

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 2030

The Vision aims that by 2030

- there are appropriate and implemented legal, regulatory and institutional frameworks for groundwater that establish public guardianship and collective responsibility

- **all major aquifer systems are properly assessed, and the resulting information and knowledge are available and shared, making use of up-to-date information and communication techniques**

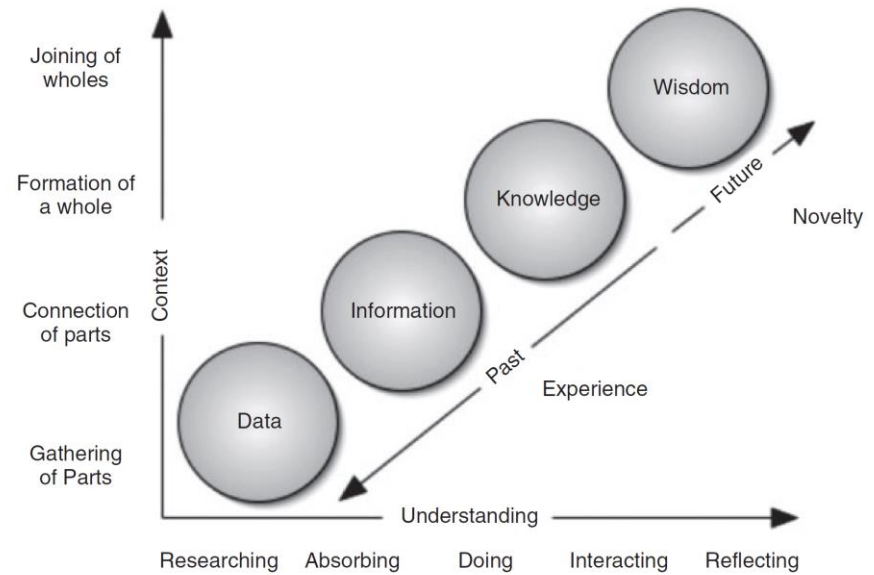
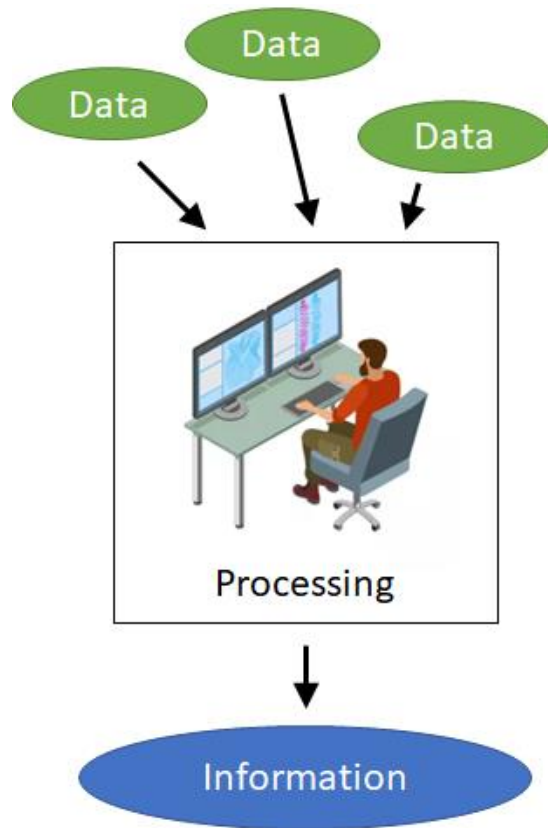
- groundwater management agencies, locally, nationally and internationally, are resourced and their key tasks of capacity building, resource and quality monitoring, and promoting demand management and supply-side measures are secured
- incentive frameworks and investment programmes foster sustainable, efficient groundwater use and adequate groundwater resources protection.

