

INFORMATION SYSTEMS FOR WATER RESOURCES MANAGEMENT



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72%

of all water withdrawals are used by agriculture, 16% by municipalities for households and services, and 12% by industries.



2.3

billion people live in water-stressed countries, of which 733 million live in high and critically water-stressed countries.



1.42

billion people – including 450 million children – live in areas of high or extremely high water vulnerability.





**A SIGNIFICANT CAUSE OF THESE
CHALLENGES IS CLIMATE
CHANGE.**

**NO COUNTRY—DEVELOPED OR
DEVELOPING—IS IMMUNE.**

Water is the primary vehicle through which we feel the impacts of climate change.

To effectively address both water and climate challenges,

we must bring climate change and water to the same table—into the same conversation:

Tackling them as one.

PUBLIC AND PRIVATE WATER MANAGERS NEED TO MAKE CRITICAL DECISIONS

- **for sustainable development**
- **prevention of water scarcity**
- **handling hazardous situations**
- **energy generation potential**

THE PROBLEMS

1

Difficulties decision making due to disjointed data sources

2

Increased risk of overflow or drought due to inaccurate projected water levels from traditional models

3

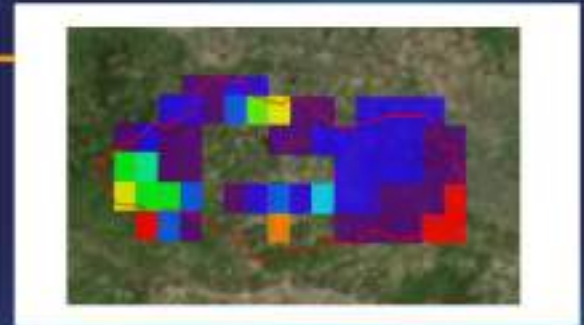
Avoidable management issues caused by lack of input data validation

4

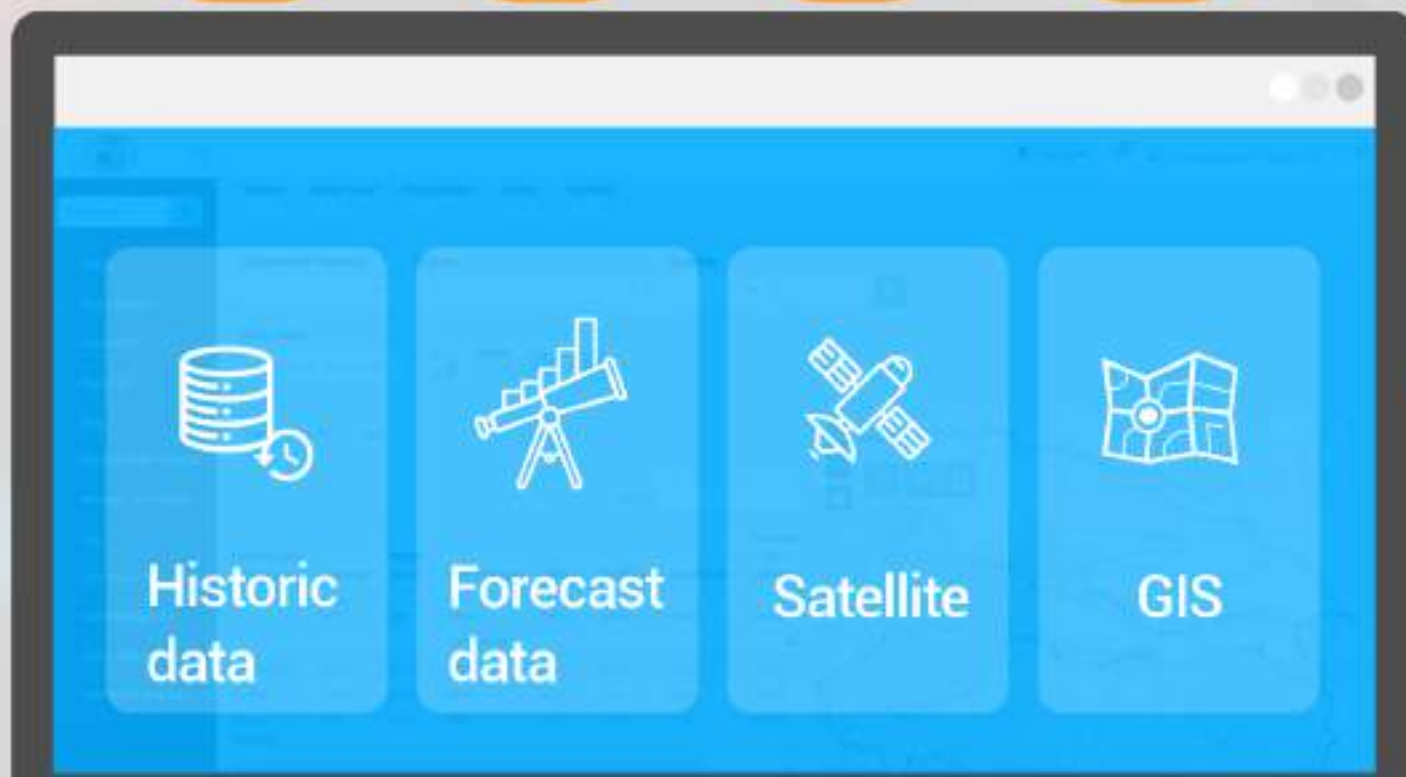
Time consuming reporting to keep management informed of the dam status



