MapX

UNEP/GRID-Geneva

Oct 22, 2024

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This document details MapX, an open-source web application designed for managing and visualizing geospatial data, developed by UNEP/GRID-Geneva.

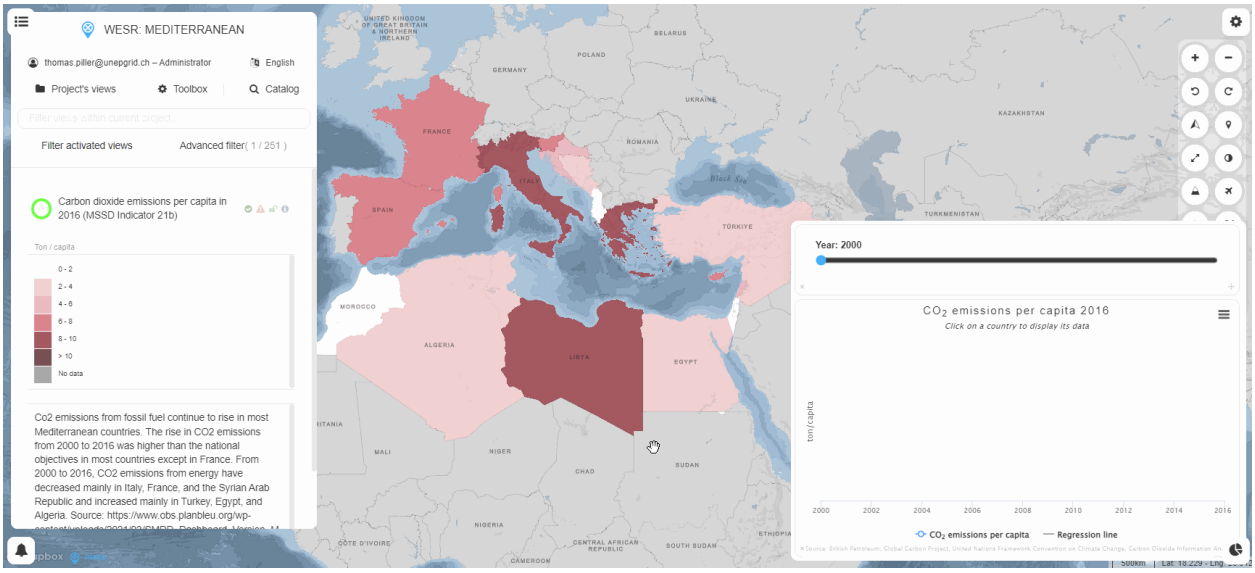


Fig. 1: MapX allows to visualize the temporal evolution of cartographic and statistical data.

Although, the content has been prepared and reviewed with utmost care by the authors, errors may still exist. As such, UNEP/GRID-Geneva and the authors disclaim any responsibility or liability for errors and their potential impact.

We welcome any feedback regarding inaccuracies you may encounter and encourage you to contact us at info@mapx.org.

The documentation features both internal and external links: internal links guide you within the document, whereas external links lead to web addresses that may not be associated with UNEP/GRID-Geneva.

Tip

To open links in new tabs, the following shortcuts can be used:

- Windows and Linux: `CTRL` + click
- MacOS: `Command` + click

The documentation source code is available on GitHub, as well as in HTML and PDF formats at https://docs.mapx.org.

We wish you an excellent reading!

The MapX team

Note

To ensure optimal performance, we suggest using the latest version of a Chromium-based browser and disabling any browser extensions when accessing MapX. For instance, ad-blockers may interfere with the loading of external content, such as data, images, and videos.

CHAPTER

ONE

INTRODUCTION

MapX is an open-source online application for managing and visualizing geospatial data on natural resources, developed by UNEP/GRID-Geneva, a data centre resulting from the partnership between UN Environment Programme (UNEP), the Swiss Federal Office for the Environment, and the University of Geneva. Field applications of MapX are varied and include biodiversity planning, chemicals management, climate change, disaster risk reduction, environmental security, extractive industries, land use planning, and renewable energy, but they are not limited to these topics. MapX targets a wide community of users that are primarily UNEP, the Secretariats of Multilateral Environmental Agreements (MEAs) and other UN agencies mandated to collect and use geospatial data in environmental decision making. Civil society groups, non-governmental organizations, academia and citizens complement this set of users. MapX was designed in 2014 and since then continuously improved with wide international stakeholder consultations.

1.1 MapX highlights

- Most of MapX content (tools or data) is publicly available without the need to register in the application.
- As of October 1, 2024, more than 1,900 public data layers have been published in MapX.
- It is currently available in all the UN's six official languages (Arabic, Chinese, English, French, Russian, Spanish) and in German, Bengali, Dari/Persian and Pashto.
- No programming capacity is required for accessing geospatial data, conducting basic data analysis, and building story maps.
- MapX has been optimized for low Internet bandwidths and connectivity.
- MapX has been developed following interoperability standards.
- A Software Development Kit (SDK) has been developed to ease the integration of MapX into a webpage and to allow user interface customization.
- The source code is provided under GPLv3 license.

1.2 MapX key concepts

1.2.1 Projects

MapX offers dedicated environments (projects) where users can find specific maps, statistic data and/or story maps (views). Each project contains a set of views that have a common topic, or that are relevant for the institution/organization that manages the project or that cover a specific geographical area.

Projects are managed independently of each other either by the MapX team or by its partners. They can be opened to the public to reach a large audience or set to "private mode" so that only its members can access it. Being a member of a project allows access to content and features that are not available to public users. Every registered user in MapX can make a request to the administrators of a project to join it as a member (only possible if the option has been activated by the administrators).

1.2.2 Roles

MapX has four types of roles which are incremental:

- Public
- Member
- Publisher
- Administrator

User rights (roles) are configured per project and will define their degree of freedom in each project. For example, a user can have a public role in a project X while being a member in a project Y and an administrator in a project Z at the same time.

Public

Public is the default role users have in MapX when they are unlogged or when they are not granted a specific role in a project. This role offers basic rights over the content of a project:

- visualization of content published without restrictions (i.e., maps, attribute tables, dashboards, story maps)
- creation and export of static maps
- approximate overlap analyses of views
- draw new geometries on map and export them
- download spatial data (requires to be logged in)

Member

Members of a project can access non-public content and can be granted the right to edit a specific view in this project.

Publisher

Publishers have the ability to add in the MapX database new data to the project (only vector data) and create content such as maps and story maps. They can be granted the right to edit and/or delete content in the project and can also grant the edit rights over a view to a specific member.

Administrator

Administrators are in charge of managing the project and user rights. In particular, they can edit the preferences of the project (title, description, country/ies to which the project is associated, theme, projection), can invite new members to the project, change the roles of specific users, accept or deny requests of membership, set the project public/private, define if the project accepts membership requests from external users, define the default organization of the views in the views panel, and can delete the project.

1.2.3 Special roles

MapX has two type of special roles which are configured per instance (i.e., valid in all projects):

- Superuser
- Developer

Superuser

Superusers have access to advanced MapX features to manage the application and its content. For security and confidentiality reasons only MapX instance managers should have this role. For https://app.mapx.org/, superusers are the MapX development team within UNEP/GRID-Geneva.

Developer

The developer role is assigned on a case-by-case basis by the MapX team and provides access to tools for creating and editing dashboards and custom code views. This organisation ensures that only users with enough knowledge of web development are able to code content in the application and thus minimizes the chance of having content in MapX that may negatively affect the user experience.

1.2.4 Data organisation

A two levels-data management system exists in MapX: “sources” and “views”. Simply put, sources are raw spatial data stored in the MapX database while views are a cartographic representation of it. As you will see below, the concept of view can go beyond this simple definition.

The different types of views available in MapX are:

- Vector tiles **views** are used to display on the map data published in the MapX database.
- Raster **views** are based on external data services as MapX does not support raster storage.
- **Custom coded views** are fully customisable views that allow, among other things, to display data from external sources or to implement advanced features (e.g., drop-down list, slider). Advanced knowledge in web development is required to code this type of view.
- **Story maps** are communication products consisting of a mix of spatial data and other types of information (text, images, graphes, videos).
- **Local GeoJSON views** are a special type of view allowing users to visualize their vector data without having to upload it to the MapX database. The data is thus temporarily stored in the user’s browser.

CHAPTER

TWO

USER INTERFACE

MapX is a web application constituted by an interactive map where geospatial layers can be displayed, a data catalog environment, and a set of functionalities (tools) to, among other things, interrogate, interact, export the data displayed in the map.

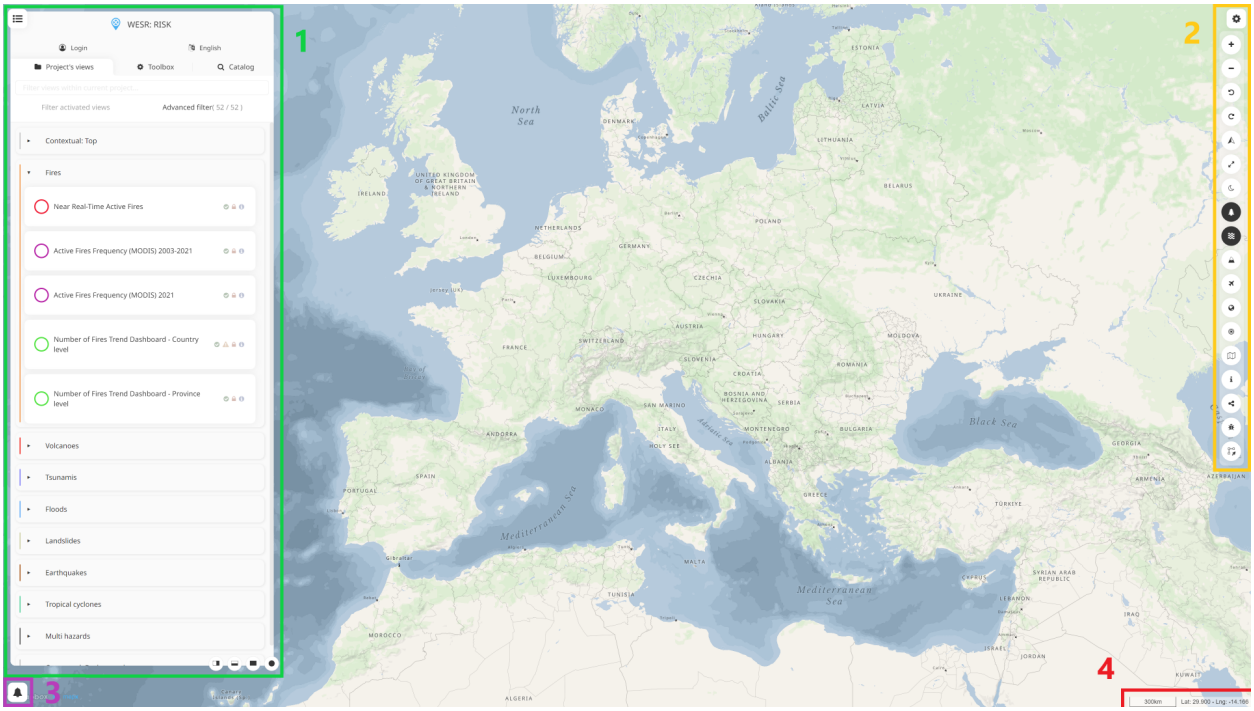


Fig. 1: MapX user interface elements

The MapX user interface is made up of 4 distinct elements which complete the interactive map and which are:

1. The **Work environment** contains several key elements of MapX: the **Data catalog** which allows users to select views to display on the map, the **Toolbox** and the **Search tool**. This environment also allows users to register in the application, select a project to explore and change the interface language.

2. The **Menu bar** contains the **Navigation buttons** that allow interaction with the map (e.g., zoom, rotation, theme, globe mode) and provides access to some of the MapX tools such as the **Map composer** or the **Sharing tool**.

3. The **Notification panel** informs users if an error has occurred in MapX. In addition, some tools (e.g., download) send information to users via the notification system.
4. The scale of the map as well as the coordinates of the pointer are displayed in this area.

> **Hint**
>
> Except for the scale and pointer coordinates, other interface elements can be hidden by clicking on the square buttons located in the corners of the application.

2.1 Work environment

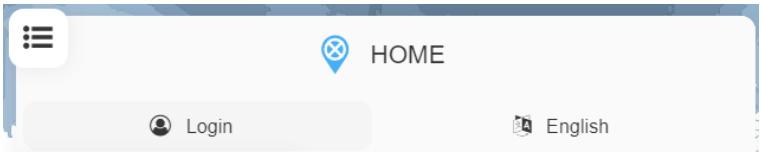


Fig. 2: Project, login and language buttons

2.1.1 Project

Each project gives access to a specific data catalog that is defined by a topic, geographic location or mission of the institution that manages the project.

By default, the "HOME" project is loaded (as in the figure above). If a user previously visited MapX within the last 30 days, the last project they consulted will be loaded. Users can change project and explore MapX content by clicking on the dedicated button (name of the current project). A panel listing all the projects to which they have access (public and private projects in which they are members) is displayed in the interface.

2.1.2 Login

No password to remember! To login in MapX, users only have to provide their email address to receive a single use password valid for 20 minutes. If after a few seconds no email from bot@mapx.org is visible in your inbox, don't forget to check your SPAM folder. By logging in MapX, users have access to additional functionalities and datasets/content according to their privileges in the different projects.

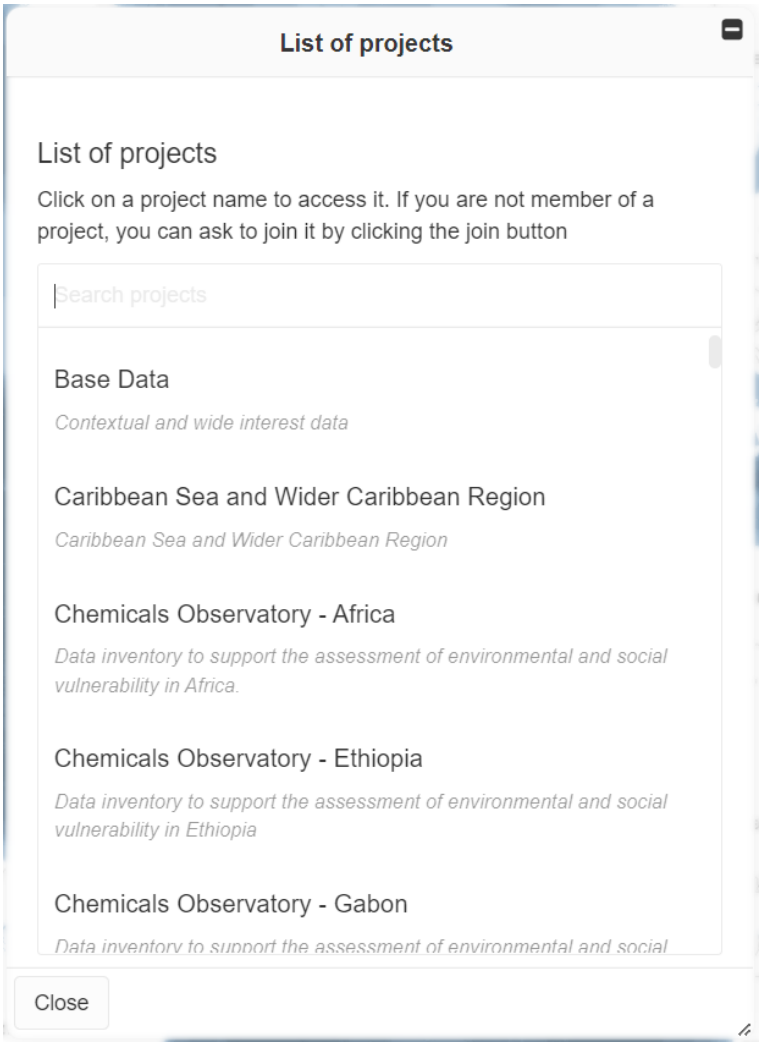


Fig. 3: List of projects available to the user

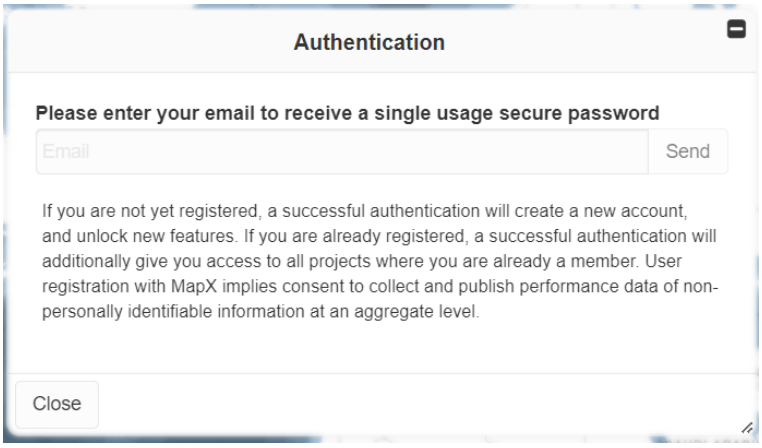


Fig. 4: Login panel

2.1.3 Language of the interface

The MapX user interface is currently available in all the UN's six official languages (Arabic, Chinese, English, French, Russian, Spanish) and in German, Bengali, Dari/Persian and Pashto. It can be changed simply by clicking on the dedicated button. Note that only the interface is translated into these languages. The data itself remains in the language provided by the publishers.

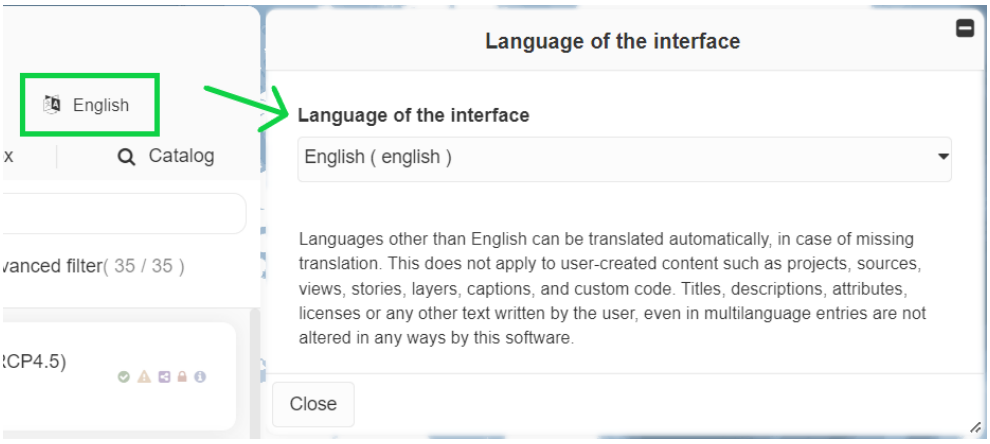


Fig. 5: Language panel

2.1.4 Data catalog

In a project, the data catalog is available in the **Project's views** tab. The list of views in the data catalog depends on the user's role in the project. Each of these views can be consulted by clicking either on its title or on the colored circle next to the title. This action will display the geospatial layer on the map and will expose data specific functionalities and settings to the users. Views in catalog can be filtered by keyword(s) or using one of the available filters under **Advanced filter**.

Filtering views

Users can filter views that are available on the list through keyword(s). The process can be performed by typing manually the keyword(s) in the text field below the name of the project. The keywords are searched in title and abstract of all available views for the selected project and on the metadata of the source layers from which the views were generated. Views can also be filtered by types, features and/or rights from the **Advanced filter** module. Multiple selection is allowed and can be managed in two different ways depending on the user's choice at the bottom of the module: 1) "Intersection" (default) or 2) "Union". The first option displays views that satisfy all parameters while the second results in a larger list of views, where displayed views are those that satisfy at least one parameter. Finally, views can be filtered according to their status (active on map or not).

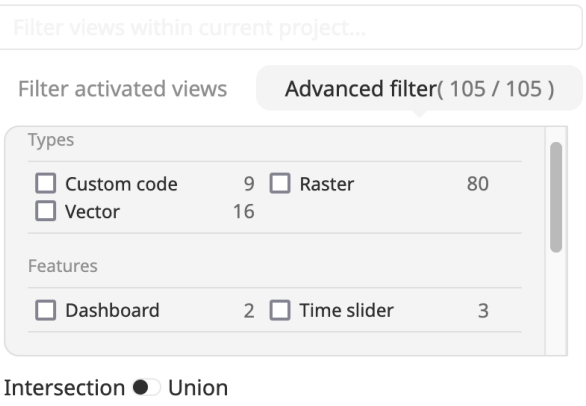


Fig. 6: Advanced filter module

Sorting views

The order of the views in the views' panel can be customized by each user with a simple dragging action operated on the title of the view or by using predefined alphabetic and date sorting methods. Furthermore, each user can customize the appearance of its panel by grouping views into user-made "categories" that can be seen as containers for views that cover the same topic (i.e., "contextual layers" vs "biodiversity") or share any similarity.

The category-dedicated module is the environment that offers the possibility to create new categories, rename them and change their identity color within the views panel. The module can be accessed by right clicking on the views panel or, directly, on a view. If a new category is created after a right click on a view, the view is automatically added to the new category. Otherwise, the new category will be empty. Views can be inserted to and removed from each category by dragging them across the panel. Users can create as many categories and sub-categories as needed and move views as they please within the panel of a project. The category module also offers two sorting methods for views: by alphabetic order and by date. The action applies to the content of a category. If no category exists, the sorting will affect the whole catalog.

Users can save their data catalog organization in their web browser without affecting the way other users experience the project by clicking on "Save this state locally" in the categories' module. Please mind the fact that using a different browser or clearing the cache from your browser will reset the organization of all projects in their original state. The original state is the organization of the views panel as it is defined by the administrator of the project (i.e., the best way to explore its content). This action can also be accomplished voluntarily by clicking on the option "Reset original state" from the categories' module. Users should not forget to click "Save this state locally" after loading the original state or after any modification of the organization.

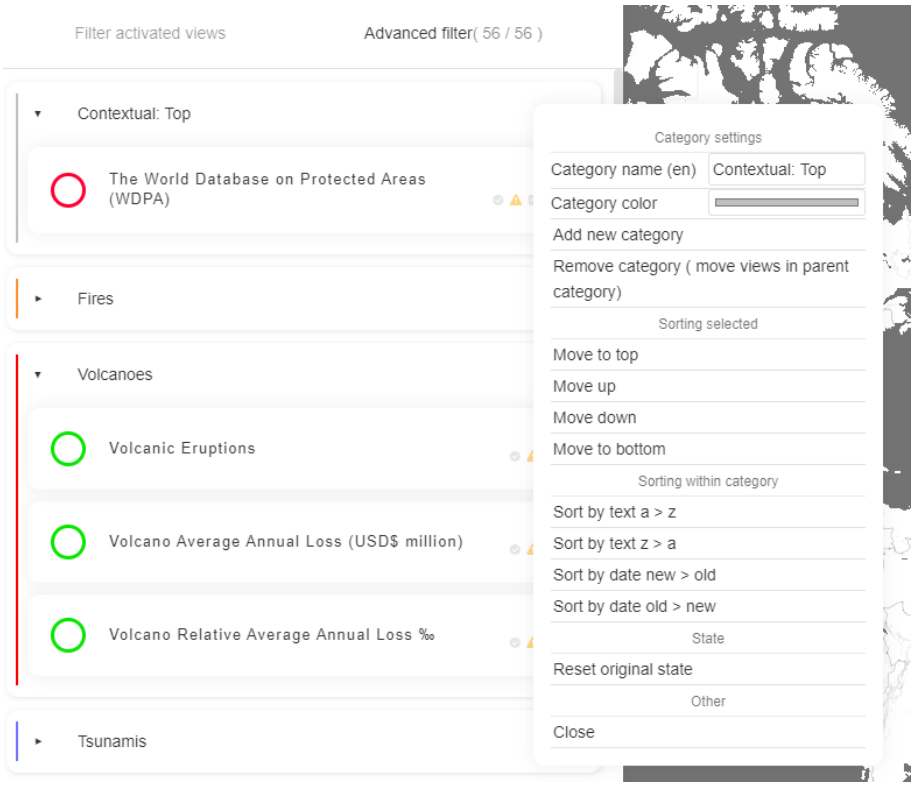


Fig. 7: Categories' module

2.2 Toolbox (basics)

The toolbox offers users a series of tools for creating and editing content in MapX, managing projects and members, and perform some basic analysis on their data. Depending on the user's role in the project, the list of available tools varies. The tools presented in this section are those available to users with a public role. Advanced tools are presented and described in the *Advanced tools* chapter.

2.2.1 Spotlight tool

The **Spotlight** tool enables users to identify areas where several layers overlap. The tool draws a highlight over the overlapping data on map and shadows the rest of the data. The tool only accepts vector tiles views as input data, but it is fully responsive to any change to the data displayed on map through filtering processes.

> **Note**
>
> For technical reasons, this tool is currently disabled in non-blink browsers (i.e., Safari, Firefox).

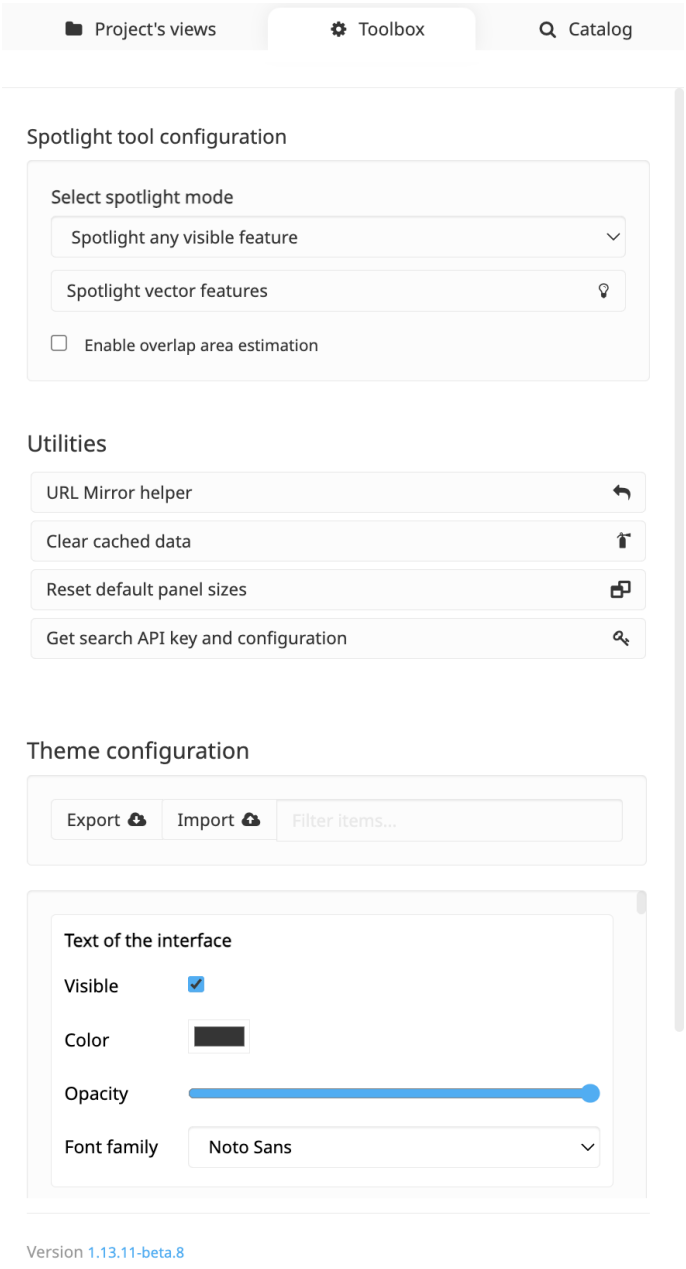


Fig. 8: Toolbox basic tools

How do I use the Spotlight tool?

First, activate the views that you want to overlap from the **Data catalog**. Then, define the "highlight mode" - minimum number of overlapping layers to be highlighted - from the **Toolbox**. Finally, activate the analysis by pressing the "Spotlight vector features" button.

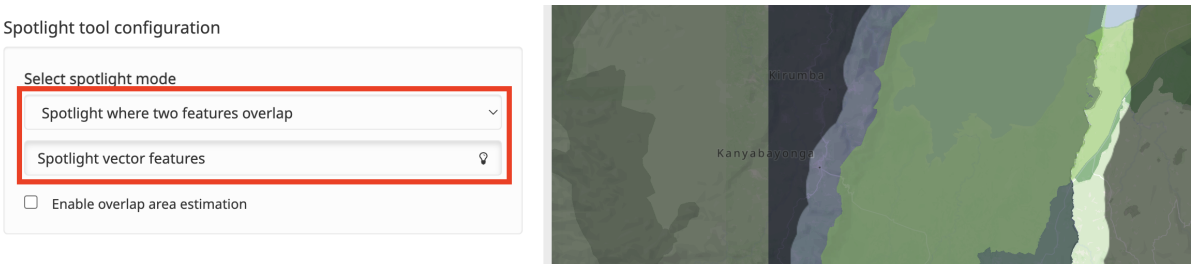


Fig. 9: Highlight tool configuration

The tool additionally offers an option to estimate the overlapping area. Please note that the area estimate only takes into account what is displayed on the screen and not the complete datasets. Values are updated automatically when the position or the zoom in the map are modified by the users.

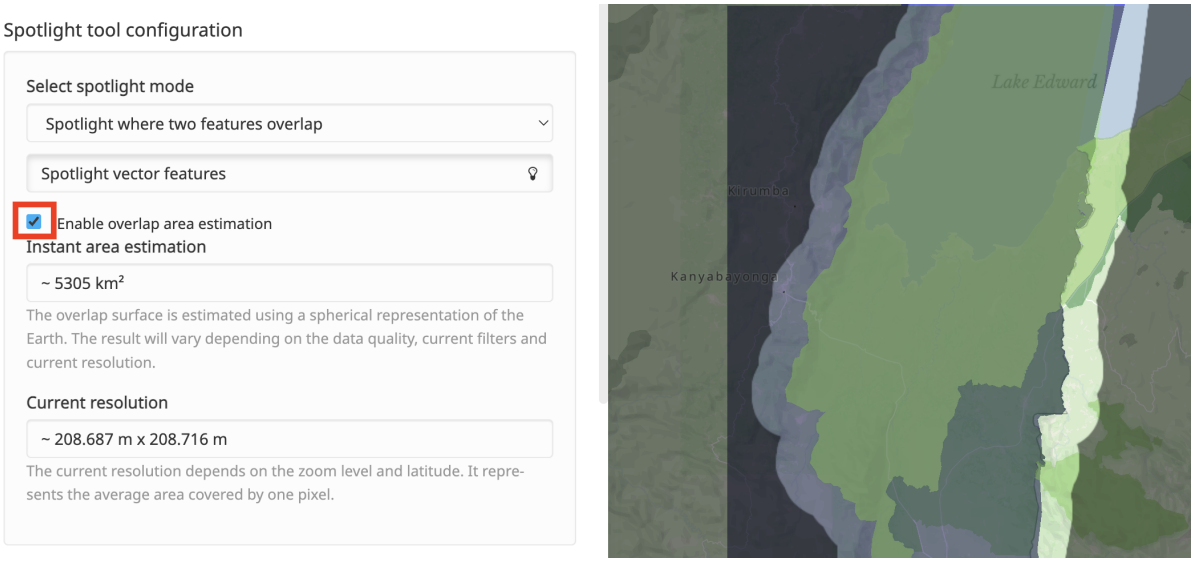


Fig. 10: Area estimation

> **Warning**
>
> This tool should be used for preliminary investigation. It uses the approximated area of spatial features and is therefore not suitable for reporting.

2.2.2 Utilities

1. **URL Mirror helper**: MapX requires that the connection to external resources (e.g., web services, APIs) be secure (i.e., https) and that CORS be enabled. To bypass this restriction, a system has been developed by the MapX team which allows to generate a valid link from any URL.
2. **Clear cached data**: This tool allows to remove all cached data set by MapX, including map tiles, GeoJSON layers, drafts, WMS responses, summaries and custom scripts. This tool will only impact data stored in the user's browser. No data will be removed server side.
3. **Reset default panel sizes**: Panels and menu bars can be resized in MapX. All modifications made by the users are cached in their browser to keep them from session to session. This tool simply allows users to reset the interface of MapX.
4. **Get search API key and configuration**: All the information to use the MapX search tool API is provided in this tool. The API technical documentation is available here.
5. **Theme configuration**: The MapX user interface as well as the basemap can be customized from this tool. For each element, users can enable/disable its display, and change its color and/or opacity. If the element is a text/label, its font can also be changed. These modifications are only effective during the current session and will therefore not be preserved if MapX is reloaded. However, if you want to keep your custom theme for future sessions, it is possible to export it in `JSON` format on your computer and then import it as needed.
6. **MapX version and changelog**: This tool allows users to consult the version of MapX they are using as well as the change-log of the application listing all the improvements, bug fixes and new functionalities deployed over the versions.

2.3 Search tool

The **Search tool** enables users to do a full-text search on the MapX public catalog. Views that are returned by the tool can be filtered, displayed in the map and/or added to the current project if the user's privileges allow it (i.e., publisher, admin).

2.3.1 General description

Users regardless of their privileges can access the **Search tool** from the left panel by clicking on the **Catalog** tab. The tool consists of six elements:

1. a field where search keywords can be specified
2. a button to access the help of the **Search tool** (this page)
3. a button to reset the search criteria
4. a button allowing access to advanced filter options
5. a list of results returned by the search tool
6. a footer where the number of views matching the search criteria is displayed

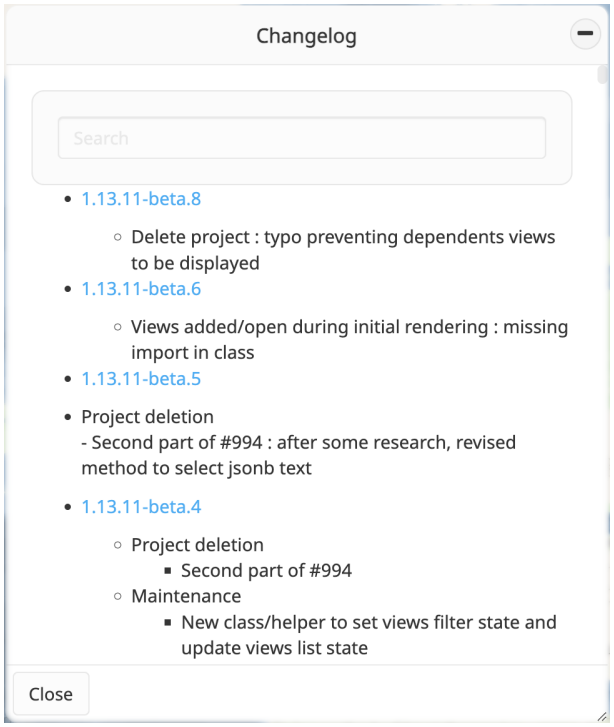


Fig. 11: MapX changelog

Hint

In the **Project's views** tab, the search field allows users to filter views within the current project, while the **Search tool** available in the **Catalog** tab allows users to search the MapX public catalog (cross-projects).

2.3.2 How do I use the Search tool?

To perform a search, enter a series of keywords in the search field separated by a space. These keywords can be related to a specific topic, a geographic entity (e.g., country, region) or even a date. The **Search tool** is dynamic meaning that the list of views matching the search criteria is re-evaluated each time a new character is added in the search field.

Structure of a result

- yellow: title of the view followed by text elements matching the search criteria
- green: list of tools available for a view:
  1. **Direct link**: generates a share link to the view in a new tab
  2. **Metadata**: opens a panel containing the metadata of the view and the data source

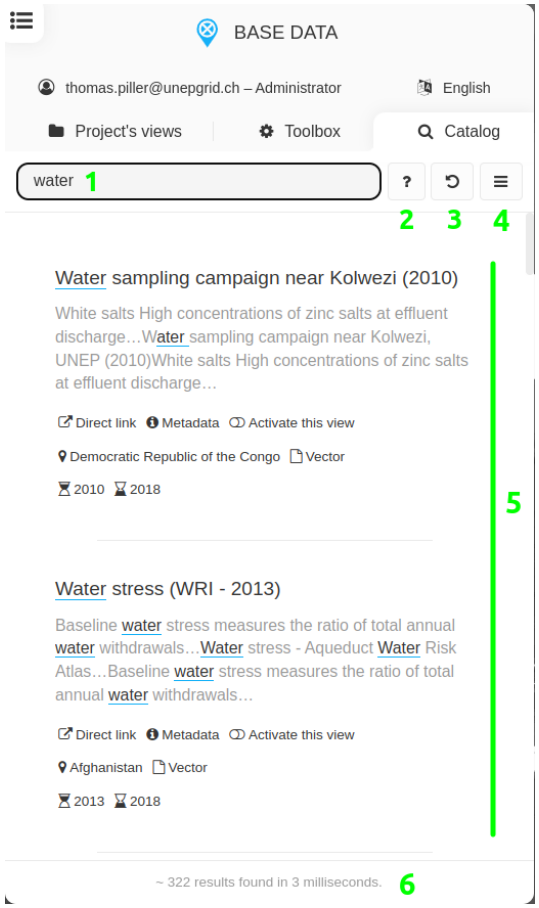


Fig. 12: Search tool layout

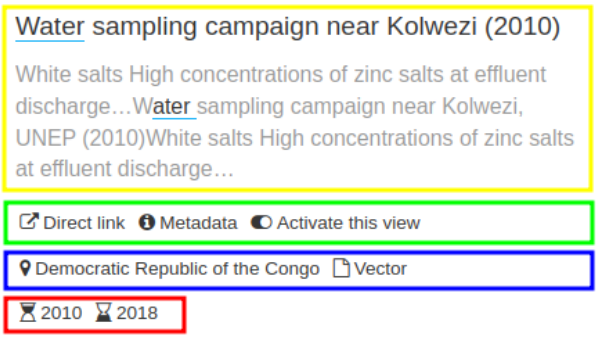


Fig. 13: Result

3. **Activate this view**: displays the view in the map. If this option is activated, the view is added temporarily to the views catalog of the current project. In the project's catalog, views shared from the **Search tool** (called temporary views in MapX) are indicated with a badge (orange circle in the image below). Temporary views can be removed from the project's catalog by clicking on the **Remove / unlink this temporary view** button (red circle in the image below).

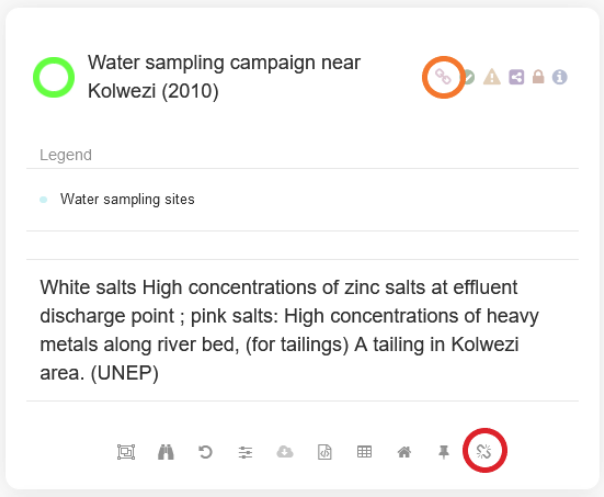


Fig. 14: Shared view from the search tool (temporary views)

- blue: list of thematic and geographic keywords and type of view
- red: time interval covered by the view (start year & end year)

How can I filter the results?

There are two methods to filter the results returned by the **Search tool**: the advanced filtering options and dynamic items in the list of results. Whatever method is used, filters can be combined to reduce the list of results. When a filter is activated, a red circle is displayed in the upper right corner of the **Advanced filtering options** button and matching items in the list of results are underlined.

Advanced filtering options

The **Advanced filtering options** allow users to filter the results of a search according to five different criteria:

1. temporal range: start and end year can be defined independently
2. thematic keywords
3. thematic keywords from the GEMET thesaurus
4. geographic keywords (generally corresponding to the spatial extent of the data)
5. type of view

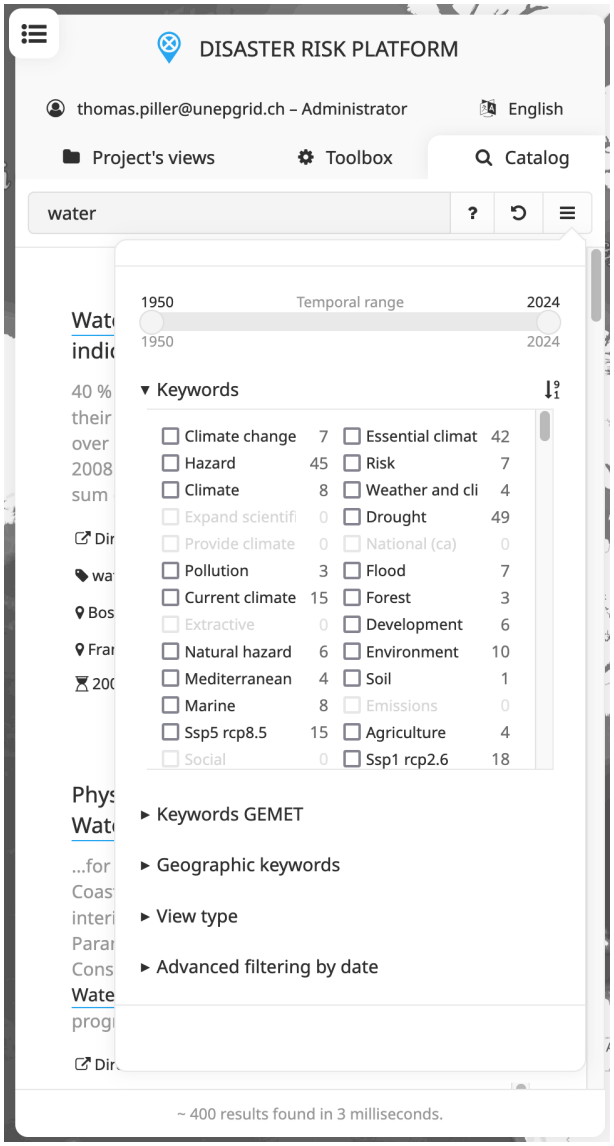


Fig. 15: Filter from the advanced filtering options

Hint

Advanced users can make more precise filters on dates (all those recorded in the views metadata) than with the temporal range by activating the **Advanced filtering by date** option.

Filtering from the list of results

Some items in the interface are dynamic and allow users to filter the results with a single click:

- GEMET thematic keywords
- geographic keywords
- type of view
- start and end year

If an item is clicked to activate a filter, it is underlined. A filter can be removed by clicking again on the item (underlined) or from the **Advanced filtering options**.

In the example below, a click on "Water quality" triggers a filter equal to `keywords GEMET = "Water quality"`.

How can I import a view into my project from the search tool?

First, temporarily add the view to the project's data catalog by clicking the **Activate this view** option in the search tool. Then, to add it to the project permanently, click on the **Import as external view** button in the view toolbar. Views imported like this are handled from the **Manage external views** tool in the toolbox.

2.4 Menu bar

The right-side **Menu bar** contains the **Navigation buttons** that allow interaction with the map and provides access to some of the MapX tools. All of these buttons/tools are accessible to users regardless of their role in MapX.

