USER MANUAL

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Manual for users of the National Forest Fire Information System

For public

In this manual, are described the steps to be followed for performing work in the NFFIS system

by Geo&Land llc

1 Introduction

1.1 Introduction to GIS

A Geographical Information System (GIS) is a collection of software that allows you to create, visualize, query and analyze geospatial data. It combines geography data and technology to provide valuable insights into various real-world phenomena and their relationships.

Geospatial data refers to information about the geographic location of an entity. This often involves the use of a geographic coordinate, like a latitude or longitude value. Spatial data is another commonly used term, as are: geographic data, GIS data, map data, location data, coordinate data and spatial geometry data.

GIS operates on the principle that location is a fundamental aspect of most data. By organizing and analyzing data spatially, GIS helps us answer questions, make informed decisions, and solve problems that have a spatial component. It allows us to explore patterns, relationships, and trends that might not be apparent in traditional tabular data.

The applications of GIS are wide and varied. It is used in fields such as urban planning, environmental management, transportation, natural resource management, public health, emergency response, and business analysis, among others. Some common use cases include mapping and visualization, spatial analysis, modeling and simulation, and decision support system.

The field of GIS continues to evolve with advancements in technology and data availability. Cloud-based GIS platforms and mobile applications have made geospatial data more accessible and enabled real-time data updates.

GIS is a powerful tool for understanding and analyzing geographic data. It helps us to unlock the spatial dimension of information and gain valuable knowledge for informed decision-making across a wide range of disciplines.

2 Geospatial Data

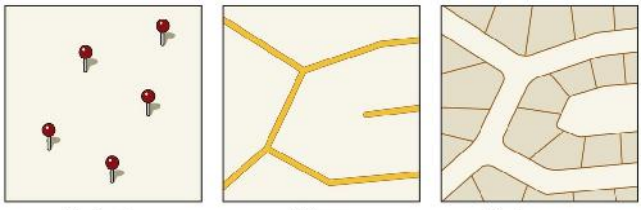
Geospatial data refers to any type of data that is associated with a specific location on the Earth's surface. It includes both spatial and attribute information, combining the geometric coordinates (latitude, longitude, and sometimes altitude) with descriptive attributes that provide additional details about the location or feature.

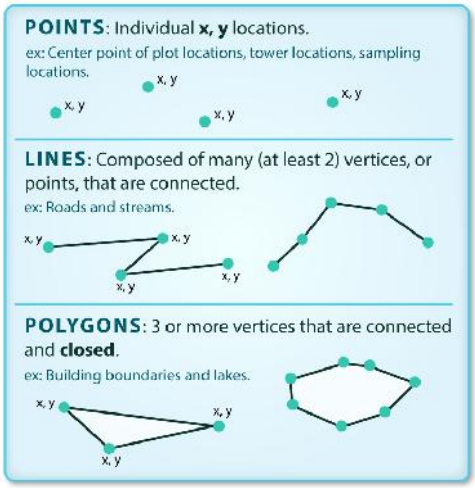
There are two types of geospatial data: Vector and Raster Data.

2.1 Vector Data

One of geospatial data are vector data. in its simplest sense, vectors are a way of describing a location by using a set of coordinates. This type of data represents geographic features as points, lines, or polygons.

- Point - a single coordinate (x,y) represent a geographic location, such a landmarks, addresses, etc.
- Line - multiple coordinates (x1,y1; x2,y2; ....xn,yn) strung together in a certain order like drawing a line from point 1 to point 2 and so on. Lines can represents roads or river.
- Polygon - is when lines are strung together by more than two points, with the last point being at the same location as the first. A triangle, circle, square, ect. are polygons. Polygons can represents area such as boundaries of countries or land parcels.





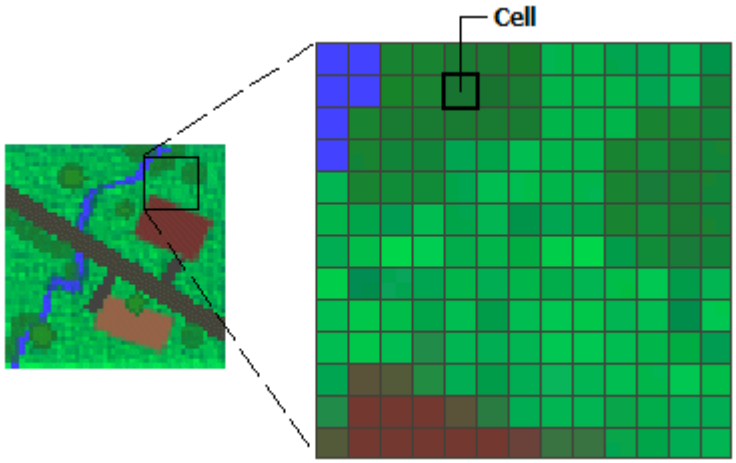
Vector data stores both the geometry (coordinates) and attributes (e.g. names, populations, land areas, etc.) of features.

2.2 Raster Data

Raster Data are also type of geospatial data that can use in a web GIS application.

Raster data is represented as a grid of cells or pixels, where each cell contains a value representing a specific attribute. the most form of raster data is digital satellite imagery or air photos. Elevation digital models are also typically represented as raster data

A raster is a regular grid made up of cells, or in the case of imagery, pixels. They have a fixed number of rows and columns. Each cell has a numeric value and has a certain geographic size (e.g. 20x20 meters in size).



3 Getting Started

This chapter provides an overview of the WebGIS application for the "National Forest Fire Information System (NFFIS)" development system, the entry procedure, and the main components of the system.

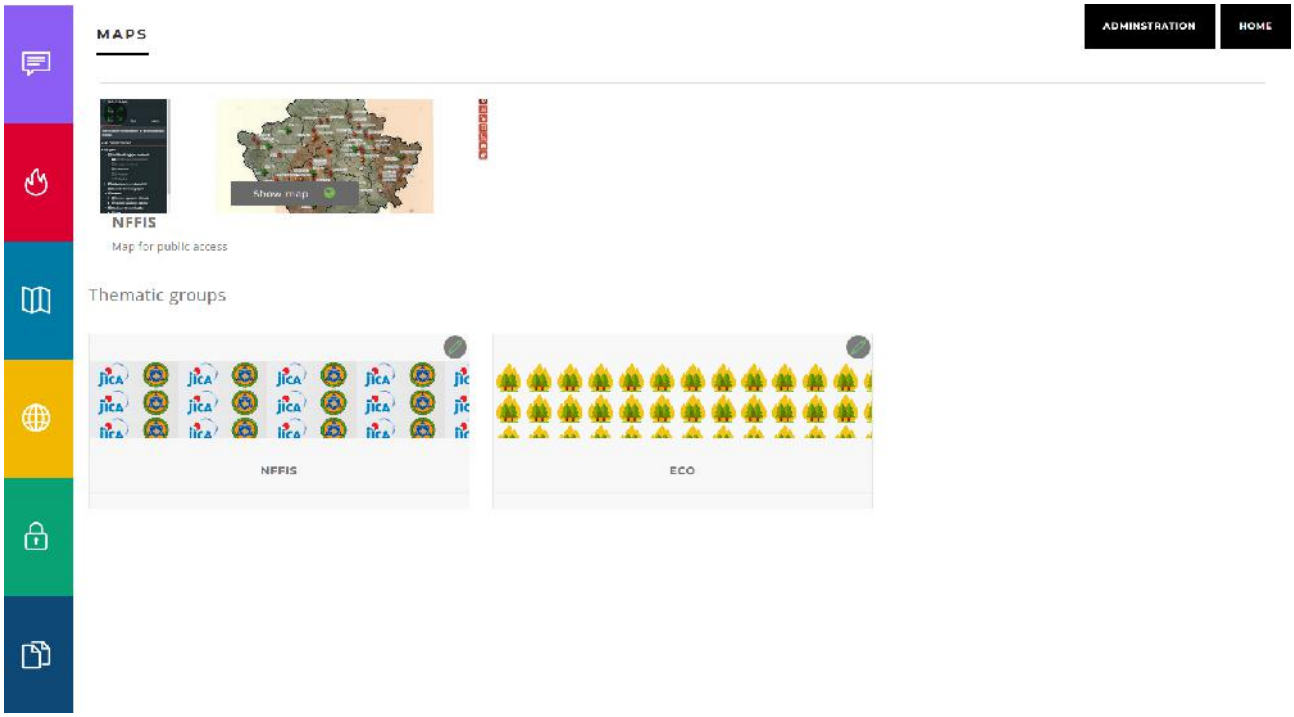
3.1 Overview

The main functionality of the NFFIS web applications is to display and to manipulate with spatial data, such as vector and raster maps. The app works together with Geoserver (http://geoserver.org) and PostgreSQL (http://www.postgresql.org/) to complete a comprehensive system for displaying maps.

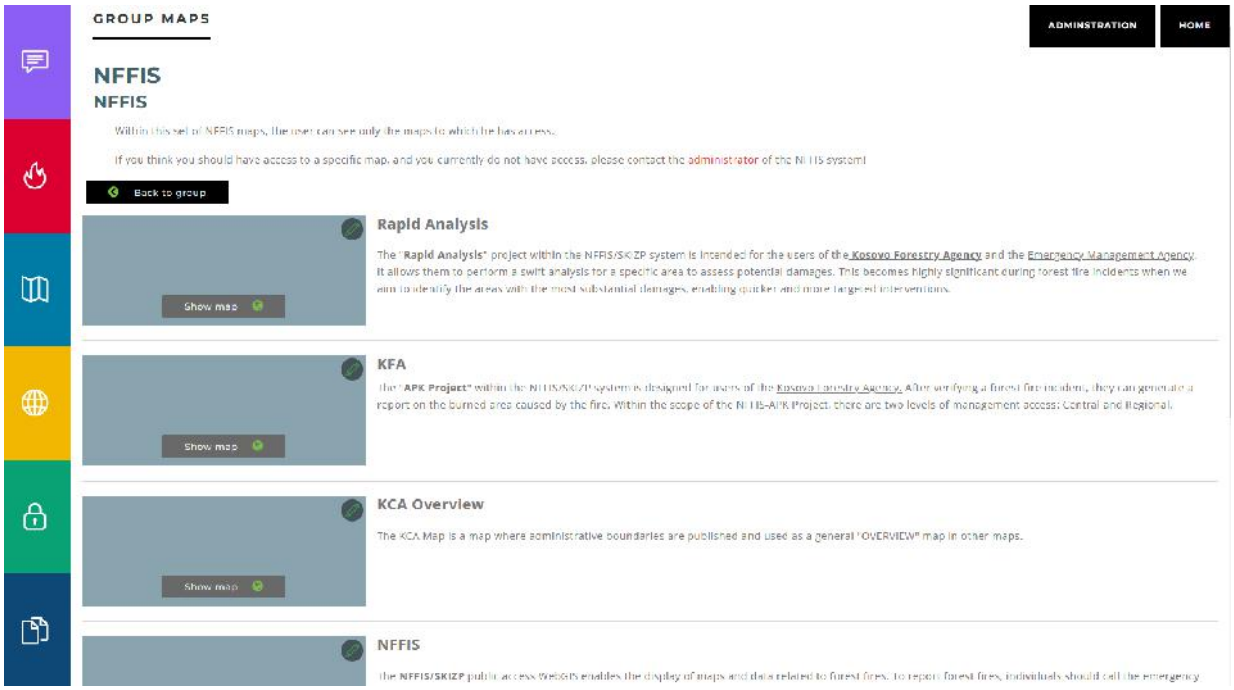
4 General use of NFFIS

Once the user has set their correct credentials, they can go directly to the *Maps* section.

When you click on the *Map*, the Maps page will open and you will see the group map there.

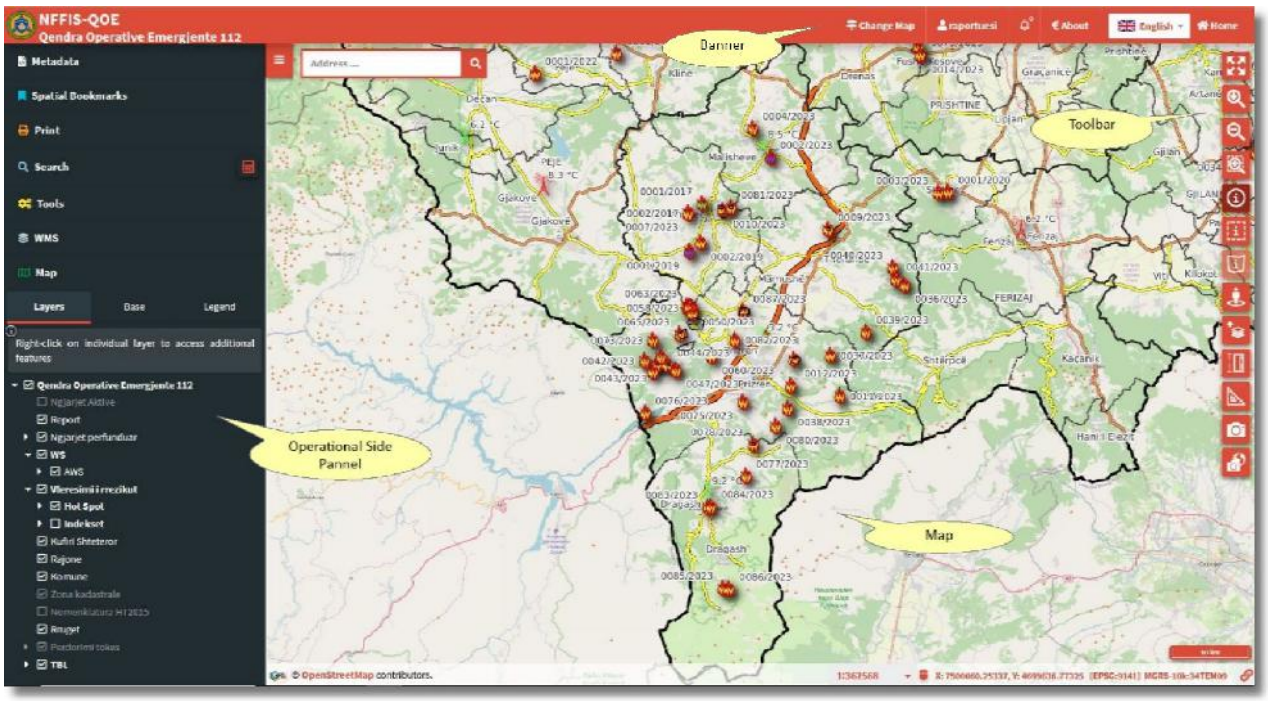


We click on the NFFIS group and the maps integrated in this group are displayed, such as: Quick Analysis Map, KFA, general KCA, SKIZP, Historical data, REOC, etc.
The respective maps also have their own descriptions of how to use them and who has access to them. Not every user can see all maps within the group, but this is defined by the Administrator. In the system, in addition to the set of maps belonging to NFFIS, we have also created a set of maps for the Restelica project and spatial data, Avalanche Hazard Map.



