctly Question No11 after the workshop	75%
Q12	% of participants that answered correctly Question No12 prior to the workshop	57%
	% of participants that answered correctly Question No12 after the workshop	0%

Q13	% of participants that answered correctly Question No13 prior to the workshop	43%
	% of participants that answered correctly Question No13 after the workshop	0%
Q14	% of participants that answered correctly Question No14 prior to the workshop	100%
	% of participants that answered correctly Question No14 after the workshop	50%

As indicated above, the quiz was filled in by a limited number of participants (7 before the training and 4 after the training). Some had problems with the English language.

7 CONCLUSIONS & OVERALL ASSESEMENT

Below is an overall evaluation of the training workshop. It can be concluded that the expected outcomes of the workshop (as planned in the design phase) have been achieved Table 6 below, describes how the planned outcomes were achieved.

Table 6: Level of achievement of training objectives and outcomes:

Planned outcomes as defined prior to the workshop	Have they been achieved?
Have specific understanding and skills for the meteorological data processing	Yes, through interactive presentations, discussions, and Q&A
Have a general understanding on drought monitoring indices.	Yes, through interactive presentations, discussions, and Q&A
Acquire specific skills for the computation of the most widely used drought indices	Yes (by a dedicated presentation)
Familiarize with specific freeware mathematical modelling regarding drought indices	Yes, through interactive presentations, discussions, hands-on practice and Q&A
Acquire specific skills for the drought hazard mapping	Yes, through interactive presentations, discussions, and Q&A
Increased awareness on the socio-economic added-value of drought risk management	Yes, through interactive presentations, discussions, and Q&A
Enhance their technical and managerial capacity to cope with drought	Yes, through interactive presentations, discussions, hands-on practice and Q&A
Have better knowledge of current drought characteristics impacts and management	Yes, through interactive presentations, discussions, hands-on practice and Q&A
Be familiar with the guidelines for the elaboration and adoption of a drought risk management regulatory framework	Yes, through interactive presentations, discussions, hands-on practice and Q&A

8 ANNEXES

8.1 AGENDA

Day 1: Drought Hazard & Vulnerability		
Time	**Session**	
8:30	Registration	**All participants**
9:00	Opening Session Welcome Speech from PWA coordinator Opening Remarks Pre-training Assessment	Mrs. **Majeda Alawneh**, SWIM's FP, Director of Water Quality
9:15	• Introduction • Principles of hydrology and droughts • 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) Hands on Potential Evapotranspiration Calculation	Mr. **Demetris Zarris**, Drought Hazard NKE
10:00	1. Definitions of Drought, Water Scarcity and Aridity. 2. Setting the Concept of the Drought Indices. 3. The Standard Precipitation Index (SPI). Theory and Calculation	Mr. **Demetris Zarris**, Drought Hazard NKE
11:00	***Coffee Break***	
11:15	1. The Standard Precipitation – Evapotranspiration Index (SPEI). Theory and Calculation 2. The Reconnaissance Drought Index (RDI). Theory and Calculation	Mr. **Demetris Zarris**, Drought Hazard NKE
12:30	1. Concepts of water scarcity 2. Concepts of drought vulnerability 3. Concept of a Drought Risk profile	Mr. **Floris Verhagen**, Drought Vulnerability NKE

13:30	**Wrap up of Day 1**	
14:00	**Lunch**	
DAY 2: Drought Risk Management Mainstreaming: Case Studies in Palestine		
08:30	1. Introduction to the case studies: Jenin and Tulkarem Governorates. 2. Development of the Drought Risk Profile for Palestine.	Mr. **Demetris Zarris**, Drought Hazard NKE
10:00	***Coffee Break***	
10:15	1. Water Scarcity Hazard in Jenin and Tulkarem Governorates. 2. Drought Vulnerability in Jenin and Tulkarem Governorates. 3. Drought Risk Profile in Jenin and Tulkarem Governorates.	Mr. **Floris Verhagen**, Drought Vulnerability NKE
11:45	***Coffee Break***	
12:00	1. Groundwater Vulnerability Assessment	Mr. **Gert Soer**, Groundwater Protection

8.2 LIST OF PARTICIPANTS

COUNTRY	TYPE OF INSTITUTION (please use the options provided*)	TITLE (Mr/Ms)	FIRST NAME	LAST NAME	POSITION/ FUNCTION	ORGANISATION/ INSTITUTION	EMAIL
Palestine	MINISTRY REPRESENTATIVES	Ms	Abeer	Awwad	head of Media	PWA	
Palestine	GOVERNMENT AGENCIES	Ms	Walaa	Aburaad	Civil Engineer / Designer & Planner	WBWD	walaa.wbwd@gmail.com
Palestine	MINISTRY REPRESENTATIVES	Ms	Salam	Abu Hantash	H.S	PWA	salamahah@gmail.com
Palestine	MINISTRY REPRESENTATIVES	Mr	Ahmad	Khawaja	H.S	PWA	ahmad_88_88@hotmail.com
Palestine	MINISTRY REPRESENTATIVES	Ms	Rania	Qaraqra	Coordination and follow up manager	PWA	karakra_rania@yahoo.com
Palestine	MINISTRY REPRESENTATIVES	Mr	Abdalnasser	Kahla	head of Consumers affairs section	PWA	nasser.kahla@yahoo.com
Palestine	GOVERNMENT AGENCIES	Mr	Isam	Isa	Director	PMD	isam_isa@yahoo.com
Palestine	MINISTRY REPRESENTATIVES	Mr	Marwan	Bdair	Director	PWA	marwan_bd@yahoo.com
Palestine	MINISTRY REPRESENTATIVES	Mr	Ashraf	Dweikat	Director	PWA	ashrafdweikat@hotmail.com
Palestine	MINISTRY REPRESENTATIVES	Mr	Majdi	Shaheen	Hydrology	PWA	Shaheen.majdi@yahoo.com
Palestine	MINISTRY REPRESENTATIVES	Ms	Majeda	Alawneh	WQ Director	PWA	malawneh@msn.com

