DELIVERABLE D.T1.3.3

Tutorial development for user friendly transfer of the WebGIS tool.

Version 04
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1. Introduction

This document is placed within the framework of the activities performed in the Thematic Work Package T 1 - Integrated WebGIS tool for decision making in the management of heritage at risk - and represents the final step to reach the objective of the output O.T1.3 - WebGIS tool for multi-risk assessment on cultural heritage in Central Europe.

The finalization of the WebGIS tool – "Risk mapping tool for cultural heritage protection" illustrated in D.T1.3.2 has been based on the outputs of the following Deliverables from Interreg CE ProteCHt2save and STRENCH projects:

The present deliverable aims to guide the end user to navigation within the WebGIS Tool explaining how to access and use its main tools.

Note:

Vers. 05 – Updates have been made compared to the previous version mainly in the page addressed to explaine the methodology for vulnerability assessment – Changes and improvement follow the feedback of the users after the testing activities of the Web GIS Tool foreseen in D.T2.2.1 and D.T.2.2.2.

Vers. 04 – Updates have been made compared to the previous version in the section dedicated to the description of the case studies

Vers. 03 - Updates have been made compared to the previous version in the section dedicated to the description of the open search tool – 2.6.3. Open search and in the section related to Vulnerability page. Other changes has been made in figures of the session 2.1.

Vers. 02 - Updates have been made compared to the previous version in the section dedicated to the description of the open search tool - 2.6.3. Open search

2. How to explore and use the WebGIS Tool for Risk Mapping

2.1. General view

The WebGIS tool "Risk mapping tool for cultural heritage protection" is available at the website https://www.protecht2save-wgt.eu/.

The web page of Web GIS Tool (WGT) for risk mapping is composed of 6 pages. The Home page is immediately available for all users, while a registration is required to access the further contents and pages.

Figure 1. Part of the Home page of the Risk Mapping Tool for Cultural Heritage Protection showing the Header of the web page with project logos, pages, registration and sign in buttons.

2.1.1. Registration

Click on the **Register** button in the home page and subsequently filling the form in all its parts and clicking on 'Register' (Fig. 2).

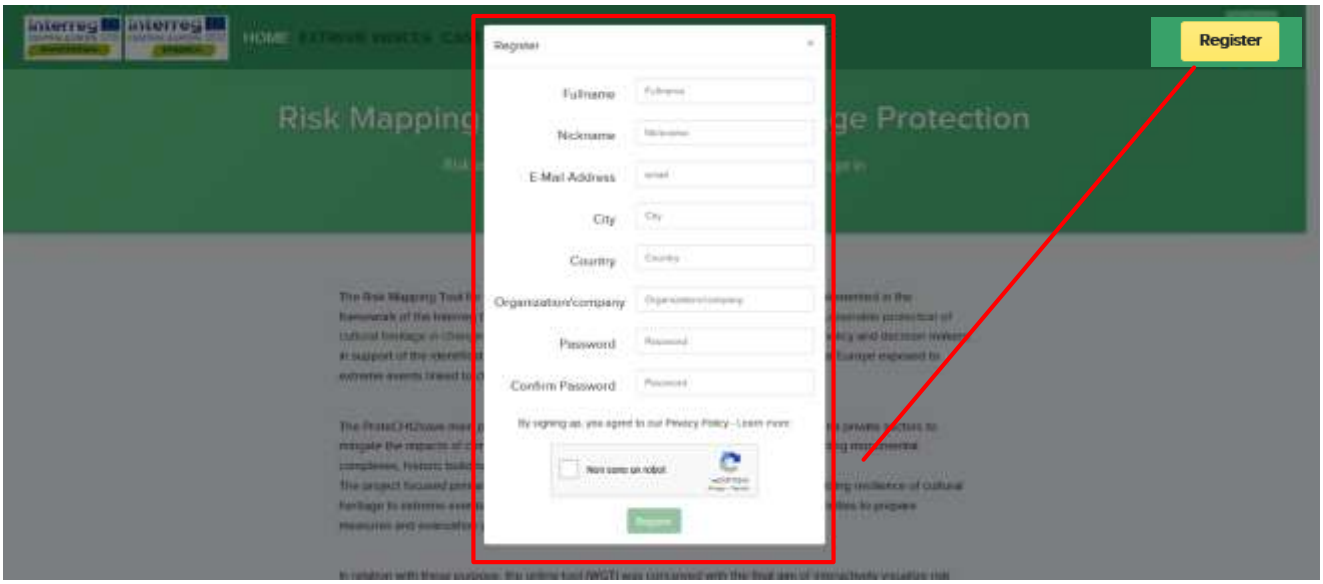


Figure 2. WGT Home page: registration form.

At this stage, the web page administration service will send an automatic notification to the provided e-mail address. Registration e-mails are usually received within few minutes after the registration procedure and it is necessary to click on the link provided in the e-mail to validate the registration.

Once the registration is confirmed, the new account will be automatically validated and enabled to the navigation on the WGT.

2.1.2. Access

Once registered, users can access the WGT home page by entering the username and password they have set up during the registration procedure and they proceed by clicking on the 'Sign in' button and inserting the username and password in the relevant fields. Finally click on the 'Login' button.

Figure 3. WGT : login procedure

2.2. Home Page

On the Home page a brief general information of the project and the introduction to the Web GIS Tool for risk mapping is provided. Furthermore, a first overview of the project pilot sites is also available.

2.3. Climate extreme indices.

In the EXTREME INDICES page detailed information about the climate extreme indices selected for the project are available (Fig. 3). These indices, selected among the 27 climate index defined by the ETCDD, are internationally accepted by the scientific community for representing change in climate extreme, such dry spell or intense precipitation. They are based on change of temperature and precipitation and relate to heavy rain, flooding, drought and extreme heating.

After a brief introduction, the climate indices and variables elaborated are listed in two separate windows: **Extreme events** and **Climate variables.**

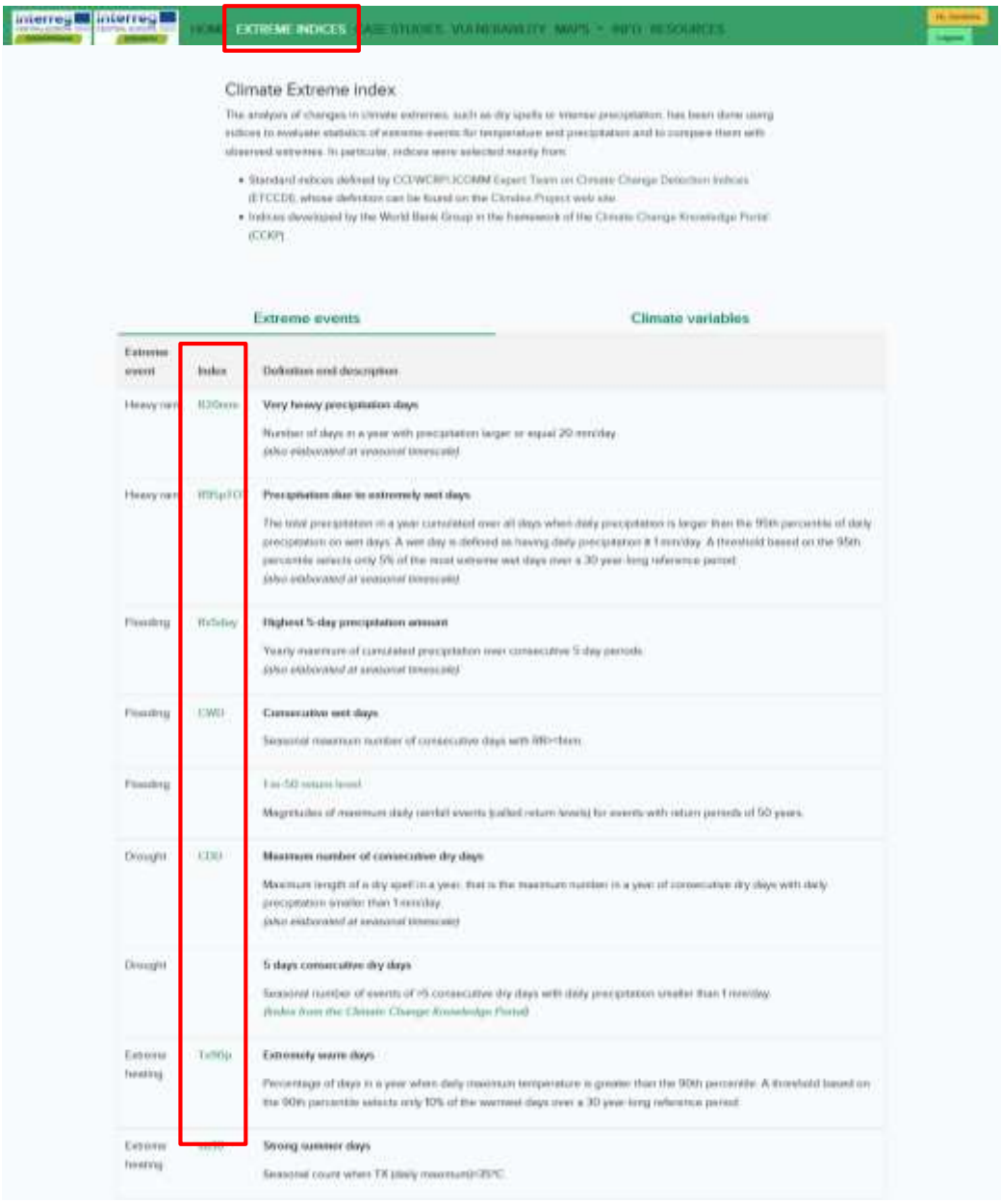


Figure 3. Visualization of the climate indices listed in the EXTREME INDICES page.

Clicking on each short name of the indices included in the "**Index**" column (red box in Fig. 3) it is possible to reach the original web page where deeper information about each climate risk index is available.

In the same page we can also visualize the climate variables elaborated (Fig. 4).

