WP	W T3: Policy integration and economic instruments

PROJECT OF DECISION SUPPORT SYSTEM (DSS) FOR N(S)WRM

D.T3.4.1

Version 1

March 2019

Content

1. Introduction

The application is created for people involved in planning water retention measures in order to mitigate the effects of drought, floods and surface contamination by biogenes. People administering the application will be part of units dealing with the coordination of measures in the catchment, province or country. The application users will be, in particular, the management boards of the catchment areas, protected areas, communes, forest districts, non-governmental organizations and individual users. The goal of the application is to familiarize the user with the catalog of Natural Small Water Retention Measures (NSWRM) and the planning process as well as to survey their preferences for their area of interest. An additional function is to help the user in making a decision about the location and type of action and to develop a report, which will allow to develop the concept of operation and prepare the necessary permits for their implementation. The application administrator will be able to download a map of the proposed measures for the selected area and a report with the hierarchy of measures' validity. The application is dedicated for Central Europe, but in the demo and test version it will cover four pilot catchments located in Poland, Slovakia, Slovenia and Hungary.

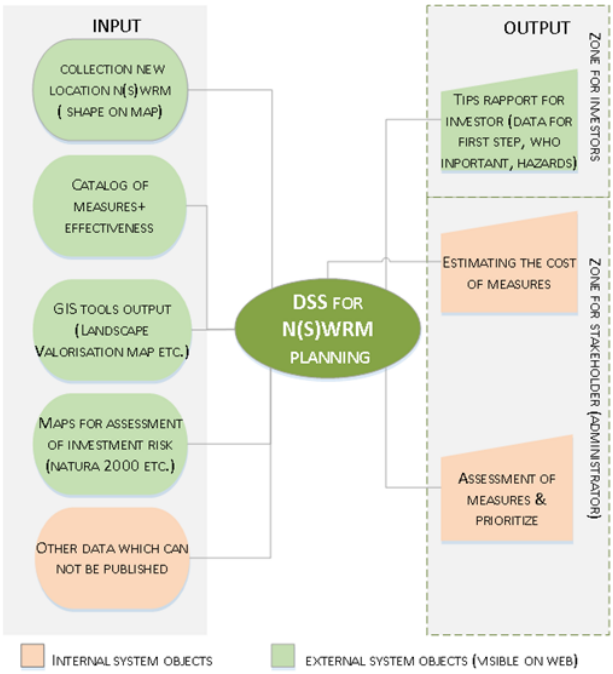


Fig. 1. General diagramme of DSS.

The web application should consist of the start page and a minimum of three groups of tabs:

- Education
- Catalog of measures
- Tools

The developers are responsible for software, installation and preparation of internet application documentation, placement of the application planner script and script on the Gitlab portal (https://gitlab.com/framwat). The client will provide the geodatabase with spatial data and substantive content to all tabs. The application is to be based on open source software, it should support seven languages and be able to analyze spatial data in a user-defined area. In the first period (ie after 6 months), an application prototype in English will be created, which will be tested by the project partners for 3 months, then after submitting comments, the developer will have 2 months to develop the final version. The scope of amendments that can be made will be determined by a separate document as part of the negotiations.

2. Specification of structure and functionality

2.1. Starting page

It should contain a general description and buttons / links to three groups of bookmarks (Education, Catalog of measures, Tools) and in the header or footer links to Contact, Language change and Link with the sponsor's logo.

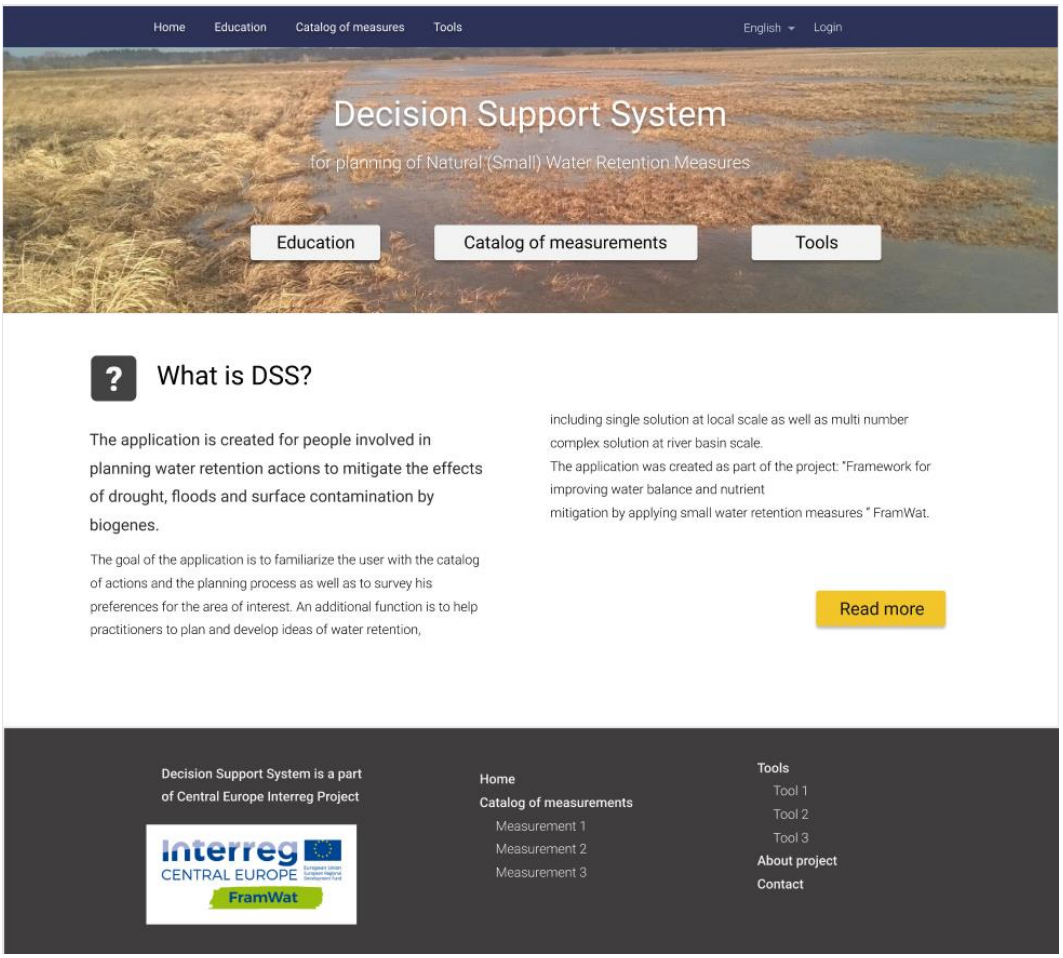


Fig. 2. DSS start page.

2.1.1. Education

The main idea of the site is to introduce the user to issues related to identifying the needs of water retention and planning measures to mitigate the effects of drought and flood. In addition, it is to describe the course of the investment process and costing the investment.

The site should have tabs: The need for water retention, Planning process, Investment process, Tools, Glossary and a link to a PDF guide.

In each of the above-mentioned tabs will be a general description with graphics and links to related pages and legal acts.

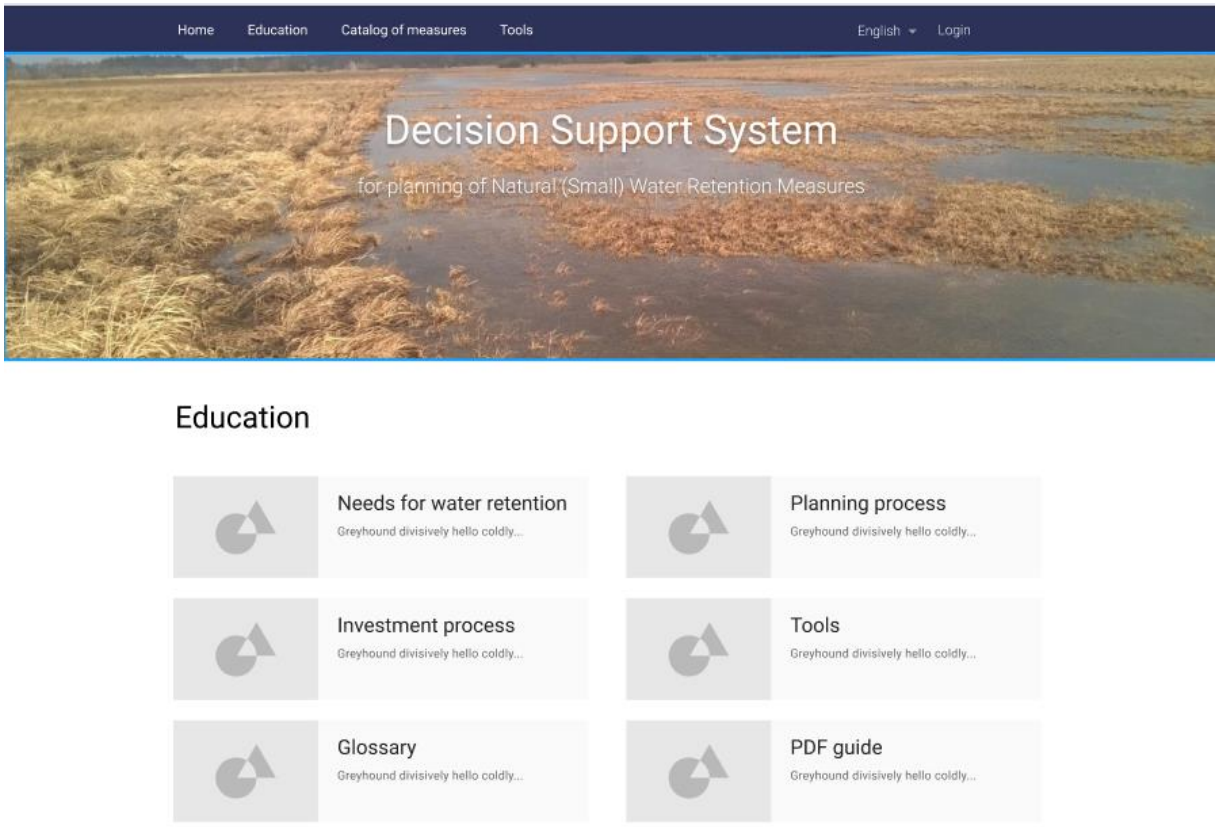


Fig. 3. DSS education page.

2.1.2. Catalog of N(S)WRM

The catalog will contain a list of up to 50 NSWRM divided into groups (Agriculture, Forestry, Hydromorphology, Hydraulic engineering / Others). Each link will refer to the internal website with a short description of the action and a photo or sketch.

Below are links to an example catalog of action:

- *NWRM Catalog*
- *NWTM Manual*

- *Query System helping to choose water quality BMP*
- *Desktop database and manual of BMP*

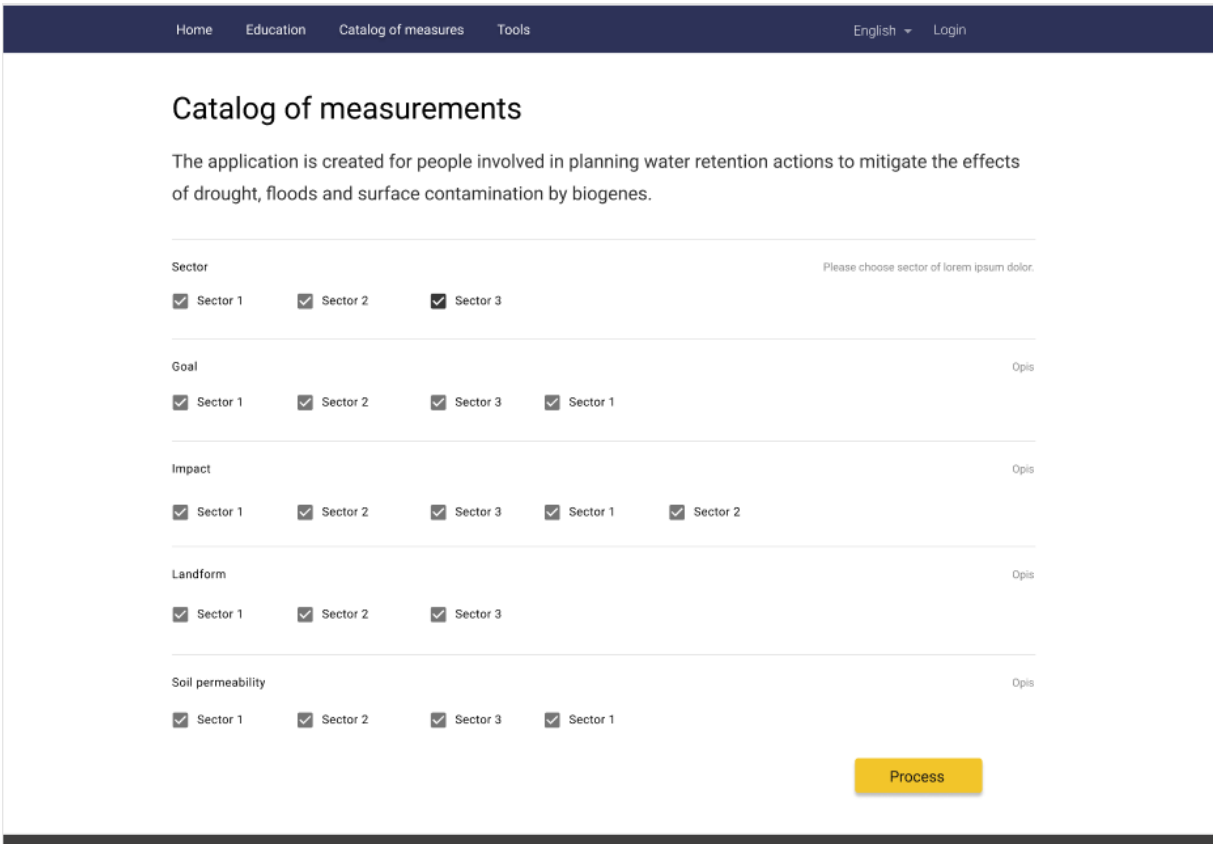
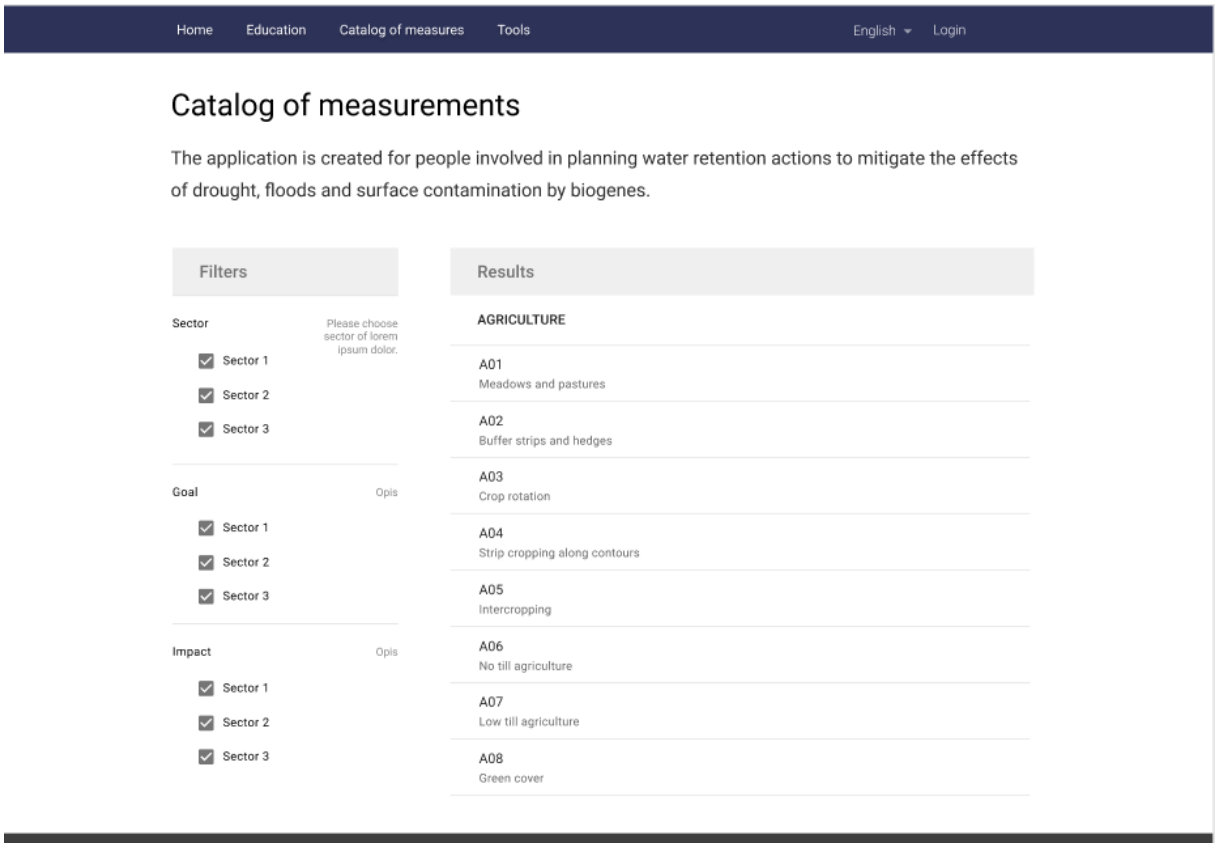