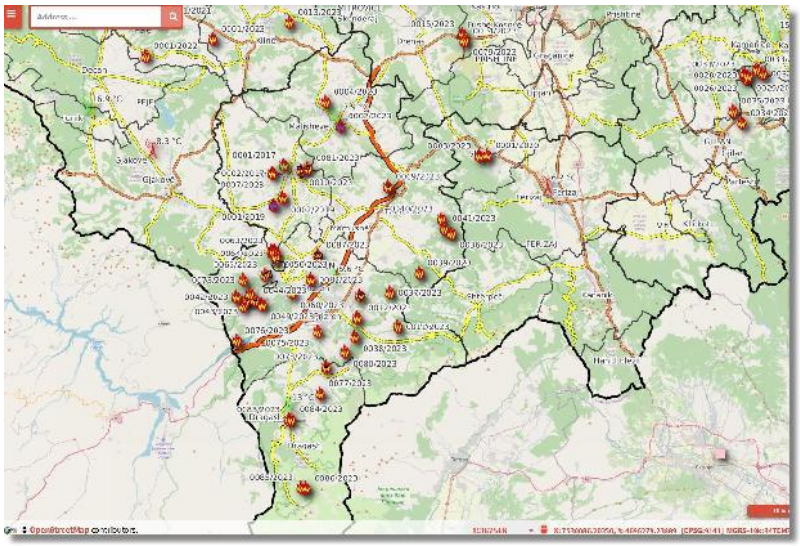
And after we click on the button *Show map* 

on the selected map, a new window opens where the map is displayed in the specified region as in figure.



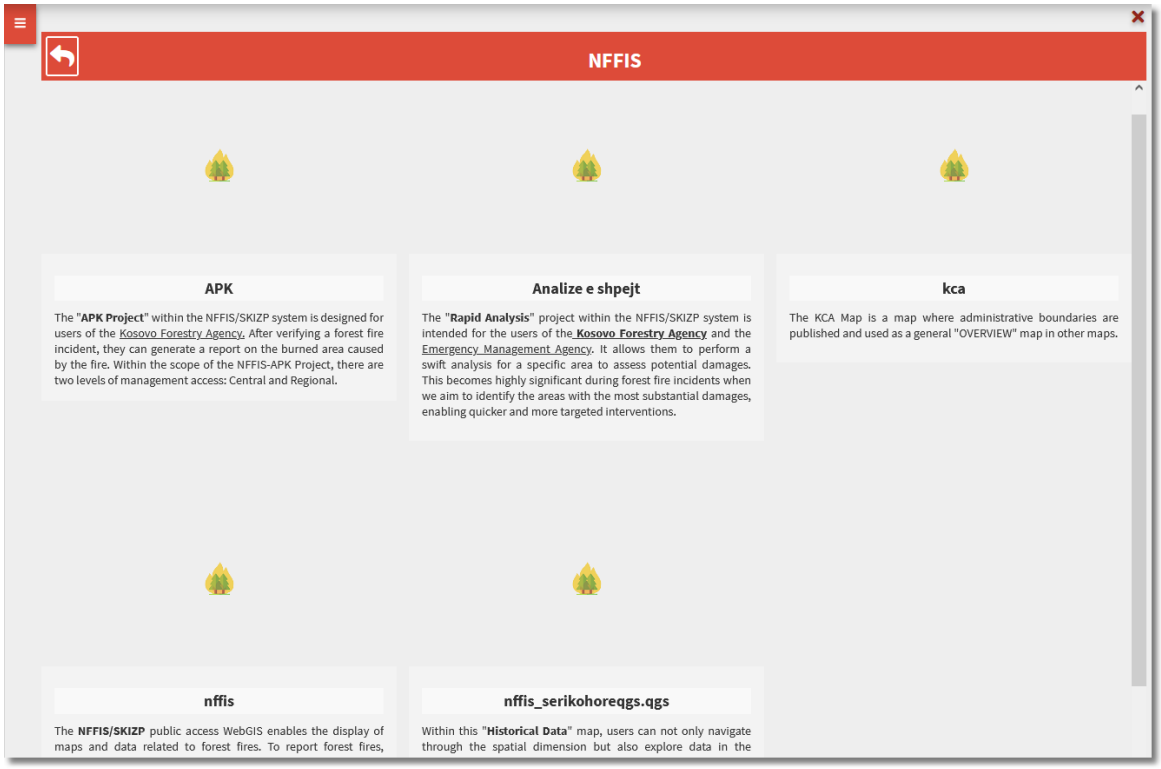
The NFFIS WebGIS home page consists of the main map panel, the top banner, the left panel, the right toolbar, the map search, all of which will be explained below.

The map view provides the main representation of the surfaces, the graphical representation of the layers that are integrated into the system.

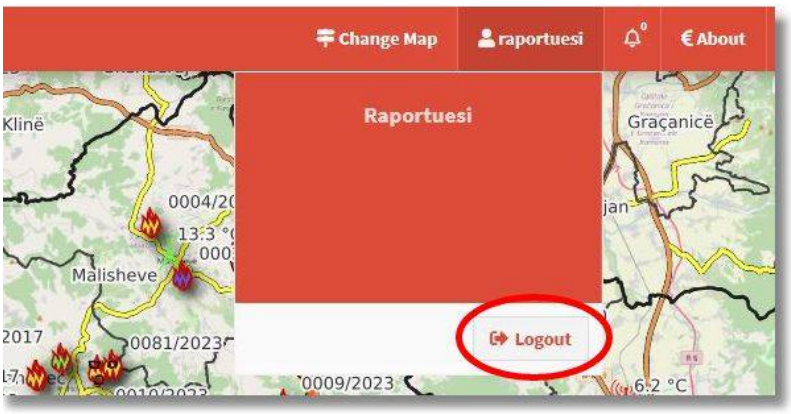


Map content is the top banner

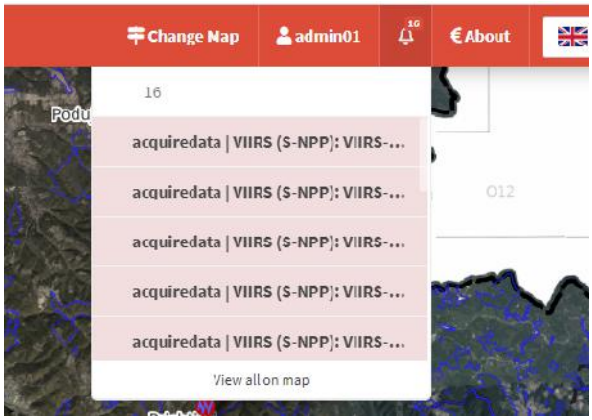
which consists of: on the left side is presented the logo of the Emergency Management Agency and the name of the department whose employees will work with this system (map). Then on the right side is the button for changing the map *Change map*  , where after clicking on this button a window opens where the possibility to change the map is given. The integrated maps have different content from each other.



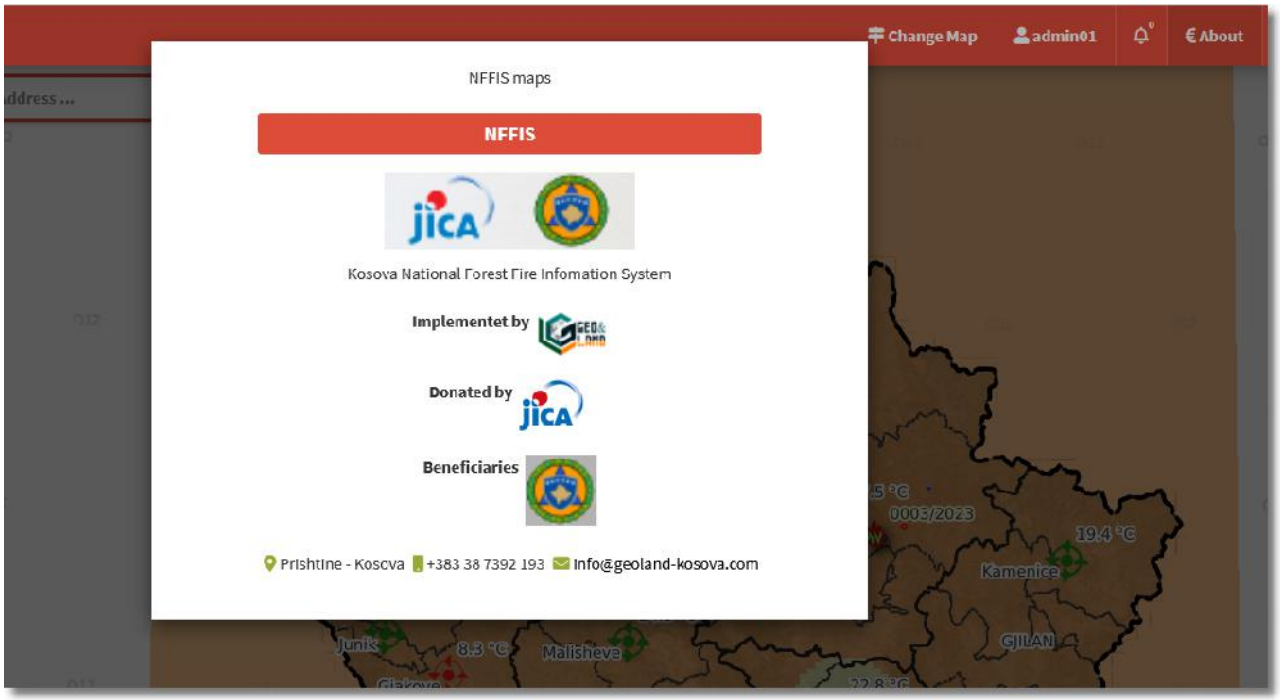
The name of the user who is connected to this system is displayed on the button for changing the map, where after clicking on it, the window opens where you can logout from the system.



Next is the notifications tool, if you click on it, you will see whether or not you have any notifications, and at the end of the text View all on map you can click if you have notifications and you can see them as a whole list.



The *About* tool tells about the application, who developed the application, who manages it and the company contact.



The national system for forest fires is built in three languages, Albanian, English and Serbian, where the language can be changed with a tool integrated in the system.

The last tool in the banner above is the tool *Home* 

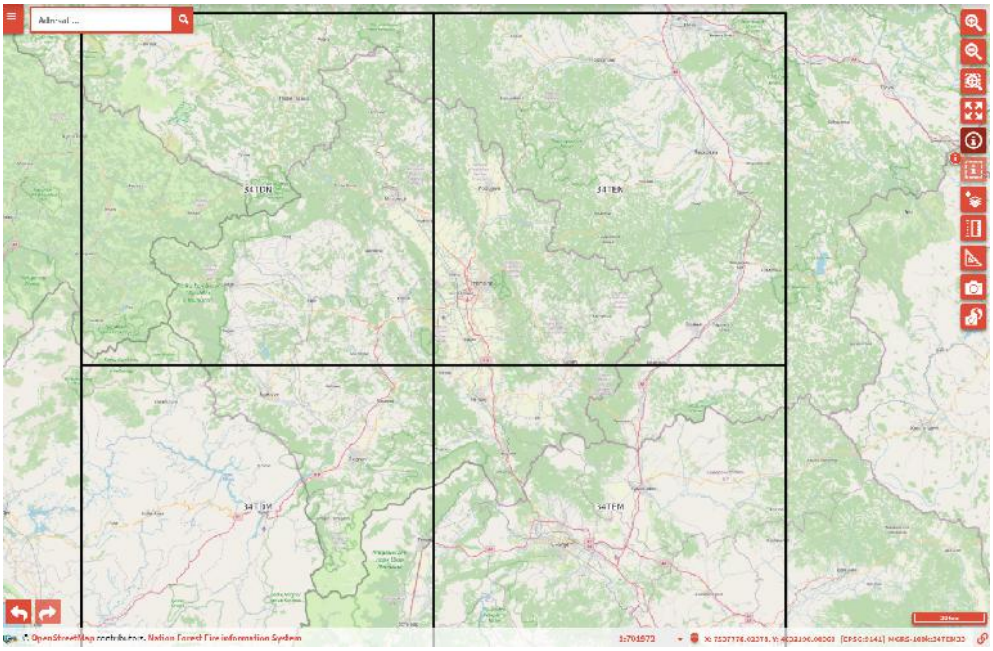
where it returns us to the main page of the system.