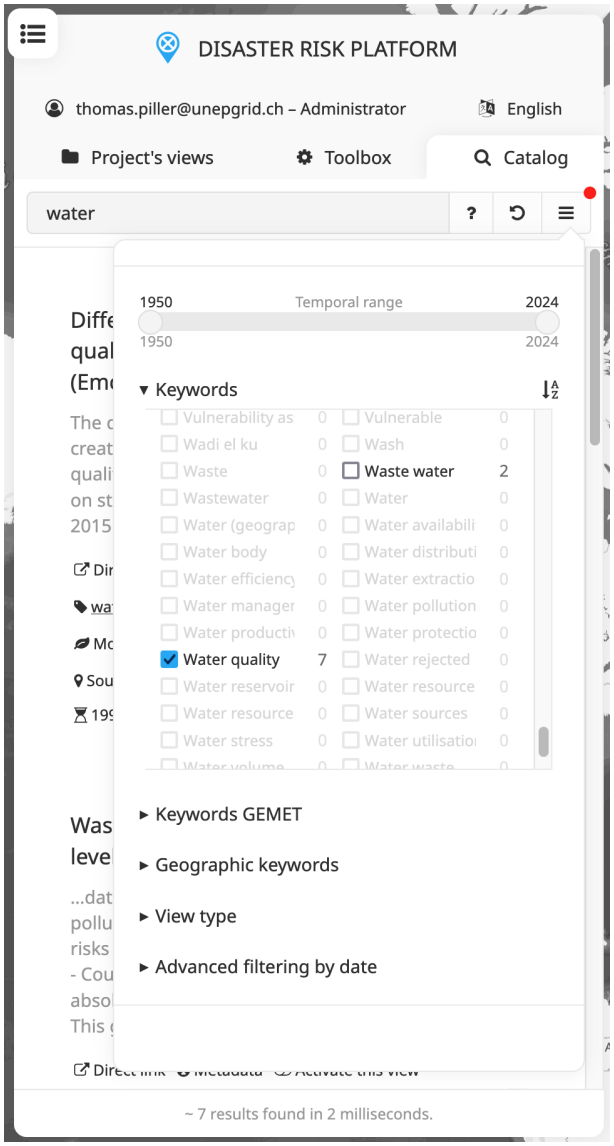


Fig. 16: Filter from the list of results

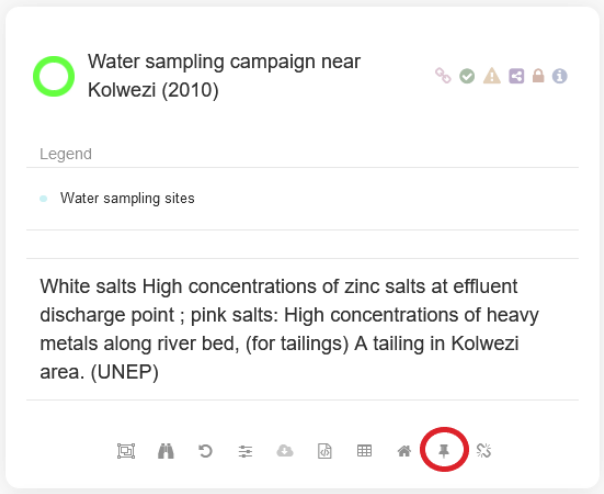


Fig. 17: Import a temporary view to the current project

2.4.1 Navigation buttons

Button	Description
	Restore default map northing and tilting
	Zoom in
	Zoom out
	Rotate the map to the left
	Rotate the map to the right
	Enable/disable the globe mode
	Enable/disable 3D terrain mode in the map
	Enable/disable the aerial photography theme
	Change between dark and light theme
	Enable/disable vegetation cover in the basemap
	Enable/disable water highlighting in the basemap

In addition to the navigation buttons, some interactions with the map can also be done via mouse and keyboard:

- Dragging through the map can be performed by clicking the left button of the mouse and moving the pointer.
- Zoom can be performed by scrolling the mouse's wheel.
- Clicking `SHIFT` and dragging with the mouse allows selecting an area where to zoom in.
- Clicking the right button of the mouse (or clicking `CTRL` and clicking the left mouse button) and moving the pointer allows the map to be tilted and rotated.

2.4.2 Tools

Button	Description	Link to the specific documentation
	Map composer	*link*
	Draw tool	*link*
	Sharing manager	*link*
	Report problematic content	*link*

2.4.3 Others

Button	Description
	Enable/disable fullscreen mode
	Terms of use
	Access to MapX documentation
	Report a bug / feature request (link to the MapX GitHub repository)

2.5 Map Composer

MapX enables users to create, customize and download maps on the platform through the **Map Composer** tool. The **Map Composer** exports all views displayed on the screen as well as the legends, abstracts and titles in PNG format. The tool is interactive and allows users to define the map resolution and to edit both the map layout and content.

2.5.1 General description

The **Map Composer** is an interactive workspace allowing to define the dimensions and spatial extent of the data frame as well as the layout of other cartographic elements (title, legend(s), abstract(s)). Menu bars are present on each side of the window and allow to manage the dimensions and the resolution of the final product (left-side bar) and the style of text elements (right-side bar). The part of the workspace that will be exported as a map is highlighted with a red border and a white background.

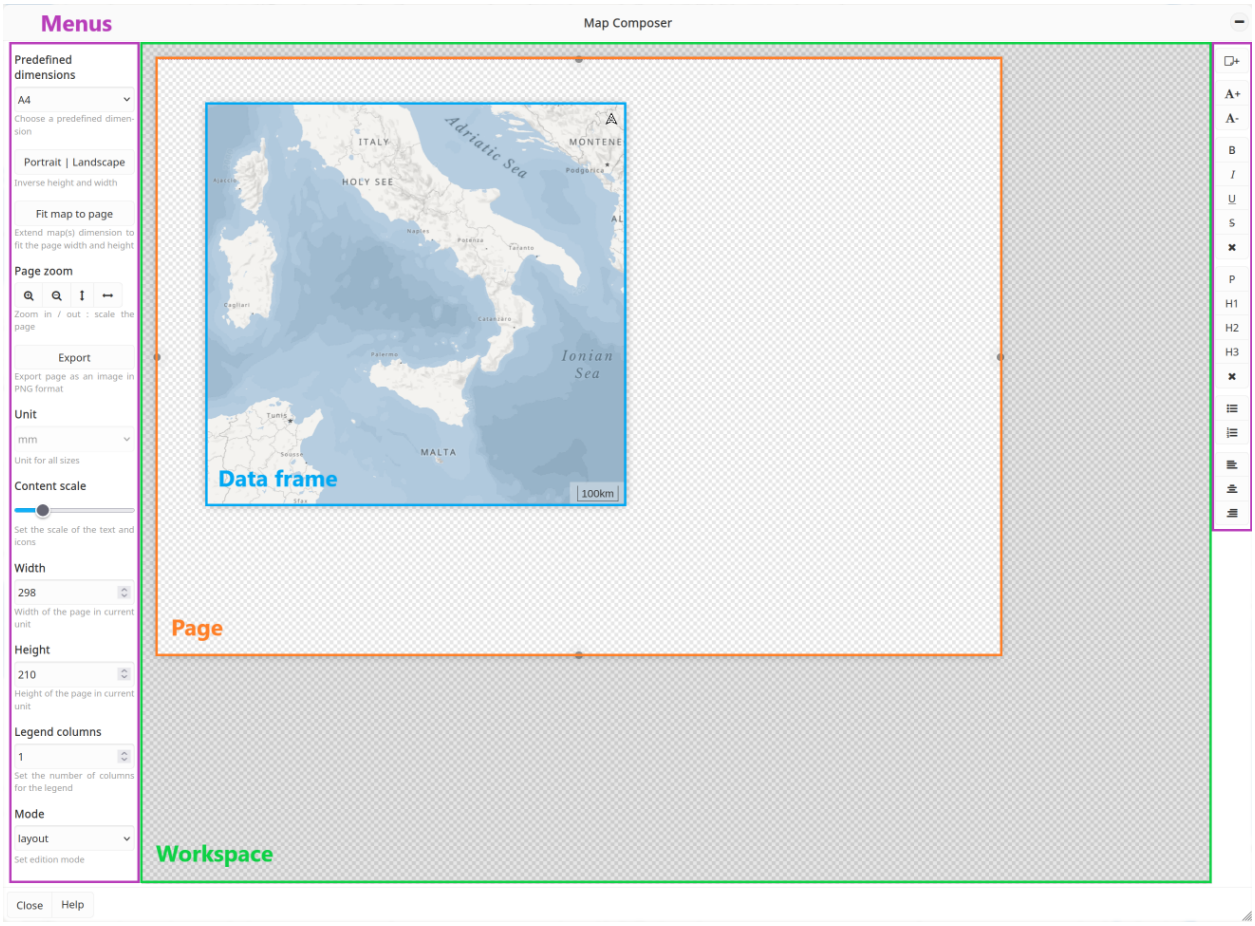


Fig. 18: Map composer layout

2.5.2 How do I use the map composer?

The **Map Composer** can be accessed from the menu located on the right-side of your screen.

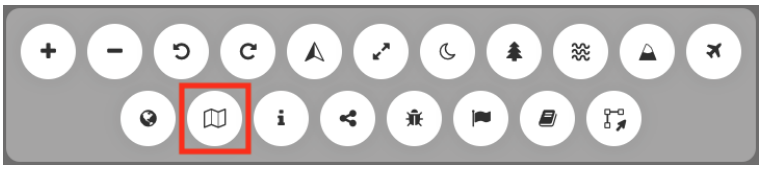


Fig. 19: Map Composer icon in the menu bar

Before using the tool, activate all the views that will be exported on the map and choose carefully the order in which they are displayed on the map. This order will be saved on the **Map Composer** and cannot be modified while creating the map. Note that the cartographic elements (scale, north arrow, etc) will be loaded automatically into the **Map Composer**.

How do I set up the map dimensions?

You can modify and adjust the size of the map using two different methods:

1. Using the left-side bar:
    1. Predefined dimensions (default): to facilitate the map export in a standard print format or for a specific screen size, presets are available. By selecting a format from the **Predefined dimensions** drop-down list, the height, width, resolution and physical measurement of the map will automatically be set. The printing resolution is automatically set to 300 dpi when a standard print format is selected.
    2. Manual input:
        1. Define the size of your map by choosing the height and width in pixel. This option can be useful if your map is viewed on a digital device (computer, tablet, phone).
        2. Define the size of your map by choosing the height and width in physical measurement (inches or millimeters). When this option is selected, the tool automatically calculates the size of the export in pixels to satisfy the parameters you entered at a print resolution of 300 dpi. Once the paper settings are selected, the page will be automatically resized in the workspace.
2. Adjusting manually the size of the page: drag the sides of the background page of your map using the handles. The values in the left-side bar will be updated accordingly.

Whatever the method used to define the size of the export, it is possible to switch from portrait to landscape orientation by clicking on the dedicated button.

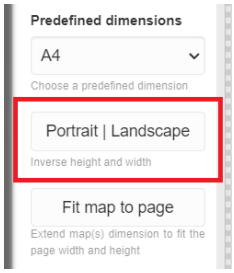


Fig. 20: Portrait/landscape button

How do I design a new map?

Several tools are available in the **Map Composer** to configure your map. At any time, you can preview your work by selecting the **Preview** mode in the left side bar.

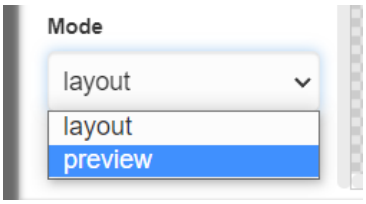


Fig. 21: Preview mode

You can edit the following components of the map:

- **Position:** each element has a handle in its center allowing to re-position it.
- **Size:** elements can be resized by dragging the handles located on each of their sides.
- **Content scale:** the text (e.g., title, legend, map labels) and the icons can be scaled to best fit the size of the export.
- **Zoom and map focus**: zoom in/out and move around the map to select the exact map position of your choice.
- **Text parameters:** edit the text using the tools located on the right-side bar. Select different options to change the font, size, style and alignment of the text.
- **Legends:** legends containing many classes can be re-organized in multiple columns using the **Legend columns** parameters located on the left-side bar.
- **Text boxes:** additional text boxes can be added to the map from the right-side bar to add any important information that is not included in the preloaded elements.

Note

Not all elements must appear on the map. If you don't want to use one of the elements displayed in your workspace, move it off the page (delimited by red border) to the darker area of the workspace using the center-handle. Alternatively, you can permanently delete an element from the **Map Composer** by clicking the **X** button located in its upper-right corner.

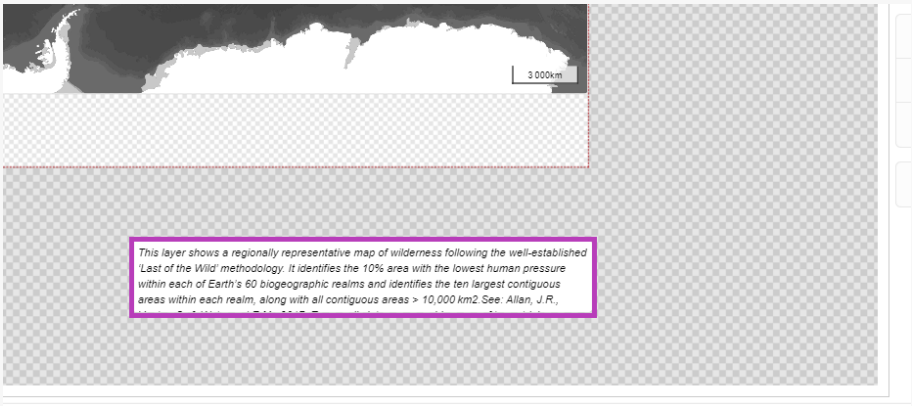


Fig. 22: Hiding cartographic element(s) from the export

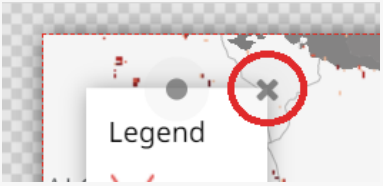


Fig. 23: Removing cartographic element(s) from the export

How do I export my map?

Once ready, click on the **Export image** button located on the left-side bar to export your map in PNG format. The map is now available in the "download" folder of your device.

2.5.3 License and data credits

Make sure you checked the license of your data from the metadata window. It indicates if the source layer(s) associated to the selected view(s) is/are allowed to be exported. Any complementary information must be included in the map if/as specified in the data license.

2.6 Draw tool

The **Draw tool** enables users to create new datasets by drawing features on the map, to download them once saved and to add them to the current project if their privileges allow it (i.e., publisher, admin).

2.6.1 How to create a new vector layer from scratch in MapX?

Users regardless of their privileges can access the **Draw tool** from the tool bar located in the top-right corner of the application.

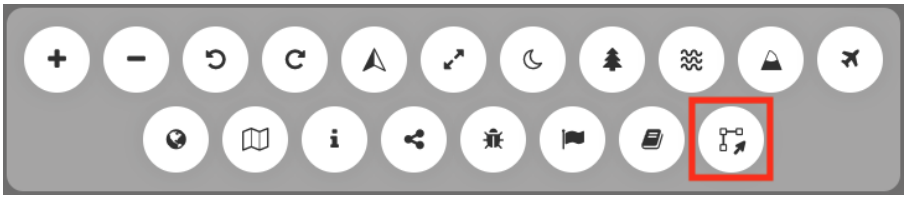


Fig. 24: Location of the Draw tool in the menu bar

Once the tool is activated, users must first choose the type of geometries that will compose their dataset (no mixing allowed) as well as its name. Once done, the options specific to the draw tool appear in the tool bar. Depending on the type of geometries selected, there are 7 or 8 buttons allowing to perform the following actions (from left to right):

Fig. 25: Draw tool options

1. Open/close the **Draw tool**.
2. Add a feature to the dataset. Each feature is drawn independently of the others using the cursor. For lines and polygons, a double click ends the editing of the element.

> **Note**
>
> The icon of this button varies according to the type of geometry selected.

3. Add a circle to the dataset by defining its radius in kilometers and its center.

> **Note**
>
> Only available for polygon layers.

4. Combine selected geometries.
5. Uncombine selected geometries
6. Delete selected geometries.
7. Save the dataset client side in the current project.
8. Quick access to the tool's documentation (this page).

Once the creation of the dataset is done, users can click on to save their view:

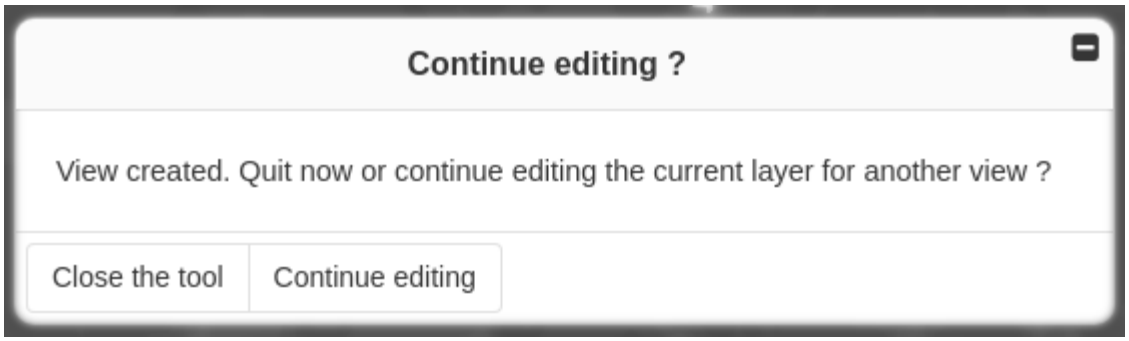


Fig. 26: Panel to save the dataset in the current project.

- *Close the tool* allows users to save their dataset in the current project and to close the tool at the same time. Once this option has been chosen, the dataset can no longer be edited in MapX.
- *Continue editing* allows users to save their dataset in the current project and then continue editing it to create another dataset. This option is useful for saving intermediate or alternative versions of a dataset.

2.6.2 Example of use

Fig. 27: Creating a dataset with the Draw tool.

2.7 Sharing manager

The **Sharing manager** enables users to create and customize links to MapX content (i.e., views, story map, project) and share them by email or on social networks.

> **Warning**
>
> Anyone receiving a link generated by the **Sharing manager** will be able to access its content. If you want to share sensitive information, it is recommended to rather invite users to your project and set access and reading rights accordingly.

2.7.1 How to create a share link in MapX?

Users regardless of their privileges can access the **Sharing manager** from the tool bar located in the top-right corner of the application.

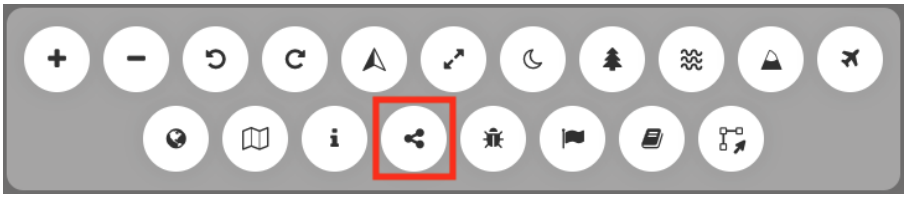


Fig. 28: Location of the Sharing manager in the tool bar

Once the tool is activated, users can create and customize a share link from a dedicated panel. The link is displayed in the upper part of the panel (green square) and is updated in real time according to the options selected in the different menus (more details in the following sections).

Once the link has been created with all the desired options, it can be shared either by clicking on the **Copy** button (copy to clipboard) or **Share** button (dynamic action opening the selected application).

Options

Sharing method

Several sharing methods are available:

- direct link (copy to clipboard)
- iFrame (to easily embed MapX content in a web page)
- email and messaging applications (e.g., WhatsApp, Skype, Telegram)
- social network (e.g., Linkedin, Reddit, Facebook)

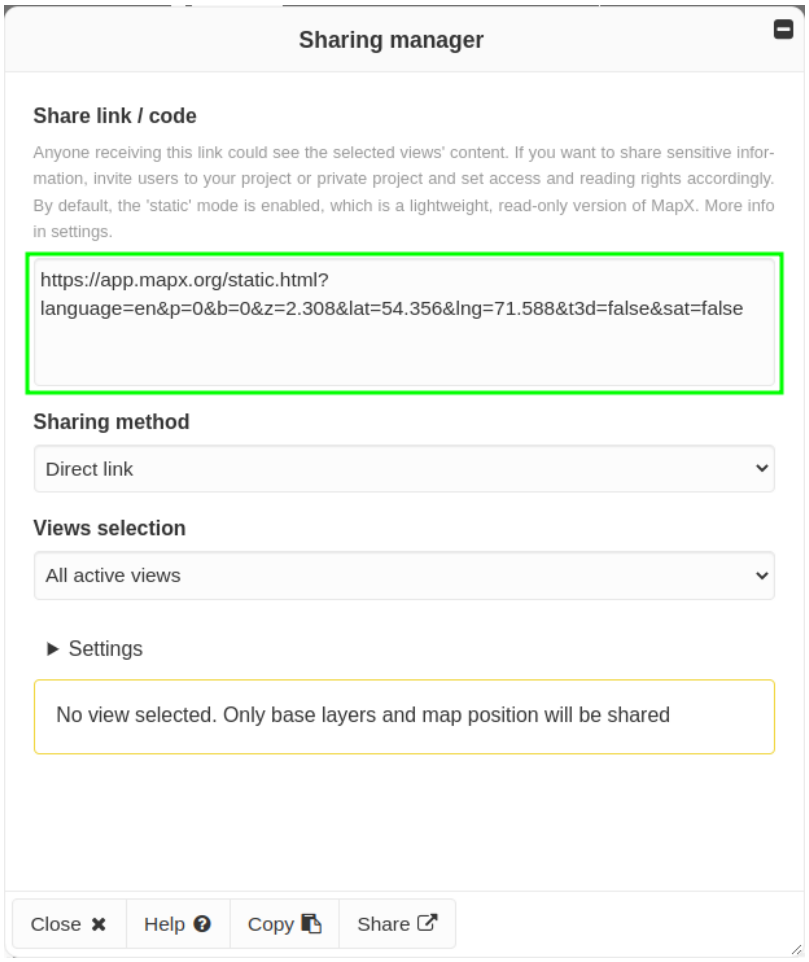


Fig. 29: Sharing manager panel

> **Note**
>
> It is possible to share a link using several methods in a row while keeping the options selected.

Views selection

This drop-down list allows users to define the content that will be shared in the link. The options available may vary depending on the environment from which the **Sharing manager** is activated (i.e., MapX, static mode and story map playback).

In most cases, only the **All active views** option is available. In that case, views activated in the catalog will be displayed by default in the map when a user consults the link. If no view is selected in the catalog, the whole project is shared.

When MapX content is consulted using the **static** mode, as there is no catalog strictly speaking, only the views displayed in the map can be shared using the **Views set in the current URL** option.

When reading a story map, it is possible to use the sharing manager to either share the story map itself (**This Story Map**) or share all views displayed in the map at a given step (**Active views in the current step**).

Settings

1. Share in **static** mode

   This option which is enabled by default is recommended for sharing MapX content. It uses a lightweight version of MapX with limited functionalities. In case a story map is shared in **static** mode, it will start automatically.

2. Set initial map position

   When this option is enabled, the current extent, tilt and bearing of the map will be used to set the initial position of the map when accessing the link. Project defaults are thus overwritten.

   > **Note**
   >
   > When this option is enabled, it is also possible to activate the **3D terrain mode** and/or the **Aerial theme** from the menu bar located in the top-right corner of the application.

3. Limit map panning to current extent

   When this option is enabled, the map will be constrained to its current extent thereby limiting what users viewing the link will see.

   > **Note**

When this option is enabled, the globe mode is automatically disabled as it cannot be constrained by an extent.

4. Zoom to all views extent, starting from initial position.

   The extent of all views displayed in the map will be computed. A zoom will be made from the initial position of the map (project defaults or user defined) to the views extent. If no view is selected, this option is ignored.

5. Hide categories

   When enabled, categories will be hidden if the complete catalog is consulted.

2.8 Report problematic content tool

The **Report problematic content tool** allows users to easily reach out to the MapX team or project editors/administrators to report any issues or concerns. Whether it's a problem with the application's functionality (e.g., user interface glitches, tool errors, translation mistakes) or content-related concerns (e.g., incorrect data, maps, or dashboards), users can use this tool to ensure that the development team is promptly informed.

2.8.1 How to report problematic content in MapX?

All users, regardless of their privileges, can access the **Report problematic content tool** from the menu bar located on the right-side of your screen.

Fig. 30: Report problematic content icon in the menu bar

Once the tool is activated, users can create and submit a report through a dedicated panel, with each input field explained in detail below.

1. Report type: four types of reports are available:

   1. Bug or feature request: This report is sent to the application developer to address bugs or suggest improvements. For bug reports, please provide detailed steps to reproduce the issue. Any error messages shown in the MapX interface (e.g., in the notification panel or a dedicated panel) should be included in the report.

   2. View, data or dashboard: This report is sent to the editor responsible for the selected views to fix data-related problems (e.g., broken views, missing or outdated data).

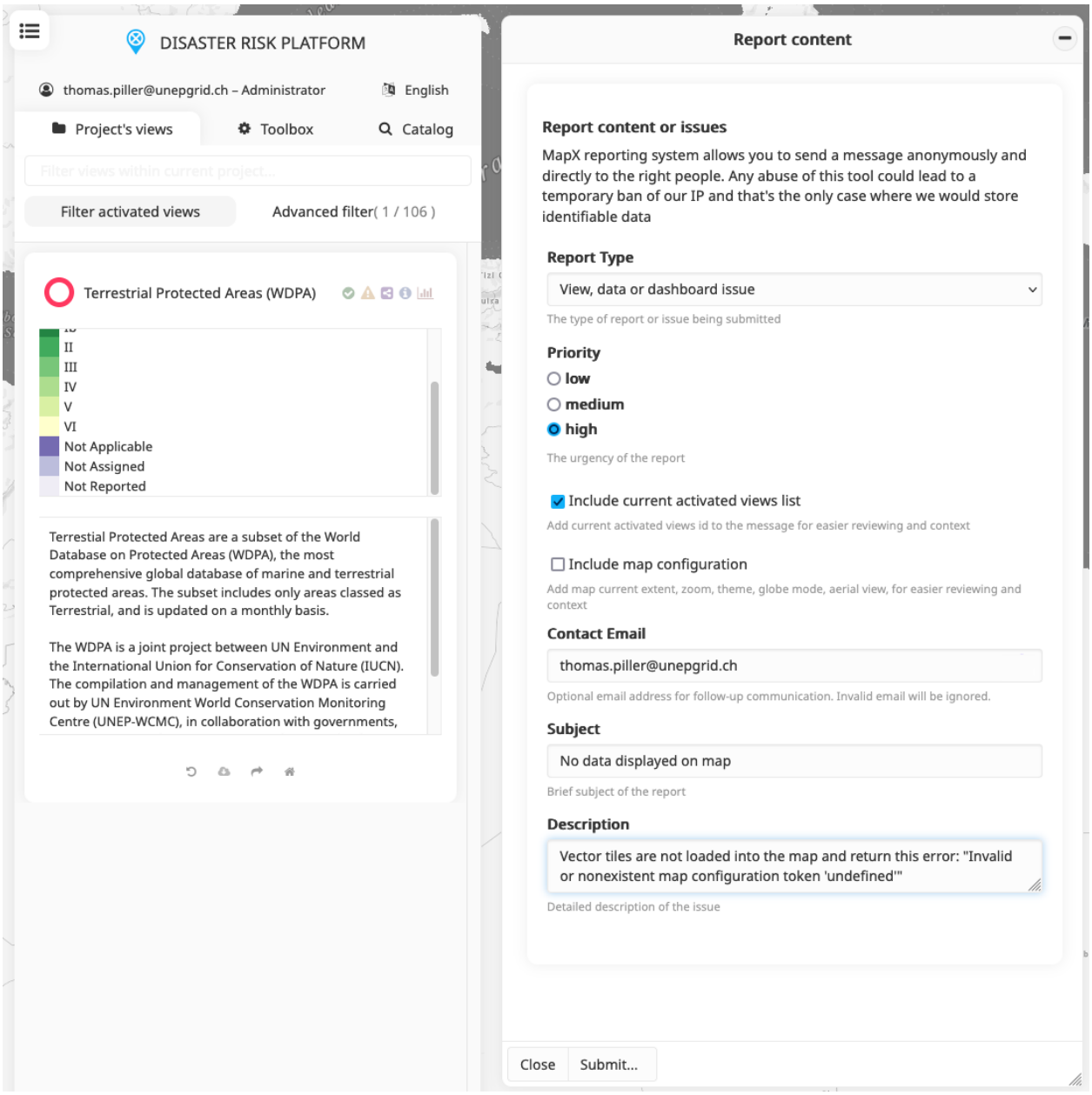


Fig. 31: Report problematic content panel

3. Project: This report is directed to the project administrator for comments or concerns about the project's content or organization.
4. Institutional: This report is sent to the MapX team for general information about the application, collaboration inquiries, or to report problematic content (e.g., prohibited material, misinformation, scientific errors).

2. Priority: Priority levels help determine how quickly a report needs to be addressed. These range from "Low" for minor issues to "High" for critical issues requiring urgent attention.
3. Include current activated views list: When this option is enabled, the reference (identifier and link) of the active views will be attached to your message. This option is mandatory for "Bug or Feature Request" reports.
4. Include map configuration: By enabling this option, the current map configuration (i.e., map extent, zoom, theme, globe mode, aerial view) will be attached to the report.
5. Contact email: An email address for follow-up communication. If left blank, the report will be submitted anonymously.
6. Subject: The title or subject of your report.
7. Description: A detailed explanation of the issue or enhancement. See *Report types* for relevant information to include.

Once the report is complete, click the "Submit" button. A summary of your message will be displayed in the MapX interface, allowing you to review and verify all details before sending. To finalize the submission, click the "Confirm" button.

After submission, a confirmation message will be sent to the email address provided in the *Contact email* field.

Tip

If your report is not addressed within a reasonable time frame, you can forward the confirmation email (which includes the report ID) to the MapX team at: issues@mapx.org.

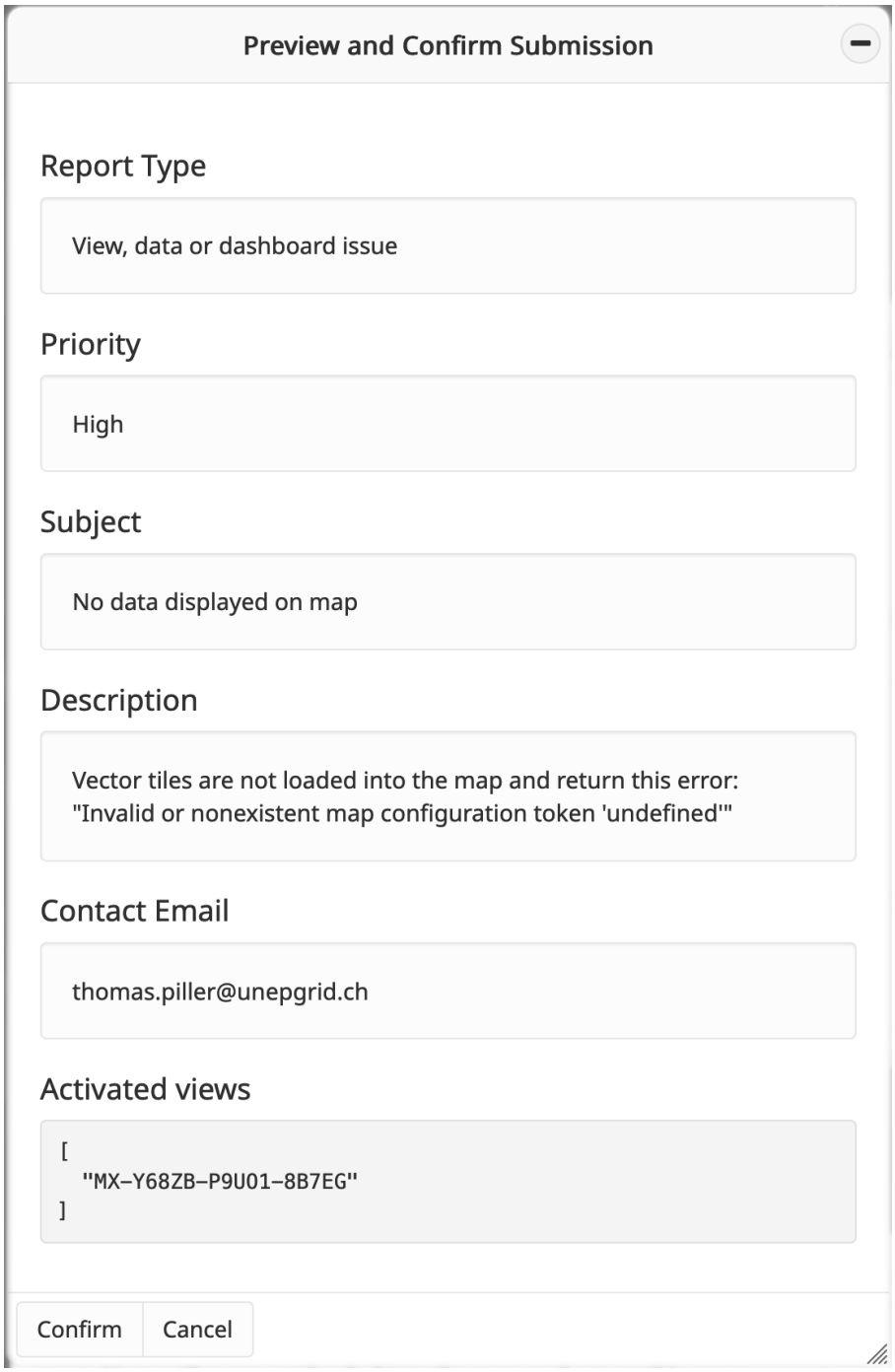


Fig. 32: Preview and confirmation panel

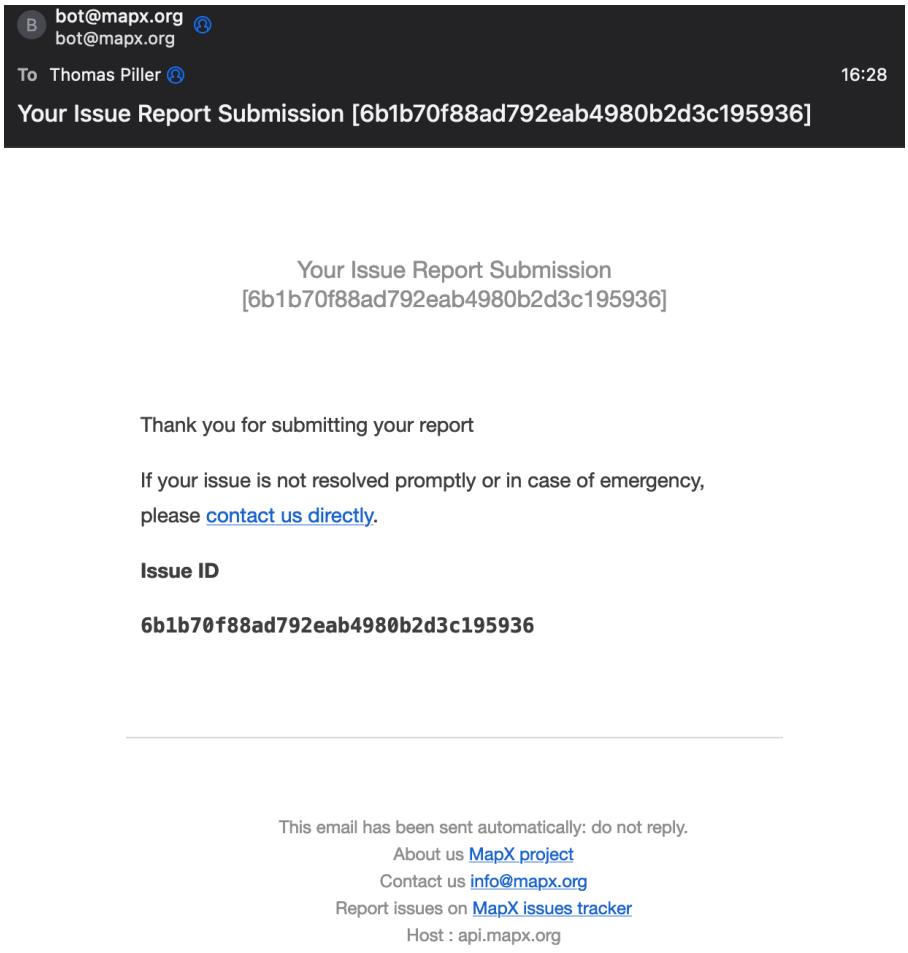


Fig. 33: Confirmation email

CHAPTER

THREE

VIEWS

A two levels-data management system exists in MapX: “sources” and “views”. Simply put, sources are raw spatial data stored in the MapX database while views are a cartographic representation of it. As you will see below, the concept of view can go beyond this simple definition.

The different types of views available in MapX are:

- Vector tiles **views** are used to display on the map data published in the MapX database.
- Raster **views** are based on external data services as MapX does not support raster storage.
- **Custom coded views** are fully customisable views that allow, among other things, to display data from external sources or to implement advanced features (e.g., drop-down list, slider). Advanced knowledge in web development is required to code this type of view.
- **Story maps** are communication products consisting of a mix of spatial data and other types of information (text, images, graphes, videos).
- **Local GeoJSON views** are a special type of view allowing users to visualize their vector data without having to upload it to the MapX database. The data is thus temporarily stored in the user’s browser.

The different view types are identifiable in MapX by the color of the circle displayed to the left of their title: - green: vector - purple: raster - blue: story map - red: custom code - orange: local GeoJSON

Fig. 1: Types of view

In the MapX interface, a view is presented as follows in the data catalog:

1. view title
2. badges associated with the view
3. legend of the style applied to the data
4. abstract providing users with key information to understand the data
5. tools associated with the view

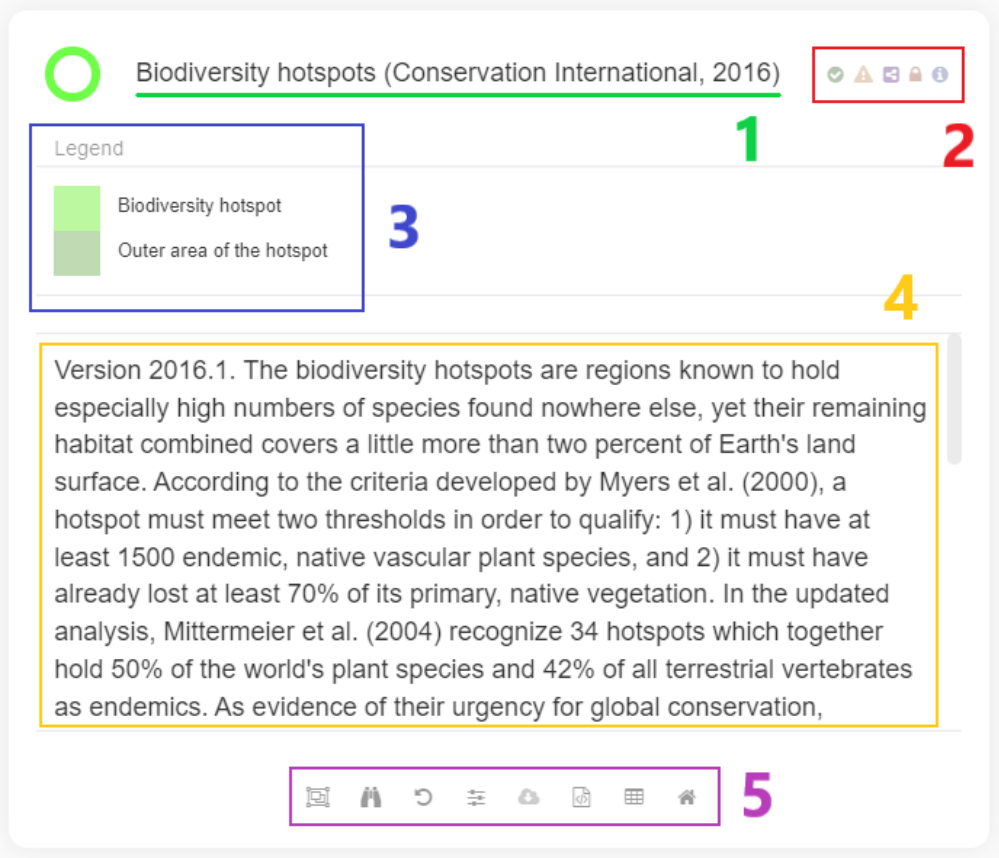


Fig. 2: Anatomy of a View

To display the data associated with a view on the map, simply click the button next to the view's title. Multiple views can be activated at the same time. When this is the case, the order in which views are displayed in the map is defined by the position of the views in the catalog. It is possible to modify the order by grabbing the view with the pointer and dragging it in the catalog to change its position.

3.1 Badges

Each view is coupled with a series of badges giving users key information about the view. These badges are displayed to the right of the view title.

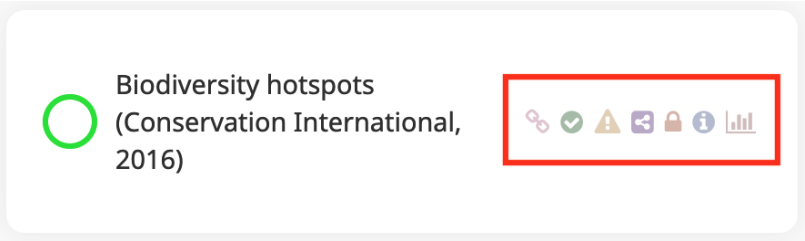


Fig. 3: Badges of a view

The badges that can be displayed in a view are the following:

Badge	Description
	This view is temporarily associated with the current project. If MapX is reloaded, it will no longer be displayed.
	By clicking on this badge, users can consult the metadata of the view as well as that of the data source.
	By clicking on this badge, users can consult the view visualization statistics.
	This badge indicates to the user whether or not they can edit the view. **Warning** Views shared from other projects cannot be edited outside of the main project.
	This view was shared from another project.
	This view is public and can be visualized by all MapX users regardless of their role.
	This view is public but some metadata fields have not been filled in. To find out which fields are missing, just click on the badge.

3.2 Tools

Each view in MapX offers a series of tools which allow among other things to configure it or to interact with the data. The number of tools available for a view varies according to its type and the user's role in the project.