Fig. 4. DSS page with catalog of measurements.



2.1.3. Tools

This page will have a minimum of four tabs:

- Valorisation of Water Retention Needs - FroGIS
- Static method of assessing the effectiveness
- Dynamic method of assessing the effectiveness
- N(S)WRM planner

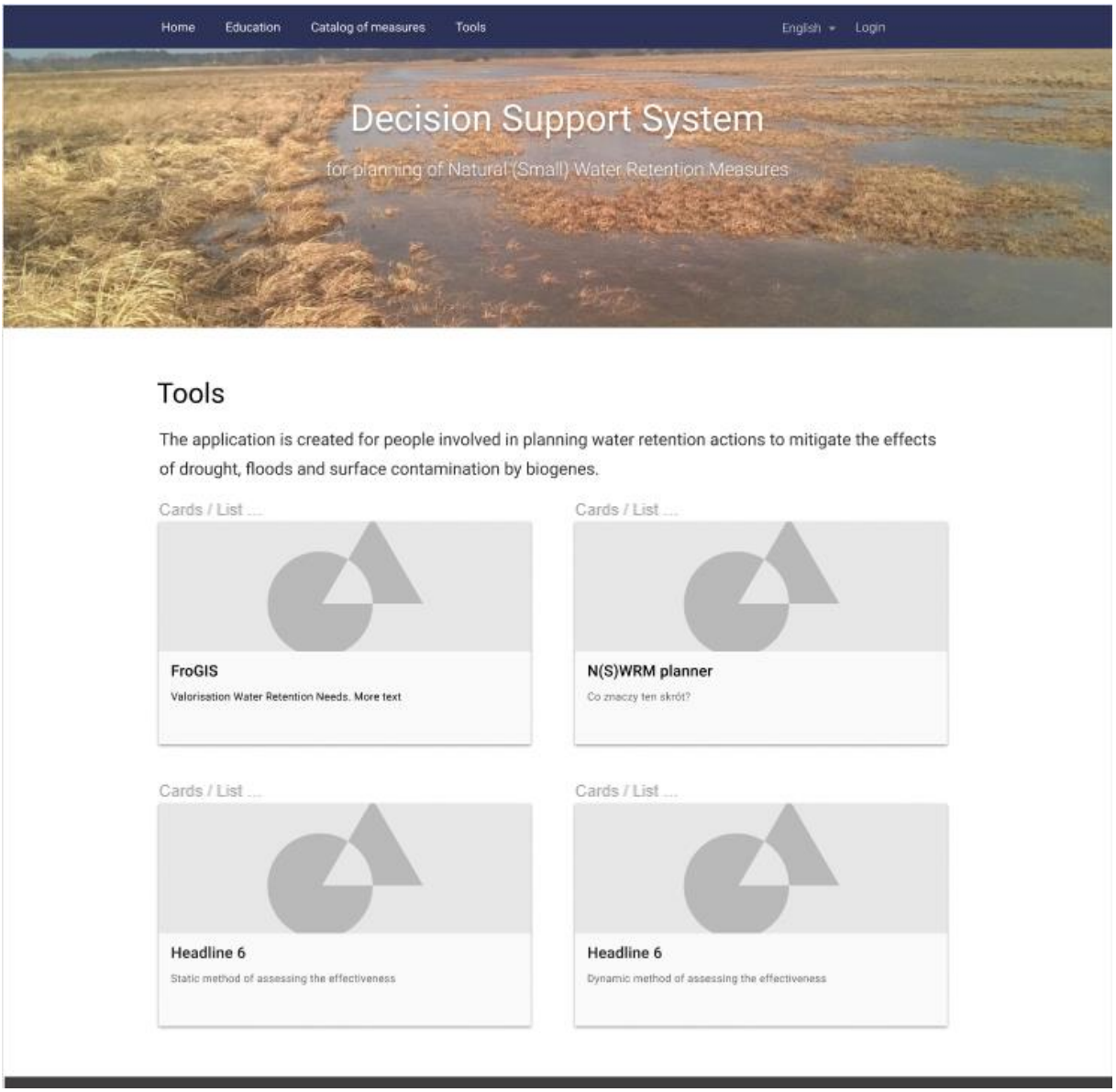


Fig. 5. DSS page with tools.

3. NSWRM planner

3.1. Functionality

The goal of the application is to:

- carry out a survey of local stakeholders in terms of ideas for planning measures in the field of water retention mitigating the effects of drought and floods,
- prepare the data necessary to develop the concept and estimate the investment risk.

Functionality:

- support via Chrome and FireFox web browser for PC and Mac devices as well as Windows and Apple OS operating systems

- two groups of users: administrator and user, from which only the administrator will require credentials

User-level functionality:

- user identification by e-mail address
- entering data for a minimum of 10 users at once
- drawing polygons of any shape
- entering polygon attributes using a form containing, among others, combo fields and with "i" icons or speech bubble describing the field
- the possibility to return and modify the polygon shapes
- generating reports in the form of tables and maps (rtf, pdf)
- saving the polygon layer and attributes to the session file (eg GeoJson, shp) and sending it to the user's address
- the possibility of re-loading the previously entered data from the session file
- the ability to switch GUI to several languages (English, Polish, German, Slovak, Slovenian, Croatian, Hungarian)
- possibility of zooming in and out of the map view
- the ability to enable or disable the following layers: OpenStreat Map, Validation maps (vector), Drop map (raster), TWI map (raster)
- the ability to identify individual objects, i.e. on the valorization map and from the connected WMS map
- the ability to connect a layer from any WMS site (OpenGIS® Web Map Service Interface Standard)

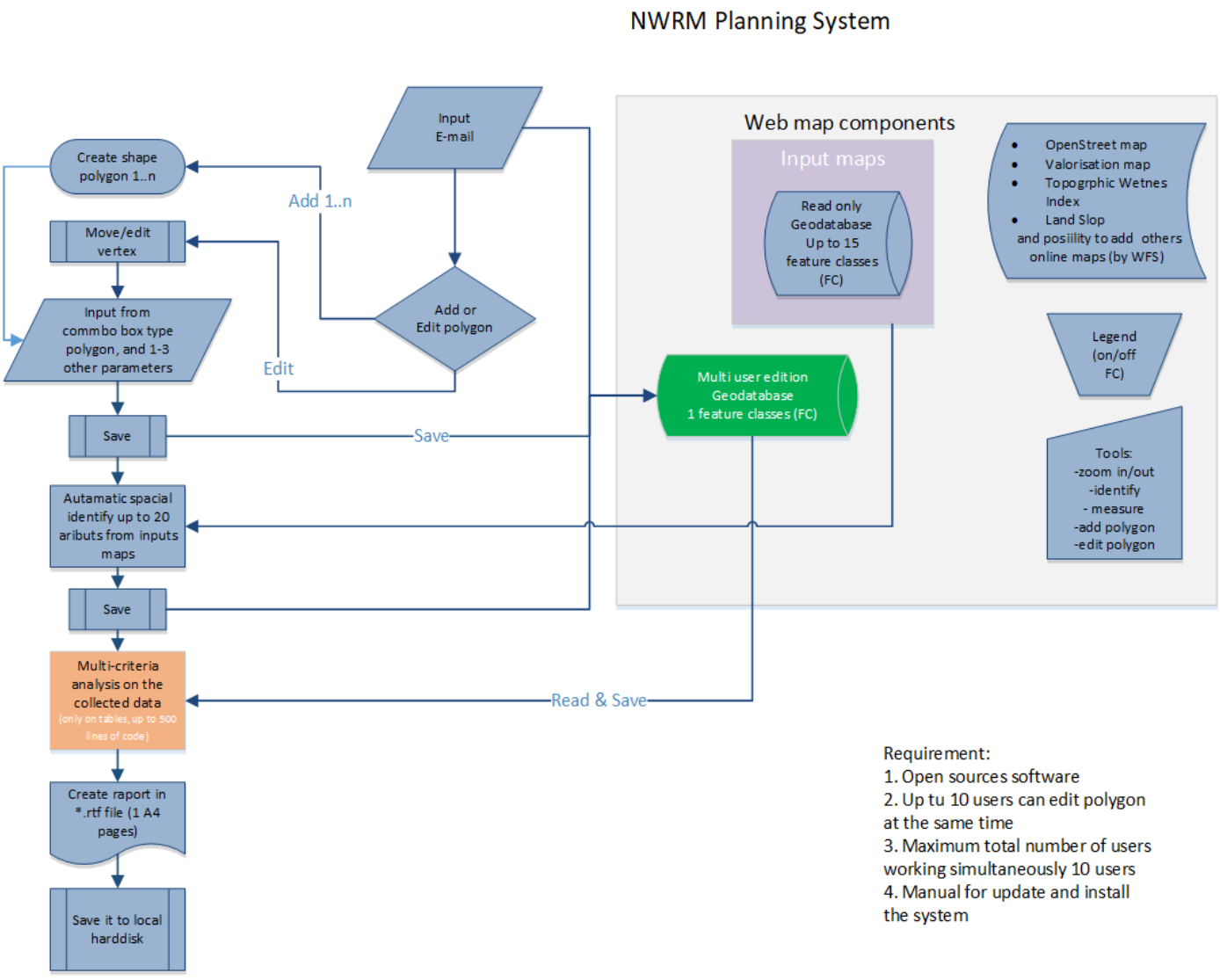


Fig. 6. NSWRM Planner algorithm (web map application).

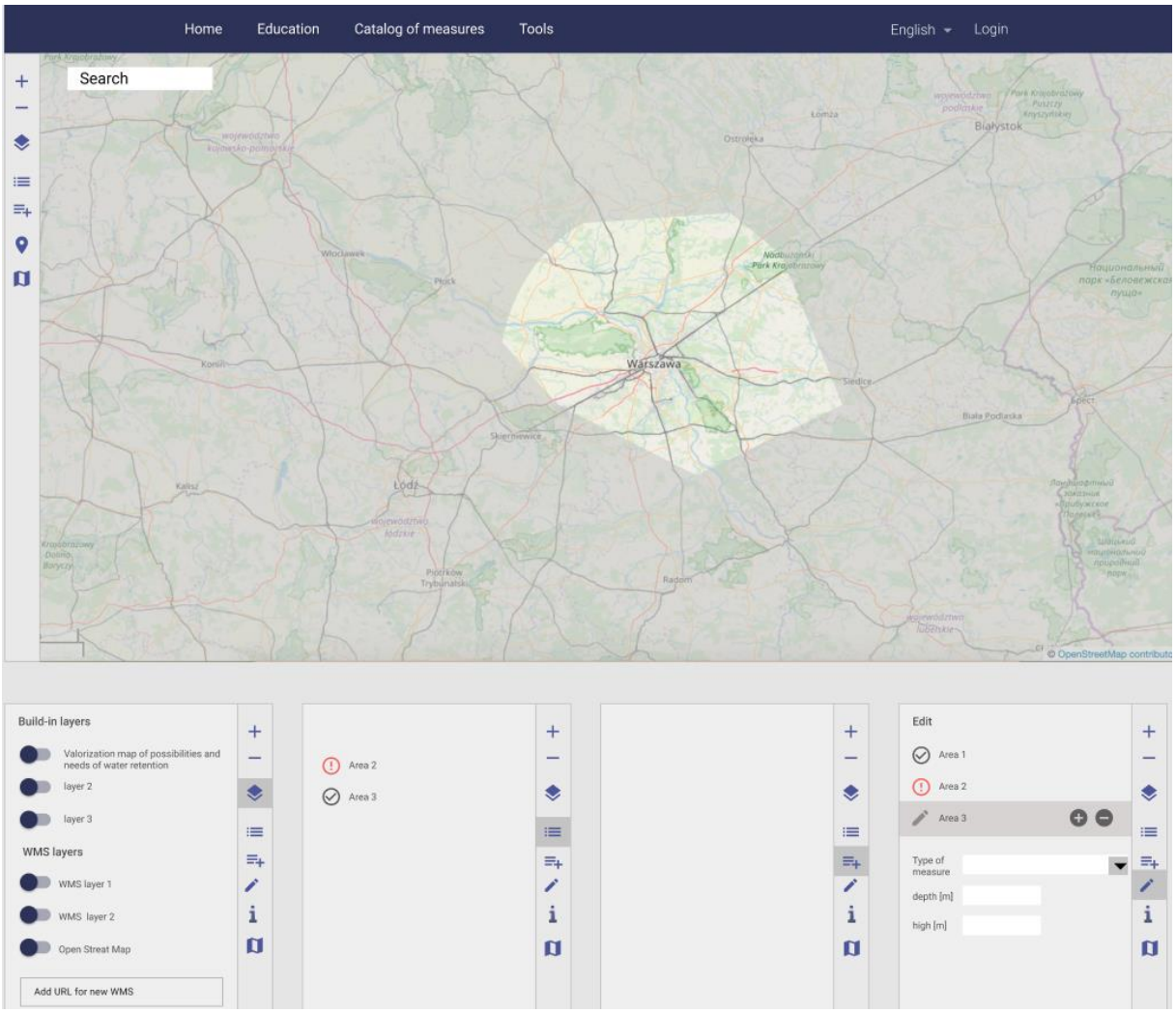
Functionality at the administrator level:

- possibility to export from the system a layer containing polygons and their attributes collected from all sessions including additionally modification date, e-mail address and proposed hierarchy of measures calculated on the basis of the analysis of data contained in the table
- possibility of updating the following maps: valorisation, slopes and TWI

Report generator functionality:

- should contain a map of objects,
- should contain a table, the following attributes are calculated on the basis of the shapes of the polygons introduced by the user:
  - area of a single polygon [ha],
  - the area of land use (according to CLC 2016),
  - name, identifier and area of protected areas (according to GDOŚ data),
  - parameters obtained from the terrain elevation model (ordinate of the area Min, Average, Max, slope of the area),

- the name and area of the sub-basin (according to MPHP),
- distance to the nearest river,
- distance from the nearest ditch,
- class of valorisation of water retention needs,
- monthly temperature and precipitation characteristics,
- climatic water balance
- flow characteristics in the nearest river,
- parcel numbers (if WFS will be available)
- administrative affiliation, district, commune, county, voivodeship
- information from the development plan (if available)
- should contain a list of permits and documents that should be collected at the implementation stage of a given type of small water retention facility



3.2. Database structure

DSS DataBase consists of 12 main spatial tables: 3 with raster data and 9 with vector data and 8 dictionary tables. Data has been prepared in ESRI ArcCatalog. Coordinate system of all data is EPSG:3857. Detailed structure of DSS Database contains Appendix 1.