3

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:

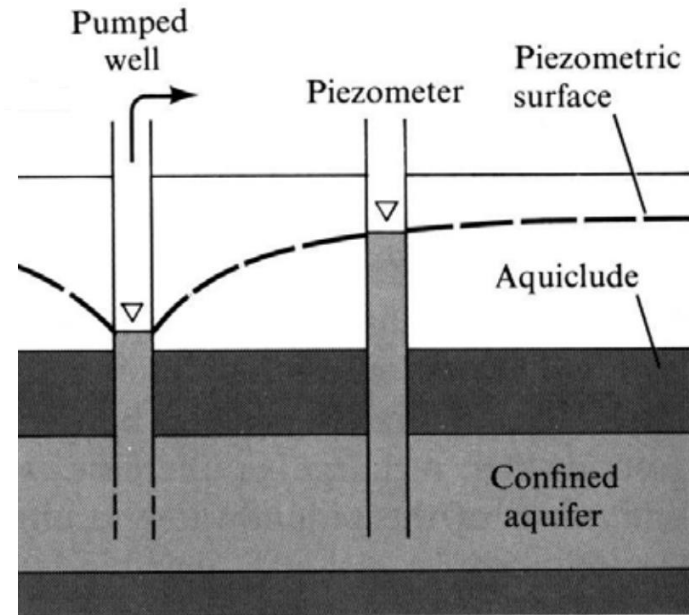
- Piezometric map*
- Graph showing groundwater level trends*
- Report on the state of groundwater*
- Warning on groundwater pollution*

Two main sources of groundwater data

1) Groundwater monitoring

Regular or continuous measurement of

- Groundwater level
- Groundwater quality
- Groundwater abstraction



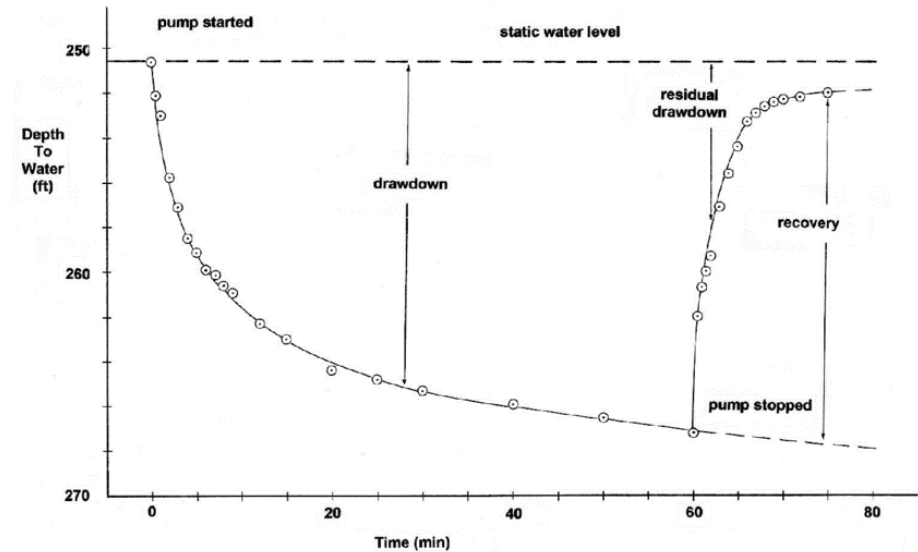
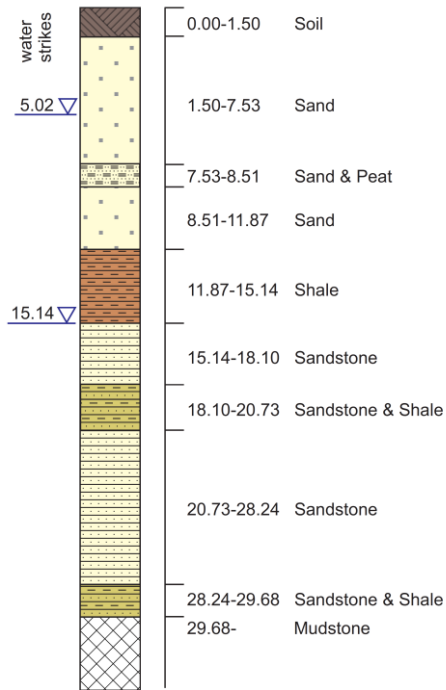
Examples of groundwater quality parameters:

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

Two main sources of groundwater data

2) Borehole siting, drilling and testing

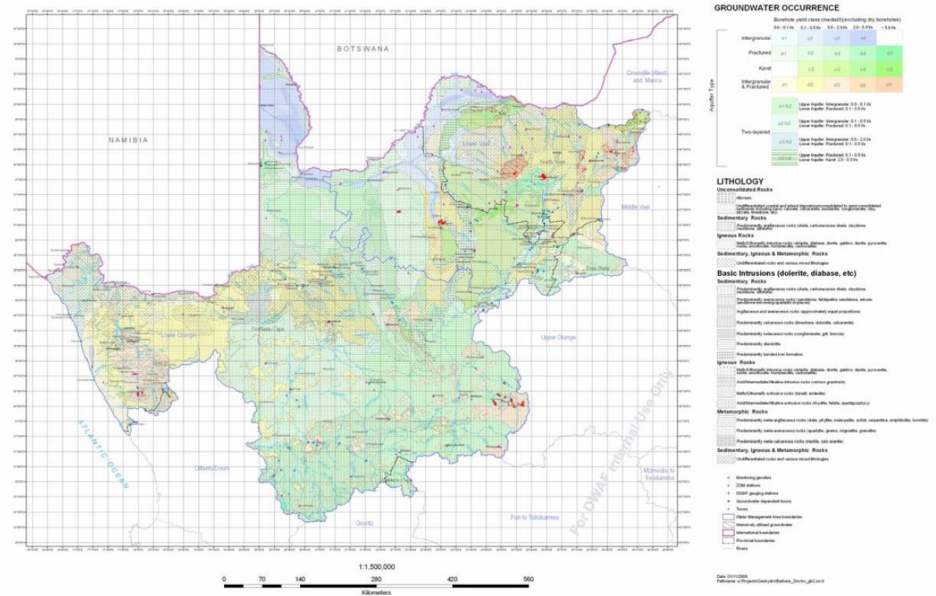
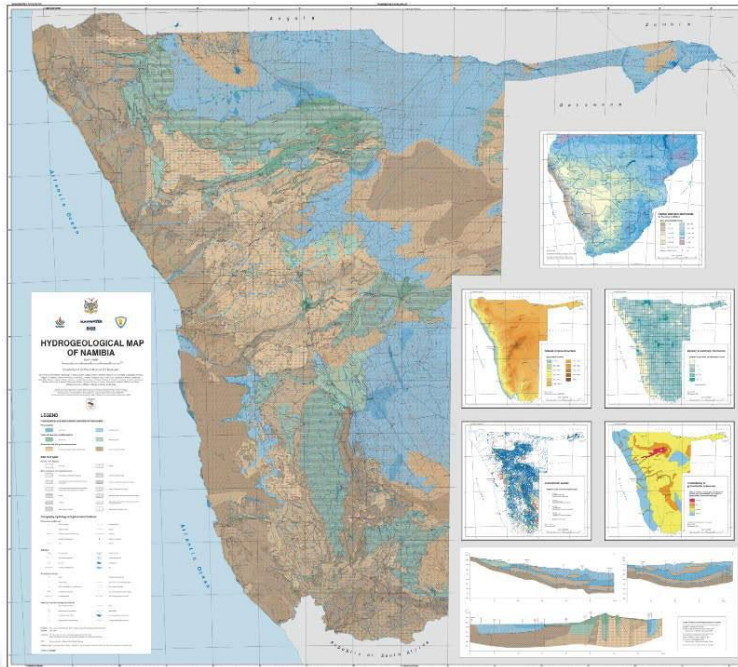
Recording relevant data from activities related to the construction of new boreholes, such as stratigraphic log, water strike, borehole design, aquifer properties, etc.