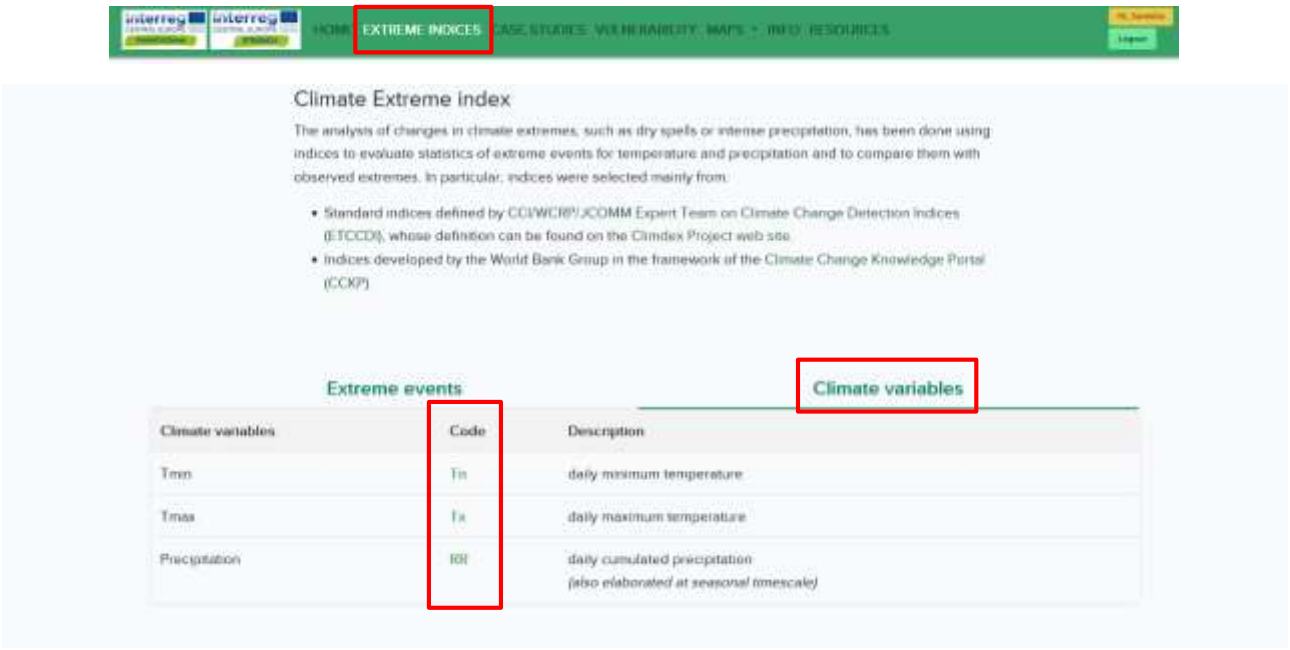


Figure 4. Visualization of the climate variable listed in the EXTREME INDICES page.

2.4. Case studies

This section of the WGT hosts the presentation of the pilot sites participating in both the projects Interreg CE ProteCHt2save and STRENCH (Fig. 5). Here is provided an in deep knowledge of the case studies involved in the projects by showcasing their geographical context with a focus on their unique cultural and natural heritage also highlighting main climate hazards impacting the sites. A survey on the past calamitous events recorded at the site and subsequent prevention, mitigation and adaptation measures put in place. Finally, a series of additional information useful to understand what tools and data can be available at local level for the protection of cultural heritage at risk are also available for an in deep knowledge of the site and a correct analysis of the still existing gaps.

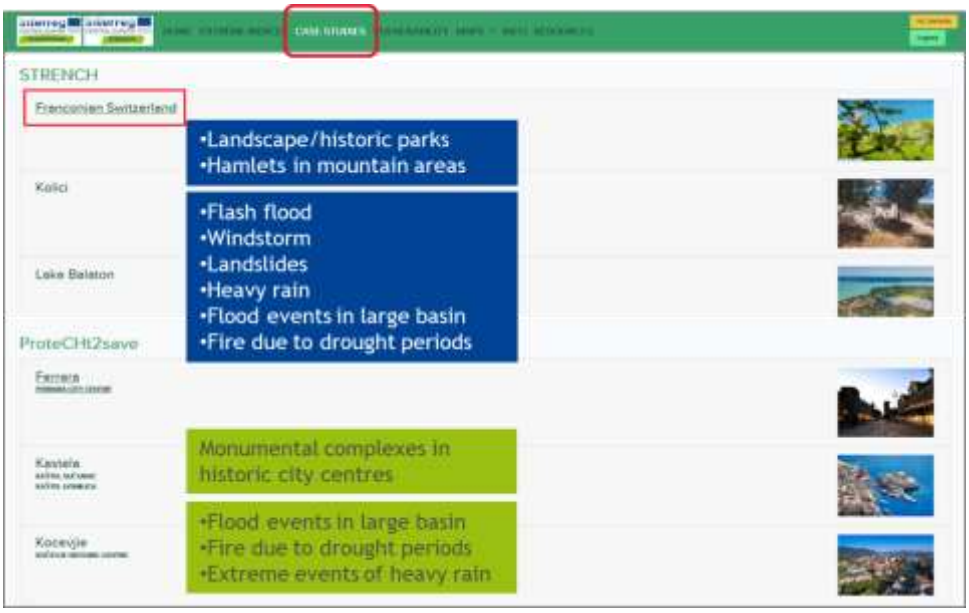


Figure 5. Visualization of the preview of the case studies

Clicking on each of the listed case study in the preview it is possible to visualize a first overview of each site (Fig. 6). In addition, for each case study, there is the possibility to download the detailed and log version of the description in pdf format.

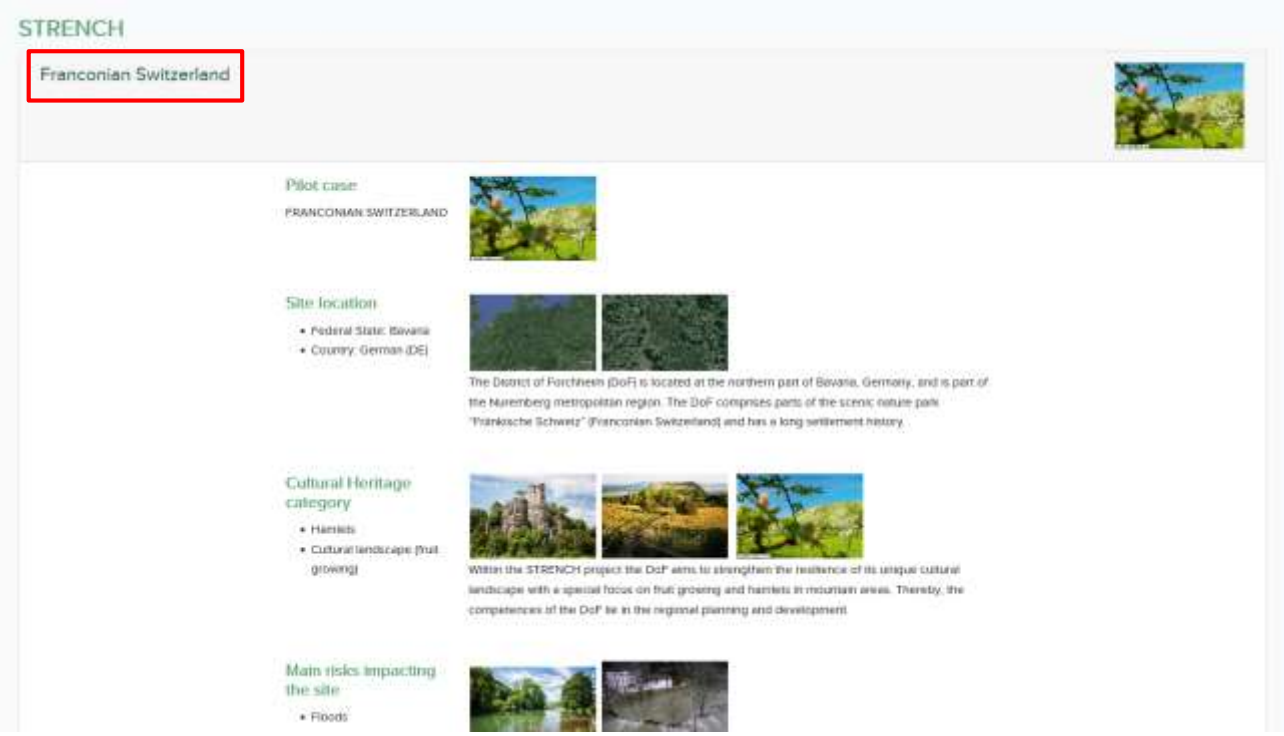


Figure 6. An example of detailed card opened for the German case study.

2.5. Vulnerability

The vulnerability section contains the methodology developed for vulnerability ranking of cultural heritage categories exposed to extreme climate events and the rate of vulnerability of all pilot sites investigated in ProtetCht2save and STRENCH projects.

In this page, after a brief general introduction, the methodology of vulnerability assessment implemented in both projects ProteCHt2save and STRENCH is presented and accessible to the users clicking on each box respectively (Fig. 7).

In addition, for each case study where the vulnerability assessment has been carried out at local level, there is the possibility to visualize on line the preliminary result of the vulnerability assessment and also to download the related document in pdf format.

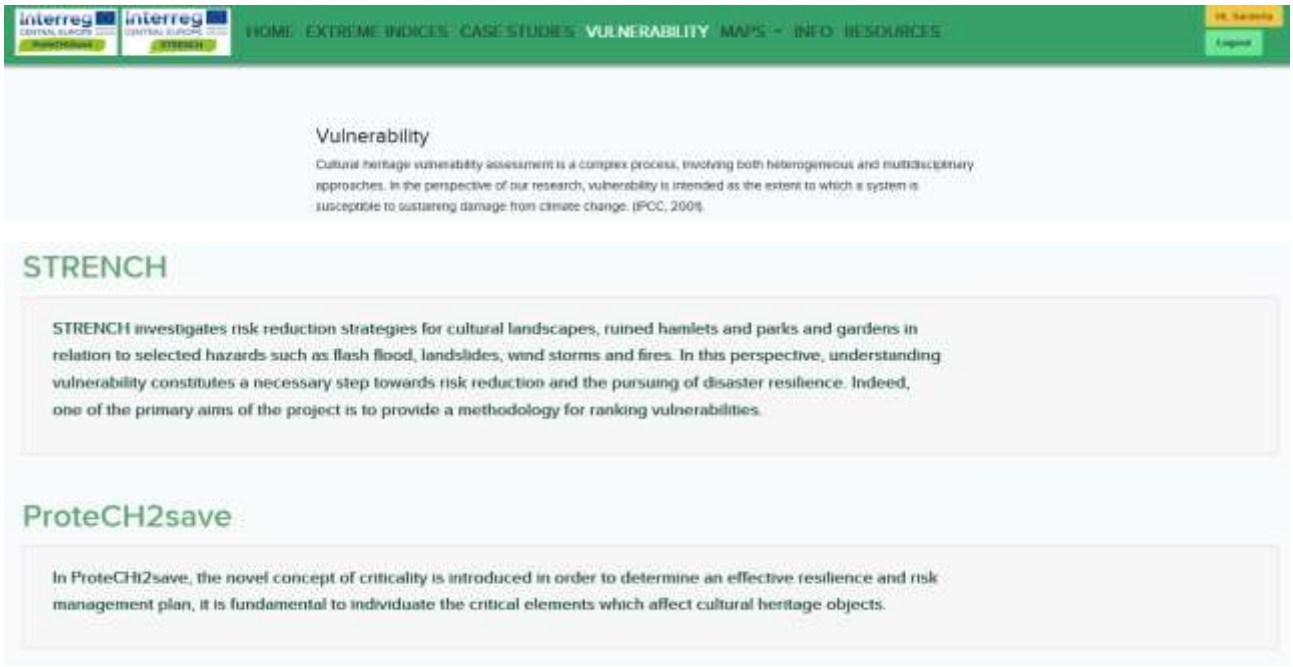


Figure 7. Extract from the Vulnerability page of the website that illustrates the two box related to the two projects.

