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

Heat Health Risk Assessment
Strengthening SDG 13 Monitoring to Address Climate-Related Health in Urban Areas

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GUIDELINES[1]

This document proposes clear and concise guidelines explaining how users can test the output of the Pilot 2 case study. Specifically, the outputs of this Pilot are:

- **OPEN PLATFORM**, in which it is possible to consult the codes structured in Python to calculate 12 climate indicators, using data derived from different open-access databases. The indicators to monitor the heat stress in urban context have been selected based on a systematic review of the existing scientific literature related to the heat-health nexus, as well as thanks to the feedback collected in previous activities of the project.
- **DECISION-MAKING TOOL**, for assessing the extreme temperatures risk at the census tract level in the Turin urban area, accessible to all users interested in viewing and downloading related contents. This user-friendly tool provides information on:
    - **Hazard**: heat stress indicators that passed the validation process based on the heat waves reports for the early warning system of the Environmental Protection Regional Agency (ARPA Piemonte). Resolution: depending on the specific open-access dataset under analysis.
    - **Exposure** (i.e. the exposed population): concerning the distribution of the population over 65 years old, by census tract.
    - **Vulnerability**: composed of indicators pertaining to the demographic, socio-economic and health conditions of the citizens residing within each census tract, as well as the contextual characteristics of the urban areas under analysis.
    - **Final risk**: which is the value derived from normalizing and combining all the previous indicators according to an IPCC framework for climate-related impacts, and is visualized in an aggregated risk map.

1. Introduction

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

The SDGs-EYES Pilot 2 PLATFORM will support users to monitor and report on the SDGs indicators selected in the project and to apply these indicators in other contexts. Two usage modes of the platform corresponding to two different types of users will be available:

1. Consultation mode: non-expert users will be allowed to explore the new indicators developed by the different pilots.
2. Exploitation mode: expert users will be able to:
    - access the development environment, use (not modify) the existing algorithms, run their own algorithms, upload data, and generate indicators, also based on the existing ones;
    - execute from remote the indicators (through standard interfaces) and retrieve the results.

As for the DECISION-MAKING TOOL, specific for the Turin urban area, users will be able to consult the tool, choose which suburban area to focus on and visualize the data related to the single factors (hazard, exposure, vulnerability) or to the aggregated final risk.

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.

[1] This is a living document – suggestions for its improvement are welcome

The PLATFORM allows users to select the climate hazard indicators used to complement the SDG13_30 indicator, and to work in an operational context of risk analysis within the IPCC framework. In fact, it is possible to access the codes used for the calculation of the hazard indicators, verify the calculation and reproduce it in other contexts. Then users can perform a context-specific validation process, extract the climate indicators that pass the validation and integrate them with a set of context-specific vulnerability indicators calculated on an exposed sample.

The graphical interface of the DECISION-MAKING TOOL allows access to Turin interactive maps that show the variation of risk with respect to the 4 hazard indicators that complement SDG13_30, visualizing choropleth maps of hazard, overall vulnerability and overall exposure. It also allows viewing the specific data referred to the single statistical unit with a click on the map, generating a pie chart and a barchart. Clicking on the vulnerability indicator represented in the barchart opens a map of its distribution in the city.

3. Pilot Overview

Introduce each pilot (and indicators), outline its objectives, and explain how it aligns with specific SDGs. Include instructions on interpreting and customizing data visualizations and exporting data for reporting.

