Commission for the Sustainable Use and Protection of the Dniester River Basin

Working Group on River Basin Planning and Management
Working Group on Emergency Situations

Development of the concept on the geoinformation platform DniesterGIS

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Acronyms

GIS - geoinformation system

DniesterGIS - Dniester River Geoinformation System

WG RWBMP - Working Group on River Basin Planning and Management

Dniester Commission - Commission for Sustainable Use and Protection of the Dniester River Basin

ICPDR - International Commission for the Protection of the Danube River

Introduction

The initiative to develop a geoinformation platform that would integrate the geospatial information base of the entire Dniester River basin came from the Working Group on Dniester River Basin Planning and Management (WG-DNRMB) of the Commission for Sustainable Use and Protection of the Dniester River Basin (Dniester Commission) at the meeting of the Commission on 28-29 October 2021. The minutes of the relevant meeting state that the WGDRMP will develop the concept of the geoinformation platform and propose it for analysis and approval at the next meeting of the Dniester Commission. The Dniester River Geoinformation Platform is proposed to be briefly named DniesterGIS.

The main objective of DniesterGIS is to integrate geospatial information of the whole Dniester River basin into a single geoinformation system (web-based system) in order to facilitate joint Moldovan-Ukrainian management of the basin.

This platform will include geospatial information of the entire Dniester River basin, both from Ukraine and the Republic of Moldova. The creation of geospatial information will be carried out by responsible teams within each state. Unification, integration and placement of common information for the whole hydrographic basin will be carried out by a special team that will manage the platform. It is assumed that within DniesterGIS the following manipulations with geospatial information will be carried out: posting and modification (by administrators), viewing (by all interested parties), downloading (by authorised users). DniesterGIS will be developed in stages: concept definition, design, construction and implementation of the platform. The platform will become a part of the Dniester Commission website - dniester-commission.com.

This report is dedicated to the DniesterGIS conceptualisation. In particular, it focuses on the overview of the platform interface and its main components. The topics such as legal framework, platform administration, access to information and users are also touched upon.

DniesterGIS is expected to be developed using the best international practices in this field, which guarantees its integration into a modern river basin management system. Examples of geoinformation (geoportal) platforms for other rivers are DanubeGIS for the Danube River, SavaGIS - for the Sava River, Upper Rhine Information Service, etc.

The report can be supplemented with important information, updated or modified upon request of the Dniester Commission.

Examples of GIS platforms for river basins

DanubeGIS placed on https://www.danubegis.org/

One of the best known geographic information platforms is DanubeGIS - Danube River Basin Information System. DanubeGIS is a geographic information system that utilises and provides geo-information services on the web. It is developed by the ICPDR parties and managed by the Information Management and GIS Expert Group (IMGIS EG) and the secretariat.

The figure below shows the interface of the DanubeGIS platform. As can be seen, the main components of the interface are the menu bar Maps, About, Data Privacy, Help. In the top right corner are the login / registration boxes. On the left side are the maps, which after activation are presented on the canvas. The canvas contains the underlying map, above which there are layers, scale, tools (zoom in, zoom out, extents, full screen, base map), the name of the created map, the map as a whole and symbols (legend).