Here is the complete list of tools that you will encounter when using MapX (some tools are described in detail in dedicated pages or later in this one):

Table 1: Tools

Tool	Icon	View type*	Restriction**	Description
Zoom to all features		rt, vt, lg	no	Zoom to all features (dataset extent)
Zoom on displayed features		vt, lg	no	Zoom to visible features (extent covered by the features displayed on the map)

continues on next page

Table 1 – continued from previous page

Tool	Icon	View type*	Restriction**	Description
Reset the view		rt, vt, cc, lg	no	Reset the view to its original state
Settings		rt, vt, cc, lg	no	Depending on the type of data, different data filter options may be available: filter by value, numeric value or/and date. Transparency of the view can also be adjusted from this tool.
Upload		lg	yes	This tool allows users to upload a local GeoJSON to the MapX database. More information *here*.
Download the data		rt, vt, cc, lg	no	This tool allows users to download the spatial dataset associated with the view. Depending on the type of view, the process can rely on a link to an external file (raster and custom code views) or offers an interactive tool to set export options (vector tiles views). More information *here*.
Code template / boilerplate / other format		vt	no	This tool allows users to copy the style of a MapX vector view and use it in diverse contexts. More information *here*.
Attribute table		vt	no	This tool allows user to consult the attribute table of a vector view. More information *here*.
Edit this view		rt, vt, cc, sm	yes	Configure this view
Edit dashboard		rt, vt, cc, lg	yes	(De)activate and edit the dashboard associated with this view
Set the style of this view		vt	yes	Set the style of this view. The way the symbology and the legend are built can be defined here and can be edited at any time.
Remove this view		all	yes	Remove this view from the MapX database. ::warning This operation is permanent and cannot be undone.

continues on next page

Table 1 – continued from previous page

Tool	Icon	View type*	Restriction**	Description
Share this view in another project		all	yes	Share this view to another project where your role is at least "publisher". The access restrictions of the view will be conserved in secondary projects.
Open original project		all	no	Open the project where the view was originally published. If the project is private, only members of the project will be able to load it.
Import as external view		rt, vt, cc, sm	yes	Import this view to the current project
Remove / unlink this temporary view		rt, vt, cc, sm	no	Remove / unlink this temporary view from the current project
Edit code		cc	yes	Edit the code of a custom view
Read this story map		sm	no	Play the Story map
Edit story map		sm	yes	Edit the structure and content of the Story map

* vt = vector; rt = raster; sm = story map; cc = custom code; lg = local GeoJSON

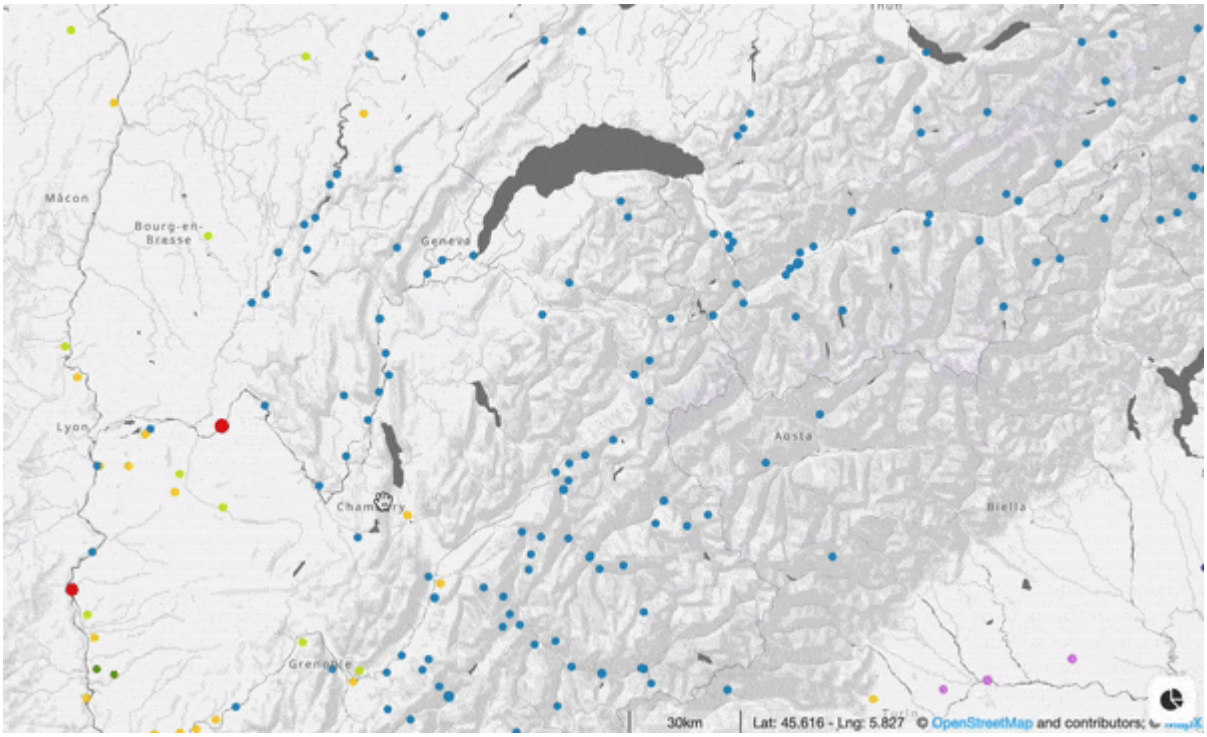
** access to these tools will depend on the rights specified in the view and your role in the project

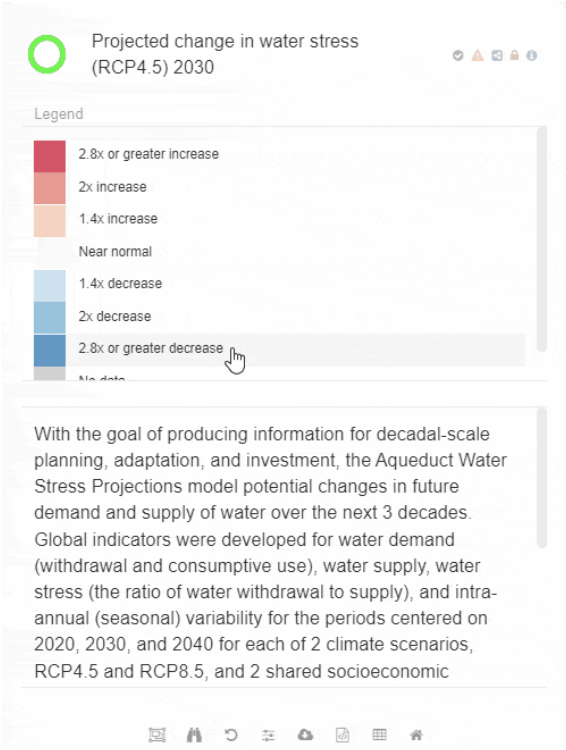
3.3 Querying and filtering data

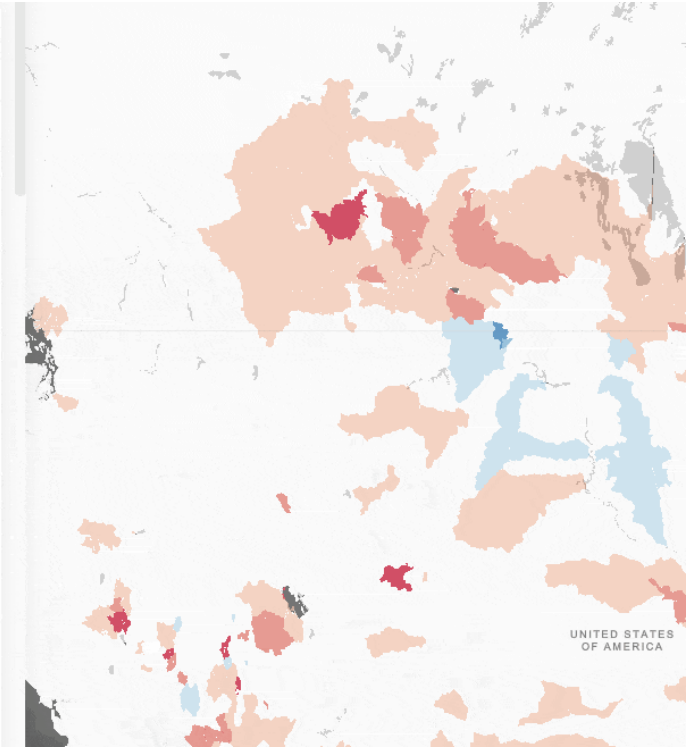
When a feature is selected/clicked on the map, a pop-up showing its attribute values is displayed (panel in the lower right corner). The list of attributes is determined by the view creator in its settings (i.e., secondary attributes). It is possible to filter the data displayed on the map from this pop-up by clicking on any attribute values (vector views only). By doing so, only features having the selected attribute value will be displayed on the map. If several values are clicked, filters will be combined with the logical operator `OR` meaning that all features satisfying at least one filter/condition will be displayed on the map. To return to the initial state of the view, several options are available:

- Close the pop-up by clicking on the button (lower left corner)
- *Reset the view*
- Click on a location on the map which does not contain features

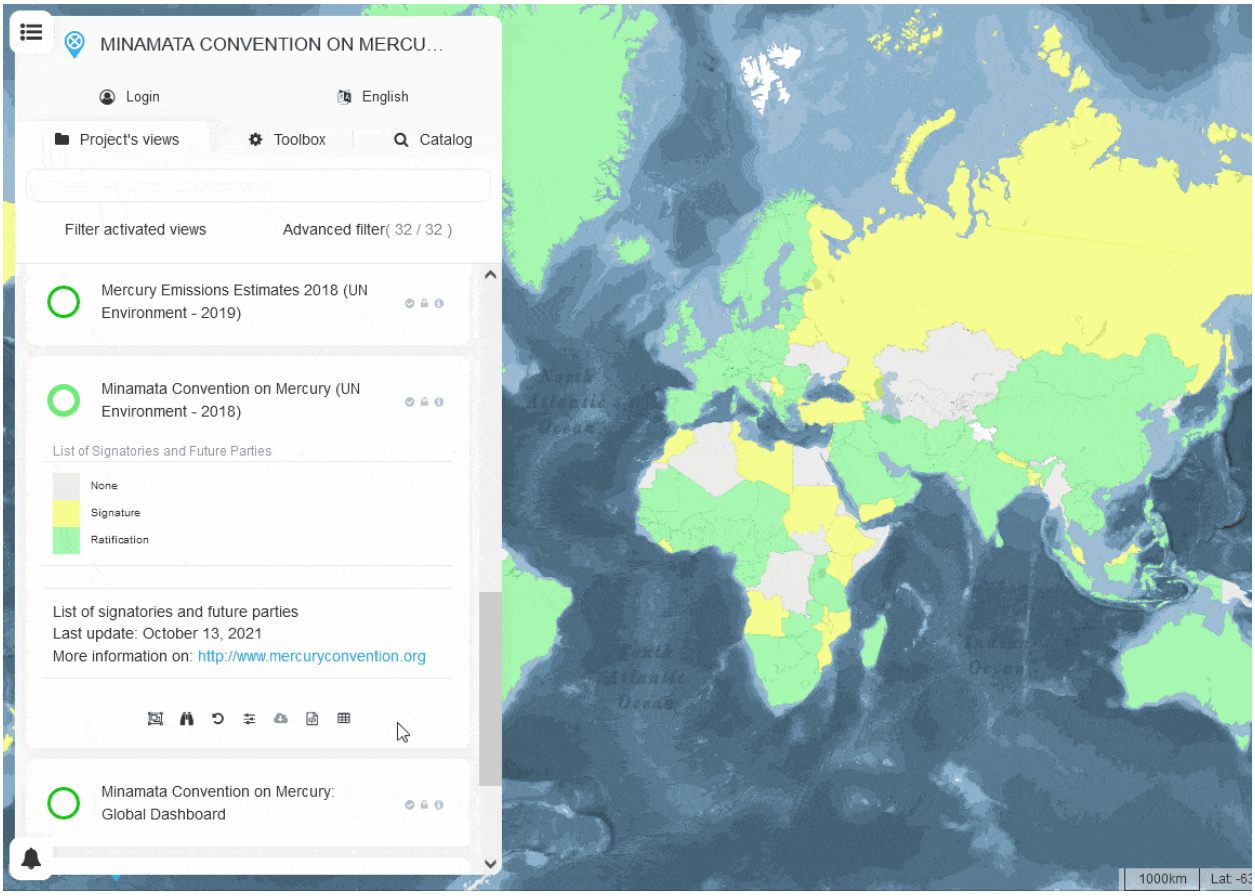
Data can also be filtered from the interactive legend of vector views by clicking on any rules which will trigger a filter on the map.


Mâcon
Bourg-en-Bresse
Geneva
Lyon
Aosta
Biella
30km
Lat: 45.616 - Lng: 5.827
© OpenStreetMap and contributors;


Projected change in water stress
(RCP4.5) 2030
Legend
2.8x or greater increase
2x increase
1.4x increase
Near normal
1.4x decrease
2x decrease
2.8x or greater decrease
With the goal of producing information for decadal-scale planning, adaptation, and investment, the Aqueduct Water Stress Projections model potential changes in future demand and supply of water over the next 3 decades. Global indicators were developed for water demand (withdrawal and consumptive use), water supply, water stress (the ratio of water withdrawal to supply), and intra-annual (seasonal) variability for the periods centered on 2020, 2030, and 2040 for each of 2 climate scenarios, RCP4.5 and RCP8.5, and 2 shared socioeconomic


UNITED STATES
OF AMERICA

Other data filter tools (e.g., time-slider) are available to users from the dedicated tool (see the above section).



3.4 Publication of new views

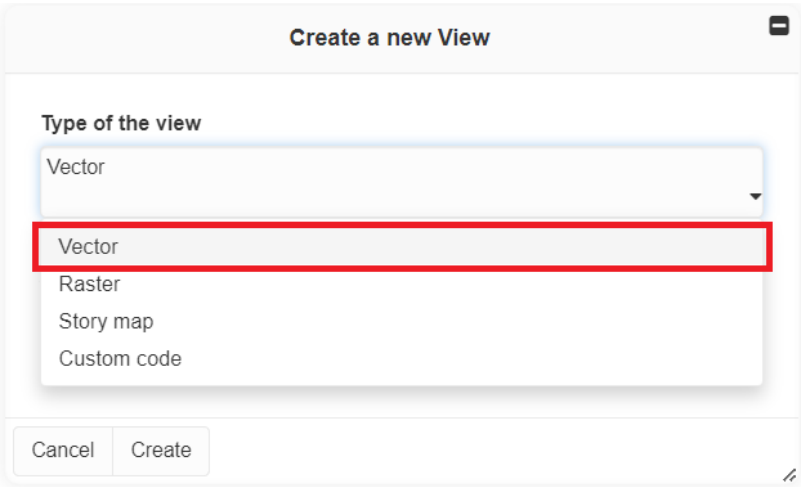
As described above, there are currently 4 types of views in MapX which all have particularities in their publishing process. In this section, the publishing process is described in detail for vector views and then the specifics of raster and custom codes views will be discussed. Story maps are covered in a dedicated *chapter*.

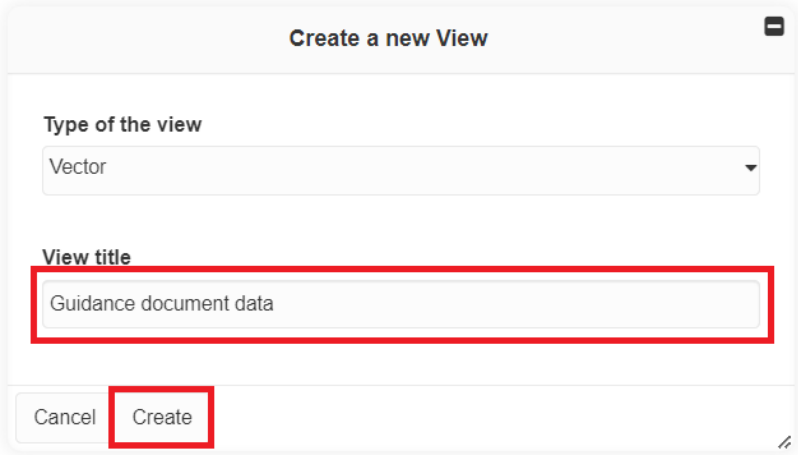
Remember that publishing (and editing) views is limited to publishers and administrators.

3.4.1 Vector views

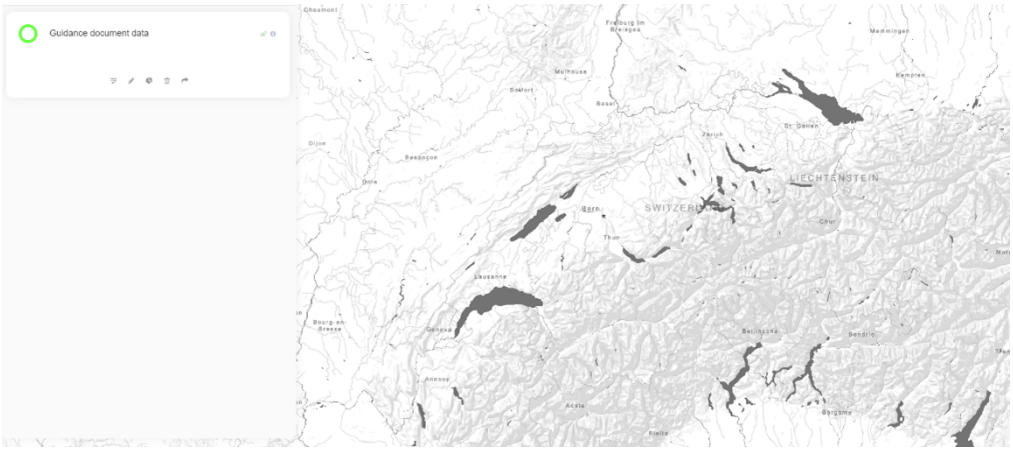
Creating a new view

1. To add a view, click on **Create a new view** from the **Toolbox**.
2. In the panel:
    1. Select the desired type of view (vector, raster (WMS/WMTS), story map or custom code) - select **Vector tiles** to create a new view based on a source stored in MapX database
    2. Define the view title
    3. Click on **Create** to validate. A message will confirm that everything went well.



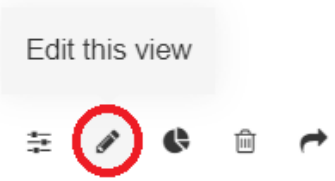


3. The new view is now available in the left panel but it is empty.



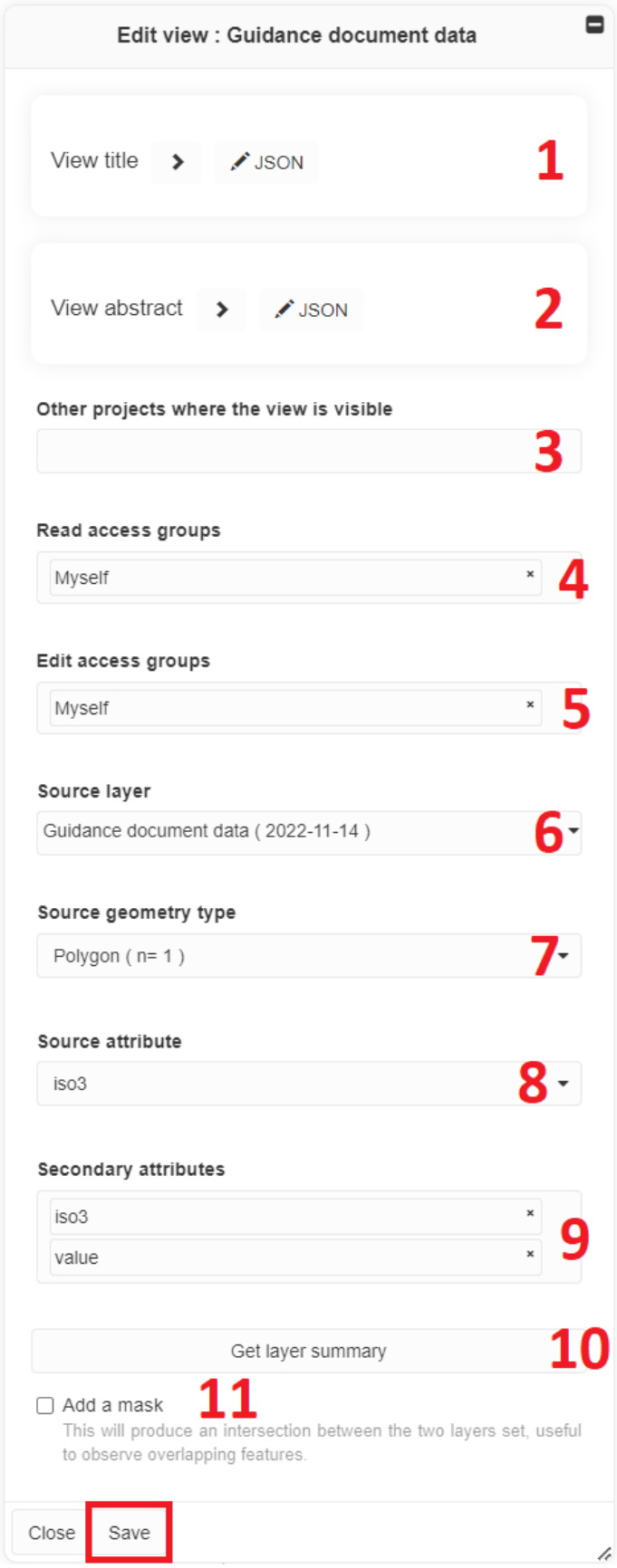
configuring a view

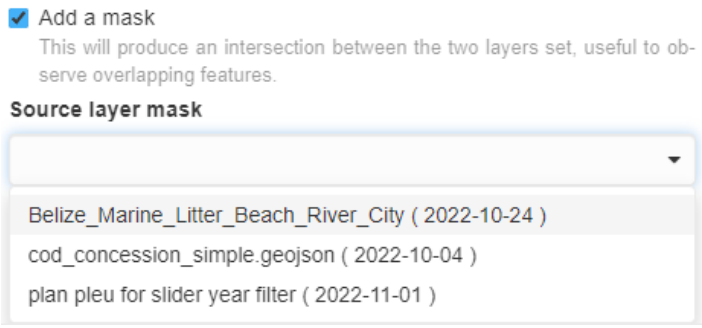
1. To configure a vector view, click on it and then click on **Edit this view**:

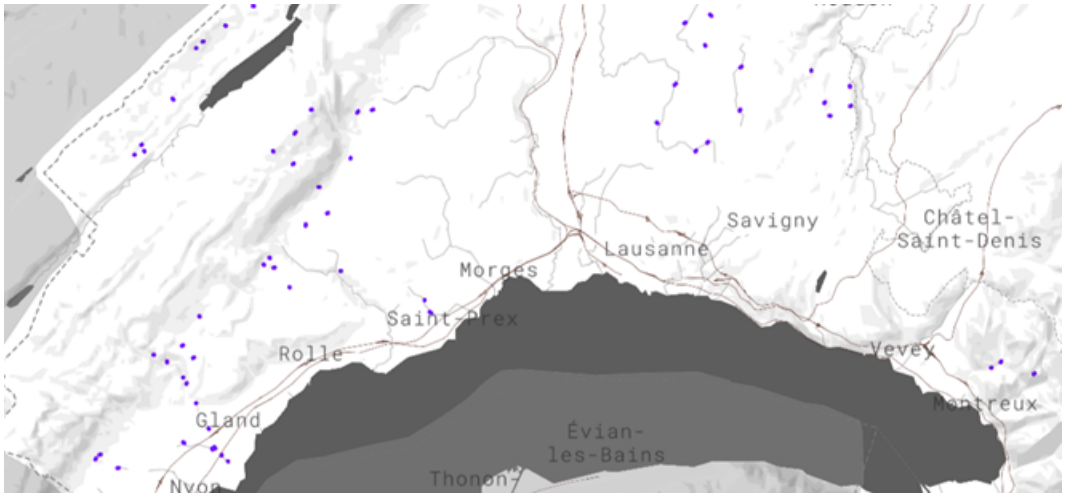


2. A configuration panel appears, fill out the form and once it is done, click on **Save**.
    1. View title *[multilingual]*
    2. Small description of your view (data, source, etc.) *[multilingual]*
    3. Select other projects where the view will be visible. The view will not be editable from these projects.
    4. Define who can access this view in MapX
    5. Define who can edit this view in MapX
    6. Select the source layer from the database
    7. Type of geometry (cannot be changed)
    8. Select the source attribute to display in the view
    9. Select secondary attribute(s) to be displayed in the pop-up and in the attribute table, and/or used in the dashboard
    10. Get layer summary
    11. Add a mask to the view. This will produce an intersection between the two data sources (useful to observe overlapping features).

The view is now configured. The selected source variable is displayed on the map when the view is activated but no style has been defined.

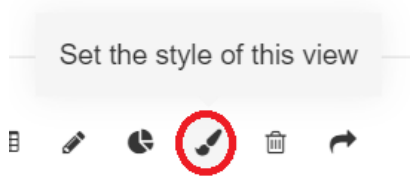

Edit view : Guidance document data
View title
JSON
1
View abstract
JSON
2
Other projects where the view is visible
3
Read access groups
Myself
4
Edit access groups
Myself
5
Source layer
Guidance document data (2022-11-14)
6
Source geometry type
Polygon (n= 1)
7
Source attribute
iso3
8
Secondary attributes
iso3
value
9
Get layer summary
10
Add a mask
11
This will produce an intersection between the two layers set, useful to observe overlapping features.
Close
Save



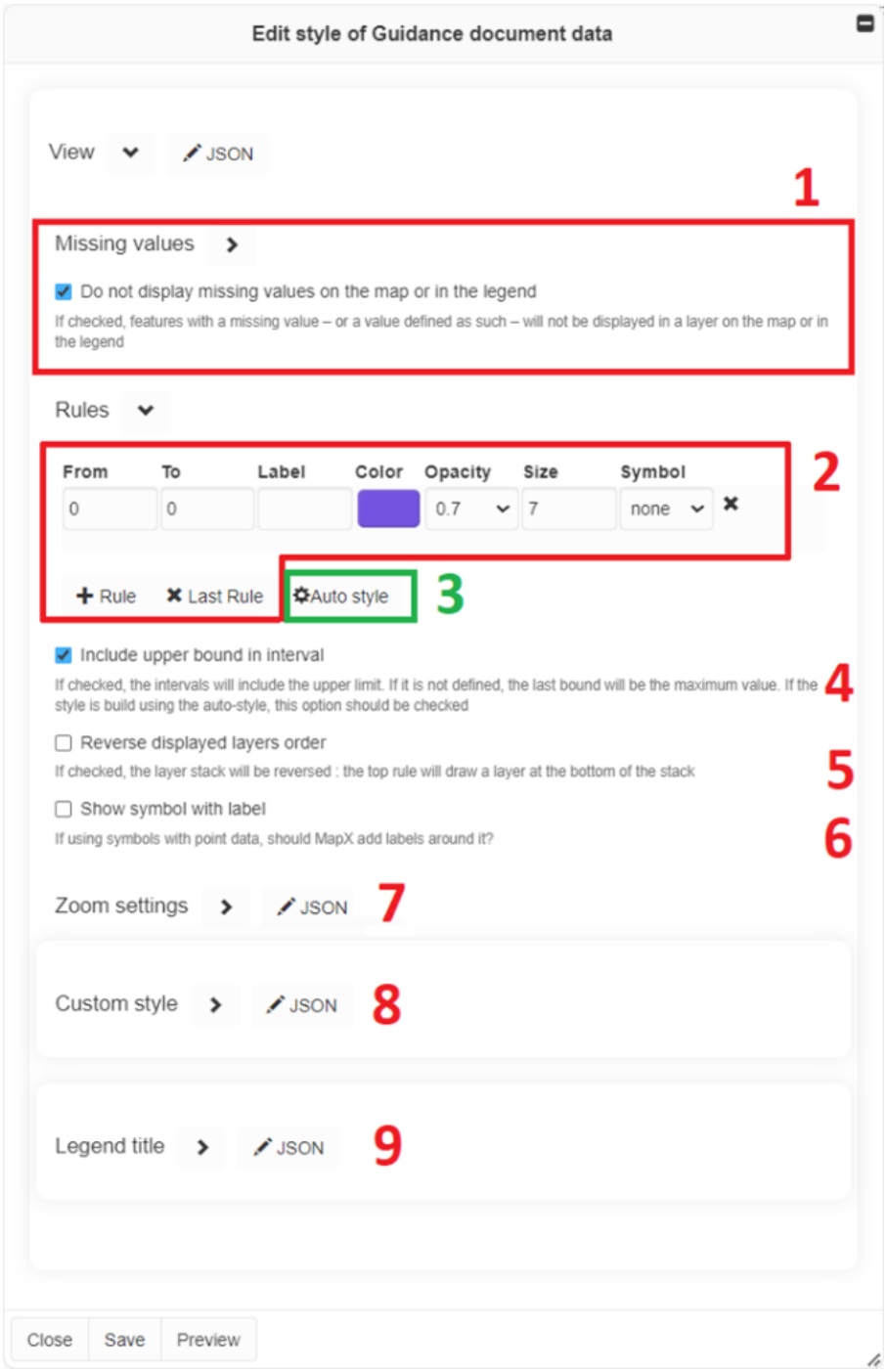


Creating a style

1. To create a style for a vector view, click on **Set the style of this view**:



2. A configuration panel appears, fill out the form and once it is done, click on **Save**.
    1. Missing values: rule allowing to style NA/null value.
    2. Rules to classify the data displayed in the map can be set manually:
        - + Rule: add a class in the legend.
        - Value: values defining the intervals of each class.
        - Label: labels will be displayed in the view's legend in the left panel.
        - Color, opacity & size: each class can be set independently of each other.
        - Symbol: additional symbol can be added to each class feature.


Edit style of Guidance document data
View
JSON
1
Missing values
Do not display missing values on the map or in the legend
If checked, features with a missing value – or a value defined as such – will not be displayed in a layer on the map or in the legend
Rules
From
To
Label
Color
Opacity
Size
Symbol
0
0
0.7
7
none
2
+ Rule
Last Rule
Auto style
3
Include upper bound in interval
If checked, the intervals will include the upper limit. If it is not defined, the last bound will be the maximum value. If the style is build using the auto-style, this option should be checked
4
Reverse displayed layers order
If checked, the layer stack will be reversed : the top rule will draw a layer at the bottom of the stack
5
Show symbol with label
If using symbols with point data, should MapX add labels around it?
6
Zoom settings
JSON
7
Custom style
JSON
8
Legend title
JSON
9
Close
Save
Preview

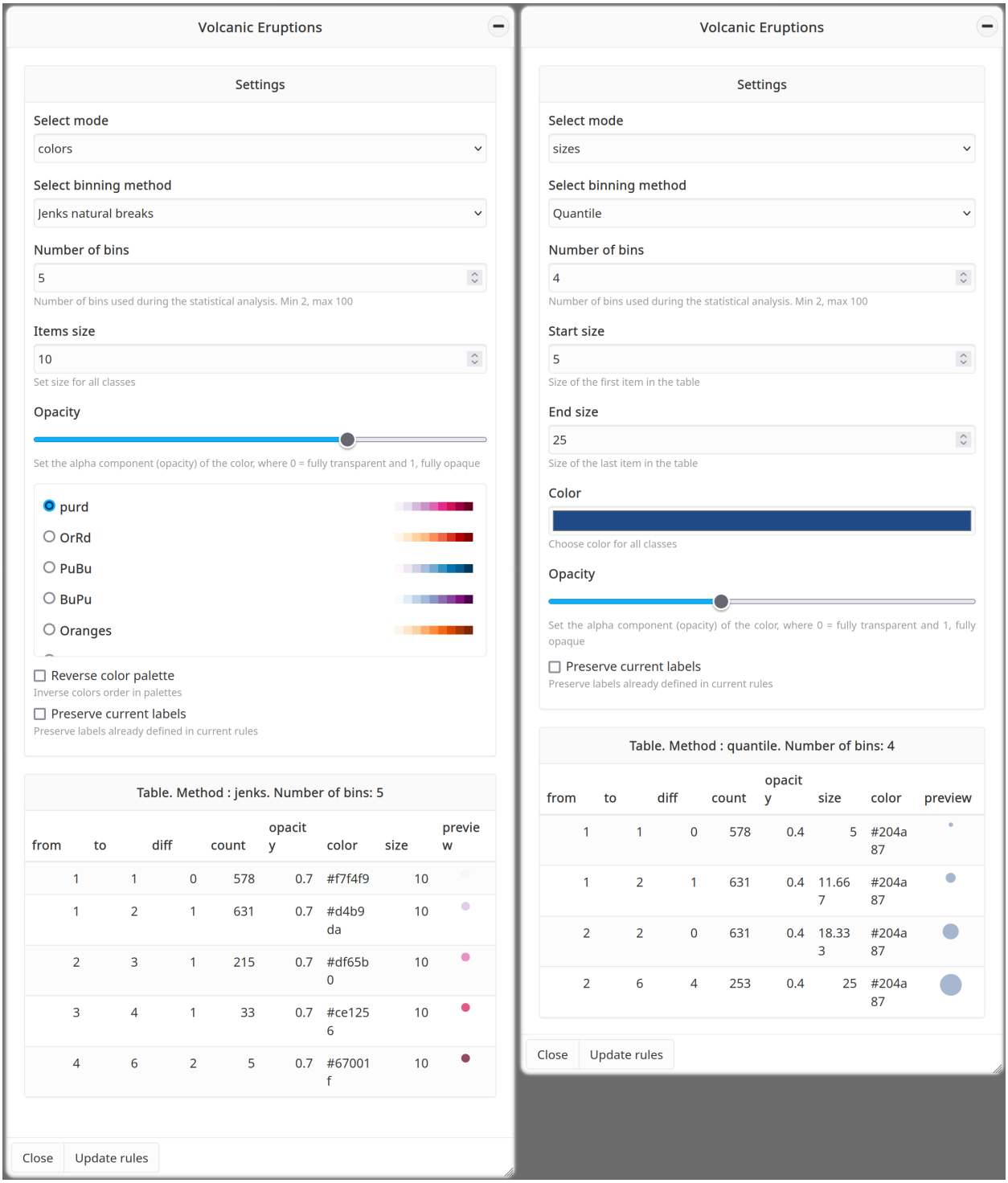
3. The **Auto style** tool automatically classifies data according to a **Number of bins** and **Binning method** (user-defined). Two visualization modes are available:

    1. **Colors**: a color ramp is selected by the user and from this, a color is assigned to each class automatically. In addition, it is possible to define a size (points and lines only) and an opacity which will be attributed to all classes.
    2. **Sizes**: a size is automatically calculated for each class between a start and end value defined by the user. In addition, it is possible to define a color and an opacity which will be attributed to all classes.

    A click on **Update rules** transfers all generated rules to the main **Edit style** panel.

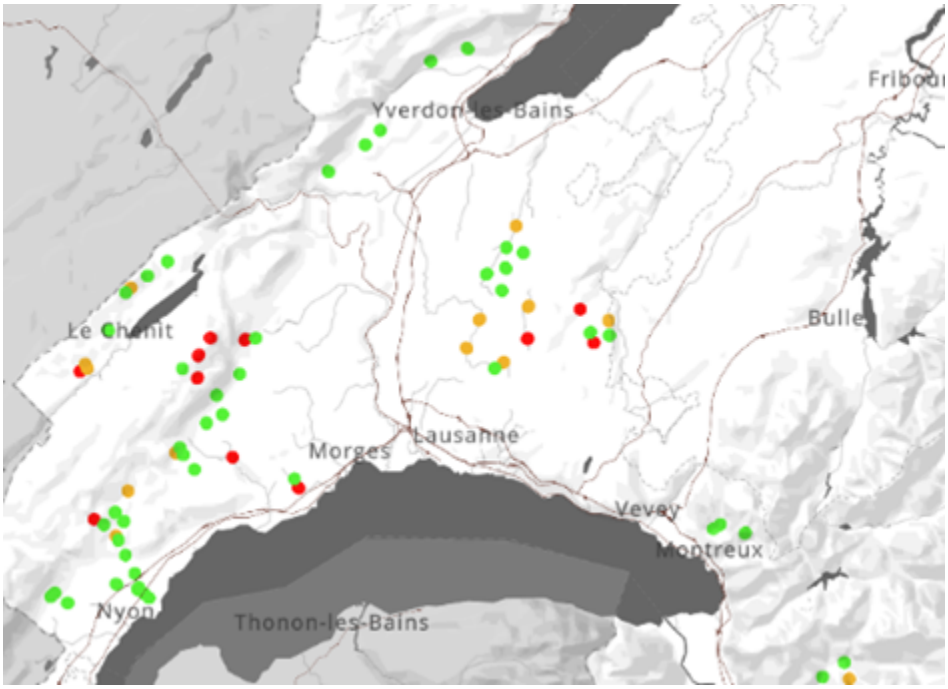
    > **Tip**
    >
    > Classification methods:
    >
    > - **Equal interval** divides the range of values into equal-sized classes. MapX determines automatically where the breaks should be depending on the number of classes you specified. This type of classification is best used for continuous data such as precipitation or temperature.
    > - **Quantile** divides the range of values into classes containing an equal number of features. It is best used for data that is evenly distributed across its range.
    > - **Natural breaks (Jenks)** generates classes based on natural groupings inherent in the data. Breaks are calculated in a way that best groups similar values together and maximizes the differences between classes. It is best used for data that is unevenly distributed but not skewed toward either end of the distribution.
    > - **Head/tail breaks** is a classification scheme for grouping data with a heavy-tailed distribution that is characterized by a majority of small values in the tail and a minority of large values in the head (i.e., heavily right skewed). Heavy tailed distributions are commonly characterized by a power law, a lognormal or an exponential function.
    >
    > For more information and examples, see the sources on which these explanations are based:
    >
    > - ArcGIS Pro Help
    > - Essentials of Geographic Information Systems v1.0 by Saylor Academy
    > - Head/tail breaks on Wikipedia

4. Include upper bound in interval: if checked, the intervals will include the upper bound. Whatever option is selected, the minimum and maximum value are always included in the first and last intervals.
5. Reverse displayed layers order: if checked, the layer stack will be reversed (the top rule will draw a layer at the bottom of the stack).


Volcanic Eruptions
Settings
Select mode
colors
Select binning method
Jenks natural breaks
Number of bins
5
Number of bins used during the statistical analysis. Min 2, max 100
Items size
10
Set size for all classes
Opacity
Set the alpha component (opacity) of the color, where 0 = fully transparent and 1, fully opaque
purd
OrRd
PuBu
BuPu
Oranges
Reverse color palette
Inverse colors order in palettes
Preserve current labels
Preserve labels already defined in current rules
Table. Method : jenks. Number of bins: 5
from to diff count opacity color size preview
1 1 0 578 0.7 #f7f4f9 10
1 2 1 631 0.7 #d4b9da 10
2 3 1 215 0.7 #df65b0 10
3 4 1 33 0.7 #ce1256 10
4 6 2 5 0.7 #67001f 10
Close
Update rules
Volcanic Eruptions
Settings
Select mode
sizes
Select binning method
Quantile
Number of bins
4
Number of bins used during the statistical analysis. Min 2, max 100
Start size
5
Size of the first item in the table
End size
25
Size of the last item in the table
Color
Choose color for all classes
Opacity
Set the alpha component (opacity) of the color, where 0 = fully transparent and 1, fully opaque
Preserve current labels
Preserve labels already defined in current rules
Table. Method : quantile. Number of bins: 4
from to diff count opacity size color preview
1 1 0 578 0.4 5 #204a87
1 2 1 631 0.4 11.667 #204a87
2 2 0 631 0.4 18.333 #204a87
2 6 4 253 0.4 25 #204a87
Close
Update rules

6. Show symbol with label: if using symbols with point data, should MapX add labels around it?
7. Zoom settings: option to vary the size of the points according to the zoom level.
8. Custom style (advanced users - requires knowledge of Mapbox style specifications): creating a style by directly editing the view code. More information in Mapbox documentation.
9. Legend title *[multilingual]*: title you want to give the legend.

Once the style is defined, it will be applied to the layer automatically when it is consulted from the data catalog.



If the vector view contains polygon type features, an additional option is present in the **Edit style** panel which allows to (de)activate and configure an outline (applied to every rule defined in the style).

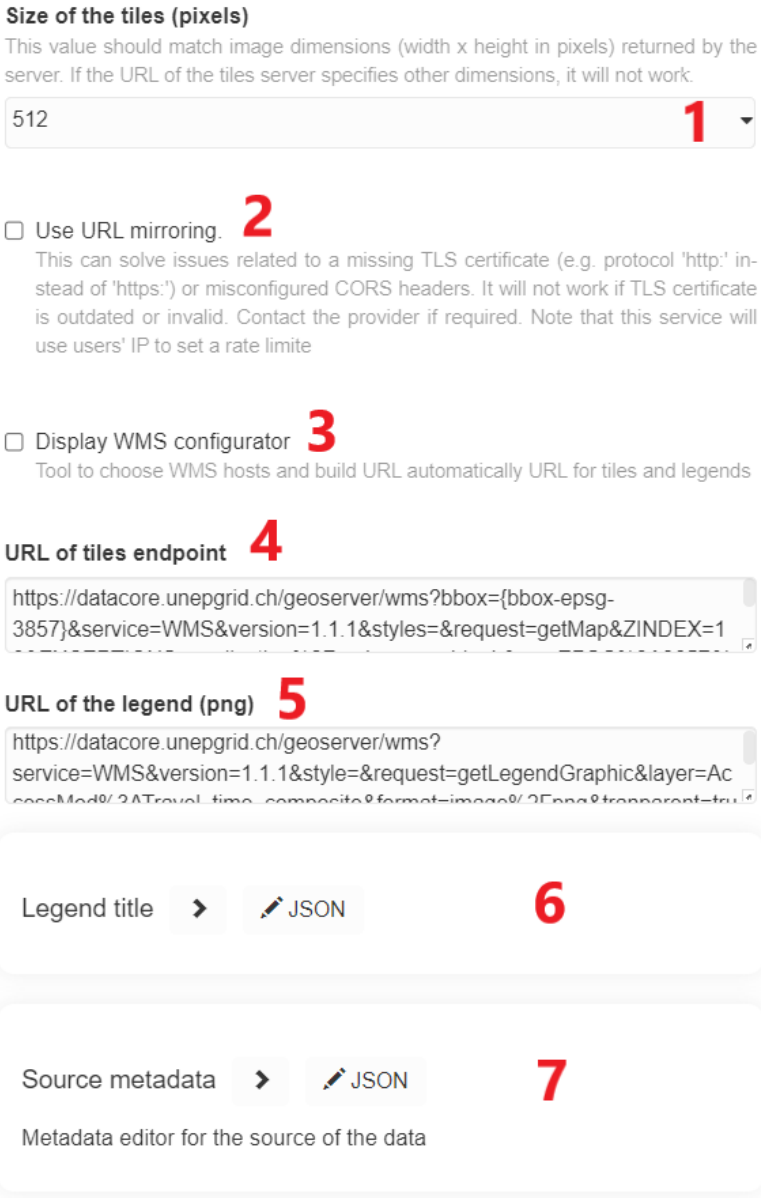
3.4.2 Raster views

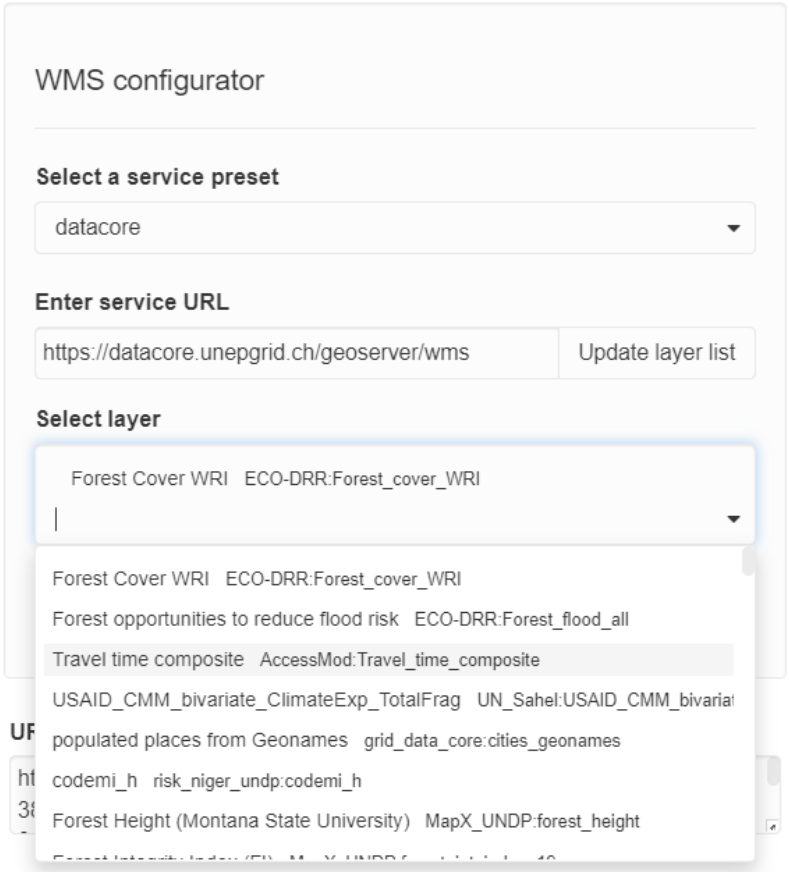
Unlike vector views which displays data published in the MapX database, raster views can only display data from external sources. They support Web Map Service (WMS) and Web Map Tile Service (WMTS) protocols from platforms that comply with the Open GeoConsortium (OGC) Standards. Their configuration differs a little from that of vector views:

- the external data source and the source metadata are defined from the view's configuration panel.
- the style of the layer and the legend are defined by the data provider and not in MapX.

After having created a new raster view, publishers can use the additional fields in the configuration panel to set up the data source and to fill the metadata.