Id	TableName	Spatial Data type	Description
1	areaofanalysis	Polygon	Contains info about catchments. Currently for test purposes it is limited to 4 catchments: Kamienna, Kamniska Bistrica, Nagykunsagi and Slana
2	auAdmUnitS	Polygon	Administrative Units. Contains information about country, local names with source of these names, region/sub-region etc. described as name1storder, name2ndorder etc. (ex. Voivodeship/county/community in Poland) up to 7 levels of the administrative unit.
3	cpParcelS	Polygon	Cadastral Parcels. Contains information about local name and source of the name of the parcel.
4	harvestNSWRM	Polygon	Harvested NSWRM by planner. Contains measures proposed by stakeholders.
5	hypBasinS	Polygon	River or drainage basin.
6	hypSurfaceWaterL	Polyline	Rivers or lake course. Contains information about water flows.
7	hypSurfaceWaterS	Polygon	River or lake surface. Contains information about local river's or lake's name.
8	LandUseS	Polygon	Table contains information about land use.
9	potentialForWaterRetension	Polygon	Potential for water retention - Valorisation map form FroGIS
10	pSiteP	Point	Table contains information about localization of protected sites.
11	pSiteS	Polygon	Protected site surface. Contains information about national names, protection class and type of protected area.
12	wfdGroundWaterBodyS	Polygon	Description of ground water body according to Water Framework Directive (WFD). Contains inter alia information about localname, localID, euGroundWaterBodyCode, gwSignificantPressureOther, gwSignificantImpactOther, gwAtRiskQuantitative and others
13	wfdSurfaceWaterBodyL	Line	Description of surface water body line (river) according to Water Framework Directive (WFD). Contains information about localid, localname, euSurfaceWaterBodyCode, surfaceWaterBodyTypeCode, swEcologicalStatusOrPotentialValue etc.
14	wfdSurfaceWaterBodyS	Polygon	Description of surface water body (lake) according to Water Framework Directive (WFD). Contains information about localname, localid, euSurfaceWaterBodyCode, surfaceWaterBodyTypeCode, swEcologicalStatusOrPotentialValue etc.
15	Dem	Raster	Digital Elevation Model. Grid size 25x25m.
16	landSlope	Raster	Slopes. Grid size 25x25m
17	monthMeanAirTemperature	Raster	Monthly mean air temperature. Contains information about mean temperature in particular months.

18	monthPrecipitation	Raster	Monthly mean precipitation. Contains information about mean precipitation in particular months.
19	monthRunOff	Raster	Monthly mean runoff. Contains information about mean water runoff in particular months.
20	Twi	Raster	Raster map of topographic wetness index. Grid size: 25x25m.
21	dicNameSpace	-	Contains information about data source names and the source of these names

Additionally DSS uses 9 dictionary tables:

1. dicCountryCode - country codes
2. dicFieldAlias - translation of fields names to different languages
3. dicGroupOfTips - translation of tips to different languages
4. dicHypBasin - translation of basin types to different languages
5. dicHypSurfaceWater - translation of surface water types to different languages
6. dicLanUse - translation of land use types to different languages
7. dicNSWRM - translation of N(S)WRM to different languages
8. dicPsSite - translation of protected sites types to different languages
9. dicWfdSurfaceWaterBody - translation of WFD surface water body types to different languages

To transfer data from ESRI Geodatabase to PostGIS, we've used GDAL (Geospatial Data Abstraction Library) for windows. This utility gives possibility to convert spatial data between many formats (including PostgreSQL with PostGIS extension). To transfer vector data, we used utility ogr2ogr.exe. Raster data has been first exported from ESRI Geodatabase to GeoTIFF and next converted to PostGIS Spatial table by using raster2pgsql.exe utility. During the conversion process, for the spatial fields spatial indexes has been created.

4. Review of national and global dataset

A review of the global datasets (conducted in D.T.1.1) found that good quality and high resolution data for Central Europe is available only for: land use (CORINE Land Cover), hydrography (EEA, European catchments and Rivers network system), digital elevation model (Copernicus) and climate (Water and Global Change). This data will be used in DSS during the testing period. Additionally other datasets were found:

Table 1: Free online spatial dataset

Dataset name	Description	Web link	Type	Range/Region
EU-DEM	25m resolution source ASTER and SRTM	http://www.eea.europa.eu/data-and-maps/data/eu-dem#tab-gis-data	Topographic	Europe
Corine Land Cover	Land cover data (1990, 2000, 2006,2012), resolution = 100 m	http://www.eea.europa.eu/data-and-maps	Land use	Europe

SoilGrids	Soil raster 250x250m. Automated soil mapping based on global soil profile and environmental covariate data. SoilGrids represents a collection of updatable soil property and class maps of the world at 1 km and 250 m spatial resolution produced using automated soil mapping based on machine learning algorithms.	https://www.soilgrids.org/	Soil	Globe
Model for Europe Hydrological Predictions for the Environment	Outputs (Discharge, Nutrients) from model HYPE for Europe (except Russia) main river	http://www.smhi.se/en/2.2139/E-hypeweb/	Hydrology, Nutrient load	Europe
River network and main catchment areas	River network and catchement areas for WFD (>10 km²)	https://www.land-oberoesterreich.gv.at/165464.htm https://www.land-oberoesterreich.gv.at/165676.htm	Hydrology	Austria
Protected Planet	Protected Planet is the most up to date and complete source of information on protected areas, updated monthly with submissions from governments, non-governmental organizations, landowners and communities. It is managed by the United Nations Environment World Conservation Monitoring Centre (UNEP-WCMC) with support from IUCN and its World Commission on Protected Areas (WCPA).	https://www.protectedplanet.net/	Protected area	Global
Global Runoff Data Centre	European Water Archive (EWA of EURO-FRIEND-Water) Flow data (daily/monthly) from 3800 gauging stations, 441 are near-natural catchments	http://www.bafg.de/GRDC/EN/Home/homepage_node.html	Hydrology	Europe
INSPIRE Geoportal Data Set	Explore all Member States' INSPIRE data sets by selecting an INSPIRE data theme.	http://inspire-geoportal.ec.europa.eu/theme_selection.html?view=qsTheme	Administrative units Cadastral parcels Transport networks Hydrography Protected sites	Europe

Table 2: Direct connection to national spatial dataset (Administrative units; Cadastral parcels; Hydrography; Protected sites; Hydrology; Meteorology)

Dataset name	Data format (INSPIRE/NATIONAL)	WFS/WMS	Type	Access limits(login/ numbers of objects)	Range/Region
Polish Protected sites	National	WMS	Protected sites		Poland
Polish Administrative borders	National for WMS INSPIRE for WFS	WMS voivodeship WMS community WFS voivodeship WFS community	Administrative	10000 obj.for WMF	Poland
Polish hydrography	National	WMS	Hydrogrphy		Poland
Polish ownership	National	WMF	Parcels	login request	Poland
Croatia geoportal	National	Only view by http	Administrative units, Cadastral plan, CROTIS hydrography		Croatia
Croatia Protected sites	National	WMS	Protected sites		Croatia
Croatia Hydrology	National	WMS	Hydrology		Croatia
Croatia Meteorology	National	Only view by http	Meteorology		Croatia

5. Review of DSS web application examples

Example of Web-base DSS:

A Web Service ecosystem for high-quality, cost-effective debris-flow hazard assessment

PLUSK for transboundary catchment Polish-Slovak

CRIS services for Polish reservoir

iDEAL (DEcision support for Adaptation pLan) for which IRENA-Istrian Regional ENergy Agency

Web map framework:

Google - Angular FW

Facebook - React FW

Level2 - QGIS Web Client FW

Geo open source software

Example of simple web map open source portal

https://www.react-simple-maps.io/

https://rawgit.com/Leaflet/Leaflet.Editable/master/example/index.html

QGIS Portal example

6. Literature review

In order to get acquainted with the existing Decision Support Systems (DSS), their functionality, structure, software and purpose, a literature review was prepared. Table 3 summarizes examples of DSS created for various purposes, eg for flood risk management; for the storage, management, visualization and analysis of hydrochemical and hydrogeological data; for support of water resources modeling; for water pollution, geospatial problems and for geochemical analysis. Most often these are interactive web-GIS, open source platforms integrated with functional tools and with different application ranges (catchment, country, etc.). The big advantage of DSS in the following examples is the user friendly interface. An important element is also a well-prepared database. In most cases, those are systems that are a conglomeration of multiple technologies, such as the Geographical Information System (GIS), AI, soft-computing tools and data mining. An example of such a system is WATERDSS (described in the table below). The design of WATERDSS consists of three layers: Database Management System (DBMS), Application Layer (AL), User-Database-Model Interface (UDMI). More detailed information related to the literature review (DSS examples) is summarized in Table 3.

Table 3: Summary of the literature review

Name of DSS/Autor	Goals	Functionality (Public or other access, Query, Search, Zoom, Edit, Geoanalysis, multilanguage)	Architecture/Structure (Main objects: Web browser, Database, IIS, Web app)	Software	Range
Decision making in flood risk management (FRM); Almoradie, A. et al	For collaboration in FRM (Flood Risk Management) intended to address some of challenges and hindrances (e.g. limitation of financial resources, stakeholders' spatial distribution and their interest to participate).	General public licence (GPL); about platform: easy to follow, interactive, customisable and flexible enough to be implemented in other case studies.	The final design of the platform resulted in two modules named 'collaborative platform' (CP) and 'collaborative modelling exercise' (CME), corresponding to the two stages of the collaborative framework. Components for visualisation and interactivity were made available through maps, tables, graphical charts, forums, chat, feedback forms, pre-prepared videos and flow charts.	Web-based platforms	Catchment

Name of DSS/Autor	Goals	Functionality (Public or other access, Query, Search, Zoom, Edit, Geoanalysis, multilanguage)	Architecture/Structure (Main objects: Web browser, Database, IIS, Web app)	Software	Range
A collaborative (web-GIS) framework based on empirical data collected from three case studies in Europe for risk management of hydro-meteorological hazards: Zar Chi Aye et al	Inform and assist the stakeholders involved in the formulation and selection of risk reduction measures based on available risk information and stakeholders' preferences; platform is useful and applicable for their activities in risk management hydro-meteorological hazards.	The framework of this platform is designed in a generic way so as to be applicable in different areas and to enable a high level of flexibility in its application. The type of users and the level of involvement and interaction in the platform depends on the institutional settings and the users' respective roles and responsibilities in a certain study area. The prototype platform accounts for three main types of users: moderator, experts and decision makers. This flexible collaborative framework extends beyond the conventional use of GIS in three aspects: enhancing spatial data access, exchange and dissemination; supporting spatial data visualization and exploration; and creating a highly adaptable tool for spatial data analysis and processing for risk management activities.	Based on a typical structure of the decision-making process the workflow of the platform is composed of the following steps: First phase: 1. Formulation of preliminary risk management alternatives; Second phase: 1. Formulation of objectives in terms of decision criteria; 2. Evaluation of risk management alternatives against decision criteria; 3. Weighting of decision criteria by involved stakeholders and 4. Comparison of ranking of alternatives to support final agreement.	Interactive web-GIS platform integrated with a multi-criteria evaluation tool.	Catchment
Assessment of open source GIS software for water resources management in developing countries; Chen, D ; Shams, S ; Carmona-Moreno, C ; Leone	Software for water resources management in developing countries.	Open source software. In the final shortlist, there are two C/Cþþ language GIS packages, namely QGIS and MapWindows. The QGIS can run on multi-platforms, and it is adequately powerful and easier to use than GRASS. MapWindow GIS can only run in MS Windows. Its advantages lie in the rich water-related functions. In the two Java GIS packages, gvSIG is very easy to use and also powerful. The OpenJUMP software is very useful too but it has less functionality than the gvSIG. Therefore, gvSIG appears to be relatively more suitable than the openJUMP.	The structure depends on a particular case	GIS software; Operation system, programming language depend on open source GIS e.g. a. DIVA GIS (Windows only) b. Deegree (Windows only) c. FMaps (Unix and Gnome) d. ILWIS (Windows only) e. MapWindow GIS (Windows only) f. NRDB (Windows only) g. SAMT (Unix only) h. SavGIS (Windows only) i. SharpMap (Windows	Countries