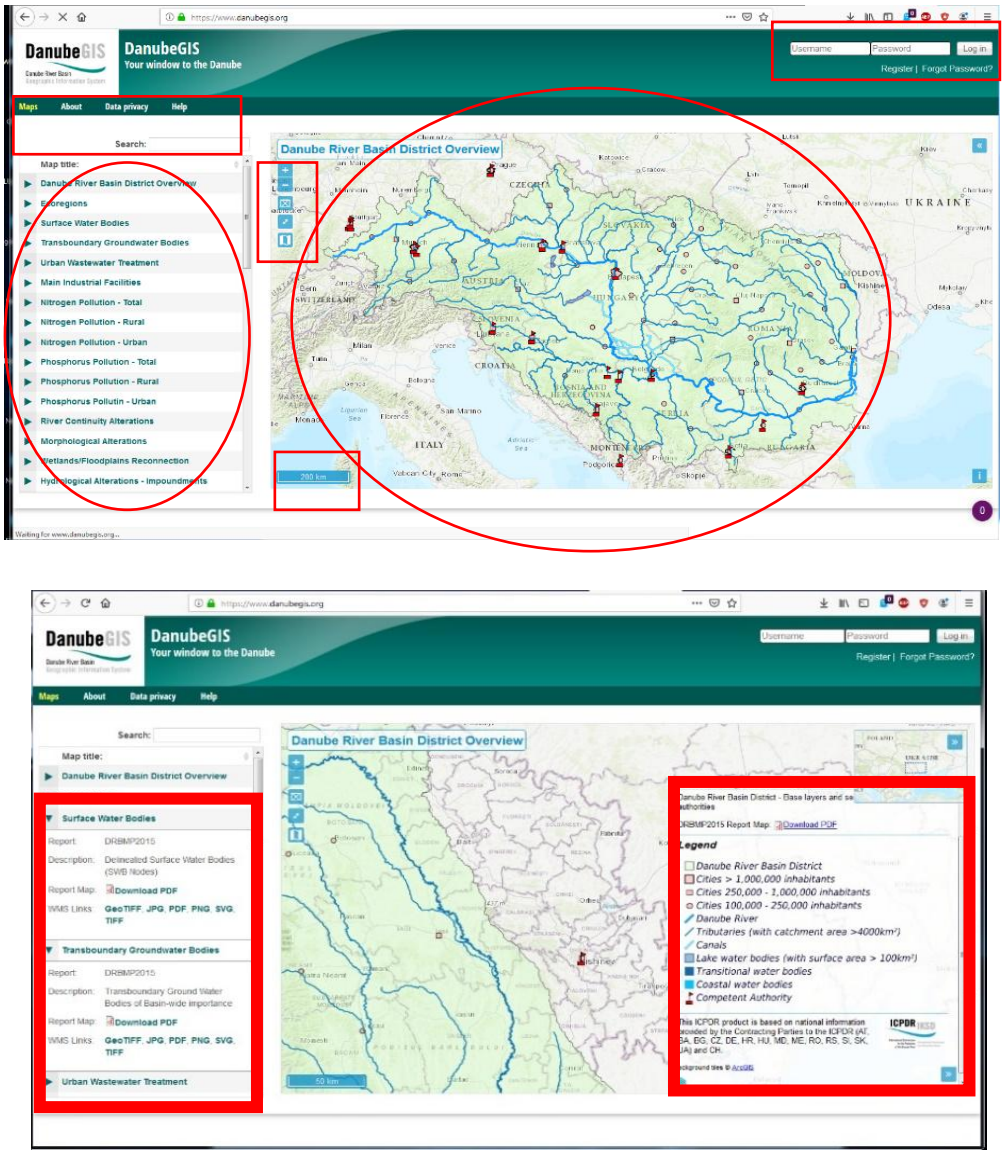

Fig 1. DanubeGIS interface

SavaGIS geoportal on https://www.savagis.org/map

SavaGIS is a geoportal for the Sava River. SavaGIS is a common platform of the International Sava River Basin Commission (ISRBC) community, designed to share and disseminate information and knowledge on water protection and water management activities in the Sava River Basin.

The architecture of the SavaGIS interface resembles that of DanubeGIS, the toolbar being richer. The main element is the presence of panels that allow access to real-time hydrometeorological data, as well as to their archive. A metadata catalogue is also presented. In addition to the tools listed above, there are also identify features, clear identity, search, measure, print, settings.

The geospatial data layer sets are grouped into several categories:

- River Basin Management

- Flood risk management

- Historical hydrological and meteorological data

The list of layers is very large. Extensive information on hydrometeorological stations is also provided. The interface can be viewed in 5 languages.