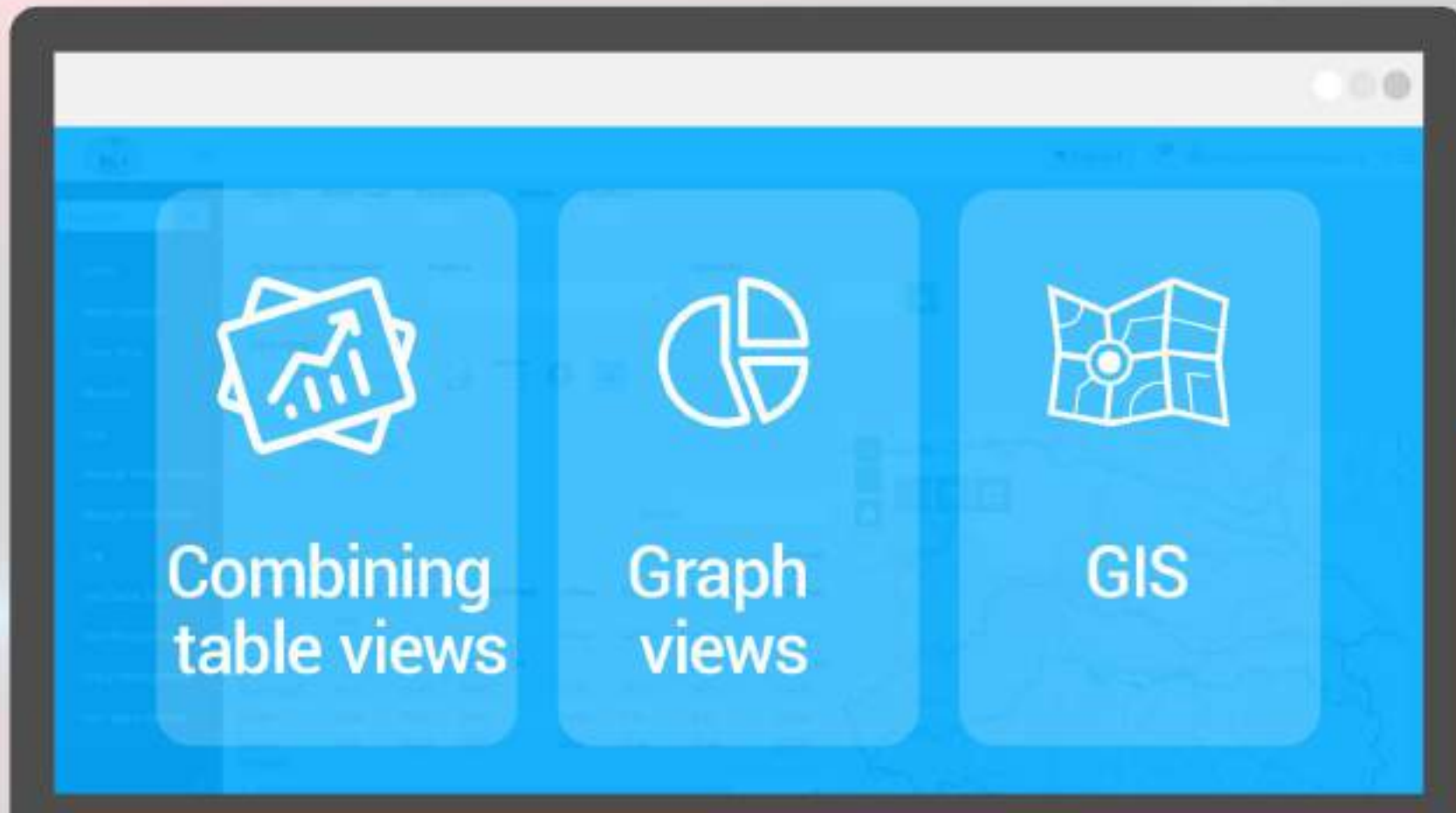
WATER RESOURCES MANAGERS DAILY RESPONSIBILITIES



