Disruptive Technologies for Improved Groundwater Management in the Mashreq Region

Global Groundwater Information System

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Rio Declaration On Environment And Development (1992), article 10:

[…] At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. […]

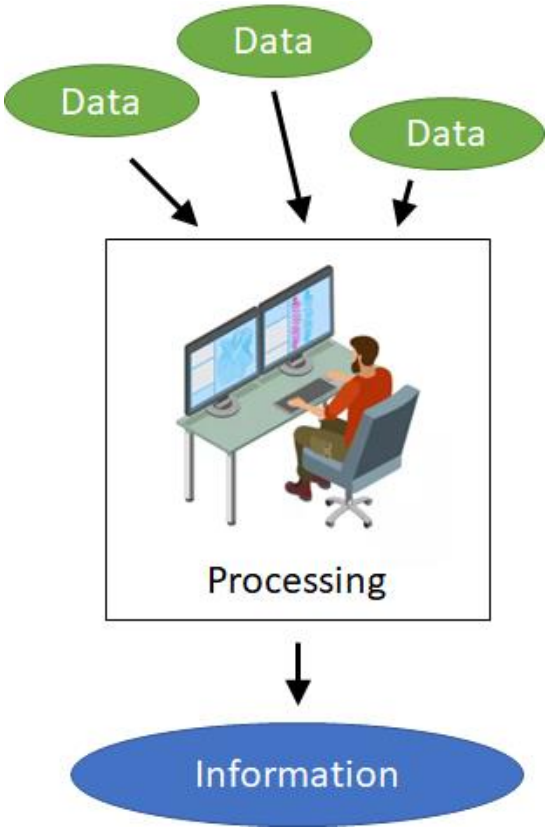
Several countries have developed online tools, platforms, dashboards, cellphone apps, etc. to share groundwater data and information.

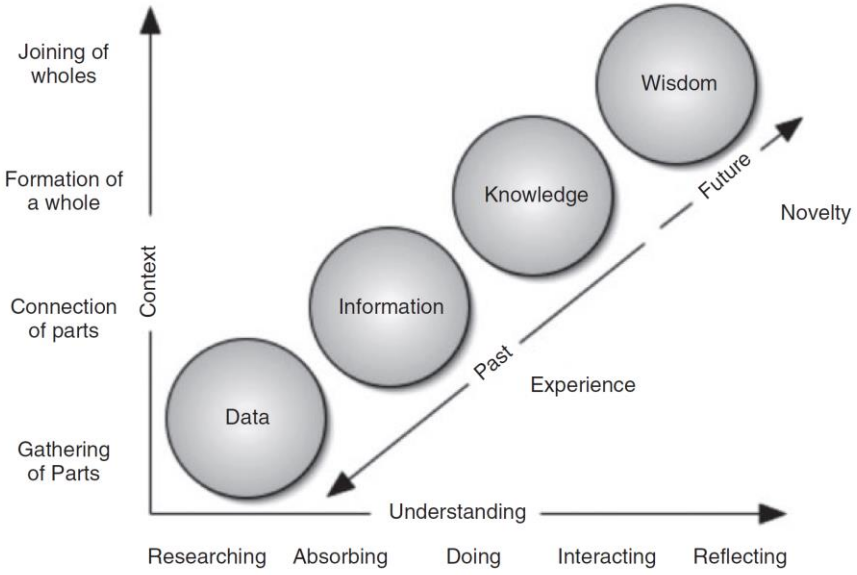
Yet, in many countries, data must be requested. Sometimes a fee is asked. Answers might come after several days. Eventually, there might be no data available.

Groundwater Governance (2017) a call for action: A Shared Global Vision for 2030

Data vs. Information

- **Groundwater data are translated into information** by hydrogeologists





Examples of groundwater information:

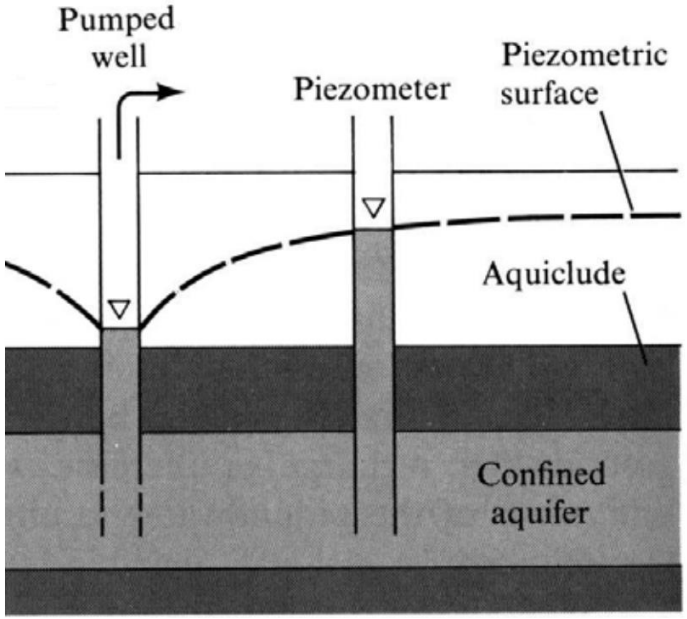
- *Piezometric map*
- *Graph showing groundwater level trends*
- *Report on the state of groundwater*
- *Warning on groundwater pollution*