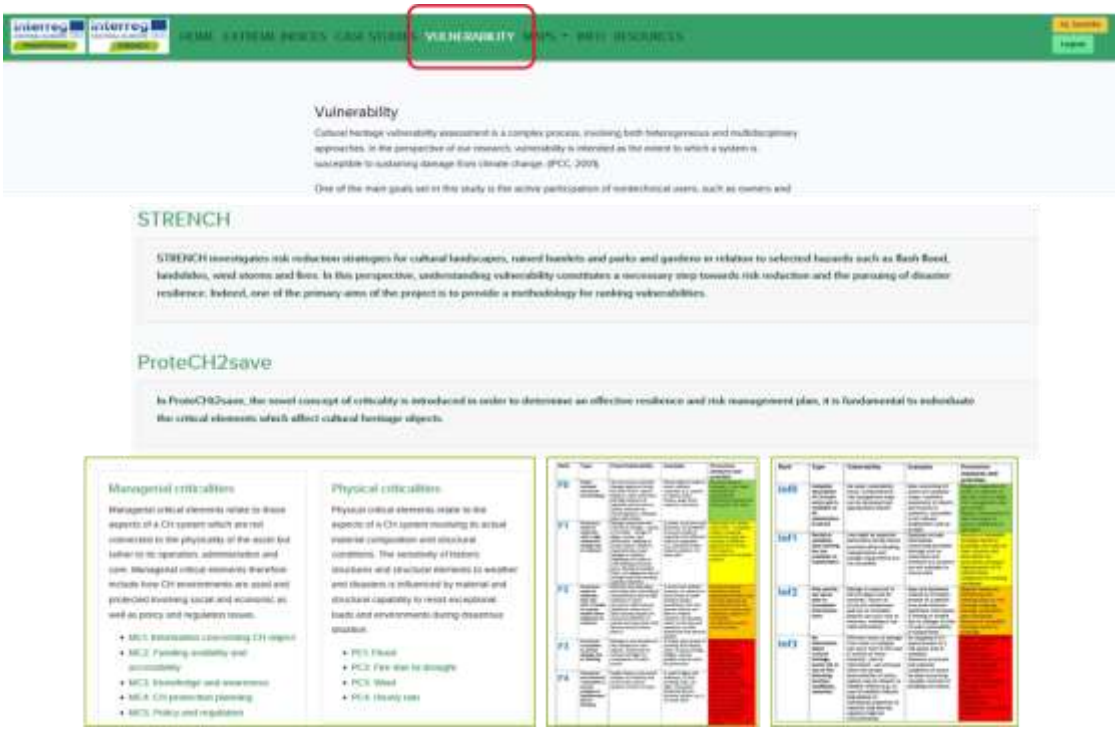


Figure 8. Extract from the ProteCHt2save methodology for the ranking of vulnerability

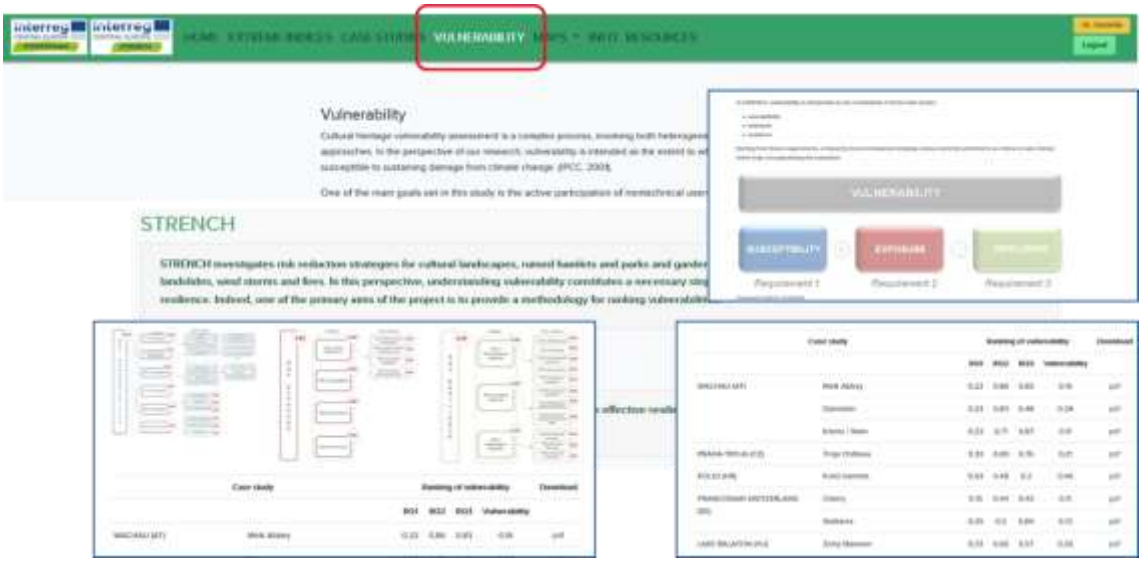


Figure 8. Extract from the STRENCH methodology for the ranking of vulnerability

2.6. Maps

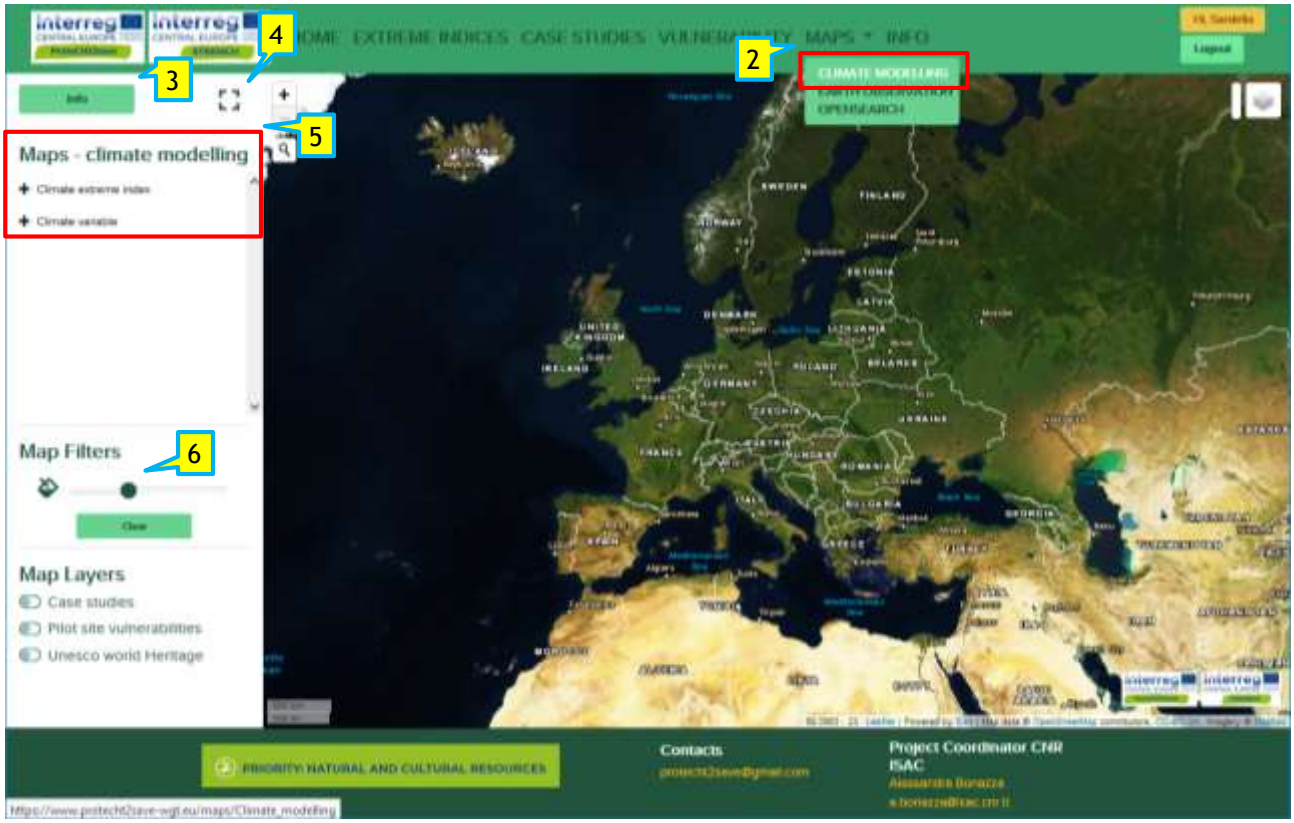
The tools created to visualize and download climate maps, time series and data, are included in the "MAPS" page 1.

