Liaison with Validation Users for the SDGs-EYES User Uptake Webinars

Platform Guidelines

Soil Erosion by Water Assessment Tool

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GUIDELINES

This document proposes clear and concise guidelines explaining how users can test the platform's tool. These guidelines cover both back-end and front-end instructions, as well as practical use cases for the tool.

1. Introduction

A brief explanation of the platform's purpose and its relevance to SDG monitoring and reporting.

The SDGs-EYES platform will support users in monitoring and reporting on the SDGs indicators selected in the project and developing new indicators based on them. Two usage modes of the platform corresponding to two different types of users will be available:
Consultation mode: non-expert users will be allowed to explore the new indicators developed by the different pilots.
Exploitation mode: expert users will be able to:
login the development environment, use (not modify) the existing algorithms, run owned algorithms, upload owned data, generate owned indicators, also based on the existing ones execute from remote the indicators (through standard interfaces) and retrieve the results.

2. Platform's Role in Supporting SDG Indicators (Specific Pilot Indicator)

How the platform supports specific SDG indicators and how it can be used to monitor them.

The platform allows users to choose a specific day to calculate and visualise the SDG indicators through interactive maps. The platform also offers data downloads in common file formats (e.g., PNG in the front end and raster geoTIFF in the backend), providing convenient access and further processing of data.

3. Pilot Overview

Introduction of the pilot (and indicators), outline of its objectives, and explanation of how it aligns with specific SDGs. It also includes instructions on how to interpret and customize data visualizations and export data for reporting.

	Soil Erosion by Water Assessment Tool
Objectives	Soil erosion by water is a major issue worldwide, leading to severe ecological, agricultural and safety concerns. In the EU, about 62% of the territory is affected by one or more soil degradation processes, among which soil erosion, which significantly impacts soil health and its capacity to provide essential ecosystem services like food production, carbon and nutrient cycling and climate change mitigation and adaptation. The loss of soil ecosystem services costs the EU at least 50 billion euros per year. Monitoring and combating soil loss has been recognized as a priority challenge by international legislative frameworks, as demonstrated by the EU Soil Strategy for 2030, the Common Agricultural Policy and the Soil Monitoring Law. These frameworks also acknowledge the need for leveraging digital tools, like Artificial Intelligence (AI), and Earth Observation (EO) data to enhance soil monitoring and provide decision tools to support

	civil protection, land planning, climate change adaptation and different economic sectors, from agriculture and food production to transport and logistics, insurance, and real estate. Pilot 4b aims to address these needs and expectations, as well as the current gaps in soil loss estimation at the EU level (i.e., aperiodicity, annual time resolution and coarse spatial resolution) by enhancing the use of the currently adopted empirical model (Revised Universal Soil Loss Equation) by combining different datasets, from Earth Observation to field data and modeling outcomes, and refining methodologies for their analysis and processing, by reviewing existing workflows and generating innovative methods based on AI.
Alignment with SDGs (which SDG indicators are being calculated, which variables)	At the UN level, the United Nations Convention to Combat Desertification (UNCCD) is the custodian agency of the indicator 15.3.1 "Proportion of land that is degraded over total land area", generally reported as a binary quantification (i.e., degraded/not degraded) of the extent of degraded land in hectares and expressed as a percentage. The binary value is based on a "one out, all out" approach considering three sub-indicators (land cover, land productivity, carbon stocks) whose value can be (i) positive or improving, (ii) negative or declining, or (iii) stable or unchanging with respect to the baseline (i.e., 2015). Acknowledging the dependence of land degradation on soil erosion, the closest EUROSTAT indicator for budgeting degraded land in the EU is "estimated soil erosion by water" (15_50), expressed as km2 and a percentage of the total non-artificial, erodible area. Indicator 15_50 is provided at a resolution of 100 m for years 2000, 2010 and 2016 using a consolidated empirical model.

Specific Guidelines for Use Cases: It provides a practical scenario for users to engage with the platform. It outlines the steps for monitoring and reporting, as well as the workflows for the pilot, from data access to figure generation and feedback submission.

Soil Erosion by Water Assessment Tool
Data Access: Instructions on accessing the needed datasets (e.g., Sentinel-2 images, gridded rainfall data, soil properties, etc.) and processing them. **Visualization**: Step-by-step guide to visualizing rainfall-induced soil erosion and its contributing factors over time. **Analysis**: Generation of reports on soil erosion over time and detection of the most vulnerable areas and hotspots of major hazard. **Scenario**: Selection of the entire Olt river basin and analysis of the potential soil erosion at a quarterly time scale. Choice between two alternative scenarios accounting (or not) for the presence of transport infrastructures. The factors contributing to erosion (e.g., rainfall erosivity, land cover and management, etc.) can also be explored individually.