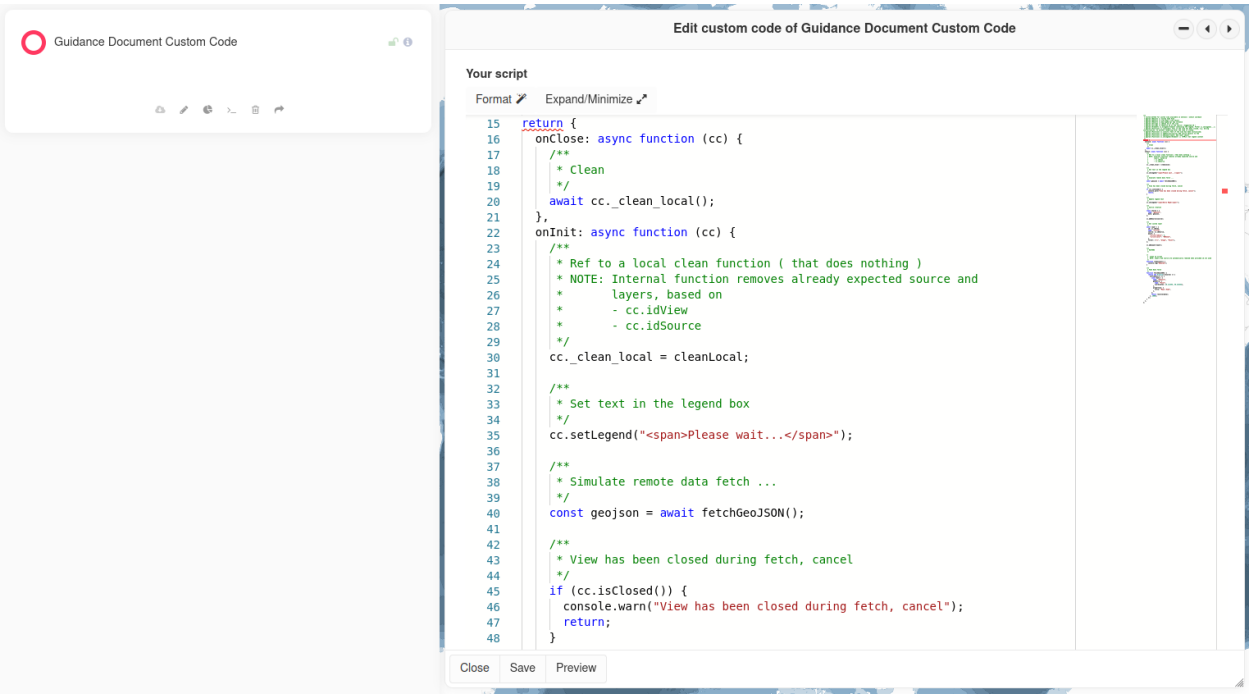
1. Size of the tiles: this value should match image dimensions (width x height in pixels) returned by the server. If the URL of the tiles server specifies other dimensions, it will not work.
2. Use URL mirroring: as MapX requires an https connection with CORS enabled to fetch external content, this option can be activated to solve issues related to a missing TLS certificate (e.g., `http` protocol instead of `https`) or misconfigured CORS headers. It will not work if TLS certificate is outdated or invalid.
3. Display WMS configurator: this tool allows to automatically build tiles and legend URLs for a WMS endpoint. Publishers can choose from a drop-down list of predefined endpoints or manually enter a WMS endpoint to get the list of available layers. Once the layer to be published in MapX has been selected, a click on the **Update generated URL** button will automatically generate the queries to fetch the tiles and the legend from the service. As for WMTS, the **WMS configurator** does not support this type of service. Queries must be entered manually in the dedicated fields.
4. URL of tiles endpoint: query to fetch the tiles (WMS/WMTS).
5. URL of the legend: query to fetch the legend. Please note that only the PNG format is supported.
6. Legend title *[multilingual]*: legend title to display in the view catalog.
7. Source metadata: since 2021, users can describe the view using the complete MapX metadata template (see *Metadata*) within the raster view configuration panel. A link to download the data source can be provided in the **Source** section of the metadata template.


Size of the tiles (pixels)
This value should match image dimensions (width x height in pixels) returned by the server. If the URL of the tiles server specifies other dimensions, it will not work.
512
1
Use URL mirroring.
2
This can solve issues related to a missing TLS certificate (e.g. protocol 'http:' instead of 'https:') or misconfigured CORS headers. It will not work if TLS certificate is outdated or invalid. Contact the provider if required. Note that this service will use users' IP to set a rate limite
Display WMS configurator
3
Tool to choose WMS hosts and build URL automatically URL for tiles and legends
URL of tiles endpoint
4
https://datacore.unepgrid.ch/geoserver/wms?bbox={bbox-epsg-3857}&service=WMS&version=1.1.1&styles=&request=getMap&ZINDEX=1
URL of the legend (png)
5
https://datacore.unepgrid.ch/geoserver/wms?service=WMS&version=1.1.1&style=&request=getLegendGraphic&layer=Ac
Legend title
JSON
6
Source metadata
JSON
7
Metadata editor for the source of the data


WMS configurator
Select a service preset
datacore
Enter service URL
https://datacore.unepgrid.ch/geoserver/wms
Update layer list
Select layer
Forest Cover WRI ECO-DRR:Forest_cover_WRI
Forest Cover WRI ECO-DRR:Forest_cover_WRI
Forest opportunities to reduce flood risk ECO-DRR:Forest_flood_all
Travel time composite AccessMod:Travel_time_composite
USAID_CMM_bivariate_ClimateExp_TotalFrag UN_Sahel:USAID_CMM_bivariat
populated places from Geonames grid_data_core:cities_geonames
codemi_h risk_niger_undp:codemi_h
Forest Height (Montana State University) MapX_UNDP:forest_height

3.4.3 Custom code views

To have a larger spectrum of solutions when creating a view, MapX allows developers (more details *here*) to code a view and thus customize it to their needs. Custom code views allow, among other things, to publish external data (raster and/or vector), to integrate advanced features such as sliders and/or drop-down lists or even to interact with the map (e.g., zoom in on specific areas). The development of this type of view is reserved for advanced users as it requires knowledge of JavaScript, HTML, CSS and the Mapbox library.



As it is for raster views, users can describe the view using the complete MapX metadata template (see *Metadata*) within the custom code view configuration panel.

If you are interested in developing your own custom code views, please contact the MapX team at: info@mapx.org.

3.5 Dashboards

> **Warning**
>
> To maintain the environment as flexible as possible, the creation and edition of dashboard is addressed to developers as coding skills are needed (JavaScript, HTML, CSS) but all users can interact with them regardless of their technical level.

In MapX, a dashboard is an informative environment which can be developed/coded in a view by publishers to complement and/or synthesize the information displayed on the map. It is composed of one or several elements called widgets which can contain for example an interactive graphic,

some text, an image or even a video. Data from the view as well as data and/or media from external sources can be used in a dashboard to present relevant information to users. Dashboards can be used for example to show aggregated data at different geographic scales (e.g., global, national, local), temporal trends or the distribution of a variable by category (e.g., exports by sector of activity). There is almost no restriction on the way data can be processed (except for spatial operations) and then displayed in a dashboard.

As a dashboard is necessarily associated with a view, it is automatically displayed in the MapX interface when the view is opened from the data catalog. It can be resized from its active vertices, hidden by clicking on the icon in the bottom-right corner and even rearranged by the user (move and delete widgets). These actions are temporary and do not affect other users. The dashboard returns to its initial state when the view is consulted again.

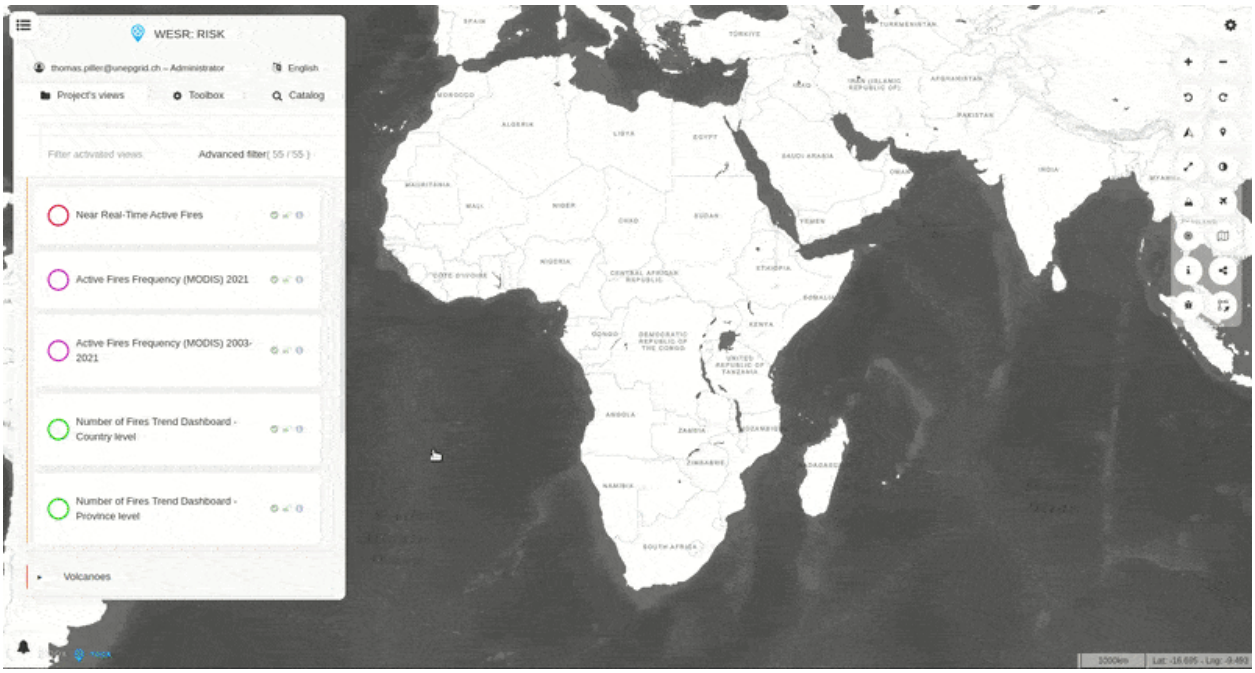


Fig. 4: Interactions with a dashboard

In a dashboard, each widget can display data based on two major types of interactions with the map:

1. Static widgets show values that do not change with zoom or at click. Simply put, there is no interaction with the map.
2. Dynamic widgets allow interacting with the map through:
    1. zooming in and out
    2. clicking on specific features
    3. mouse hovering over specific features

The majority of widgets in MapX interact with the map via a click to display item-specific data in the widget.

If you are interested in developing your own dashboards, please contact the MapX team at: info@mapx.org.

3.6 Sharing views between projects

All types of views can be shared to other projects. Shared views are available without editing tools (i.e., view, style, dashboard) in secondary projects. Sharing can be done from the view editing panel by setting the name of the project(s) in which the view must be shared in the field **Other projects where the view is visible**. The available projects in which the view can be shared are those where the current editor is at least publisher.

Views can also be imported into other projects by any user having reading right on it using the **Share this view in another project** tool (*link*). However, this action can be performed only to projects in which the user is at least publisher. Views imported into a project are listed and can be removed from the project by publishers and administrators from the **Manage external views** available in the **Toolbox**.

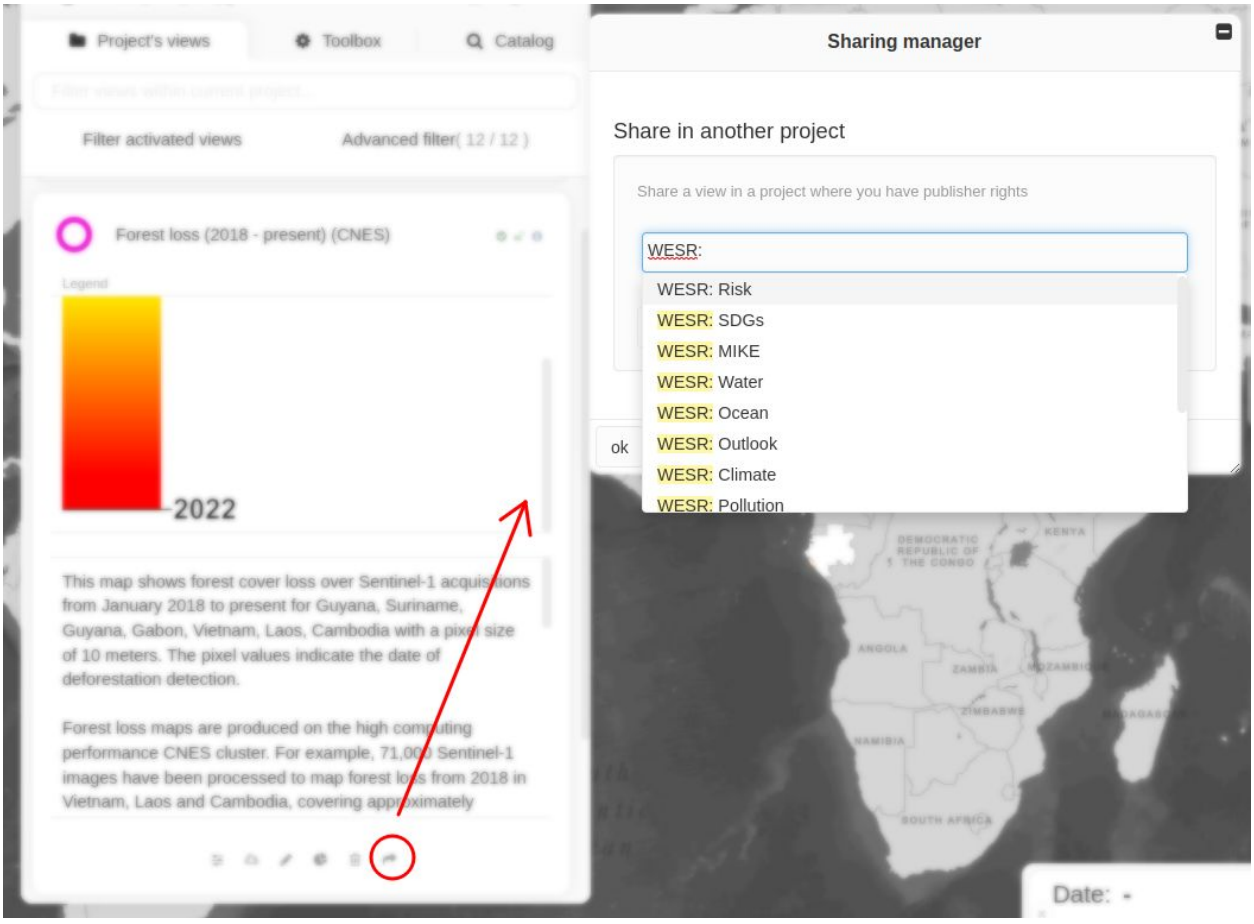


Fig. 5: Importing views

3.7 Download tool

The **Download tool** enables users to export the dataset(s) associated with a view. Depending on the type of view, the tool may either provide a download link to an external resource (raster and custom code views) or an interactive interface to download data from the MapX database with customizable options (vector tiles views).

3.7.1 How do I use the Download tool?

The **Download tool** is accessible from each view but is not necessarily active. Depending on the data license, the download may not have been authorized by the data publisher. In this case, the tool is grayed out in the MapX interface.

Vector views

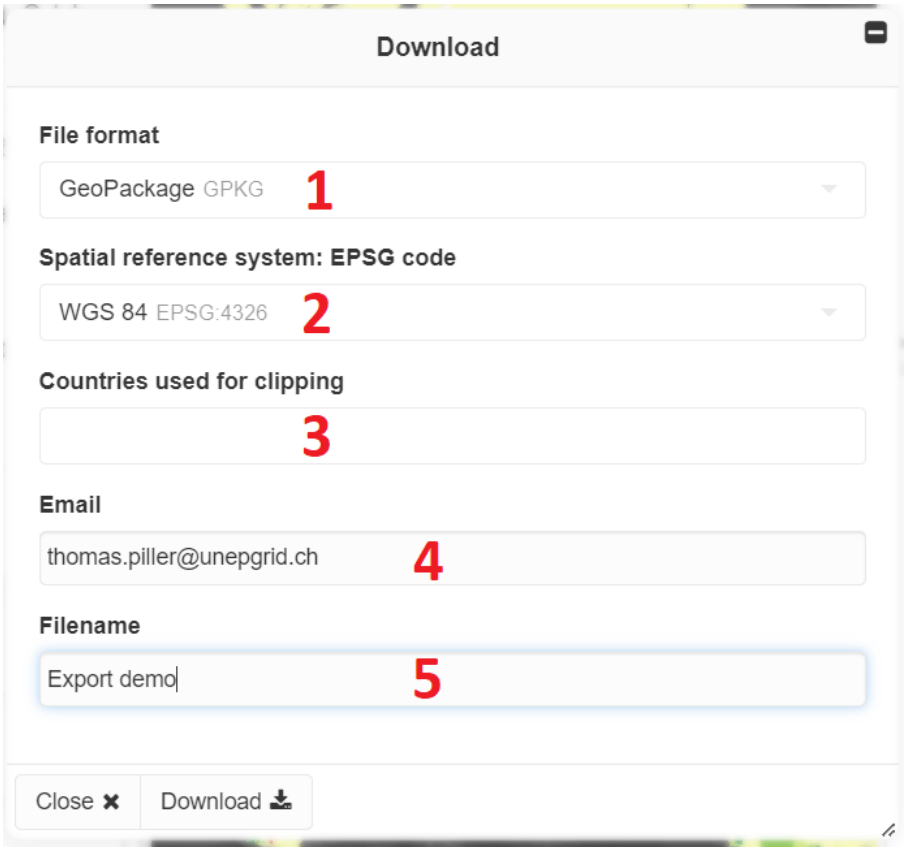


Fig. 6: Download tool interface for vector views

To export a dataset from a vector view, you must:

1. Select the output file format. The MapX team recommends exporting data in GeoPackage (GPKG) format. Details on the file formats supported by MapX are available in the *Supported formats* section.

2. Select the Spatial Reference System (SRS) of the export. By default the data is exported in WGS 84 (EPSG:4326), the SRS in which spatial data is stored in the MapX database. By specifying another SRS, the **Download tool** will project the data during the export.
3. Select a list of countries for clipping the export *[optional]*. If left blank, the entire dataset will be exported. National administrative boundaries come from GAUL 2015.

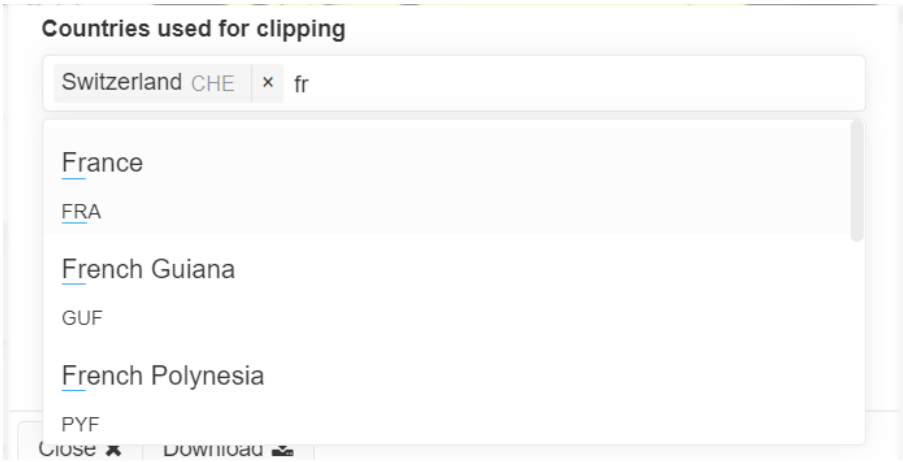


Fig. 7: List of countries for clipping the export

4. Enter an email address which will be used to notify you that the file is available for download. By default, the email address of the MapX account is used.
5. Enter an export file name. By default, the data source name is used.

Once the export has been configured, the process can be launched by clicking on the **Download** button. The export status can be consulted from the notification panel (available from bottom-left corner). Once the export completed, the file can be downloaded either from the notification panel or from the link sent automatically by email.

The downloaded `ZIP` folder contains:

1. the data in the selected format
2. the source metadata in `JSON` format (`metadata.json`)
3. an `info.txt` file containing the export date

Raster and custom code views

If the view is of the raster or custom code type, the download tool will display a simple link to an external resource. It can either be a download link or a link to a web page where the data is available.

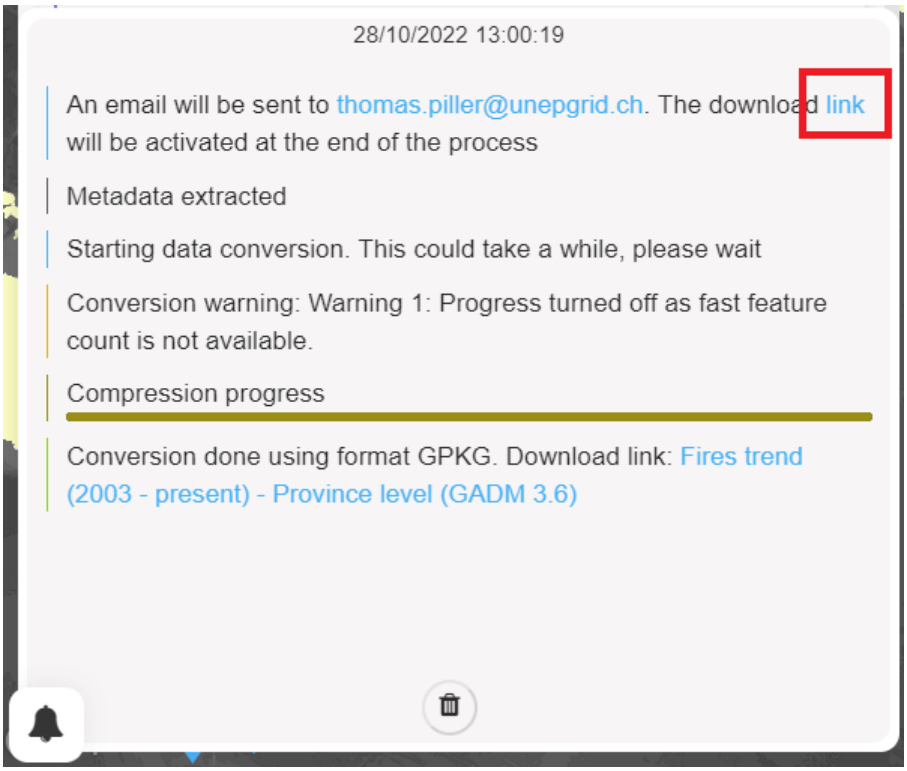


Fig. 8: Notification panel

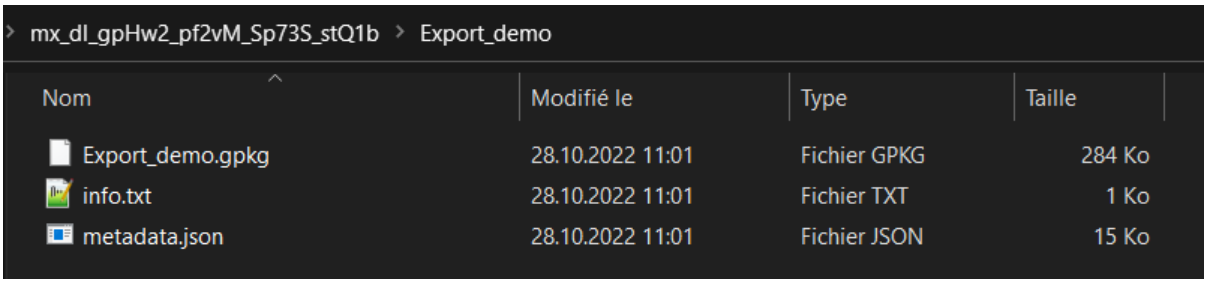


Fig. 9: Content of the ZIP folder

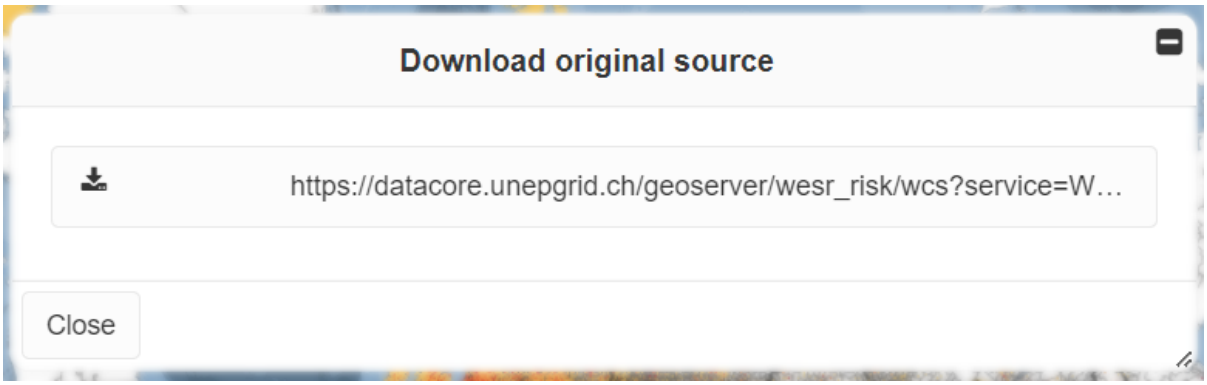


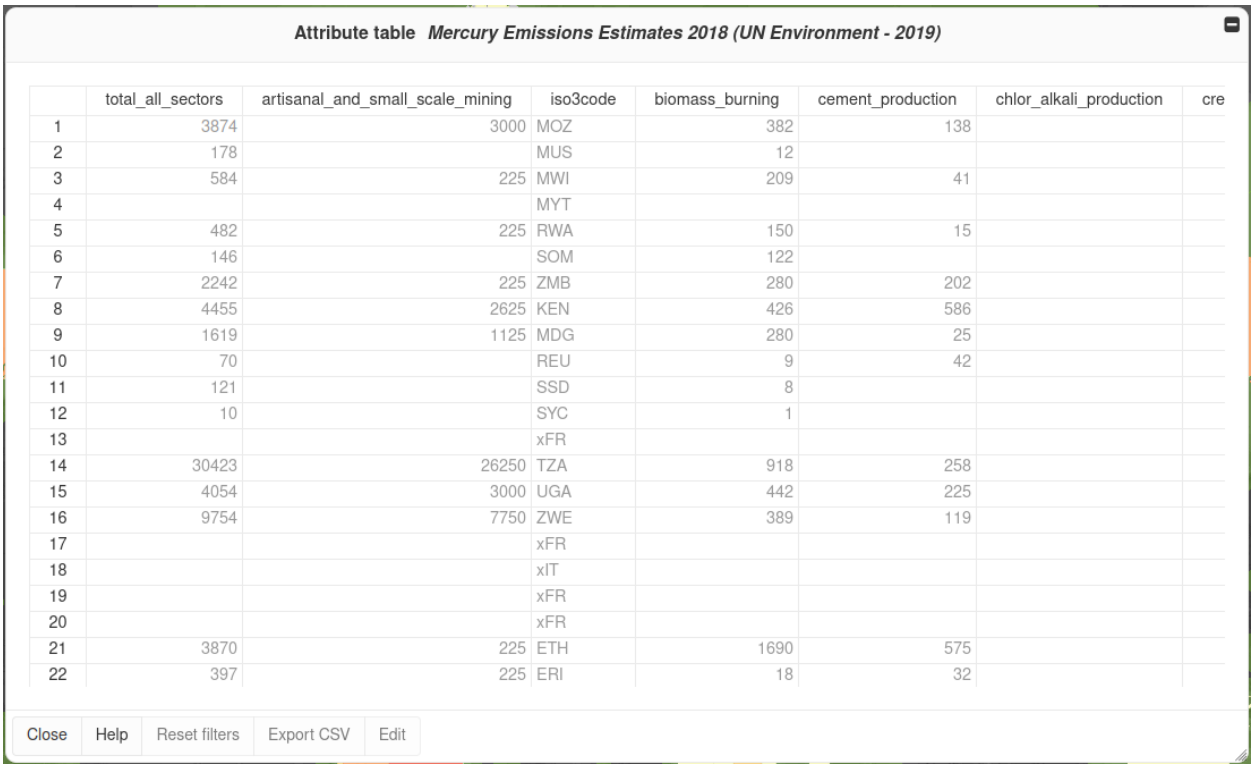
Fig. 10: Download tool interface for raster and custom code views

3.8 Attribute table

MapX enables users to access the attribute table of vector views from the data catalog. This tool allows users to visualize and extract the data in tabular format.

3.8.1 General description

The attribute table is an interactive workspace allowing to access the tabular data of the view. Each row in the table represents a feature displayed in the map and each column contains a specific information about the feature. Features in the table can be easily sorted.



	total_all_sectors	artisanal_and_small_scale_mining	iso3code	biomass_burning	cement_production	chlor_alkali_production	cre
1	3874	3000	MOZ	382	138		
2	178		MUS	12			
3	584	225	MWI	209	41		
4			MYT				
5	482	225	RWA	150	15		
6	146		SOM	122			
7	2242	225	ZMB	280	202		
8	4455	2625	KEN	426	586		
9	1619	1125	MDG	280	25		
10	70		REU	9	42		
11	121		SSD	8			
12	10		SYC	1			
13			xFR				
14	30423	26250	TZA	918	258		
15	4054	3000	UGA	442	225		
16	9754	7750	ZWE	389	119		
17			xFR				
18			xIT				
19			xFR				
20			xFR				
21	3870	225	ETH	1690	575		
22	397	225	ERI	18	32		

Fig. 11: Attribute table layout

3.8.2 How do I use the attribute table?

Only vector type views provide the ability to access their attribute table. They are identifiable in the data catalog by their green color (circle to the left of their title). Once a vector view is open, its attribute table can be accessed via the dedicated button in the options bar.

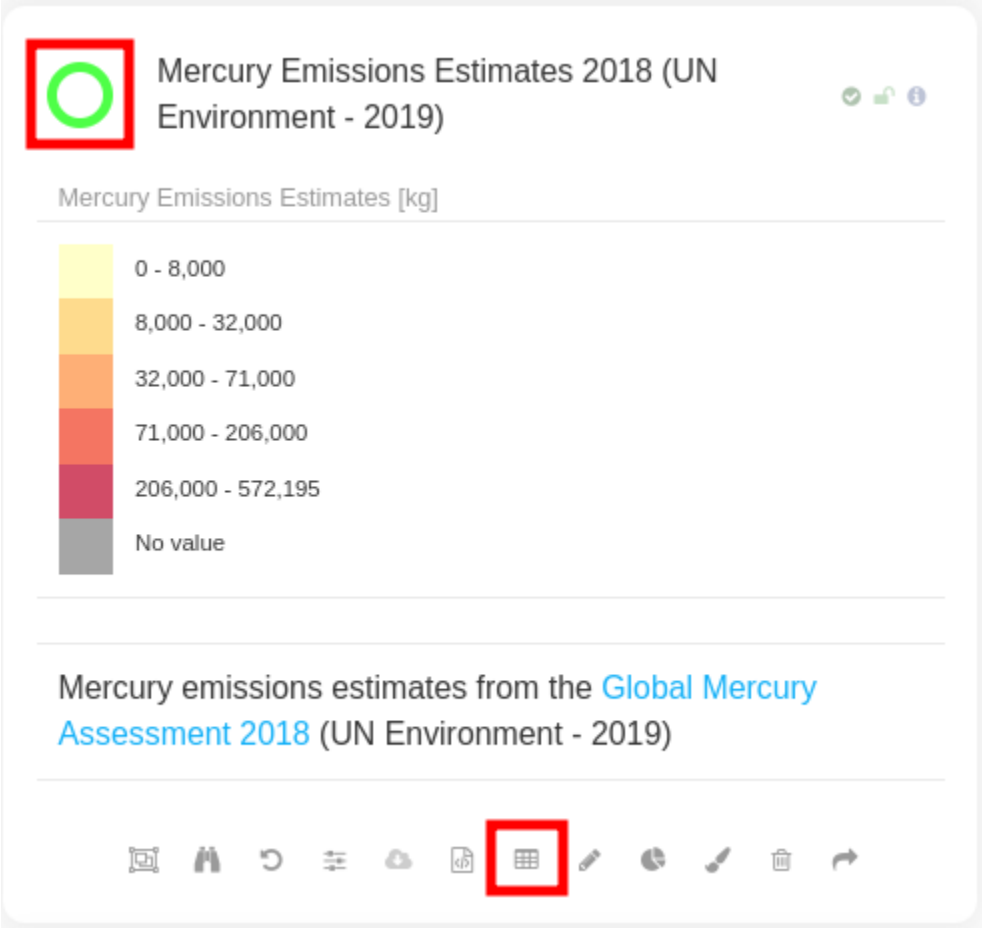
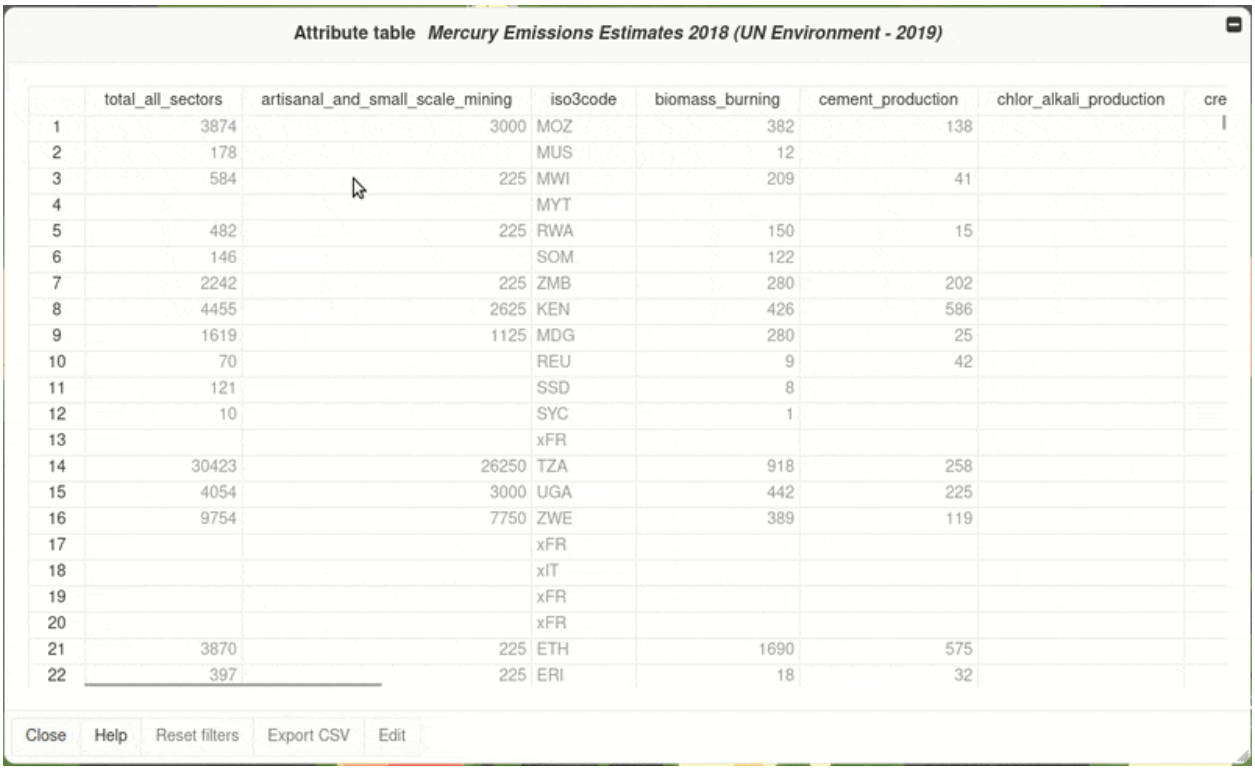


Fig. 12: Attribute table icon

How can I sort the data?

Click on the header of the column. Depending on the type of your data, sorting will be done by:

- alphabetical order (A to Z OR Z to A)
- numerical order (lower to higher OR higher to lower values)



	total_all_sectors	artisanal_and_small_scale_mining	iso3code	biomass_burning	cement_production	chlor_alkali_production	cre
1	3874	3000	MOZ	382	138		
2	178		MUS	12			
3	584	225	MWI	209	41		
4			MYT				
5	482	225	RWA	150	15		
6	146		SOM	122			
7	2242	225	ZMB	280	202		
8	4455	2625	KEN	426	586		
9	1619	1125	MDG	280	25		
10	70		REU	9	42		
11	121		SSD	8			
12	10		SYC	1			
13			xFR				
14	30423	26250	TZA	918	258		
15	4054	3000	UGA	442	225		
16	9754	7750	ZWE	389	119		
17			xFR				
18			xIT				
19			xFR				
20			xFR				
21	3870	225	ETH	1690	575		
22	397	225	ERI	18	32		

How do I export the data I just filtered?

Click on the button **Export CSV** located at the bottom of the modal panel to export your data in CSV format. If the button is grayed out, it means that the data license does not allow data to be downloaded. The file should be available in the download folder of your device.

How can I edit the content of the attribute table?

If you have editing rights on the data source, the **Edit** button located at the bottom of the panel will be active and by clicking on it, you will automatically load the current data source into the **Edit vector source** tool. Please refer to the *Edit vector source* section for more information.

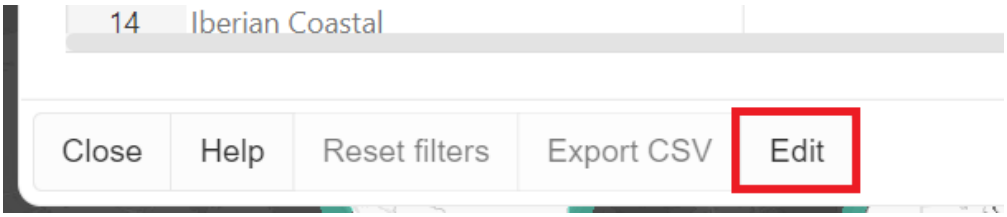


Fig. 13: Shortcut to vector source editing tool

3.9 Code share tool

The **Code share** tool is an interactive workspace allowing users to copy the style of a MapX view and use it in diverse contexts. Only vector type views provide the ability to access this tool. They are identifiable in the data catalog by their green color (circle to the left of their title). Once a vector view is open, the **Code sharing** tool table can be accessed via the dedicated button in the options bar.

The **Code share** tool allows users to export the style in several formats which are described in the following sections:

1. **Simple html/js app, using maplibre**: this option allows to copy the code of a basic but complete web page which displays the view. Maplibre and the MapX API are used to display the map in an interactive way.
2. **Mapbox style (layers only)**: this option allows to copy the code of all Mapbox layers composing the view knowing that each rule defined in the style of the view corresponds to a layer (link to the Mapbox documentation).
3. **Mapbox style (full)**: this option allows to copy the code of the complete Mapbox style (source & layers) of the view. This option can be useful for integrating MapX content into another cartographic application based on Mapbox.
4. **SLD format**: the last option allows to copy the style of the view as a Styled Layer Descriptor (SLD). This format is supported by multiple open source softwares: QGIS, GeoServer, MapServer.