Pilot 2: Heat Health Risk Assessment	
Objectives	The objective of the pilot is to ensure the reproducibility of the applied analyses so that they can be useful in different contexts and at various resolution scales. The possibility to run all the heat stress climate indicators considered in the analyses and available on the PLATFORM, to download the Python codes, as well as to retrieve the results for Turin, provides multiple benefits from various perspectives. On the other hand, the DECISION-MAKING TOOL will allow users to consult the distribution of hazards, the exposed sample, the associated vulnerabilities, and the aggregated risk. This approach is essential for clearly prioritizing areas most at risk from heat, with particular attention to public health and risk prevention for the population.
Alignment with SDGs (which SDG indicators are being calculated, which variables)	Starting from the SDG13_30 indicator (Mean near surface temperature deviation), the pilot aim is to complement this indicator with more sensitive climate hazard indicators to be used within the IPCC risk framework addressing the heat-health nexus. Specific objectives are: 1. to integrate high-resolution climate data provided by different state-of-the-art open-access datasets from different spatial and temporal domains to define which climate indicators could be used within the risk framework at the intra-urban scale; 2. to develop a risk assessment framework combining hazard, exposure and vulnerability indicators at the highest resolution available over the urban area of Turin; 3. to integrate the achieved results from factor assessments (hazard, exposure, vulnerability) and risk evaluations into a decision-making tool that will provide clear indications on the spatial distribution of the health risk arising from extreme temperatures in the investigated urban area and will identify the micro-areas and vulnerable populations at greatest risk. This tool is interactive, and users are able to choose which specific factor they want to visualize.

Specific Guidelines for Use Cases: They provide a practical scenario for users to engage with both the PLATFORM and the DECISION-MAKING TOOL. They outline the steps for monitoring and reporting, as well as the workflows for the pilot, from data access to report generation and feedback submission.

Pilot 2: Heat Health Risk Assessment	
Data Access	PLATFORM. The platform contains 12 climate hazard indicators related to heat stress and computed on data derived from different datasets (VHR-REA_IT, CERRA, and ERA5-LAND). These are: • Apparent Temperature (Tapp) • Discomfort Index (DI) • Hot Waves (HW) • Thermal Discomfort Index (Humidex5) • Summer days (SU) • Tropical nights (TR) • Warm days (TX90p) • Warm Spell Duration Index (WSDI) • Warm Spell Duration Index (WS3DI) • Warm Wet days (WW) • Warm Dry days (WD) • Maximum Apparent Temperature (Tmax app) DECISION-MAKING TOOL. The tool provide the possibility to access and examine the distribution of all the indicators selected to estimate the e~~E~~xtreme t~~T~~emperatures r~~R~~isk at the census tract level. Specifically, hazard indicators were those that passed the validation procedure (separately for each dataset). The exposed population is the resident population aged >65 years. The vulnerability indicators include sex, age, socioeconomic factors, prevalence of chronic diseases, and indicators of indoor/outdoor environmental context and access to facilities. All these data passed a normalization process, in order to get comparable values in the 0-1 range. A weight system is also applied to the vulnerability factors, to reflect their different impact on the climate-related health risk.
Visualization	PLATFORM For each of the 12 climate indicators, the following will be available: • Python codes to calculate each indicator; • .csv files; • shapefiles and png file. DECISION-MAKING TOOL The interactive tool allows the visualization of all the elements of the risk framework into different maps for each factor and in the combined map for the final risk distribution. In the maps different geographical aggregations can be visualized, from the finest level of the census tract to the health district level.
Analysis (and Outcomes)	PLATFORM Codes can be downloaded and used in the “work” area of the platform, to run personal analyses and compute new indicators and relative outputs.

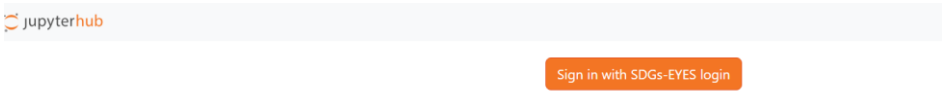
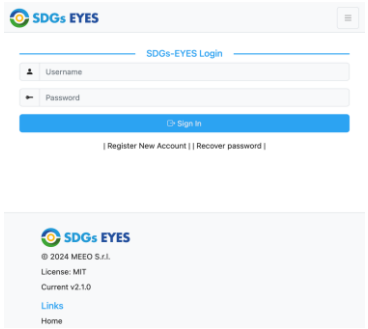
	DECISION-MAKING TOOL With the interactive maps, users can select specific sub-urban areas in the Turin municipality and - for each climate indicator - compare results between areas in terms of • the distribution of vulnerability indicators in each area; • the final health risk associated to urban heat; • the main determinants of risk in each area. This will help to identify areas at greatest risk to focus on for priority actions, as well as identify the most associated factors, with the aim of choosing the potentially most effective adaptation measures and strategies based on the social and built environment context.