Data Access	Potential rainfall-induced soil erosion is presented in the visualization panel through maps, which are also available for download. The overall budget of soil loss is displayed on a dedicated panel.
Visualization	Users can visualise potential soil loss as an interactive map. Maps for the individual factors contributing to erosion can also be selected for visualization.

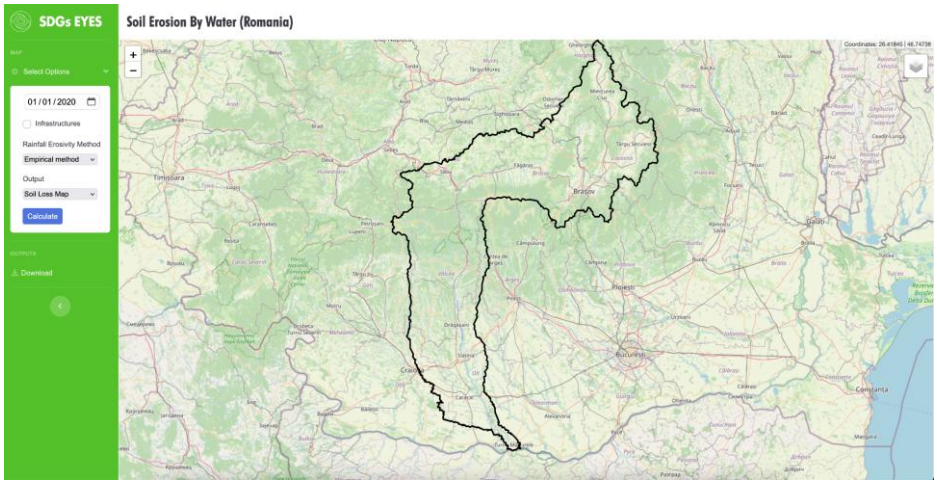
Analysis	Users can download the output maps as .geoTIFF rasters for local analysis or visualization on GIS software in the backend and PNG images in the frontend.
Scenario	Users can download output for a chosen date and consider two different scenarios for transport infrastructures (with/without). The time range that can be inspected is related to the availability of Sentinel-2 images.

4. Navigating the Platform

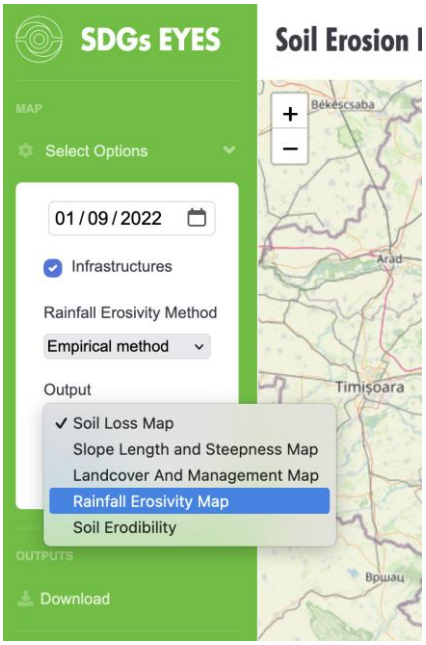
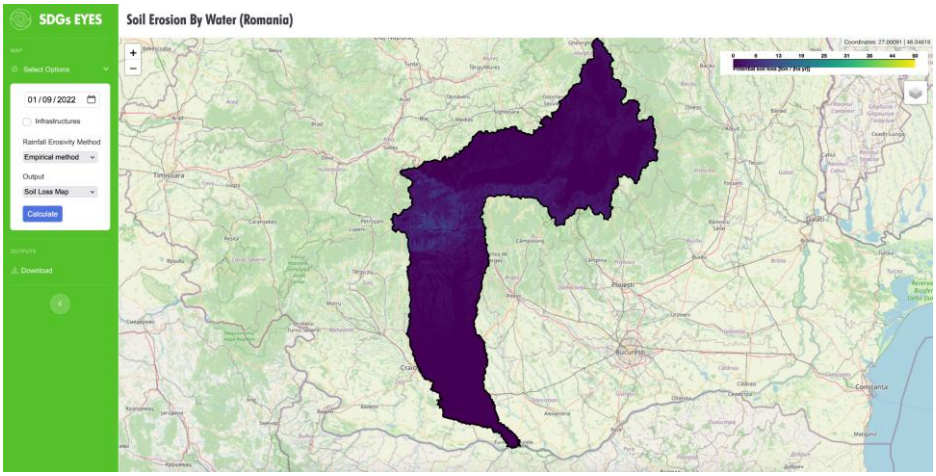
Step-by-step instructions on using the platform: logging in, accessing the dashboard, selecting relevant SDG indicators, and utilizing platform features. A detailed description of the platform can be found here.