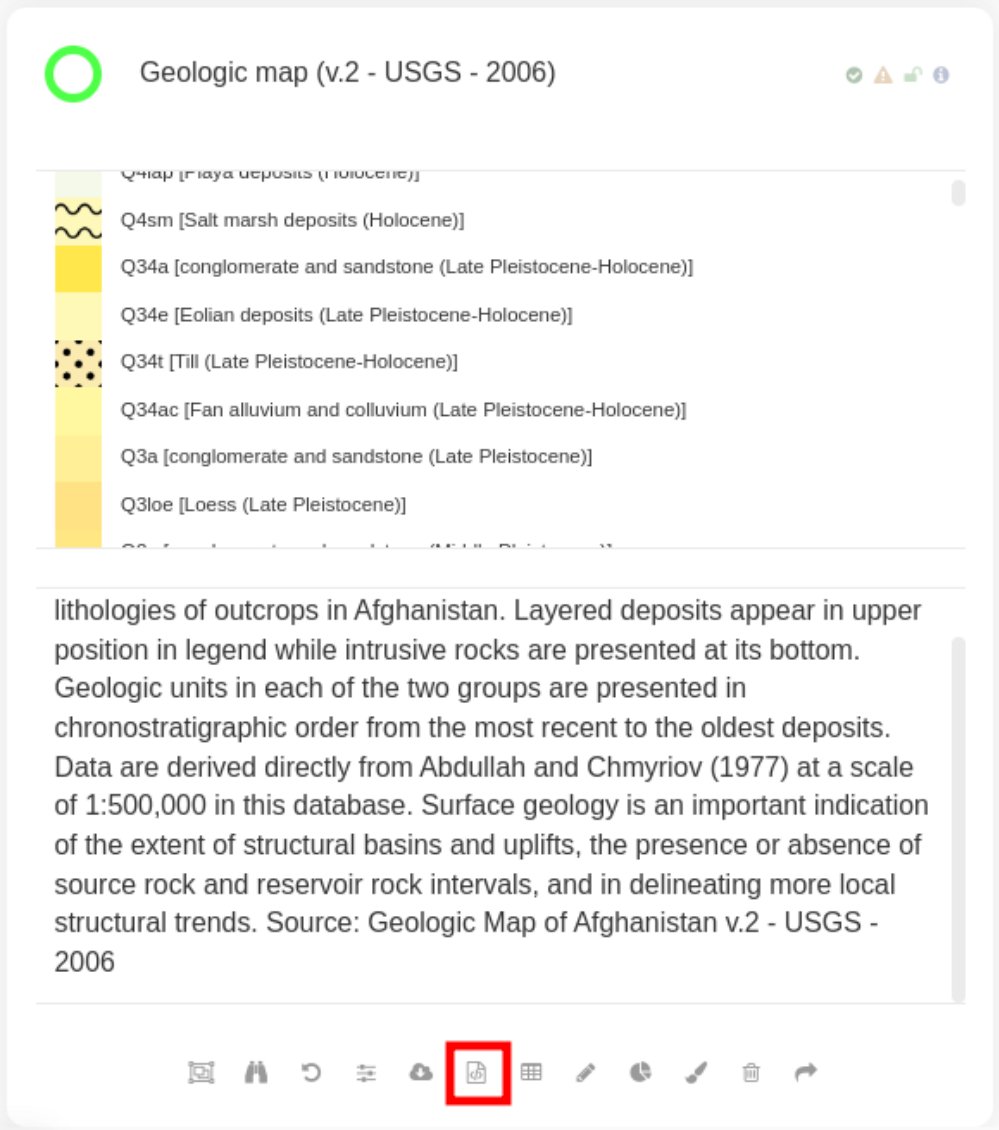


Fig. 14: Code share icon

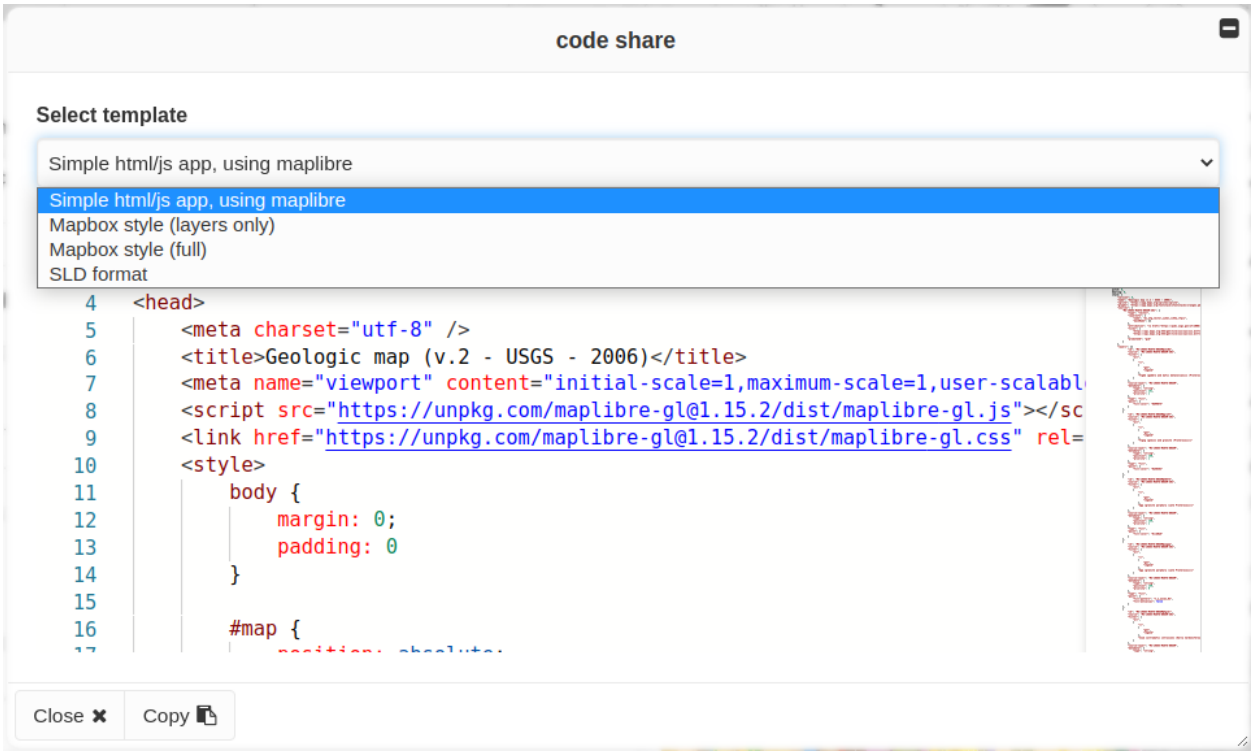


Fig. 15: Code share layout

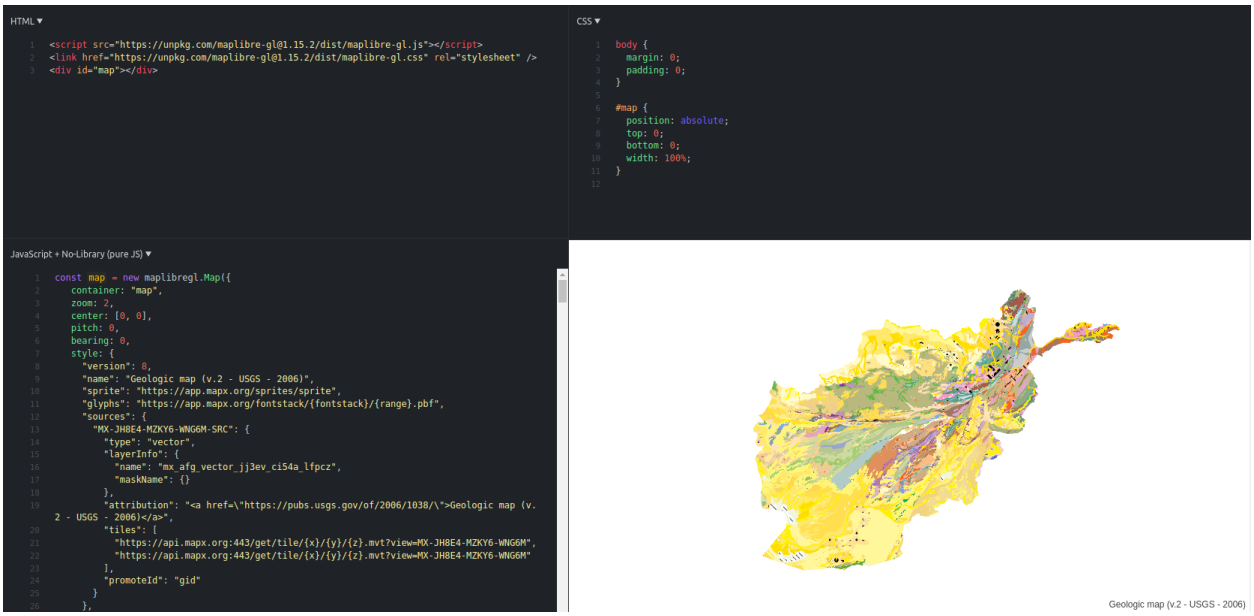


Fig. 16: JSFiddle integration example

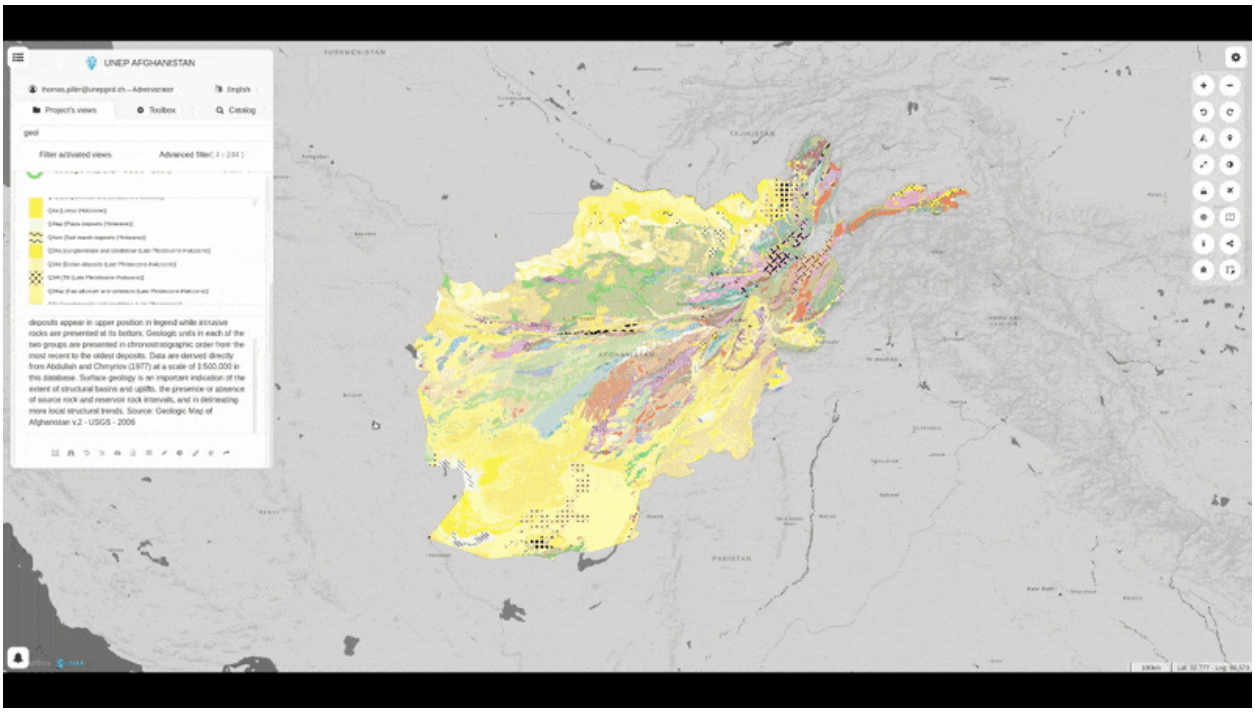


Fig. 17: Style integration in QGIS

CHAPTER

FOUR

METADATA

The **MapX Metadata Standard**, which was developed by the MapX team, is an extension of the ISO standard for describing geographic information (ISO 19115-1:2014). It provides information about the identification, the content, the spatial and temporal aspects, the license, and other properties of a dataset. Moreover, some descriptive elements can be filled in all the languages supported by MapX.

4.1 Structure

The **MapX Metadata Standard** is composed of:

- mandatory metadata elements (prevent saving metadata if they are not filled in)
- recommended metadata elements (minimum to be provided so that users can discover the data and determine if it is suitable for their use)

> **Warning**
>
> A warning sign is displayed in the interface to inform users that some recommended elements are missing (*link*).

- optional metadata elements to allow for a more detailed description of the data

4.1.1 Description of the MapX Metadata Standard

1. Text: textual description of the data using title, abstract and tags
    - Title [m] (multilingual): title given to the source in the MapX tools
    - Abstract [m] (multilingual): detailed description of the dataset
    - Additional notes (multilingual): any other relevant information to be provided to MapX users (processing performed on the data, modifications, disclaimer, citation, etc.)
    - Keywords: keywords (or tags) help users discover your data. Please include terms that can be used by a technical and non-technical audience.

  - Keywords [r] (user-defined)
  - Geographic Keywords [m] (based on Standard country or area codes for statistical use (M49))
  - GEneral Multilingual Environmental Thesaurus (GEMET) keywords
- Attribute description (multilingual): description of the attributes contained in the dataset
- Alias for attribute names: short names (aliases) for attributes can be defined in this section. It's often valuable to replace technical or truncated attribute names by something clearer. For example, a source using the attribute name `x_1Mp_mean` would be more comprehensive with: "Average monthly precipitation [mm]". Aliases are used when the attribute table is consulted or when an feature is queried in the map.

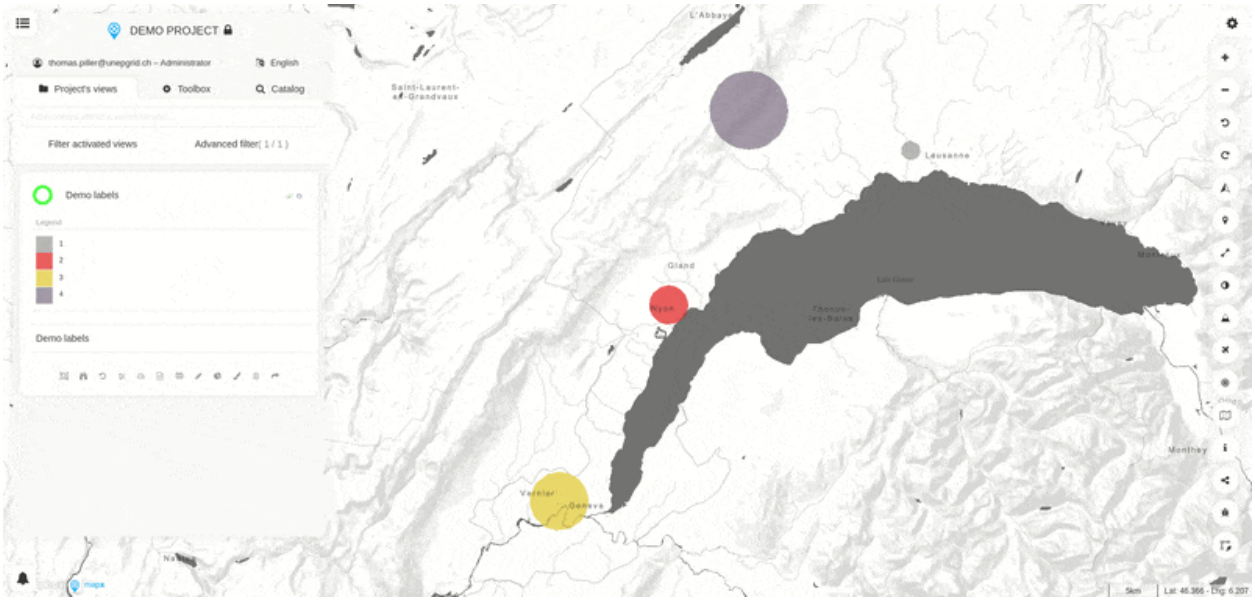


Fig. 1: demo_labels

- Language: language(s) used in dataset content

2. Temporal: description of the dataset using temporal references
   - Issuance:
     - Periodicity: frequency at which the data is published or updated
     - Release date: date of formal issuance
     - Last update: date of the latest update
   - Range: the time range covered by the data
     - Check box: whether the data has no time range (yes/no)
     - Start: initial date covered by the data
     - End: end date covered by the data

3. Spatial: description of the data using spatial reference (automatically filled by MapX)
    - Spatial reference system: description of the spatial reference system
        - Code of the SRS (EPSG)
        - URL to the SRS code definition
    - Bounding box: spatial bounding box of the data using latitude and longitude
4. Contact [r]: information about people or organization related to this data (e.g., data provider)
5. Source: origin of the dataset and how to retrieve it
    - Homepage [r]: homepage (URL) of the data or, where applicable, that of the data provider
    - Sources: link to retrieve the data
        - Check box: whether the link contains a query to retrieve the data automatically (yes/no)
        - URL [r]: direct link to download the data or, where applicable, link to a webpage where the data is accessible
6. Licensing: If any, description of the data license(s)
    - List of licenses [r]: name and/or description of the license
7. Annexes: list of online documents (URL) related to the dataset, such as a technical report or a scientific publication.

[m] mandatory metadata elements; [r] recommended metadata elements

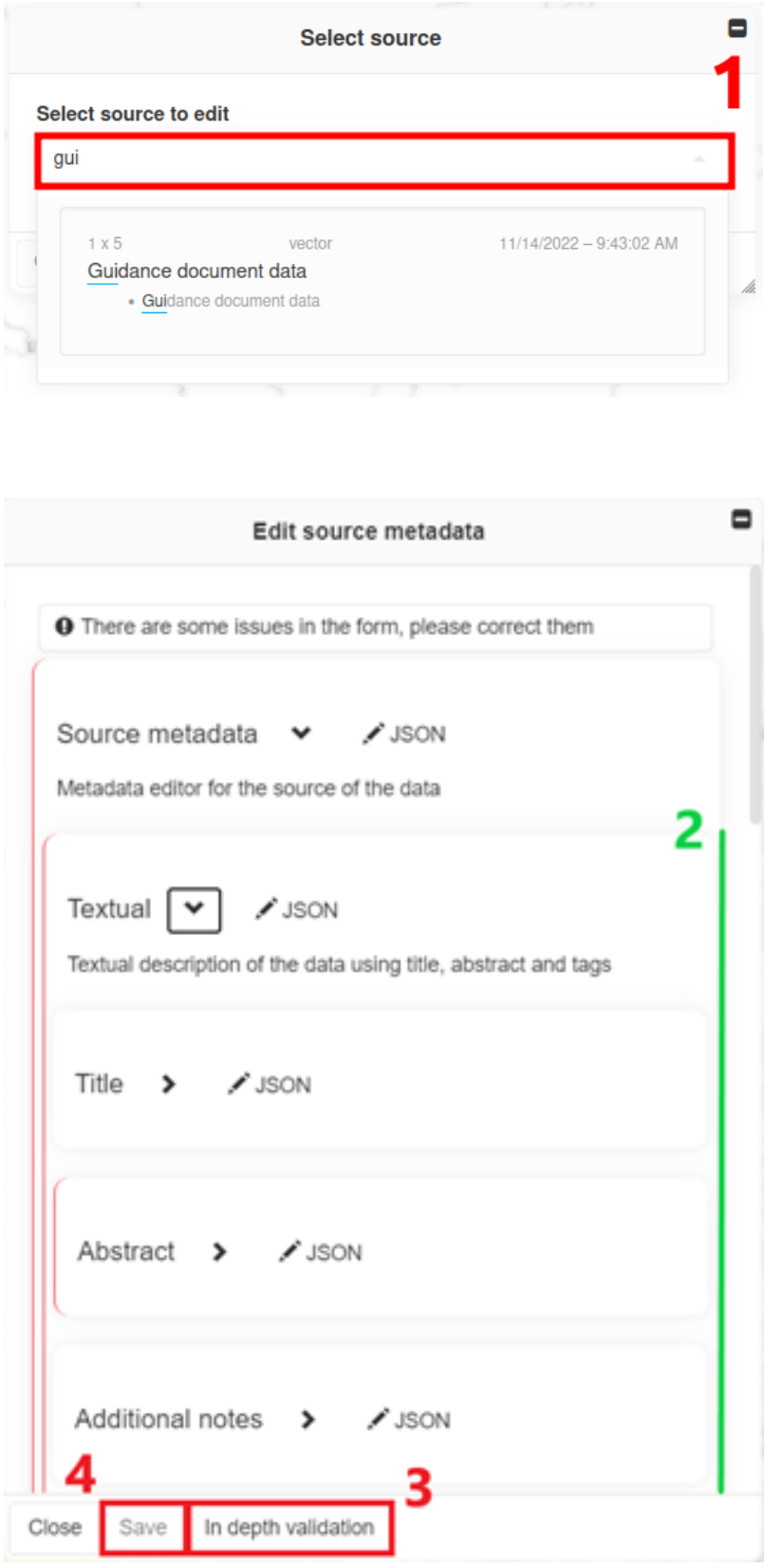
4.2 Editing the metadata of a source

1. To fill in or edit the metadata of a source, click on the **Toolbox** tab and then on **Edit sources metadata**:

2. A window appears and allows you to edit the metadata, of each source for which you have editing rights:
    1. select the desired source
    2. edit the metadata through the form

> **Warning**
>
> red lines indicate fields that need to be filled in or that contain invalid values

    3. verify that all recommended metadata elements are filled in
    4. save your edits by clicking on **Save**.


Select source
1
Select source to edit
gui
1 x 5
vector
11/14/2022 – 9:43:02 AM
Guidance document data
Guidance document data
Edit source metadata
There are some issues in the form, please correct them
Source metadata
JSON
Metadata editor for the source of the data
2
Textual
JSON
Textual description of the data using title, abstract and tags
Title
JSON
Abstract
JSON
Additional notes
JSON
4
3
Close
Save
In depth validation

CHAPTER

FIVE

SOURCES

A two levels-data management system exists in MapX: “sources” and “views”. Simply put, sources are raw spatial data stored in the MapX database while views are a cartographic representation of it. This chapter introduces this concept in detail and covers publishing, managing and editing sources.

5.1 Publication of new sources

5.1.1 Data preparation

Before adding a new source to MapX, it is necessary to prepare the spatial dataset to be compatible with the application. A geographic information system (GIS) software such as QGIS (cross-platform, free & open-source) or ArcGIS Desktop can be used to check the compatibility of your spatial dataset, to edit it and to convert it into another format if necessary.

Users should pay attention that:

- the geometries of the spatial dataset are valid
- the attribute table is encoded in UTF-8
- the columns of the attribute table are associated to the right data type (e.g., text attributes don’t offer the same styling possibilities as numerical ones)
- the dataset is stored in a format supported by MapX

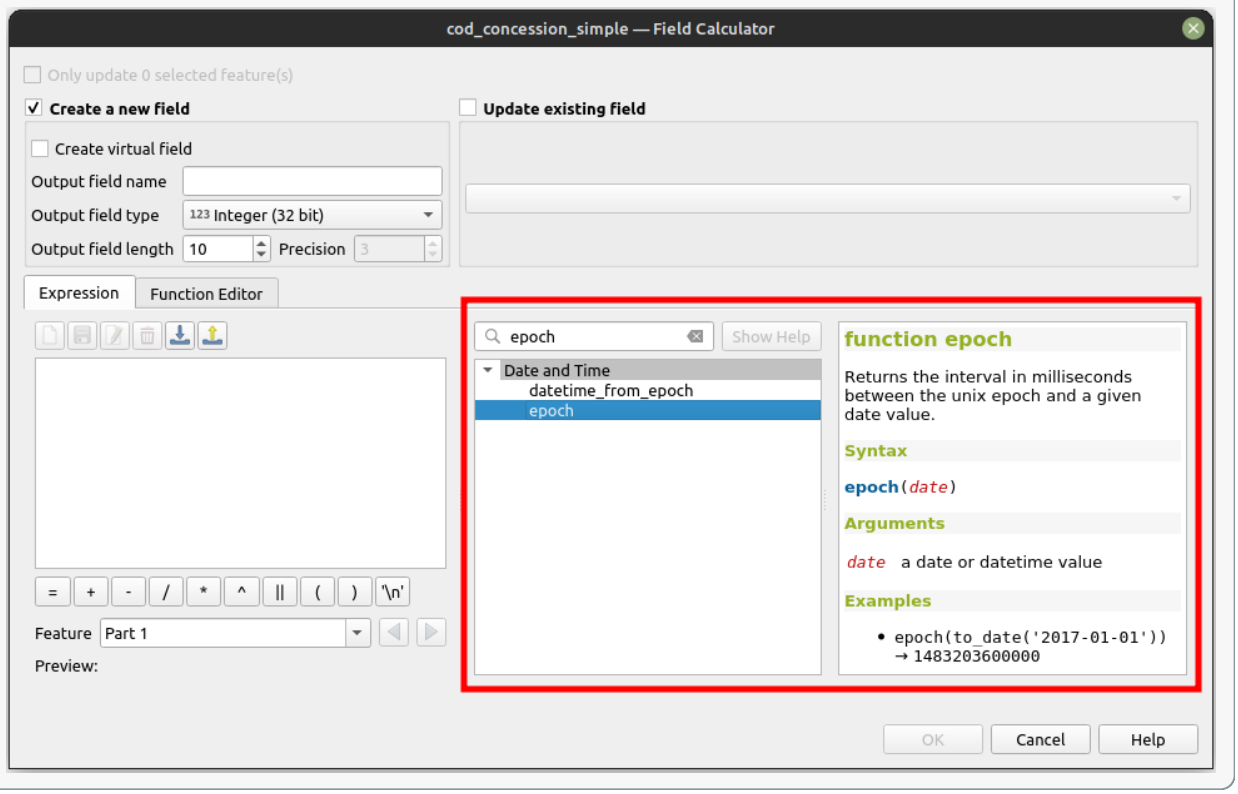
Warning

Dates must be stored in one of two formats `YYYY-MM-DD` or `YYYY/MM/DD`. If not, dates will be imported as text into the MapX database.

Note

If your data has a time component and you want to activate the time-slider in MapX, you will need to preformat your dataset before importing it. To be integrated in a time-slider, dates must be stored in a column named `mx_t0` and time intervals must be stored in columns `mx_t0`

(start date) and `mx_t1` (end date). The format of these columns must be Unix epoch (in seconds). Relevant information for converting from and to Unix epoch can be found at this address: https://www.epochconverter.com/. Alternatively, it is possible to perform date <-> epoch conversions using the Field Calculator in QGIS.



5.1.2 Supported formats

Here is a list of formats supported by MapX for importing and exporting data:

Format	Import: module	Import: drag and drop	Export
GeoPackage *(vector only)*	yes	no	yes
GeoJSON	yes	yes	yes
ESRI Shapefile	yes [1]	yes [1,Z]	yes [1]
SQLite	yes	no	yes
KML	yes [1]	yes [1]	yes [1]
GML	yes [1]	no	yes [1]
GPX	yes [1]	yes [1]	no [2]
CSV *(tabular only)*	yes [1]	no	yes [1]
DXF	yes [1,3]	no	no [2]
PostgreSQL SQL Dump	no	no	yes

[1] partial support, data could be altered, missing attribute, missing geometry

[2] driver error

[3] need SRS assignation

[Z] ESRI Shapefiles being composed of multiple files, it's necessary to zip them in an archive to be uploaded with the drag and drop method. The files (at least: `.shp`, `.shx`, `.dbf`, `.cpg` & `.prj`) should be located at the first level of the archive.

Types of geometry

The types of geometry supported by MapX are :

- Geometry primitives: Point, LineString & Polygon
- Multipart geometries: MultiPoint, MultiLineString & MultiPolygon

> **Note**
>
> MapX only partially supports GeometryCollection. For this reason, the MapX team recommends that you do **not** use this type of geometry to upload your data into the platform.

5.1.3 Data publication

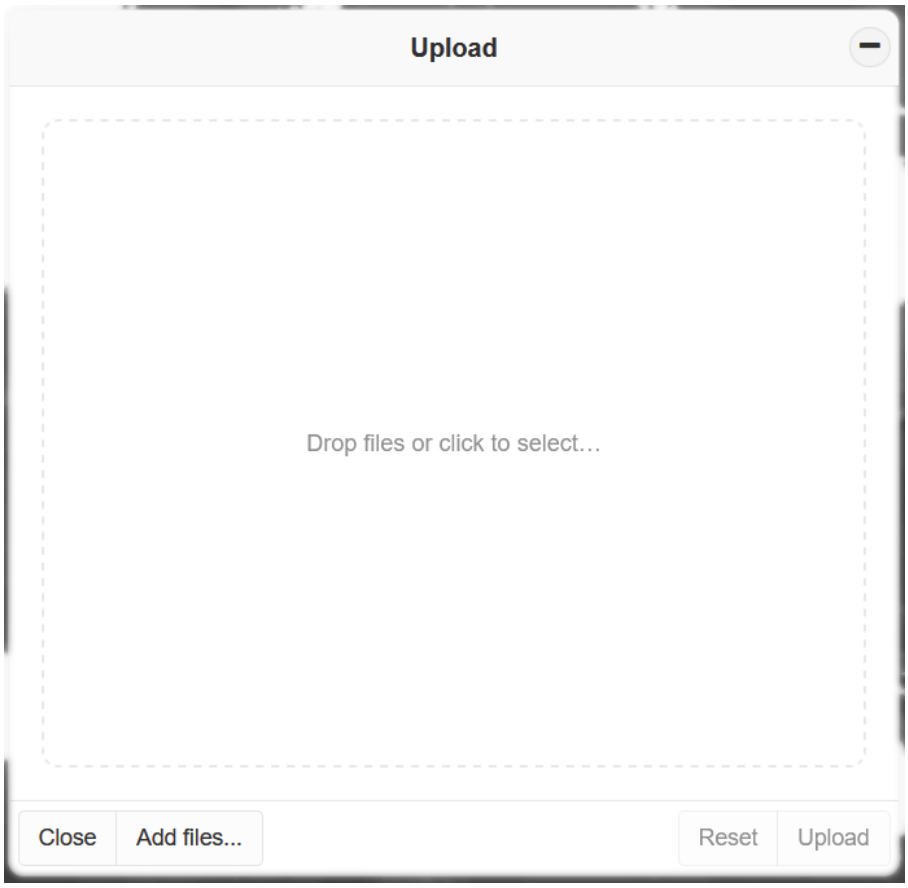
> **Note**
>
> Sources are linked to the project in which they were uploaded and will only be accessible from there. Be careful to be in the right project when uploading sources.

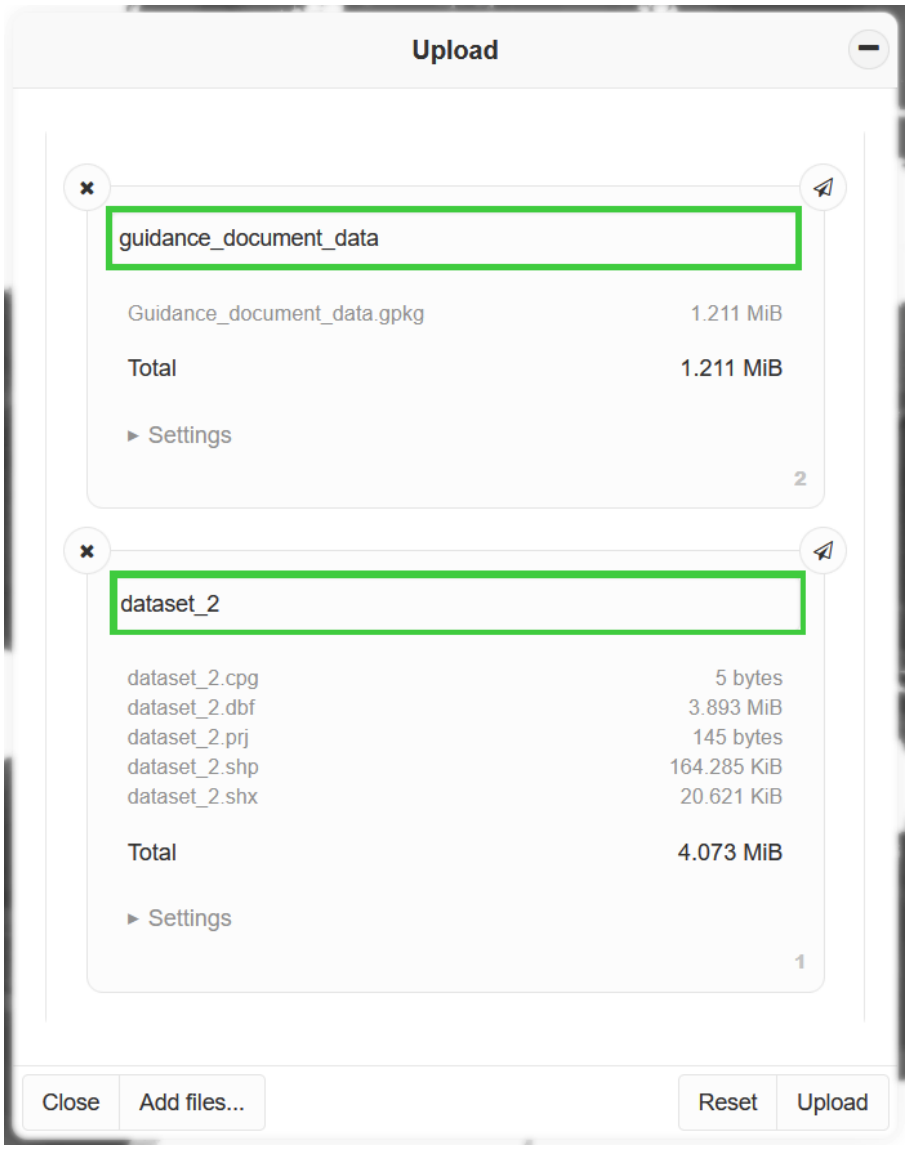
There are two different ways to upload datasets to a project in MapX:

1. the **Add a source layer** tool (also called **Upload tool**)
2. the **drag and drop** method

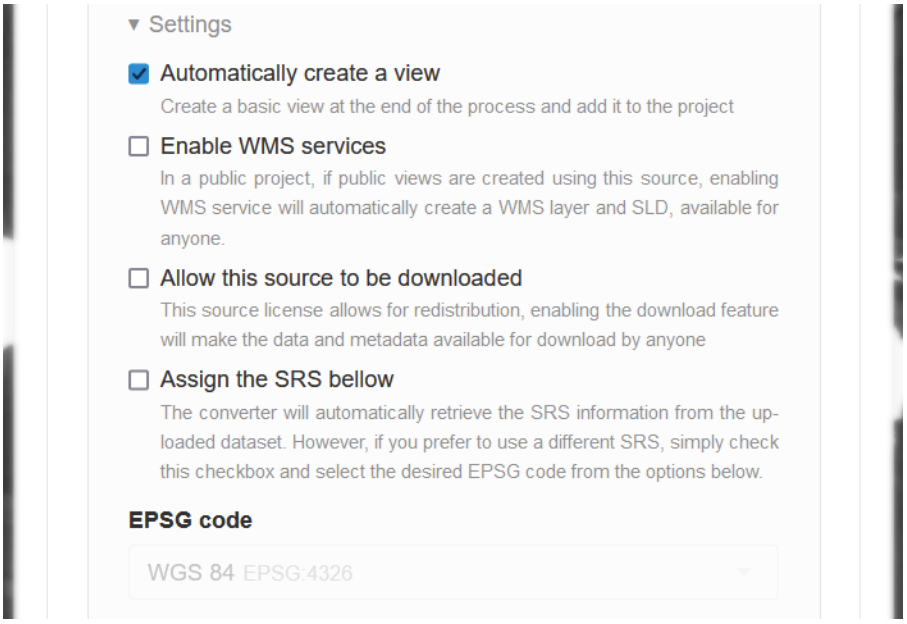
Upload tool

1. Click on the **Add a source layer** button in the **Toolbox** to load the **Upload tool** in the MapX UI.
2. Add the dataset(s) you want to import into MapX. For this, two methods are available (they can be combined):
    1. drag and drop your file(s) from your computer
    2. click on **Add files...** to open your device file browser and select your chosen file(s)
3. By default, the name of the dataset is assigned to the source that will be created in MapX. If required, you can edit it before the import.


Upload
Drop files or click to select…
Close
Add files...
Reset
Upload


Upload
guidance_document_data
Guidance_document_data.gpkg 1.211 MiB
Total 1.211 MiB
▸ Settings
2
dataset_2
dataset_2.cpg 5 bytes
dataset_2.dbf 3.893 MiB
dataset_2.prj 145 bytes
dataset_2.shp 164.285 KiB
dataset_2.shx 20.621 KiB
Total 4.073 MiB
▸ Settings
1
Close
Add files...
Reset
Upload

4. The import of each dataset can be configured by expanding its **Settings** section:



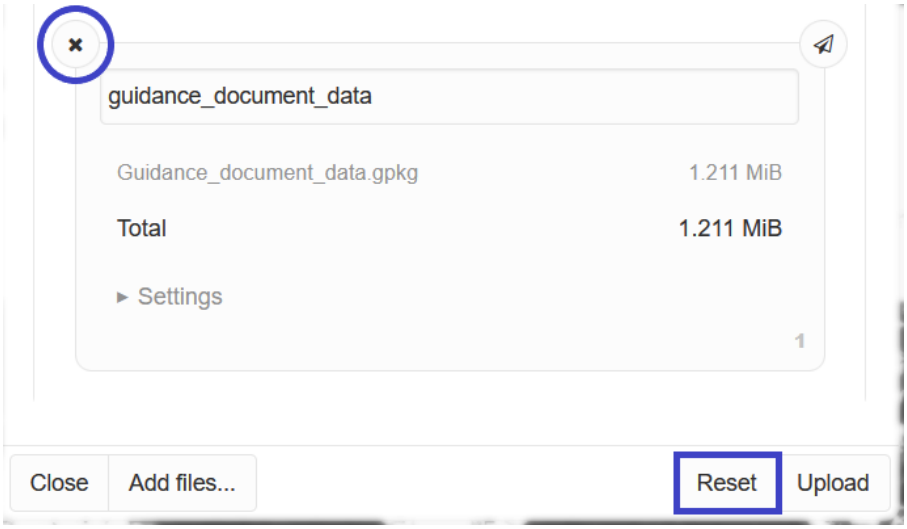
   - **Automatically create a view**: creates a preconfigured view during the upload process using the data source. The view will automatically be added at the top of the data catalog.
   - **Enable WMS services**: In a public project, if public views are created using this source, enabling WMS service will automatically create a layer and a style (SLD) in the MapX GeoServer.
   - **Allow this source to be downloaded**: If the data license allows for redistribution, enabling this option will activate the *Download tool* for this data source for all users.
   - **Assign the SRS**: The upload tool will automatically retrieve the Spatial Reference System (SRS) of the dataset and will reproject it to WGS 84 (EPSG:4326), the SRS used to store all data in the MapX database. If you want to bypass this behavior, you can enable this option and manually select the SRS corresponding to your dataset.

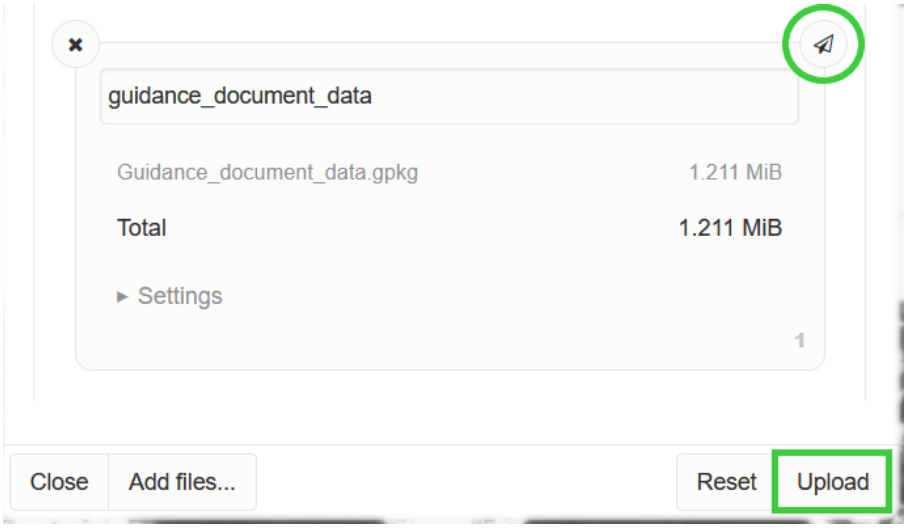
5. If needed, you can remove a dataset from the **Upload tool** by clicking on the **X** button located in its upper left corner. Moreover, it is possible to empty the entire **Upload tool** by clicking on the **Reset** button.

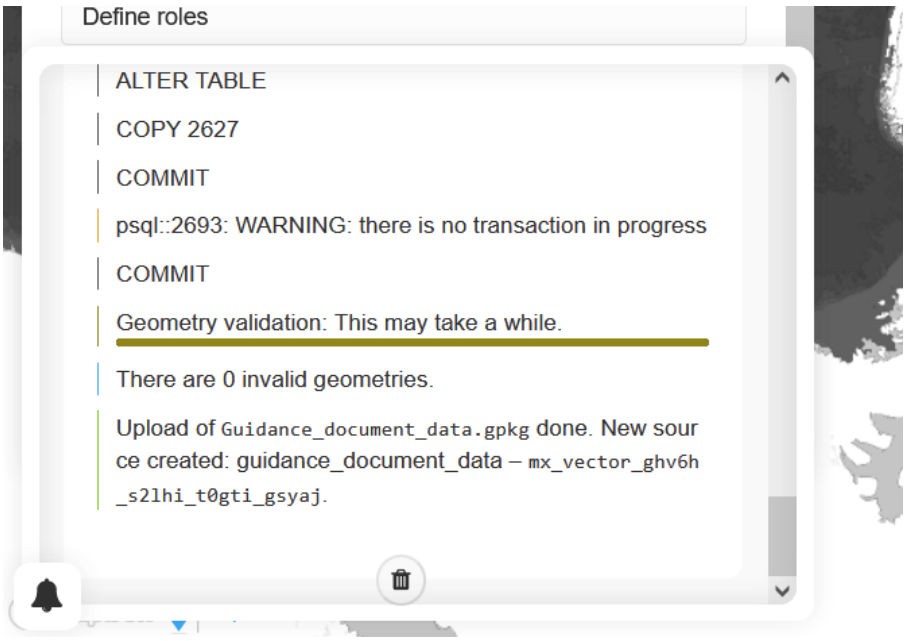
6. Once configured, datasets can be imported into MapX one by one by clicking on the **Send** button located in their upper right corner or in bulk mode by clicking on the **Upload** button.

   The import status can be consulted from the MapX notification panel:

7. Once the upload process is completed, you will be notified by email. In the event of failure, the error is returned in the body of the email.


guidance_document_data
Guidance_document_data.gpkg
1.211 MiB
Total
1.211 MiB
Settings
1
Close
Add files...
Reset
Upload


guidance_document_data
Guidance_document_data.gpkg
1.211 MiB
Total
1.211 MiB
Settings
1
Close
Add files...
Reset
Upload


Define roles
ALTER TABLE
COPY 2627
COMMIT
psql::2693: WARNING: there is no transaction in progress
COMMIT
Geometry validation: This may take a while.
There are 0 invalid geometries.
Upload of Guidance_document_data.gpkg done. New source created: guidance_document_data – mx_vector_ghv6h_s2lhi_t0gti_gsyaj.

Drag and drop

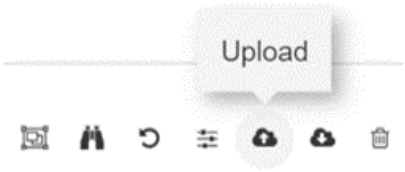
> **Note**
>
> The **drag and drop** method only allows to upload spatial datasets with a SRS equal to WGS 84 (EPSG:4326).

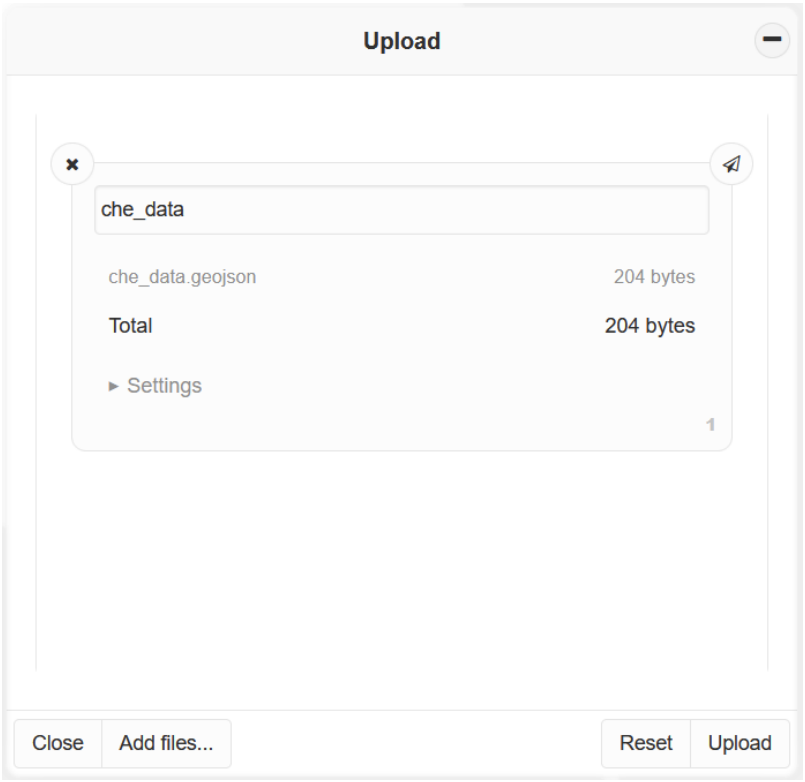
1. Drag and drop your file from your computer to the map in MapX.

2. A progress bar indicates the status of loading.

3. Once your file is loaded, it will appear in the data catalog on top of the list of views. An orange circle on the left side of the view indicates that its type is **Local GeoJSON**. This means that the data linked to the view has been temporarily stored in the local storage of your web browser and **not** in the MapX database.
4. To add your dataset as a source to MapX (your dataset will be stored in the MapX database):
    1. click on the view corresponding to your dataset
    2. click on **Upload**.
5. The **Upload tool** automatically opens in the MapX interface with your dataset (**Local GeoJSON**) included. See the **Upload tool** section above for the rest of the operations.
6. Once your dataset has been added to the MapX database and to avoid duplicates, you can delete the **Local GeoJSON** (orange circle) by clicking on **Delete**.


che_data.geojson
che_data.geojson


Upload


Upload
che_data
che_data.geojson
204 bytes
Total
204 bytes
Settings
1
Close
Add files...
Reset
Upload


Delete

5.2 Tips & tricks

5.2.1 ESRI Shapefiles import: column format might not be respected

In a ESRI Shapefile, the column format in the dbf file may not be respected in the data. This can be problematic during the upload process in MapX. In PostgreSQL, the table will be created according to what is specified in the dbf headers. If the data stored in the dbf doesn't respect the format, the upload will most certainly fail.

Example

- header: Shape_Area,N,19,11
- value found in the dbf: 62124125000.00000000000

Solutions (user side)

- open & save the dbf in `R`
- delete problematic columns for the ESRI Shapefile
- save the ESRI Shapefile in another format such as GeoPackage

5.2.2 Layer cleaning and simplification

Mapping performance and visualization experience could be heavily impacted by the quality and shape of the uploaded data. The simpler and cleaner the layer is, the smoother the experience will be. Sometimes, complexity is not negotiable and simplification is only advisable at render time, at a given zoom level. MapX handle this automatically. In other cases, the data can be poorly optimized and can be simplified without losing any meaningful information. In all cases, it is recommended to pre-process the data to improve the final user experience. There is a lot of tools to help: any GIS software have solutions. However, some specialized tools outperform all others, in terms of simplicity, quality and speed.

Mapshaper

One of those tool that will help tremendously is mapshaper. There is a lot of options and it has a nice GUI and a very performant command-line version. Here is a use case and a single command line to solve most of the issues encountered within a layer.