Name of DSS/Autor	Goals	Functionality (Public or other access, Query, Search, Zoom, Edit, Geoanalysis, multilanguage)	Architecture/Structure (Main objects: Web browser, Database, IIS, Web app)	Software	Range
AkvaGIS - tool for water quantity and quality management; Criollo, R. et al.	Standardized and easy-to-use workflow for the storage, management, visualization and analysis of hydro-chemical and hydrogeological data. The main application is devised to simplify the characterization of groundwater bodies for the purpose of building rigorous and data-based environmental conceptual models.	Free and open source. 'The user can manage data by adding, deleting or editing the needed information to perform the study.' 'The user can manage and query hydrogeological measurements and estimates performed in wells, piezometers or springs.'	AkvaGIS tools is a geospatial database implemented using the relational database SpatiaLite (SQLite spatial extension, http://www.sqlite.org/), where all data related to a hydrogeological study are stored. SpatiaLite is an open-source database able to store many format files (e.g., raster, shapefiles or cad files). AkvaGIS tools are divided into 3 main sections (Fig. 2): the database management tools that are designed to manipulate the hydrochemical and hydrogeological data stored in the AkvaGIS database; the hydro- chemical tools for managing, visualizing, analysing, interpreting and pre-processing the hydrochemical data; and the hydrogeological tool.	AkvaGIS is developed in Python (www.python.org) and integrated into the FREEWAT platform (Fig. 1). This tool is freely available from the official QGIS experimental repository, the FREEWAT project re-pository (www.freewat.eu) or the gitlab repository (https://gitlab.com/freewat).	From the local to regional scale/country. This example: The Walloon region (Belgium) [...]
Prototype web application for water resources using latest advancements in Information and Communication Technologies (ICT); Delipetrev, B. et al.	For support of water resources modelling.	Open source software, 'The presented web application has several main advantages: it is available all the time, it is accessible from everywhere, it creates a real time multi-user collaboration platform, the programing languages code and components are interoperable and designed to work in a distributed computer environment, it is flexible for adding additional components and services and, it is scalable depending on the workload.', multi-users access, geoanalysis, searching, presenting and downloading geospatial maps and data from the HMak database, zoom. Specific type of geospatial object can be inserted.	The web application for water resources consists of a relational database, a middle tier for managing geospatial data, two web interfaces for the specialized services and other software components. The web application has three web services for: (1) managing, presenting and storing of geospatial data, (2) support of water resources modeling (WRM) and (3) water resources optimization. The web service for managing, presenting and storing of geospatial data consists of two components: (1) the relational database named HMak that was created in PostgreSQL3 and PostGIS,4 which is a data repository; and (2) the web application GeoServer.5 Six vector geospatial data layers currently are stored in HMak: (used by the web service for support of WRM): rivers, canals, users, agriculture areas, reservoirs and inflows together with their corresponding attribute tables.	The web application is developed using several programming languages (PhP, Ajax, JavaScript, Java), libraries (OpenLayers, JQuery) and open source software components (GeoServer, PostgreSQL, PostGIS).	Catchment

Name of DSS/Autor	Goals	Functionality (Public or other access, Query, Search, Zoom, Edit, Geoanalysis, multilanguage)	Architecture/Structure (Main objects: Web browser, Database, IIS, Web app)	Software	Range
Web based GIS platform for zero energy settlements monitoring; Gobakis, K.; Mavrigiannaki, A.; Kalaitzakis, K.; Kolokotsa, D.-D.	WEB GIS data monitoring platform is developed for the data gathering of zero energy settlements. To support the next generation of multi-process big data and service-oriented computing, a Web-GIS platform is considered a viable solution for gathering and sharing of collected data from various case studies NZE settlements, so that the information flows are easily managed and interpreted, by means of spatial thematic maps related to specific levels of information, within the various case studies.	Open-source, The Application Server communicates the data to the end user via the Front End of the WEB GIS monitoring platform. Navigation on the Web-GIS ZERO PLUS Platform - When accessing the Web-GIS monitoring platform through any web browser. Then, after typing in the users' credentials, the user is moved to the map of Europe, where the ZERO PLUS settlements are pinpointed.	The overall layout of the monitoring platform is comprised of: The monitoring devices and data acquisition units at building and at settlement level, The Cloud Server which incorporates: The database for storing the monitoring data of each settlement, the spatial database for the geographical data of each settlement, the GeoServer for displaying the geographical data. The Application Server which communicates the data to the end user and the Front End of the NZE settlements monitoring platform, The Communication system between the data acquisition units and the Cloud Server. The database holding the measurements data fulfils the following requirements: Variability of user access levels to ensure security of the data, Ability to store different data objects, such as files, floats, photos, maps, etc, Interconnection with several software and programming languages, such as Java, C, JavaScript, PHP, etc. Supports various database management systems that are available and ready to be used for any specific application. The PostgreSQL is selected to support the data storage of the Web -GIS monitoring platform.	The Front End is designed to allow the visualisation of the monitoring data using any web-browser, such as Internet Explorer 9 and higher, Firefox Mozilla, Google Chrome, etc. Therefore, the data visualisation does not require any installation of extra software.	Countries
Web service-oriented environment (GRASS GIS example); Li, X. et al.	GRASS GIS contains modules that can be used for scientific analysis of geospatial data and solving geospatial problems in many areas, for example, soil modeling, hydrological modeling, wildfire spread simulation, and landslide risk mapping.	The geographic resources analysis support system (GRASS) is an open source geographic information system (GIS) with more than 350 modules for management, processing, analysis and visualization of georeferenced data	Typical geospatial Web services implementation adapts the existing modules in GRASS GIS software: general commands, imagery commands, raster commands, and vector commands	GIS software	Global

Name of DSS/Autor	Goals	Functionality (Public or other access, Query, Search, Zoom, Edit, Geoanalysis, multilanguage)	Architecture/Structure (Main objects: Web browser, Database, IIS, Web app)	Software	Range
Water Ecosystems Tool (WET), Nielsen, A.; Bolding, K.; Hu, F.; Trolle, D.	For application and evaluation of aquatic ecosystem models.	WET is cross-platform compatible (installation instructions are available throughwet.au.dk) and implemented in the open source QGIS program, which must be installed on the computer prior to installation of WET. Multiple criteria were assessed during the architecture and development phases of the WET modelling workflow. Priorities were 1)open source development and open source resources to facilitate availability and further development; 2) possibility to access, read, and process key geo-referenced data such as bathy-metric maps; and 3) implementation of a link between the aquatic ecosystem model and a state-of-the-art watershed model. WET automatically loads a world land cover map (2009 dataset, 300 m grid) from the European Space Agency (ESA).	A WET project consists of a dedicated QGIS (.qgs) project file(serving as entrance to GIS operations of the project and for visualization of loaded layers at the map canvas) and a neighboring project-specific directory mirroring the project name. The project directory holds all project inputs and eventually simulation out-puts. Inputs and project-specific information are stored in a designated SQLite project database (hosting a number of database tables with cascading joined relationships) as well as in supporting model configuration files. WET operates with relative paths to files, and transfer of WET projects from one location to another (e.g. between computers) is easily done by copying the QGIS project file and the WET project directory, respectively.	Workflow implemented (as a plugin) in QGIS	Catchment

Name of DSS/Autor	Goals	Functionality (Public or other access, Query, Search, Zoom, Edit, Geoanalysis, multilanguage)	Architecture/Structure (Main objects: Web browser, Database, IIS, Web app)	Software	Range
WATERDSS, Salah, H.A. et al.	The WATERDSS online data (web) services provide a computed water quality index or water pollution test per water application unit employing statistical models. WATERDSS tests the data of water management stations in real-time. WATERDSS is designed to help policy makers in the field of water management to define long term strategies that would avoid water pollution accidents, as well as take quick actions in case of pollution events.	WATERDSS is a user friendly-interactive-web based decision support system that consists of different ecosystem processes and their modelling for water pollution development and management of water quality. It's widely supported open-source software based on the water management information system for better decision making. implementing knowledge repository services during information-decision support with spatial/non- spatial database management, visualization, analysis, query and user individualized customization utilities for optimization and management of water resources properly.	The WATERDSS attempt illustrates the development of a viable and generic toolkit for integrated water planning and management of its natural resources. The system is a conglomeration of multiple technologies like Geographical Information System (GIS), AI, soft-computing tools, and data mining. The design of WATERDSS consists of the following three layers: •Database Management System (DBMS) • Application layer (AL) • User-Database-Model Interface (UDMI)	The spatial dataset interface was designed by using the open source GIS application, 'Arc Map', in conjunction with the front-end application 'universal map', which is implemented through incorporating Java Script, Map Script and PHP scripts.	Catchment (testet in Tigris River in Baghdad)

Name of DSS/Autor	Goals	Functionality (Public or other access, Query, Search, Zoom, Edit, Geoanalysis, multilanguage)	Architecture/Structure (Main objects: Web browser, Database, IIS, Web app)	Software	Range
ENORASIS	Environmental optimization of irrigation management with the combined use and integration of high precision satellite data, advanced modelling, process control and business innovation.	In a field that uses the ENORASIS system, wireless sensor and water valves are distributed over the cultivated area. The sensors compile raw data for various parameters that influence the evapotranspiration of the total input of water, such as soil moisture, air temperature, humidity, solar radiation, wind speed and rain gauge. The ENORASIS system server collects both the sensors measurements and the water valve activity. The advanced ENORASIS Meteorological Analysis Tool produces a personalized weather forecast with a resolution of about 2 km. Daily forecasts for rain probability, soil humidity and other atmospheric parameters that affect irrigation management, are generated specifically for each field. Information from the sensors, the water valves and the weather forecasts is combined once a day by the system, in order to generate an individual daily irrigation plan. This plan is tailored to each field and its soil characteristics to ensure maximum yield for the crop. Farmers can receive irrigation recommendations directly on their smartphone, tablet or computer. Furthermore, water management authorities are provided with real time information about water demand. This information helps them set water prices and estimate short and long term pressures on water reservoirs. A long term, detailed collection of valuable statistics concerning irrigation water consumption is also available for them. ENORASIS system presents all information and data on a GIS interface, infrastructure in a user friendly way.	The basic parameters of ENORASIS Service Platform and Components are: •Decision Support System based on GIS technologies, acting as the main information backbone of the platform •Irrigation Management System, performing the assessment of irrigation water needs and controlling irrigation management rules •Meteorological Analysis Tools, assimilating advanced weather forecast models •Field hardware (smart card readers, sensors etc.) to be deployed in farmers fields for measurements and reporting purposes •The Smart Card Irrigation System, to be used by farmers/water management companies and ENORASIS Service Platform for exchange of information. Users can access the ENORASIS system mainly by a web browser. The web platform is used by all the system actors (e.g. farmers, watering authorities, consultants and administrators) to perform their daily tasks.	GIS software; Android Application, Website.	Farmers and water management companies.

7. Conclusion

Based on our own experience, consultations with partners and stakeholders as well as a review of existing solutions, the project of the DSS system were created and the technology of its implementation were selected. Its functionality will enable the introduction of stakeholders in the subject of planning activities, familiarizing with existing measures and submitting ideas. A less experienced user will be able to report a problem and plan a specific measure. The generated report will allow the user to estimate the investment risk and indicate the necessity to obtain a permit. The system design will be published on the GitLab.com portal in the form of an open source software, which will enable further development of the application.

