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The project consortium is comprised of:

EGYPT	Heliopolis University (HU)
ETHIOPIA	Water and Land Resource Centre (WLRC)
FINLAND	Finish Environment Institute (SYKE)
ITALY	Centro Internazionale di Alti Studi Agronomici Mediterranei di Bari (CIHEAM-Bari)
ITALY	Italian Research Council (CNR)
KENYA	Kenya Agricultural & Livestock Research Organization (KALRO)
SUDAN	Water Research Centre (WRC)
THE NETHERLANDS	International Soil Reference and Information Center (ISRIC)
UGANDA	Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA)

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Abstract (for dissemination)	The WATDEV project aims to provide a toolbox, based on numerical models, to support local managers and farmers in assessing the potential impacts of the large-scale implementation of Best Management Practices (BMPs) and Innovations within the project study areas and potentially, beyond them. For this purpose, a modelling toolbox has been developed by ISRIC, in close collaboration with CIHEAM-Bari and SYKE, and in consultation with the local partners and stakeholders. The toolbox enables the visualisation of the impacts of BMPs across different locations within the project study areas, including the possibility of adding new areas, for multiple biophysical Key Performance Indicators (KPIs). It also allows the incorporation of the simulated impacts of new BMPs; the generation and assessment of new BMP implementation scenarios, the calculation of socioeconomic KPIs under different economic assumptions, and the selection of the most suitable BMPs through Multi-Criteria Analysis (MCA). Local partners were also trained in the use of the Toolbox through both basic and an advanced workshop, the former targeting managers and the latter modellers. These trainings were held in Wageningen, Addis Ababa and Cairo. The training materials used in these trainings were subsequently generalised so that they can be reused in future training activities. This deliverable summarises the outputs produced for the Toolbox, and provides links to access the results, source code and training materials online.
Keywords	Modelling Toolbox; Best Management Practices; Key Performance Indicators; Multi-Criteria Analysis, Training Materials, Source code, GitHub Repository

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Acronyms and Abbreviations

AICS	Italian Agency for Development Cooperation
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa, Uganda
AU-EU	Africa-Europe
CIHEAM	Centre International de Hautes Etudes Agronomiques Méditerranéennes, Italy
CNR-IPSP	Consiglio Nazionale delle Ricerche, Italy
DG DEVCO	The Commission's Directorate-General for International Cooperation and Development
EIARI	Ethiopian Institute of Agricultural Research, Ethiopia
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
HCENR	Higher Council for Environment and Natural Resources, Sudan
HRC	Hydraulics Research Center - Ministry of Water and Irrigation- Gezira, Sudan.
HU	Heliopolis University, Egypt
ISRIC	International Soil Reference and Information Center, The Netherland
IWUA	Irrigation Water Users Association
KALRO	Kenya Agricultural & Livestock Research Organization, Kenya
KU	Khartoum University, Sudan
MCA	Multi-Criteria Analysis
NIA	National irrigation Authority, Kenya
NRC	National Research Council, Sudan
R&I	Research and Innovation
RTTs	Regional Toolbox Trainings
SACCO	Savings Credit and Cooperative Organizations
SMA	Sudan Meteorological Authority, Sudan
SOM	Soil Organic Matter
STI	Science, Technology, and Innovation
SYKE	Finnish Environment Institute, Finland
TARDA	TAna River Development Authority, Kenya
WATDEV	Climate Smart WATER Management and Sustainable DEVELOPMENT for Food and Agriculture in North and East Africa
WB	World Bank
WLRC	Water and Land Resource Center, Ethiopia
WMII	Water Management and Irrigation Institute, Sudan
WRC	Water Research Centre, Sudan
WUA	Water User Association
WUE	Water-Use Efficiency