The layer `CobVeg_180615.shp` has > 100'000 features, 75 classes in the main attribute (`Simbolo`), ~10 attributes and many polygons are vectorised rasters, at high resolution. The original file size is > 600MB. There are also encoding issues and line artefacts in many polygons. The strategy will be to simplify the arcs as much as possible without losing data and merge all geometries into a multi-features per class, and then convert back into cleaned single features. MapX requires data to have a specific projection type. Our layer has a `.prj` file, so we can handle the re-projection in the same step:

```
mapshaper-xl \
  CobVeg_180615.shp \
  -simplify 20% keep-shapes \
  -dissolve Simbolo copy-fields=Simbolo,CobVeg2013 \
  -explode \
  -clean \
  -proj EPSG:4326 \
  -o out/mapa_cobertura_vegetal_2015.shp
```

-> ~100'000 features, ~ 137MB

The option -explode is not required, but the upload and validation will be slower. However, the rendering time online for the end user will be faster :

```
mapshaper-xl \
  CobVeg_180615.shp \
  -simplify 20% keep-shapes \
  -dissolve Simbolo copy-fields=Simbolo,CobVeg2013 \
  -clean \
  -proj EPSG:4326 \
  -o out/mapa_cobertura_vegetal_2015.shp
```

-> ~75 multi features, ~ 132MB

5.3 Managing sources

In MapX, it is possible to define for each source:

1. which types of users can use the source layer to create views within the project
2. which type of users can edit the source layer (i.e., attribute table, metadata, settings)

Editors can also allow the dataset to be downloaded from the MapX interface (e.g., activation of the **Download** tool in all views using the source) and/or published in the GeoServer instance of MapX from which the dataset will be available through web services in compliance with the Open GeoConsortium (OGC) Standards.

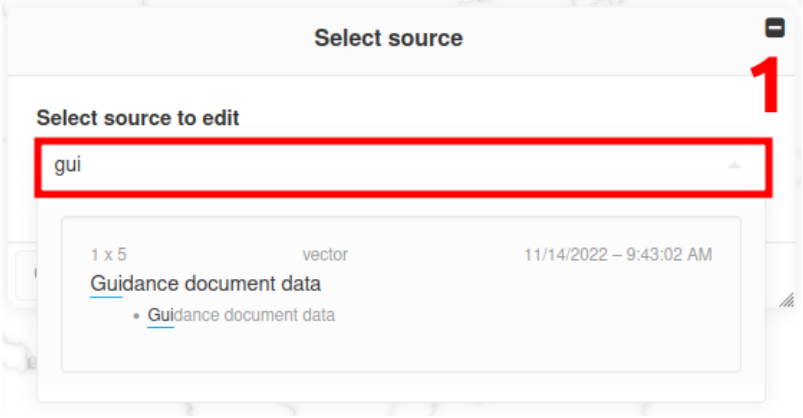
Additionally, superusers have the option to enable global mode, allowing vector data sources to be accessible across all MapX projects. This enables publishers from all projects to utilize key data sources (e.g., UNMap, EEZ) for creating vector views in their projects or as a component of a join-type source.

Here are the steps to follow to configure a source:

1. To manage a source, click on the **Toolbox** tab and then on **Edit source settings**:

2. A window appears, enabling you to manage all sources for which you have editing rights:

1. Select the desired source.
2. Configure the source as necessary:
   - Specify the types of users who can utilize or edit the source.
   - Activate any required services (e.g., allow download, publish in GeoServer).
   - Enable global mode to make the source accessible in all MapX projects (superusers only).
3. Save your edits by clicking on **Update**.



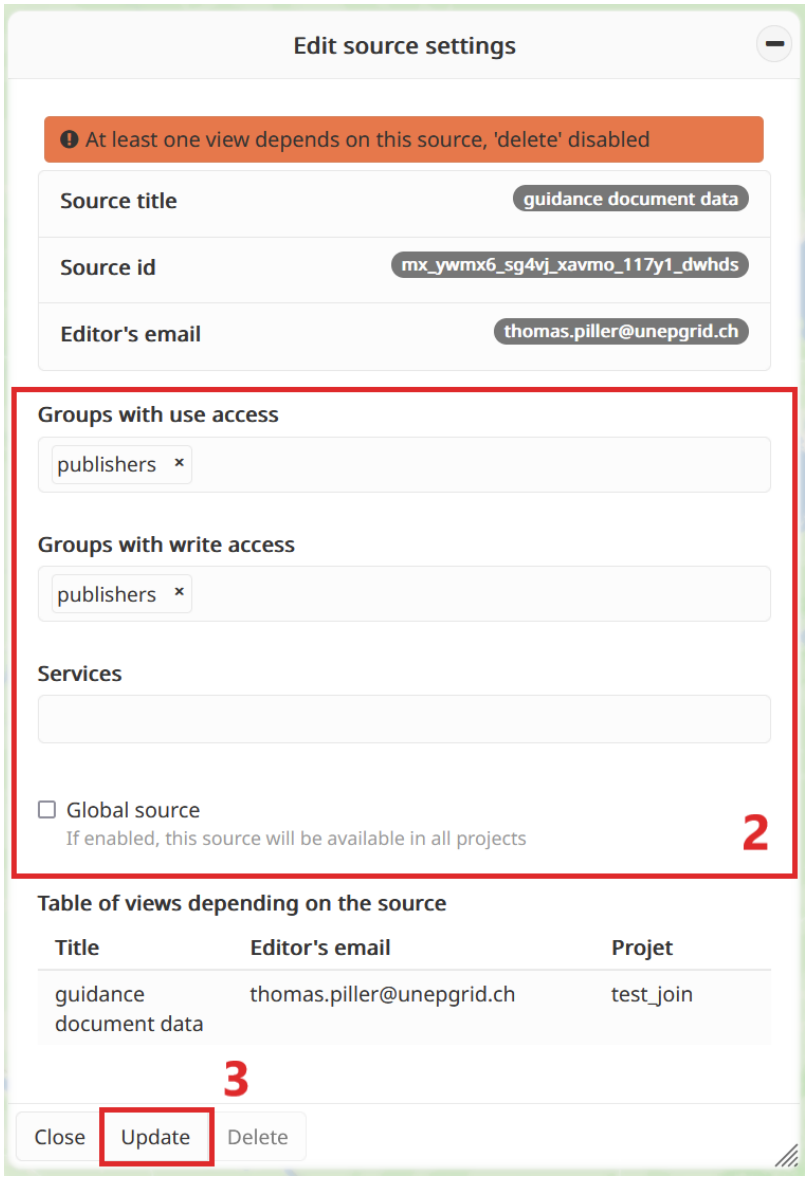
You can erase a source from the database by clicking on **Delete**, but be careful this action is irreversible. A source can only be deleted if it has no dependencies (e.g., views, joins). At the bottom of the panel, a table indicates all its dependencies in detail.

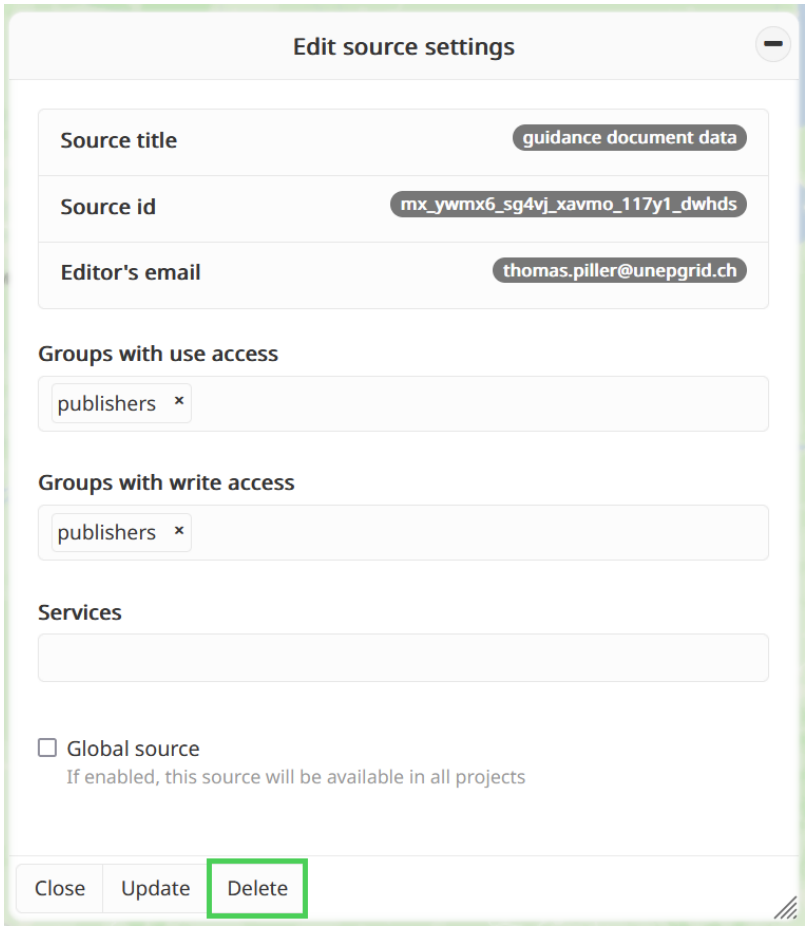
5.4 Edit vector source

> **Warning**
>
> The MapX database currently utilizes two separate backup systems. However, user-specific data recovery is not yet supported for structural changes to tables, such as deletions of rows or columns, which are considered irreversible. Therefore, using the **Edit vector source** tool may cause data to be permanently altered or even deleted, as with desktop spreadsheet editors. Please use this tool with caution.

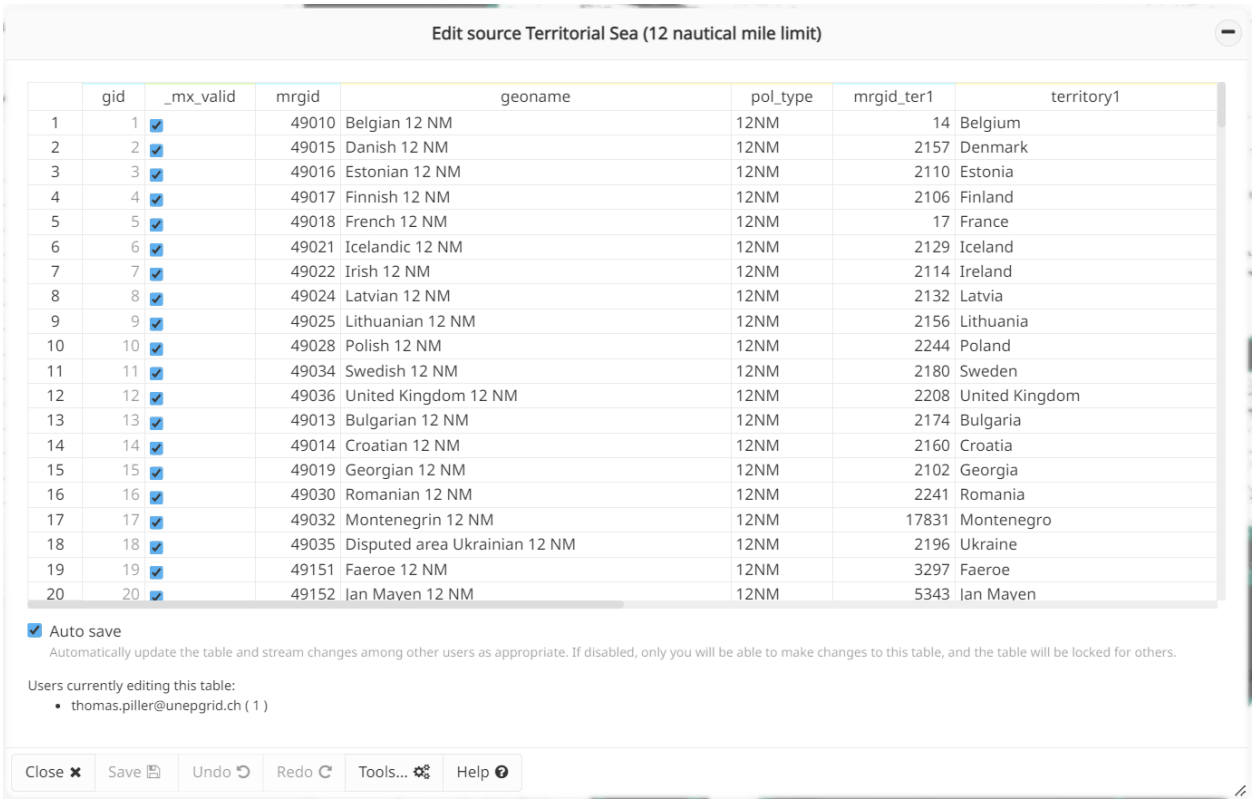
The **Edit vector source** is an interactive workspace allowing to access the tabular data of a vector source and edit its content dynamically (i.e., update values, add/remove columns, validate/repair geometries). It is available to publishers from the **Toolbox** or directly from vector views (more details *here*).

Currently, only attributes can be edited. The **Edit vector source** tool doesn't *yet* include drawing functions like reshape, merge, split, or trim to modify geometry shapes manually, as you would find in GIS software like QGIS or ArcGIS Pro).


Edit source settings
At least one view depends on this source, 'delete' disabled
Source title
guidance document data
Source id
mx_ywmx6_sg4vj_xavmo_117y1_dwhds
Editor's email
thomas.piller@unepgrid.ch
Groups with use access
publishers
Groups with write access
publishers
Services
Global source
If enabled, this source will be available in all projects
2
Table of views depending on the source
Title
Editor's email
Projet
guidance document data
thomas.piller@unepgrid.ch
test_join
3
Close
Update
Delete


Edit source settings
Source title
guidance document data
Source id
mx_ywmx6_sg4vj_xavmo_117y1_dwhds
Editor's email
thomas.piller@unepgrid.ch
Groups with use access
publishers
Groups with write access
publishers
Services
Global source
If enabled, this source will be available in all projects
Close
Update
Delete

This feature becomes particularly valuable when paired with the *Join Editor*, allowing you to seamlessly join custom tables to existing geometries, such as country boundaries.



	gid	_mx_valid	mrgid	geoname	pol_type	mrgid_ter1	territory1
1	1	☑	49010	Belgian 12 NM	12NM	14	Belgium
2	2	☑	49015	Danish 12 NM	12NM	2157	Denmark
3	3	☑	49016	Estonian 12 NM	12NM	2110	Estonia
4	4	☑	49017	Finnish 12 NM	12NM	2106	Finland
5	5	☑	49018	French 12 NM	12NM	17	France
6	6	☑	49021	Icelandic 12 NM	12NM	2129	Iceland
7	7	☑	49022	Irish 12 NM	12NM	2114	Ireland
8	8	☑	49024	Latvian 12 NM	12NM	2132	Latvia
9	9	☑	49025	Lithuanian 12 NM	12NM	2156	Lithuania
10	10	☑	49028	Polish 12 NM	12NM	2244	Poland
11	11	☑	49034	Swedish 12 NM	12NM	2180	Sweden
12	12	☑	49036	United Kingdom 12 NM	12NM	2208	United Kingdom
13	13	☑	49013	Bulgarian 12 NM	12NM	2174	Bulgaria
14	14	☑	49014	Croatian 12 NM	12NM	2160	Croatia
15	15	☑	49019	Georgian 12 NM	12NM	2102	Georgia
16	16	☑	49030	Romanian 12 NM	12NM	2241	Romania
17	17	☑	49032	Montenegrin 12 NM	12NM	17831	Montenegro
18	18	☑	49035	Disputed area Ukrainian 12 NM	12NM	2196	Ukraine
19	19	☑	49151	Faeroe 12 NM	12NM	3297	Faeroe
20	20	☑	49152	Jan Mayen 12 NM	12NM	5343	Jan Mayen

Fig. 1: Edit vector source tool layout

5.4.1 How does the tool work?

Selecting the source to edit

Once the tool is opened from the **Toolbox**, a drop-down list presents all the sources editable by the current user. For each source, the following information is provided:

- title
- last modification date
- type of source
- dimensions (rows x columns)
- list of views based on source

A search can be performed on the list by entering text in the interactive field. All the information listed above are parsed and matching texts are underlined.

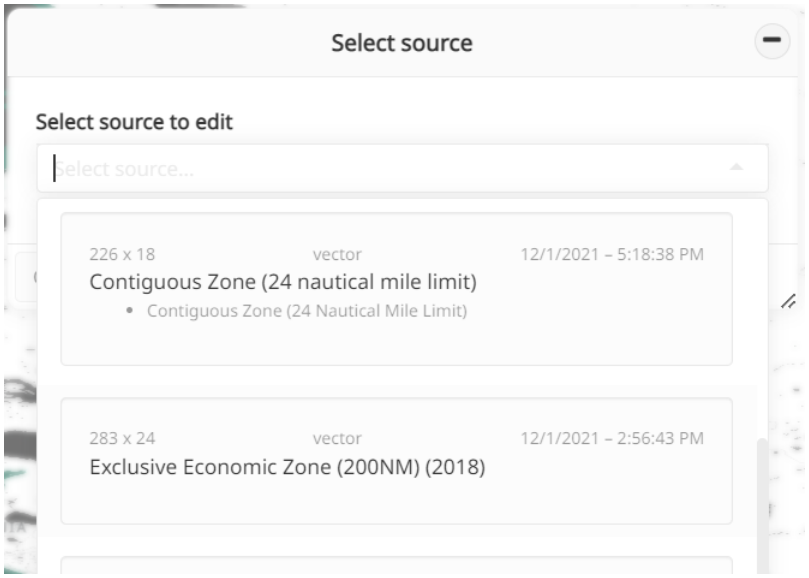


Fig. 2: Selection of the source to edit

Note

In order not to compromise the user experience and to avoid any performance problem, editing is limited to sources having less than 10,000 rows and 1,000 columns. Beyond these dimensions, the source is grayed out in the list and cannot be selected.

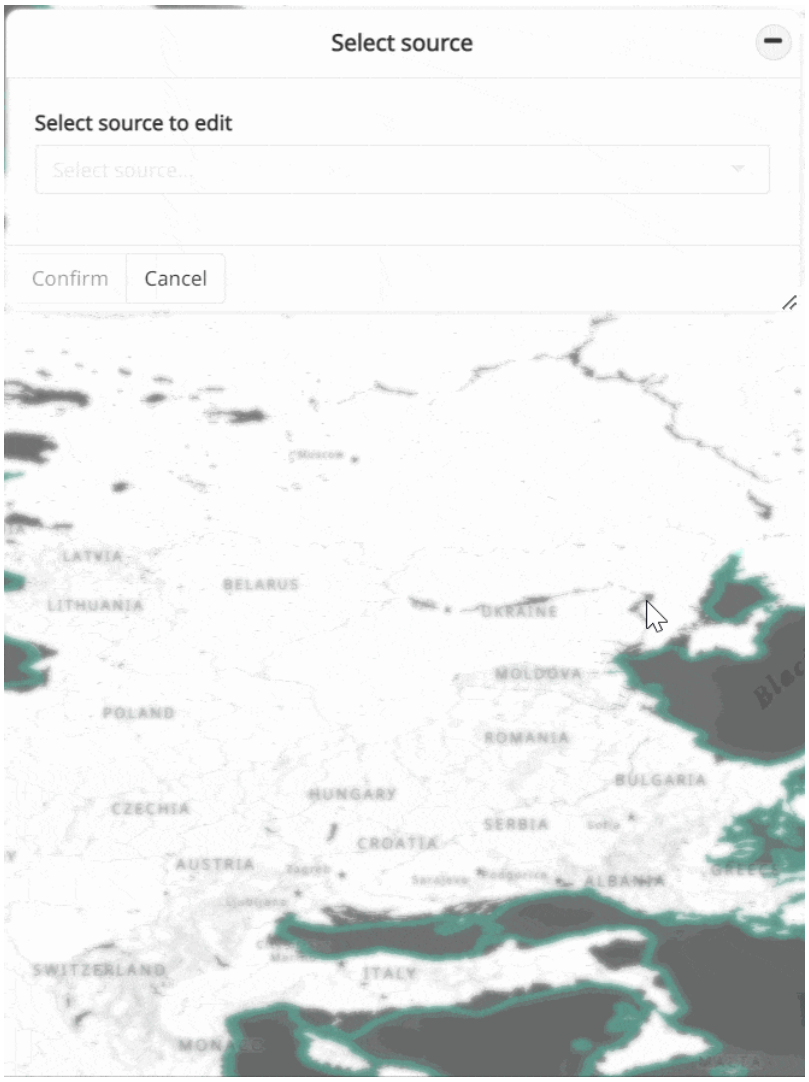
Editing the content of the attribute table

As several users can edit the same source in parallel, two editing modes have been developed:

1. auto-save `ON (default)`: all edits are automatically pushed to the database and dynamically transmitted to all users viewing/editing the same source. Parallel edits are allowed in this mode. This behavior is similar to what other spreadsheet applications offer (e.g., Google Sheets, Microsoft Excel online).
2. auto-save `OFF`: table editing is blocked for everyone except the active user. Parallel edits are therefore not allowed in this mode. Changes are not automatically saved to the database. The **Save** button must be clicked to push all changes to the database and to all users viewing/editing the source. The number of modifications that have not been saved in the database is indicated in the **Save** button.

By default, auto-save is `ON`. The MapX team advises users to use this mode when editing sources.

In either mode, editing is straightforward. First, select the cell(s) to edit and then enter or paste the new value(s). If invalid values are entered during this operation (i.e., the data type does not match), cell(s) will be highlighted in orange in the table. Invalid values are obviously not saved to the database.


Select source
Select source to edit
Select source...
Confirm
Cancel
LATVIA
BELARUS
LITHUANIA
UKRAINE
MOLDOVA
POLAND
ROMANIA
BULGARIA
HUNGARY
CZECHIA
SERBIA
CROATIA
AUSTRIA
ALBANIA
SWITZERLAND
ITALY

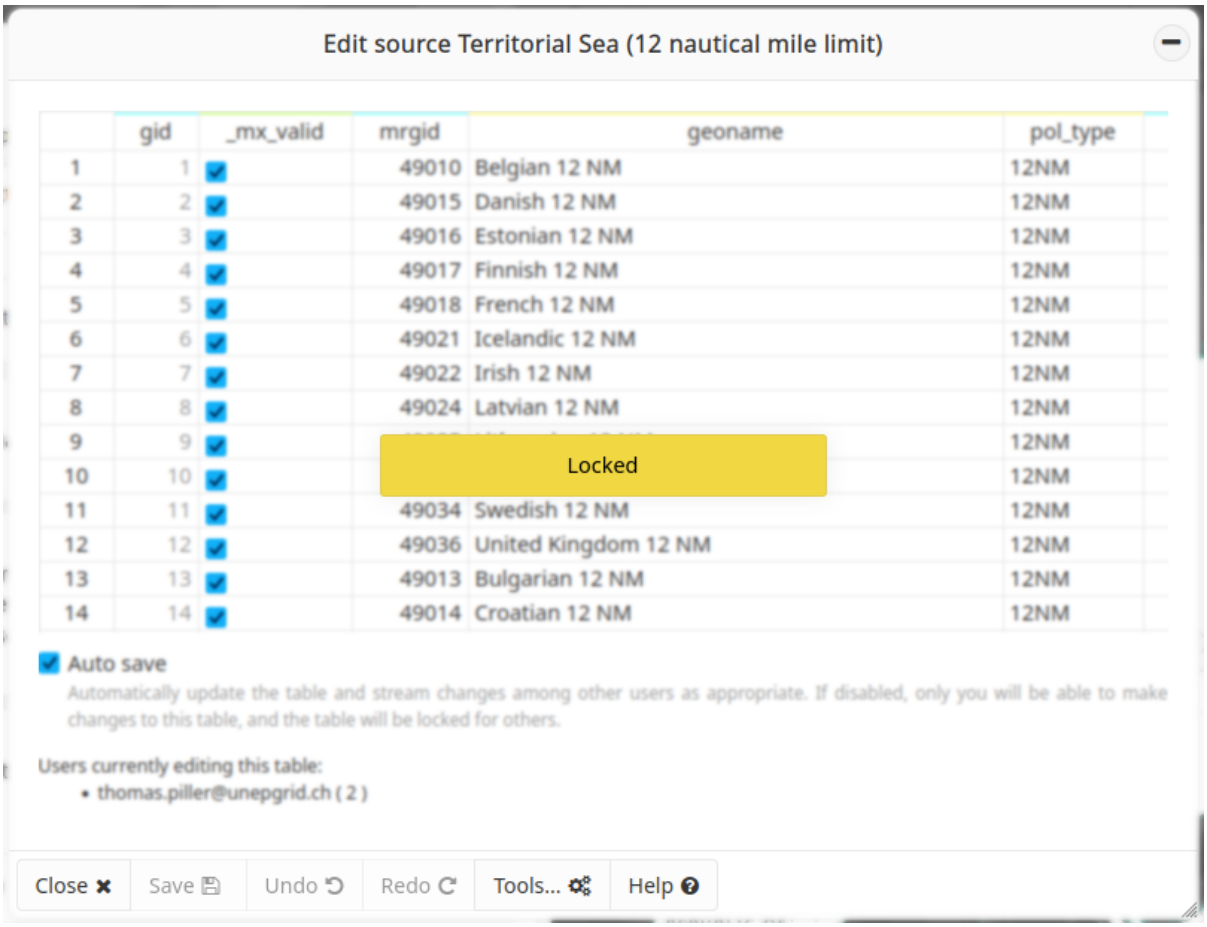
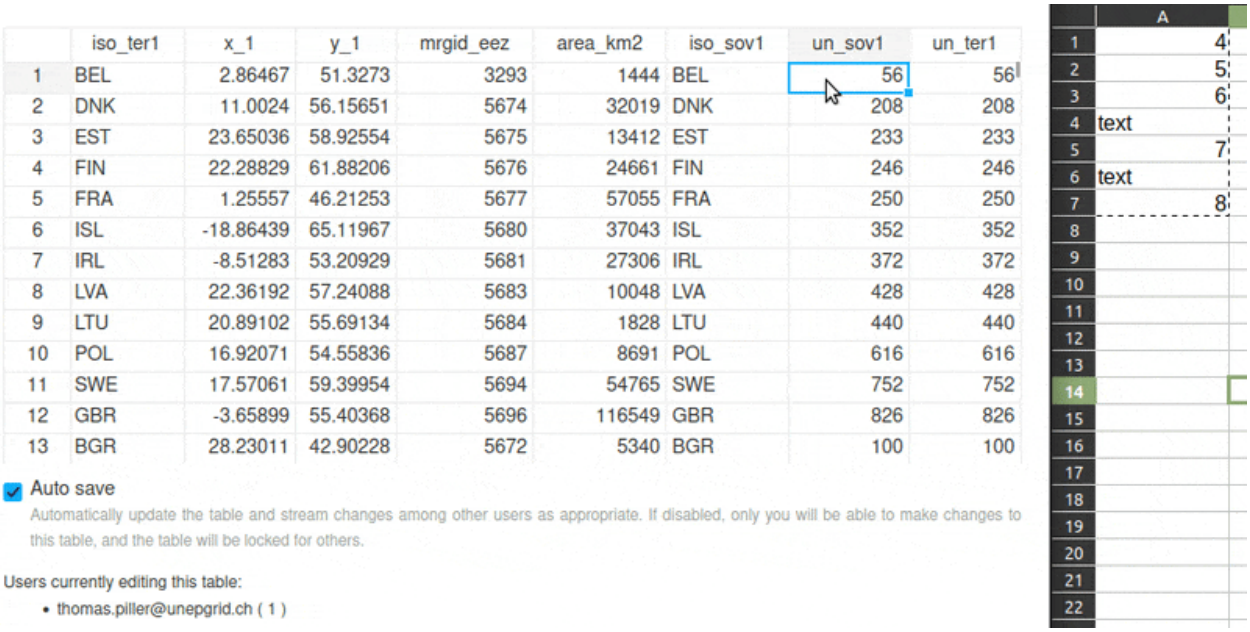


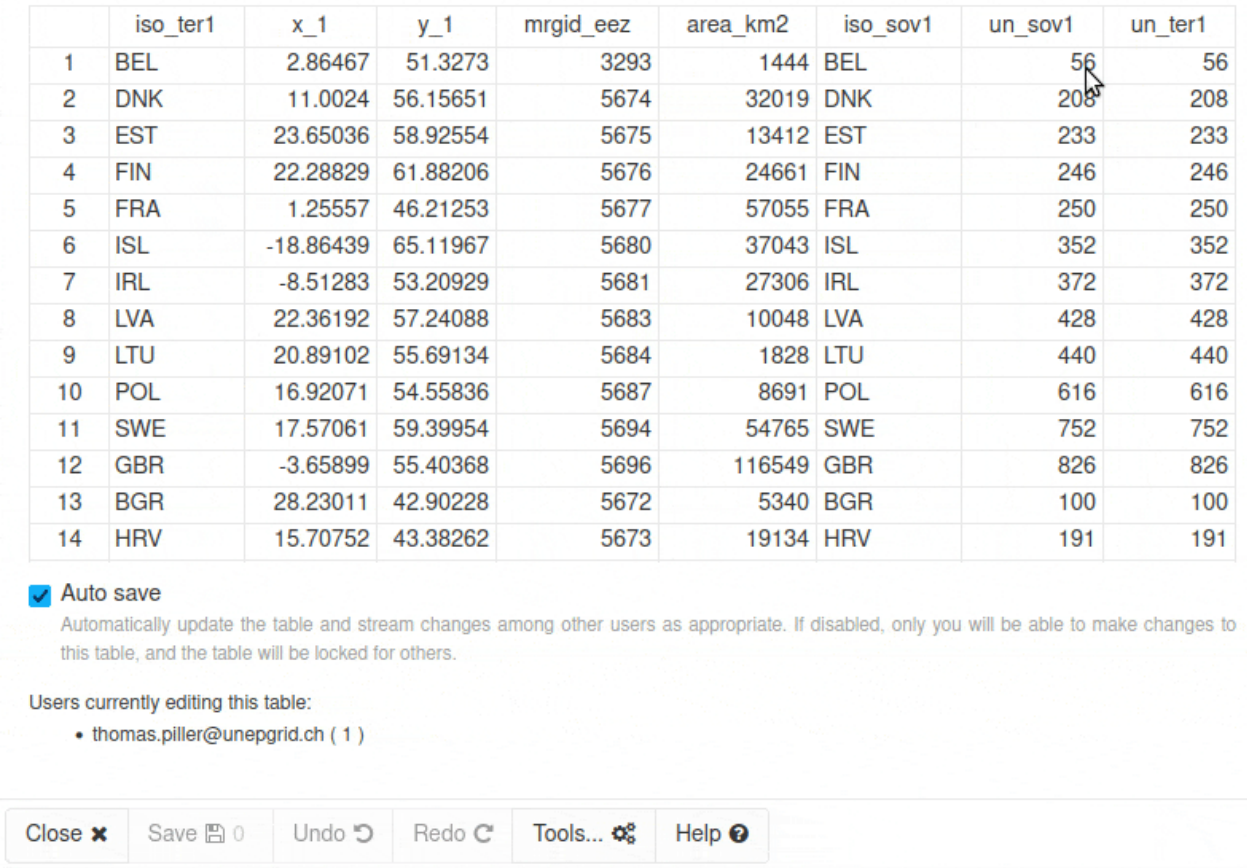
Fig. 3: Blocked user when auto-save is deactivated



Warning

Numeric values must be formatted with a . as a decimal separator.

As long as the **Edit vector source** tool has not been closed, it is possible to undo/redo all the changes using the dedicated buttons (located at the bottom of the panel).



	iso_ter1	x_1	y_1	mrgid_eez	area_km2	iso_sov1	un_sov1	un_ter1
1	BEL	2.86467	51.3273	3293	1444	BEL	56	56
2	DNK	11.0024	56.15651	5674	32019	DNK	208	208
3	EST	23.65036	58.92554	5675	13412	EST	233	233
4	FIN	22.28829	61.88206	5676	24661	FIN	246	246
5	FRA	1.25557	46.21253	5677	57055	FRA	250	250
6	ISL	-18.86439	65.11967	5680	37043	ISL	352	352
7	IRL	-8.51283	53.20929	5681	27306	IRL	372	372
8	LVA	22.36192	57.24088	5683	10048	LVA	428	428
9	LTU	20.89102	55.69134	5684	1828	LTU	440	440
10	POL	16.92071	54.55836	5687	8691	POL	616	616
11	SWE	17.57061	59.39954	5694	54765	SWE	752	752
12	GBR	-3.65899	55.40368	5696	116549	GBR	826	826
13	BGR	28.23011	42.90228	5672	5340	BGR	100	100
14	HRV	15.70752	43.38262	5673	19134	HRV	191	191

Advanced tools

Nine advanced tools are available from the dedicated button at the bottom of the panel:

Add column

This tool allows to add a new empty column to the source. Naming rules are as follows: - cannot start with a number - spaces, special characters and reserved keywords are prohibited - length should be more than 3 and less than 50 characters - no duplicates

By default, news columns are added at the last position of the source but it is possible to move them using the **Set columns order** tool (see below).

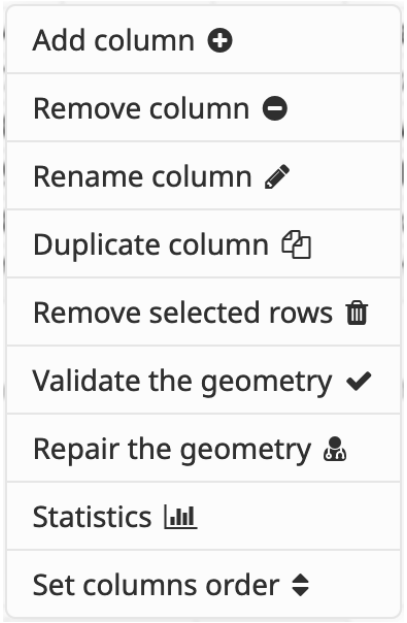


Fig. 4: Advanced tools

Note

New columns are not automatically added to secondary attributes of views. Therefore, the view settings need to be updated to use them in a dashboard or visualize them (i.e., attributes table, pop-up) (more details *here*).

Remove column

This tool allows to remove a specific column from the source. The deletion will be performed in the database and all interactive tables. It is not possible to undo this action after the last confirmation panel.

Note

It is not possible to delete a column that is used as a primary and/or secondary attribute in views.

Tip

A publisher may not have editing rights on all the views using the column to be deleted. In such a case, the list of views using the source is available from the *Manage sources* tool and the email address of the view's last editor is available in the view's metadata. If deletion is mandatory, please contact the publishers in question to request an update to these views or the MapX team

at info@mapx.org.

Rename column

This tool allows to rename a column from the source (see *Add column* for naming rules).

In the event that some code uses data from the source, the tool is blocked to avoid breaking publicly available content. Code may be:

- custom code views
- vector views with a custom style
- dashboards (which can be associated with any type of views)

In the tool interface, a table lists all views with code that depends on the source. The views title is a clickable link allowing easy access to publishers for editing.

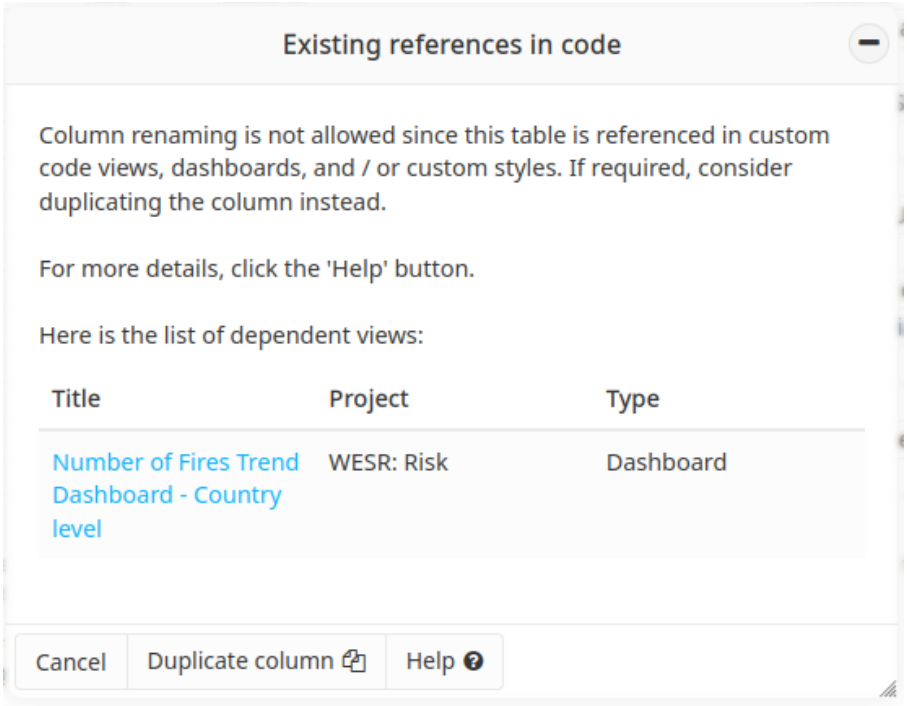


Fig. 5: List of references in code

In such a scenario, to rename a column follow these steps:

1. duplicate the desired column (a shortcut is available at the bottom of the panel)
2. update the code for the views listed in the table using the new column/name defined in point 1
3. update the views settings so that only the new column is listed in the primary and/or secondary attributes

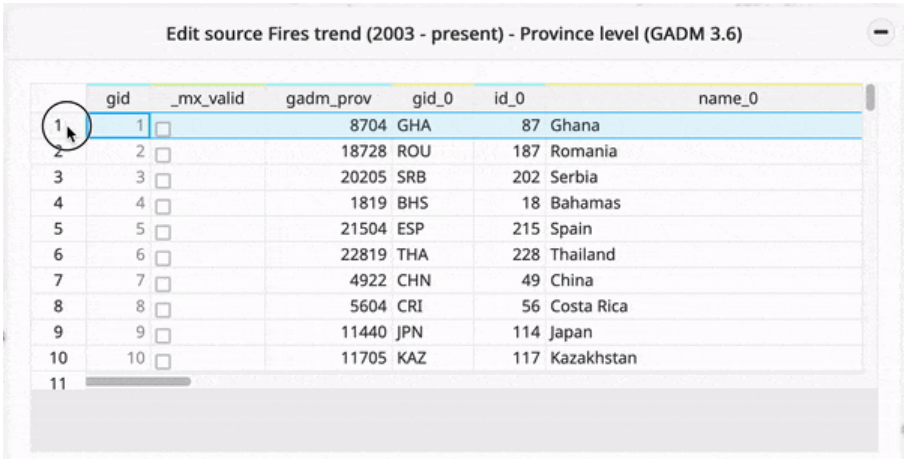
4. delete the original column now that it is no longer used anywhere

Duplicate column

This tool allows to duplicate a column of the attribute table with its content. As a new column is added, the same restrictions as **Add column** apply (see above).

Remove selected rows

This tool allows to delete rows from the dataset that have been previously selected from the table editor. To select rows, simply click on the row indexes. Multiple selection can be performed by holding down the `CTRL` key or `Command` key on macOS. The deletion will be performed in the database and all interactive tables. It is not possible to undo this action after the last confirmation panel.



	gid	_mx_valid	gadm_prov	gid_0	id_0	name_0
1	1	☐	8704	GHA	87	Ghana
2	2	☐	18728	ROU	187	Romania
3	3	☐	20205	SRB	202	Serbia
4	4	☐	1819	BHS	18	Bahamas
5	5	☐	21504	ESP	215	Spain
6	6	☐	22819	THA	228	Thailand
7	7	☐	4922	CHN	49	China
8	8	☐	5604	CRI	56	Costa Rica
9	9	☐	11440	JPN	114	Japan
10	10	☐	11705	KAZ	117	Kazakhstan
11						

Fig. 6: Selecting rows for deletion

Note

While it's possible to delete all the rows of a source without impacting the MapX application, an empty source will definitely become unusable, as it is currently not possible to add new rows to sources.

Validate the geometry

This tool checks the validity of all the source geometries (most important for polygons as lines and points cannot be invalid) without repairing them. Validity is evaluated with the **PostGIS** function ST_IsValid() and the result is saved in the `_mx_valid` column which is automatically generated by MapX. Having a source with valid geometries (`_mx_valid IS TRUE`) is crucial as it is a prerequisite for using algorithms for geometry calculations (e.g. *Area intersection tools*).

Repair the geometry

This tool repairs the invalid geometries present in the source. Polygons (remember lines and points are always valid) with a `FALSE` value in the `_mx_valid` column will be repaired using the **PostGIS** ST_Buffer() function. Buffer output is always a valid polygonal geometry and it can handle invalid inputs, so buffering by distance 0 is used as a way of repairing invalid polygons (source).

> **Warning**
>
> In rare cases, valid outputs may not conform to your intuition as to their appearance.

Statitics

This tool allows to get basic statitics for a given attribute as well as the number of missing values it has. `numeric` type attributes are automatically classified in 5 bins/classes using the Jenks method. A frequency table of distinct values is displayed for `boolean` and `string` type attributes.

Set columns order

This tool allows to define the order in which the columns are displayed when the attribute table is viewed or edited. The use of this tool does not alter the table in the database but just its rendering in MapX.

5.5 Table join tool

The MapX join tool, developed in 2024, addresses a specific user requirement: the ability to seamlessly integrate tabular statistical data with map visuals using reference geometries such as UNMap, which offers authoritative administrative boundaries recognized by the United Nations. By leveraging joins within MapX, users can efficiently combine datasets without duplicating information, thus optimizing database storage space and maintenance. This approach ensures data integrity while empowering users to enrich their geospatial datasets with additional attributes from tabular sources.

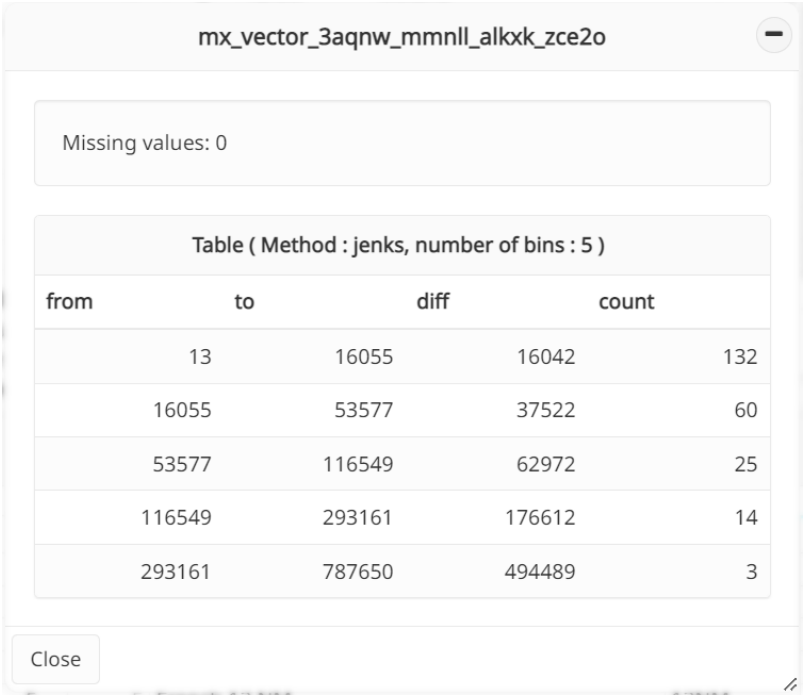
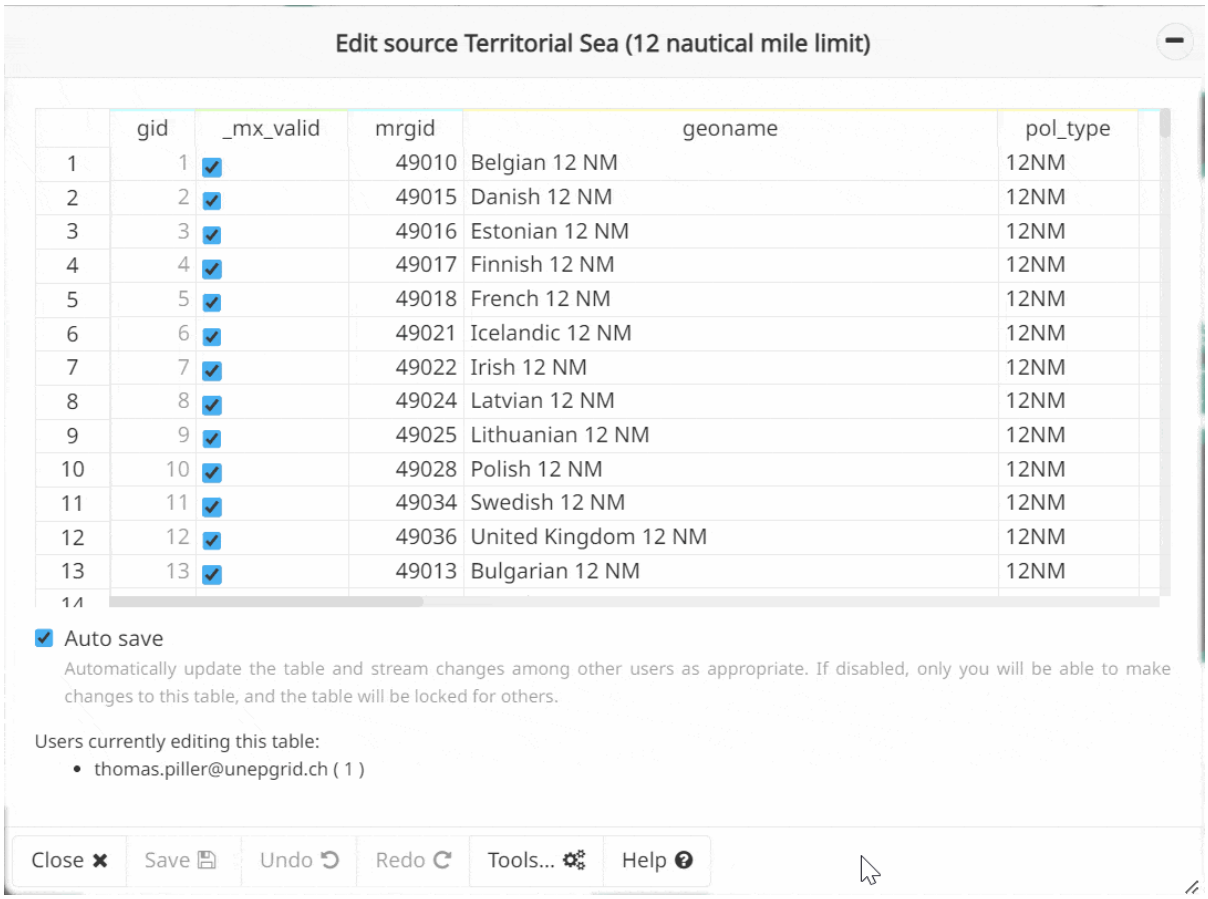


Fig. 7: Attribute statistics



5.5.1 SQL joins

A SQL join is an operation that combines data from two or more tables in a relational database based on a related column between them. This operation allows to fetch data from multiple tables in a single query, providing a unified view of the data.