Two main sources of groundwater data

1) Groundwater monitoring

Regular or continuous measurement of

- Groundwater level
- Groundwater quality
- Groundwater abstraction



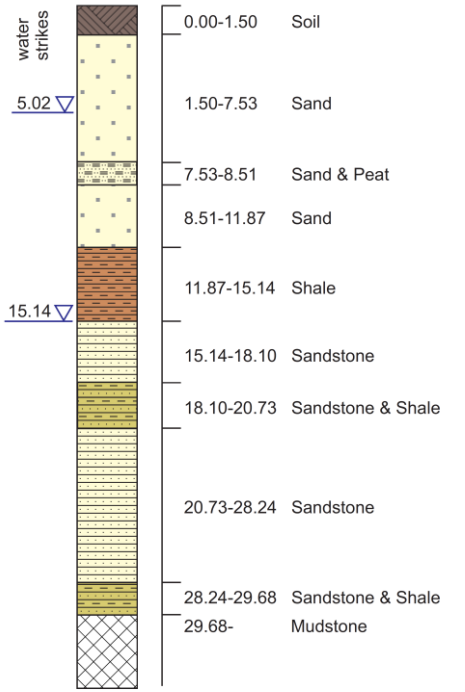
Examples of groundwater quality parameters:

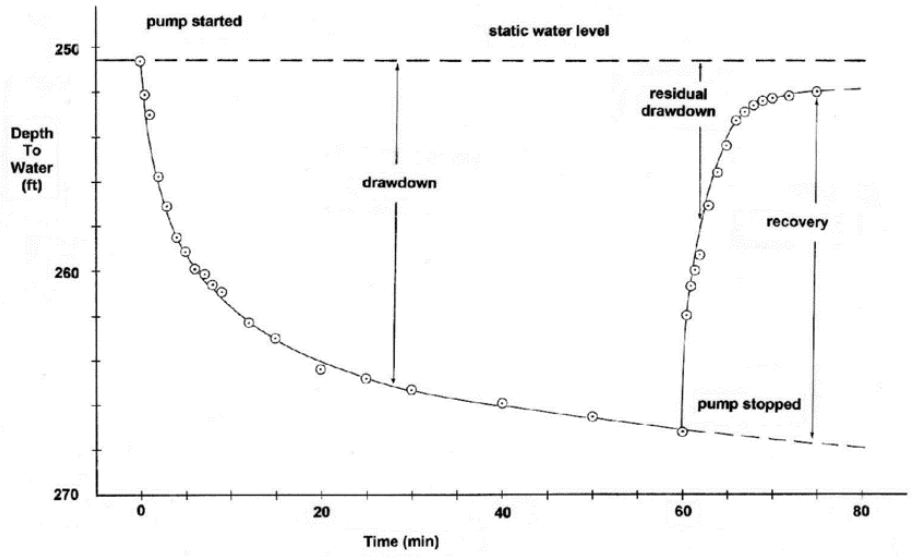
- *temperature*
- *EC / total dissolved solids (TDS)*
- *pH*
- *major ions*
- *microbiological quality*

Two main sources of groundwater data

2) Borehole siting, drilling and testing

Recording relevant data from activities related to the construction of new boreholes, such as stratigraphic log, water strike, borehole design, aquifer properties, etc.