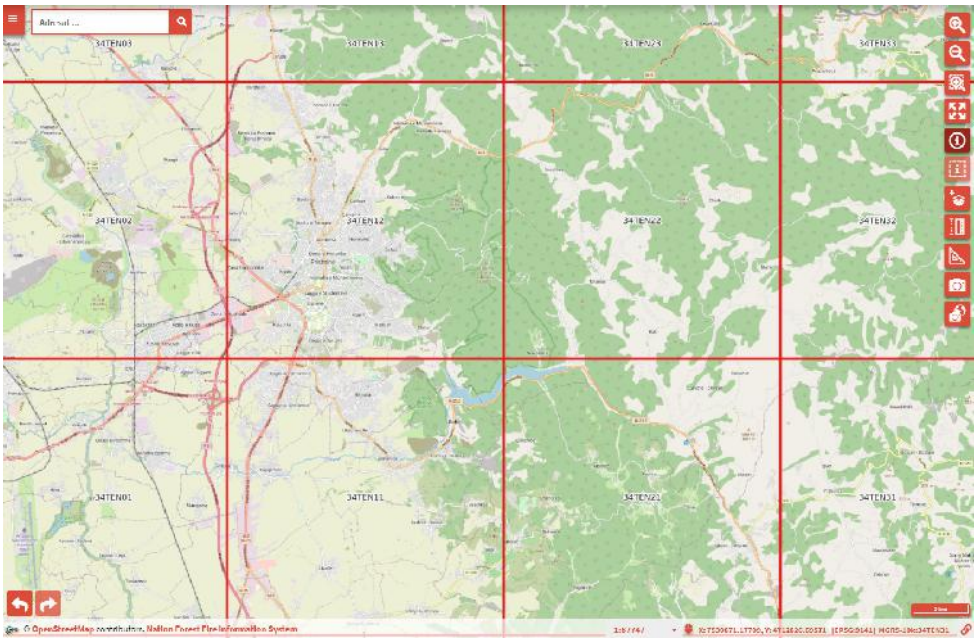
WebGIS NFFIS coordinate systems

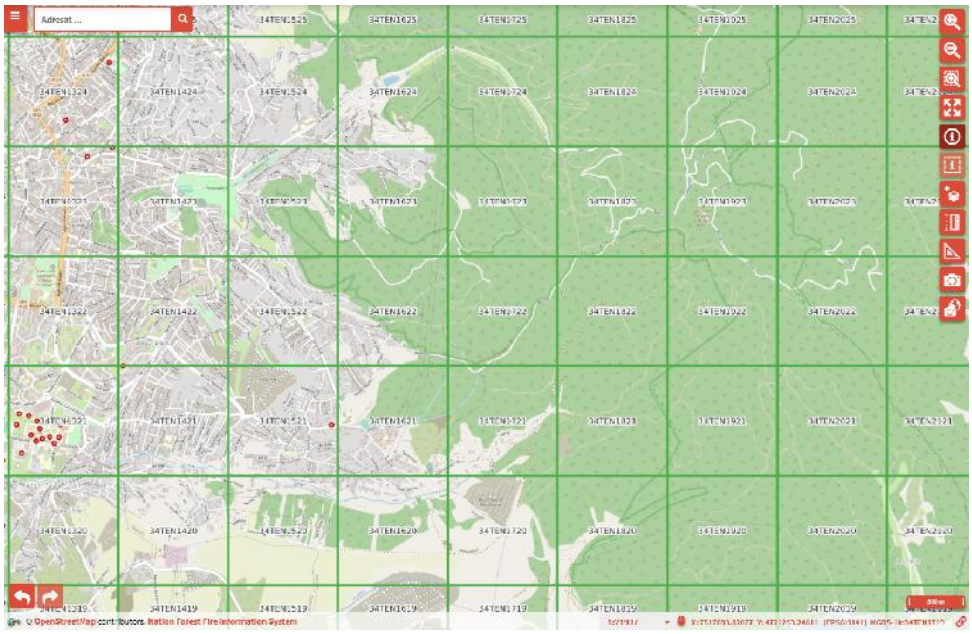
In the bottom left side of the map it says which base map is in use. On the right side, the scale of reduction, the coordinate system (KosovaRef01 or WGS84) and the MGRS military coordinate system are shown.

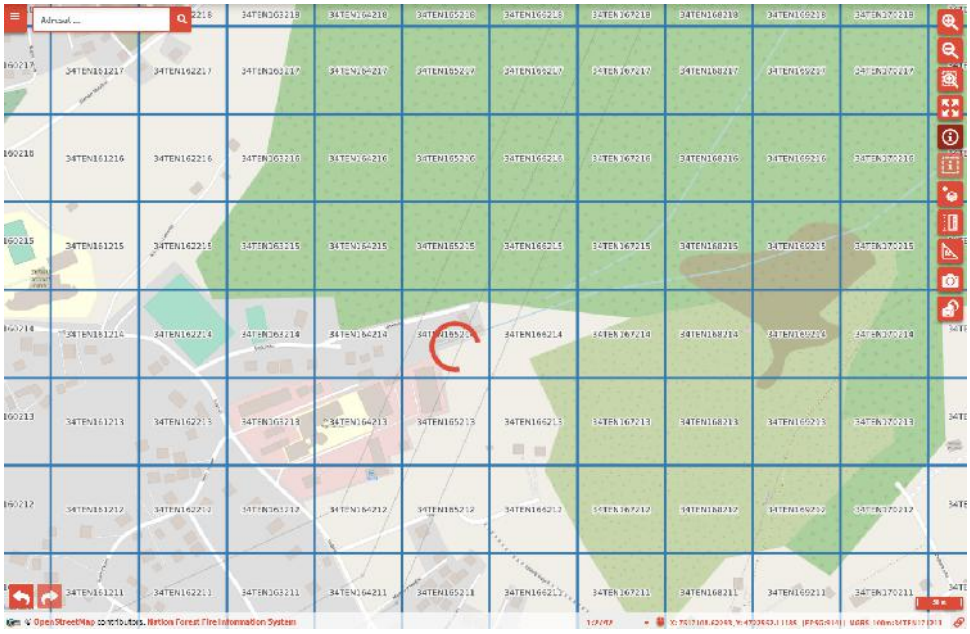
Sistemi koordinativ mund të ndryshohet nga ai KosovaRef01 në WGS84 dhe anasjelltas, duke klikuar mbi shenjën e miun.

MGRS military coordinates are map grid every 100km, 10km, 1km, 100m.



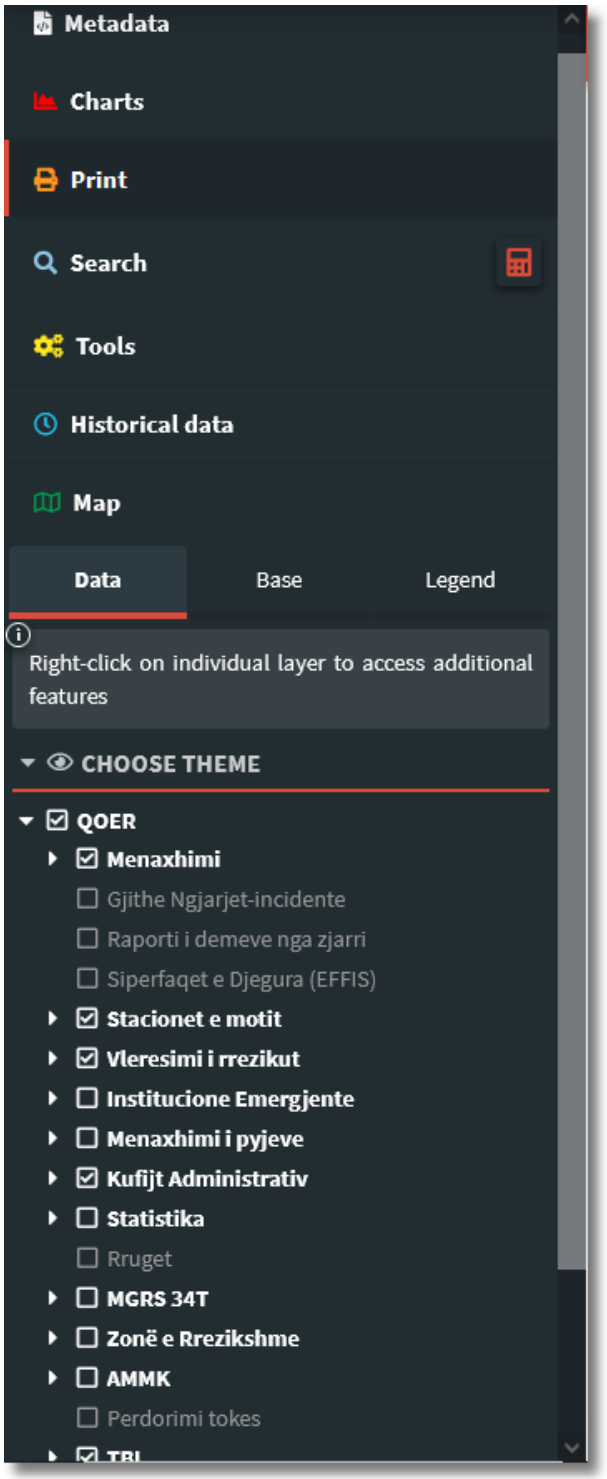






Layers and Tools

Another part of the map is the *Tools and Layers* panel on the left.

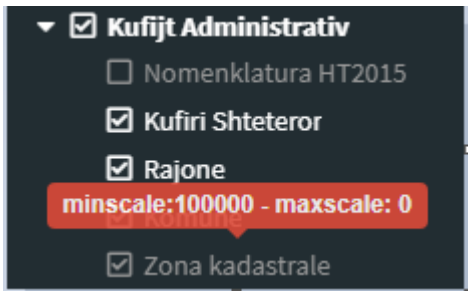


The left panel consists of layers where it shows which layers are integrated into the map, then the base layers which are mainly used as a background in the map (e.g. orthophotos, topographic maps, openstreetmap maps, etc.) and that two base layers cannot be activated at the same time.

In the *Layers* the layers are arranged with the name of the map in this case: Emergency Operations Center 112, as a group that contains the layers that are necessary for this department, for example:

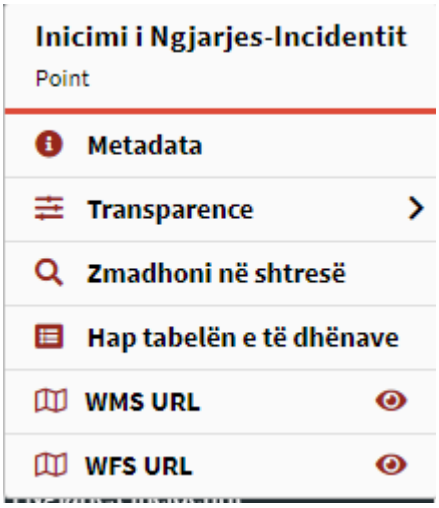
- Administrative boundaries
- Roads, etc.

which by clicking on the box on the left (as seen in the figure above) you can activate or not. Active layers are read in white letters, while inactive ones are shaded. Layers with a limited display scale can also be seen shaded, so these layers have their display set by default, depending on the degree of reduction of the map (minimum and maximum scale).

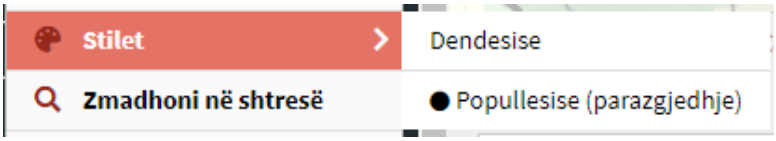


If the right mouse button is clicked on the corresponding layer, the various options/possibilities for the layer are displayed.

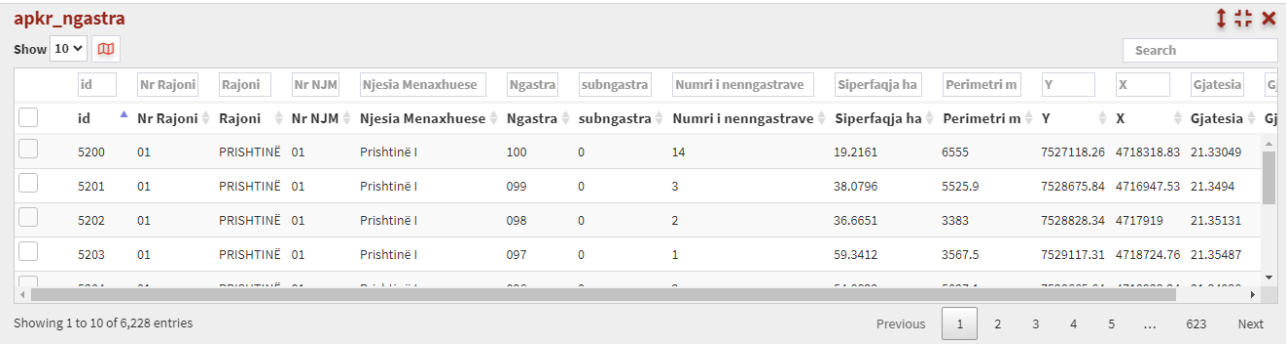
- Metadata - general layer data,
- Transparency - the transparent presentation of the layer, expressed in percentage,
- Zoom in layer - zooms in on the layer,
- Open data table - layer data table,
- WMS URL - copies the map web service link,
- WFS URL - copies the web service link of the feature.



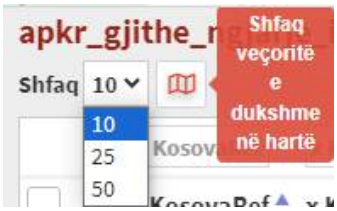
In cases where the layer has several contents, the styling of the layer can be changed depending on its contents; e.g. The Population in the Municipality layer can be viewed in different styles depending on the data according to the number of the population or according to the population density.



The *Attribute Table* presents various data of the respective layer. The table can be zoomed in/out as needed.
In *Search*, a general search can be made for all table data. Also, this data can be classified according to the attributes of the corresponding layer in each column.