1 Tab for the selection the tool in the "MAPS" menu: Climate modelling, Hearth observation and Open search.

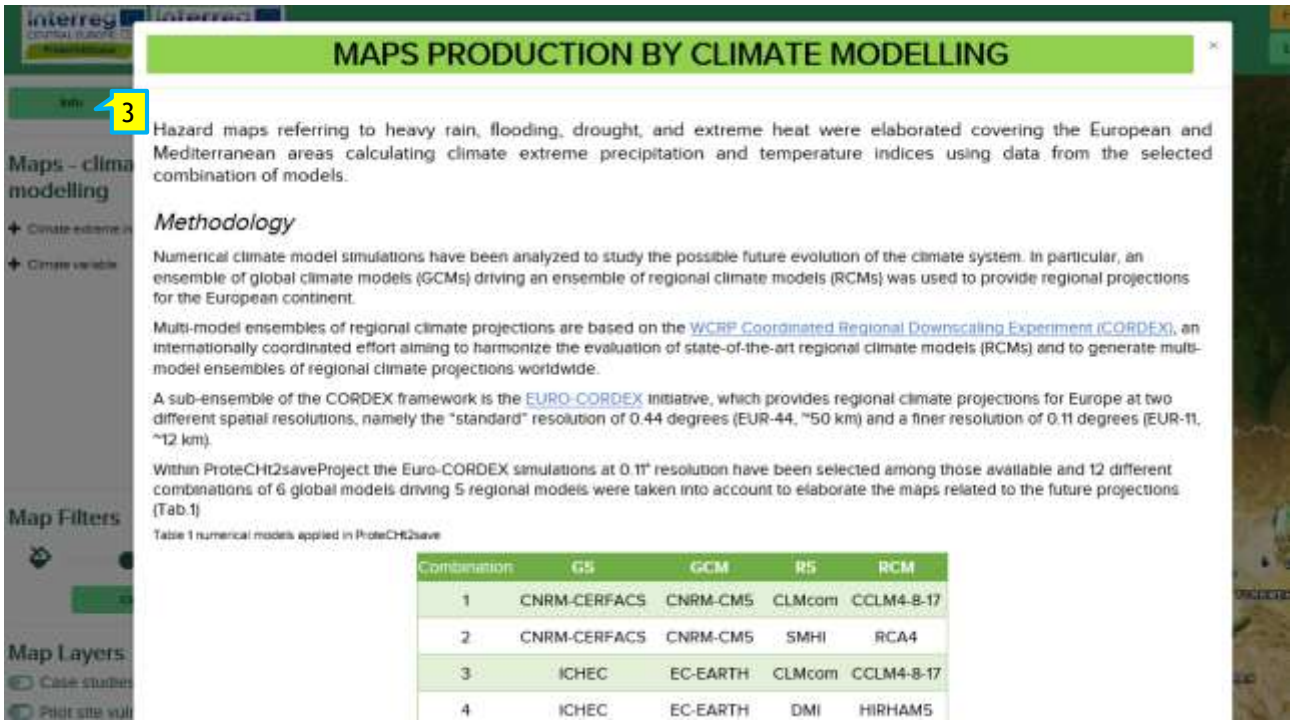
2.6.1. Climate modelling

Map setting box

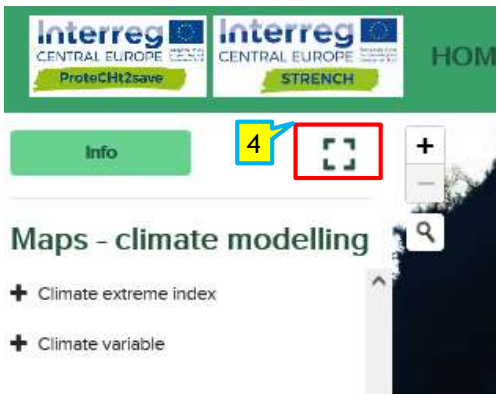
2 Select CLIMATE MODELLING in the MAPS menu in order to open the corresponding maps tool.

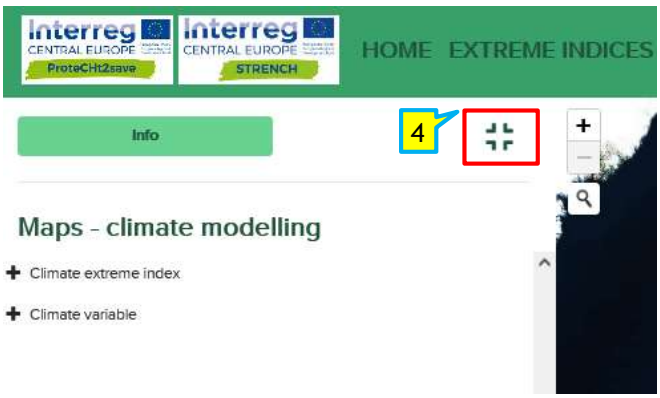


3 First. Click the " Info " button for more detail about Methodology applied. **This step is mandatory before to continue to set the option for the creation of the climate maps.**



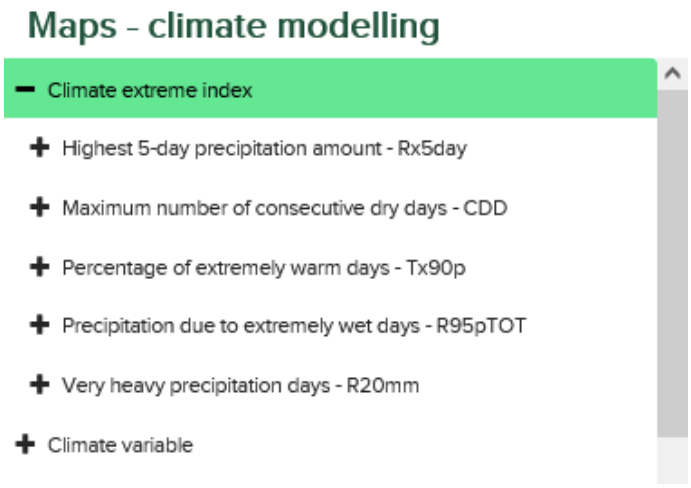
4 Click to enlarge or narrow the width of the setting box.



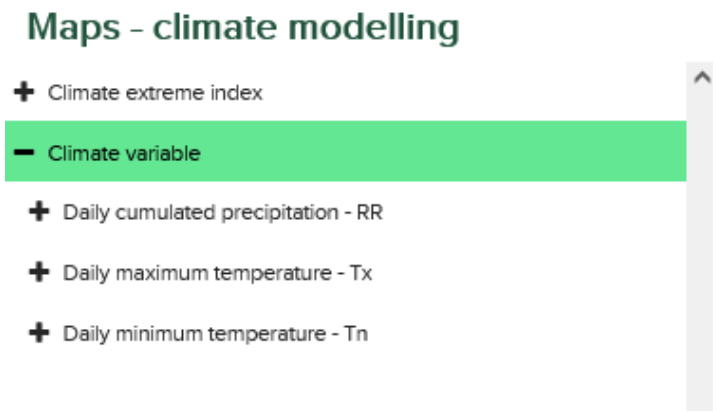


5 Climate index/variable setting option for maps – climate modelling. Click on ✚ at the left to open and visualize the list of the Climate extreme indices and Climate variables present in this map tool.

List of the 5 climate extreme indices elaborated:

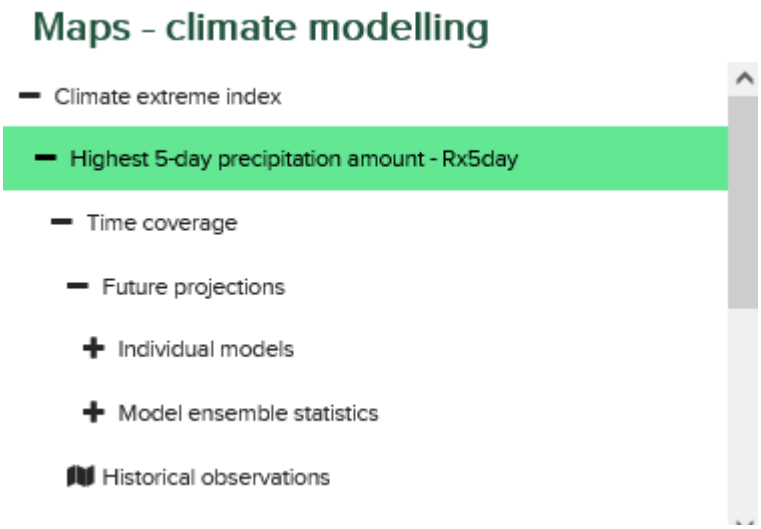


List of the 3 climate variables elaborated:



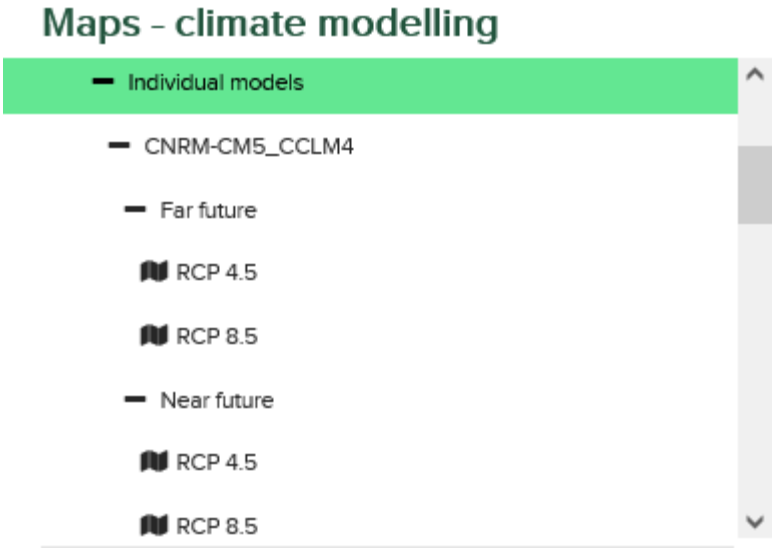
Climate extreme index includes 5 indices. Clicking on + of a climate extreme index or variable of interest and listed in this box (index in green in this example) further setting option will be available. First of all the **"Time coverage"**: **"Future projections"** and **"Historical observations"**.