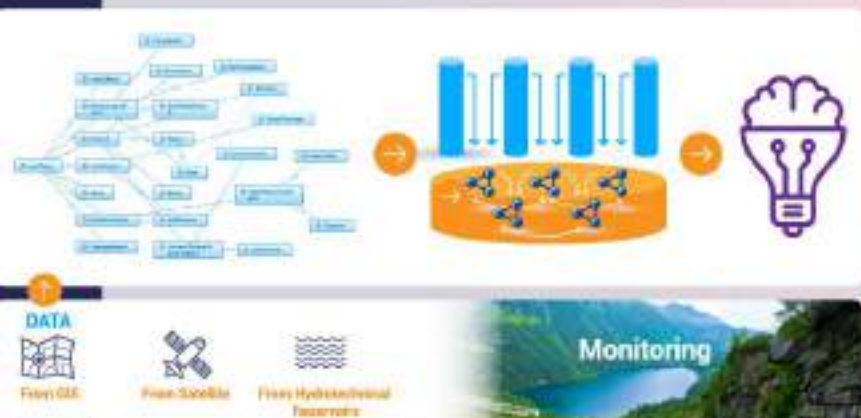
AUTOMATING ROUTINE TASKS AND DE-RISKING COMPLEX TASKS



ISME-HYDRO IMPROVES OPERATIONAL EFFICIENCY



SEMANTIC INFRASTRUCTURE FOR WATER MANAGEMENT

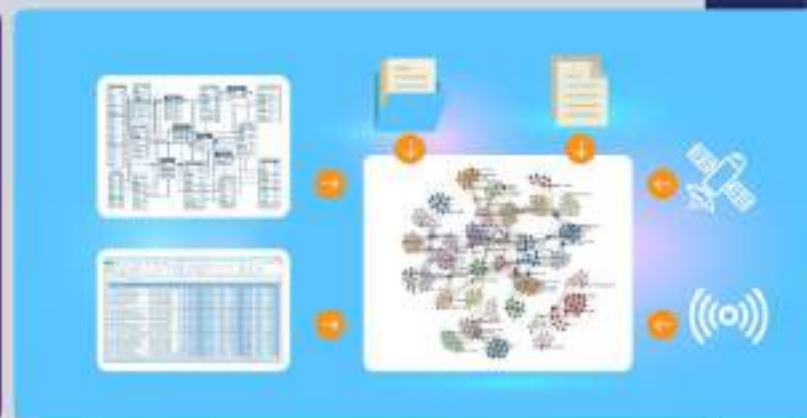


INFORMATION INFRASTRUCTURE

- Easy interlinking
- Efficient storage
- Interoperability
- Easy extendibility



NETWORK OF CONNECTED OBJECTS



NEURAL NETWORKS

METEOROLOGICAL AND ENVIRONMENTAL FACTORS



Turbidity



**Surface
reflection**



Precipitation



Snow cover



Soil moisture



Wind



**Vegetation
index**



Solar radiance



Velocity

FORECASTING METHOD – EO4GEO



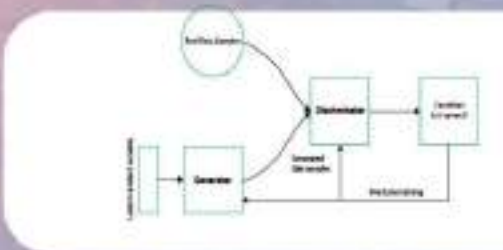
Satellite data



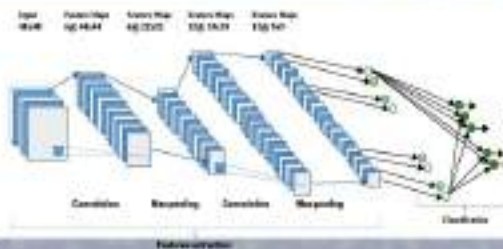
Geospatial position



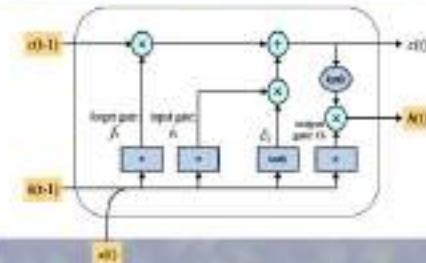
In-situ measurements



GAN



CNN



LSTM

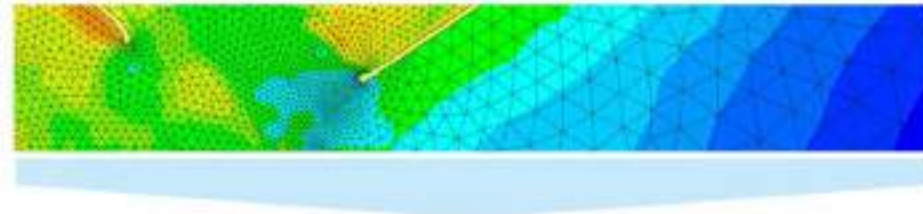
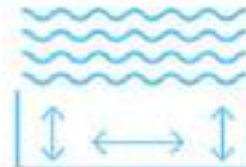
FORECAST OF RIVER DYNAMICS

Forecasted data for
river discharge

100110011001
101010101010



Bathymetry, riverbed




TELEMAC

THE APPLICATION – ISME-HYDRO

The screenshot displays the ISME-HYDRO application interface. At the top, there is a navigation bar with a logo, a hamburger menu, and user information including the language (English) and email (mariana.dimova@mozajka.cz). A left sidebar contains a search bar and a list of navigation items: Home, Water Balance, Snow Stock, About Us, Help, Manage Water Balance, Manage Snow Stock, Log, User Snow Stock, User Management, Group Management, and User Water Balance.