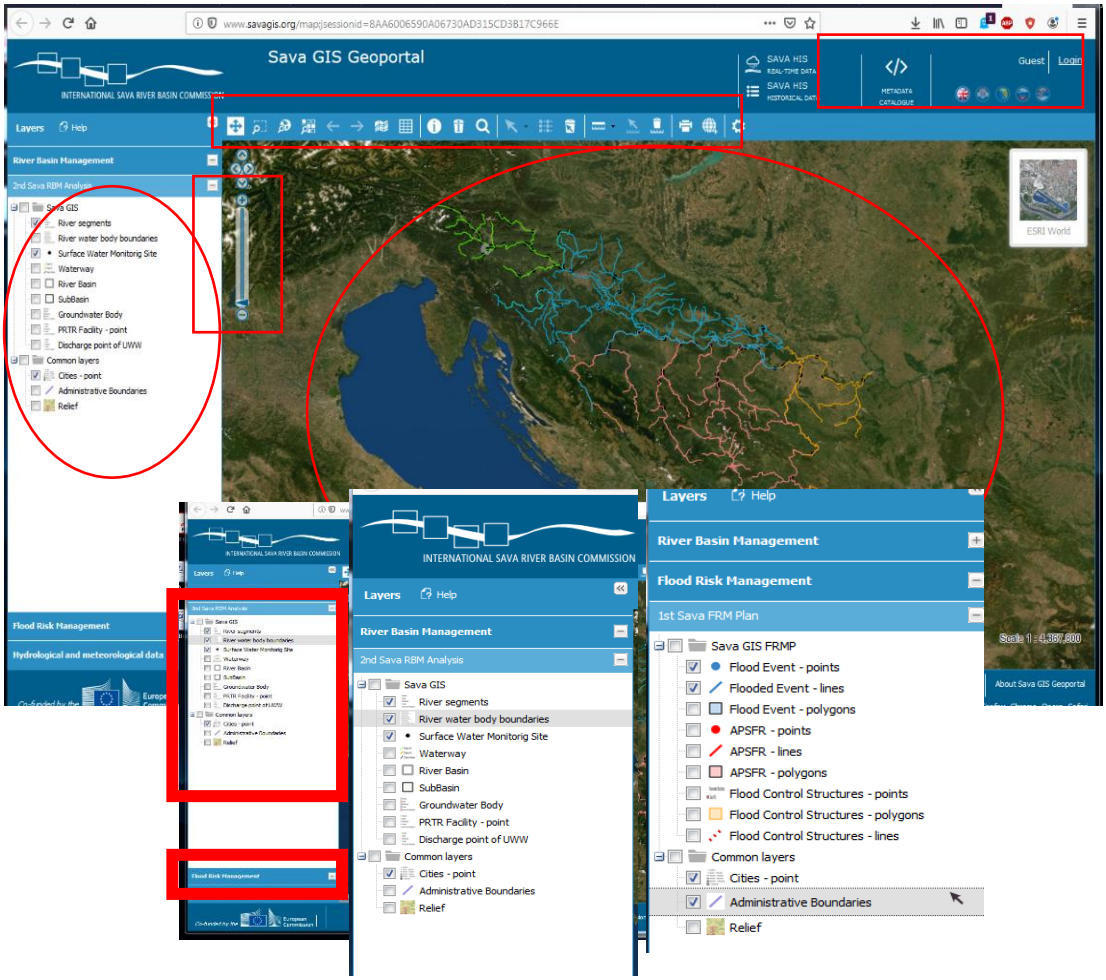

Figure 2. SavaGIS interface

Legal basis

DniesterGIS development, as well as provision of placement and access of users to geospatial information should be carried out in accordance with the legislation of each state. Taking into account that the legislative base of each state is complex, at the initial stage of the geoinformation platform development it is proposed to place geospatial information, which can be freely accessed.

As an example, spatial information can be downloaded free of charge from https://earthexplorer.usgs.gov/. From this global platform, it is possible to download a digital terrain model from which various geo-information layers can be modelled, such as rasters: slope, slope aspect, topographic wetness index, etc., or vectors: river basins, hydrographic network, etc. It is expected that these layers can be placed on the platform without violating the laws of the States. Another example of free data is the geoinformation database developed under the GEF / UNDP / OSCE / UNECE Project "Ensuring Transboundary Co-operation and Integrated Water Resources Management in the Dniester River Basin" – The GEF / UNDP/ OSCE/ UNECE project "Enabling transboundary co-operation and integrated water resources management in the Dniester River Basin".