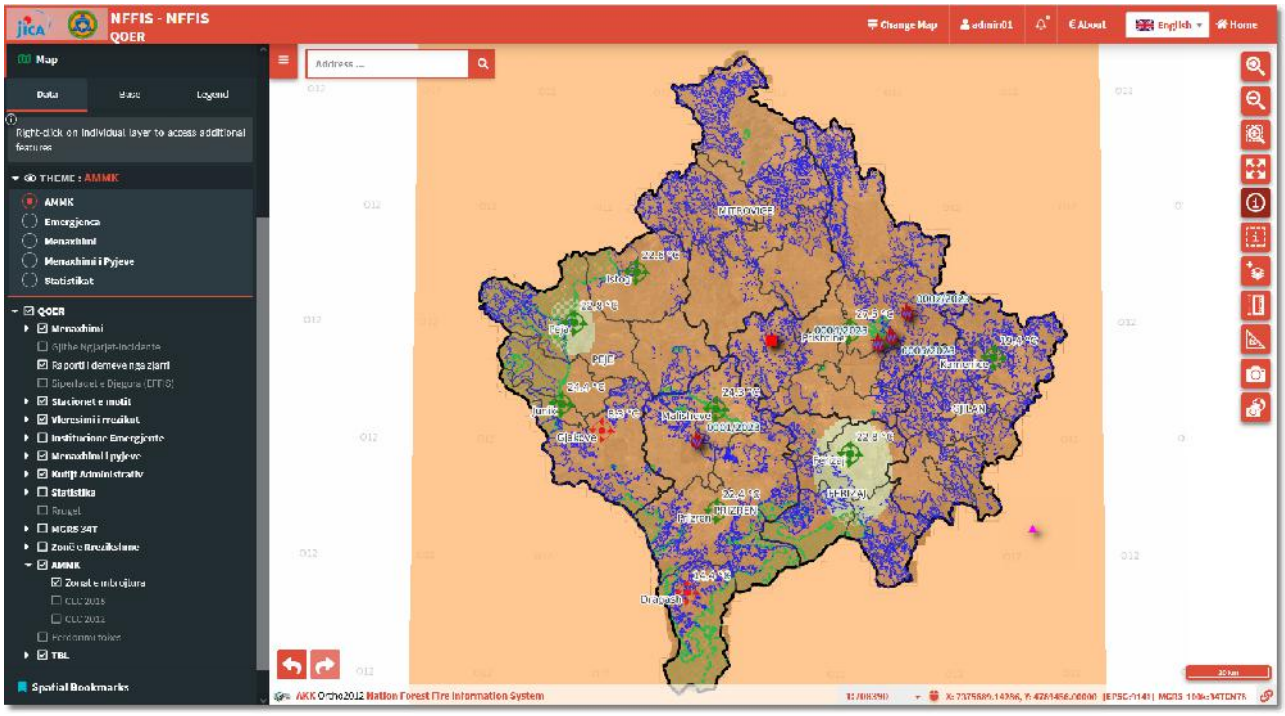


The table list can be long depending on the number of rows defined. There is also a button to show visible features, where as a result only the data of features that are visible on the map will be presented in the data table.

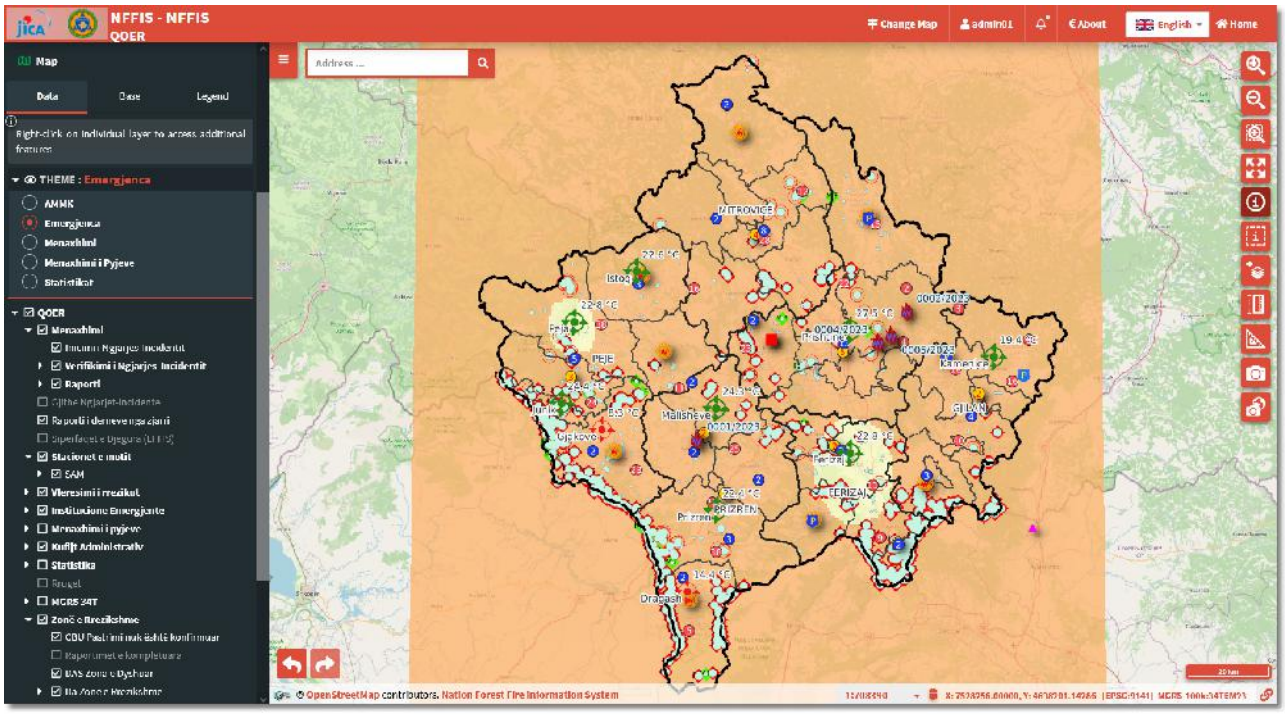


The *THEME* component has also been integrated into the beds, which enables the activation of certain themes.

Depending on the department and the role the user has, he can click on the corresponding topic and the layers corresponding to that topic are activated, e.g. for the KEPA topic, the layers belonging to this topic (Protected Areas, Dangerous Areas, etc.) will be displayed on the map.



As for the Emergency theme, the corresponding layers of this theme will be displayed on the map (Police stations, Firemen, etc.).

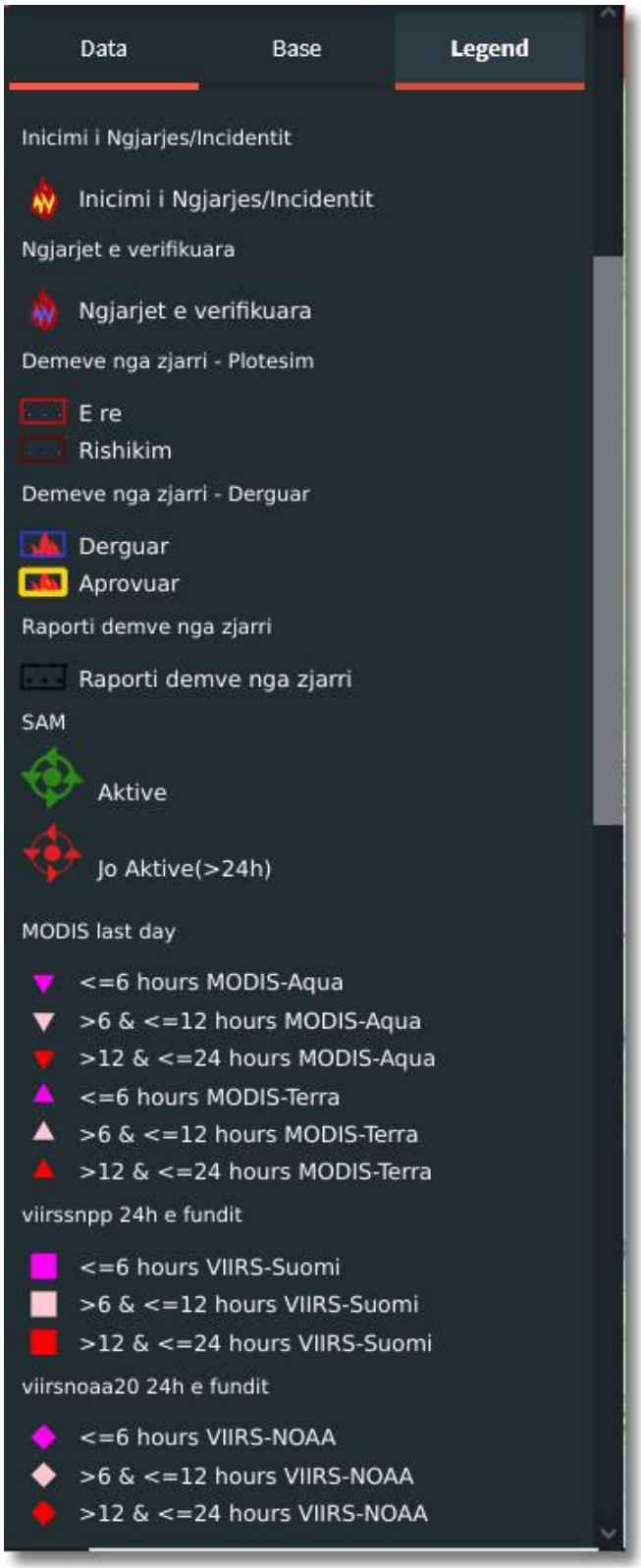


In *basemaps*: basemaps are integrated which can be used in any map. These maps are pre-prepared and are from different sources such as: KCA, OSM, etc. these basemaps are integrated in this component:

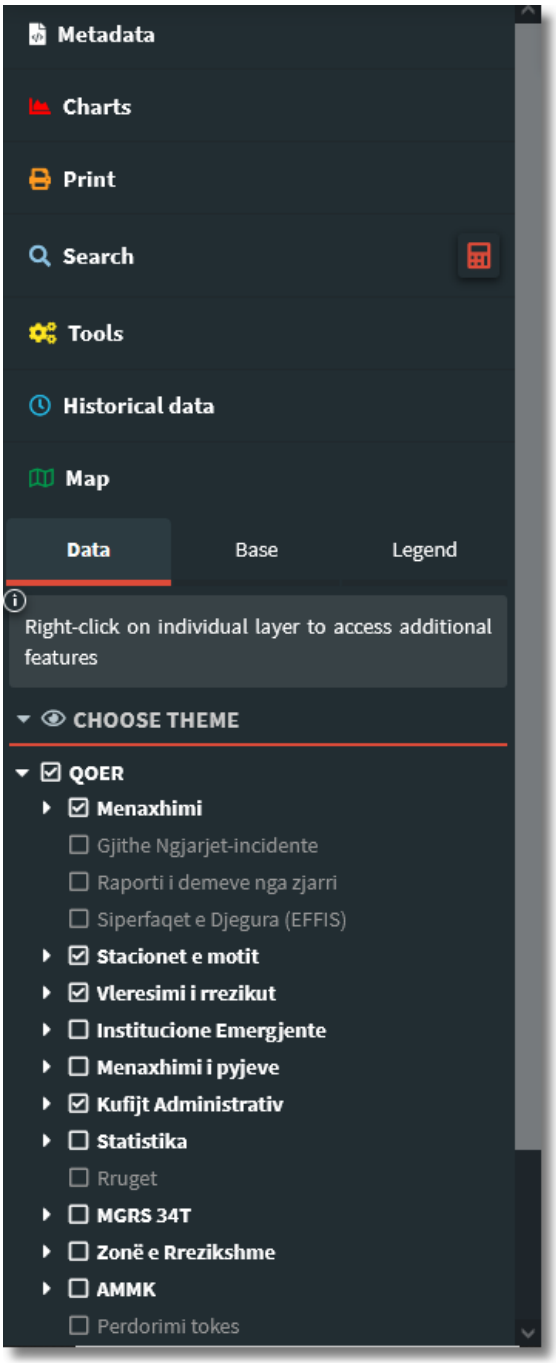
- OSM (open street map standart)
- Orto2012 (ortophoto of 2012 from KCA)

- Topo8 (Old topographical maps)
- Topo15 (New topographical maps)
- OpenTopoMap
- Humanitarian OSM (open street map with humanitarian component)
- No basemap (if you want to not have any basemaps enabled)

In the *Legend* section, the legend for the integrated layers is presented, where this helps to understand and read the elements that are presented on the map. For example, the "Completed Events" layer in the legend indicates with what symbol and style this layer is categorized and is shown on the map (see the figure below).



The upper part of the panel consists of tools such as: Metadata, Graph, Print, Search, Historical data, Tools, WMS, Spatial bookmark (as in the figure below).



Tools:

Fit to extent	With this tool you can enlarge the entire space in the extension.
Zoom in	You can increase the zoom level
Zoom out	You can reduce the zoom level

