Digital mapping of groundwater: effective tool management in Wallonia (Belgium), applicable to other countries or regions

Mohamed BOUEZMARNI
mbouezmarni@ulg.ac.be
Université de Liège
Department of Science and Environmental Management
Laboratory of Water Resources

Engineers in charge: M. Bouezmarni, L. Capette, P. Engels, S. Imerzoukene, S. Rekk, S. Roland, I. Ruthy

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Plan

I. Introduction and Objectives

II. Methodology

III. Hydrogeological map on paper and on Web

IV. Fields of application

V. Conclusions and perspectives
1999: Hydrogeological mapping program (Regional Ministry)
2011: 108 maps has been produced
2012: 35 maps are available online
2015: 140 maps must be produced and available online
II. Objectives of the hydrogeological maps

1. Improving the quantitative and qualitative management of the groundwater resources, at local and regional scales, by collecting, synthesizing, structuring and mapping data.

2. Providing information at 1/25,000 scale, about different hydrogeological aspects as extension, geometry, piezometry as well as hydrochemical and hydrodynamic characteristics of the aquifers.
III. Methodology

1. Data collection
   - Existing data coming from numerous varied sources
   - Field work

2. Storage into a database (DB-HYDRO)

3. Building of the map
   - Digitalization of geographical data
   - Download of spatial and attribute data into Personal GeoDataBase
   - Cartographic project with GIS-software (ArcView® 9.x – ESRI)
III. Methodology

1. Data collection

- Existing data coming from numerous varied sources
- Field work
2. Storage into a database (DB-HYDRO)

- Implemented with Oracle® and based in Ministry Administration
- Used for hydrogeological mapping but also for all GW studies

III. Methodology
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Tracer test
Pump test

Geochemistry measurements

DB-HYDRO structure

Points
DB-HYDRO User Interface
III. Methodology

3. Building of the map

- Digitalization of geographical data
- Download of spatial and attribute data into Personal GeoDataBase
- Cartographic project with GIS-software (ArcView® 8.x or 9.x – ESRI)
IV. Presentation of the hydrogeological map on paper

- Main map at 1/25,000
- Thematic maps at 1/50,000
  - Pumped volumes
  - Information about tests (chemical, pumping, tracing...), Type of aquifers
  - Thickness of main aquifers
- Geological and hydrogeological cross-sections
- Lithostratigraphic table (Geology and Hydrogeology)
- Explanatory booklet
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• Topography
• Hydrogeology (based on geology)
• Hydrographic network
• Localization of wells, piezometers, springs, galleries
• Isopiestic lines, probable direction of underground flows
• Protection zones
• Particular phenomena, ...

Main map

Scale: 1/25.000

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**Hydrogeological cross-section**

**Geological structure and the saturation level depth**

**Geological-Hydrogeological table**
- Exploited volumes
- Aquifers occurred by wells, piezometers, ...

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• Confinement of the aquifers
• Hydrochemical analysis
• Pumping, tracing tests
• Geophysical investigations

Scale: 1/50,000

Thickness of the main aquifer
WebGIS application

✓ Currently, the cover is discontinuous and static: map sheet for a given date

✓ In the future, the cover will be continuous and dynamic: the entire Wallonia with regular updates

✓ Many advantages of the interactive map compared to the A0 format paper poster
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VI. Fields of application

- Public authorities (town, region, country)
- Water supply companies (private or public)
- Research centers
- Environmental agencies, consultants
- Industries (driller, careerers, landfill...)
- Civil defence, firemen
- Everyone
VIII. Conclusions and perspectives

- Thank to the WebGIS application, regularly update and easily accessible

- Scale of 1/25.000 requires a large volumes of high-quality data, organized in clear structures

- Developed methodology is applied to other countries or regions

- More carrying out the hydrogeological maps, the next step is the translation into English of the Web site
Thank you for your attention

http://environnement.wallonie.be/cartosig/cartehydrogeo