The platform offers two user-interaction modalities:

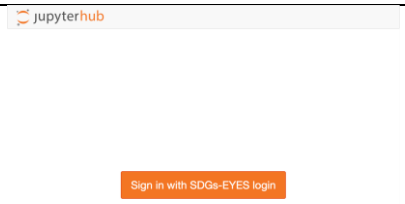
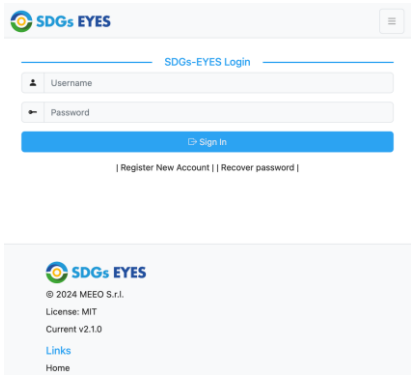
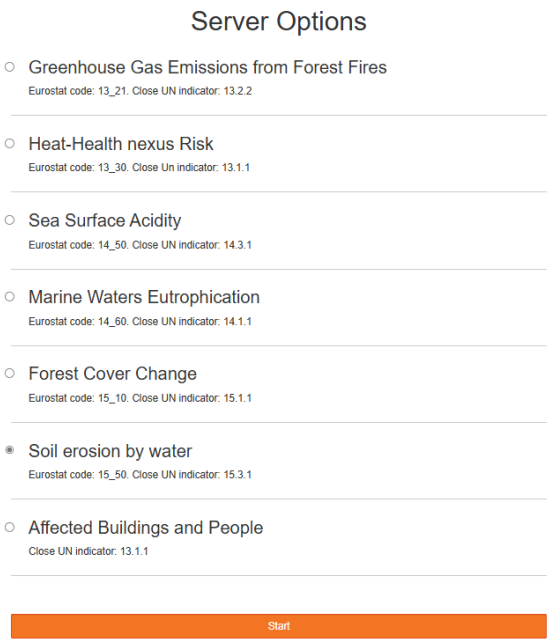
- **Pilot Frontends.** Dedicated frontend prototypes developed on the needs of the stakeholders to be consumed by the stakeholders are made available to demonstrate the capabilities of the new indicators.
- **Laboratory.** This is an environment where the indicators are developed, tuned, and finalised. Practically it is a Jupyter lab[1] environment with direct access to the datasets and can exploit the computational resources. The final code is stored on the project repository to be optimised and dockerized for execution.

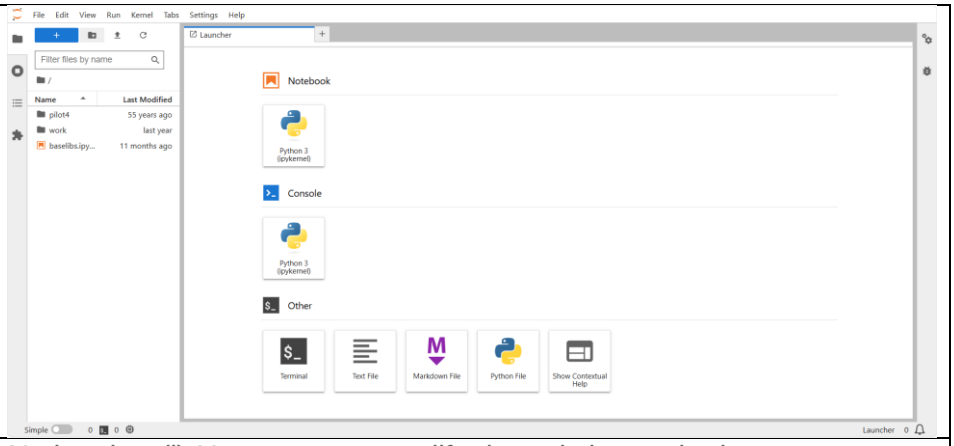
Tool Frontend (Consultation mode)	
Step-by-Step Process	The user accesses the UI via the website or directly by entering the url: Soil Erosion by Water Assessment Tool
Logging-in	The user enters credentials to access the UI and is redirected to the UI (to be configured)
Accessing the dashboard	The UI presents a selection menu on the left and a map of the Olt river basin in the middle 
Selection of SDG indicators	The user enters the date, infrastructure (Y or N), and some alternative methods to compute the individual factors contributing to erosion. The user can select among 5 different outputs: rainfall erosivity, soil

[1] *Jupyter-based python instance to provide access to Pilot material, including shared data and re-executable notebooks*

	erodibility, slope length and steepness, land cover and management, and soil loss, and clicks on the “Calculate” button. 
Platform features	The resulting layer is displayed on the map. It is possible to zoom in and out. The download button allows the user to download the results. 