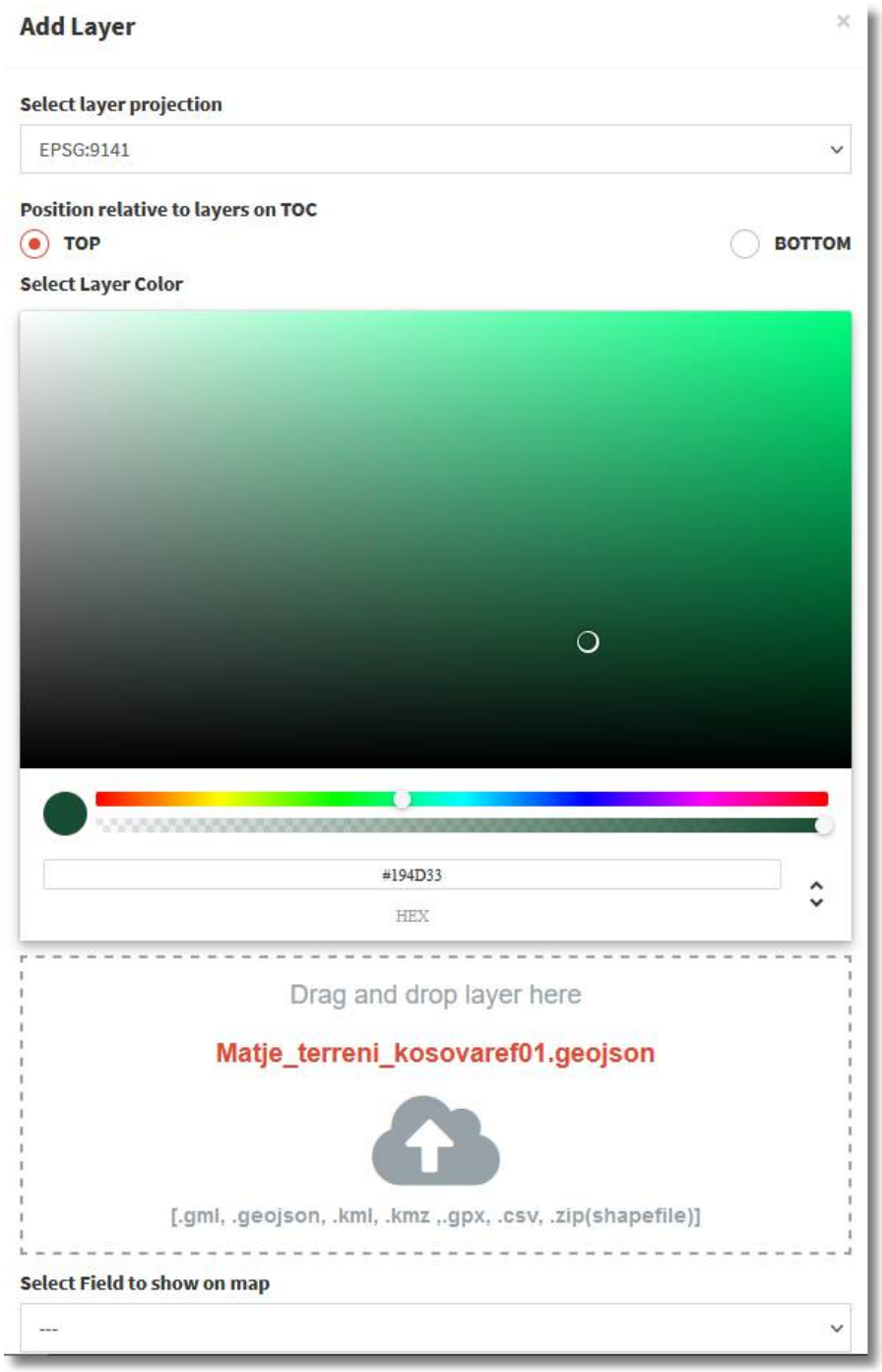
 *Zoom to box*	Zooms the map to a user-defined extent Draw and define the area to zoom
 *Query layer*	A query layer is a layer that allows users to retrieve or filter data based on specific criteria. can be used to extract or analyze subsets of data within a larger data set.
 *Query BBox layer*	A question box layer is a layer that allows users to select features or data within a certain area or boundary.
 *Query by polygon*	Filtering by polygon is a way to select or filter data within a certain area or boundary defined by a polygon shape
 *Add Layer*	With this tool you can add a layer, with a format that is acceptable to the system. Layer formats are: .geojson, .kml, .kmz, .gpx, .csv, .gml, .zip(shapefile), .json.
 *Length*	The length measurement tool allows you to measure the length of the distance you draw on the map
 *Area*	The area calculator calculates the area of the polygon you draw on the map
 *Screenshot*	With this tool you can took a screen-shot of map.
 *Geoscreenshot*	Geoscreenshot tool allows you to take a photo of the map but georeferenced, where you can use it in your programs directly in the kosovaref coordinate system

Query layer: in a Web GIS application, the query layer tool allows users to retrieve or filter data based on specific criteria or conditions. The query layer can be used to extract or analyze subsets of data within a larger data set based on certain attributes, location, or other criteria.
Clicking on the map with the query layer tool gives the results, for those layers that have been clicked, in the case as in the picture below: an event-incident, a region, a municipality.

In the results, for each feature you can work with the tools that are listed within the results  .

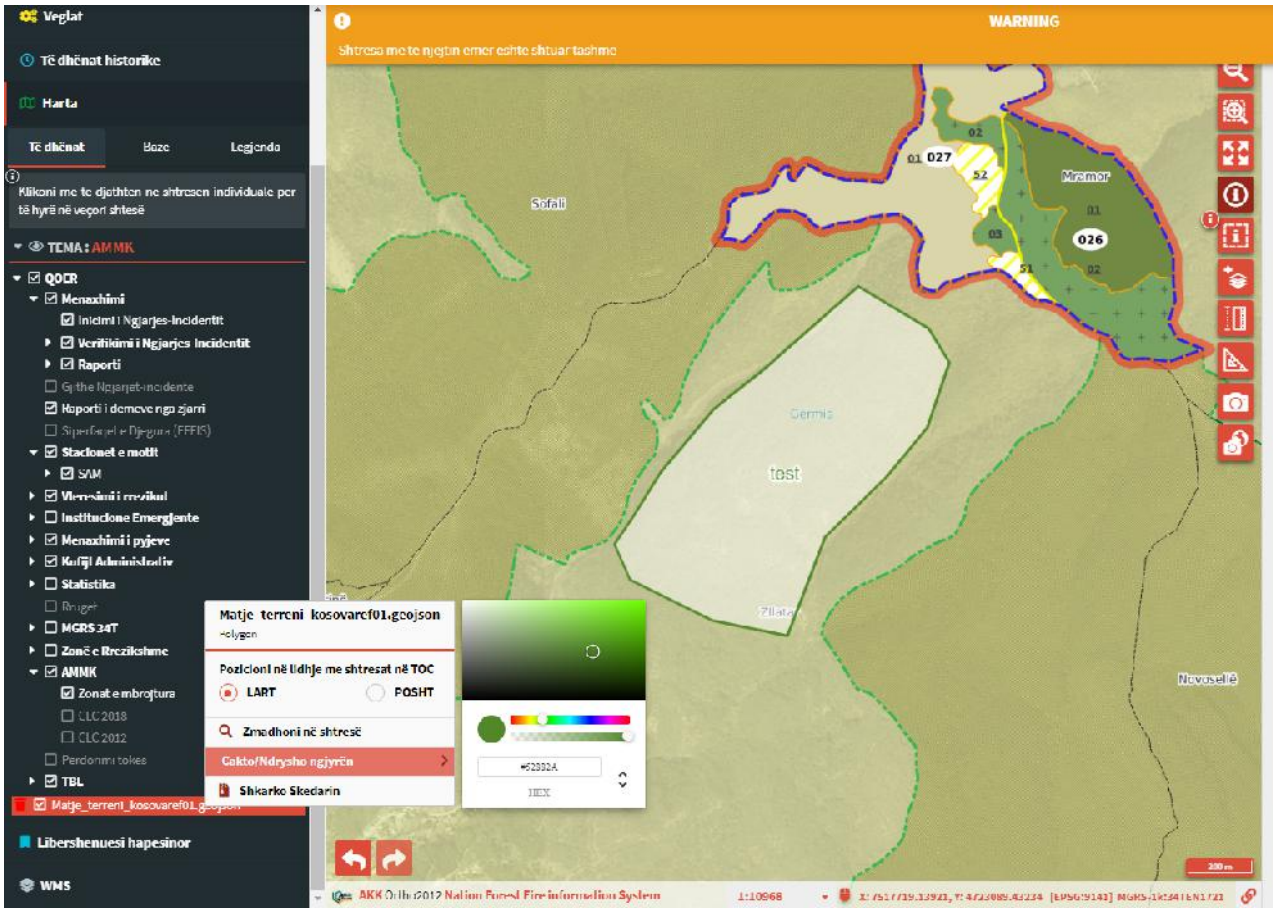
 *zoom to feature*	Zoom in on the feature location
 *remove feature from results*	You can remove one or more features from the results
 *Add/Remove selection*	This tool allows you to add or remove a feature from the selection
 *Copy map URL*	Copy the map URL with the geometry feature extension
 *Editing*	By clicking this tool, you can edit the geometry of the selected feature

Add layer: the *Add Layer* tool enables you to upload a layer with the data you want to the system. After clicking the *Add layer* tool, the window opens as in the picture below. After clicking on the down arrow, the layer to be added to the map is selected (it can also be dragged and dropped on the window), the projection and color of the layer are determined, the position where to place the layer up or down in the list of layers (on the left side of the map), and the layer attributes that you want to appear on the map.

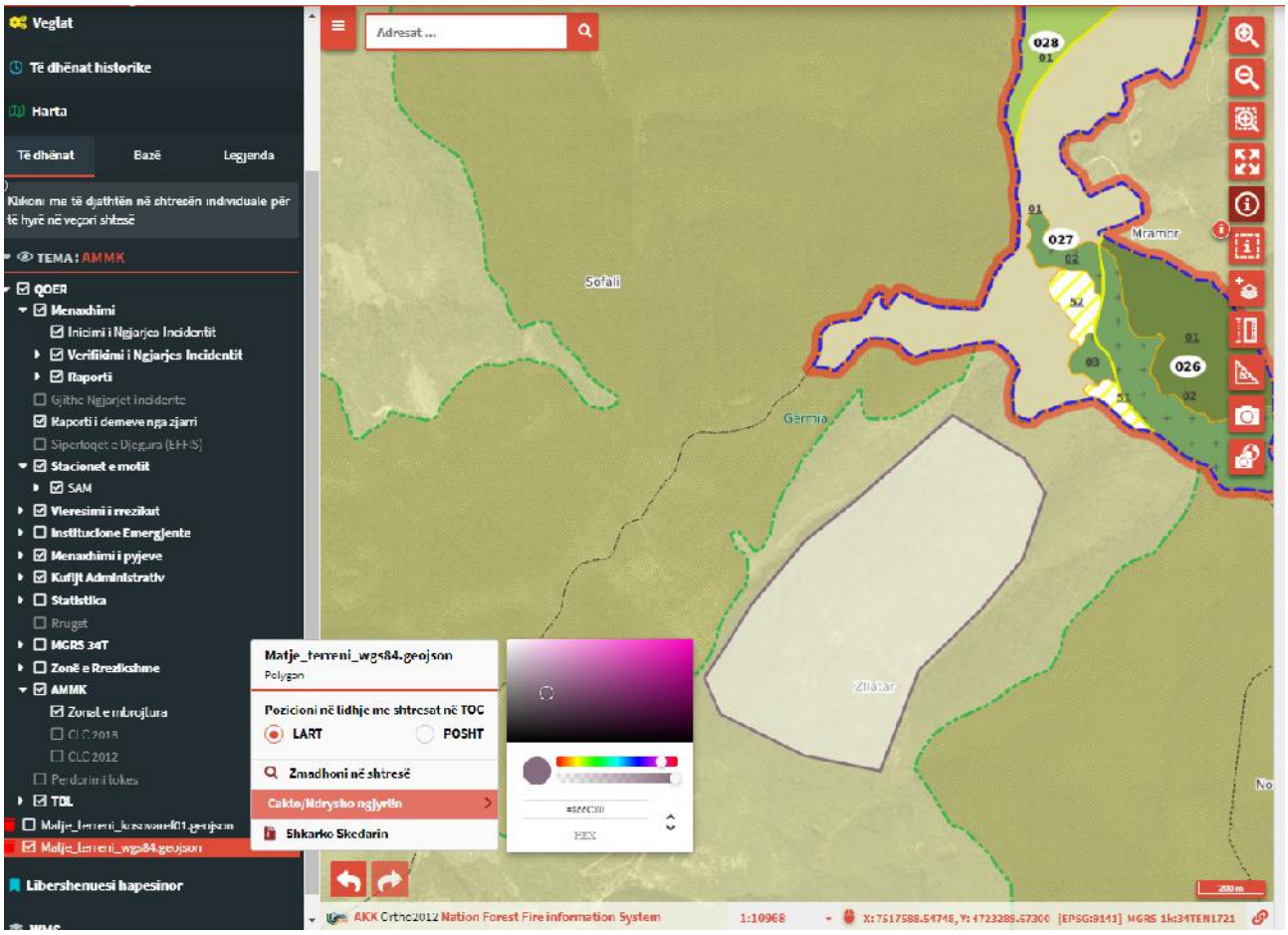


The system supports files of the format *.gml, .gmx, .csv, zip(shapefile), .kmz*, while *.kml* and *.geojson* are preferred.
The layer projection is recommended to be one of these:

- EPSG:9141 - KosovoREF01
- EPSG:4326 - WGS 84 - geographic coordinates (longitude and latitude).



In the photo above, you can see the Kosovaref01 terrain survey (*Matje terreni kosovaref01)* layer (.geojson) has been added to the map, where you can zoom in on this layer, change the color of the layer, and download it.
In this form, it is also done with WGS84 projection layers.

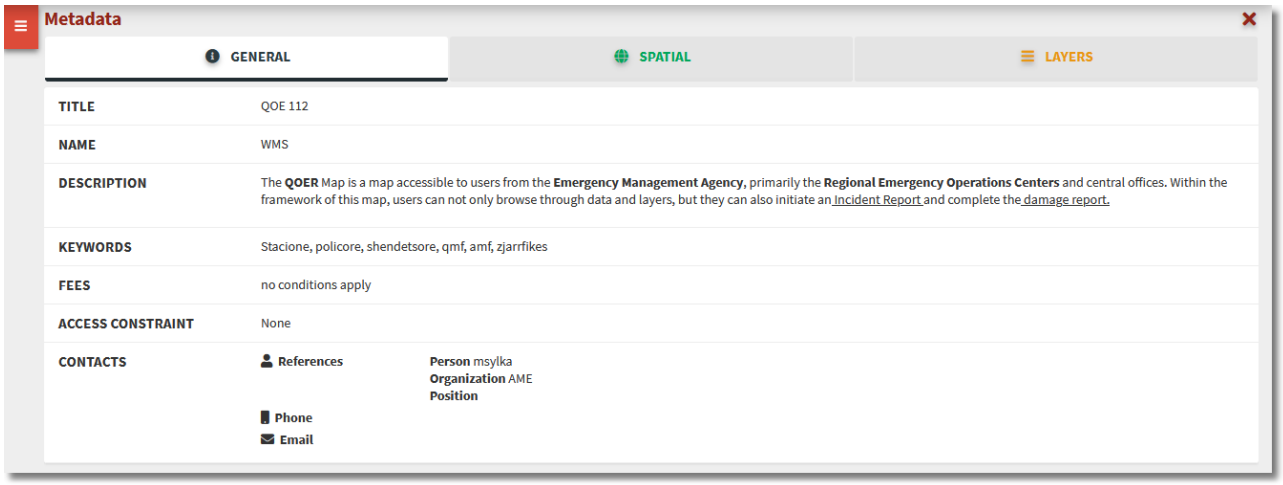


This added layer is a temporary layer and is not saved in the system!