Greece		Mr	Dimitris	Zarris	NKE drought	SWIM-H2020 SM	dez@ldk.gr
Greece		Mr	Floris	Verhagen	NKE drought	SWIM-H2020 SM	floris.verhagen@rhdhv.com
Palestine	MINISTRY REPRESENTATIVES	Ms	Ibtisam	Abuhaija	Director	MOA	abuhaijaibtisam@yahoo.com

8.3 QUIZ

TRAINING ASSESSMENT QUESTIONNAIRE

Workshop Title	**SWIM-Horizon 2020 Support Mechanism** **Capacity Building on Drought Risk Management Mainstreaming (DRMM)** **Expert Facility Activity No: EFS-PS-1**
Date	07-08 November 2018
Venue Location	Carmel Hotel, Ramallah – State of Palestine
Participant Name	
Participant Title/ Position	
Participant Country	PALESTINE

INSTRUCTIONS/ INSTRUCTIONS:

Please respond to the questions below. Your feedback is sincerely appreciated. Thank you.

1. Which are the main Drought Hazard characteristics? (3 out of 5 are correct answers)

☐ Magnitude (intensity)

☐ Duration

☐ Extent

☐ Streamflow velocity

☐ Vegetation index

2. What is the difference between **Drought** and **Water Scarcity**?

☐ They are exactly the same

☐ Drought is a natural, temporary phenomenon where rainfall is less than normal. Water scarcity is a man-made, permanent state where water demand/abstraction is large compared to the annual renewable water resources.

3. Some commonly used **Drought Indicators** include: (5 out of 7 answers are correct)

☐ Standard Precipitation Index (SPI)

☐ Inundation depth

☐ Percent Normal Precipitation and percentiles/ deciles

☐ Soil Moisture Anomaly

☐ Water velocity

☐ Steam Low Flow Q90

☐ Normalized Difference Vegetation Index (NDVI)

4. The Standard Precipitation Index (SPI) and the Reconnaissance Drought Index (RDI) are similar in the way: (2 out of 4 are correct answers)

☐ are both dependent only in precipitation.

☐ are calculated by using variables in monthly time step.

☐ are using the same threshold values for drought characterization.

☐ are also dependent on the catchment's runoff.

5. The Streamflow Drought Index (SDI): (2 out of 4 are correct answers)

☐ is using the same threshold values for drought characterization as the SPI.

☐ utilizes runoff values when upstream water abstractions are zero or insignificant in comparison to the available water resources.

☐ is insignificant because it does not utilize precipitation data.

☐ is unable to accumulate over more than one months

6. In order to assess the effect of drought to groundwater, the required accumulation of SPI is: (only one answer is correct)

☐ SPI-12

☐ SPI-6

☐ SPI-3

7. If SPI falls below -2, then the drought is characterized as (only one is correct)

☐ Mild Drought

☐ Severe Drought

☐ Extreme Drought

8. For accurate calculation of the SPI rainfall time series should have a length of (only one is correct)

☐ 5 years should be enough.

☐ Data for the period we are interested in checking for drought.

☐ Generally more than 30 years because the parameters of the Gamma distribution of the SPI is dependent on the sample size.

9. For applying the Palmer's Drought Severity Index (PDSI) (only one is correct)

☐ Rainfall data are enough.

☐ Evapotranspiration data are enough.

☐ PDSI is a remote sensing index.

☐ A water budget modelling is necessary to simulate water content in the soil.

10. Drought magnitude is a “measure” of the drought severity and computed as (only one is correct)

☐ Sum of monthly rainfall compared to the total data time series of the same duration.

☐ Adding consecutive negative values of SPI and taking the absolute value.

☐ Adding consecutive negative values of SPI (provided that just one value is below -1) and taking the absolute value.

11. The profiling of drought risk involves the analysis of: (only one is correct)

☐ Drought hazard and water scarcity.

☐ Drought hazard and vulnerability/resilience factors.

☐ Water scarcity and vulnerability/resilience factors.

☐ Drought hazard, water scarcity and vulnerability/resilience factors.

12. An area vulnerable for drought is: (only one is correct)

☐ An area with limited rainfall.

☐ An area with limited infrastructure to supply water.

☐ An area which is not resilient to the impact of hazards.

☐ An area with more abstraction then recharge.

13. Drought vulnerability can only be defined by: (only one is correct)

☐ Approved standards of the United Nations.

☐ A geographical analysis.

☐ The use of rainfall data, water abstraction, streamflow and population density.

☐ There is no universal framework.

14. Drought vulnerability: (only one is correct)

☐ Can change per location and time.

☐ Is only an issue in countries with high evaporation rates.

☐ Is only an issue in agricultural areas.

THANK YOU!

The civil society component of SWIM-H2020 SM is facilitated by the UfM labelled BlueGreen project and network