Executive Summary

The Climate Smart WATER Management and Sustainable DEvelopment for Food and Agriculture in East Africa (WATDEV) aims to enhance the sustainability of agricultural water management and strengthen the resilience of agro-ecosystems to climate change in Eastern Africa and Egypt. AICS (Agenzia Italiana per la Cooperazione e lo Sviluppo) is the executive agency; while CIHEAM-BARI leads scientific institution working with ASARECA (Strengthening Agricultural Research in Eastern and Central Africa), KALRO (Kenya Agricultural and Livestock Research Organization), WLRC (Water and Land Resource Centre - Ethiopia), WRC (Water Research Centre, Sudan) and HU (Heliopolis University, Egypt). ISRIC (International Soil Reference and Information Centre – The Netherlands) and SYKE Finnish Environment Institute (Finland) are the modelling partners. The overarching objective of the project is to enhance the sustainability of agricultural water management and strengthen the resilience of agro-ecosystems to climate change in East Africa and Egypt.

The specific objectives include: (1) National Ministries and Research Institutions improve their knowledge and management of water in agriculture; and (2) Farmers and local actors, cooperatives and Water User Associations implement innovative/sustainable solutions and skills on water management.

The WATDEV project aims to provide a toolbox, based on numerical models, to support local managers and farmers in assessing the potential impact of the large-scale implementation of BMPs (Best Management Practices) and Innovations within the project study areas and potentially beyond them.

For this purpose, a modelling toolbox (hereafter called Toolbox) has been developed by ISRIC, in close collaboration with CIHEAM-Bari and SYKE, and in consultation with the local partners and stakeholders. The toolbox enables the visualisation of the impacts of BMPs across different locations within the project study areas (with the option to include additional areas), covering multiple biophysical KPIs (Key Performance Indicators). It also allows users to incorporate simulated impacts of new BMPs, generate and evaluate alternative BMP implementation scenarios, and calculate socioeconomic KPIs based on different economic assumptions.

The toolbox supports the selection of the best BMPs through a Multi-Criteria Analysis.

Local partners were also trained in the use of the Toolbox through both basic and advanced workshops, the former for managers and the latter for modellers. These Regional Toolbox Trainings (RTTs) were held in Wageningen (NL), Addis Ababa (ET) and Cairo (EG).

The training materials used in the RTTs were subsequently generalised to ensure they can be reused in future training activities.

This deliverable summarizes outputs produced for the Toolbox, and provides links to access the results, source codes and training materials online.

1. Introduction

The WATDEV project has developed a modelling toolbox that can be used to simulate the impacts of different Best Management Practices on crop water use, yield, fertilizer application, and other Key Performance Indicators, including socioeconomic indicators.

The toolbox has been implemented as an online platform, and local and regional stakeholders have been trained in its use to support decision-making. This deliverable describes the WATDEV toolbox itself; the location of the WATDEV source code and other development materials; as well as the available training materials.

2. The WATDEV Toolbox

The Toolbox has been developed by ISRIC, in close collaboration with CIHEAM-Bari and SYKE, which contributed input data and supported the testing of the implemented functions.

The final version has been delivered to CIHEAM-Bari and deployed on one of their internet servers: <https://toolbox.watdev.eu/>.

The WATDEV Toolbox allows users to:

- visualise the impacts of BMPs assessed by WATEV in different locations within the project study areas: Sharqia in Egypt, Gezira in Sudan, Koga in Ethiopia, and Tana in Kenya;
- add new study areas;
- assess impacts across multiple biophysical KPIs, grouped into impacts on crops, soils, and water;
- incorporate new BMPs simulated with the WATDEV model;
- generate new BMP application scenarios for the study areas;
- calculate socioeconomic KPIs based on different economic assumptions; and
- evaluate different BMPs using Multi-Criteria Analysis (MCA).