Map for Historical observation is immediately available clicking on Historical observations :

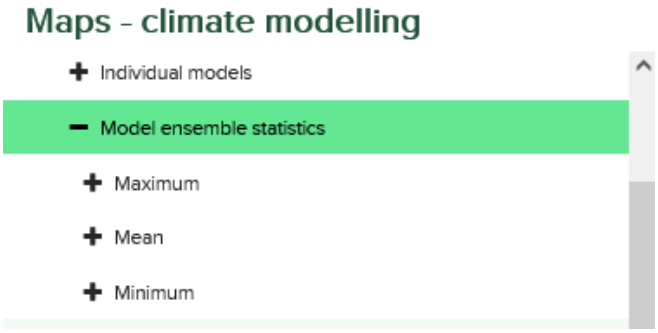


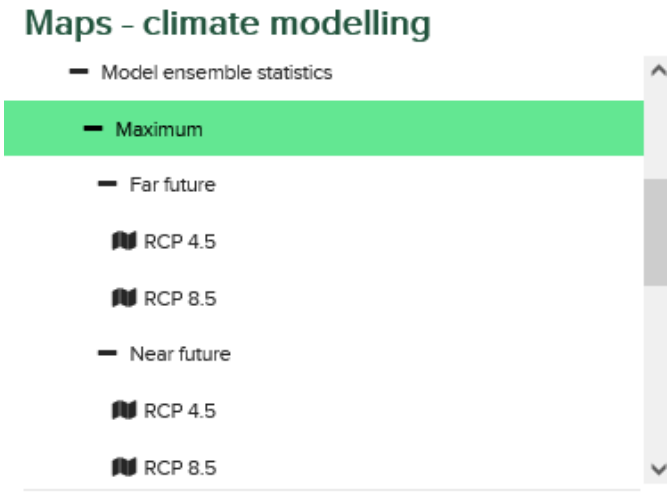
Considering the "**Future projections**" it is possible to select between "**Individual models**" and "**Model ensemble statics**" (click "**INFO**" button 3 for detailed information on both the combination of the individual models elaborated and the model ensemble statistics).

Clicking on + of "**Individual models**" a list of the 12 model combination is provided. Selecting only one of them and clicking on + at the left of the name (e.g. CNRM-CM5_CCLM4) other two option are available: "**Near future**" and "**Far future**". For each of them two maps are plotted and immediately available clicking respectively on RCP 4.5 and RCP 8.5 .

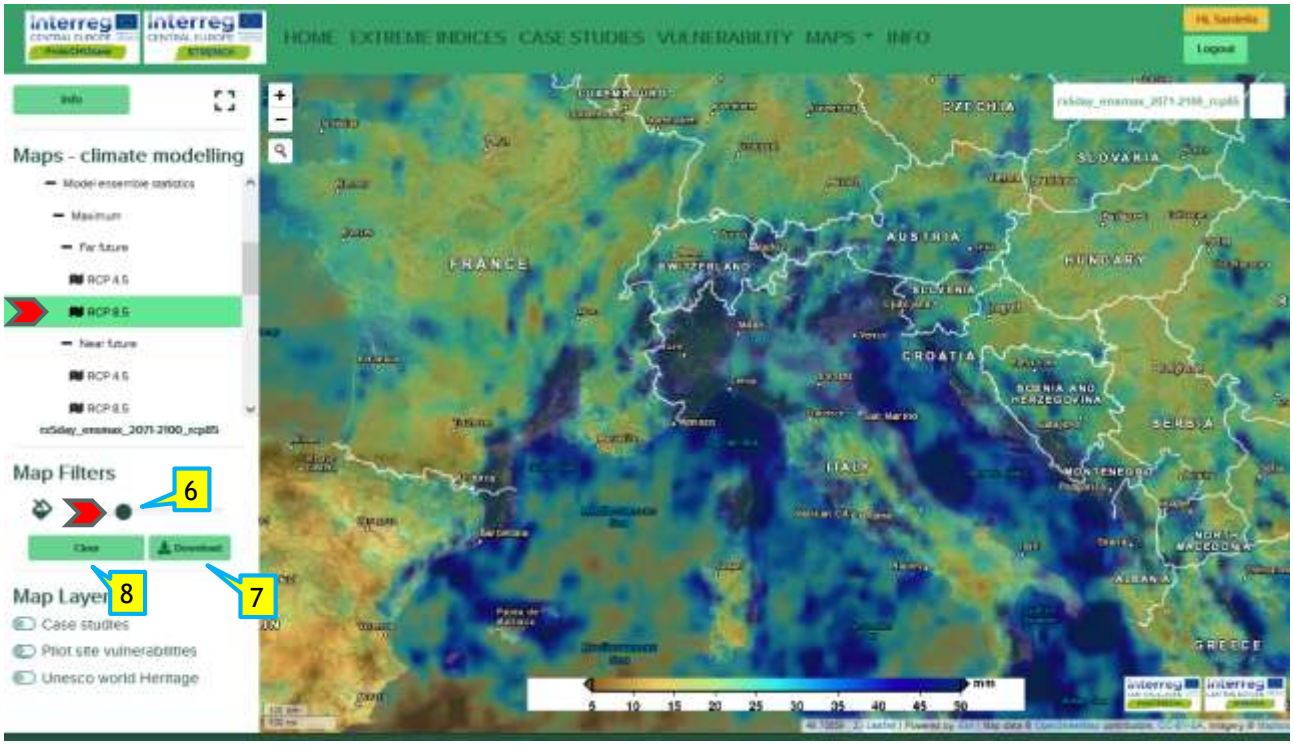


Also in the case of "**Model ensemble statistics**", maps for "Near future" and "Far future" under two RCPs scenario (4.5 and 8.5) are available and elaborated for 3 different ensemble statistics: "Maximum", "Mean" and "Minimum".





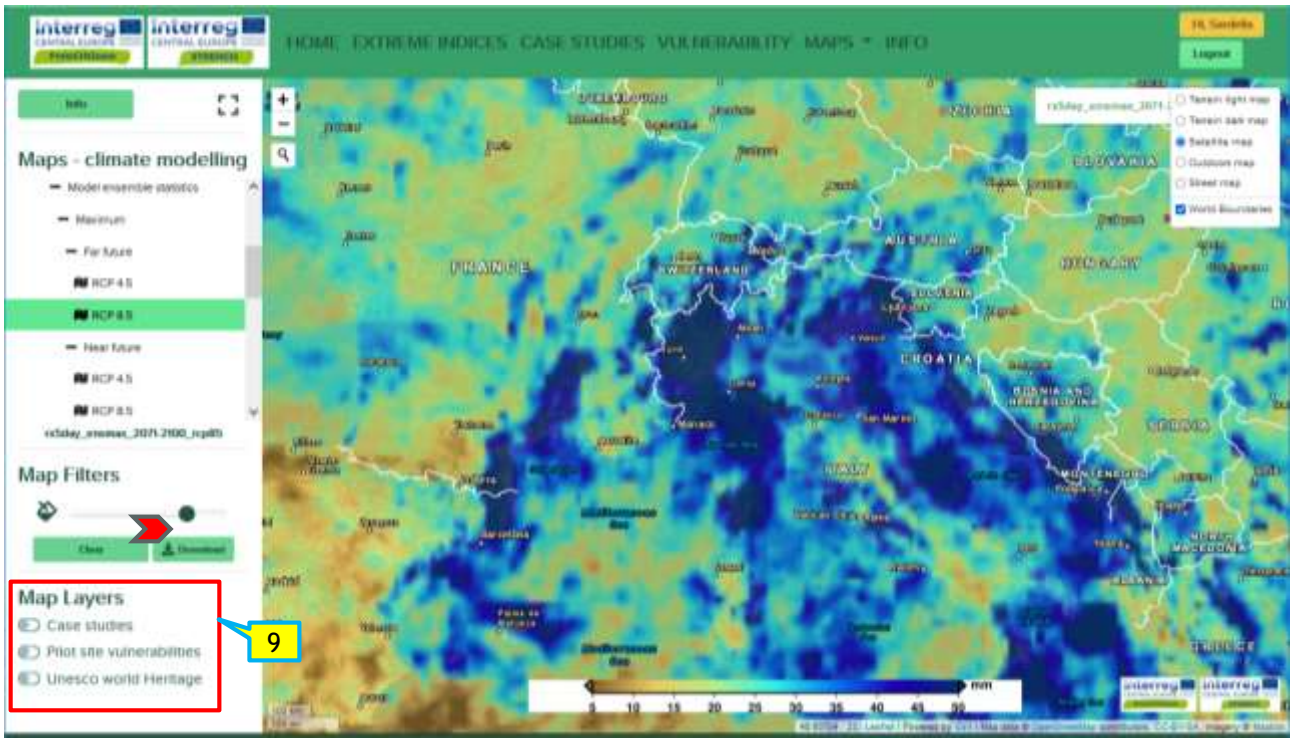
As the final step of the selection, for both climate extreme index and variable, clicking on each RCPs with the symbol RCP it is possible to create the related map, as follows:



The figure represents an example of a map created by selecting RCP 8.5 in the **"Far future"** for **"Maximum"** of **"Model ensemble statistics"** related to **"Rx5day"** extreme index.

After that the map has been visualized on the screen:

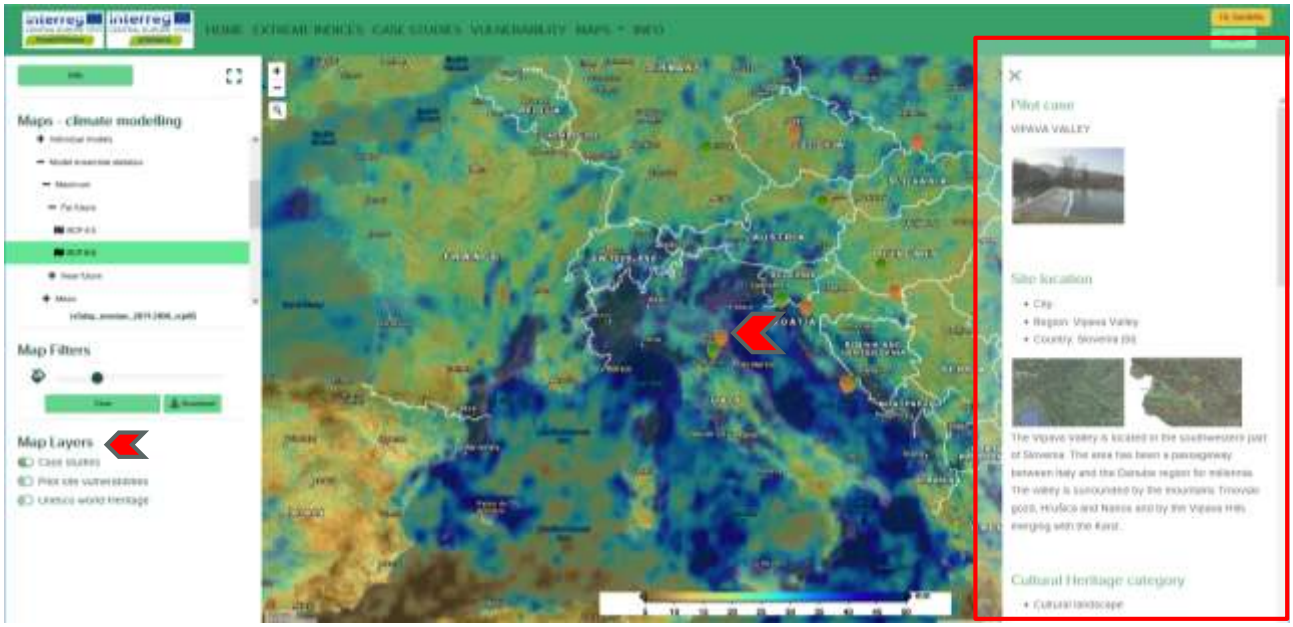
6 Move the green dot of the Map filters option in order to change the transparency of the map colours