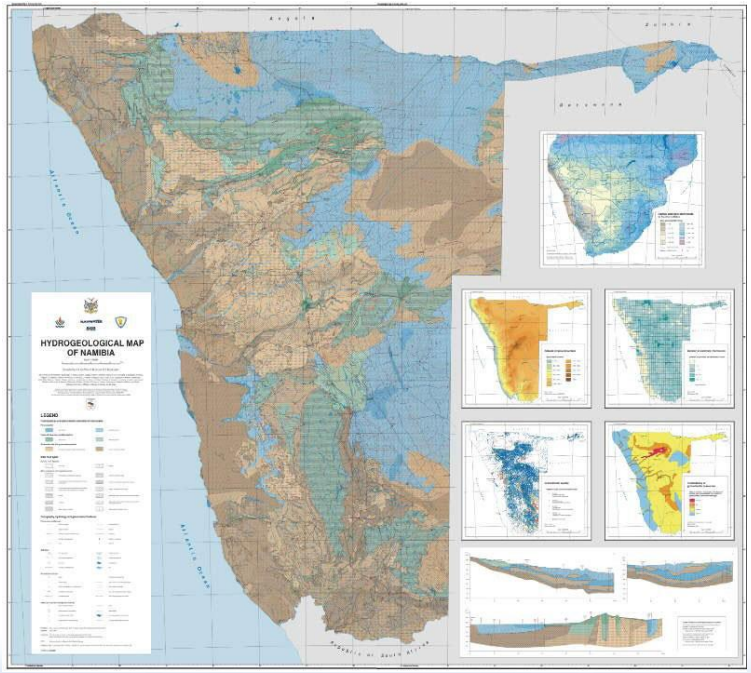


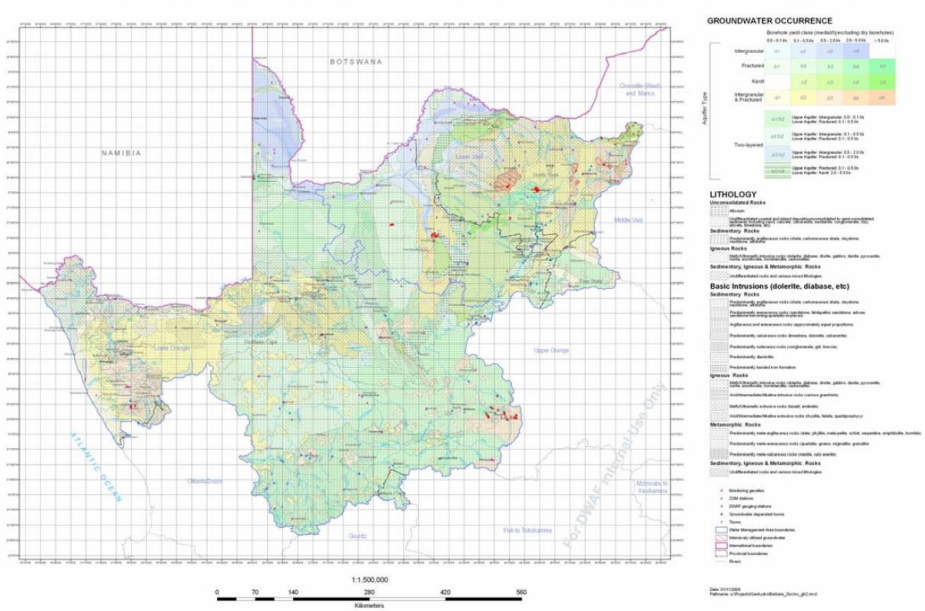


Data vs. Information

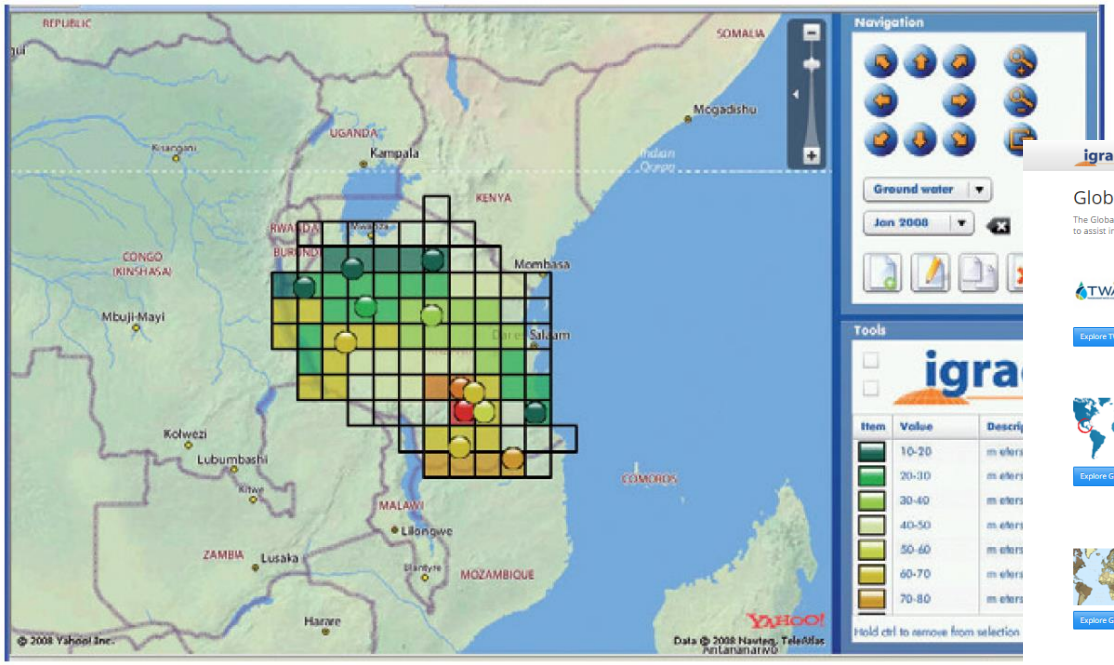
- Data are **independent of the context**. Unlike information, they are unbiased.
- **Data can be reinterpreted** for multiple purposes.