Laboratory/Jupyter Lab (Exploitation mode, i.e., using your own workspace)	
Step-by-Step Process	The user accesses the SDGs-EYES Laboratory via the website or directly by entering the url: jup.sdgs-eyes.adamplatform.eu

	 Then the SGDs-EYES login page is presented. 
Logging-in	The user enters credentials to access the SDGs-EYES Laboratory. To create a new account follow the Sign-Up procedure i.e. “Register New Account”
Selection of Pilot	The user selects the Pilot of interest  Then the “baseline” of the select Pilot is loaded and the user has access to data and material made available for the Pilot

	
Execution	Notice that (i) Users cannot modify the existing code, but can create a copy of it, modify and run it (ii) Users can upload owned data and run the code on them The Jupyter Notebooks are located in the "/work/pilot4/codes/" directory within the respective folders along with a readme.md file. The main algorithm to run can be found at the following path: "/work/pilot4/codes_4b/pilot4b_main.ipynb". Please note that the end user should be experienced with the Jupyter environment and Python programming language to be able to change the input/output directories in the workflow to be able to save their own results in a folder assigned to them.

5. Testing

Information about the description of the datasets.

	Soil Erosion by Water Assessment Tool
Input new data	• ERA5-Land: total precipitation from 2002 to 2023 • GloREDa: global rainfall erosivity • SoilGrids • CORINE Land Cover 2018 (v2020) • EDTM30: Ensemble Digital Terrain Model of the world at 30 m spatial resolution • Shapefiles related to roads and railways from Romanian Geoportal ANCPI • Sentinel-2 L2A images from 2020 to 2023
Adjust relevant SDG indicator	Users can select: • A date within 2020-2023 and the assessment will be carried out for the corresponding season (winter: Jan-Mar, spring: Apr-Jun, summer: Jul-Sep; fall: Oct-Dec). • A region of interest (the Olt river basin or a sub-area). • The transport infrastructure scenario [with/without].

	The method for computing the R-factor (rainfall erosivity) [1: based on GloREDa dataset, 2: empirical model applied to ERA5-Land, 3: artificial intelligence-based model applied to ERA5-Land]. The method for computing the C-factor (land cover and management) [1: empirical method applied to Sentinel-2 images, 2: artificial intelligence-based method applied to Sentinel-2 images].

FEEDBACK

1. Feedback Mechanism

Generic: Validation users are encouraged to suggest improvements and provide feedback on the platform's usability. Feedback should cover aspects such as overall impressions of the new products, ease of data visualization, downloading, processing, and interpreting the data. Additionally, users can evaluate how well the new products meet their specific needs.

Platform usability	
Overall impression new products (exploitation)	
Visualization (exploitation)	
Downloading (exploitation-laboratory)	
Processing(laboratory)	
Interpreting data (exploitation)	
Expectation from needs (exploitation-laboratory)	

Workflows & Methodology: (i) **Spatial and Temporal Resolution & Scale:** Users will be asked to provide feedback on the importance of the increased spatial and temporal resolution of the new products. Specifically, they will assess how the higher resolution improves their analysis and decision-making processes. (ii) **Focus on Specific Indicators:** Users will identify which specific activities (e.g., those related to the pilots) the new products were most helpful for. They will also indicate whether the new products provided insights that they were previously unable to obtain from other sources. (iii) **Access & Visualization:** Users will provide feedback on how easily they could access and visualize the data, ensuring that the platform is user-friendly and meets their expectations. (iv) **Future Use and Recommendations:** Users will be asked to give their thoughts on how they plan to use the platform in the future and provide recommendations for improvement based on their experience.

	Soil Erosion by Water Assessment Tool
Spatial and Temporal Resolution & Scale	
Focus on Specific Indicator	
Access & Visualization	
Future Use	
Recommendations	

2. Support and Contact Information

Contact details for technical support, so SDGsEYES can elaborate a comprehensive FAQ section that addresses common issues and troubleshooting tips ensuring that users can quickly resolve problems and get assistance when needed.

Soil Erosion by Water Assessment Tool
For the validation phase, should you encounter any problem in accessing, or retrieving any data, please contact (i) For the service: melissa.latella@cmcc.it; For Pilot Frontend (Consultation): alessandro.danca@cmcc.it or for the Laboratory (Exploitation - Using your own workspace) JupyterLab: natali@sistema.at and mantovani@sistema.at

Learn more about SDGs-EYES:
https://sdgs-eyes.eu/

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