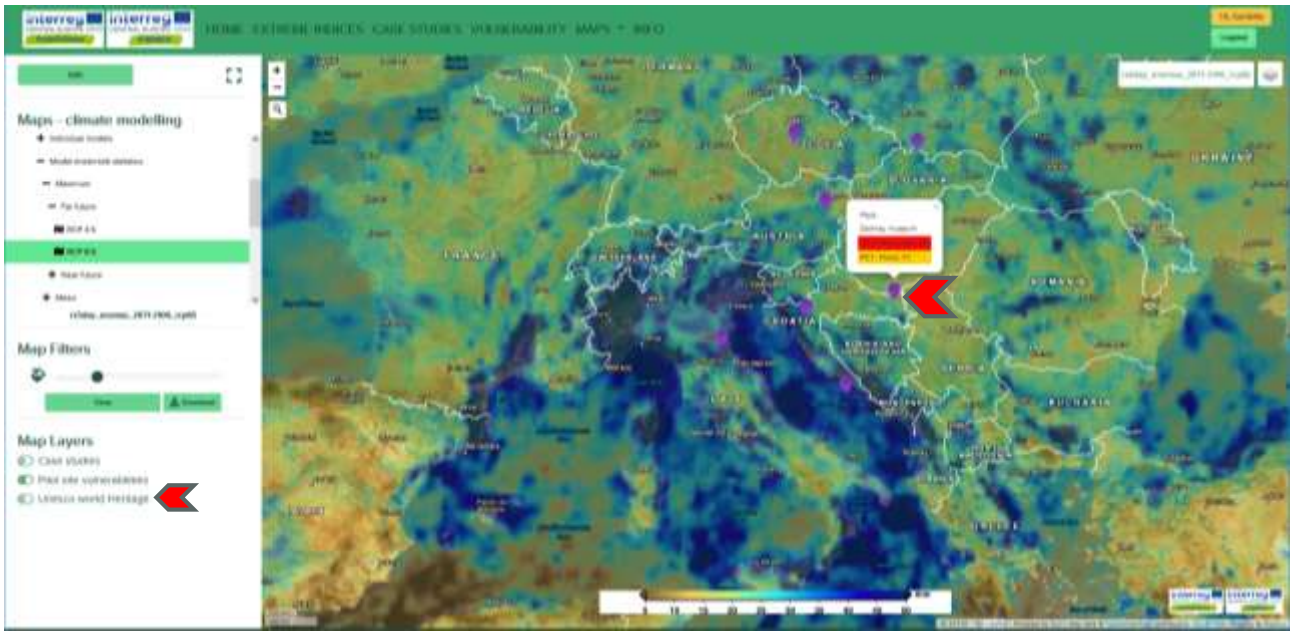
7 Click to download the visualized map.

8 Click “Clear” button to reset both setting box and map window.

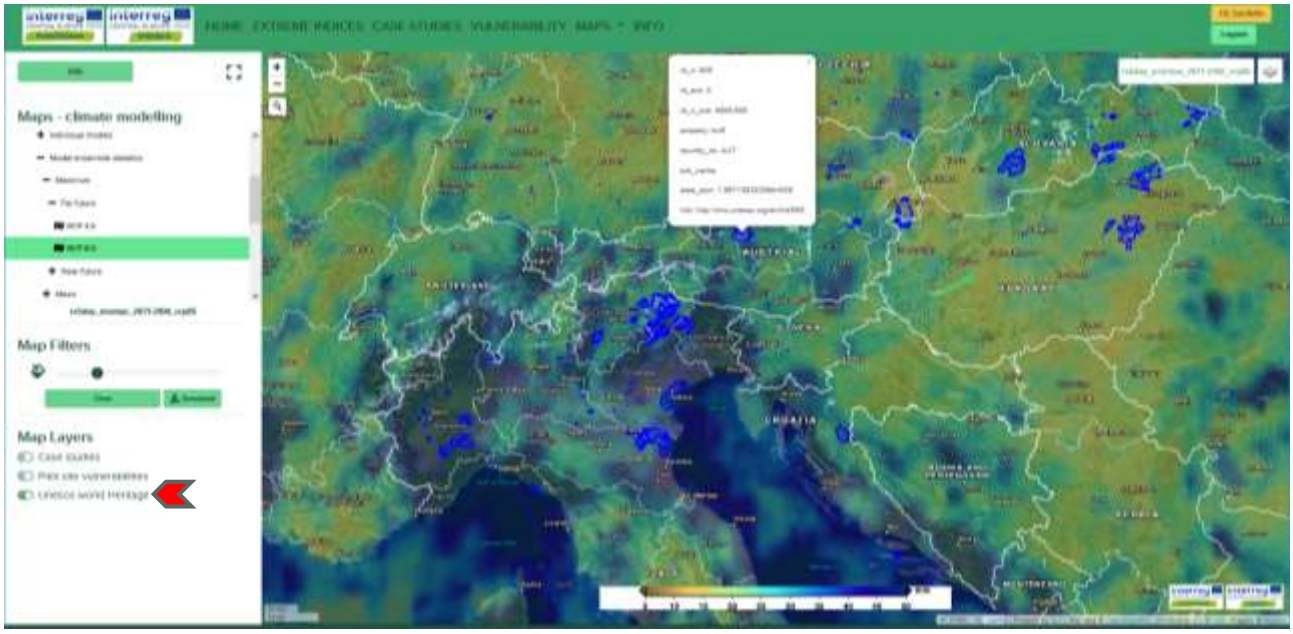
9 In the Map Layers box it is possible to switch on and off supplementary layers containing detailed information on the project case study and their vulnerability and a layer related to the distribution of UNESCO World Heritage Sites (data from JPI-CH PROTHEGO Project).



Switch on the Case studies layer. Clicking on the icons in the visualized map a card with detailed information on the case studies selected will be displayed on a new box on the right of the map



Switch on the Pilot site vulnerabilities layers. Clicking on the icons in the visualized map information related to the vulnerability of the pilot sites will be provided.



Switch on the UNESCO World Heritage layer to visualize on the map the boundaries of the World Heritage Sites.

Map Visualization window

10 Zoom in/out.

11 Search for place or addresses (search is available only for the map boundary within the window).

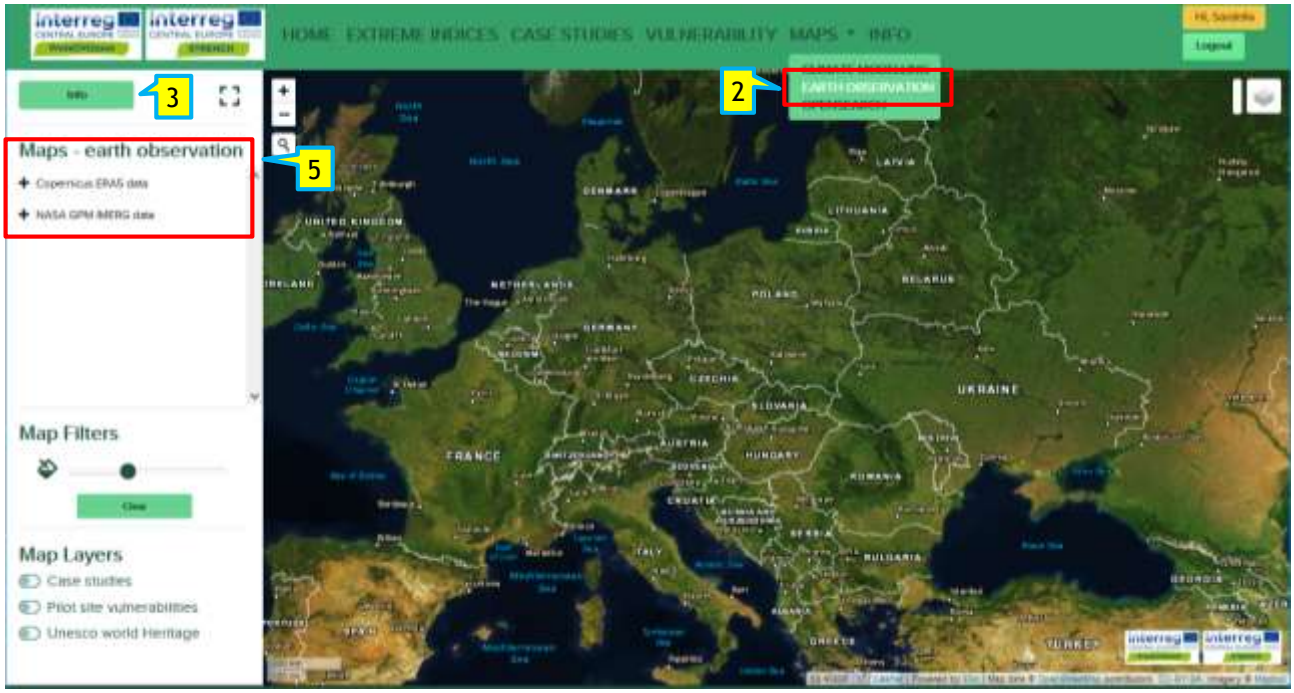
12 Name of the map produced.