Example: How would you merge different groundwater maps into one that covers the entire basin?



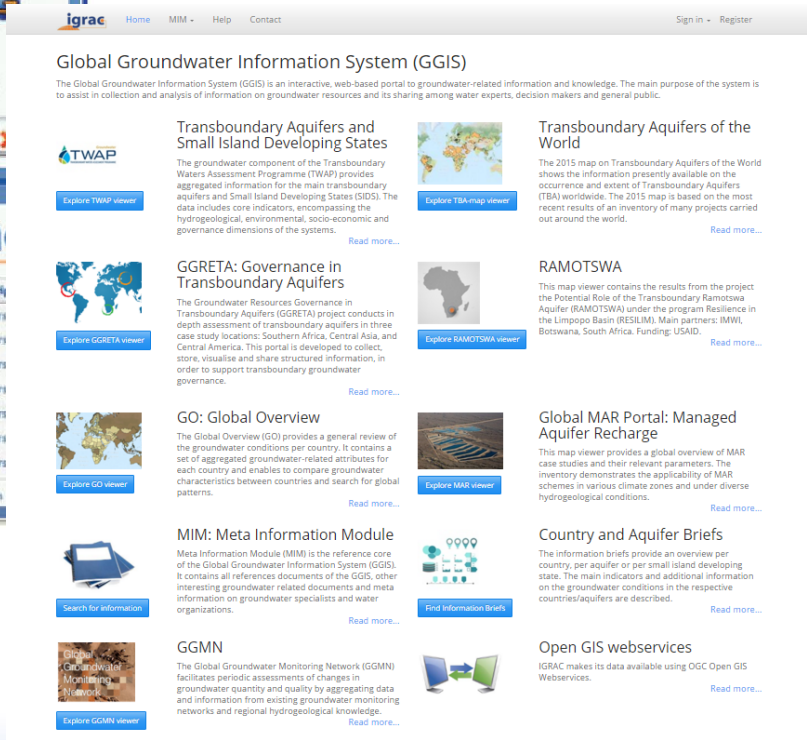


Since 2004, IGRAC promotes the sharing of groundwater data and information through the Global Groundwater Information System (GGIS) and the Global Groundwater Monitoring Network (GGMN) platform.