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APPENDIX 1

DATABASE STRUCTURE

DECISION SUPPORT SYSTEM (DSS) FOR N(S)WRM

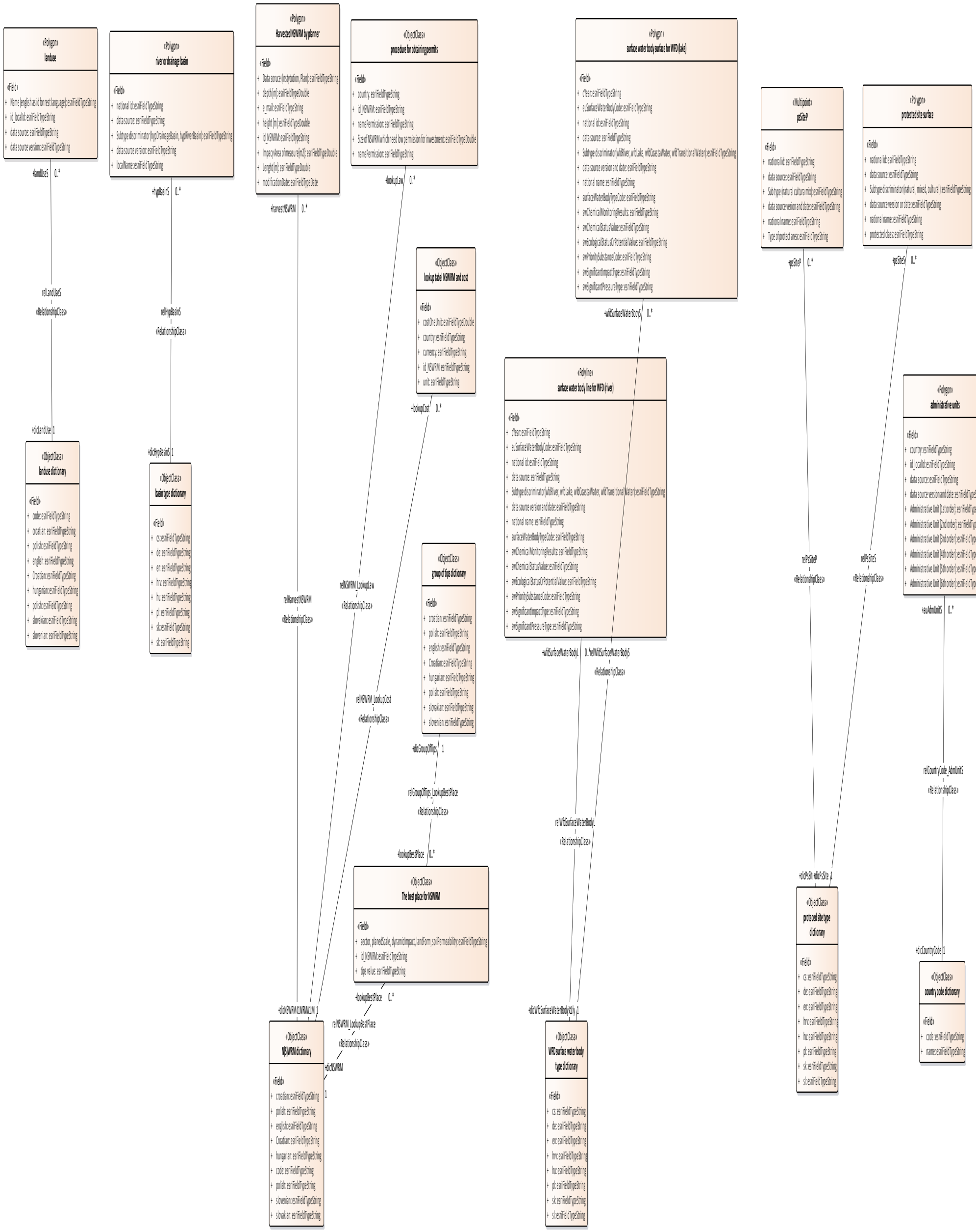
Workspace

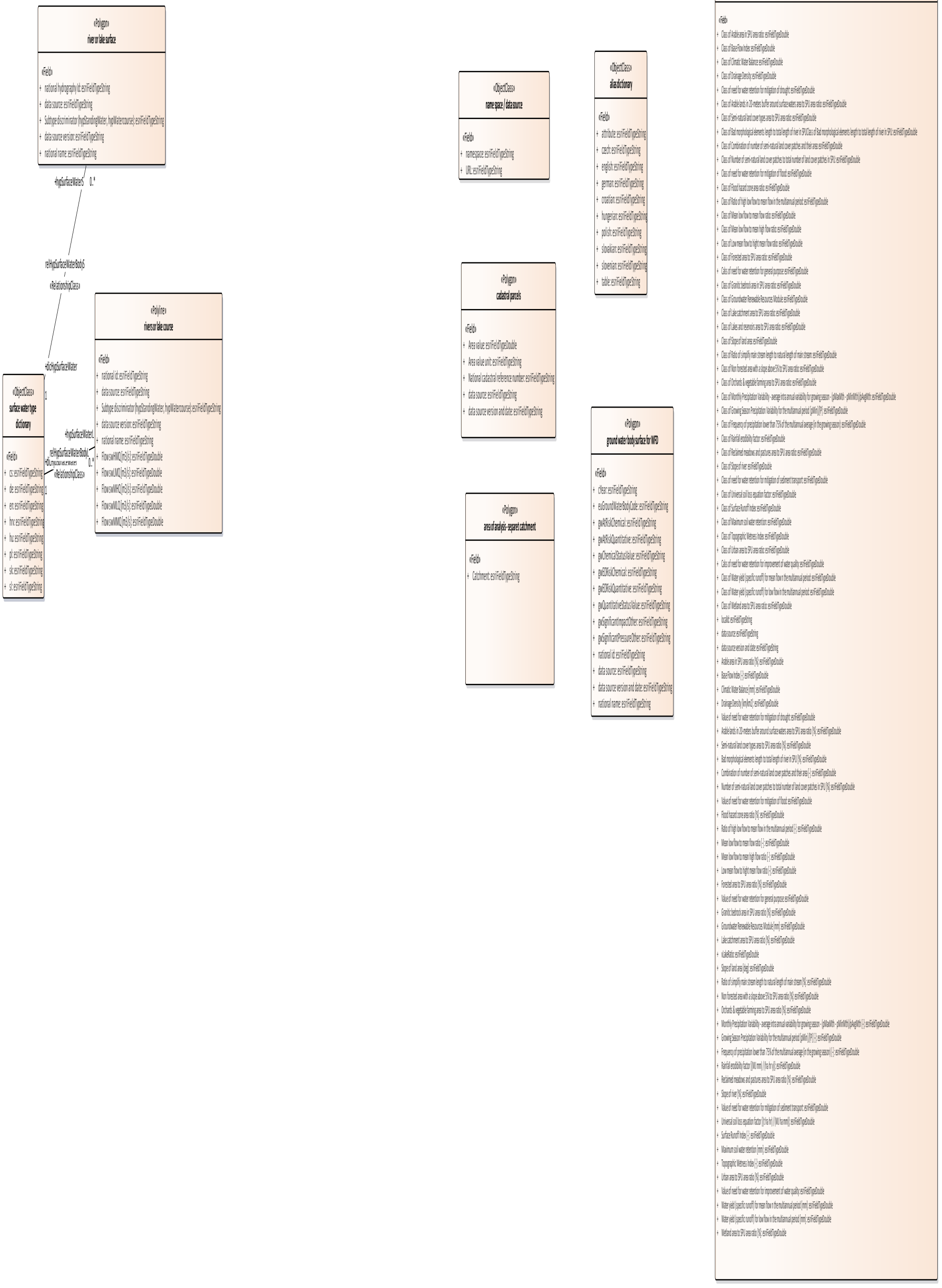
CREATED WITH ENTERPRISE ARCHITECT

Table of Contents

Workspace

Workspace diagram

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«Field»
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+ data source: esriFieldTypeString
+ Subtype discriminator (hypStandingWater, hypWatercourse): esriFieldTypeString
+ data source version: esriFieldTypeString
+ national name: esriFieldTypeString
+hypSurfaceWaterS
0..*
relHypSurfaceWaterBodyS
«RelationshipClass»
«Polyline»
rivers or lake course
«Field»
+ national Id: esriFieldTypeString
+ data source: esriFieldTypeString
+ Subtype discriminator (hypStandingWater, hypWatercourse): esriFieldTypeString
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+ FlowswMHQ [m3/s]: esriFieldTypeDouble
+ FlowswMLQ [m3/s]: esriFieldTypeDouble
+ FlowswMMQ [m3/s]: esriFieldTypeDouble
+hypSurfaceWaterL
relHypSurfaceWaterBodyL
«RelationshipClass»
+DicHypSurfaceWater
1
0..*
«ObjectClass»
surface water type dictionary
«Field»
+ cs: esriFieldTypeString
+ de: esriFieldTypeString
+ en: esriFieldTypeString
+ hnv: esriFieldTypeString
+ hu: esriFieldTypeString
+ pl: esriFieldTypeString
+ slc: esriFieldTypeString
+ sl: esriFieldTypeString
«ObjectClass»
name space / data source
«Field»
+ namespace: esriFieldTypeString
+ URL: esriFieldTypeString
«ObjectClass»
alias dictionary
«Field»
+ attribute: esriFieldTypeString
+ czech: esriFieldTypeString
+ english: esriFieldTypeString
+ german: esriFieldTypeString
+ croatian: esriFieldTypeString
+ hungerian: esriFieldTypeString
+ polish: esriFieldTypeString
+ slovakian: esriFieldTypeString
+ slovenian: esriFieldTypeString
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+ Catchment: esriFieldTypeString
«Polygon»
ground water body surface for WFD
«Field»
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+ euGroundWaterBodyCode: esriFieldTypeString
+ gwERiskChemical: esriFieldTypeString
+ gwERiskQuantitative: esriFieldTypeString
+ gwChemicalStatusValue: esriFieldTypeString
+ gwECRiskChemical: esriFieldTypeString
+ gwECRiskQuantitative: esriFieldTypeString
+ gwQuantitativeStatusValue: esriFieldTypeString
+ gwSignificantImpactOther: esriFieldTypeString
+ gwSignificantPressureOther: esriFieldTypeString
+ national Id: esriFieldTypeString
+ data source: esriFieldTypeString
+ data source version and date: esriFieldTypeString
+ national name: esriFieldTypeString
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Potential for water retention - Valorisation map form FmGIS
«Field»
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+ Class of Base Flow Index: esriFieldTypeDouble
+ Class of Climatic Water Balance: esriFieldTypeDouble
+ Class of Drainage Density: esriFieldTypeDouble
+ Class of need for water retention for mitigation of drought: esriFieldTypeDouble
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+ Class of Semi-natural land cover types area to SPU area ratio: esriFieldTypeDouble
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+ Class of Number of semi-natural land cover patches to total number of land cover patches in SPU: esriFieldTypeDouble
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+ Class of Mean low flow to mean flow ratio: esriFieldTypeDouble
+ Class of Mean low flow to mean high flow ratio: esriFieldTypeDouble
+ Class of Low mean flow to hight mean flow ratio: esriFieldTypeDouble
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+ Calss of need for water retention for general purpose: esriFieldTypeDouble
+ Class of Granitic bedrock area in SPU area ratio: esriFieldTypeDouble
+ Class of Groundwater Renewable Resources Module: esriFieldTypeDouble
+ Class of Lake catchment area to SPU area ratio: esriFieldTypeDouble
+ Class of Lakes and reservoirs area to SPU area ratio: esriFieldTypeDouble
+ Class of Slope of land area: esriFieldTypeDouble
+ Class of Ratio of simplify main stream length to natural length of main stream: esriFieldTypeDouble
+ Class of Non forested area with a slope above 5% to SPU area ratio: esriFieldTypeDouble
+ Class of Orchards & vegetable farming area to SPU area ratio: esriFieldTypeDouble
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+ Class of Reclaimed meadows and pastures area to SPU area ratio: esriFieldTypeDouble
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+ Class of Maximum soil water retention: esriFieldTypeDouble
+ Class of Topographic Wetness Index: esriFieldTypeDouble
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+ Monthly Precipitation Variability - average intra annual variability for growing season - (pMaxMth - pMinMth)/pAvgMth [-]: esriFieldTypeDouble
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+ Value of need for water retention for improvement of water quality: esriFieldTypeDouble
+ Water yield (specific runoff) for mean flow n the multiannual period [mm]: esriFieldTypeDouble
+ Water yield (specific runoff) for low flow in the multiannual period [mm]: esriFieldTypeDouble
+ Wetland area to SPU area ratio [%]: esriFieldTypeDouble

areaOfAnalysis

area of analysis - separate catchment

Class Properties	
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Class Relationships

Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
Catchment	FieldTypeString	50	0	0	true		Catchment
FDO_OBJECTID							
FDO_SHAPE							
SHAPE	FieldTypeGeometry	0	0	0	true		SHAPE
SHAPE_Area	FieldTypeDouble	8	0	0	true		
SHAPE_Length	FieldTypeDouble	8	0	0	true		

auAdmUnitS

administrative units

Class Properties	
Stereotype:	«Polygon»

Class Relationships

Name	Origin	Origin Primary Key	Origin Card.	Target Class	Target Foreign Key	Target Card.	Origin Role (Forward Path Label)	Target Role (Backward Path Label)
relCountryCode_AdmUnitS	dicCountryCode	code	1	auAdmUnitS	id_country	0..*	dicCountryCode	auAdmUnitS

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
FDO_OBJECTID							
G18id_country							
id_country	FieldTypeString	5	0	0	true		country
id_localId	FieldTypeString	100	0	0	true		
id_nameSpace	FieldTypeString	100	0	0	true		data source
id_versionId	FieldTypeString	100	0	0	true		data source version and date
name1stOrder	FieldTypeString	150	0	0	true		Administrative Unit [1st order]
name2ndOrder	FieldTypeString	150	0	0	true		Administrative Unit [2nd order]
name3rdOrder	FieldTypeString	150	0	0	true		Administrative Unit [3rd order]
name4thOrder	FieldTypeString	150	0	0	true		Administrative Unit [4th order]
name5thOrder	FieldTypeString	150	0	0	true		Administrative Unit [5th order]
name6thOrder	FieldTypeString	150	0	0	true		Administrative Unit [6th order]
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SHAPE_Area	FieldTypeDouble	8	0	0	true		
SHAPE_Length	FieldTypeDouble	8	0	0	true		

cpParcelS

cadastral parcels

Class Properties	
Stereotype:	«Polygon»

Class Relationships

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
areaValue	FieldTypeDouble	8	0	0	true		Area value
areaValue_uom	FieldTypeString	10	0	0	true		Area value unit
FDO_OBJECTID							
id_localId	FieldTypeString	100	0	0	true		National cadastral reference number
id_nameSpace	FieldTypeString	100	0	0	true		data source
Id_versionId	FieldTypeString	100	0	0	true		data source version and date
SHAPE	FieldTypeGeometry	0	0	0	true		
SHAPE_Area	FieldTypeDouble	8	0	0	true		
SHAPE_Length	FieldTypeDouble	8	0	0	true		

dicCountryCode

country code dictionary

Class Properties	
Stereotype:	«ObjectClass»

Class Relationships

Name	Origin	Origin Primary Key	Origin Card.	Target Class	Target Foreign Key	Target Card.	Origin Role (Forward Path Label)	Target Role (Backward Path Label)
relCountryCode_AdmUnitS	dicCountryCode	code	1	auAdmUnitS	id_country	0..*	dicCountryCode	auAdmUnitS

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
code	FieldTypeString	4	0	0	false		
FDO_OBJECTID							
G15code							
name	FieldTypeString	50	0	0	false		

dicFieldAlias

alias dictionary

Class Properties	
Stereotype:	«ObjectClass»

Class Relationships

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
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cz	FieldTypeString	100	0	0	true		czech
en	FieldTypeString	100	0	0	true		english
FDO_OBJECTID							
ge	FieldTypeString	100	0	0	true		german
hrv	FieldTypeString	100	0	0	true		croatian
hu	FieldTypeString	100	0	0	true		hungerian
I3table_							
pl	FieldTypeString	100	0	0	true		polish
sk	FieldTypeString	100	0	0	true		slovakian
sl	FieldTypeString	100	0	0	true		slovenian
table_	FieldTypeString	100	0	0	true		table

dicGroupOfTips

group of tips dictionary

Class Properties	
Stereotype:	«ObjectClass»

Class Relationships

Name	Origin	Origin Primary Key	Origin Card.	Target Class	Target Foreign Key	Target Card.	Origin Role (Forward Path Label)	Target Role (Backward Path Label)
relGroupOfTips_LookupBestPlace	dicGroupOfTips	en	1	lookupBestPlace	groupOfTips	0..*	dicGroupOfTips	lookupBestPlace

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
cz	FieldTypeString	100	0	0	true		czech
de	FieldTypeString	100	0	0	true		german
en	FieldTypeString	100	0	0	false		english
FDO_OBJECTID							
hrv	FieldTypeString	100	0	0	true		croatian
hu	FieldTypeString	100	0	0	true		hungarian
I10en							
pl	FieldTypeString	100	0	0	true		polish
sk	FieldTypeString	100	0	0	true		slovakian
sl	FieldTypeString	100	0	0	true		slovenian

dicHypBasinS

basin type dictionary

Class Properties	
Stereotype:	«ObjectClass»

Class Relationships

Name	Origin	Origin Primary Key	Origin Card.	Target Class	Target Foreign Key	Target Card.	Origin Role (Forward Path Label)	Target Role (Backward Path Label)
relHypBasinS	dicHypBasinS	en	1	hypBasinS	id_typeSpace	0..*	dicHypBasinS	hypBasinS

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
cz	FieldTypeString	254	0	0	true		czech
de	FieldTypeString	254	0	0	true		german
en	FieldTypeString	255	0	0	true		english
FDO_OBJECTID							
hrv	FieldTypeString	254	0	0	true		croatian
hu	FieldTypeString	254	0	0	true		hungarian
l14en							
pl	FieldTypeString	254	0	0	true		polish
sk	FieldTypeString	254	0	0	true		slovakian
sl	FieldTypeString	254	0	0	true		slovenian

dicHypSurfaceWater

surface water type dictionary

Class Properties	
Stereotype:	«ObjectClass»

Class Relationships

Name	Origin	Origin Primary Key	Origin Card.	Target Class	Target Foreign Key	Target Card.	Origin Role (Forward Path Label)	Target Role (Backward Path Label)
relHypSurfaceWaterBodyL	dicHypSurfaceWater	en	1	hypSurfaceWaterL	id_typeSpace	0..*	dicHypSurfaceWater	hypSurfaceWaterL
relHypSurfaceWaterBodyS	dicHypSurfaceWater	en	1	hypSurfaceWaterS	id_typeSpace	0..*	dicHypSurfaceWater	hypSurfaceWaterS