The main dashboard area features several interactive elements: tabs for Volume, Water Level, Precipitation, Inflow, and Outflow; a filter section for Hydropower Reservoir, Feature, and Quantity; a date range selector set to 2019/09/03 - 2019/09/03; and a view selector with Day, Month, and Year options. A search bar is also present.

Below these controls is a data table with the following structure:

Hydropower Reservoir	Volume	Water Level	Precipitation	Inflow	Outflow	Overflow	Forecast for Volume
	(mln m ³)	(m)	(mm)	(m ³ /s)	(m ³ /s)	(m ³ /s)	(mln m ³)
2019-09-03							201
Ivaylovgrad	84.31	52.04	9999	85.77	36.17	36.17	140.37
Kyrdjali	59.47	82.57	9999	66.97	8.35	8.35	381.65
Shumen Kladenec	99.7	55.88	9999	84.6	77.46	77.46	280.57

On the right side of the dashboard, there is a map showing a geographical area with a river network. The map includes a search bar and several control icons for zooming and navigation.

THE APPLICATION – ISME-HYDRO

This screenshot shows the control panel of the ISME-HYDRO application. It features a top navigation bar with tabs for 'Home', 'Dashboard', 'Reports', 'Users', and 'Admin'. Below this, there are several filter sections: 'Hydrological Station' with dropdowns for 'Station' and 'Year', and 'GIS Data' with a search bar and a 'Filter' button. A table titled 'Hydrological Station' is visible, with columns for 'Station ID', 'Name', and 'Status'. To the right, a topographic map displays the geographical layout of the stations.