4. Navigating the Platform and the Tool

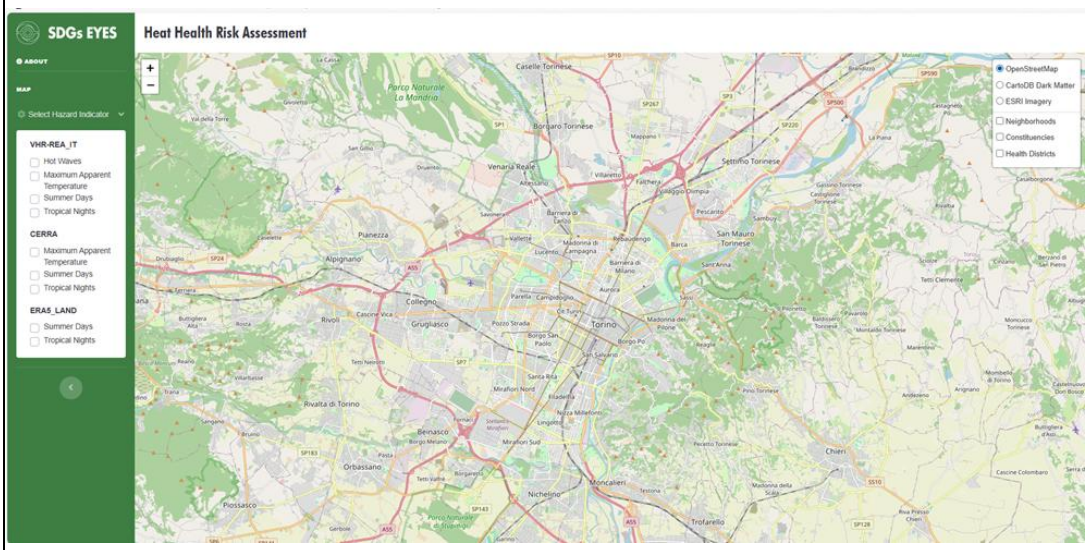
Step-by-step instructions on using the platform and the tool. The PLATFORM offers two user-interaction modalities:

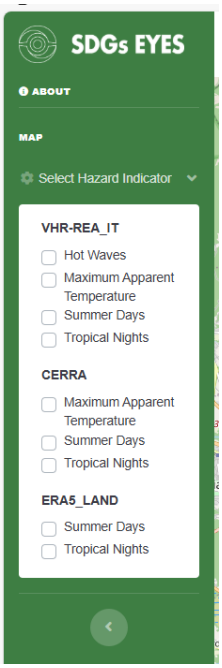
- **Pilot Frontends**. Dedicated frontend prototypes developed on the needs of the stakeholders to be consumed by the stakeholders are made available to demonstrate the capabilities of the new indicators.
- **Laboratory**. This is an environment where the indicators are developed, tuned, and finalised. Practically it is a Jupyter lab2 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.

The DECISION-MAKING TOOL can be visualized in an interactive mode, but it not include a Laboratory.