4.1 Metadata

Metadata: are data that provide information about other data, so metadata means "data about data". Metadata[27] are defined as data that provide information about one or more aspects of the data. It is used to summarize basic information about data that can make it easier to track and work with specific data. Some examples include:
- data creation tools,
- the purpose of the data,
- time and date of data creation,
- the author of the data,
- the location where the data is stored,
- the standards used,
- file size,
- data quality - data source,
- the process used to create the data.

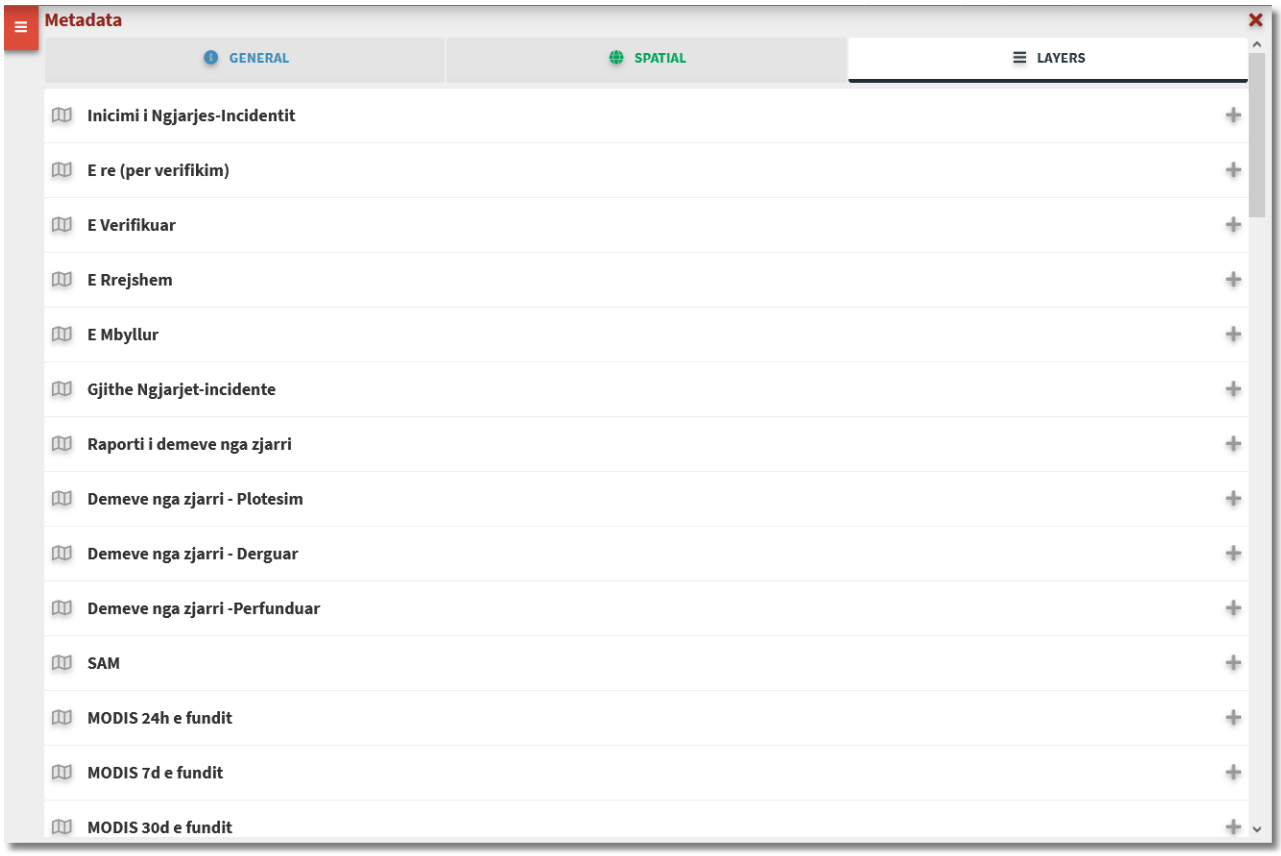
After clicking on *Metadata*, a window opens containing three categories: *General, Spatial* and *Layers*.



In GENERAL, general information about the Map is given, such as: title, name, description, keywords, system access restriction, contacts.

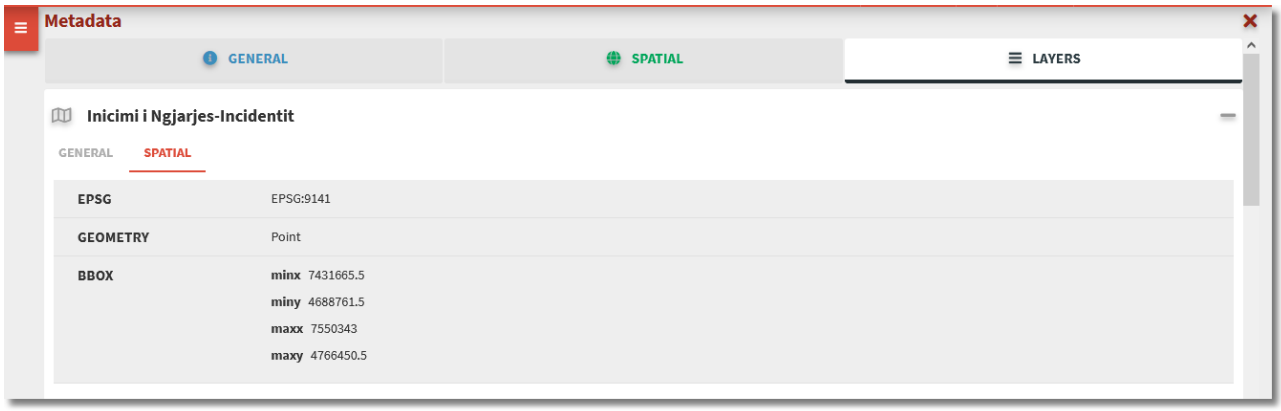
Then there is the SPATIAL part which presents the geographic data for the map such as: notes on the coordinate system that was used, and also the spatial extent in coordinates.

At the third part of metadata 27 is *LAYERS,* where in it are the information for all the layers (they are presented as a list).



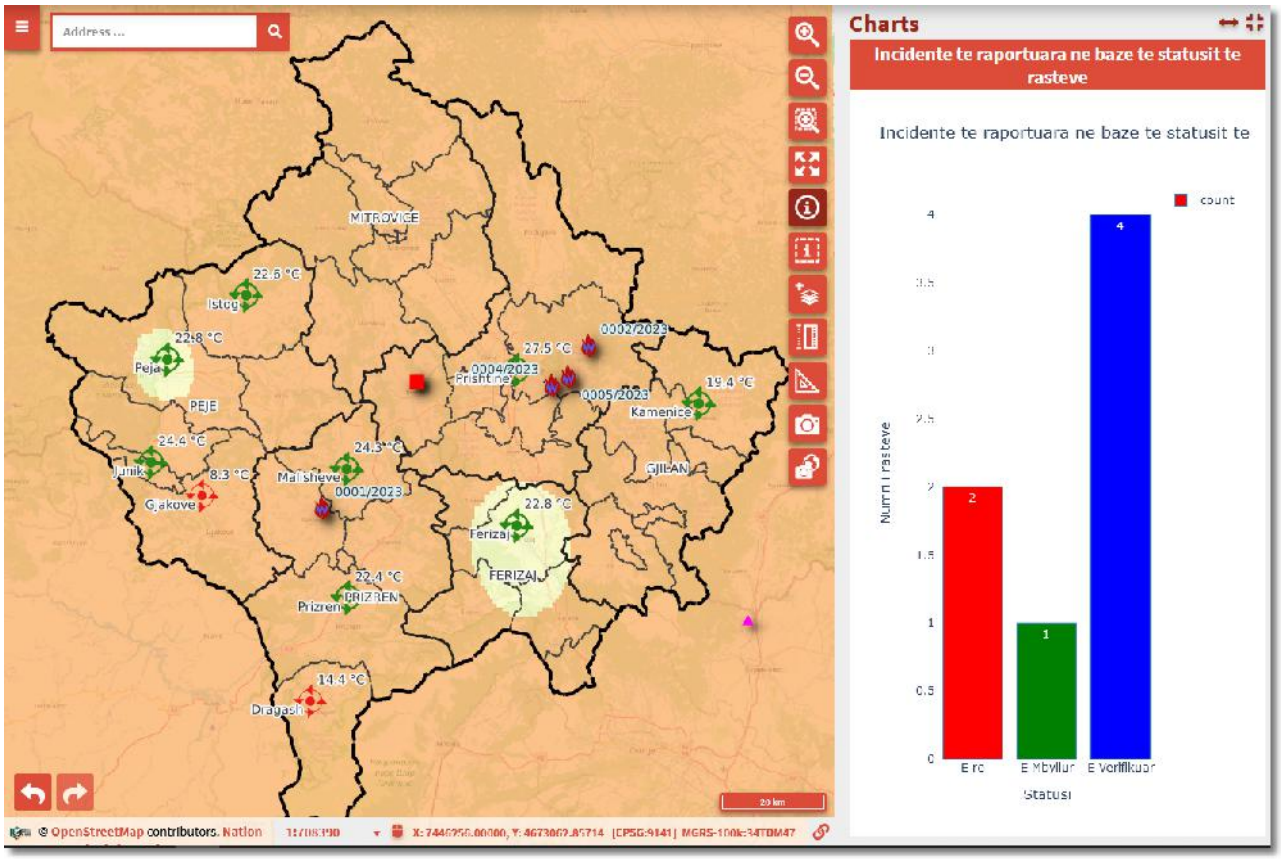
As seen and from the figure above, each layer has a + sign on the right side, when you click on it, the information about that layer opens.

Layer information is General and Spatial. In General there are general information, such as: title, layer name, source and abstract.The Spatial part presents information about spatial data, for example: Coordinate System, geometry, spatial extent of the map.

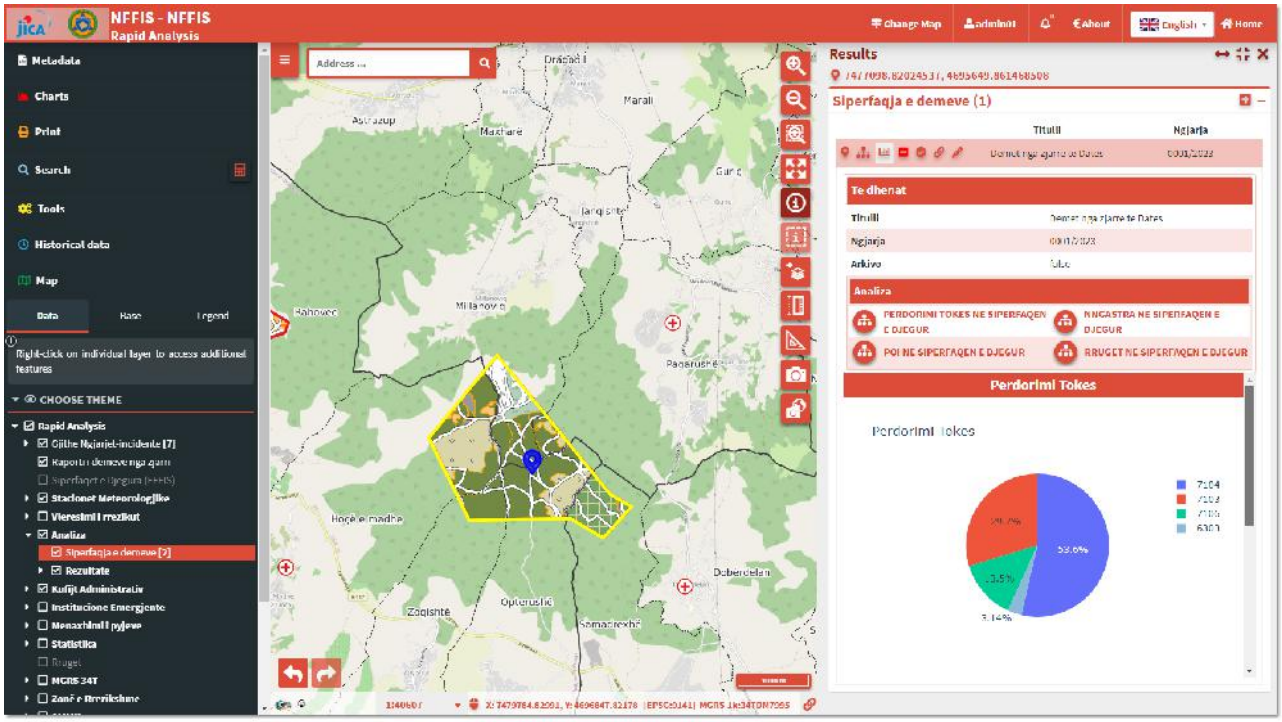


4.2 Charts

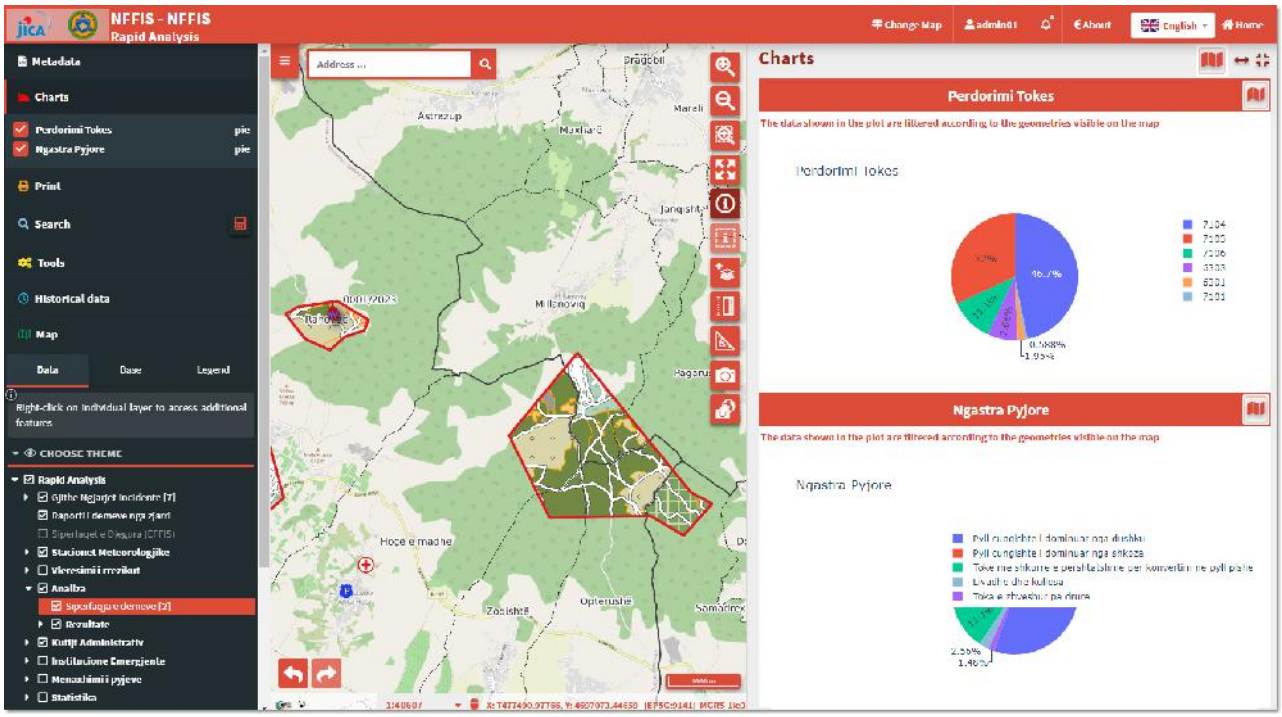
In the chart menu, the chart with the data for incidents reported based on the status of the cases is presented, where after clicking on the menu, the window for the specified data opens, on the right side of the system. In the figure below, the graph with the reported incidents is illustrated, with the correct number of new verified cases of incidents, cases that have the status as a new case and the number of false cases.