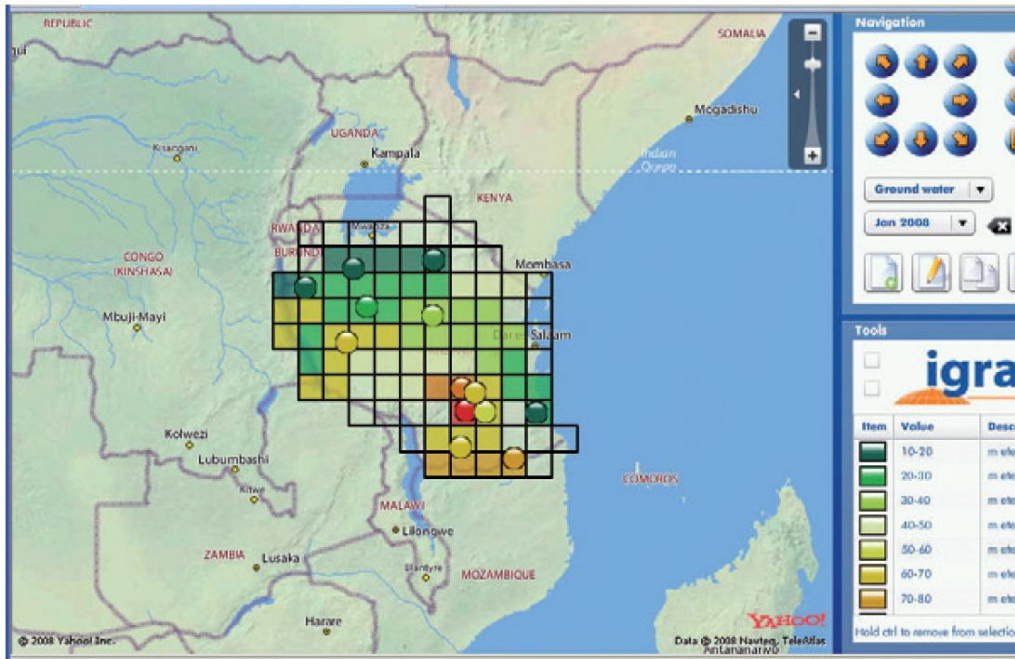
Data vs. Information

- 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

Home MIM - Help Contact
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Global Groundwater Information System (GGIS)

The Global Groundwater Information System (GGIS) is an interactive, web-based portal to groundwater-related information and knowledge. The main purpose of the system is to assist in collection and analysis of information on groundwater resources and its sharing among water experts, decision makers and general public.

Transboundary Aquifers and Small Island Developing States

The groundwater component of the Transboundary Waters Assessment Programme (TWAP) provides aggregated information for the main transboundary aquifers and Small Island Developing States (SIDS). The data includes core indicators, encompassing the hydrogeological, environmental, socio-economic and governance dimensions of the systems.

[Explore TWAP views](#)

Transboundary Aquifers of the World

The 2015 map on Transboundary Aquifers of the World shows the information presently available on the occurrence and extent of Transboundary Aquifers (TBA) worldwide. The 2015 map is based on the most recent results of an inventory of many projects carried out around the world.

[Explore TBA map views](#)

GGRETA: Governance in Transboundary Aquifers

The Groundwater Resources Governance in Transboundary Aquifers (GGRETA) project conducts in depth assessment of transboundary aquifers in three case study locations: Southern Africa, Central Asia, and Central America. This portal is developed to collect, store, visualise and share structured information, in order to support transboundary groundwater governance.

[Explore GGRETA viewer](#)

RAMOTSWA

This map viewer contains the results from the project the Potential Role of the Transboundary Ramotswa Aquifer (RAMOTSWA) under the program Resilience in the Limpopo Basin (RESILIM). Main partners: IMWL, Botswana, South Africa. Funding: USAID.