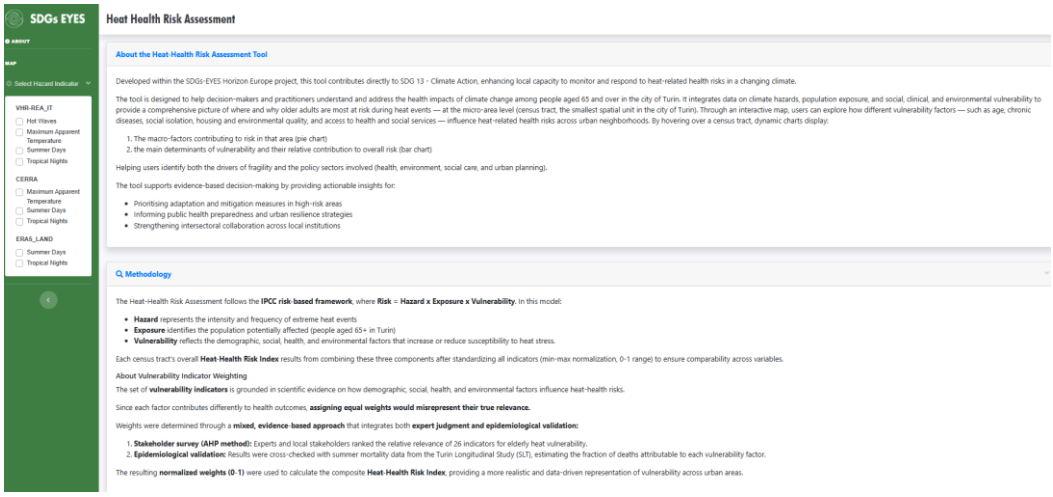
Step-by-Step Process	**PLATFORM** Users access the platform through this url: https://jup.sdgs-eyes.adamplatform.eu/hub/login  Then the SGDs-EYES login page is presented. 

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

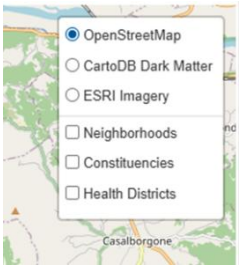
	DECISION-MAKING TOOL Users access the Graphic User Interface (GUI) by entering the following url: https://extreme-temperatures-risk.apps.sdgs-eyes.adamplatform.eu 
Logging-in	**PLATFORM** The credential to access the platform will be sent by email by a partner of the project. **DECISION-MAKING TOOL** At the moment, no credentials are needed to access the tool.
Accessing the dashboard	**PLATFORM** Users access the JupyterLab. After login, they can select which specific pilot to access. Heat-health nexus is explored and calculated in Pilot 2. **DECISION-MAKING TOOL** The GUI shows a map of the city of Turin giving users the possibility to choose between different hazard indicators from different databases, by using the menu on the left-hand side.