Types of joins

There are several types of joins in SQL, each with its specific use cases. Four types have been implemented in the MapX join tool:

1. **Inner Join**: This is the most common type of join. It returns only the rows that have matching values in both tables. For example, if you join a table of customers with a table of orders, it will return only customers who have placed an order.
2. **Left Join (or Left Outer Join)**: This type of join returns all rows from the left table and the matching rows from the right table. If there is no match in the right table, it will return NULL for the columns from the right table.
3. **Right Join (or Right Outer Join)**: This is the opposite of a left join. It returns all rows from the right table and the matching rows from the left table. If there is no match in the left table, it will return NULL for the columns from the left table.
4. **Full Join (or Full Outer Join)**: This type of join returns all rows from both tables, matching rows where possible. If there is no match in either table, it will return NULL for the columns from the table that doesn't have a match.

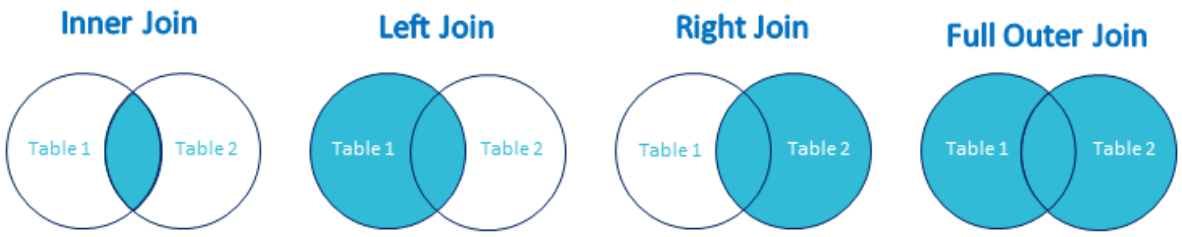


Fig. 8: Types of SQL joins (source: knoldus.com)

Why joins are useful

- **Combining data**: Joins allow you to combine data from different tables into a single result set, providing a more comprehensive view of your data.
- **Flexibility**: By using different types of joins, you can control which data is included in the final result set, tailoring the output to your specific needs.
- **Data integrity**: Joins enable you to maintain relationships between tables, which is important for ensuring data integrity and consistency.

- **Avoiding data duplication**: By using joins with a set of reference tables for geometry (e.g., countries, regions, administrative units at level 1 and 2), you can avoid duplicating data in the database. This approach saves storage space and helps maintain data integrity by having a single source of truth for each geometry reference.
- **Adding geometry columns**: In a cartographic application such as MapX, you may want to join a tabular dataset with a geospatial dataset to add a geometry column. This allows you to visualize tabular datasets in the map and/or to integrate additional attributes into your geospatial data, making it richer and more informative.

5.5.2 The table join tool in MapX

In MapX, users can now generate new vector data sources by performing joins between two or more existing data sources, whether they are vector or tabular. These join-type sources are stored within the MapX database and function like any other vector source once published in your project. The management of source settings, including access and editing rights, downloading permissions, metadata, and the creation of vector views based on join-type sources, follow identical procedures.

Create/edit a table join

The following sections will guide you through the process of creating/editing a join-type source, along with providing key insights into their functionality.

Key concepts

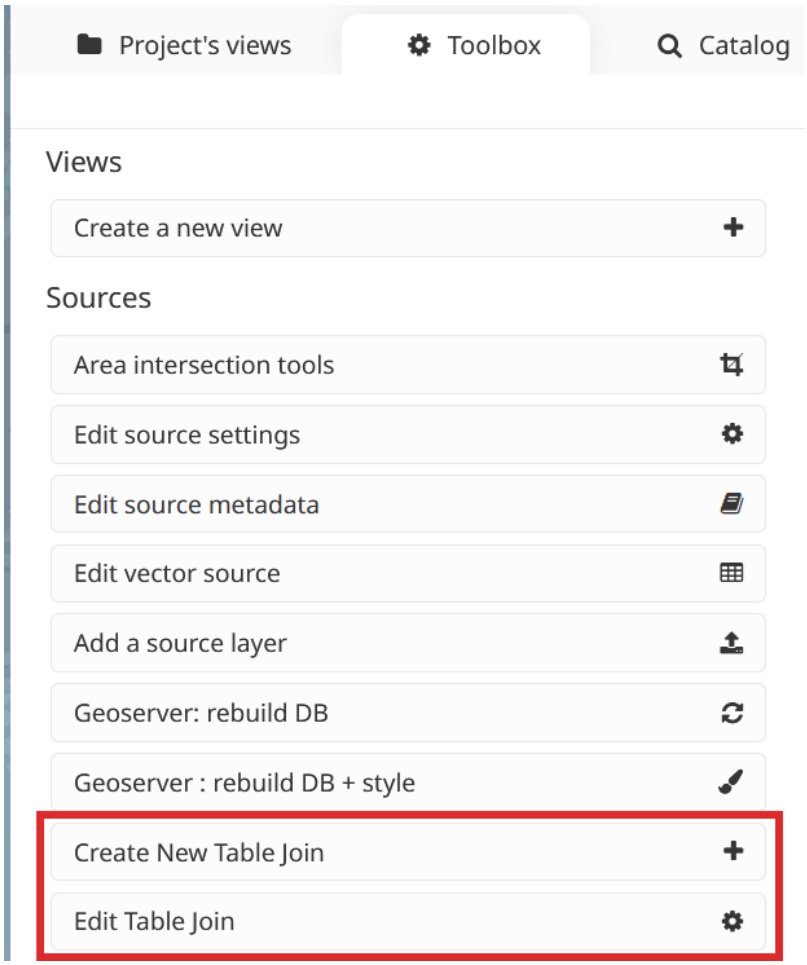
Here are some key concepts related to table join tools in MapX:

1. **Source base**: This serves as the foundational data source whose geometry column is utilized in the creation of the join-type source. The geometry column from the base source is seamlessly integrated into the join-type source.
2. **Join item(s)**: Tabular or vector sources whose attributes are joined to the base source. Multiple join items can be joined to the base source. Please note that the geometry column of the join items is not included in the process. Only one geometry column will be available in the join-type source, which comes from the base source.
3. **Validation**: Ensures that all necessary fields are filled out correctly and any errors or mandatory fields are addressed before proceeding.
4. **Permissions**: The tool is accessible only to publishers and utilizes vector or tabular sources from within the project, respecting their reading rights, along with global sources that are public across all MapX projects.
5. **Join-type sources**: These are sources created via the tool, essentially functioning as vector sources in MapX. They share similar characteristics such as configuration settings, metadata, and view creation. However, two essential points to note:
    1. Activation of downloading for a join-type source relies on enabling the download option for all sources involved in the join.

2. Modifying the attribute table of a join-type source necessitates edits to the tabular/vector sources constituting the join. Any changes made to these sources will be automatically reflected in the join-type source.

Step-by-step instructions

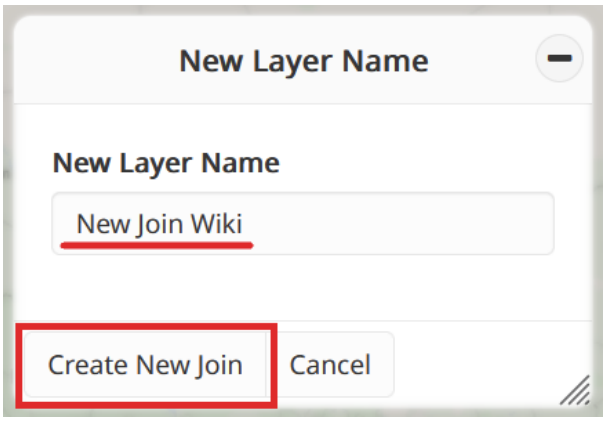
The tools for creating/editing a join-type source can be found in the MapX toolbox:

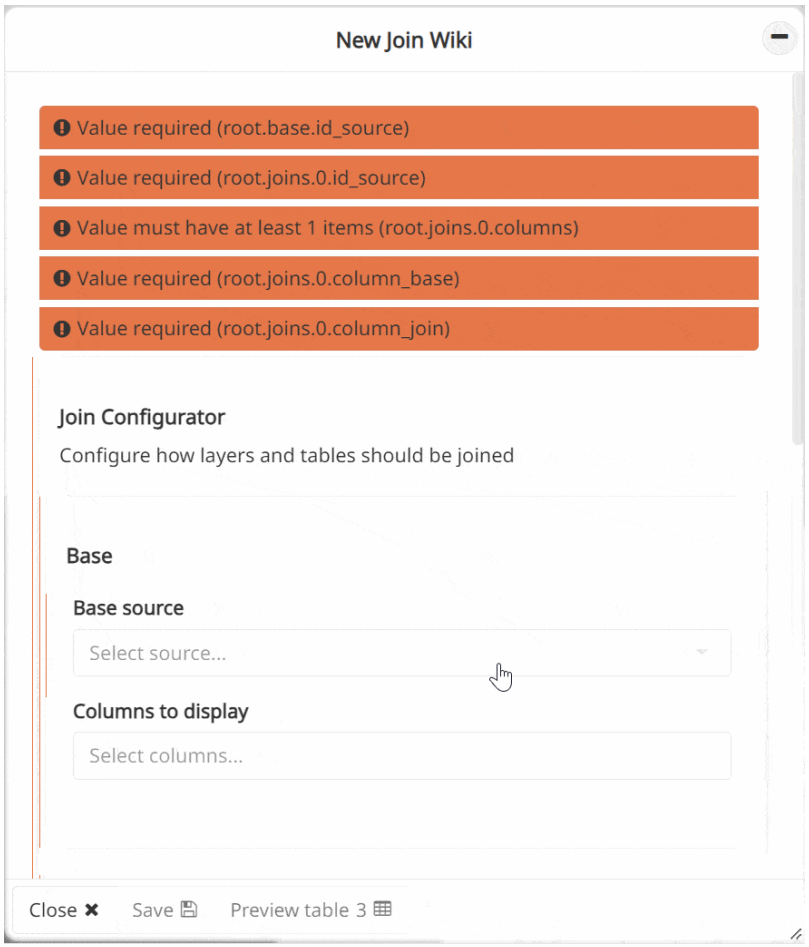


Since both tools share the same interface, only the creation process is presented here. Editing follows the same procedure, adhering to the same validity rules.

To create a join-type source, follow these steps:

1. Open the **Create New Table Join** tool from the toolbox.
2. Provide a name for the join-type source you wish to add to your project. Once you've entered the name, click on the **Create New Join** button to continue.
3. Configure the **Base**:
    - **Source base**: Select the vector source containing the geometry column for the join.


New Layer Name
New Layer Name
New Join Wiki
Create New Join
Cancel


New Join Wiki
Value required (root.base.id_source)
Value required (root.joins.0.id_source)
Value must have at least 1 items (root.joins.0.columns)
Value required (root.joins.0.column_base)
Value required (root.joins.0.column_join)
Join Configurator
Configure how layers and tables should be joined
Base
Base source
Select source...
Columns to display
Select columns...
Close
Save
Preview table 3

- **Columns to display**: Specify the columns from the base source to integrate into the join.

4. Configure one or more **Join item(s)**:
   - **Join source**: Select the vector or tabular source to join with the base source.
   - **Columns to display**: Specify the columns from the join item (source) to include in the join.
   - **Base column**: Indicate the column from the source base used for joining.
   - **Type**: Define the type of join to execute (refer to above for more information).
   - **Join column**: Specify the column from the join source for joining purposes.

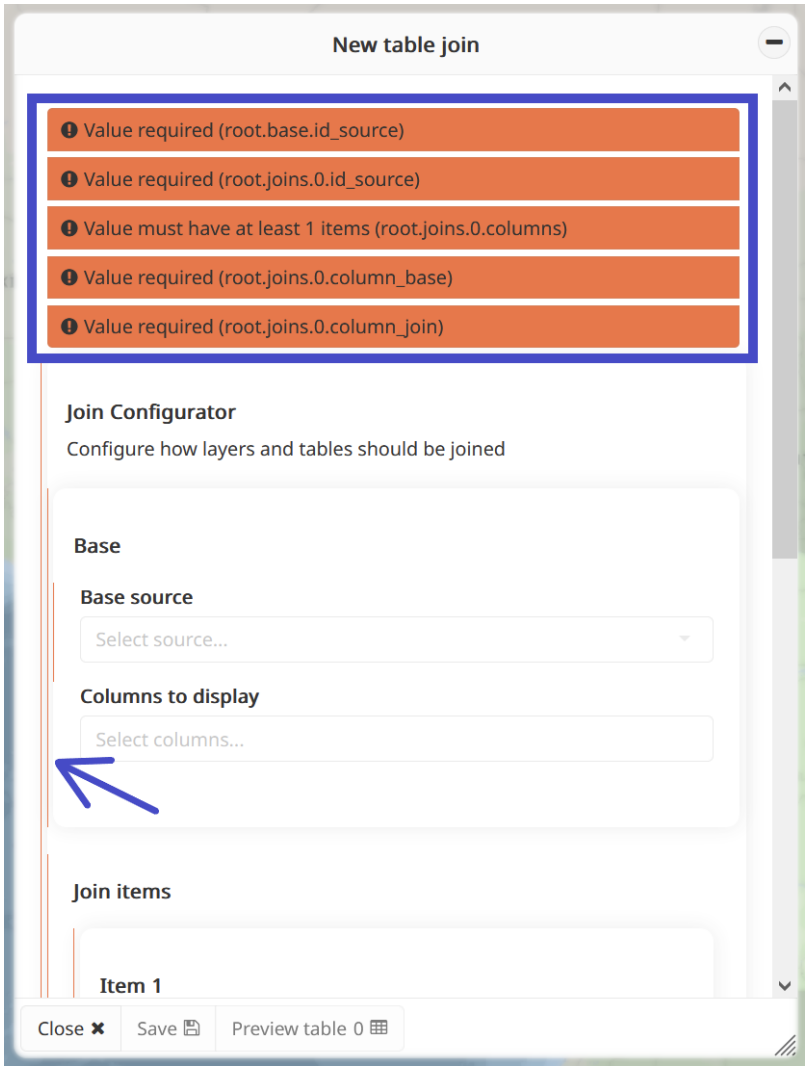
   > **Note**
   >
   > The columns used to join sources are not automatically included in the join-type source. Be sure to add them to the columns to display if you want them included.

5. Once the join is configured, you can preview the table that will be published to the MapX database by clicking the **Preview table** button. If the join is valid, the **Save** button becomes active, completing the creation process.
6. Once the new join-type source is published in the MapX database, it will automatically appear in other MapX tools, and the data can be visualized through a vector-type view.

> **Note**
>
> Columns to display are limited to a maximum of 50 for the “Base source” as well as for all “Join sources”.

Validation system

Validation within the interface ensures that all necessary fields are filled out correctly and that any errors or mandatory fields are addressed before proceeding. Mandatory fields or errors are prominently displayed at the top of the panel and along the left edge with thin red lines. Until all warnings are resolved within the interface, saving the configuration will not be possible.


New table join
Value required (root.base.id_source)
Value required (root.joins.0.id_source)
Value must have at least 1 items (root.joins.0.columns)
Value required (root.joins.0.column_base)
Value required (root.joins.0.column_join)
Join Configurator
Configure how layers and tables should be joined
Base
Base source
Select source...
Columns to display
Select columns...
Join items
Item 1
Close
Save
Preview table 0

CHAPTER

SIX

STORY MAPS

Story maps are a simple yet powerful tool to inform, engage, and inspire your audience with any story you may want to tell. Story maps are an effective way to harness the power of maps and geo-spatial visualization, bring data to life and make stories often hidden in data accessible to both the wider public or to a targeted audience including policy makers.

A story map is a combination of a narrative, photos, and videos with interactive maps. The MapX story map engine allows publishers of the platform to independently build story maps without any GIS or programming skills. Story maps can cover a wide variety of subjects and tell any type of story.

This chapter aims to provide MapX users with technical guidance on how to build a successful story map that is both interesting and informative. Furthermore, it includes the step-by-step procedure to build a story map.

6.1 How to tell a great story?

A great story map is visually appealing, simple, focused, and flows both seamlessly and logically.

First, think about your audience. Before you build your story map, think about who you want to reach, what you want your key messages to be, and how the audience may find it meaningful. Do you want to raise awareness, be informative or catalyze action? Craft your text, maps, and other content to suit your audience and your objectives. Avoid jargon and acronyms that might be confusing to viewers unfamiliar with the topic of your story.

Next, think about your text, including the title and subtitles. It should be simple, clear, and compelling. The more you focus on essential elements, the more likely you are to tell an effective story. A person should not have to get to the fifth or sixth section in your story to understand its concepts and objectives.

In any medium, a good story typically has:

- Characters (i.e., a human face)
- A challenge to be faced
- Action
- A turning point when change happens

- A resolution

6.2 Recommendations for story map development

- Develop story maps with 15 to 20 steps.
- Craft your title to be intriguing and descriptive.
- Begin with an introductory paragraph that summarizes the story and its conclusion. Try to include basic answers to the questions of "why, who, what, when, where." The reader should have a good idea of what took place after reading this paragraph.
- Provide more details in the following paragraphs, elaborating on the brief information in the first paragraph.
- Catch the audience's interest: use maps, images, key figures etc.
- Make sure the maps you use show quality data, have appropriate styling and complete metadata.
- Make your titles and subtitles active, engaging, and concise.
- Personalize your story: add pictures, citations, interviews, videos etc.
- Give proper citation to maps, quotes and media used in the story map.
- Write short paragraphs - try to keep them under 100 words.
- Adapt the amount of text depending on its end-use: more text would be fine for online reading where less text would be appropriate if you plan to use this as a presentation.
- Give a voice to your story: call to action at the end of your story map if necessary
- Add a last step containing credits, contacts, organization logos, and if necessary, links to relevant external resources.
- Test your story map on different screen sizes and different devices (computer, tablet, smartphone): what looks great on one screen doesn't necessarily look great on another. This is particularly true between computer screens and mobile phones.
- Ensure that media loads quickly. For instance, it may take several seconds or even several minutes to load a 10MB image depending on the users internet connection. We recommend using photos with a file size less than 1MB.

6.3 Creating a story map

To prepare your story map, we recommend creating what is known as a storyboard to plan your story map before developing it on the platform. With each step you should know what the content will include: a title, text, picture, video, and/or spatial data. Before embarking on the implementation of your story map, make sure that all geospatial data is available in MapX and that you have collected and prepared all supporting media (i.e., photos, infographics, videos). An example of a storyboard is available here and its implementation in MapX here.

6.3.1 Glossary

Here are the specific terms you will find in the story map editing tool:

- **Step**: the steps of your story map are what appears on the screen. These are equivalent to "chapters" of your story: when the first chapter is over, create another by adding a new step.
- **Slide**: a slide is the box containing the text or images you see on your screen. You can show different slides one your screen, meaning you can add different slides to each step.
- **Class**: the class is the parameter given to your slide. It determines the position of your slides on the screen, the level of transparency, etc.

6.3.2 Creating a story map view

Story maps are a special type of view in MapX. Their creation and configuration is similar to that of vector views which is described in detail in *Publication of new views*. Please refer to this chapter for full details.

6.3.3 Adding content to a story map

Once you have created and configured your story map (view), you can start designing/implementing its content.

To edit the content of your story map, click on the **Edit story map** button in the view tools. This will open the main menu to edit the story.

From here on, this guide will take you step by step through all of all the tools at your disposal to design the content of the story map.

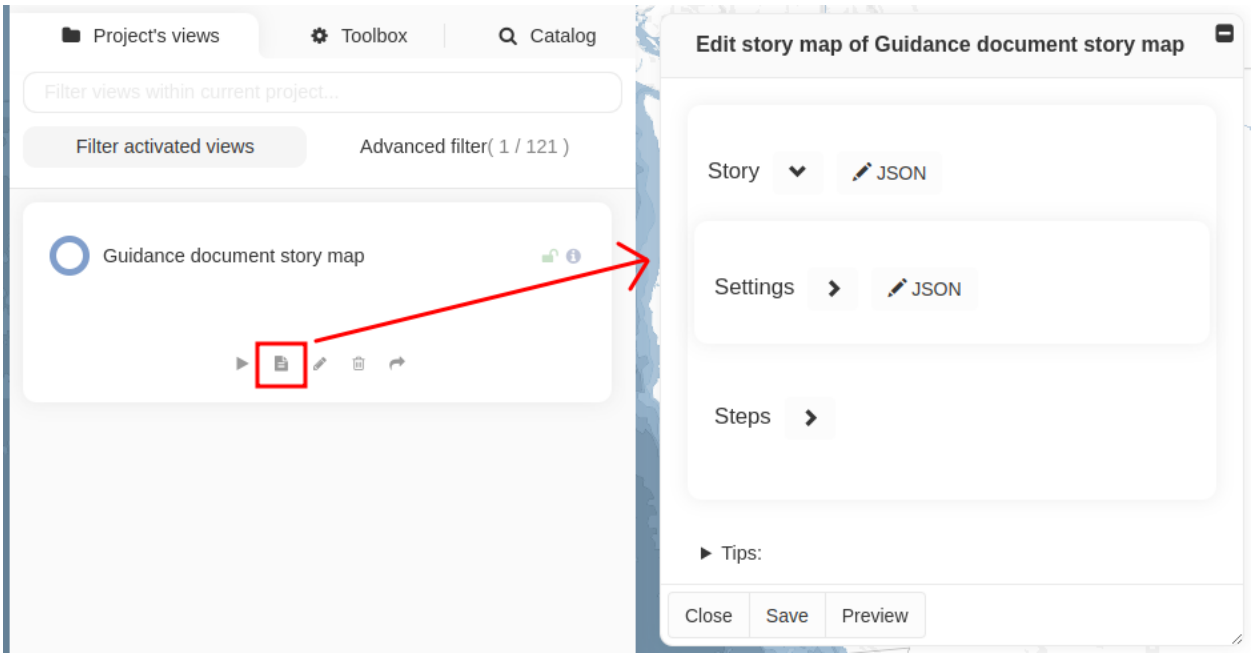


Fig. 1: Access to the story map editing tool

Defining the settings of a story map

First, you should define the settings that will apply to the whole story map by clicking on the arrow > to expend the **Settings** section:

- **Theme**: change application and map colors scheme (the default theme in MapX is **Classic light**)
- **Projection**: change map projection (the default projection in MapX is **Web Mercator**)
- **Screen resolution**: resolution of the page during reading. It will automatically scale to fit the screen and preserve content formatting. The default parameters of the screen resolution are automatically set on 720p (16:9). The most used screen resolution is 720p and 1080p.
- **Dashboards display mode**: if view(s) in the story map have an associated dashboard, this setting allows to define how they will be rendered (i.e., open, closed or hidden). This setting applies to the whole story map, but it can be overwritten at each step if necessary.
- **Legends display mode**: set how the legend panel should be displayed in the story map (i.e., open or closed). This setting applies to the whole story map, but it can be overwritten at each step if necessary.
- **Timeout before decreasing opacity [ms]**: delay before decreasing the opacity of panels (i.e., legends, dashboards, pop-ups) and the menu bar in case of mouse inactivity.

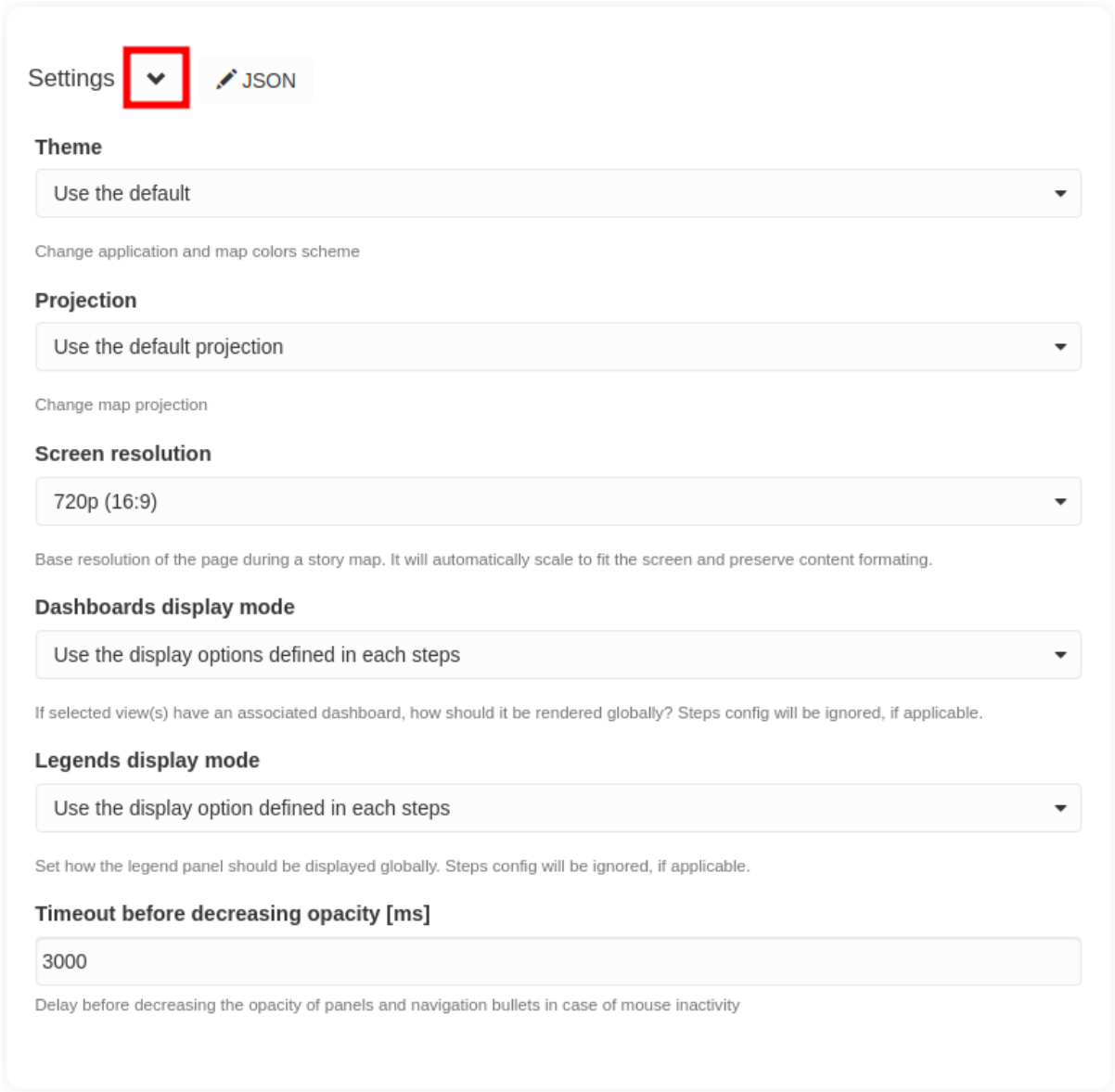


Fig. 2: Global story map settings

Creating a step

The step is the space containing your narrative, your pictures, etc. that support the map. It is basically a chapter of your story map (similar to the slide concept in PowerPoint). Typically, a story map has between 15 and 20 steps. To create a complete story map, you will have to repeat the operations described in the sections below for each of them.

To create/add a new step, click on the + `Step` button. Once the step is created, you can expand its editing section by clicking on the > arrow.

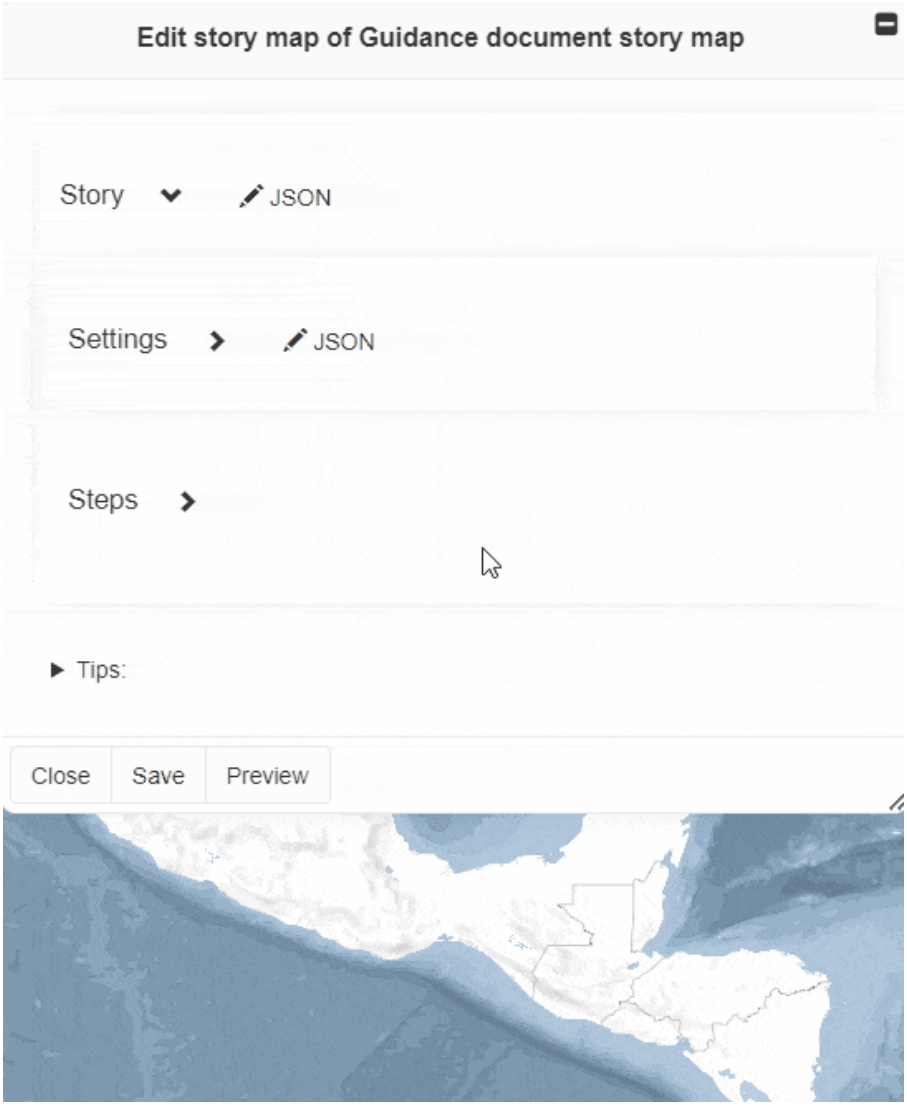


Fig. 3: Creating a step

Here is a brief overview of the different tools you will find in the step editing section some of which are detailed in dedicated subsections that you will find further down this page.

- **Step name**: set a title to the step to keep your story map organized. Titles can be edited at any time. As a story map typically has 15-20 steps, finding the step you want to edit becomes

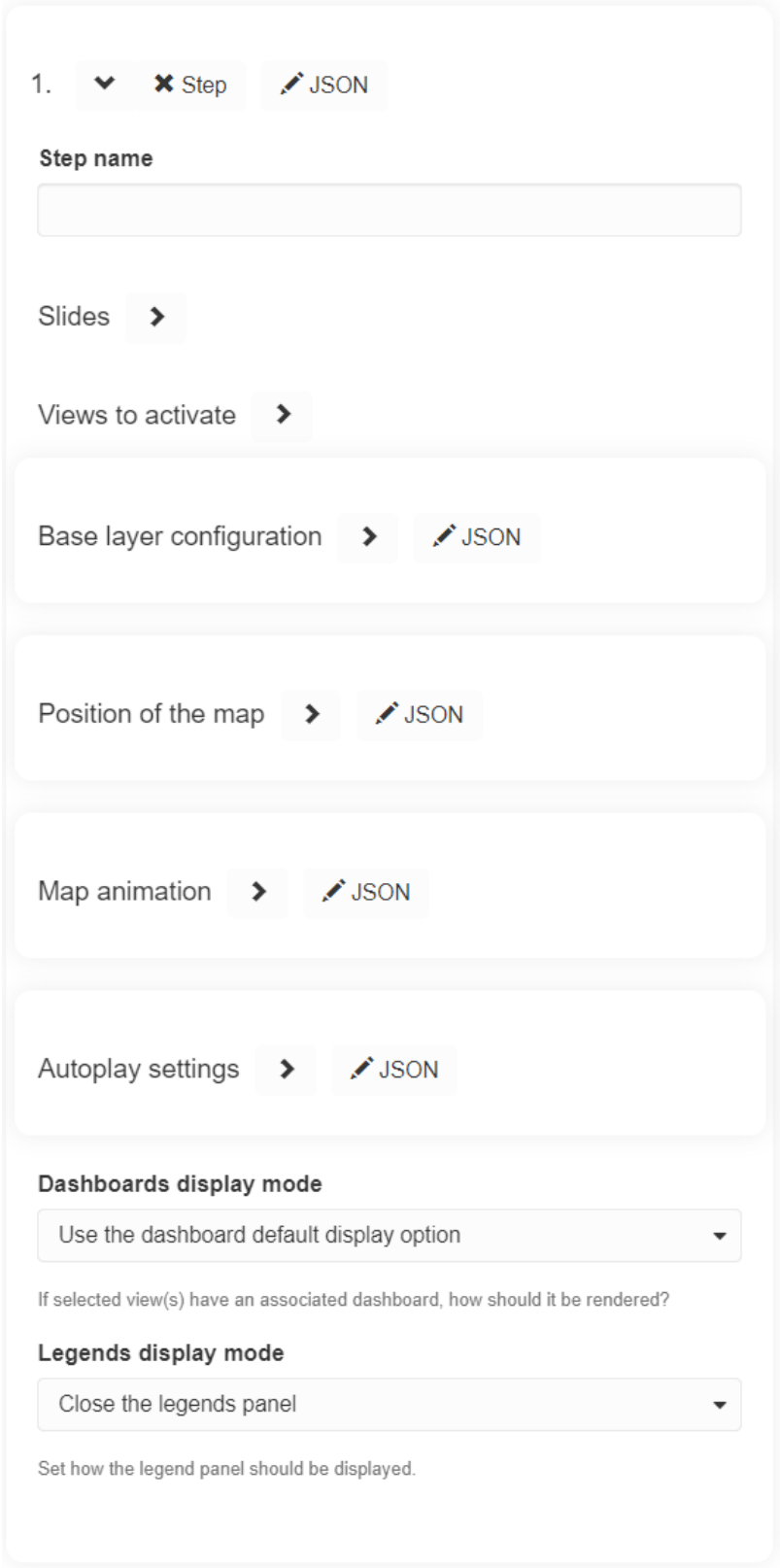


Fig. 4: Step editing section

easier and will allow the reader to know where they are in your story. You can move your steps around by clicking the up and down arrows beneath each step title.

- **Slides**: add a slide to the step. Slides are boxes where media (e.g., photo, video) and text elements can be added to the current step of the story map.
- **Views to activate**: add data on the map.
- **Base layer configuration**: add a high-resolution aerial imagery to the map and/or to enable the 3d terrain mode which make elevation appears in 3 dimensions. The 3d terrain mode renders well at high zoom, with the camera tilted.
- **Position of the map**: set the position of the map for a given step. Either manually enter the center coordinates and zoom of the map or (recommended) use the **Update using current map parameter** to automatically set the map according to its current position. This determines what geographic area is displayed on the map.
- **Map animation**: set the way of transitioning from one step to the next step of the story map.
- **Autoplay settings**: define how the step will be played when the story map is consulted in autoplay mode (triggered by pressing the spacebar), in particular the time during which the step is displayed.
- **Dashboards display mode** and **Legends display mode**: override the global options set in the story map settings.

Note

- Remember to regularly save your draft story map by clicking on the **Save** button located at the bottom of the story map editor.
- The **Preview** button lets you see what the story map will look like. This is especially useful when experimenting with different design solutions for the content you want to display.

Creating a slide

By creating slides (the building blocks of a step), you add content into the step of the story map. It is recommended to add one slide per content (e.g., title, text, photo, video, etc.).

To add a new slide, expand the **Slide** section by clicking on > arrow and then click on the `+ Slide` button.

To stay organized, title your slide immediately after creating it (e.g., slide 1: photo; slide 2: text; etc.).

It is possible to add content to the slide in HTML format directly from the **Content** section but we recommend that you do not do so. A more interactive method for adding text, image or video is available and described below. Before adding content interactively, we recommend that you configure the step as follows:

- **Text color**: click on the color bar to choose the color to be applied to the text.

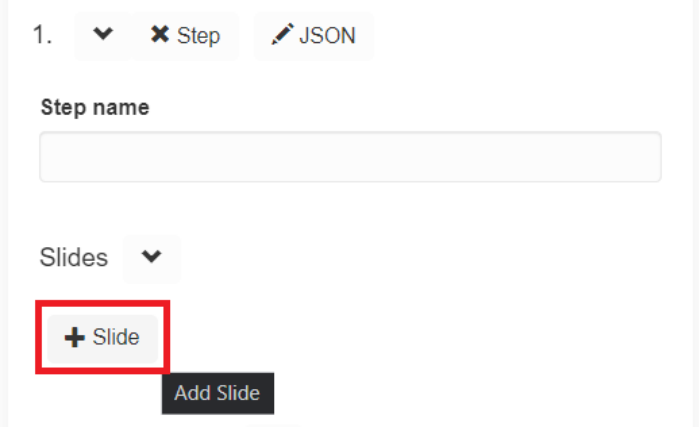
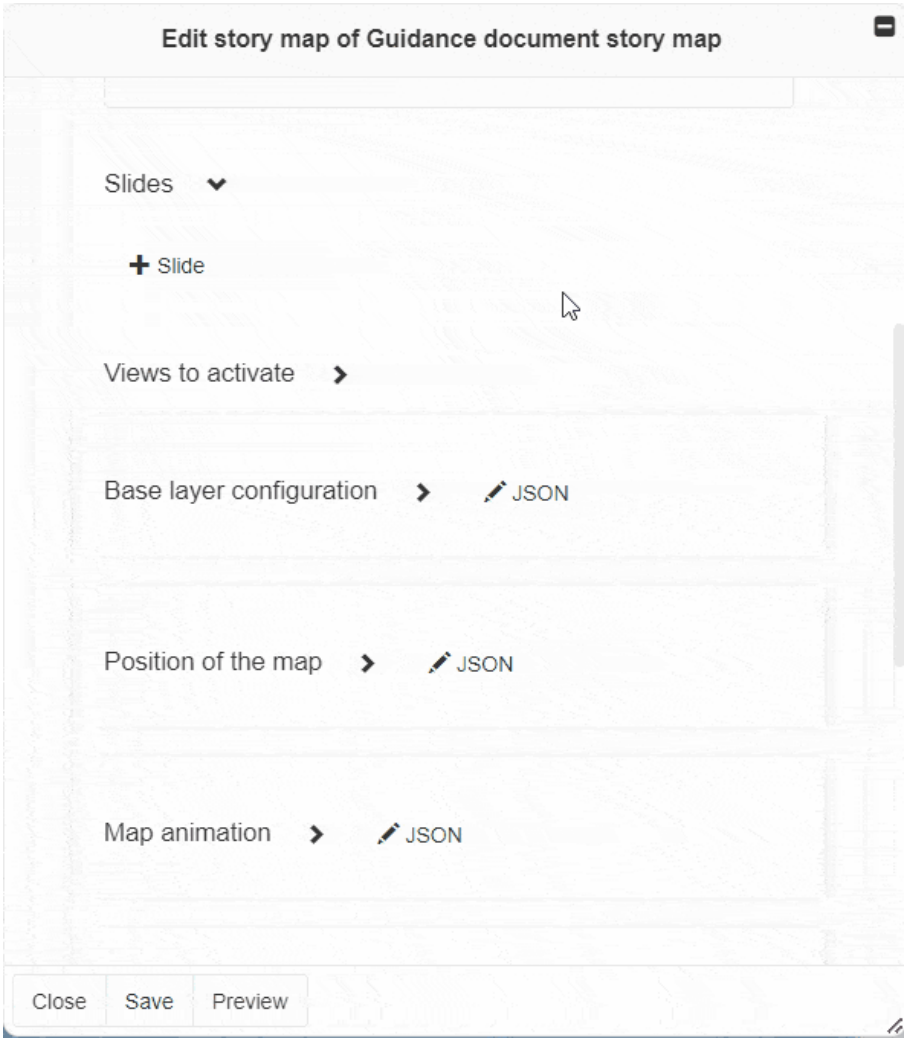


Fig. 5: Creating a slide



- **Background color**: click on the color bar to choose the color to be applied to the background of the slide.
- **Background opacity**: click on the number in the box and define manually the opacity between 0 and 1. **NB**: 0 is totally transparent and 1 is totally opaque.
- **Base text size in pixels**: click on the text size number in the box and define manually the size of the text.
- **Effects**: this section allows you to configure parallax effect(s) on the slide. This is an advanced option that is not widely used in MapX and therfore, not covered in detail in this document.
- **Allow scrolling**: enable this option if the slide content goes outside the container. A scrollbar will be displayed automatically.
- **Slide classes**: click on this section to define the positioning of your slide using the preconfigured classes. Classes can be combined (e.g., `half-top / half-bottom` + `half-left / half-right` to place the slide in the quadrant of your choice).