More detailed information about the WATDEV Toolbox, including its functioning and contents, can be found in the following deliverables:

- D3.2.1 and D3.2.2: study areas and BMPs incorporated in the WATDEV Toolbox, and respective model results
- D4.2.1: technical validation of the WATDEV Toolbox
- D4.3.2: Guidelines for using the toolbox for decision-making

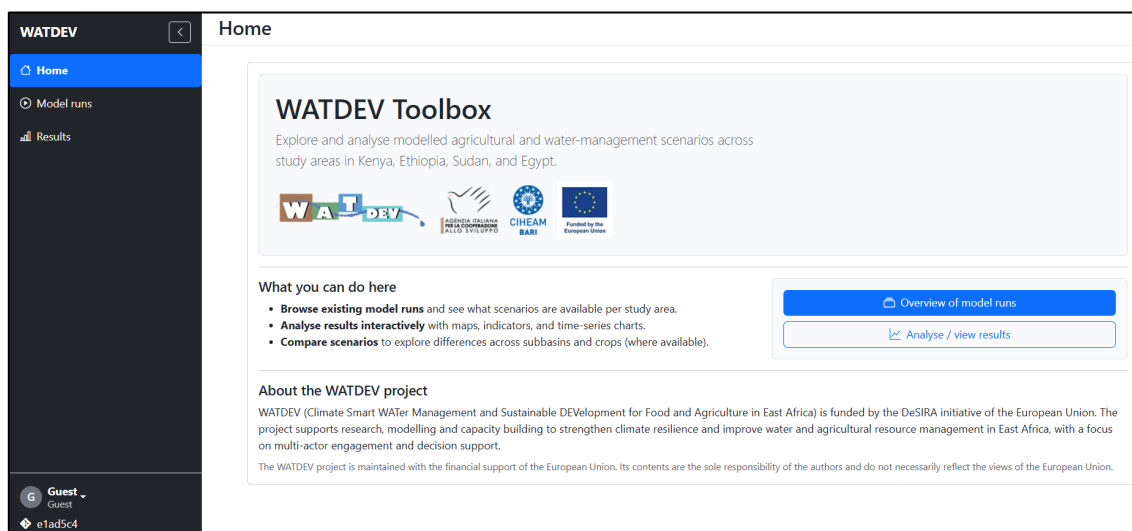


Figure 1 - Front page of the WATDEV Toolbox, available at <https://toolbox.watdev.eu/>.

3. WATDEV Toolbox source code

The source code for the WATDEV Toolbox has been published in a WATDEV-associated GitHub repository: <https://github.com/watdev-eu>. This repository includes:

- Source code for the Toolbox
- Source code for the integrated model
- Templates of the WATDEV model
- Place to run the integrated model
- Other utilities

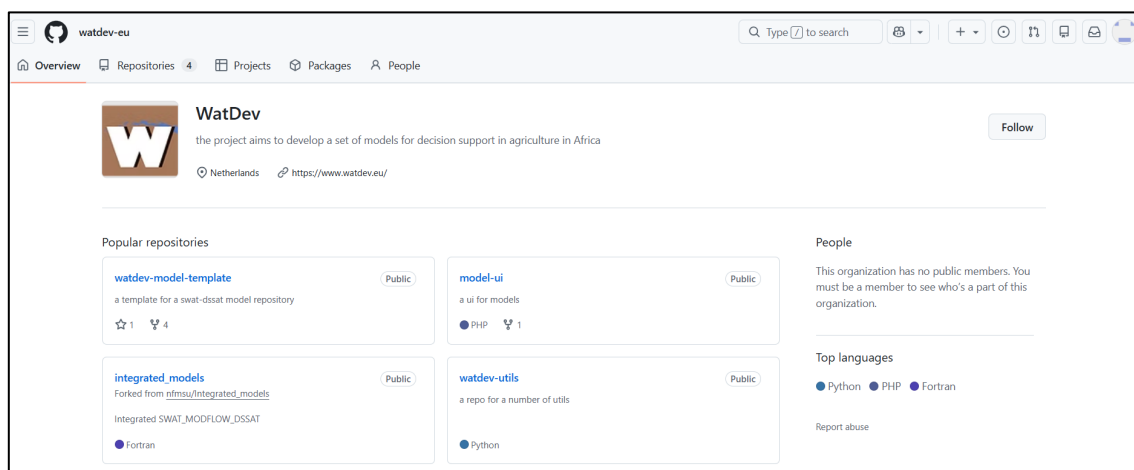


Figure 2 – Front page of the WATDEV GitHub repository, available at <https://github.com/watdev-eu>.