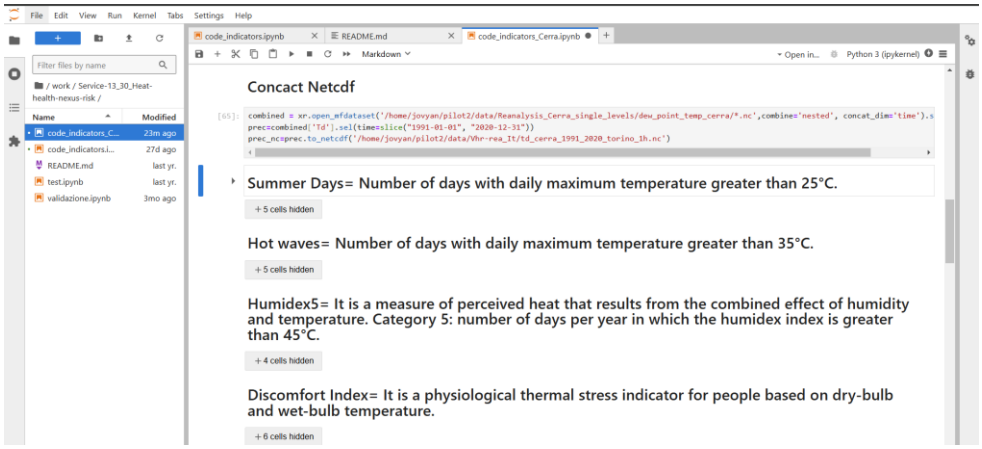


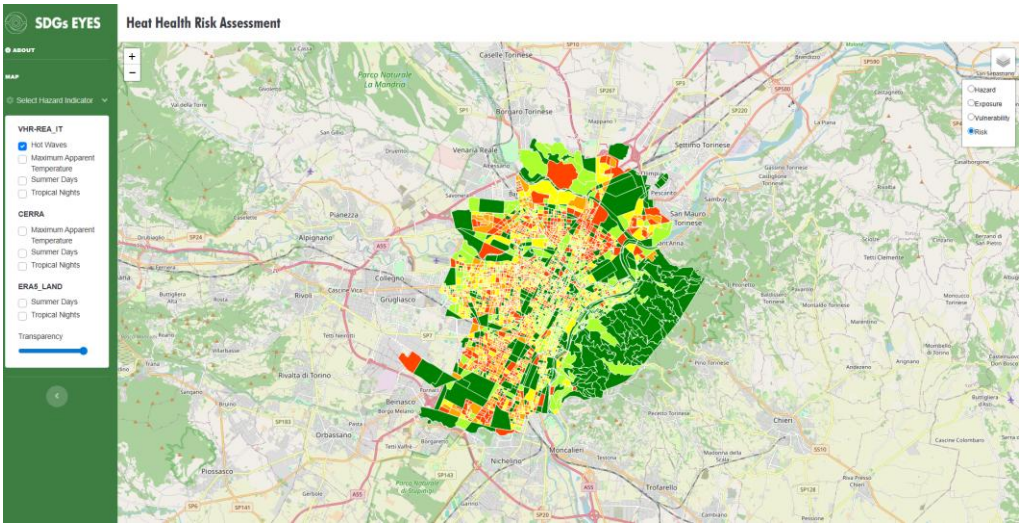
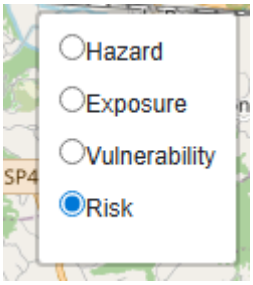
On the same side, the “About” button opens a new page with a brief explanation of the features of the tool and the methodology used.

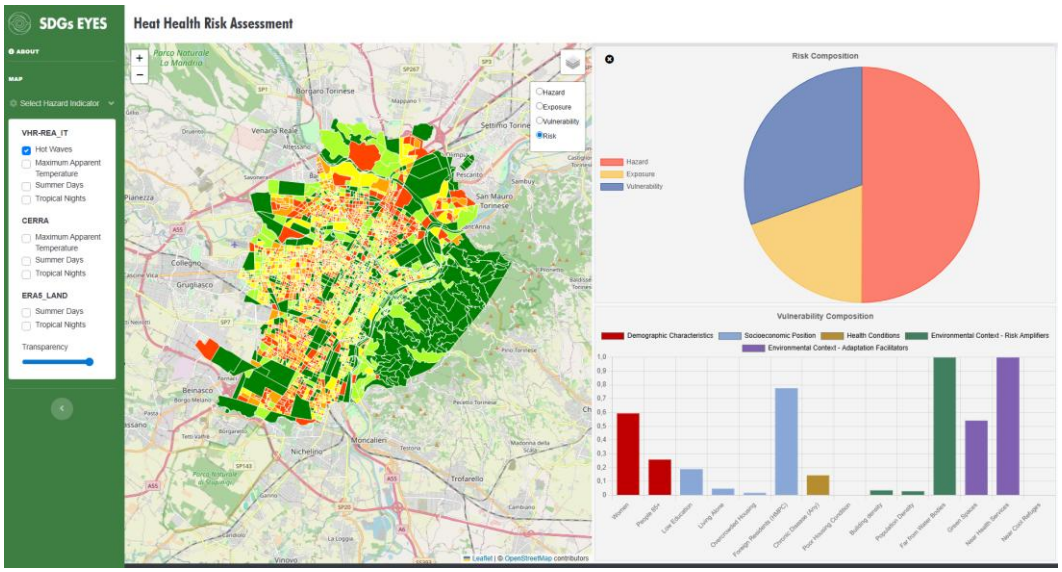


Returning to the map page (“Map” button in the menu), from the top right menu users can choose different modes to visualize the background map (OpenStreetMao, CartoDB Daark Matter, ESRI Imagery), as well as highlight other administrative/geographical units: Neighbourhoods, Administrative Districts and Health Districts.



Further steps for the PLATFORM only	
Execution	Within the pilot 2 folder, users can access the Python codes for calculating the climate indicators and execute them interactively. The input data stored in the project repository refers to the specific geographical area analysed in the pilot (Turin), but the codes are valid for any location, after general data pre-processing operation. The VHR-REA_IT dataset is available only for Italy. 