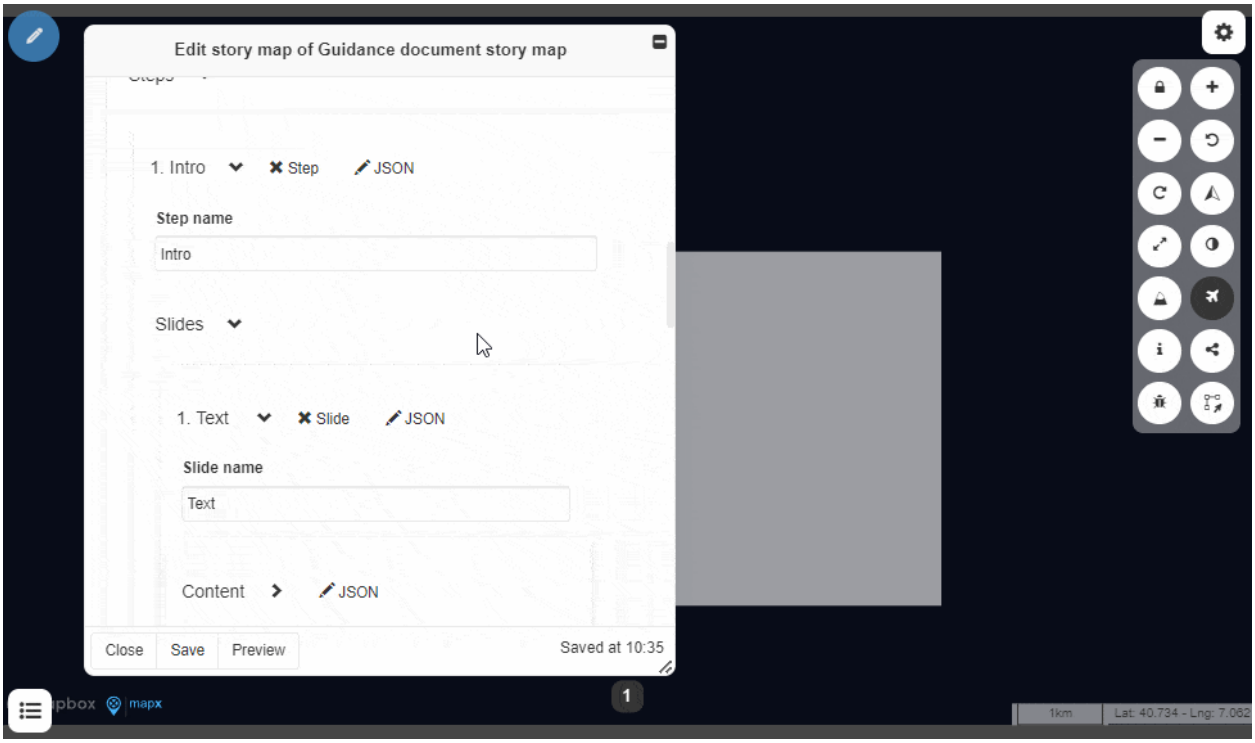
Hint

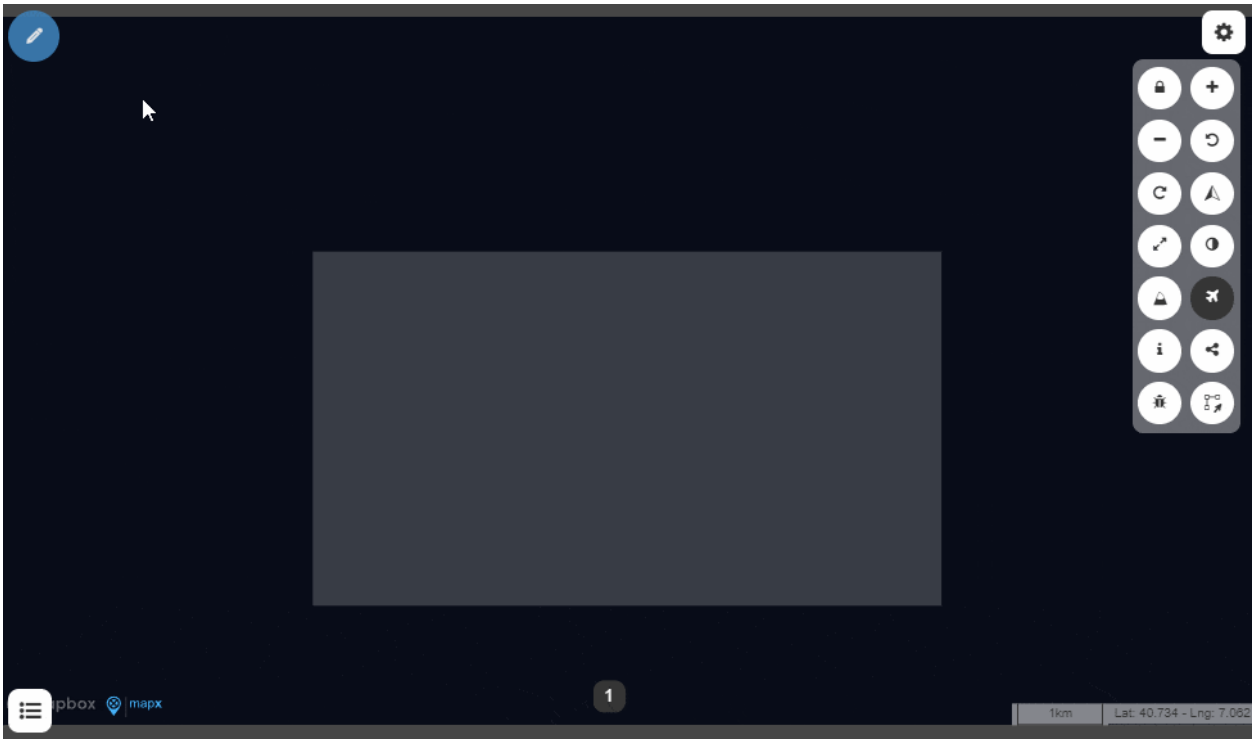
- Photos look good when either placed in one of the quadrants or as a full-size image in the background.
- Full screen titles look good with e.g., the `half-horizontal-center` class for the text and a full-size image in the background.
- Adding the `image-cover` class to the slide means that if you insert a photo, it will be displayed over the whole slide defined by the other classes. You can change the order of the image in the slide so that text is displayed on top using the arrows next to the slide number.
- The `text` classes define the alignment of the text within the slide.

Once the slides are configured, press the **Preview** button to view your step. To edit the content of the slides in interactive mode, press the pencil button in the top-left corner. You can now click in a slide and add content i.e., text, photos, videos. A panel containing text formatting options and tools for adding images and videos is automatically displayed in the interface as soon as this editing mode is activated.

When done with editing, click on the green button located on the top-left corner of the screen to save all changes or click on the red button to discard them.

In case an image and/or a video is added in a slide, it can be resized by dragging one of its corners and its positioning can be fine-tuned using additional options by clicking on the “img” or “iframe” button located in the bottom-left corner.


Edit story map of Guidance document story map
1. Intro
Step
JSON
Step name
Intro
Slides
1. Text
Slide
JSON
Slide name
Text
Content
JSON
Close
Save
Preview
Saved at 10:35
1
mapx
1km
Lat: 40.734 - Lng: 7.062


1
mapx
1km
Lat: 40.734 - Lng: 7.062

Adding a hyperlink

You may need to add a hyperlink in your narrative to refer to further information or to cite a data source. To do so, select the text to attach the hyperlink to, and click on the "tie" icon. A text box appears above the highlighted text, paste your link, and click on the green (check) button to save it. If you want the link to open in a new tab (which we recommend), you just have to click on the "external" (circled in purple) button before saving your link.

Fig. 6: Add a hyperlink

Activate views

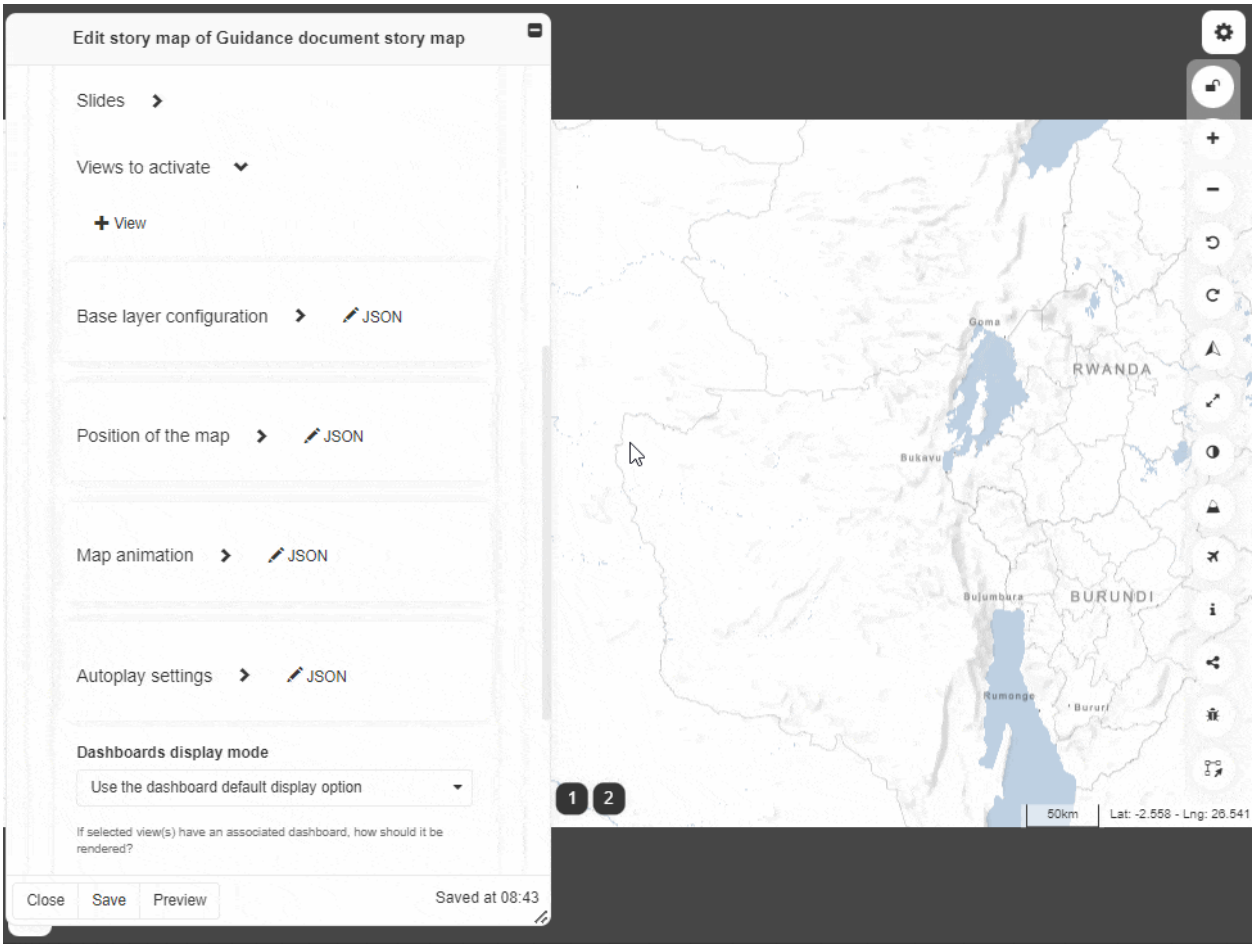
The **Activate views** section allows you to enable spatial data (views) to be displayed in the map for a given step. All public views as well as private views for which you have read rights (except for story maps, no inception possible) can be activated in the map. Multiple views can be activated in the same step and if so, they will be organized according to the order defined in the tool (e.g., View 1 being the top layer and the View 2 being the bottom layer).

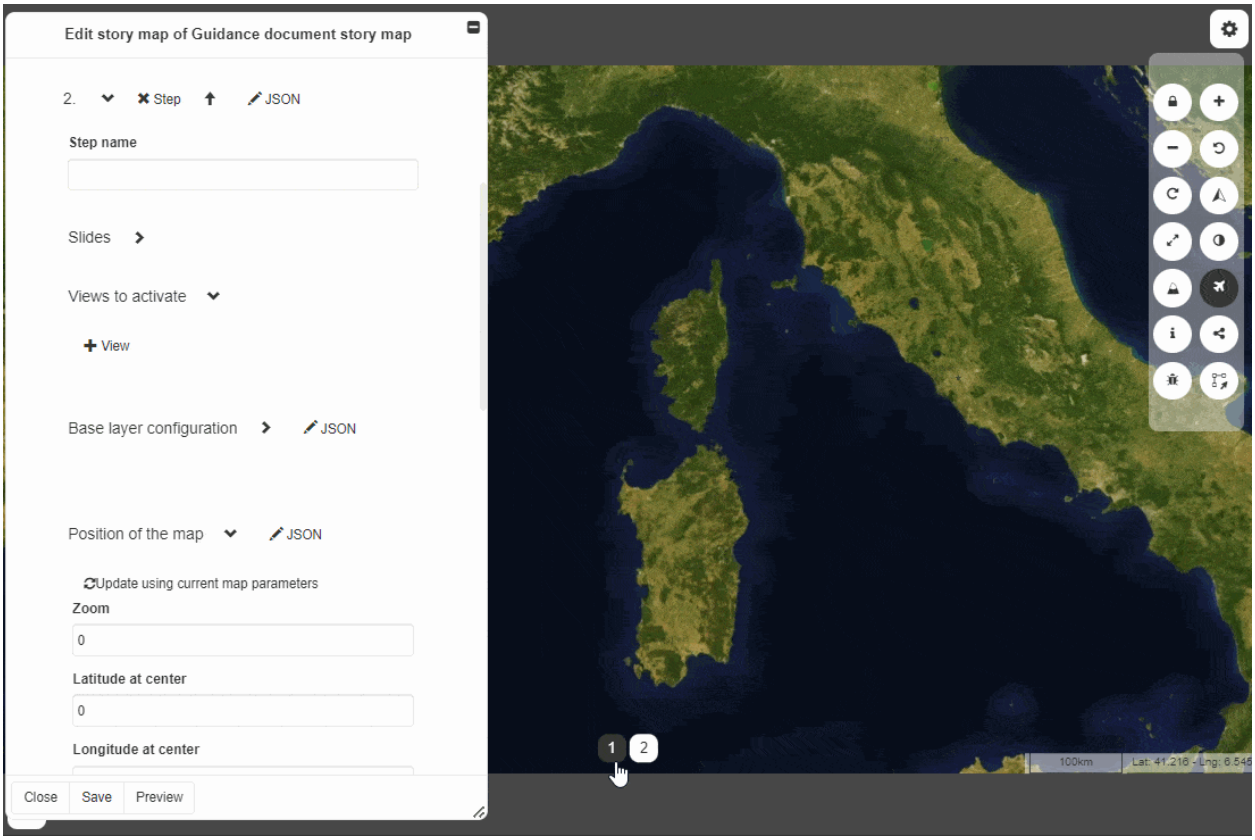
Reminder: if you want to display your data with the aerial mode as basemap, you will have to activate it from the **Base layer configuration** section.

Position of the map

By default, the steps cover the entire world which is suitable for the visualization of global data but depending on the subject you are addressing, it may be relevant to show a specific geographic area in the map in your story map. To do so:

1. Expand the **Position of the map** section.
2. Click on the lock button in the menu bar (top-right corner) to unlock the map.
3. With your mouse, you can now zoom in, zoom out, and move the map as much as you want to select the area of your interest.
4. Click again on the lock button to lock the map.
5. Click on the **Update using current map parameters** to update the geographic coordinates of the map according to the map you see on your screen. The geographic coordinates of your map appear automatically in the text boxes.


Edit story map of Guidance document story map
Slides
Views to activate
View
Base layer configuration
JSON
Position of the map
JSON
Map animation
JSON
Autoplay settings
JSON
Dashboards display mode
Use the dashboard default display option
If selected view(s) have an associated dashboard, how should it be rendered?
Close
Save
Preview
Saved at 08:43
Goma
RWANDA
Bukavu
Bujumbura
BURUNDI
Rumonge
Bururi
1
2
50km
Lat: -2.558 - Lng: 26.541



Map animation

The **Map animation** section lets you choose the transition from one step to the next in a story map.

> **Note**
>
> The settings provided in this section apply to how you get to the current step. In other words, to customize the transition from the first to the second step, you will need to edit the **Map animation** settings on Step 2.

- **Animation duration**: the time over which the transition spans in millisecond [ms].
- **Trajectory method**: this describes the kind of transition between the steps.
- **Animation function** and **Animation function exponent**: these are additional settings you can experiment to personalize the map animation of your story map.

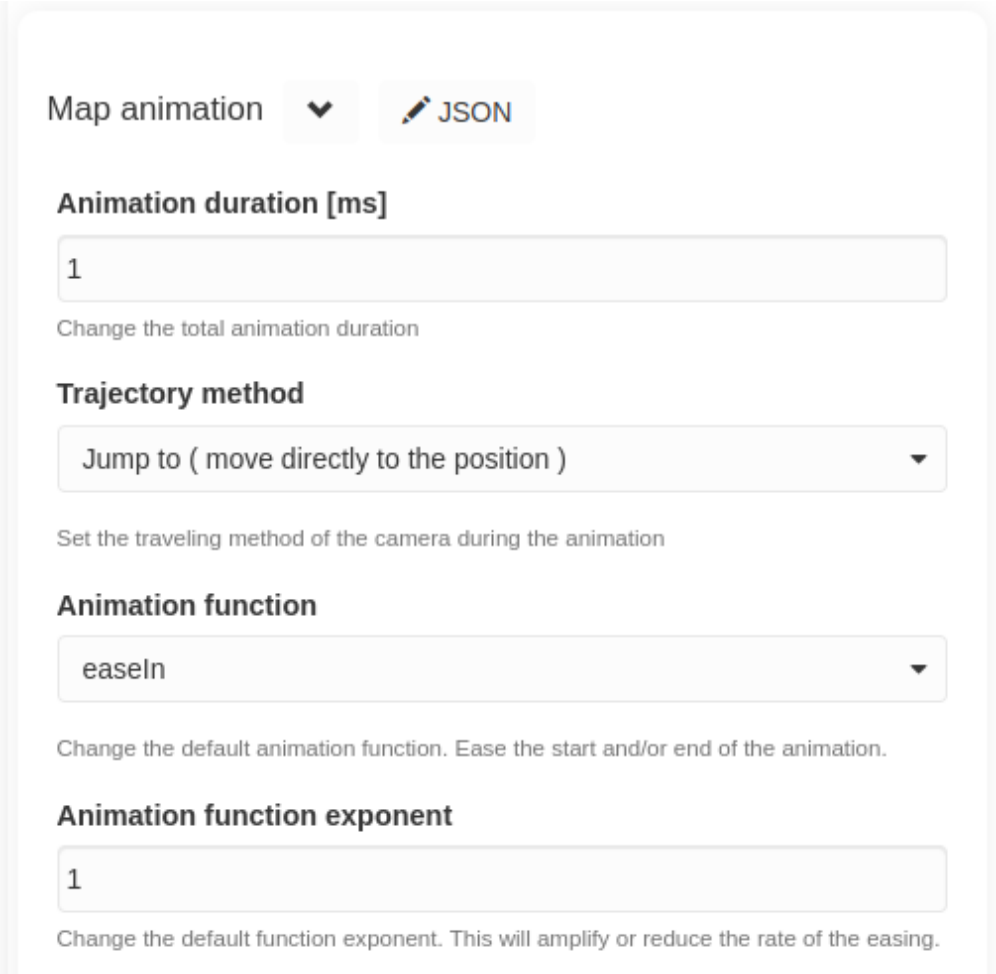


Fig. 7: Map animation section

6.4 Sharing a story map

You can use the **Sharing manager** to generate a link and share it on social media or by email. The use of this tool is described in details in the *Sharing manager* section. We recommend that you share story maps in static mode (default mode) which allows them to be read automatically when the link is opened.

The **Sharing manager** is also available in the menu bar when the story map is played. This way, readers can either share the story map itself or share the views displayed in the map for a given step.

6.5 Tips & tricks

6.5.1 List of current shortcuts

- `space` Start / Stop autoplay
- `esc` Stop playing and close
- `l` Lock / Unlock story to interact with map features
- ← ↑ → ↓ Next / previous step. Continuous keypress will fast-forward the steps
- `0-9` Activate step number. Type without pause to reach a number greater than "9". For example, type `1` then `3` to activate step 13. There is no key repeat prevention: if you keep pressing `1`, it will try to reach step `11111111` : the last step will be played.

Note: Shortcuts only work in edit mode if the focus is on the map and the text editor is not active.

6.5.2 How to handle badly formatted HTML from story map slides ?

Description of a possible issue

- When the visual editor is launched , a cog logo appears and the editor toolbar does not show up.
- An error is visible in the console:

```
Error: Transition is undefined: ...
```

- Other "it does not work after I've made a manual operation" errors.

Probable cause

Badly formatted HTML in a slide

How to avoid it

Use the visual editor and don't modify HTML manually.

How to solve an issue

For large story map JSON, it could be difficult to detect errors simply by reading the code. A solution is to use a HTML validation tool, such as the one available in jsfiddle.net.

MapX also has an integrated validator, but it's turned off at the moment. So, you will have to use an external tool for now.

1. Copy the JSON code from the story map editor
2. Open a javascript console
3. Paste the JSON in a variable, for example:

```
var story={ "steps": []}
```

4. Using a nested loop, extract the HTML for the desired language:

```
var txt = "";
story.steps.forEach(
  function(s) {
    s.slides.forEach(function(sl) {
      txt = txt + sl.html.en
    })
  })
```

5. Copy the result. In Chrome interactive console, the command `copy(txt)` will copy the result in your clipboard.
6. Paste the result in jsfiddle.net, under the HTML section
7. Now you can see issues visually, for example:

CHAPTER

SEVEN

ADVANCED TOOLS

This chapter compiles documentation of the advanced tools provided in MapX that were not covered in previous chapters.

7.1 Area intersection tools

The **Area intersection tools** enables publishers to perform GIS-like overlap analysis to:

1. calculate the exact area of overlapping features;
2. create a new data source from the result of the analysis.

7.1.1 How do I use the Area intersection tool?

Publishers can access the tool from the **Toolbox** by clicking on the **Area intersection tools** button. Analyses are done at the project level, which means that only data sources published in the current project can be used. In addition, to optimize the use of computing resources, analyses are limited to the extent of a single country.

To perform an analysis, you must:

1. Select 1 to 3 data sources. The **Add sources by views** helper allows to add data sources from the views activated in the map and/or from the title of the views published in the project.
2. Select a country: the analysis is limited to the extent of a single country (administrative boundaries are from GAUL 2015).
3. Select the type of analysis (both types can be performed one after the other):
    1. **Calculate area of intersection**: click on **Run analysis** once the sources have been selected. The overlap area in km2 is displayed in the MapX interface.
    2. **Create new layer based on the intersection**: Before clicking on **Run analysis**, you must define the name of the data source that will be published in the current project. Once the analysis completed, you will receive an email informing you that the source is available in the database and you will be able to use it to create new views in the projet.

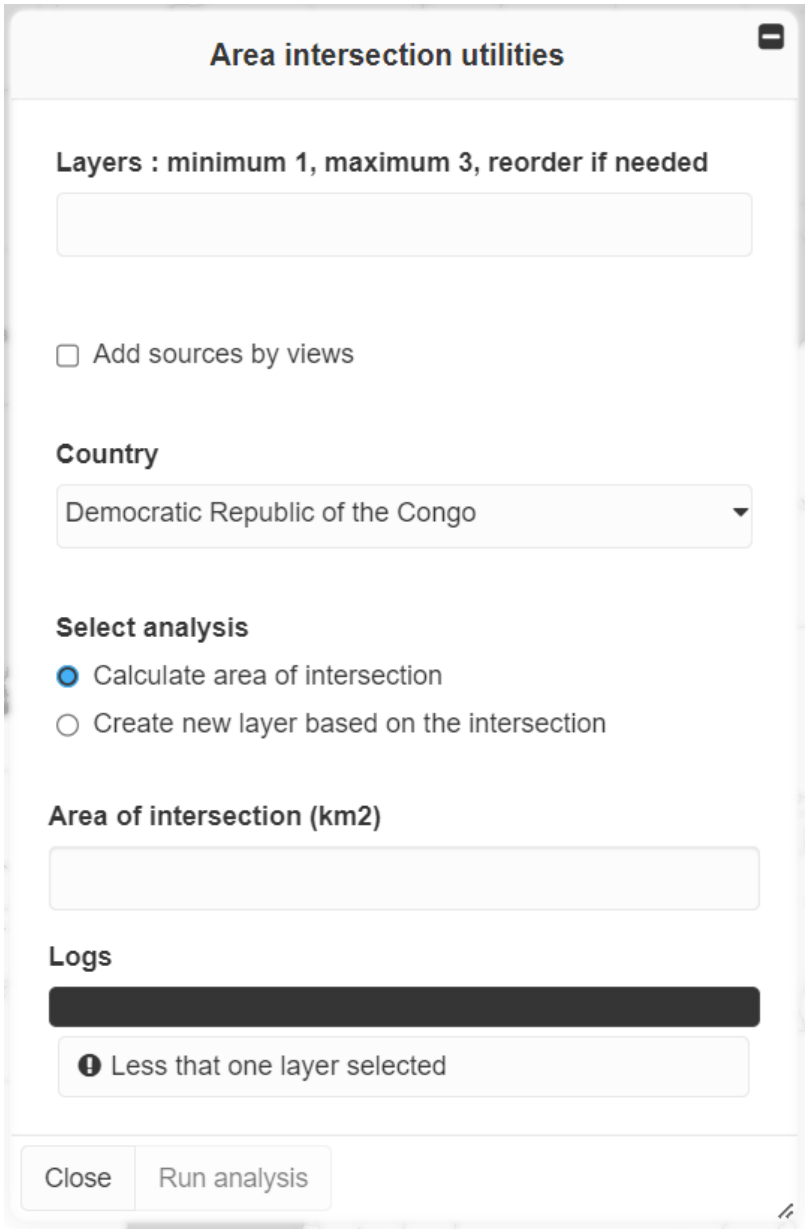


Fig. 1: Area intersection tools interface

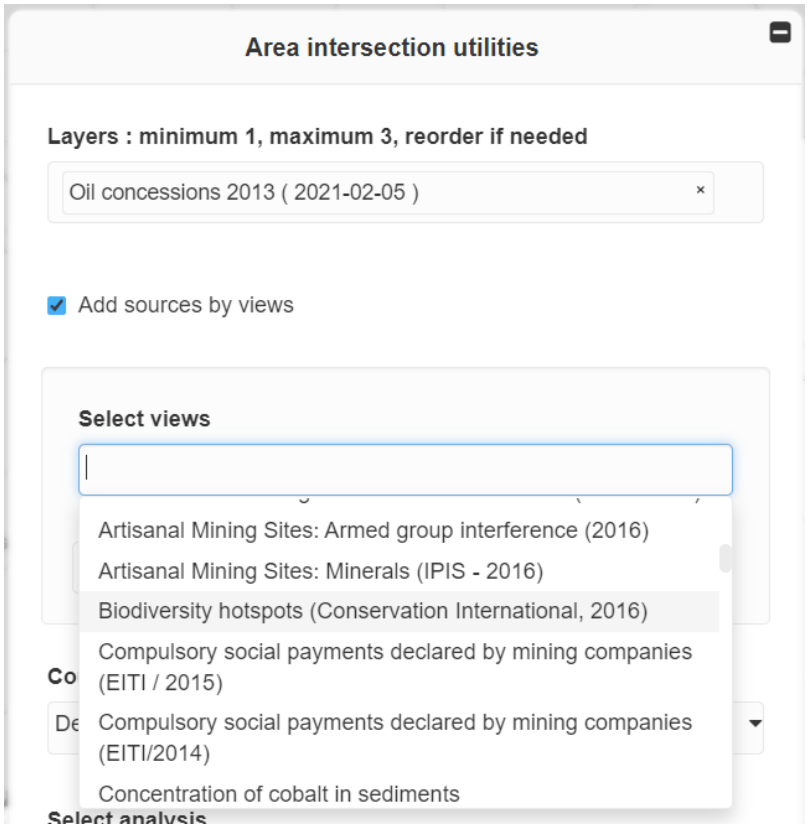


Fig. 2: Selection of data sources

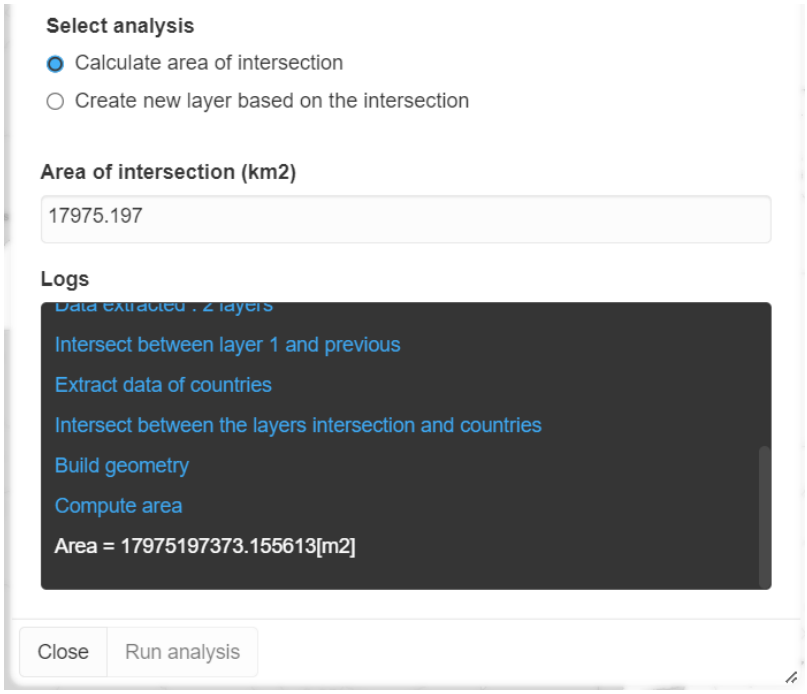


Fig. 3: Area of intersection

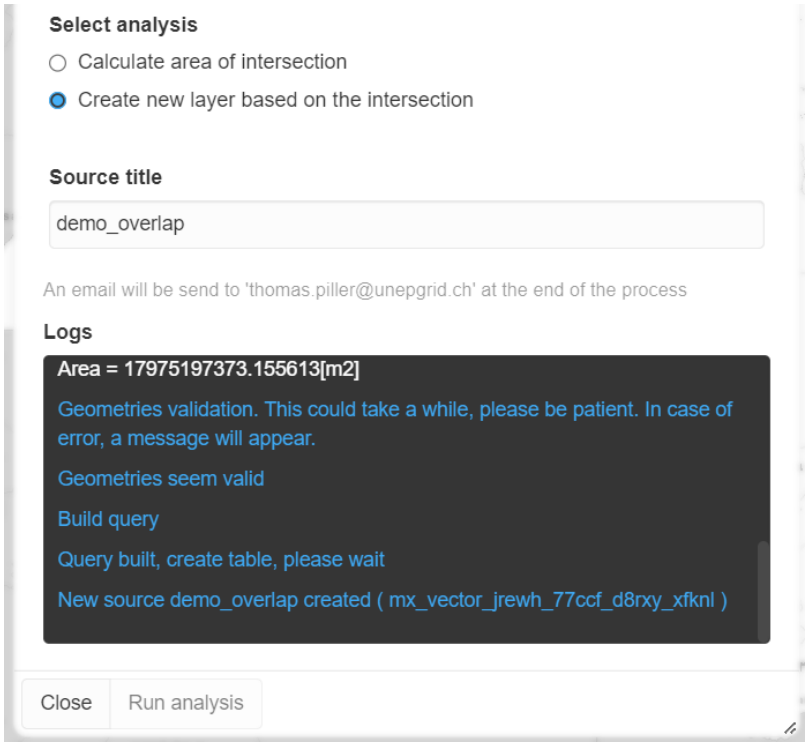


Fig. 4: Creation of a new layer based on the intersection

Note

The **Area intersection tools** are only available to publishers due to the high resource-load needed to process the data in the back-end. For the same reason, the number of layers that can be used for analysis is limited to 3, plus the administrative boundary of a country.

CHAPTER

EIGHT

PROJECT MANAGEMENT

Administrators are in charge within a project of managing user roles as well as configuring its settings (e.g., title, abstract, countries highlighting, map projection, default map position). They are also responsible for establishing a work strategy within the project and verifying the content that has been published.

Tools for managing projects and users are described in the following sections.

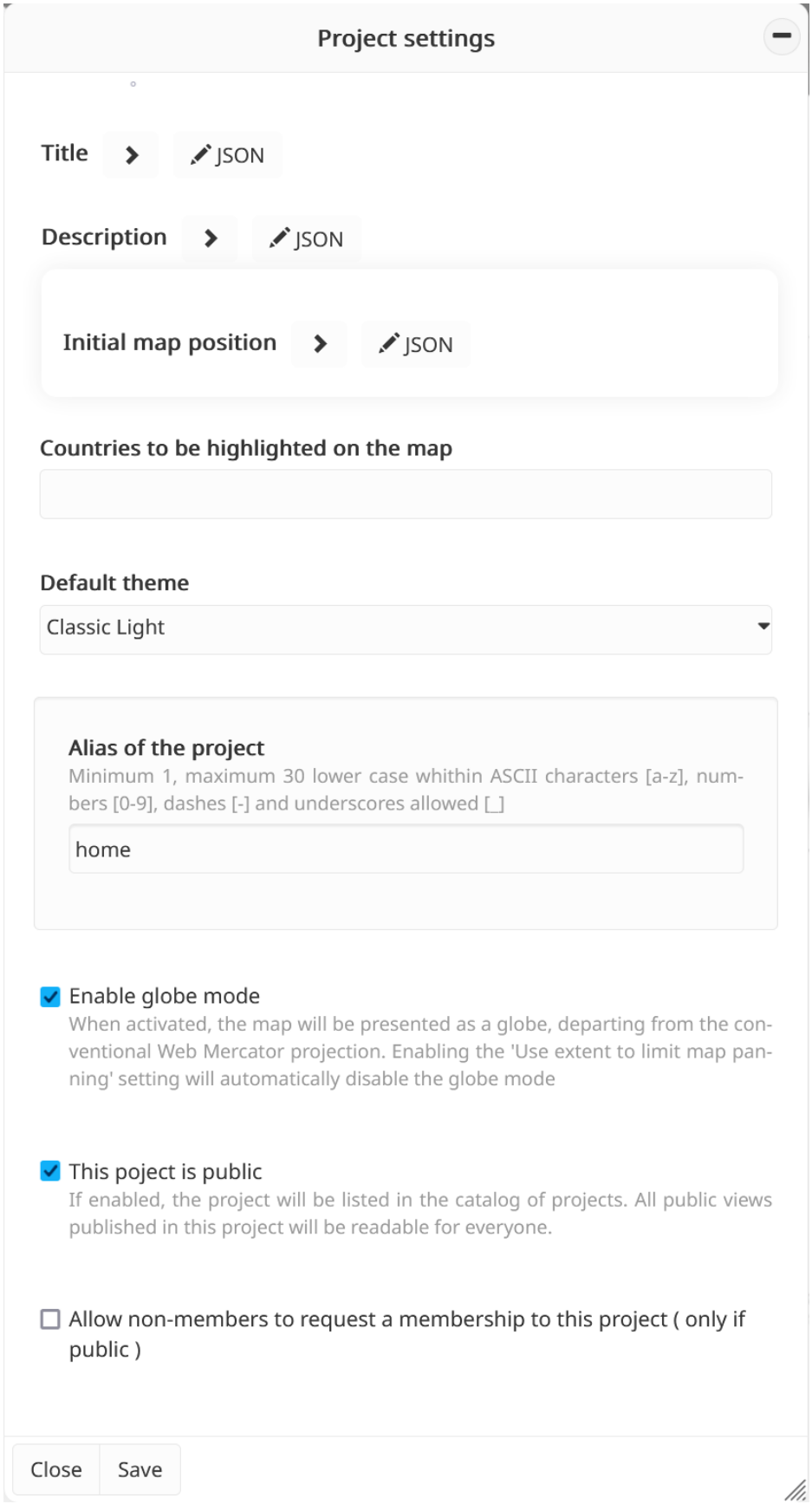
8.1 Data catalog organization

Administrators can define the default organization of the data catalog in their project. This includes sorting of views and grouping in categories and subcategories (detailed explanations *here*). To do so, administrators must first organize the data catalog as they wish and then save its state using the **Save views list state** tool available in the **Toolbox**. Thus, users connecting to the project will see the organization as thought by the administrators but will still have the possibility of modifying it for their personal session in MapX (see *Sorting views*).

8.2 Project configuration

Administrators can access the **Project configuration** tool from the **Toolbox** and fill/update the following settings:

- **Title** (multilingual)
- **Description** (multilingual): brief summary of the project content
- **Initial map position**: default map position when the project is loaded by a user. In addition, it is possible to limit the map panning to the defined position, thus limiting what users will be able to see when exploring the project (e.g., a project can be limited to the Mediterranean region and only display its extent).
- **Countries to be highlighted on the map**
- **Default theme**: default MapX theme when the project is loaded by a user
- **Alias of the project**: a human readable name with which the project is identified and that can be used in the URL for accessing the project


Project settings
Title
JSON
Description
JSON
Initial map position
JSON
Countries to be highlighted on the map
Default theme
Classic Light
Alias of the project
Minimum 1, maximum 30 lower case whithin ASCII characters [a-z], numbers [0-9], dashes [-] and underscores allowed [_]
home
Enable globe mode
When activated, the map will be presented as a globe, departing from the conventional Web Mercator projection. Enabling the 'Use extent to limit map panning' setting will automatically disable the globe mode
This poject is public
If enabled, the project will be listed in the catalog of projects. All public views published in this project will be readable for everyone.
Allow non-members to request a membership to this project (only if public)
Close
Save

- **Enable globe mode**: administrators have the option to default to the globe mode to display data in the map instead of the Web Mercator projection.

> **Warning**
>
> Enabling the **Use extent to limit map panning** setting (in the **Initial map position** section) will automatically disable the globe mode.

In addition to the settings above, there are two options for defining the degree of openness of the project:

1. Public or private project: while public projects can be searched in the list of projects by all MapX users, private projects are only visible/accessible by their members.

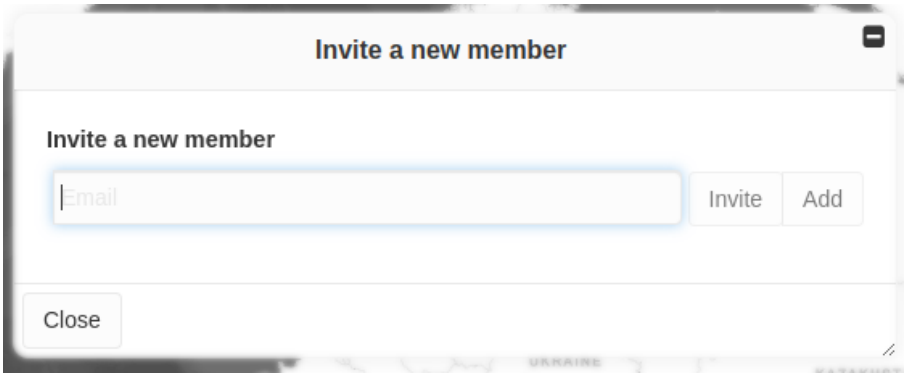
> **Note**
>
> Don't forget that it is possible to define specific reading rights for each view of a project. It is therefore possible to publish private views (e.g., available only to members) in a public project.

2. Allow public users to apply for a member role in the project: this option complements the **Invite a new member** tool available to administrators (see below).

8.3 Management of members/roles

> **Note**
>
> Within a project, each time a member is added or user roles are updated, all project administrators will receive an email notifying them of these changes.

8.3.1 Invite new members



Administrators can invite users to join their project from the **Invite a new member** tool available in the **Toolbox**. To do so, the email address of the person to add must be entered in the panel and one of the following option should be selected:

1. **Invite**: A formal invitation is sent to the person by email. The invitation must be accepted within two days by clicking on the link provided in the email.
2. **Add**: The person is directly added to the project as a member. They are notified by email about their new membership.

> **Note**
>
> For this option to be available, the email address provided must be that of a user who is already registered in MapX.

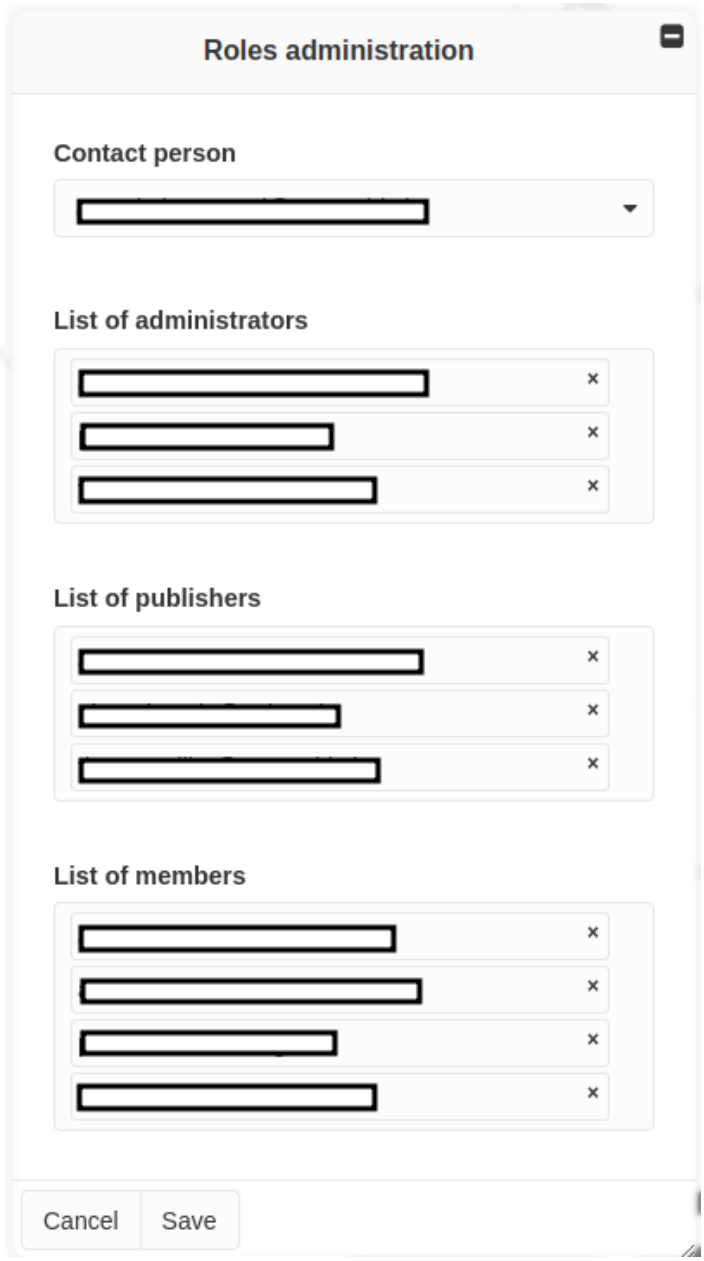
8.3.2 Setting users roles and permissions

Administrators can define the roles of each project member from the **Define Roles** tool. Please note that users must first be added as members before being able to upgrade their role. The different types of roles available in MapX are described *here*.

Only administrators can define the roles of other members, publishers, and administrators. If more administrators exist, each of them oversees the management of the project and has equal full power. An administrator must be designated as **Contact person** to receive membership requests that are sent by public users - if the service has been enabled in the project configuration.

8.3.3 Receiving/accepting membership requests from public users

Requests from public users wanting to become members of a project are sent by email to the project **Contact person** (see above). These emails, sent from bot@mapx.org, contain all the necessary information for the **Contact person** to accept or refuse the requests. To accept, the administrator simply has to click within two days on the link provided in the request. An invitation will be sent back to the user that requested the membership.


Roles administration
Contact person
List of administrators
List of publishers
List of members
Cancel
Save

CHAPTER

NINE

INFORMATION FOR DEVELOPERS

Technical documentation for developers is available in the MapX Github repository and can be accessed from the following links:

- How to contribute
- Upgrade Docker images
- Search tool API
- URL parameters
- SDK documentation