Station ID	Name	Status
1001	Station 1	Active
1002	Station 2	Inactive
1003	Station 3	Active
1004	Station 4	Inactive

This screenshot displays a data table and a heatmap. The table, titled 'Hydrological Station', has columns for 'Station ID', 'Name', and 'Value'. The heatmap overlay on the map visualizes the data values across the geographical area, with colors ranging from blue (low values) to red (high values).

Station ID	Name	Value
1001	Station 1	100
1002	Station 2	200
1003	Station 3	300
1004	Station 4	400

This screenshot shows the control panel and a heatmap. It includes the same filter sections as the first screenshot. The heatmap overlay on the map visualizes the data values across the geographical area, with colors ranging from blue (low values) to red (high values).

Station ID	Name	Value
1001	Station 1	100
1002	Station 2	200
1003	Station 3	300
1004	Station 4	400



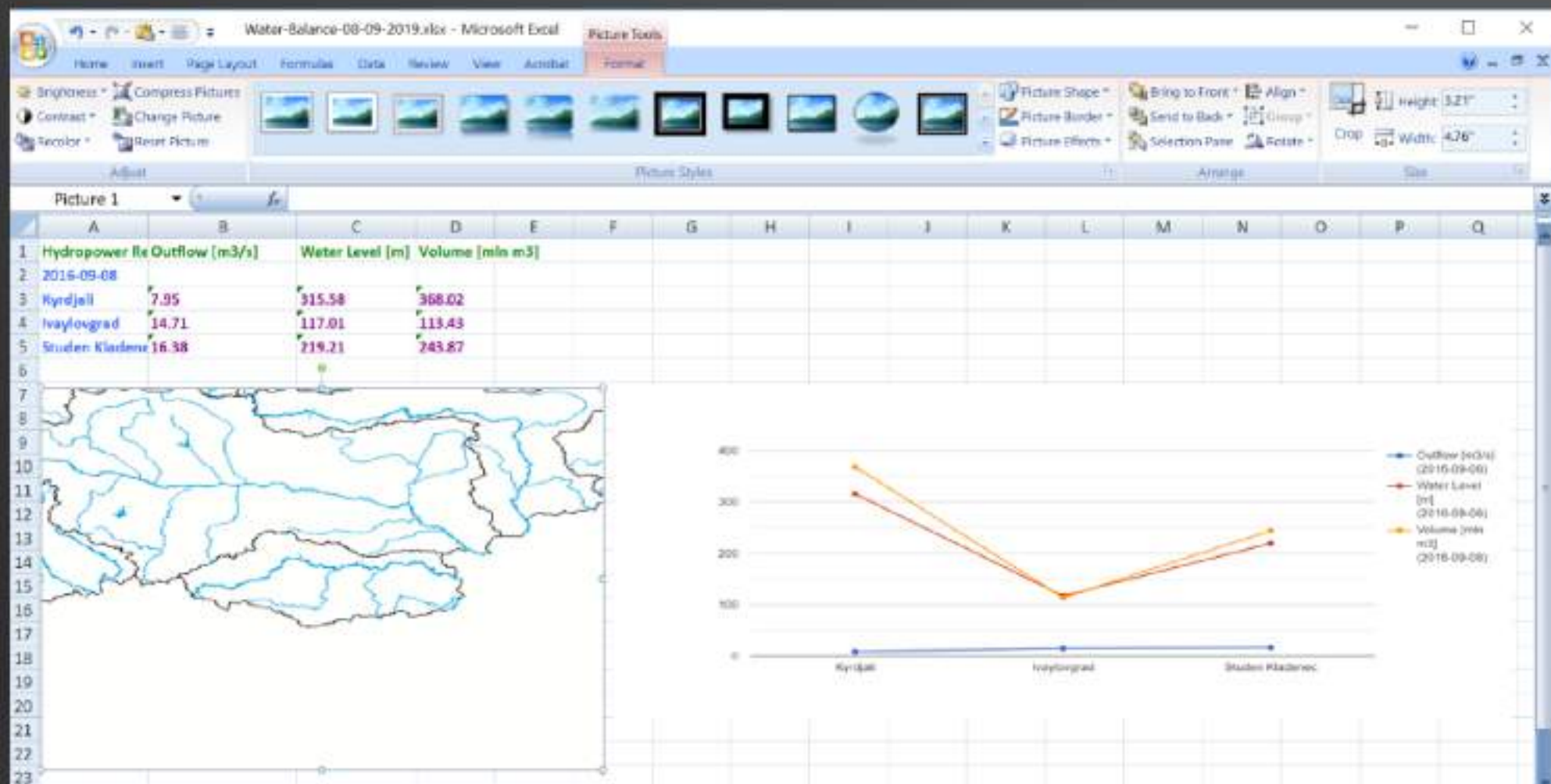
THE APPLICATION – ISME-HYDRO

The screenshot displays a web application interface with a dark sidebar on the left and a main content area. The sidebar contains a search bar and a list of navigation items: Home, Water Balance, Snow Stock, About Us, Help, Manage Water Balance, Manage Snow Stock, User Management, Group Management, Log, User Water Balance, and User Snow Stock. The main content area features a Wikipedia article titled "Arda (Maritsa tributary)". The article text states: "The Arda (Bulgarian: Арда [arda], Greek: Αρδός [ardos], Turkish: Arda [arda]) is a 230-kilometre-long (130 mi) river in Bulgaria and Greece. It is a tributary