[Explore RAMOTSWA viewer](#)

GO: Global Overview

The Global Overview (GO) provides a general review of the groundwater conditions per country. It contains a set of aggregated groundwater-related attributes for each country and enables to compare groundwater characteristics between countries and search for global patterns.

[Explore GO viewer](#)

Global MAR Portal: Managed Aquifer Recharge

This map viewer provides a global overview of MAR case studies and their relevant parameters. The inventory demonstrates the applicability of MAR schemes in various climate zones and under diverse hydrogeological conditions.

[Explore MAR viewer](#)

MIM: Meta Information Module

Meta Information Module (MIM) is the reference core of the Global Groundwater Information System (GGIS). It contains all references documents of the GGIS, other interesting groundwater related documents and meta information on groundwater specialists and water organizations.

[Search for information](#)

Country and Aquifer Briefs

The information briefs provide an overview per country, per aquifer or per small island developing state. The main indicators and additional information on the groundwater conditions in the respective countries/aquifers are described.

[Find information Briefs](#)

GGMN

The Global Groundwater Monitoring Network (GGMN) facilitates periodic assessments of changes in groundwater quantity and quality by aggregating data and information from existing groundwater monitoring networks and regional hydrogeological knowledge.

[Explore GGMN views](#)

Open GIS webservice

IGRAC makes its data available using OGC Open GIS Webservices.

[Read more...](#)

The Global Groundwater Information System (GGIS)

The GGIS is an interactive portal for sharing data and information on groundwater resources around the world. It gives access to map layers, documents, and well and monitoring data. It also contains several thematic map viewers.

Visit IGRAC Website

Hide this banner

Explore the viewers



Transboundary Aquifers of the World map

The GGIS provides access to the online versions of the Transboundary Aquifers of the World Map. The TBA map 2015, the most recent edition of the map, is based on the most recent results



Global Groundwater Monitoring Network (GGMN)

The Global Groundwater Monitoring Network (GGMN) is a participative, web-based network of networks, set up to improve quality and accessibility of



MAR Portal

The MAR Portal contains the Global MAR Inventory, an inventory of over 1200 sites where Managed Aquifer Recharge is or has been implemented. The Global MAR Inventory



Senegalo-Mauritanian Aquifer Basin (SMAB) / Bassin Aquifère Sénégal-Mauritanien (BASM)



Dinaric Karst (DIKTAS Project)

This DIKTAS Information Management System (IMS)