GIS platform for the Dniester River

The GIS platform for the Dniester River will be briefly called DniesterGIS. The main objective of DniesterGIS is to integrate geospatial information of the entire Dniester River basin into a single geoinformation system (web-based system). The geospatial information will be used for various purposes, one of which is the development and subsequent implementation of a joint Moldovan-Ukrainian Dniester River Basin Management Plan. In addition, the data collected and stored in the system can be used for various scientific studies or expertise at the basin level, thus ensuring the development of knowledge about the entire hydrographic basin and the exchange of experience between the inhabitants of the upper, middle and lower reaches of the river.

It is important to emphasise that the platform should include geospatial information of the entire Dniester River hydrographic basin, both in Ukraine and the Republic of Moldova.

Creation of geospatial information will be carried out by responsible teams within each state, unification, integration and placement of common information for the whole hydrographic basin will be carried out by a special team that will manage the platform. It is assumed that within DniesterGIS the following manipulations with geospatial information will be carried out: posting and modification (by administrators), viewing (by all interested parties), downloading (by authorised users).

DniesterGIS will be developed in stages: concept definition, design, construction and implementation of the platform. The platform will become part of the Dniester Commission website – dniester-commission.com.

DniesterGIS interface

Any web platform consists of an interface that allows navigation and utilisation of information. For DniesterGIS a classical interface is proposed, which will consist of:

- Menu bar
- Toolbar
- GIS layers panel
- Legend panel
- Canvas (working surface)

It is proposed that the menu bar and toolbar be placed horizontally at the top of the platform interface. The panels with GIS layers and legend (symbols) will be placed vertically on the left side. The canvas will occupy most of the interface and will be placed to the right and centre of the interface

Menu bar

The menu bar consists of menus such as:

- News
- Tools
- Maps
- Help
- Contact

Tool bar

- Move (move around the site)
- Zoom (zoom in, zoom out, zoom in to full scale)
- Search
- Measurement (length, area)
- Identification / information
- Print

Legend

The legend will be specific to each layer.

Canvas

On the map canvas (working surface) the underlying map (geo base) will be presented, which can be Open Street Map or Google Map. The zoom indicator (Zoom in, zoom out) will be placed on the right side and the scale - in the bottom centre.

Language

In order to ensure the right to use the geo-information platform to a larger number of people it is proposed to develop DniesterGIS interface in the following languages:

- Romanian
- Ukrainian
- English

As the geospatial information is supposed to be unified for the whole hydrographic basin, it is proposed to develop attributes and metadata in the language of international circulation, e.g. English. Alternatively, the geo-information layers can be placed in the 3 languages proposed above.

Possible layers and metadata

The information to be integrated into DniesterGIS platform is grouped into:

- Non-spatial information (attribute):
  - Textual
  - Numeric
- Spatial information:
  - Raster layers
  - Vector layers

Layers that can be included in DniesterGIS platform are:

- **General data**
  - ✓ Transboundary basins in Europe
  - ✓ Dniester river basin
  - ✓ Small river basins
  - ✓ Physical map
  - ✓ Topography
  - ✓ Administrative-territorial division
  - ✓ Air temperature. Precipitation
  - ✓ Vulnerability to climate change
  - ✓ Hydrographic network
  - ✓ River network density
  - ✓ Water resources (flow, volume, etc.)
  - ✓ Reservoirs and ponds
  - ✓ Groundwater
  - ✓ Transitional and coastal waters
  - ✓ Mineral deposits
  - ✓ Geological hazards
  - ✓ Ecoregions
  - ✓ Forests \ Share of forests in small river basins
  - ✓ Population, Rural population
  - ✓ Agglomerations and wastewater treatment plants
  - ✓ Land use
  - ✓ Surface water use
  - ✓ Wastewater discharge
  - ✓ Water quantity monitoring network
  - ✓ Water quality monitoring network
  - ✓ Protected areas

- **Implementation of the Water Framework Directive:**
  - ✓ surface water bodies
  - ✓ groundwater bodies
  - ✓ surface water risk assessment
  - ✓ protected areas
  - ✓ ecological status or potential of surface water bodies
  - ✓ chemical status of surface water bodies
  - ✓ quantitative status of groundwater bodies
  - ✓ chemical status of groundwater bodies
  - ✓ wastewater treatment plants
- **Flood Directive** – flood risk and hazard maps
- **Nitrate directive** – areas vulnerable to nitrate accumulation
- **Wastewater directive** – vulnerable areas

The list of layers can be extended during use. It is proposed to store spatial information in the cloud.