13 Visualization option to change the base map.

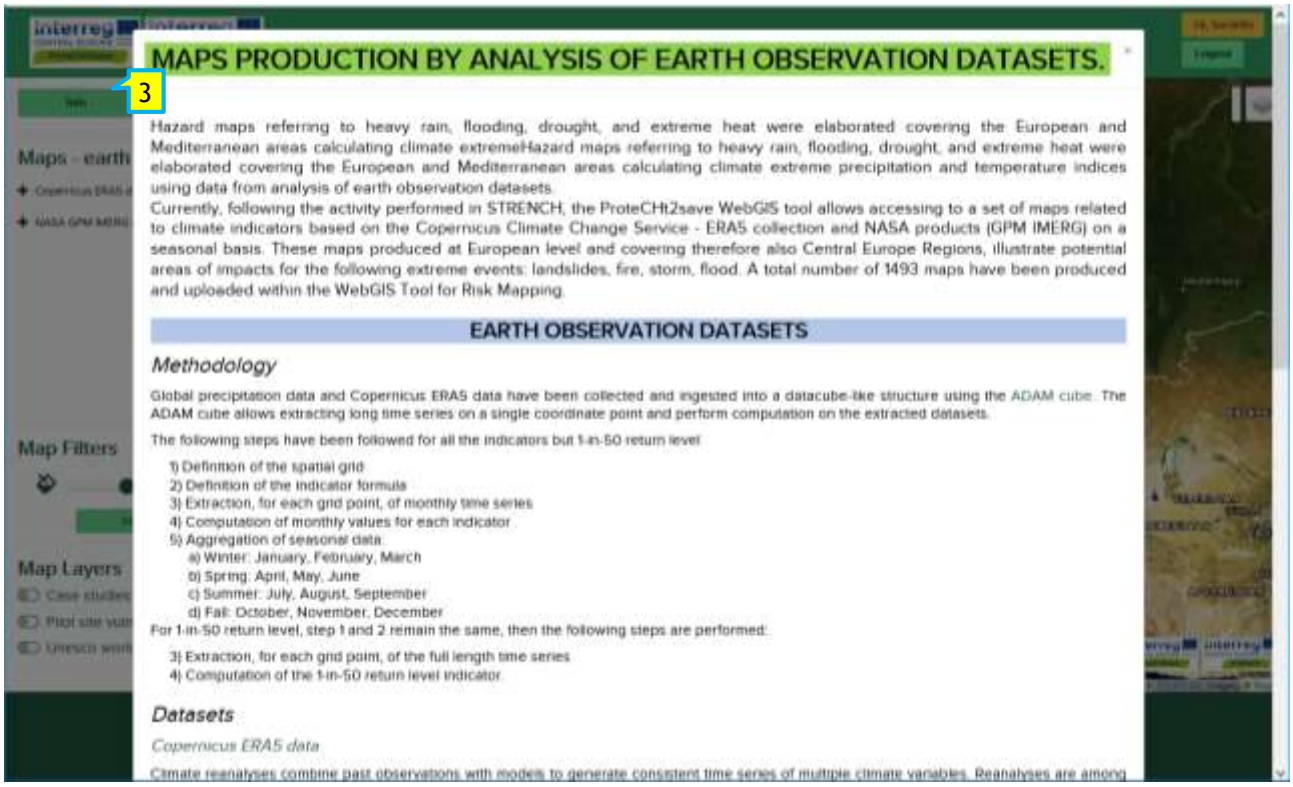
2.6.2. Earth Observation

Map setting box

2 Select EARTH OBSERVATION in the MAPS menu in order to open the corresponding maps tool.

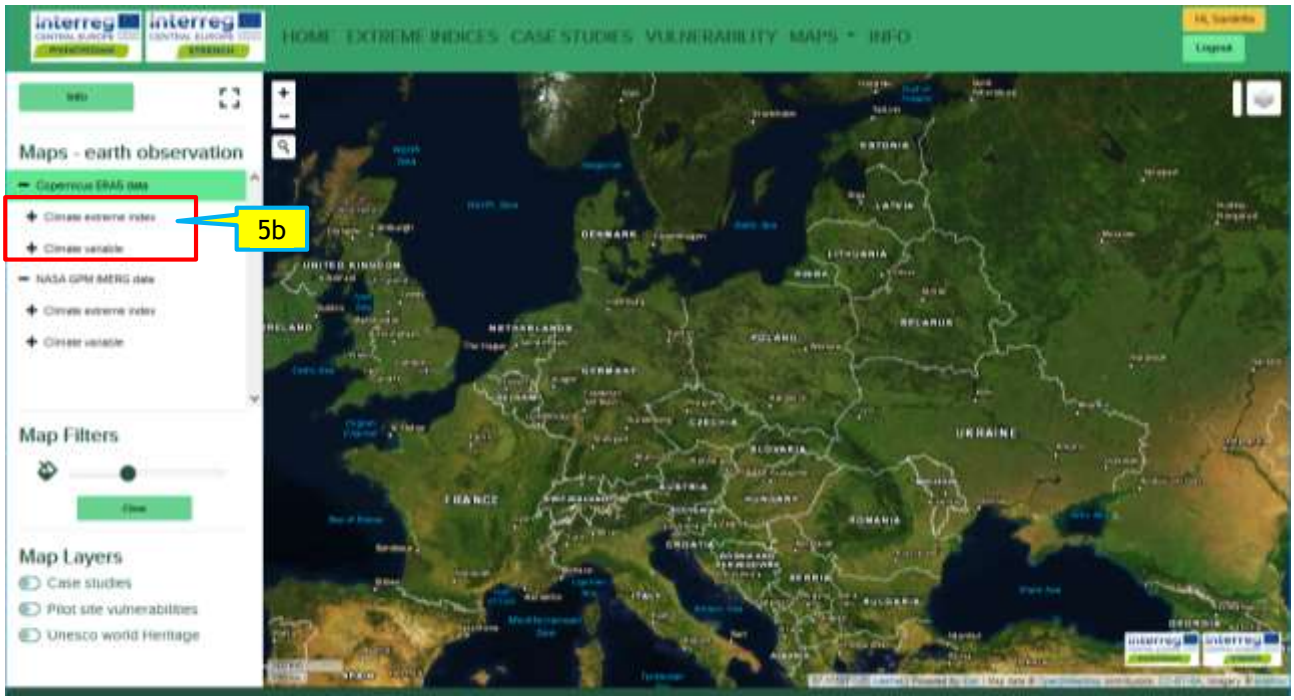


3 First. Click the " Info " button for more detail about Methodology applied. **This step is mandatory before to continue to set the option for the creation of the climate maps.**

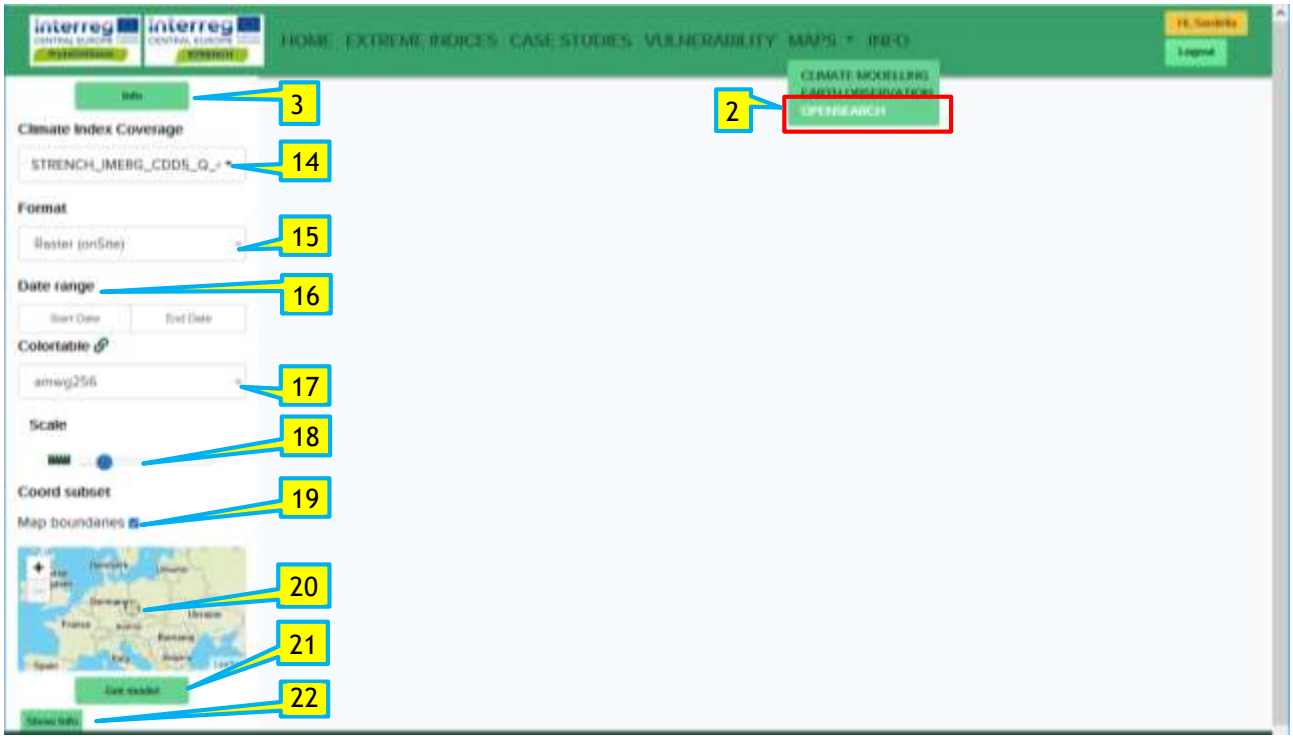


5 Setting box related to the selected map tool. In this box it possible to explore and visualize map related to the different earth observation dataset used to climate index calculation selecting between Copernicus ERA5 or NASA GPM IMERG. See more detail clicking on the info button 3.

5b Click ✚ to visualize the list of the Climate extreme indices and Climate variables related to the selected dataset. The procedure for maps visualization is similar to the one explained climate modelling action.