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
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de	FieldTypeString	100	0	0	true		german
en	FieldTypeString	25	0	0	false		english
FDO_OBJECTID							
hrv	FieldTypeString	100	0	0	true		croatian
hu	FieldTypeString	100	0	0	true		hungarian
I12en							
pl	FieldTypeString	100	0	0	true		polish
sk	FieldTypeString	100	0	0	true		slovakian
sl	FieldTypeString	100	0	0	true		slovenian

dicLandUse

landuse dictionary

Class Properties	
Stereotype:	«ObjectClass»

Class Relationships

Name	Origin	Origin Primary Key	Origin Card.	Target Class	Target Foreign Key	Target Card.	Origin Role (Forward Path Label)	Target Role (Backward Path Label)
relLandUseS	dicLandUse	en	1	landUseS	enName	0..*	dicLandUse	landUseS

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
code							
code	FieldTypeString	4	0	0	true		code
cz	FieldTypeString	254	0	0	true		czech
de	FieldTypeString	254	0	0	true		german
en	FieldTypeString	254	0	0	true		english
FDO_OBJECTID							
hrv	FieldTypeString	254	0	0	true		croatian
hu	FieldTypeString	254	0	0	true		hungarian
I4en							
pl	FieldTypeString	254	0	0	true		polish
sk	FieldTypeString	254	0	0	true		slovakian

Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
sl	FieldTypeString	254	0	0	true		slovenian

dicNSWRM

N(S)WRM dictionary

Class Properties	
Stereotype:	«ObjectClass»

Class Relationships								
Name	**Origin**	**Origin Primary Key**	**Origin Card.**	**Target Class**	**Target Foreign Key**	**Target Card.**	**Origin Role** (Forward Path Label)	**Target Role** (Backward Path Label)
relHarvestNSWRM	dicNSWRM	id_NSWRM	1	harvestNSWRM	id_NSWRM	0..*	dicNSWRM	harvestNSWRM
relNSWRM_LookupBestPlace	dicNSWRM	id_NSWRM	1	lookupBestPlace	id_NSWRM	0..*	dicNSWRM	lookupBestPlace
relNSWRM_LookupCost	dicNSWRM	id_NSWRM	1	lookupCost	id_NSWRM	0..*	dicNSWRM	lookupCost
relNSWRM_LookupLaw	dicNSWRM	id_NSWRM	1	lookupLaw	id_NSWRM	0..*	dicNSWRM	lookupLaw

Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
cz	FieldTypeString	254	0	0	true		czech
de	FieldTypeString	254	0	0	true		german
en	FieldTypeString	254	0	0	true		english
FDO_OBJECTID							
G5id_NSWRM							
hrv	FieldTypeString	254	0	0	true		croatian
hu	FieldTypeString	254	0	0	true		hungarian
I5en							
id_NSWRM	FieldTypeString	10	0	0	true		code
pl	FieldTypeString	254	0	0	true		polish
sk	FieldTypeString	254	0	0	true		slovenian
sv	FieldTypeString	254	0	0	true		slovakian

dicNameSpace

name space / data source

Class Properties	
Stereotype:	«ObjectClass»

Class Relationships

Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
en	FieldTypeString	255	0	0	true		namespace
FDO_OBJECTID							
I8en							
URL	FieldTypeString	255	0	0	true		URL

dicPsSite

protected site type dictionary

Class Properties	
Stereotype:	«ObjectClass»

Class Relationships								
Name	**Origin**	**Origin Primary Key**	**Origin Card.**	**Target Class**	**Target Foreign Key**	**Target Card.**	**Origin Role** (Forward Path Label)	**Target Role** (Backward Path Label)
relPsSiteS	dicPsSite	en	1	psSiteS	id_typeSpace	0..*	dicPsSite	psSiteS
relPsSiteP	dicPsSite	en	1	psSiteP	id_typeSpace	0..*	dicPsSite	psSiteP

Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
cz	FieldTypeString	50	0	0	true		czech
de	FieldTypeString	50	0	0	true		german

Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
en	FieldTypeString	25	0	0	false		english
FDO_OBJECTID							
hrv	FieldTypeString	50	0	0	true		croatian
hu	FieldTypeString	50	0	0	true		hungarian
I13en							
pl	FieldTypeString	50	0	0	true		polish
sk	FieldTypeString	50	0	0	true		slovenian
sl	FieldTypeString	50	0	0	true		slovakian

dicWfdSurfaceWaterBody

WFD surface water body type dictionary

Class Properties	
Stereotype:	«ObjectClass»

Class Relationships								
Name	**Origin**	**Origin Primary Key**	**Origin Card.**	**Target Class**	**Target Foreign Key**	**Target Card.**	**Origin Role** (Forward Path Label)	**Target Role** (Backward Path Label)
relWfdSurfaceWaterBodyL	dicWfdSurfaceWaterBody	en	1	wfdSurfaceWaterBodyL	id_typeSpace	0..*	dicWfdSurfaceWaterBody	wfdSurfaceWaterBodyL
relWfdSurfaceWaterBodyS	dicWfdSurfaceWaterBody	en	1	wfdSurfaceWaterBodyS	id_typeSpace	0..*	dicWfdSurfaceWaterBody	wfdSurfaceWaterBodyS

Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
cz	FieldTypeString	50	0	0	true		czech
de	FieldTypeString	50	0	0	true		german
en	FieldTypeString	25	0	0	false		english
FDO_OBJECTID							
hrv	FieldTypeString	50	0	0	true		croatian
hu	FieldTypeString	50	0	0	true		hungarian
I11en							
pl	FieldTypeString	50	0	0	true		polish
sk	FieldTypeString	50	0	0	true		slovenian
sl	FieldTypeString	50	0	0	true		slovakian

harvestNSWRM

Harvested NSWRM by planner

Class Properties	
Stereotype:	«Polygon»

Class Relationships								
Name	**Origin**	**Origin Primary Key**	**Origin Card.**	**Target Class**	**Target Foreign Key**	**Target Card.**	**Origin Role** (Forward Path Label)	**Target Role** (Backward Path Label)
relHarvestNSWRM	dicNSWRM	id_NSWRM	1	harvestNSWRM	id_NSWRM	0..*	dicNSWRM	harvestNSWRM

Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
DataSoruce	FieldTypeString	255	0	0	true		Data soruce (Instytution, Plan)
depth_m	FieldTypeDouble	8	0	0	true		depth [m]
e_mail	FieldTypeString	255	0	0	true		
FDO_OBJECTID							
G28id_NSWRM							
height_m	FieldTypeDouble	8	0	0	true		height [m]
id_NSWRM	FieldTypeString	10	0	0	true		id_NSWRM
ImactArea_m2	FieldTypeDouble	8	0	0	true		Impact Area of measure[m2]
lenght_m	FieldTypeDouble	8	0	0	true		Lenght [m]
modificationDate	FieldTypeDate	8	0	0	true		
SHAPE	FieldTypeGeometry	0	0	0	true		
SHAPE_Area	FieldTypeDouble	8	0	0	true		
SHAPE_Length	FieldTypeDouble	8	0	0	true		

hypBasinS

river or drainage basin

Class Properties	
Stereotype:	«Polygon»

Class Relationships

Name	Origin	Origin Primary Key	Origin Card.	Target Class	Target Foreign Key	Target Card.	Origin Role (Forward Path Label)	Target Role (Backward Path Label)
relHypBasinS	dicHypBasinS	en	1	hypBasinS	id_typeSpace	0..*	dicHypBasinS	hypBasinS

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
FDO_OBJECTID							
G19id_typeSpace							
id_localId	FieldTypeString	100	0	0	true		national id
id_nameSpace	FieldTypeString	100	0	0	true		data source
id_typeSpace	FieldTypeString	50	0	0	false		Subtype discriminator (hypDrainageBasin, hypRiverBasin)
id_versionId	FieldTypeString	100	0	0	true		data source version
localName	FieldTypeString	255	0	0	true		
SHAPE	FieldTypeGeometry	0	0	0	true		SHAPE
SHAPE_Area	FieldTypeDouble	8	0	0	true		
SHAPE_Length	FieldTypeDouble	8	0	0	true		

hypSurfaceWaterL

rivers or lake course

Class Properties

Stereotype:	«Polyline»

Class Relationships

Name	Origin	Origin Primary Key	Origin Card.	Target Class	Target Foreign Key	Target Card.	Origin Role (Forward Path Label)	Target Role (Backward Path Label)
relHypSurfaceWaterBodyL	dicHypSurfaceWater	en	1	hypSurfaceWaterL	id_typeSpace	0..*	dicHypSurfaceWater	hypSurfaceWaterL

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
FDO_OBJECTID							
G21id_typeSpace							
id_localId	FieldTypeString	100	0	0	true		national id
id_nameSpace	FieldTypeString	100	0	0	true		data source
id_typeSpace	FieldTypeString	50	0	0	false		Subtype discriminator (hypStandingWater, hypWatercourse)
id_versionId	FieldTypeString	100	0	0	true		data source version
localName	FieldTypeString	255	0	0	true		national name
SHAPE	FieldTypeGeometry	0	0	0	true		SHAPE
SHAPE_Length	FieldTypeDouble	8	0	0	true		
swHMQ	FieldTypeDouble	8	0	0	true		Flow swHMQ [m3/s]
swLMQ	FieldTypeDouble	8	0	0	true		Flow swLMQ [m3/s]
swMHQ	FieldTypeDouble	8	0	0	true		Flow swMHQ [m3/s]
swMLQ	FieldTypeDouble	8	0	0	true		Flow swMLQ [m3/s]
swMMQ	FieldTypeDouble	8	0	0	true		Flow swMMQ [m3/s]

hypSurfaceWaterS

river or lake surface

Class Properties	
Stereotype:	«Polygon»

Class Relationships

Name	Origin	Origin Primary Key	Origin Card.	Target Class	Target Foreign Key	Target Card.	Origin Role (Forward Path Label)	Target Role (Backward Path Label)
relHypSurfaceWaterBodyS	dicHypSurfaceWater	en	1	hypSurfaceWaterS	id_typeSpace	0..*	dicHypSurfaceWater	hypSurfaceWaterS

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
FDO_OBJECTID							
G22id_nameSpace							
G22id_typeSpace							
id_localId	FieldTypeString	100	0	0	true		national hydrography Id
id_nameSpace	FieldTypeString	100	0	0	true		data source
id_typeSpace	FieldTypeString	50	0	0	false		Subtype discriminator (hypStandingWater, hypWatercourse)
id_versionId	FieldTypeString	150	0	0	true		data source version
localName	FieldTypeString	255	0	0	true		national name
SHAPE	FieldTypeGeometry	0	0	0	true		SHAPE
SHAPE_Area	FieldTypeDouble	8	0	0	true		
SHAPE_Length	FieldTypeDouble	8	0	0	true		

landUseS

landuse

Class Properties	
Stereotype:	«Polygon»

Class Relationships

Name	Origin	Origin Primary Key	Origin Card.	Target Class	Target Foreign Key	Target Card.	Origin Role (Forward Path Label)	Target Role (Backward Path Label)
relLandUseS	dicLandUse	en	1	landUseS	enName	0..*	dicLandUse	landUseS

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
enName	FieldTypeString	2147483647	0	0	true		Name (english as id for rest language)
enName_1							
FDO_OBJECTID							
id_localId	FieldTypeString	100	0	0	true		
id_nameSpace	FieldTypeString	100	0	0	true		data source
id_versionId	FieldTypeString	100	0	0	true		data source version
SHAPE	FieldTypeGeometry	0	0	0	true		
SHAPE_Area	FieldTypeDouble	8	0	0	true		
SHAPE_Length	FieldTypeDouble	8	0	0	true		

lookupBestPlace

The best place for NSWRM

Class Properties	
Stereotype:	«ObjectClass»

Class Relationships

Name	Origin	Origin Primary Key	Origin Card.	Target Class	Target Foreign Key	Target Card.	Origin Role (Forward Path Label)	Target Role (Backward Path Label)
relGroupOfTips_LookupBestPlace	dicGroupOfTips	en	1	lookupBestPlace	groupOfTips	0..*	dicGroupOfTips	lookupBestPlace
relNSWRM_LookupBestPlace	dicNSWRM	id_NSWRM	1	lookupBestPlace	id_NSWRM	0..*	dicNSWRM	lookupBestPlace

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
FDO_OBJECTID							
G9groupOfTips							
G9id_NSWRM							
groupOfTips	FieldTypeString	100	0	0	true		sector, planedScale, dynamicImpact, landForm, soilPermeability
id_NSWRM	FieldTypeString	5	0	0	true		id_NSWRM
tips	FieldTypeString	100	0	0	true		tips value

lookupCost

lookup tabel NSWRM and cost

Class Properties

Class Properties	
Stereotype:	«ObjectClass»

Class Relationships								
Name	**Origin**	**Origin Primary Key**	**Origin Card.**	**Target Class**	**Target Foreign Key**	**Target Card.**	**Origin Role** (Forward Path Label)	**Target Role** (Backward Path Label)
relNSWRM_LookupCost	dicNSWRM	id_NSWRM	1	lookupCost	id_NSWRM	0..*	dicNSWRM	lookupCost

Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
costOneUnit	FieldTypeDouble	8	0	0	true		costOneUnit
country	FieldTypeString	50	0	0	true		country
currency_	FieldTypeString	5	0	0	true		currency
FDO_OBJECTID							
G6id_NSWRM							
id_NSWRM	FieldTypeString	10	0	0	true		id_NSWRM
unitName	FieldTypeString	50	0	0	true		unit

lookupLaw

procedure for obtaining permits

Class Properties	
Stereotype:	«ObjectClass»

Class Relationships								
Name	**Origin**	**Origin Primary Key**	**Origin Card.**	**Target Class**	**Target Foreign Key**	**Target Card.**	**Origin Role** (Forward Path Label)	**Target Role** (Backward Path Label)
relNSWRM_LookupLaw	dicNSWRM	id_NSWRM	1	lookupLaw	id_NSWRM	0..*	dicNSWRM	lookupLaw

Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
country	FieldTypeString	50	0	0	true		country
FDO_OBJECTID							
G7id_NSWRM							
id_NSWRM	FieldTypeString	10	0	0	true		id_NSWRM
namePermission	FieldTypeString	255	0	0	true		namePermission
sizeNSWRMneedPermission	FieldTypeDouble	8	0	0	true		Size of NSWRM which need low permission for inwestment
sizeUnit	FieldTypeString	5	0	0	true		namePermission

potentialForWaterRetention

Potential for water retention - Valorisation map form FroGIS

Class Properties	
Stereotype:	«Polygon»

