Hydrogeological Data and Visualization Tools for Urban Areas

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INTRODUCTION

The rise in human population itself leads to a higher consumption of resources, processed or natural. A sustainable management and development of the urban environment must take into account the water (surface or groundwater) as resource and also as a source.

Managing Water for the City of the Future
http://www.switchurbanwater.eu
The urban environment alters the physical and chemical characteristics of the underneath aquifers. The scale of the pressure is controlled by the urban development in time and space. To have a clear image on the spatial and temporal distribution of different groundwater-urban structures interaction we need a set of thematic maps.
Geology
Geotechnics
Geophysics
Hydrogeology
Land survey
Urban infrastructura
Land cover
Climatology
Hydrology
Quality data

Sedimentary media modeling platform for groundwater management in urban areas
Raw data
- More than 2000 boreholes
- Depths between 10 – 300 m
- Coordinates
- Lithological description (decimetre resolution – type, color, etc)
- Stratigraphical data
- Geotechnical data
- Geophysical logs

Analyzed data
- Geological cross-sections
- Geological and geotechnical studies
- Geological maps
Hydrogeology

Raw data
- Well construction
- Hydraulic head
- Water flow, drawdown
- Pumping tests
- Hydrogeological parameters
- Quality data

GROUNDWATER MONITORING SYSTEM

Analyzed data
- Hydrogeological cross-sections
- Hydrogeological studies
- Hydrogeological maps
Gestiunea si vizualizarea datelor in hidrogeologia urbana

- Hydrology
- Climatology

Raw data
- Water bodies geometry (lakes and rivers)
- Volumes and hydraulic heads for lakes
- Hydraulic structures
- Water Quality data
- Climatology data (temperature and precipitations)

Analyzed data
- Hydrological studies
- Climatological studies
Data

- SRTM data
- Topographic data points
- Topographic maps 1:5,000 si 1:10,000
- Lidar Data
- Sewer network hydraulic model
- Dambovita river hydro – works study
DATA ISSUES

- No coordinates
- No lithological description
- Data format
- Incomplete sets of data
- Redundancy
- No data integration
- No metadata
- OLD vs. NEW
GROUNDWATER MONITORING SYSTEM
Total number of piezometric wells: 146

Colentina: 116
Mostiștea: 30

ANAR: 60
ANB/CCIAS: 54
CCIAS: 12
TERTI: 20
Sedimentary media modeling platform for groundwater management in urban areas
The software platform architecture is based on three major components.
International standards for Geo-Spatial data transfer.

Object – Orientated approach.

Open Geospatial Consortium (OGC)
The geospatial server application allows the communication between the client side application (geoportal), the geospatial database and the desktop platform component.
Sedimentary media modeling platform for groundwater management in urban areas

GEOPORTAL APPLICATION
The desktop platform is designed to be used by *specialists* and *researchers*.

The platform is developed under a *GIS framework* (ArcGIS).
The geological toolbox allows the specialist to manage litology, geophysical, and petrological data. Analysis such as: borehole diagram, geological cross-sections, defining hydrogeological units, can be easily made and exported in 2D and in 3D environment.
The hydrochemical toolbox performs a series of hydrochemical analysis for groundwater quality data: hydrochemical parameter statistics (univariable, bivariable, analysis), geostatistics (using GSLib library), general chemical diagrams, charts and maps (Stiff Map, Wilcox diagram, Ionic Balance, Piper Diagram) and a series of parameter orientated maps.
The third toolbox is an interface between the platform and other third parties software (such as GMS - Groundwater Modelling System). Data from the geospatial database are exported to the modelling software and the outputs of model can be imported back to the platform. Beside the communication capabilities, the toolbox can generate an optimal cell-size modelling grid on the basis of the hydrogeological data spatial distribution.
Sedimentary media modeling platform for groundwater management in urban areas
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Thank you!