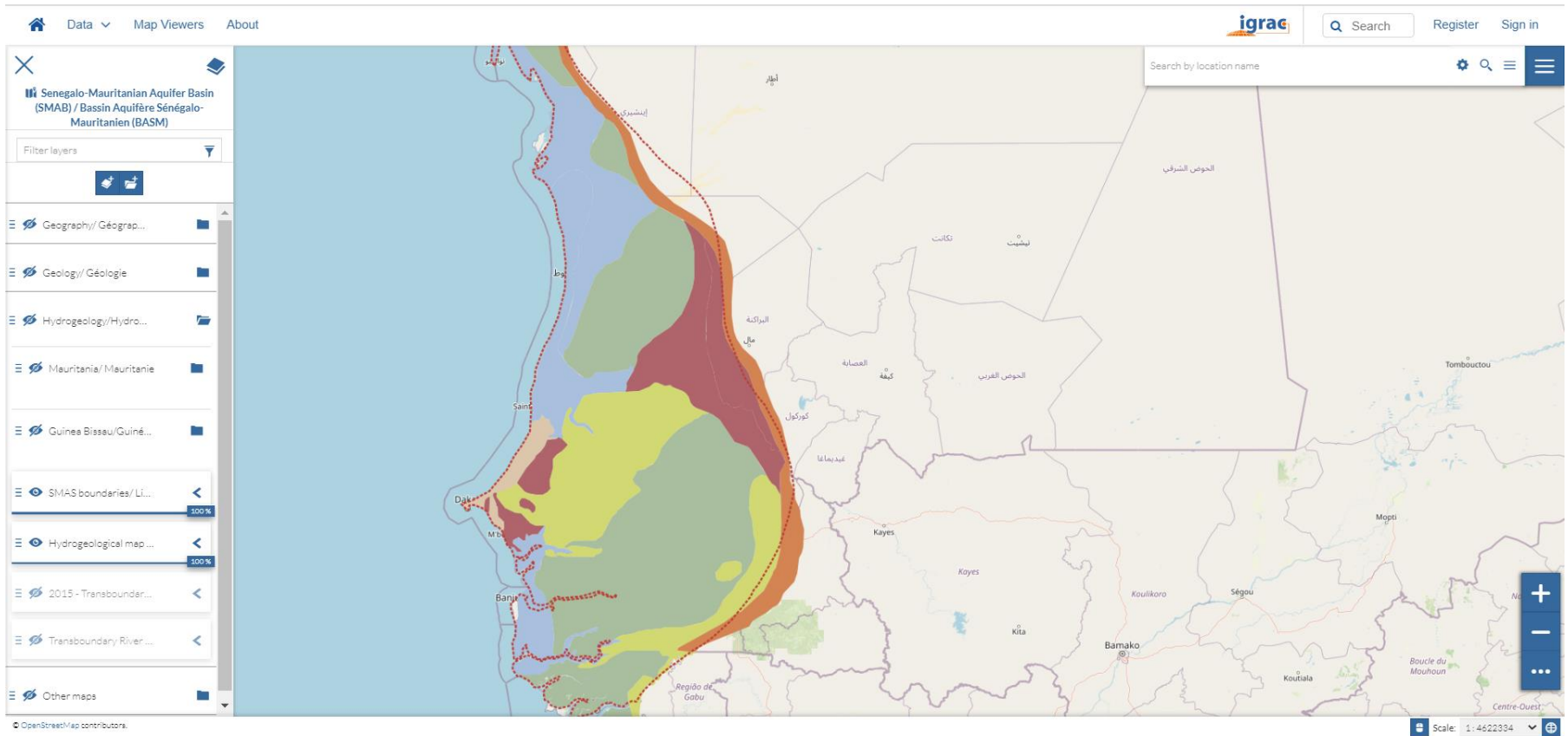


Transboundary Aquifers (TWAP Project)