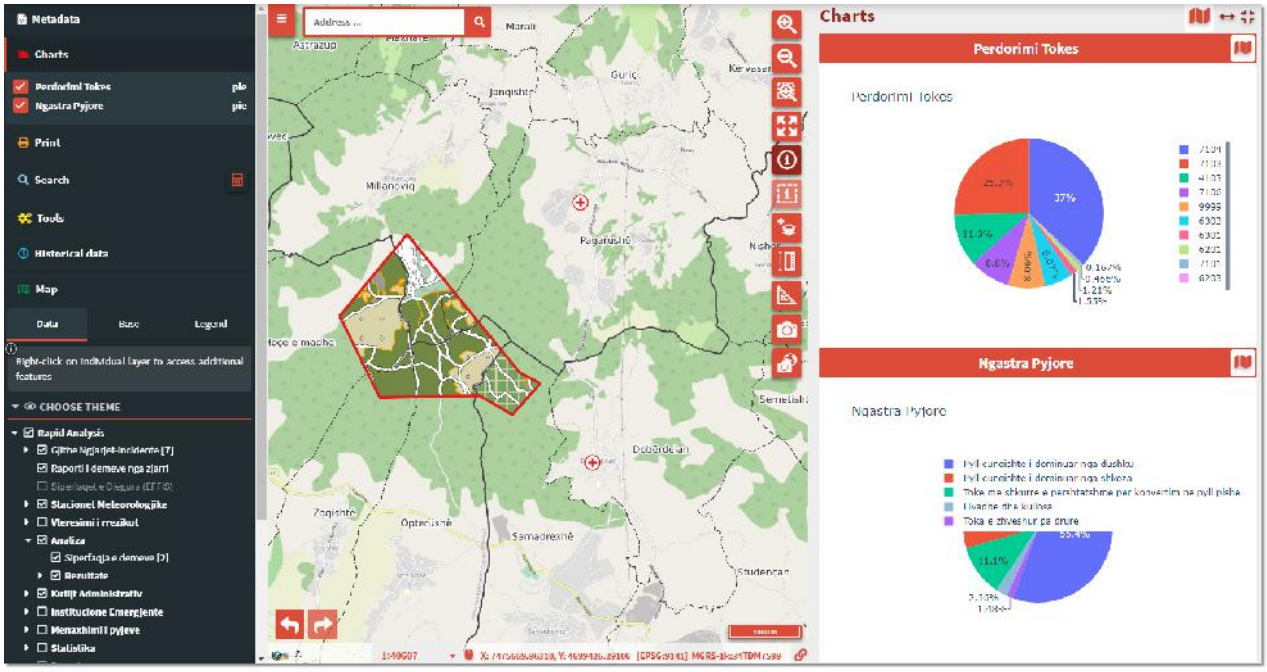
In addition, graphs for specific feature data can also be viewed; e.g. on the Quick Analysis map, with the identification/selection of a polygon, different graphs can be displayed, such as that of Land Use or Forest Stands.



In case that one of the features is not selected, the data in the graph represents the general/total data for this layer.



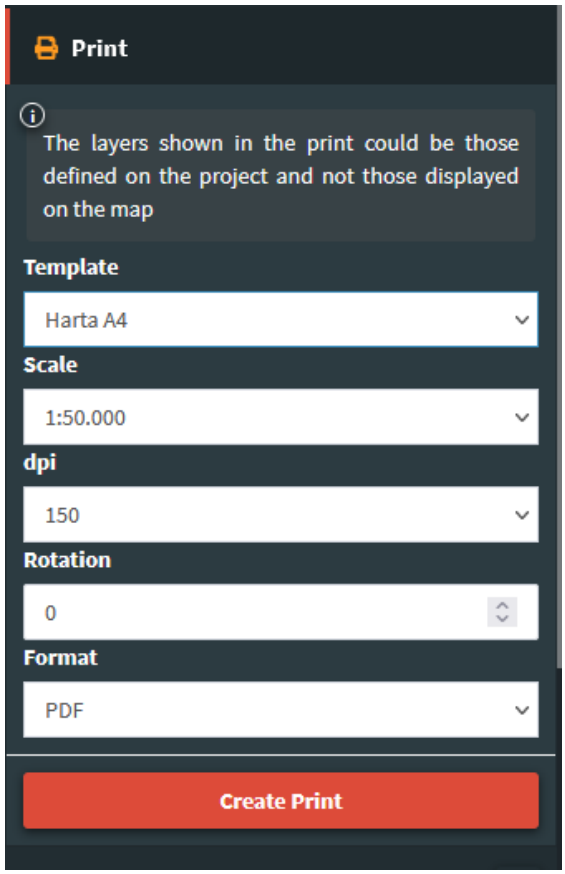
The Map button filters all graphs by geometries visible on the map, displaying data only for these geometries.



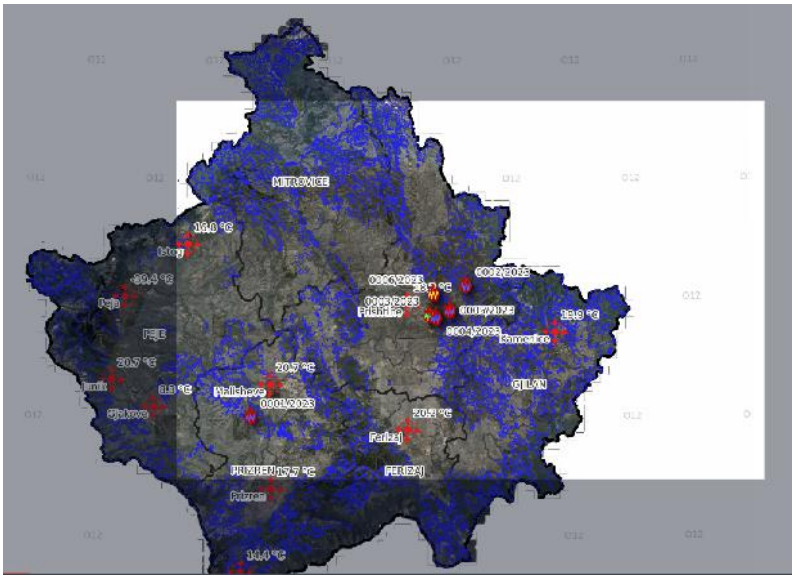
4.3 Print

Printing is the process of producing physical copies of electronic or digital documents, images or other digital content on paper.

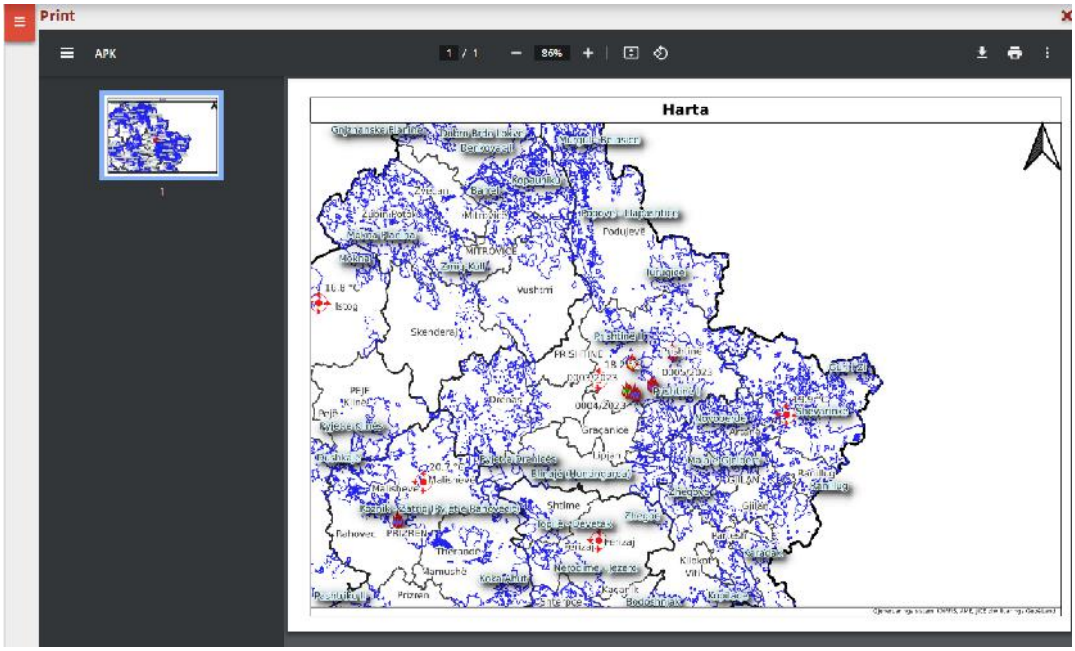
The NFFIS system has an integrated template for printing as shown in the figure below: Map A4. Various maps can be printed in this format.



The scale of the map is determined and the area to be printed is navigated to.

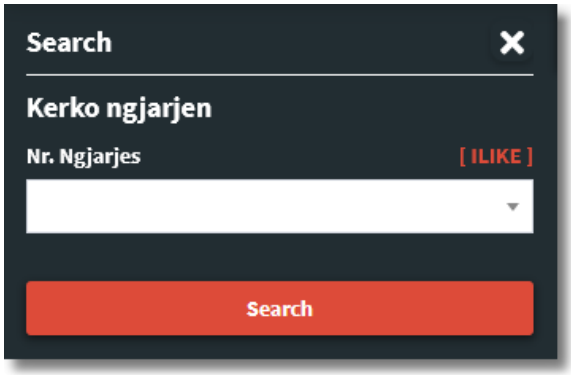


Then dpi (map resolution), rotation and map format (pdf or jpg) are determined. After defining these characteristics, the Map is created and the window appears to specify the storage location of the created map and the map is in pdf or jpg format ready for printing (physical form).



4.4 Search

Search is an in-app search tool where you can search bug report, event and AWS in NFFIS app. After clicking on *Search for damage reports*, the field for marking any character opens and the report that was found with those marked characters appears in the list.

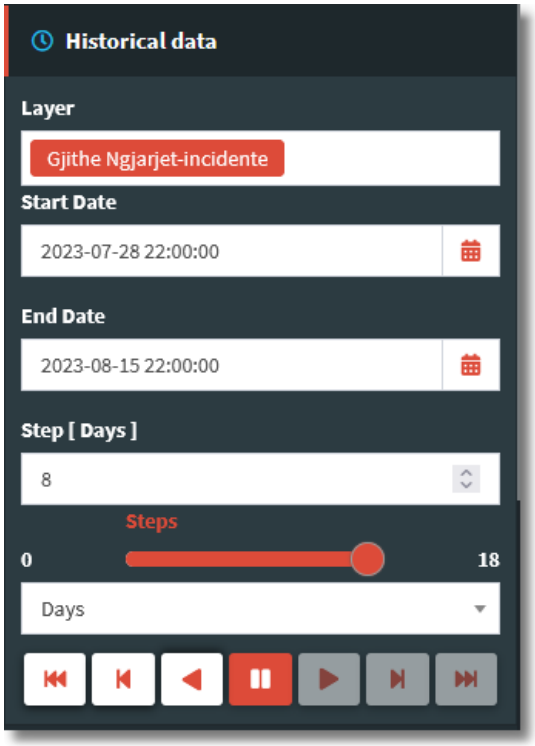


After clicking on search, the results for the given report are displayed (figure below, view to the right).

In the search results numerous information about the reports are displayed, where and for a certain report you can make edits (changes), additions of information.