of the Maritsa (or Evros). Its source lies in the Bulgarian Rhodope Mountains near the village Arda, part of the municipality of Evrosyon. It flows eastward past Rusozem, Kardzhik and Ivaylovgrad and enters Greece in the northern part of the Evros regional unit. It flows into the Maritsa on the border of Greece and Turkey, between the Greek village Kastanika and the Turkish city Edirne. In the Bulgarian section there are three hydroelectric and irrigation dams, Kardzhik Dam, Studen Kladevets Dam." Below the text are two images: "The Arda at Velehrak, Bulgaria" and a map of the region. To the right of the article is a large map showing the Arda river basin, with labels for "BULGARIA" and "GREECE". The map includes a scale bar (0 to 50 km) and a north arrow.

RESULTS IN GRAPHVIEW



RESULTS DOWNLOADED INTO EXCEL FILE



ALERTING

The screenshot shows a web dashboard for water management. The interface includes a sidebar with navigation options, a top navigation bar with user information, and a main content area with filters and data tables. A map on the right displays a geographical area with a red warning icon indicating an overflow event.

Navigation Sidebar:

- Home
- Water Balance
- Snow Stock
- About Us
- Help
- Manage Water Balance
- Manage Snow Stock
- Log
- User Snow Stock
- User Management
- Group Management
- User Water Balance

Dashboard Filters:

- Volume, Water Level, Precipitation, Inflow, Outflow (toggle buttons)
- Hydropower Reservoir: Studen Kladevec
- Feature: Volume
- Quantity: -
- Unit: m³
- Date range: 2019-09-18 - 2019-09-20