The following repositories are included with a public dissemination:

- **.github**: a general description of the GitHub (WATDEV) organisation (MIT license)
- **integrated_models**: the WATDEV integrated model (see D3.1.1; CC-BY-4.0 license)
- **model-ui**: the source code for the WATDEV toolbox, where UI stands for user interface (MIT license)
- **watdev-model-template**: a template to run the WATDEV integrated model from GitHub (CC-BY-4.0 license)

The full model applications developed by the WATDEV project for each study area can also be made available in this GitHub repository. At present, however, they are under embargo until mid-2027 to allow for the scientific publication of model applications and detailed results.

4. WATDEV Toolbox training materials

Local partners from Egypt, Ethiopia, Kenya and Sudan were trained in the use of the Toolbox. These trainings fall under A4.1-A5.1 activities as Regional Toolbox Trainings (RTTs). More details on the RTTs were provided in deliverable D5.1.1 (released by CIHEAM Bari).

A full training for experts (for researchers and modellers) was conducted in Wageningen, the Netherlands in February 2026, covering both the use of the Toolbox and the application of the WATDEV models. This training was also attended by PhD students from Wageningen University and ISRIC staff.

Follow-up trainings for managers, focused on the use of the Toolbox for decision-making, were conducted in Addis Ababa, Ethiopia and Cairo, Egypt in May 2026.

Due to local interest, the Addis Ababa RTT also included a second edition of the training for experts.

The Cairo training was also attended by trainees from the WATERKNOWLEDGE project.

The trainings included lectures, group discussions, Toolbox demonstrations, and group exercises facilitated by coaches. During these sessions, suggestions for Toolbox improvement were collected from the participants and implemented where possible.



Figure 3 – Group photo for the 1st Regional Toolbox Training in Wageningen (Netherlands), February 4-6, 2026.



Figure 4 – Group photo for the 2nd Regional Toolbox Training in Addis Ababa (Ethiopia), May 5-7, 2026.



Figure 5 – Group photo for the 3rd Regional Toolbox Training in Cairo (Egypt), May 13-14, 2026.

The training materials developed by ISRIC for these meetings were turned into generic versions that can be used to support future training activities (see Annexes below).

These include generic versions of the slides used in each training session, the exercises delivered in the Regional Toolbox Trainings(s), and of the training agenda. In addition, a training script was developed for future trainers, providing detailed explanations of the learning objectives for each component, guidance on how to implement the training in practice, and suggestions for adapting the content to the level and interests of different groups of trainees.

5. Annexes

5.1. Training programme and script:

- programme RTT template: <https://cloud.watdev.eu/index.php/s/8mG2rqXgCDmLCJ3>
- script: <https://cloud.watdev.eu/index.php/s/qsC85c9cfp7o4d2>

5.2. Training presentations:

- RTT day 1 (decision-makers): <https://cloud.watdev.eu/index.php/s/aZpG7GM7CWebqXg>
- RTT day 2 (decision-makers): <https://cloud.watdev.eu/index.php/s/MCrrJECToQSk9mp>
- RTT day 3 (experts): <https://cloud.watdev.eu/index.php/s/NkLKRBcL9dRTMNf>

5.3. Training group exercises:

- BMPs scenarios: <https://cloud.watdev.eu/index.php/s/ACMaFtgyZLwnPMo>
- MCA: <https://cloud.watdev.eu/index.php/s/XN7ZwPwJQjLReX9>
- Toolbox & Model: <https://cloud.watdev.eu/index.php/s/Zm38B2jDYacHeDS>