Recognizing the value of

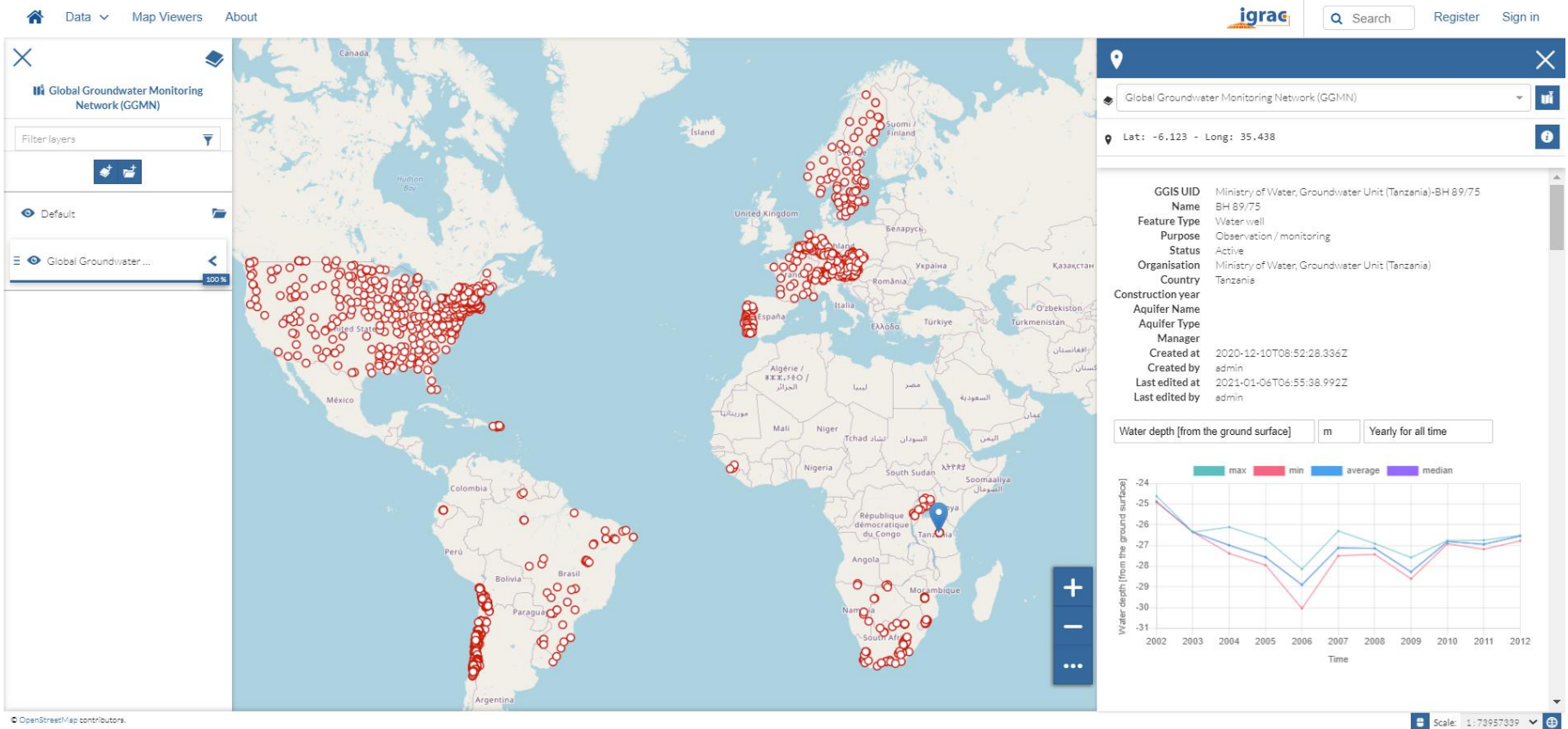
The GGIS contains thematic map viewers

Example : the Senegalo-Mauritanian Aquifer Basin (SMAB)




<https://gis.un-igrac.org/view/basm>

Well and monitoring data are now integrated in the GIS



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

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

[Home](#) [Data](#) [Map Viewers](#) [About](#)  [Register](#) [Sign in](#)

Explore Layers Upload Layers

Selection

No list items selected. Use the selection fields to add.

Create a Map

Filters Clear

TEXT

Search

KEYWORDS

TYPE

Raster Layer 65

Vector Layer 565

Remote Layer 23

CATEGORIES


RESPONSIBLE

GROUPS

GROUP CATEGORIES

DATE

653 Layers found 🔍



TWAP - TRANSBOUNDARY AQUIFERS +


[Basic information on Transboundary Aquifers](#)

This layer contains basic information on TWAP transboundary aquifers and links to information sheets.

Data were created and originally published in 2015.

[Arnaud Sterckx](#) 📅 29 Apr 2021 👁️ 74 👉 0 ★ 0

[Create a Map](#)




DEEPWATER - CENTRAL EUROPE +

[Croatia_2071-2100 vs 1971-2000 RCA4/EC-EARTH/RCP8.5](#)

No abstract provided

[Matko Patekar](#) 📅 13 Apr 2021 👁️ 55 👉 0 ★ 0

[Create a Map](#)



DEEPWATER - CENTRAL EUROPE +

[Croatia_2021-2050 vs 1971-2000 RCA4/EC-EARTH/RCP8.5](#)