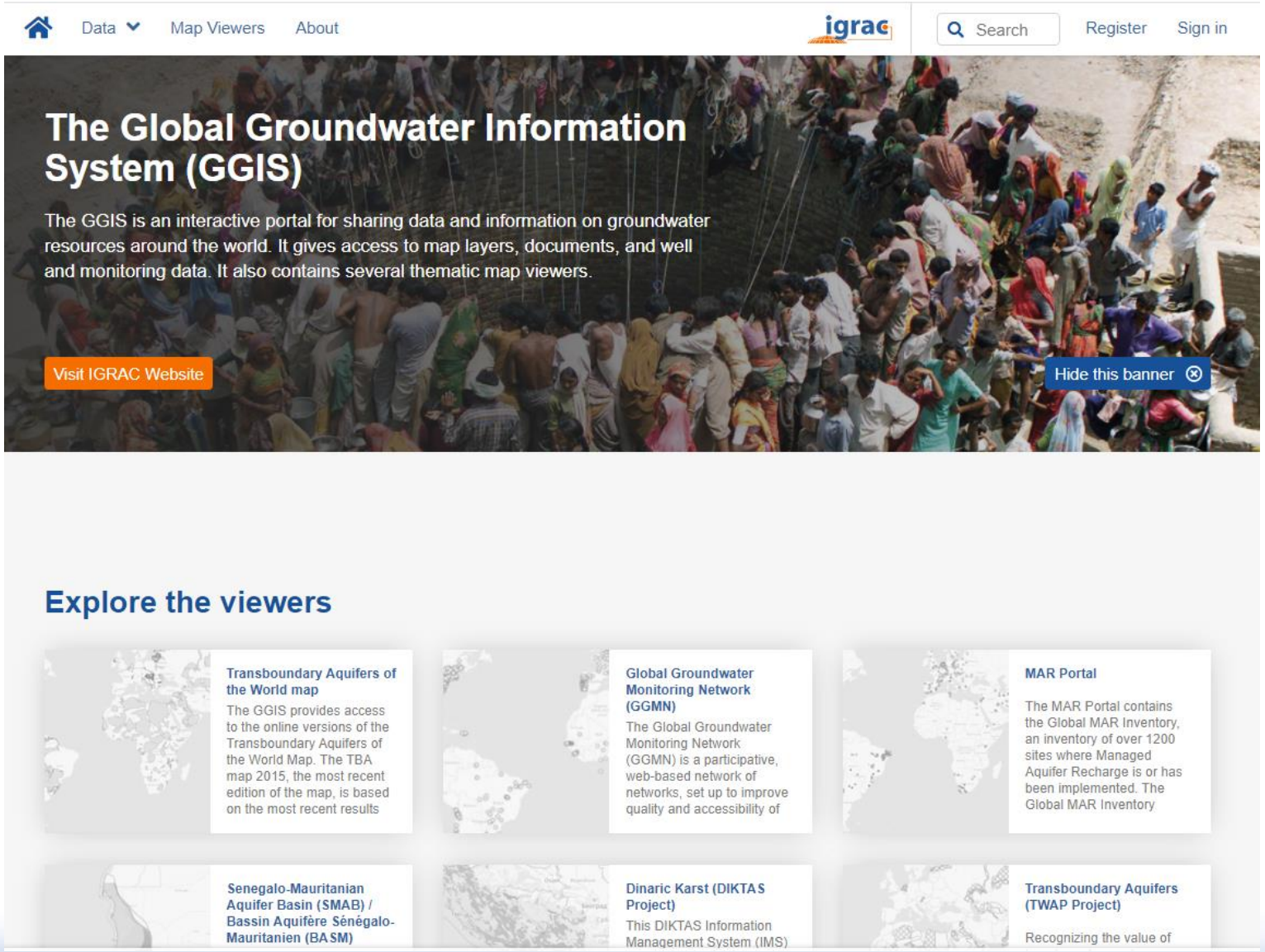
2008

2016

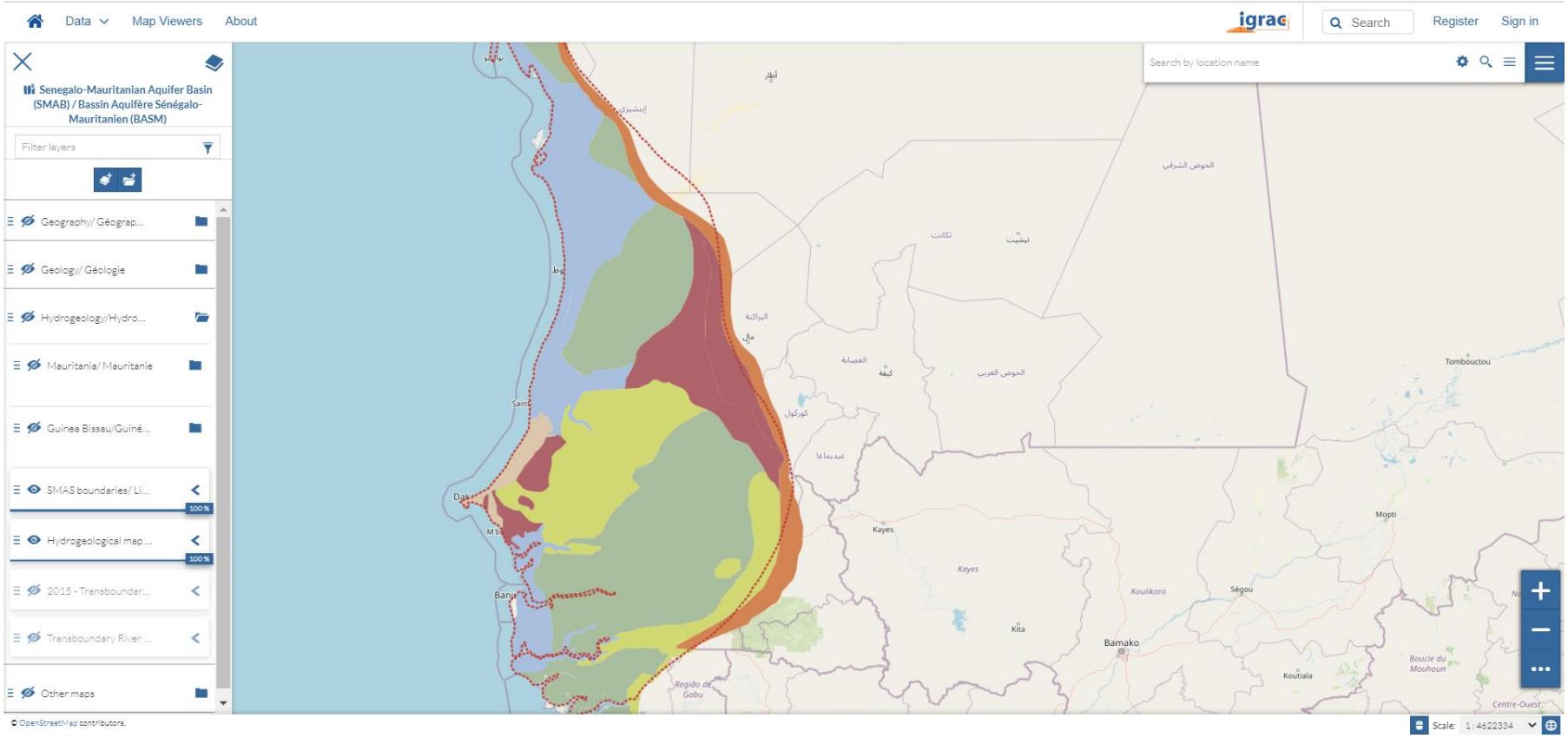


https://ggis.un-igrac.org/

2021



The GGIS contains thematic map viewers
Example : the Senegalo-Mauritanian Aquifer Basin (SMAB)