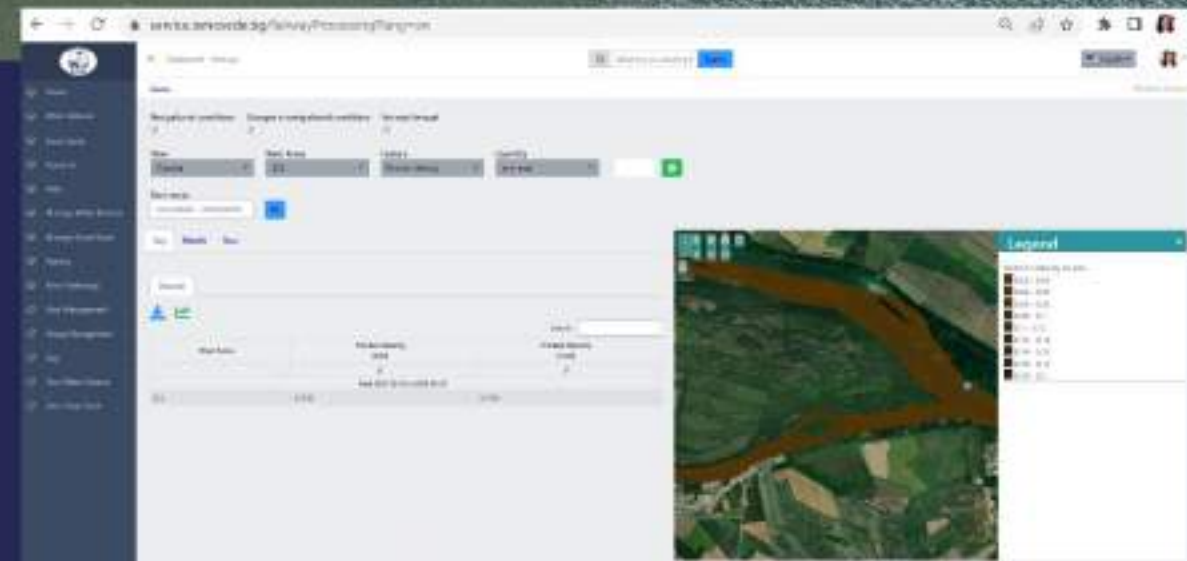
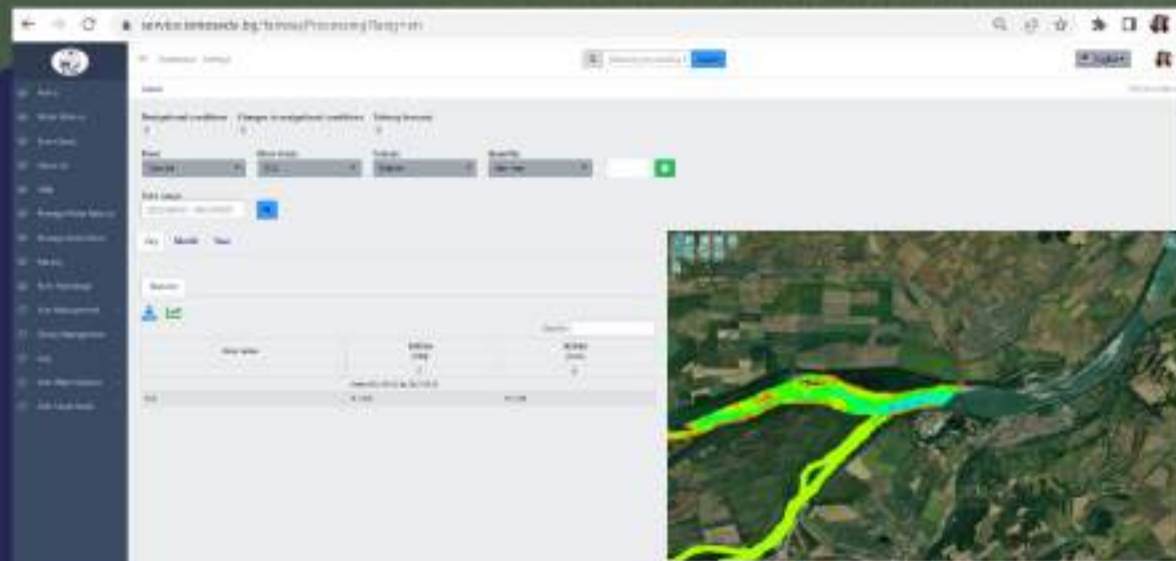
Data Table:

Hydropower Reservoir	Volume (mln. m ³)
2019-09-18	
Studen Kladevec	17.08
2019-09-19	
Studen Kladevec	23.89
2019-09-20	
Studen Kladevec	60.65