Class Relationships

Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
cArableRatio	FieldTypeDouble	8	0	0	true		Class of Arable area in SPU area ratio
cBFI	FieldTypeDouble	8	0	0	true		Class of Base Flow Index
cCWB	FieldTypeDouble	8	0	0	true		Class of Climatic Water Balance
cDrainageD	FieldTypeDouble	8	0	0	true		Class of Drainage Density
cDrought	FieldTypeDouble	8	0	0	true		Class of need for water retention for mitigation of drought
cEcoAraBuf20mRatio	FieldTypeDouble	8	0	0	true		Class of Arable lands in 20-meters buffer around surface waters area to SPU area ratio
cEcoAreaRatio	FieldTypeDouble	8	0	0	true		Class of Semi-natural land cover types area to SPU area ratio
cEcoBadRHS	FieldTypeDouble	8	0	0	true		Class of Bad morphological elements length to total length of river in SPU Class of Bad morphological elements length to total length of river in SPU
cEcoCombined	FieldTypeDouble	8	0	0	true		Class of Combination of number of semi-natural land cover patches and their area
cEcoNumRatio	FieldTypeDouble	8	0	0	true		Class of Number of semi-natural land cover patches to total number of land cover patches in SPU
cFlood	FieldTypeDouble	8	0	0	true		Class of need for water retention for mitigation of flood
cFloodRiskAreaRatio	FieldTypeDouble	8	0	0	true		Class of Flood hazard zone area ratio
cFlowMaxAvgRatio	FieldTypeDouble	8	0	0	true		Class of Ratio of high low flow to mean flow in the multiannual period
cFlowMinAvgRatio	FieldTypeDouble	8	0	0	true		Class of Mean low flow to mean flow ratio
cFlowMinMaxRatio	FieldTypeDouble	8	0	0	true		Class of Mean low flow to mean high flow ratio
cFlowVarRatio_m	FieldTypeDouble	8	0	0	true		Class of Low mean flow to hight mean flow ratio
cForestRatio	FieldTypeDouble	8	0	0	true		Class of Forested area to SPU area ratio
cGeneral	FieldTypeDouble	8	0	0	true		Calss of need for water retention for general purpose
cGraniteRatio	FieldTypeDouble	8	0	0	true		Class of Granitic bedrock area in SPU area ratio

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
cGRR	FieldTypeDouble	8	0	0	true		Class of Groundwater Renewable Resources Module
cLakeCatchRatio	FieldTypeDouble	8	0	0	true		Class of Lake catchment area to SPU area ratio
cLakeRatio	FieldTypeDouble	8	0	0	true		Class of Lakes and reservoirs area to SPU area ratio
cLandSlope	FieldTypeDouble	8	0	0	true		Class of Slope of land area
cMeanderRatio	FieldTypeDouble	8	0	0	true		Class of Ratio of simplify main stream length to natural length of main stream
cNonForestedRatio	FieldTypeDouble	8	0	0	true		Class of Non forested area with a slope above 5% to SPU area ratio
cOrchVegRatio	FieldTypeDouble	8	0	0	true		Class of Orchards & vegetable farming area to SPU area ratio
cPre_Var_a	FieldTypeDouble	8	0	0	true		Class of Monthly Precipitation Variability - average intra annual variability for growing season - (pMaxMth - pMinMth)/pAvgMth
cPre_Var_m	FieldTypeDouble	8	0	0	true		Class of Growing Season Precipitation Variability for the multiannual period [pMin]/[P]
cPrecFreqLow75	FieldTypeDouble	8	0	0	true		Class of Frequency of precipitation lower than 75% of the multiannual average (in the growing season)
cRainFallErodibility	FieldTypeDouble	8	0	0	true		Class of Rainfall erodibility factor
cReclaimedRatio	FieldTypeDouble	8	0	0	true		Class of Reclaimed meadows and pastures area to SPU area ratio
cRiverSlope	FieldTypeDouble	8	0	0	true		Class of Slope of river
cSediment	FieldTypeDouble	8	0	0	true		Class of need for water retention for mitigation of sediment transport
cSoilErodibility	FieldTypeDouble	8	0	0	true		Class of Universal soil loss equation factor
cSRI	FieldTypeDouble	8	0	0	true		Class of Surface Runoff Index
cSWR	FieldTypeDouble	8	0	0	true		Class of Maximum soil water retention
cTWI	FieldTypeDouble	8	0	0	true		Class of Topographic Wetness Index
cUrbanRatio	FieldTypeDouble	8	0	0	true		Class of Urban area to SPU area ratio
cWaterQuality	FieldTypeDouble	8	0	0	true		Calss of need for water retention for improvement of water quality
cWaterYieldAvgFlow	FieldTypeDouble	8	0	0	true		Class of Water yield (specific runoff) for mean flow n

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
							the multiannual period
cWaterYieldMinFlow	FieldTypeDouble	8	0	0	true		Class of Water yield (specific runoff) for low flow in the multiannual period
cWetlandRatio	FieldTypeDouble	8	0	0	true		Class of Wetland area to SPU area ratio
FDO_OBJECTID							
id_localId	FieldTypeString	100	0	0	true		localId
id_nameSpace	FieldTypeString	100	0	0	true		data source
id_versionId	FieldTypeString	100	0	0	true		data source version and date
SHAPE	FieldTypeGeometry	0	0	0	true		
SHAPE_Area	FieldTypeDouble	8	0	0	true		
SHAPE_Length	FieldTypeDouble	8	0	0	true		
vArableRatio	FieldTypeDouble	8	0	0	true		Arable area in SPU area ratio [%]
vBFI	FieldTypeDouble	8	0	0	true		Base Flow Index [-]
vCWB	FieldTypeDouble	8	0	0	true		Climatic Water Balance [mm]
vDrainageD	FieldTypeDouble	8	0	0	true		Drainage Density [km/km2]
vDrought	FieldTypeDouble	8	0	0	true		Value of need for water retention for mitigation of drought
vEcoAraBuf20mRatio	FieldTypeDouble	8	0	0	true		Arable lands in 20-meters buffer around surface waters area to SPU area ratio [%]
vEcoAreaRatio	FieldTypeDouble	8	0	0	true		Semi-natural land cover types area to SPU area ratio [%]
vEcoBadRHS	FieldTypeDouble	8	0	0	true		Bad morphological elements length to total length of river in SPU [%]
vEcoCombined	FieldTypeDouble	8	0	0	true		Combination of number of semi-natural land cover patches and their area [-]
vEcoNumRatio	FieldTypeDouble	8	0	0	true		Number of semi-natural land cover patches to total number of land cover patches in SPU [%]
vFlood	FieldTypeDouble	8	0	0	true		Value of need for water retention for mitigation of flood
vFloodRiskAreaRatio	FieldTypeDouble	8	0	0	true		Flood hazard zone area ratio [%]

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
vFlowMaxAvgRatio	FieldTypeDouble	8	0	0	true		Ratio of high low flow to mean flow in the multiannual period [-]
vFlowMinAvgRatio	FieldTypeDouble	8	0	0	true		Mean low flow to mean flow ratio [-]
vFlowMinMaxRatio	FieldTypeDouble	8	0	0	true		Mean low flow to mean high flow ratio [-]
vFlowVarRatio_m	FieldTypeDouble	8	0	0	true		Low mean flow to hight mean flow ratio [-]
vForestRatio	FieldTypeDouble	8	0	0	true		Forested area to SPU area ratio [%]
vGeneral	FieldTypeDouble	8	0	0	true		Value of need for water retention for general purpose
vGraniteRatio	FieldTypeDouble	8	0	0	true		Granitic bedrock area in SPU area ratio [%]
vGRR	FieldTypeDouble	8	0	0	true		Groundwater Renewable Resources Module [mm]
vLakeCatchRatio	FieldTypeDouble	8	0	0	true		Lake catchment area to SPU area ratio [%]
vLakeRatio	FieldTypeDouble	8	0	0	true		
vLandSlope	FieldTypeDouble	8	0	0	true		Slope of land area [deg]
vMeanderRatio	FieldTypeDouble	8	0	0	true		Ratio of simplify main stream length to natural length of main stream [%]
vNonForestedRatio	FieldTypeDouble	8	0	0	true		Non forested area with a slope above 5% to SPU area ratio [%]
vOrchVegRatio	FieldTypeDouble	8	0	0	true		Orchards & vegetable farming area to SPU area ratio [%]
vPre_Var_a	FieldTypeDouble	8	0	0	true		Monthly Precipitation Variability - average intra annual variability for growing season - (pMaxMth - pMinMth)/pAvgMth [-]
vPre_Var_m	FieldTypeDouble	8	0	0	true		Growing Season Precipitation Variability for the multiannual period [pMin]/[P] [-]
vPrecFreqLow75	FieldTypeDouble	8	0	0	true		Frequency of precipitation lower than 75% of the multiannual average (in the growing season) [-]
vRainFallErodibility	FieldTypeDouble	8	0	0	true		Rainfall erodibility factor [(MJ mm) / (ha hr y)]
vReclaimedRatio	FieldTypeDouble	8	0	0	true		Reclaimed meadows and pastures area to SPU area ratio [%]
vRiverSlope	FieldTypeDouble	8	0	0	true		Slope of river [%]
vSediment	FieldTypeDouble	8	0	0	true		Value of need for water retention for mitigation of sediment transport

Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
vSoilErodibility	FieldTypeDouble	8	0	0	true		Universal soil loss equation factor [(t ha hr) / (MJ ha mm)]
vSRI	FieldTypeDouble	8	0	0	true		Surface Runoff Index [-]
vSWR	FieldTypeDouble	8	0	0	true		Maximum soil water retention [mm]
vTWI	FieldTypeDouble	8	0	0	true		Topographic Wetness Index [-]
vUrbanRatio	FieldTypeDouble	8	0	0	true		Urban area to SPU area ratio [%]
vWaterQuality	FieldTypeDouble	8	0	0	true		Value of need for water retention for improvement of water quality
vWaterYieldAvgFlow	FieldTypeDouble	8	0	0	true		Water yield (specific runoff) for mean flow n the multiannual period [mm]
vWaterYieldMinFlow	FieldTypeDouble	8	0	0	true		Water yield (specific runoff) for low flow in the multiannual period [mm]
vWetlandRatio	FieldTypeDouble	8	0	0	true		Wetland area to SPU area ratio [%]

psSiteP

psSiteP

Class Properties	
Stereotype:	«Multipoint»

Class Relationships								
Name	**Origin**	**Origin Primary Key**	**Origin Card.**	**Target Class**	**Target Foreign Key**	**Target Card.**	**Origin Role** (Forward Path Label)	**Target Role** (Backward Path Label)
relPsSiteP	dicPsSite	en	1	psSiteP	id_typeSpace	0..*	dicPsSite	psSiteP

Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
FDO_OBJECTID							
GDB_63_id_typeSpace							
id_localId	FieldTypeString	100	0	0	true		national id
id_nameSpace	FieldTypeString	100	0	0	true		data source
id_typeSpace	FieldTypeString	50	0	0	false		Sub type (natural cultura mix)
id_versionId	FieldTypeString	100	0	0	true		data source verion and date
localName	FieldTypeString	255	0	0	true		national name
protClass	FieldTypeString	255	0	0	true		Type of protect area
SHAPE	FieldTypeGeometry	0	0	0	true		

psSiteS

protected site surface

Class Properties	
Stereotype:	«Polygon»

Class Relationships								
Name	**Origin**	**Origin Primary Key**	**Origin Card.**	**Target Class**	**Target Foreign Key**	**Target Card.**	**Origin Role** (Forward Path Label)	**Target Role** (Backward Path Label)
relPsSiteS	dicPsSite	en	1	psSiteS	id_typeSpace	0..*	dicPsSite	psSiteS

Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
FDO_OBJECTID							
id_localId	FieldTypeString	100	0	0	true		national id
id_nameSpace	FieldTypeString	100	0	0	true		data source
id_typeSpace	FieldTypeString	25	0	0	false		Subtype discriminator (natural, mixed, cultural)
id_versionId	FieldTypeString	100	0	0	true		data source version or date
localName	FieldTypeString	255	0	0	true		national name
protClass	FieldTypeString	255	0	0	true		protected class
SHAPE	FieldTypeGeometry	0	0	0	true		SHAPE
SHAPE_Area	FieldTypeDouble	8	0	0	true		
SHAPE_Length	FieldTypeDouble	8	0	0	true		

wfdGroundWaterBodyS

ground water body surface for WFD

Class Properties	
Stereotype:	«Polygon»

Class Relationships

Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
cYear	FieldTypeString	4	0	0	true		cYear
euGroundWaterBodyCode	FieldTypeString	50	0	0	true		
FDO_OBJECTID							
FDO_SHAPE							
gwAtRiskChemical	FieldTypeString	30	0	0	true		
gwAtRiskQuantitative	FieldTypeString	30	0	0	true		
gwChemicalStatusValue	FieldTypeString	100	0	0	true		
gwEORiskChemical	FieldTypeString	255	0	0	true		
gwEORiskQuantitative	FieldTypeString	255	0	0	true		
gwQuantitativeStatusValue	FieldTypeString	100	0	0	true		
gwSignificantImpactOther	FieldTypeString	255	0	0	true		
gwSignificantPressureOther	FieldTypeString	255	0	0	true		
id_localId	FieldTypeString	100	0	0	true		national id
id_nameSpace	FieldTypeString	100	0	0	true		data source
id_versionId	FieldTypeString	100	0	0	true		data source version and date
localName	FieldTypeString	255	0	0	true		national name
SHAPE	FieldTypeGeometry	0	0	0	true		SHAPE
SHAPE_Area	FieldTypeDouble	8	0	0	true		
SHAPE_Length	FieldTypeDouble	8	0	0	true		

wfdSurfaceWaterBodyL

surface water body line for WFD (river)

Class Properties	
Stereotype:	«Polyline»

Class Relationships

Name	Origin	Origin Primary Key	Origin Card.	Target Class	Target Foreign Key	Target Card.	Origin Role (Forward Path Label)	Target Role (Backward Path Label)
relWfdSurfaceWaterBodyL	dicWfdSurfaceWaterBody	en	1	wfdSurfaceWaterBodyL	id_typeSpace	0..*	dicWfdSurfaceWaterBody	wfdSurfaceWaterBodyL

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
cYear	FieldTypeString	4	0	0	true		
euSurfaceWaterBodyCode	FieldTypeString	50	0	0	true		
FDO_OBJECTID							
G20id_typeSpace							
id_localId	FieldTypeString	100	0	0	true		national id
id_nameSpace	FieldTypeString	100	0	0	true		data source
id_typeSpace	FieldTypeString	25	0	0	true		Subtype discriminator(wfdRiver, wfdLake, wfdCoastaWater, wfdTransitionalWater)
id_versionId	FieldTypeString	100	0	0	true		data source version and date
localName	FieldTypeString	255	0	0	true		national name
SHAPE	FieldTypeGeometry	0	0	0	true		SHAPE
SHAPE_Length	FieldTypeDouble	8	0	0	true		
surfaceWaterBodyTypeCode	FieldTypeString	50	0	0	true		
swChemicalMonitoringResults	FieldTypeString	255	0	0	true		
swChemicalStatusValue	FieldTypeString	100	0	0	true		
swEcologicalStatusOrPotentialValu	FieldTypeString	100	0	0	true		

Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
e							
swPrioritySubstanceCode	FieldTypeString	255	0	0	true		
swSignificantImpactType	FieldTypeString	255	0	0	true		
swSignificantPressureType	FieldTypeString	255	0	0	true		

wfdSurfaceWaterBodyS

surface water body surface for WFD (lake)

Class Properties	
Stereotype:	«Polygon»

Class Relationships								
Name	**Origin**	**Origin Primary Key**	**Origin Card.**	**Target Class**	**Target Foreign Key**	**Target Card.**	**Origin Role** (Forward Path Label)	**Target Role** (Backward Path Label)
relWfdSurfaceWaterBodyS	dicWfdSurfaceWaterBody	en	1	wfdSurfaceWaterBodyS	id_typeSpace	0..*	dicWfdSurfaceWaterBody	wfdSurfaceWaterBodyS

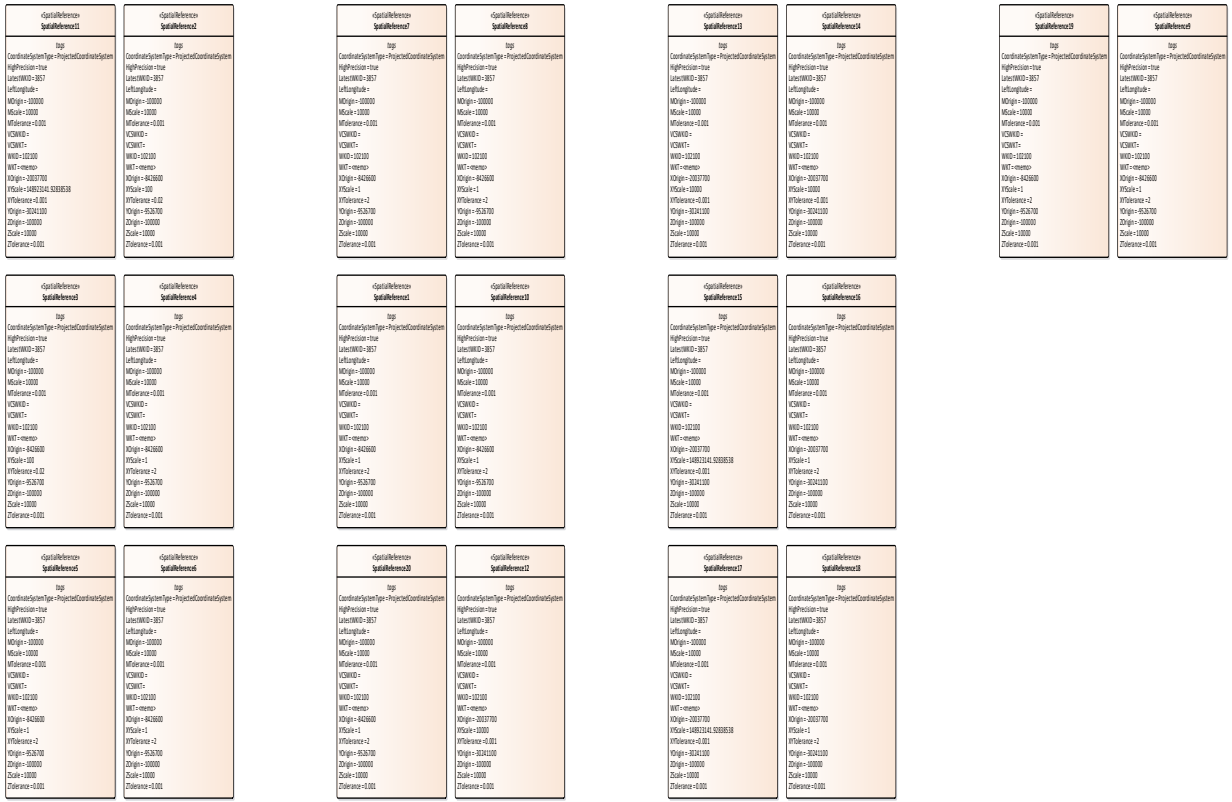
Class Attributes							
Name	**Type (or Domain)**	**Length**	**Precision**	**Scale**	**Allow Nulls**	**Default Value**	**Description**
cYear	FieldTypeString	4	0	0	true		
euSurfaceWaterBodyCode	FieldTypeString	50	0	0	true		euSurfaceWaterBodyCode
FDO_OBJECTID							

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
G25id_typeSpace							
id_localId	FieldTypeString	100	0	0	true		national id
id_nameSpace	FieldTypeString	100	0	0	true		data source
id_typeSpace	FieldTypeString	25	0	0	false		Subtype discriminator(wfdRiver, wfdLake, wfdCoastaWater, wfdTransitionalWater)
id_versionId	FieldTypeString	100	0	0	true		data source version and date
localName	FieldTypeString	2147483647	0	0	true		national name
SHAPE	FieldTypeGeometry	0	0	0	true		SHAPE
SHAPE_Area	FieldTypeDouble	8	0	0	true		
SHAPE_Length	FieldTypeDouble	8	0	0	true		
surfaceWaterBodyTypeCode	FieldTypeString	50	0	0	true		
swChemicalMonitoringResults	FieldTypeString	255	0	0	true		
swChemicalStatusValue	FieldTypeString	100	0	0	true		
swEcologicalStatusOrPotentialValue	FieldTypeString	100	0	0	true		
swPrioritySubstanceCode	FieldTypeString	255	0	0	true		
swSignificantImpactType	FieldTypeString	255	0	0	true		
swSignificantPressureType	FieldTypeString	255	0	0	true		

SpatialReferences

SpatialReferences diagram

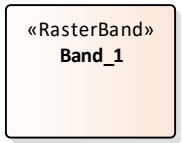


SpatialReference[1..20]

Spatial Reference Properties	
Coordinate System:	ProjectedCoordinateSystem
WKID:	EPSG: 3857

dem

dem diagram



Band_1

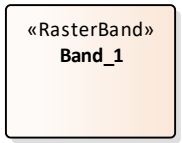
Class Properties	
Stereotype:	«RasterBand»

Class Relationships

Class Attributes

landSlope

landSlope diagram



Band_1

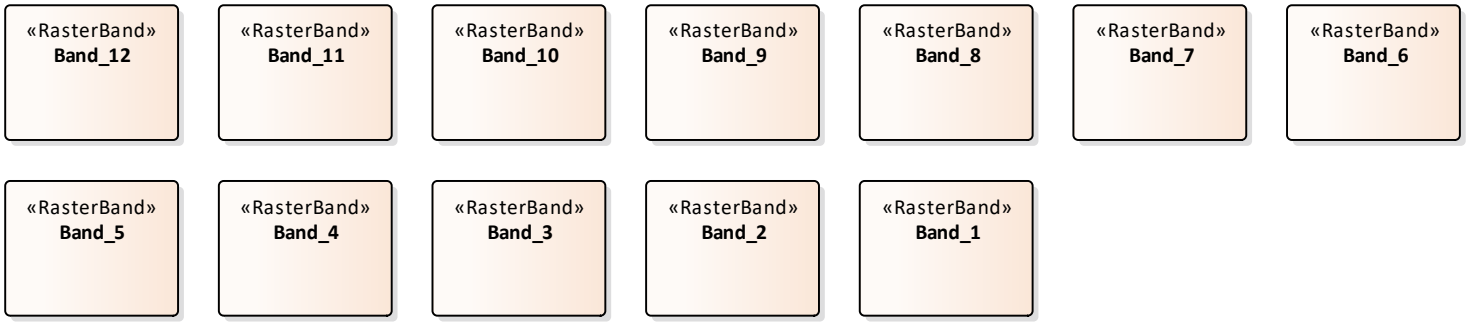
Class Properties	
Stereotype:	«RasterBand»

Class Relationships

Class Attributes

monthMeanAirTemp

monthMeanAirTemp diagram



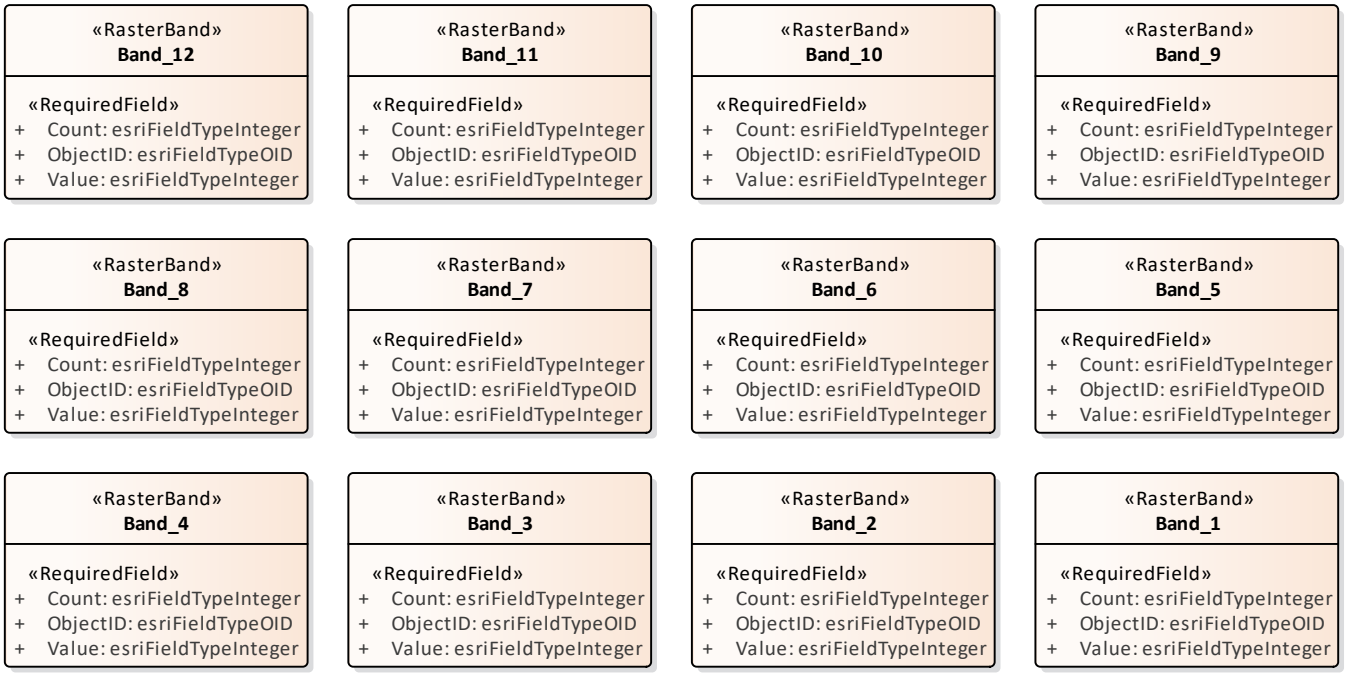
Band_[1…12]

Class Properties	
Stereotype:	«RasterBand»

Class Attributes

monthPrecipitation

monthPrecipitation diagram



Band_[1..12]

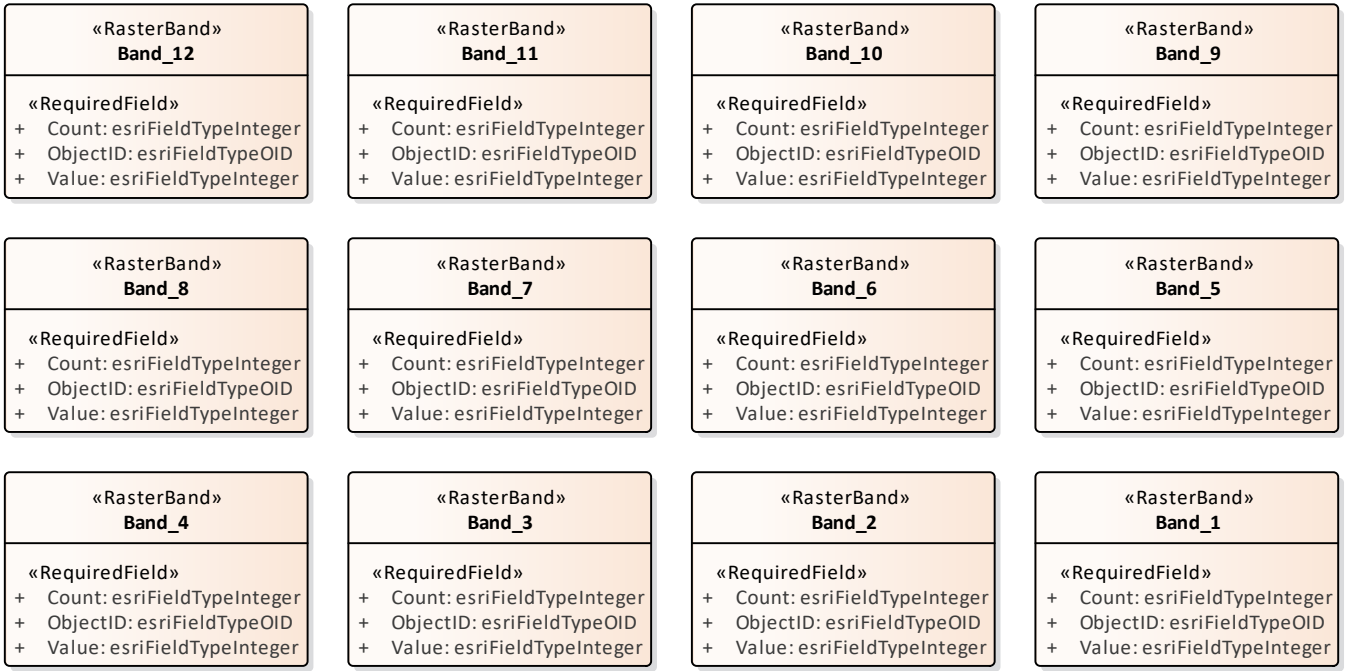
Class Properties	
Stereotype:	«RasterBand»

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
Count	FieldTypeInteger	0	0	0	true		
ObjectID	FieldTypeOID	4	0	0	false		
Value	FieldTypeInteger	0	0	0	true		

monthRunOff

monthRunOff diagram



Band_[1..12]

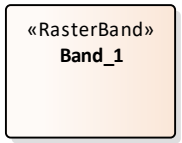
Class Properties	
Stereotype:	«RasterBand»

Class Attributes

Name	Type (or Domain)	Length	Precision	Scale	Allow Nulls	Default Value	Description
Count	FieldTypeInteger	0	0	0	true		
ObjectID	FieldTypeOID	4	0	0	false		
Value	FieldTypeInteger	0	0	0	true		

twi

twi diagram



Band_1

Class Properties	
Stereotype:	«RasterBand»

Class Attributes