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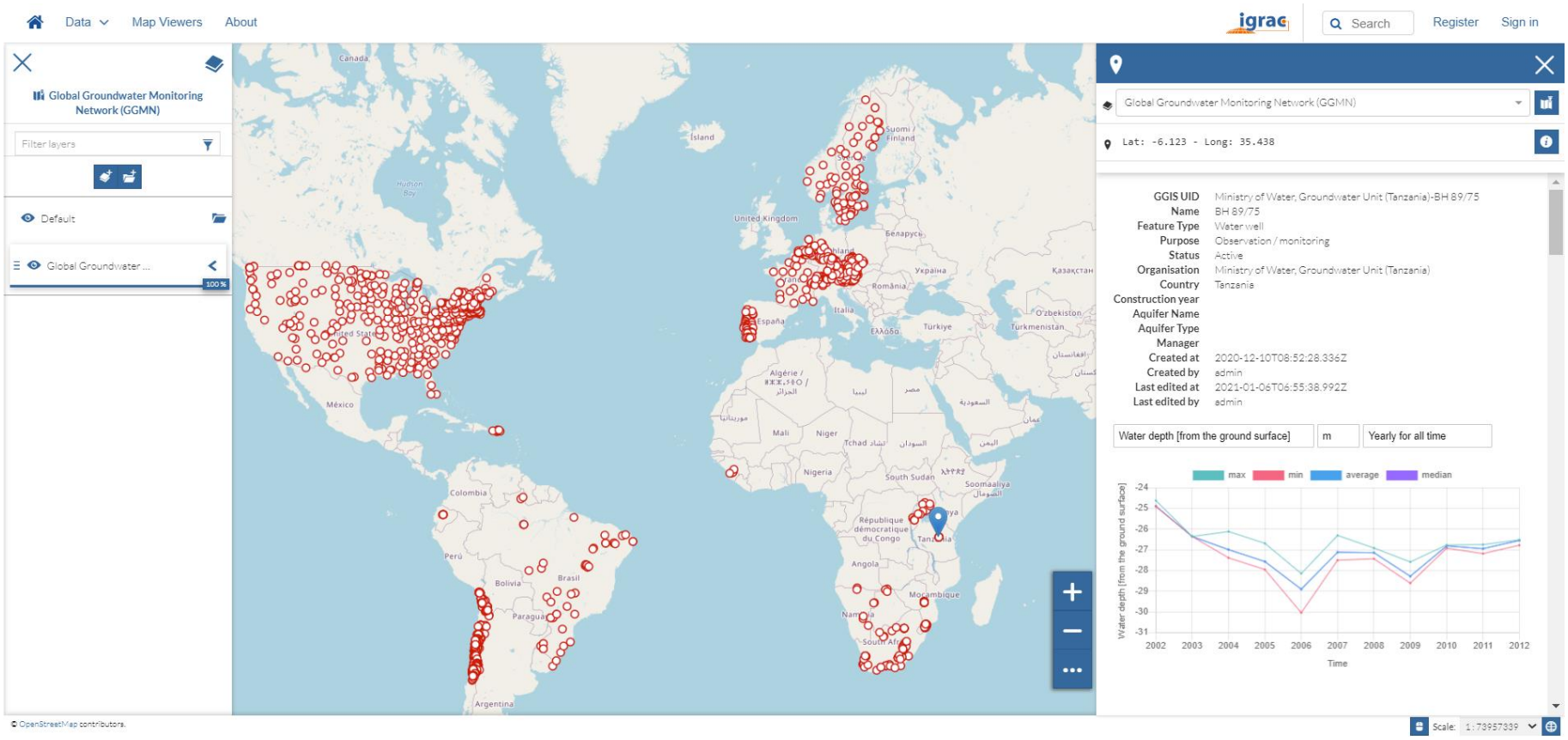
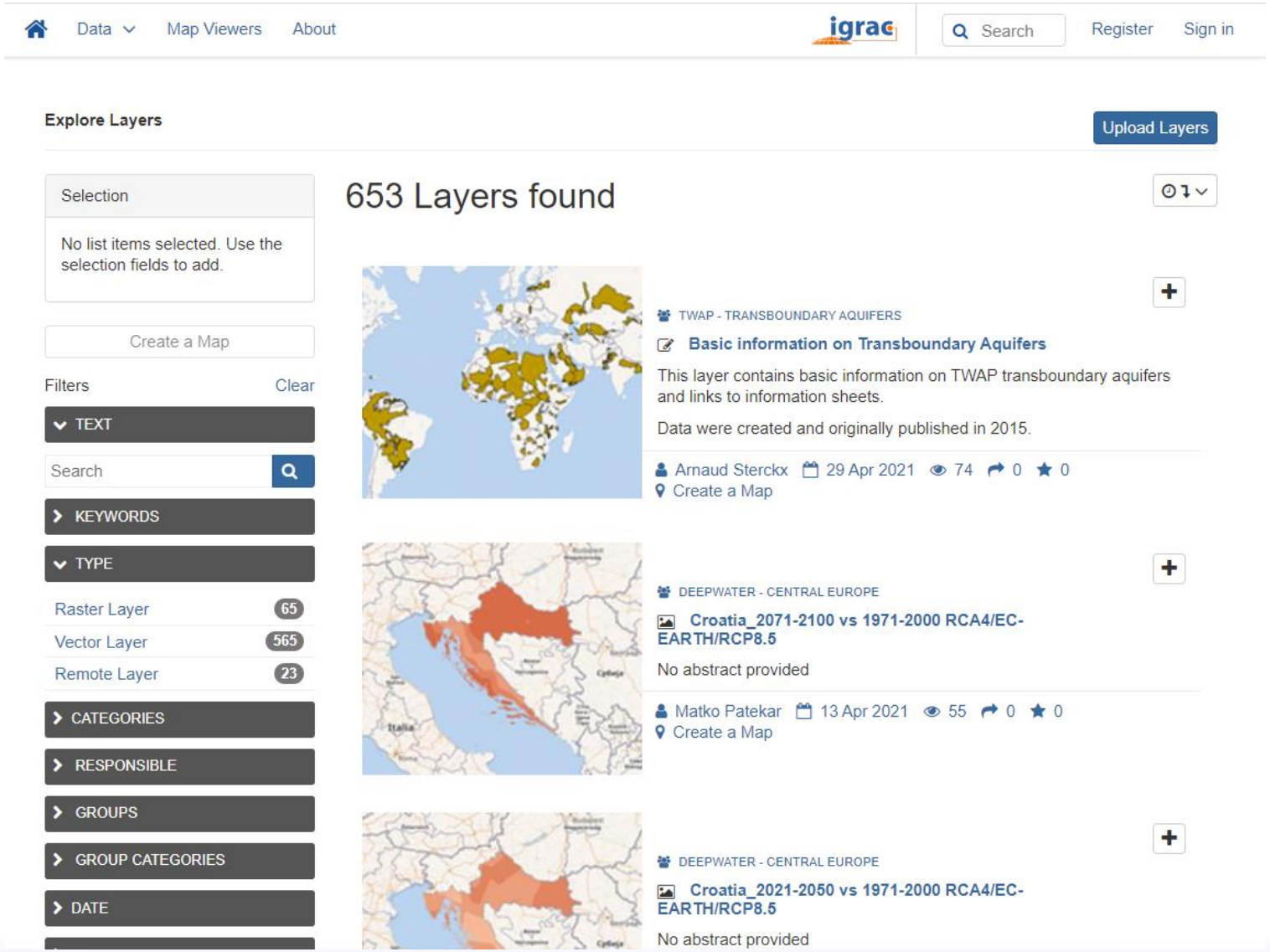
Well and monitoring data are now integrated in the GGIS



https://ggis.un-igrac.org/view/ggmn

Map layers, documents and well and monitoring data can be accessed



Well and Monitoring Data Record

- General Information
- Drilling and Construction
- Hydrogeology
- Management
- Monitoring Data
- Groundwater Level
- Groundwater Quality
- Abstraction / Discharge
- Metadata