Further steps for the DECISION-MAKING TOOL only	
Selection of indicators	After the selection of a specific hazard indicator, the map of Turin is populated with the related values. At first, the risk map is shown.  From the top-right menu, users can choose between 4 different factors to be displayed (inside each risk-scenario previously chosen from the left menu): Hazard, Exposure, Vulnerability, and Risk. 

Tool features	By clicking on a single statistical unit on the map (a census tract), a pie chart and a bar chart are displayed, providing detailed information on the 4 aforementioned factors. The pie chart shows the risk composition, in terms of the distribution of hazard, exposure and vulnerability within the individual census tract; the bar chart shows the vulnerability composition, in terms of the impact of the single specific indicators. Clicking on a bar of the bar chart loads the map with the distribution of that vulnerability indicator across the entire city. 

5. Testing

Information about the description of the datasets.

Pilot 2: Heat Health Risk Assessment	
Input new data / replicability	**PLATFORM** All the indicators require specific input data and functions (e.g., percentiles and functions for creating the colorbar) produced externally to the project platform and subsequently uploaded to enable the execution of the entire calculation flow. If needed, the process can be replicated anytime and anywhere outside the platform, but requires: the identification and download of appropriate datasets (to calculate hazard indicators) and the clip over the specific area of interest. **DECISION-MAKING TOOL** The tool requires specific input data, namely external local data. If needed, the process can be fully replicated anytime and anywhere outside the platform, but requires (in addition to hazard data as described above) the identification, availability, and access to demographic, socioeconomic, health, and contextual data to calculate exposure and vulnerability. Specifically, the hazard indicators adopted to complement the SDG indicator require only data from the open-access datasets. However, if these hazard indicators are to be validated at the local level, access to observed event data for comparison is needed. Exposure and vulnerability indicators are derived from data that may be freely available from public institutions (e.g.

	census data), but in some cases, such as health data, a partnership with local health authorities is likely to be necessary.
Adjust relevant SDG indicator	The SDG13_30 indicator is not adopted anymore, so the hazard indicators adopted in Pilot 2 can be considered a set of replacement indicators that best complement the real need of our society.

6. Support and Contact Information

Provide users with clear contact details for technical support. This ensures that users can quickly resolve problems and get assistance when needed

Pilot 2: Heat Health Risk Assessment
Should you encounter any problem in accessing, or retrieving any data, please contact (i) For the service: nicolas.zengarini@epi.piemonte.it or mattia.scalas@cmcc.it (ii) 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. Should you have any need of clarification please contact (i) for the methodological framework related to the Heat Health Risk Assessment, nicolas.zengarini@epi.piemonte.it or mattia.scalas@cmcc.it; (ii) for the hazard indicator selection and calculation, alessandro.pugliese@cmcc.it; (iii) for the health, socio-economic and environmental indicator selection and calculation, nicolas.zengarini@epi.piemonte.it.

7. Define a Roadmap with Timelines

SDGsEYES is excited to announce a series of five webinars, running from January to May 2025, designed to engage users with the services developed through the project. These sessions aim to foster collaboration and gather valuable feedback to shape the validation and future exploitation of SDGs-EYES outcomes, including data, algorithms, and tools. These webinars go beyond information-sharing—where users can actively contribute to refining EO-based solutions.

Your feedback will directly contribute to improving the accessibility and usability of these solutions and we will be pleased if you consider participating in such a webinar scheduled for:

- **15th of April**: Pilot 2 – Extreme Temperatures Risk: Developing tools for forecasting and mitigating the impacts of heatwaves.

Other webinars planned are:

- **29th of April:** Pilot 5 – Climate Security: Enhancing resilience by monitoring climate-related risks such as natural disasters and food insecurity.
- **28th of May**: Pilot 4 – Forest Cover and Erosion: Monitoring deforestation and soil erosion for better land management and biodiversity conservation.

Adjustments to this timeline may be made as needed to align with the progress of each pilot.

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

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