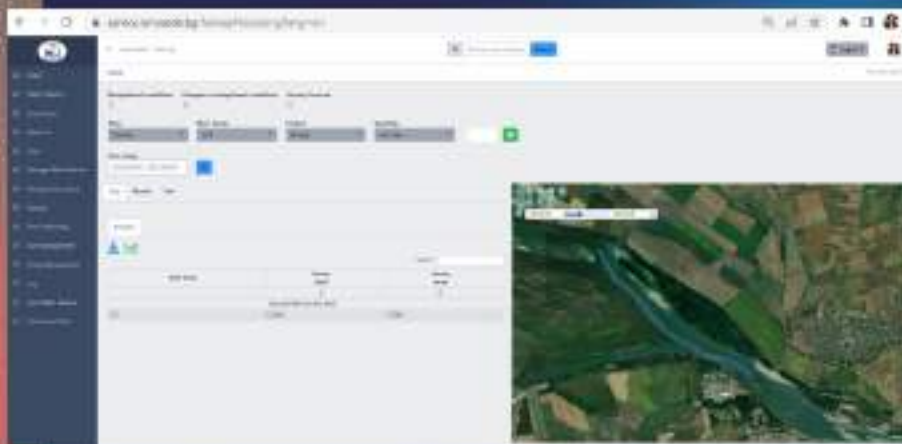
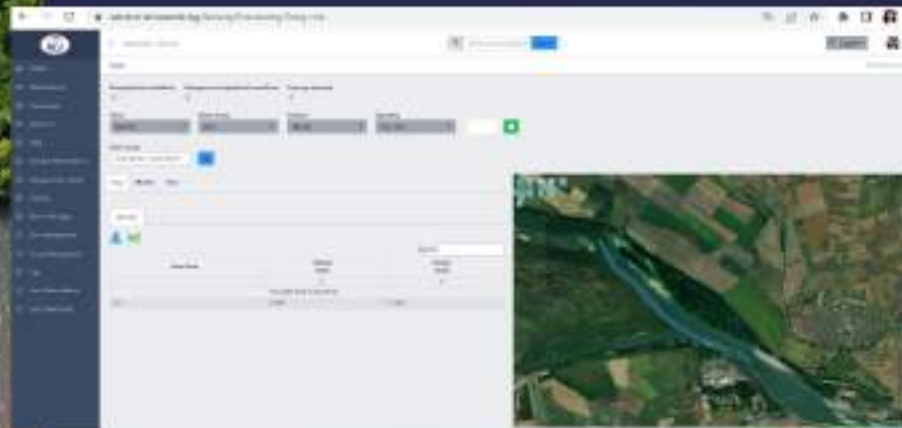
Alert: Kynčperk, 2019-09-22, Overflow, Deviation: 12 mln m³

Map: A topographic map showing a river network and reservoirs. A red warning triangle is positioned over the map, corresponding to the overflow alert.

INTEGRATION OF THE FORECASTED HYDRODYNAMIC MODEL INTO A WEB-BASED WORKFLOW BASED ON LINKED DATA E-INFRASTRUCTURE



FAIRWAY MODIFICATION VISUALIZATION



A NOVEL WAY TO PROVIDE INFORMATION



The forecasts are integrated into the linked data infrastructure and are made available for further use such as



querying



alerting



reviewing



analysing

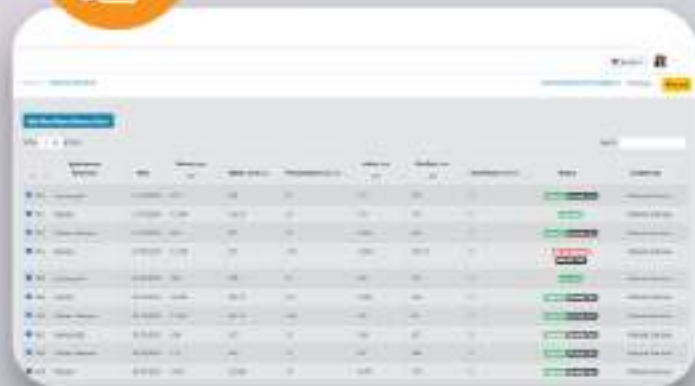
USER INTERFACE LEVEL



Data Consumer



Data Auditor



Admin



ISME-HYDRO – AN INTEGRATED INFORMATION SYSTEM FOR THE BENEFIT OF WATER RESOURCES MANAGERS



a disruptive web-based
workflow



that makes use of
a combination of AI methods



and delivers a viable and
hands-on solution



WE ARE READY TO ASSESS & DEPLOY ALL AROUND THE WORLD.

LET'S DISCUSS: e-mail mariana.damova@mozajka.co | mobile +359885796530



THANK YOU

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