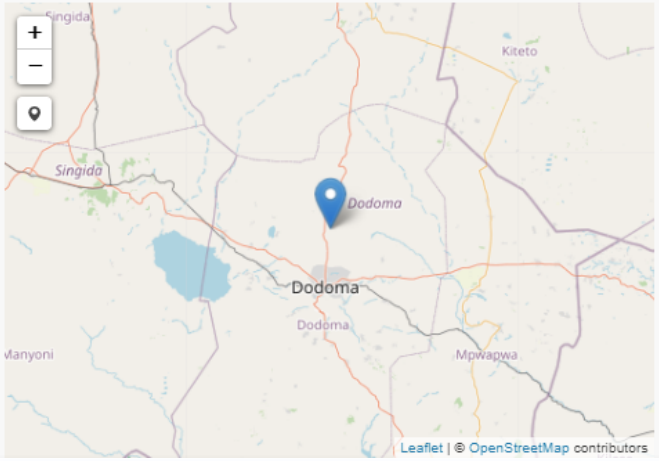
GENERAL INFORMATION

Identification

GGIS UID	Ministry of Water, Groundwater Unit (Tanzania)-BH 89/75
Original ID	BH 89/75
Name	BH 89/75
Feature type	Water well
Purpose	Observation / monitoring
Status	Active
Photo	
Description	

Location

Latitude	-5.93617
Longitude	35.76833
Ground surface elevation	1082.0 m
Top of well elevation	
Country	Tanzania
Address	



MAIN FUNCTIONALITIES

Explore thematic map viewers

Access public map layers, documents, well and monitoring data

REGISTERED USERS' FUNCTIONALITIES

Access restricted map layers, documents, well and monitoring data

Upload and edit data

Create thematic map viewers

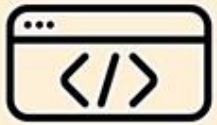
Join user groups

Record monitoring data in the field with the GGMN app

ADDITIONAL FEATURES

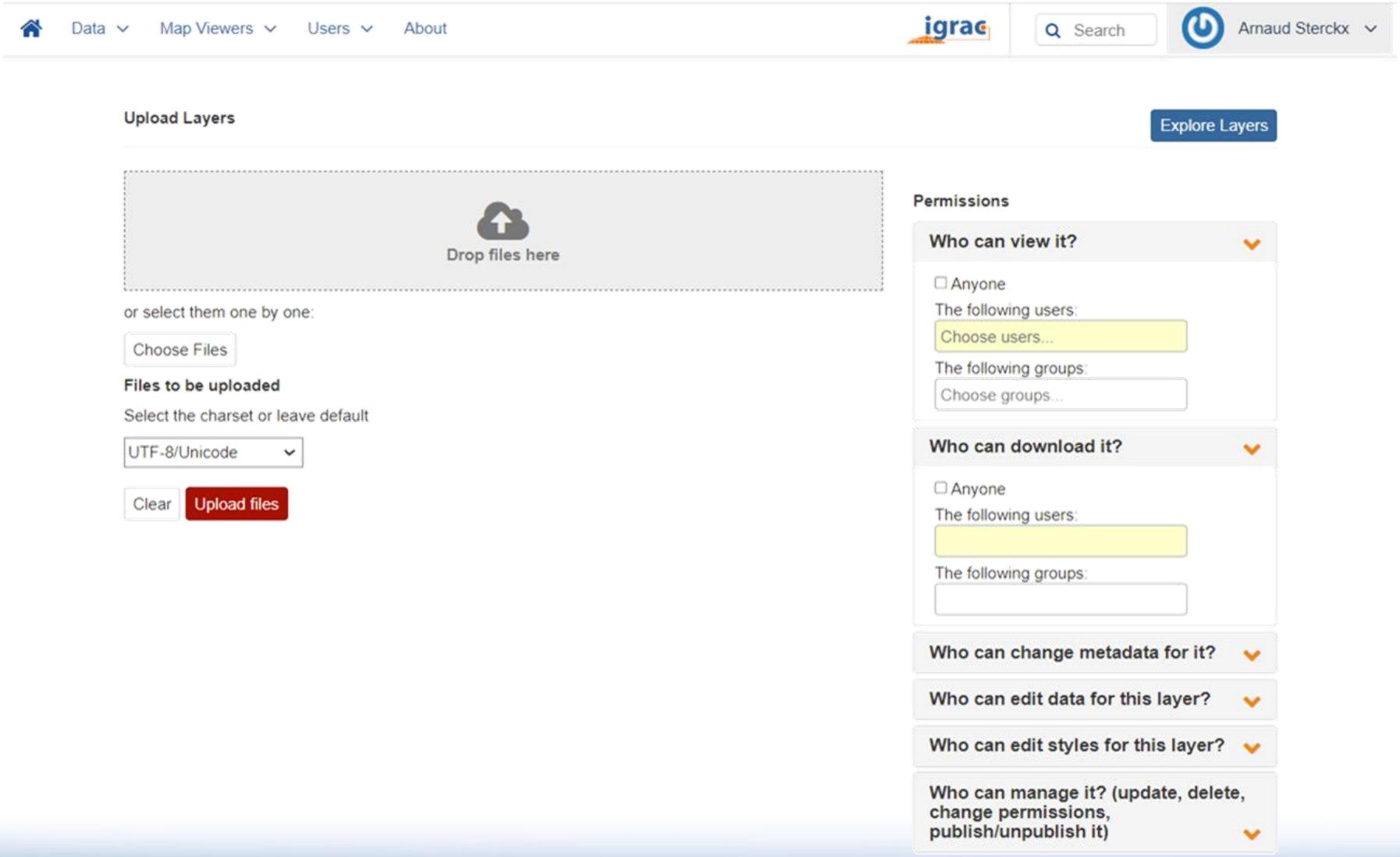
Exchange map layers via web services

Set up connections with external well and monitoring databases



Embed thematic map viewers in external websites

Data providers remain in control of their data, through permissions and licenses.