Each of these layers will contain metadata specifying the following:

- Layer name (full and shortened)
- Code / identifier (as appropriate)
- A brief description of the layer (including date of creation, modification/updating, posting to the web-site)
- Type
- Coordinate system
- Information about the author / responsible for the layer (name, surname, organization, phone number, address)
- Legend, attributes (if necessary)
- Other properties (if needed)

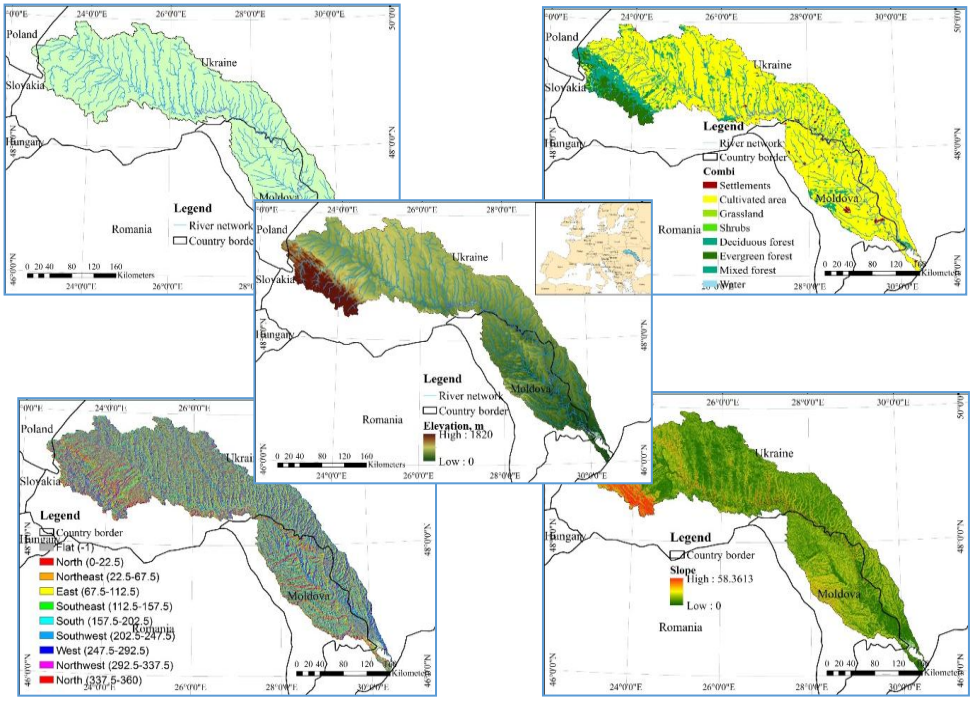

Fig 3. Examples of maps that can be located on DniesterGIS platform

A serious problem can be duplication of layers (in the process of modifying/updating them), in this case the old layers should be placed in the archive.

Access, administrators, users

By common agreement, States will decide on the type of data access and users. It is currently proposed to categorise users according to the following criteria:

- External users:
  - Anonymous
  - Registered
- Internal users:
  - Experts responsible for data
  - Responsible for posting information on the platform
  - Administrators

Regarding access to spatial data, this will be:

- Open access
- Restricted access

States will define the rights of each type of user. In particular, the rights to view, download, upload data to the platform will be fixed.

The administrators of the platform will be responsible for its design and maintenance. The team of administrators should be international and spatial information can be hosted and stored in the cloud.

WMS/WFS - services

A decision will be made whether to offer or not the users the option of using WMS/WFS - services.

Contact information and feedback

Within the interface there will be a link to contact information that will be formed from the responsible persons details, including phone number and email address.

Useful links

In order to integrate useful information for use within DniesterGIS, useful links with various information resources will be created, such as:

- Open Street Map
- Google Map
- http://vb.dniester-commission.com/
- http://dnister.meteo.gov.ua

User manual, technical advice, help

In the "Help" menu it can be found the User Manual, which will contain technical recommendations and usage of DniesterGIS platform for different user groups.