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Action A.9:

Development of Groundwater Models to Support Groundwater Management in the Maltese Islands

Deliverable D3.2: First Training Report

2019

Development of Groundwater Models to Support Groundwater Management in the Maltese Islands

Deliverable D3.1: Training Material (Phase 1)
Deliverable D3.2: First Training Report

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Project Manager	Iacopo Borsi (TEA)
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Acronyms and abbreviations

ADI	Adi Associates Environmental Consultants Ltd
CGT	University of Siena-Centre of Geotechnologies
EWA	Energy and Water Agency
GUI	Graphical User Interface
STEAM	Steam S.r.l.
TEA	TEA SISTEMI S.p.A.

1. Training objectives and program

The purpose of this report is to present the 1st Training activity of the project "Development of Groundwater Models to Support Groundwater Management in the Maltese Islands".
The training activity took place at the headquarters of the Energy and Water Agency, in Malta on May 29-30 2019.

The training was attended by the EWA's Project Manager and four EWA Officers, and it was organized including theoretical lectures and exercises. It aimed at getting the Officers informed and trained about:

- The conceptualization used to build the numerical models.
- The effective use of the chosen numerical tools applied to develop the 2 steady-state models, and their calibration.
- The explanation of the methodology applied to define and run the calibrated models.

The topics discussed during the 2-days training are:

1. Review and comments on the dataset applied in the numerical models, and the conceptual models based on those.
2. Theory of the codes applied for this study.
3. Illustration of steady-state models implementation.
4. Illustration of model sensitivity and calibration.
5. Tutorials on the implementation and calibration of the Malta island model.

The Trainers followed a program organized according to different Sessions, as detailed below.

DAY 1
Session 1 - Conceptualization
1. Available data
2. Conceptual models
Session 2 - Theory
1. MODFLOW code
2. FREEWAT modelling GUI
3. MODFLOW Package SWI2
Session 3 - Exercise: model building
1. Model objective and settings
2. Grid and Boundary Conditions
3. Model run and evaluation of results

DAY 2
Session 4 - Theory
1. Calibration: background theory
2. UCODE and PEST codes: an introduction
Session 5 - Exercise: Model calibration
1. Soft and hard knowledge
2. Parameters definition
3. UCODE settings
4. Run and evaluation of results
5. Import of the PEST calibrated parameter field and evaluation of results.
Session 6 - Exercise: Seawater Interface (Optional)
1. Setting of SWI2 Package
2. Run and evaluation of results

2. Training activity and achievements

Before starting the training, the Trainers asked the Officers to report their level of knowledge about the topics of the course. The Officers declared to have only a soft knowledge regarding numerical modelling for groundwater resources, while having a quite deep knowledge on GIS systems (even if not necessarily using QGIS as desktop software). Some of them experienced the application of MODFLOW code through commercial Graphical User Interfaces (GUIs), even if for a limited time. Furthermore, a couple of them attended an introductory course about FREEWAT GUI.
Therefore, the Trainers decided to proceed according to the envisaged program, in particular presenting the basic theory and information regarding modelling stages, numerical codes and theory of sensitivity and calibration applied to groundwater models.
Before starting each Session, the Trainers provided the Officers with slides and training material necessary to follow the lectures and/or the exercises. Some material (referred to as "pre-training material" was sent two weeks before the training, according to what stated in the Inception Report.
As envisaged before the training, Session 6 was not performed during the class, due to time lacking: however, the Trainers provided the Officers with all the material needed to run this Session by themselves, and asked them to effectively perform this exercise to check their knowledge on using the simulation tools by themselves.
During the two days of training, the Contractors made a video recording of the lectures, to be used by the Officers as effective training material (see next Section).

Although the Officers declared to not have so much experience on the course's topics, they followed all the lectures with a very good understanding of each argument presented, as well as the several parts of the exercises. Furthermore, whenever they experienced some difficulty on running the exercises, they responded quickly by applying suggestions and tips given by Trainers.

Therefore, the Contractor could claim to be fully satisfied of the achievements of this activity. On the other hand, the Officers gave a general positive feedback about the lectures: however, to have a deeper understanding of the training achievements, the Contractor is going to provide EWA (as annex to the present report) with an Evaluation Questionnaire to be filled out by the Officers, assuring anonymity of compilation. This task will improve the Contractor's knowledge about potential criticalities of the training, having as final goal the improvement of this activity in view of next training steps (2nd and 3rd Training Activity).

This report is endowed with the training material (Deliverable D3.1), including slides and input files for the exercises, as detailed in next Session.

3. Training material

The training material is provided as attachment to this report, and it consists of the following annexes:

a) An archive (in *.zip format), named *D3.1_TrainingMaterial_Phase1.zip* including:
   - Slides on training introduction and program
   - Slides used for Session 1, 2 and 4
   - Slides and input files used for Session 3
   - Slides and input files used for Session 5
   - Slides and input files needed to run Session 6

b) Video recording performed during the class, provided at the links included in the following table:

Date	**Day**	**Session**	**Lenght**	**Link**
Wednesday, May 29, 2019	1	1	32 min 26 sec	Play recording
		2 part 1	1 hr 33 min 53 sec	Play recording
		2 part 2	37 min 51 sec	Play recording
		3	1 hr 49 min 44 sec	Play recording
		6	31 min 21 sec	Play recording
Thursday, May 30, 2019	2	4	1 min 29 sec	Play recording
		5	28 min 3 sec	Play recording
		5	42 min 10 sec	Play recording

c) Training Questionnaire, available at the following link:
https://forms.gle/8p93E9KjmHsFN63H9