4.5 Historical Data

The historical data menu looks like this:

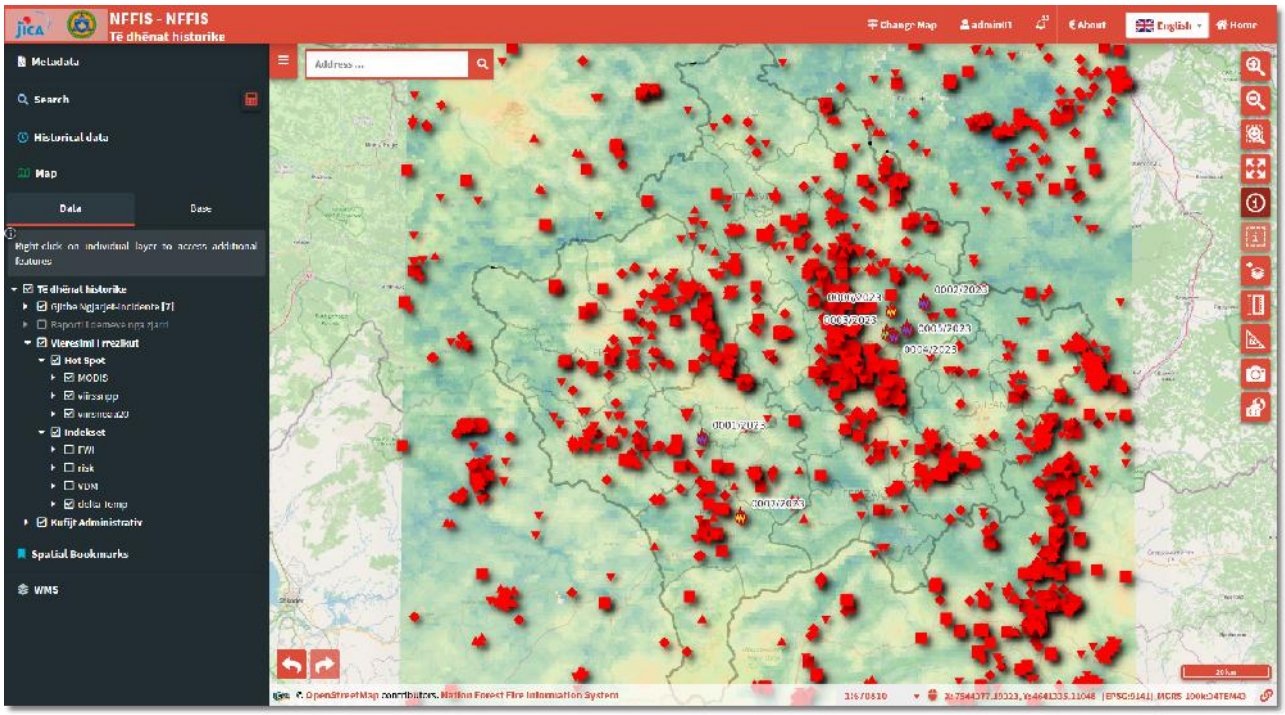


In the first field, we see that it is the layer of events-incidents, so we want to see the incidents in different periods of time. Then the start date and the end date, where in these dates we determine from which date to which other date we want to navigate in the historical data. At step (Days) we can set how many steps we want to navigate forward or backward, then at Days we can change to years, months, weeks, etc.

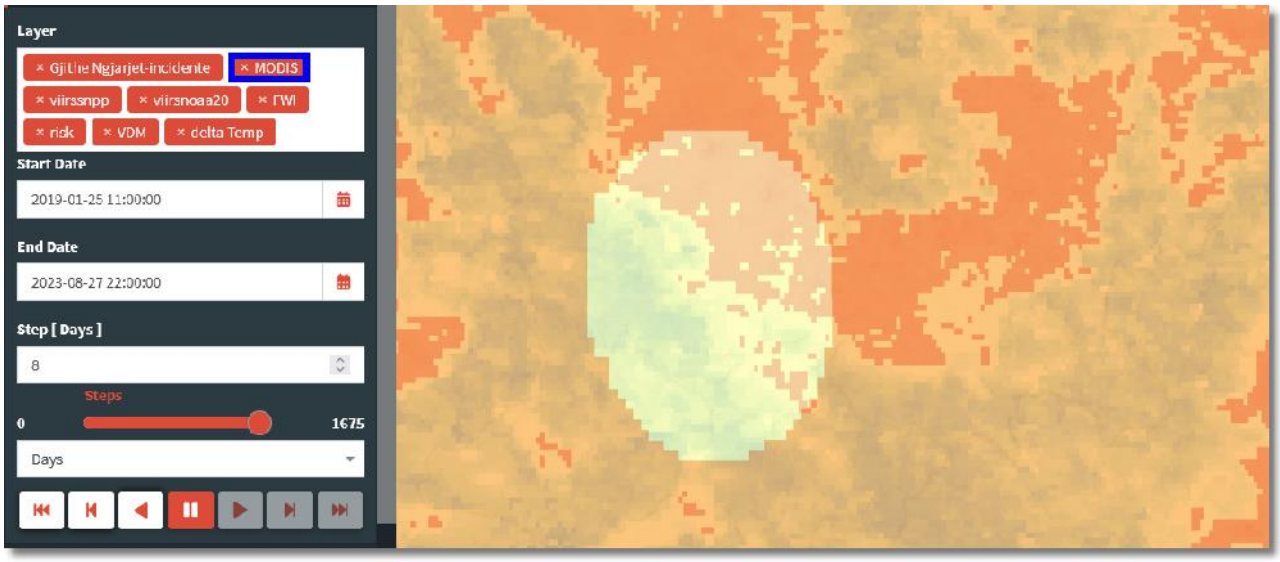
While the buttons above show the following:

	The first button returns the navigation to the beginning of the step.
	The second button takes a step back, if the days are set, for example week, then with this button you return to the navigation one week back..
	The third button automatically navigates back the steps that have been set to the beginning of the date
	Pause button, stop navigation.
	The fifth button automatically navigates forward the steps that are set until the end of the date.
	The sixth button takes a step forward.
	The seventh button sends the navigation to the bottom of the steps.

For historical data, a special map has been created in the system, where all users have access to this map, regardless of their rights. The map can be activated after clicking on the top banner change the map, where after clicking the window opens as in the photo and click on the map nffis_seriakohore and the map opens.

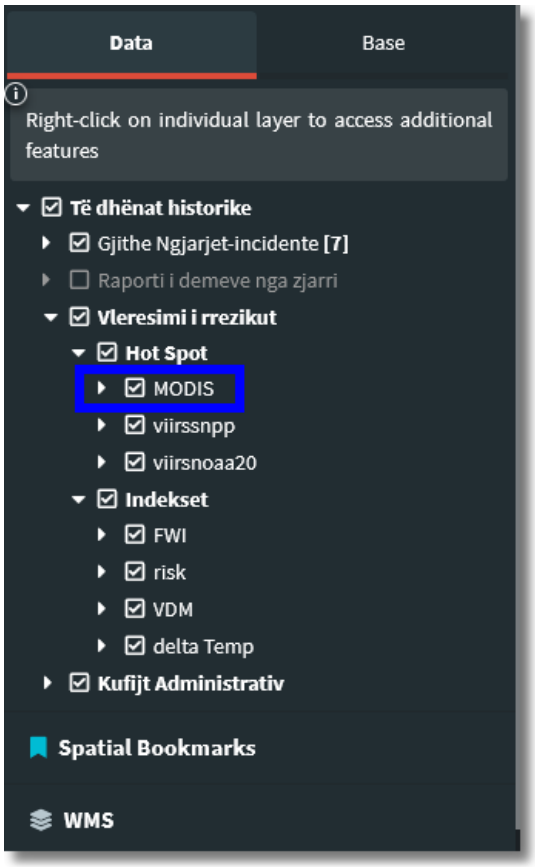


Navigation in the time series is the same as in the explanation above, only that the special time series map has integrated layers for which you can navigate at different times and you can set which ones you want them to give you information about at different times.



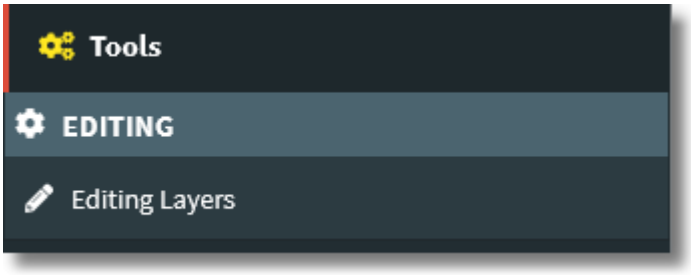
We see in the figure above that there are more than one layer in the layer whose information can be seen in different periods of time. If you want not to navigate the time series for a certain layer, then click *x* to remove it.

Information:
If you want to remove a layer from the navigation in the time series, then you must deactivate the same one from the panel below the layers (as in the picture below).

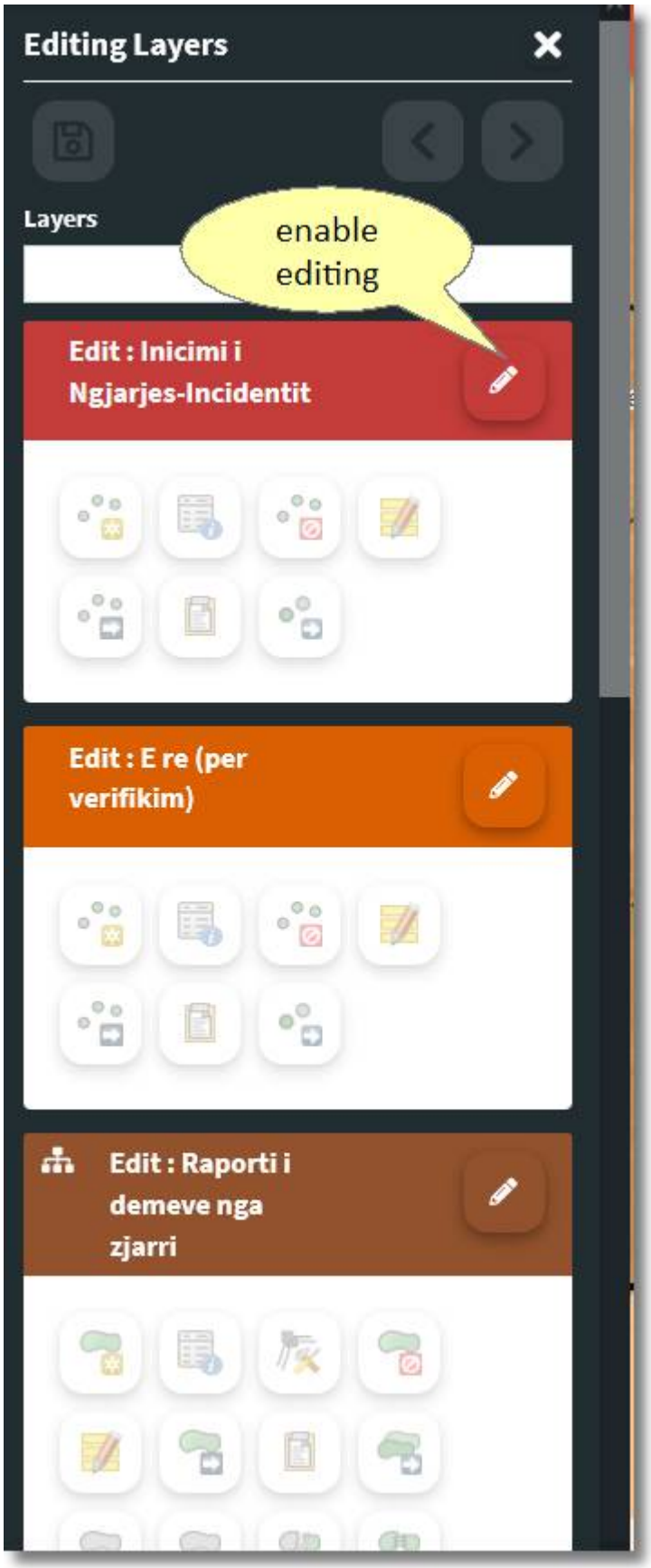


4.6 Tools - Editing

Editing is a tool as part of the left panel of the NFFIS application. Editing in a Web GIS system typically involves making changes or updates to existing geographic data, or creating other new data, such as adding new features, modifying attributes, or deleting data.



After clicking on *Editing* and then on *Editing Layers*, the layers will appear on which layer you want to do the editing.



On each layer is the pencil symbol that enables editing. Let's take for example the first layer: the active events, where after activating the editing other tools are enabled for use.

Editing tools for point type layer:

	Add feature
	Update feature data
	Update data of the selected feature
	Move feature
	Paste feature from another layer
	Copy feature

The next example is for editing the fire damage report layer.

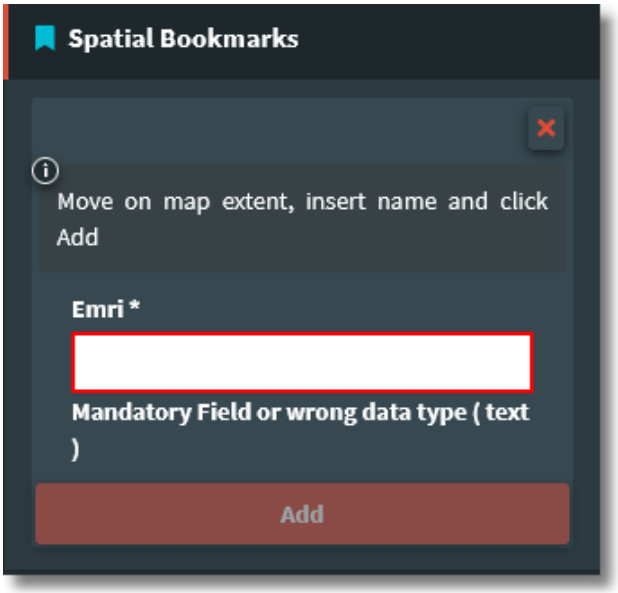
Veglat për editim për shtresë të tipit poligon:

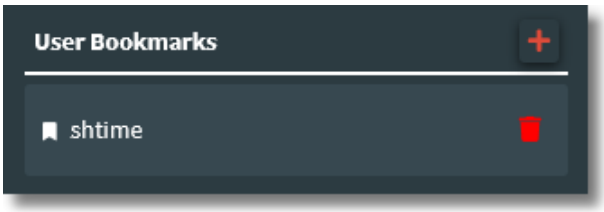
	Add feature
	Update feature data
	Update feature vertex
	Update data of the selected feature
	Move feature
	Paste feature from another layer
	Copy feature
	Add parts to multiparts
	Delete part from multiparts
	Split feature

	Dissolve feature

4.7 Spatial bookmark

Spatial Bookmarks a feature commonly used in GIS systems that allow users to easily save and move to specific locations or areas of interest within a map or scene. Bookmarks can be created by zooming in on a specific area, setting the extent and giving it a name or label.





Bookmarking is particularly useful for users who work with large datasets and need to move to specific locations frequently, as it can save time and reduce the likelihood of errors.

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