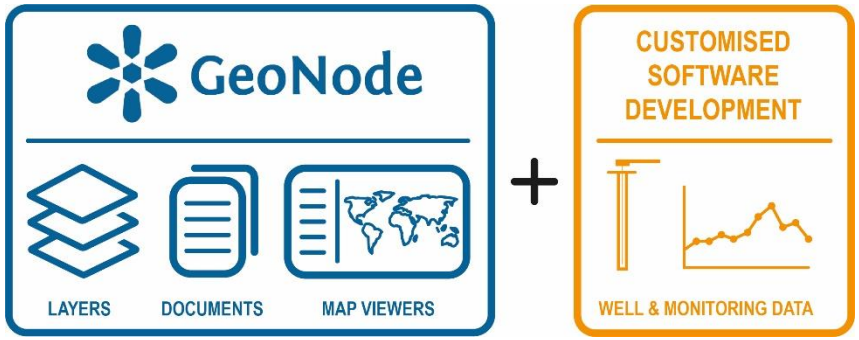
- The GGIS operates as a Spatial Data Infrastructure (SDI), where many users can register for uploading/accessing data.

  In most countries, the majority of groundwater data and information is held by the state, e.g. ministry of water, water authority (national or decentralized), geological survey… but additional data might be held by other ministries or departments, river basin organisations, water companies, universities, NGOs, private companies, etc.

- It supports international standards for spatial data exchange.

  Data can be easily shared among multiple platforms.

- It is based on a free and open-source software (GeoNode).

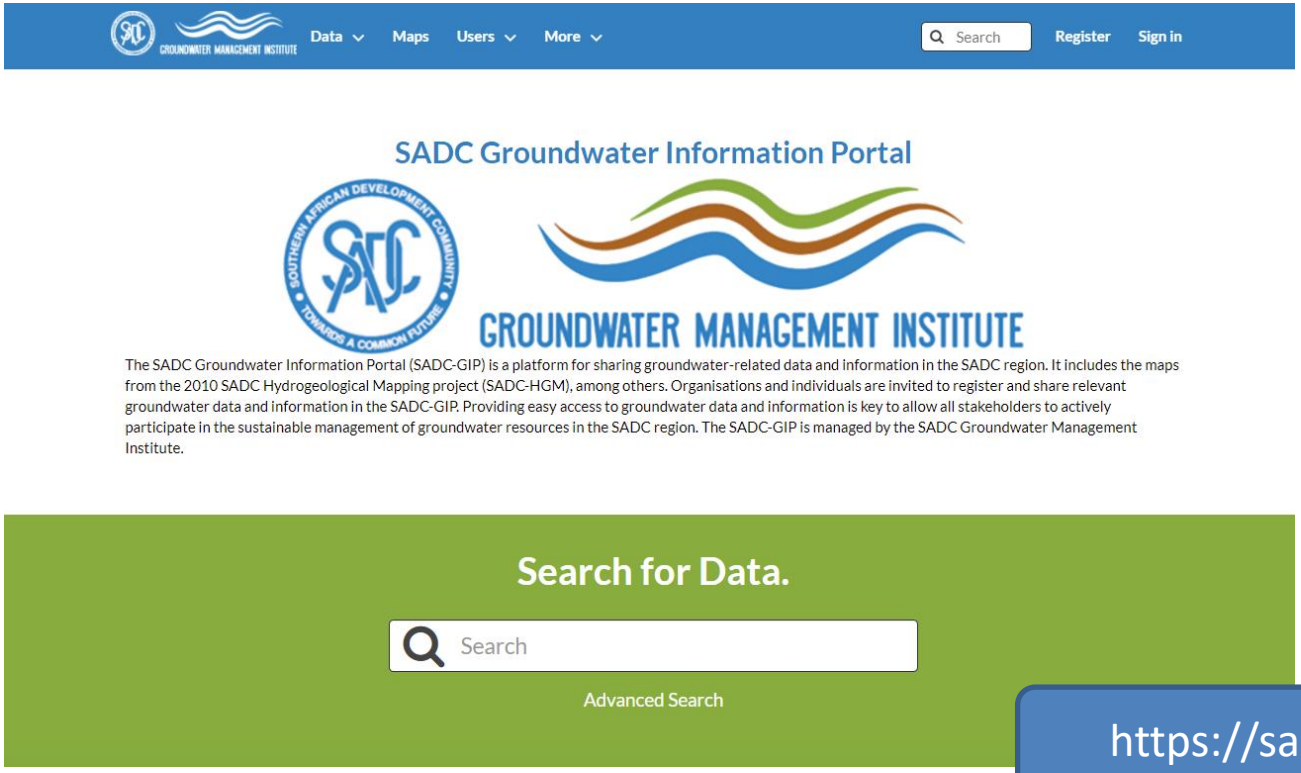


- SDI also support extensive metadata

SDI have developed much over the last 15 years, in relation with the INSPIRE Directive, an EU initiative to develop SDI across the member states, to promote the flow of data and information in support of environmental policies and applications. The Directive came into force in 2007 and has been implemented gradually.

A regional institution can be instrumental and cost-efficient for promoting groundwater data and information sharing

Example: SADC-GMI and the SADC Groundwater Information Portal



https://sadc-gip.org/

Thank you for your attention!

International Groundwater Resources Assessment Centre

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Delft, The Netherlands

United Nations Educational, Scientific and Cultural Organization

International Hydrological Programme

World Meteorological Organization

Government of The Netherlands