No abstract provided

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

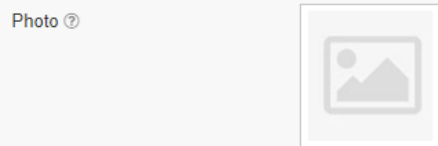
Original ID BH 89/75

Name BH 89/75

Feature type Water well

Purpose Observation / monitoring

Status Active



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 GGMM app

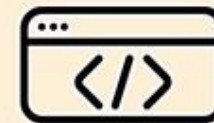
ADDITIONAL FEATURES



Exchange map layers via web services



Set up connections with external well and monitoring databases

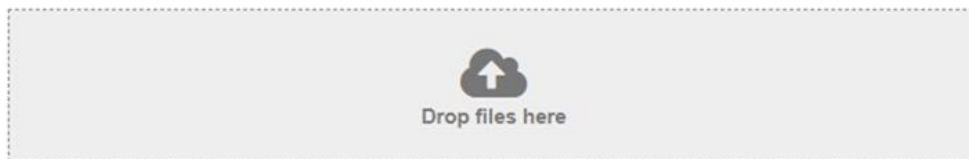


Embed thematic map viewers in external websites

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

Upload Layers

[Explore Layers](#)



or select them one by one:

Files to be uploaded

Select the charset or leave default

Permissions

Who can view it?

Anyone

The following users:

The following groups:

Who can download it?

Anyone

The following users:

The following groups:

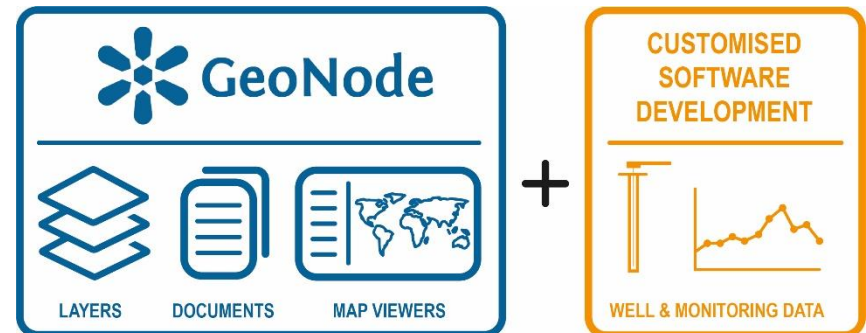
Who can change metadata for it?

Who can edit data for this layer?

Who can edit styles for this layer?

Who can manage it? (update, delete, change permissions, publish/unpublish it)

- 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).



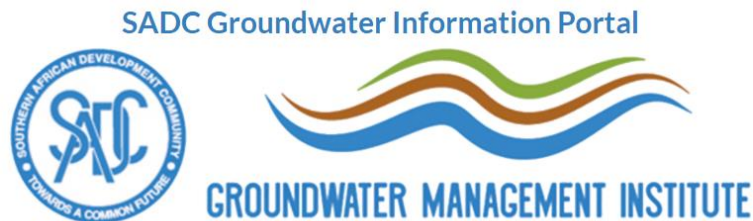
- SDI also support extensive metadata

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



The SADC Groundwater Information Portal (SADC-GIP) is a platform for sharing groundwater-related data and information in the SADC region. It includes the maps from the 2010 SADC Hydrogeological Mapping project (SADC-HGM), among others. Organisations and individuals are invited to register and share relevant groundwater data and information in the SADC-GIP. Providing easy access to groundwater data and information is key to allow all stakeholders to actively participate in the sustainable management of groundwater resources in the SADC region. The SADC-GIP is managed by the SADC Groundwater Management Institute.

Search for Data.

Advanced Search

<https://sadc-gip.org/>

Thank you for your attention!



International Groundwater Resources Assessment Centre

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Delft, The Netherlands



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Cultural Organization



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World Meteorological
Organization



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The Netherlands