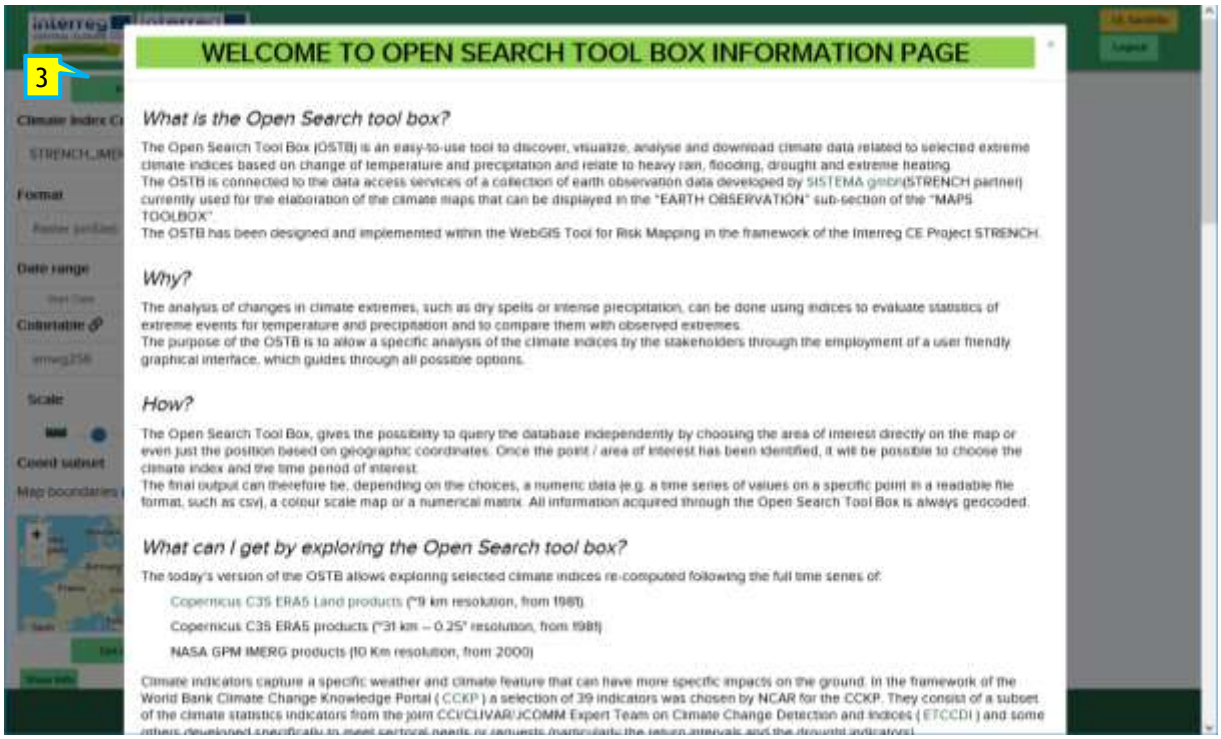


2.6.3. Open search



2 Select OPEN SEARCH in the MAPS menu in order to open the corresponding maps tool.

3 First. Click the " Info " button for more detail about Methodology applied. **This step is mandatory before to continue to set the option for the creation of the climate maps.**

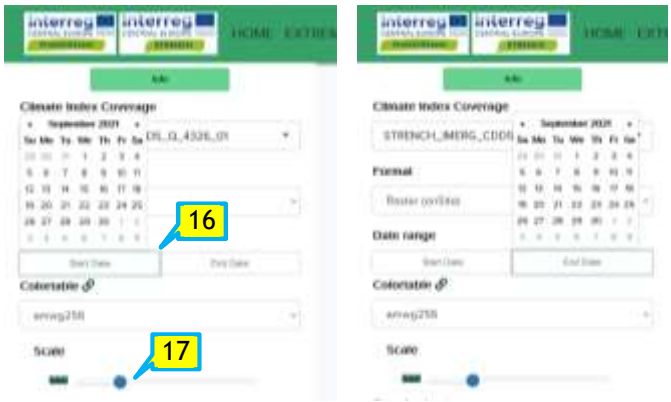


14 Select to choose the climate index, listed based on earth observation datasets IMERG – ERA5 – ERA5LAND (see INFO button for details).

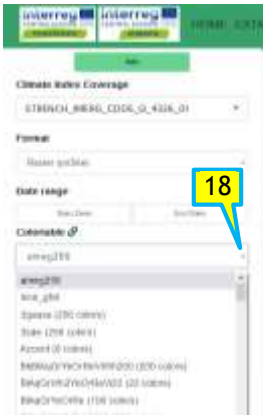
15 Select to choose the format of the outputs:

- **Geotiff** (only download) – This option allows to download the file of the data related to the visualized map in the preview window at the right of the screen. Data are downloaded in geotiff format and can be opened and managed with any GIS application.
- **Raster** (only map view – onSite) – Selecting this option, the map related to selected options done in the points 14, 16, 17, 18, 19 and 20 will be visualized in the preview window at the right of the screen. The width of the map displayed will match with the one present in the map box (once flagging to activate the map boundaries, point 19).
- **Timeseries** (graph – view onsite and download data) – This option allows to visualize and download related data of the timeseries after selecting options in the points 14, 16, and 21. Visualized and downloaded data refer only to the values present in the location defined by the pointer in the map (point 21) or by wrote the name of the location (point 22).
- **Application/tar** (only download) – Selecting this option it will be downloaded the entire set of data related to the visualized map in the preview window at the right of the screen. Data will download in tar format, can be opened and managed with any decompression program and subsequent managed with any GIS application.

16 Select Start Date and end End Date to identify the data range



17 Moving the dot in the scale bar it is possible to modify the resolution of the visualized map.



18 To change the colour table (only for raster view).

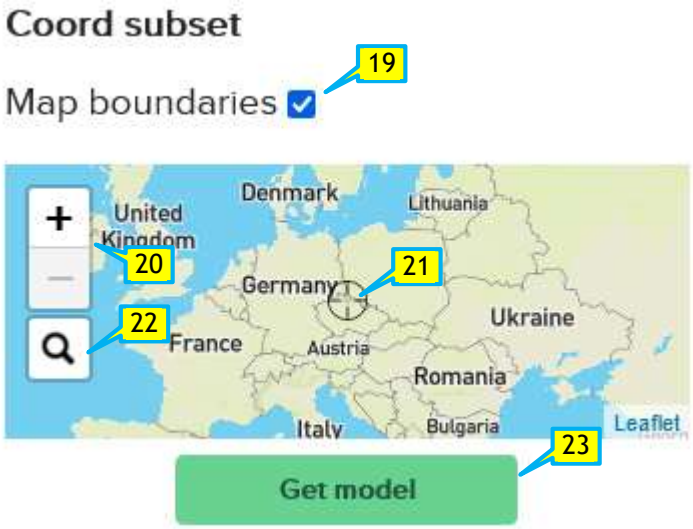
19 Flag to activate the map boundaries in order to ensure visualization/download of map/data relative to the map extension shown in the box. Without flag Map boundaries, global data will be downloaded/visualized.

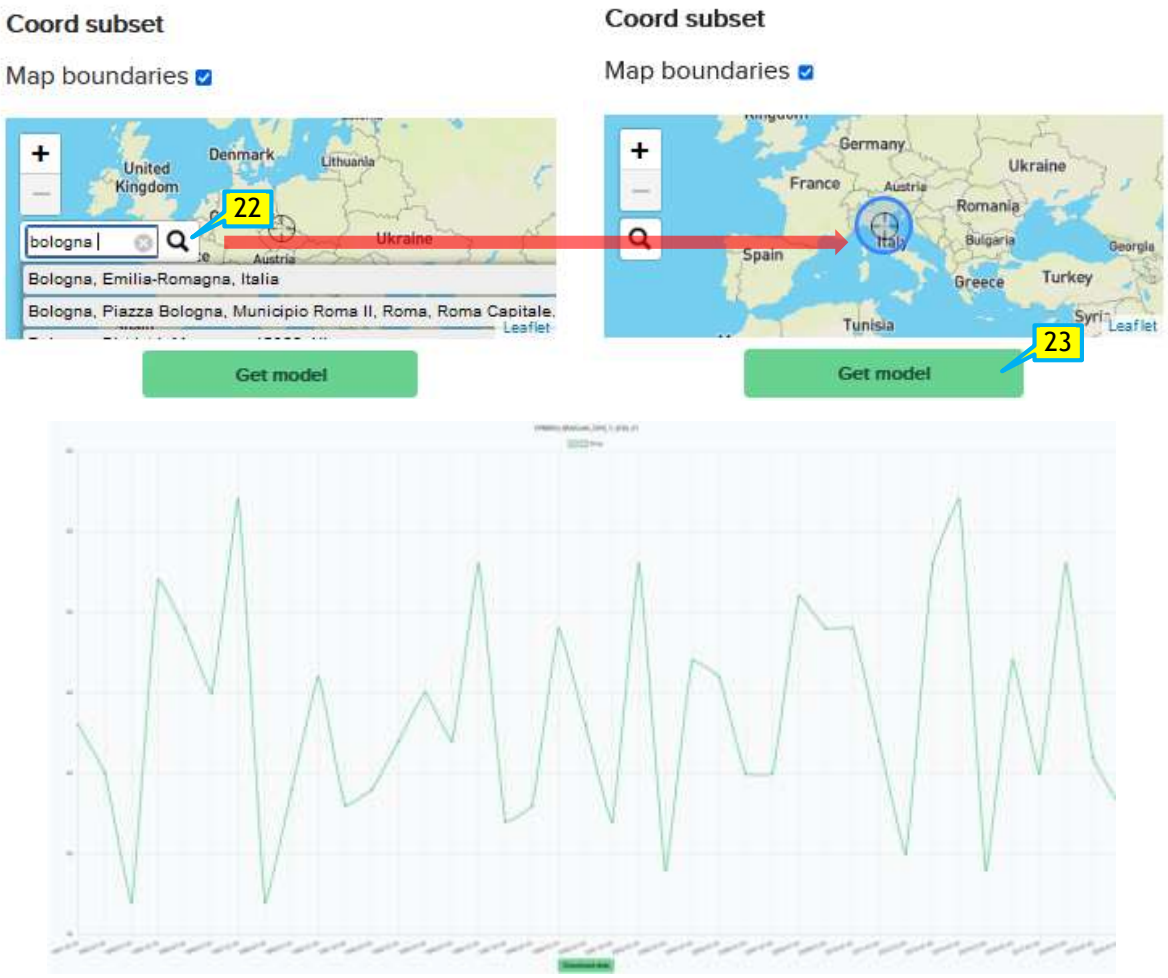
20 Zoom in, zoom out

21 Centre of the map box. Move the map to place the centre on the point of interest for the Time series elaboration

22 Search tool – select to write the name of the location of interest for the time series production.

23 At the end, click on Get model to visualize





Example of time series of the climate index CWD (ERA5 Land, Yearly assemblage, entire dataset) related to the city of Bologna using selection from (14), (15), (16), (22) and finally (23)

3. Methodological Approach to work with the Risk Mapping Tool for Cultural Heritage Protection