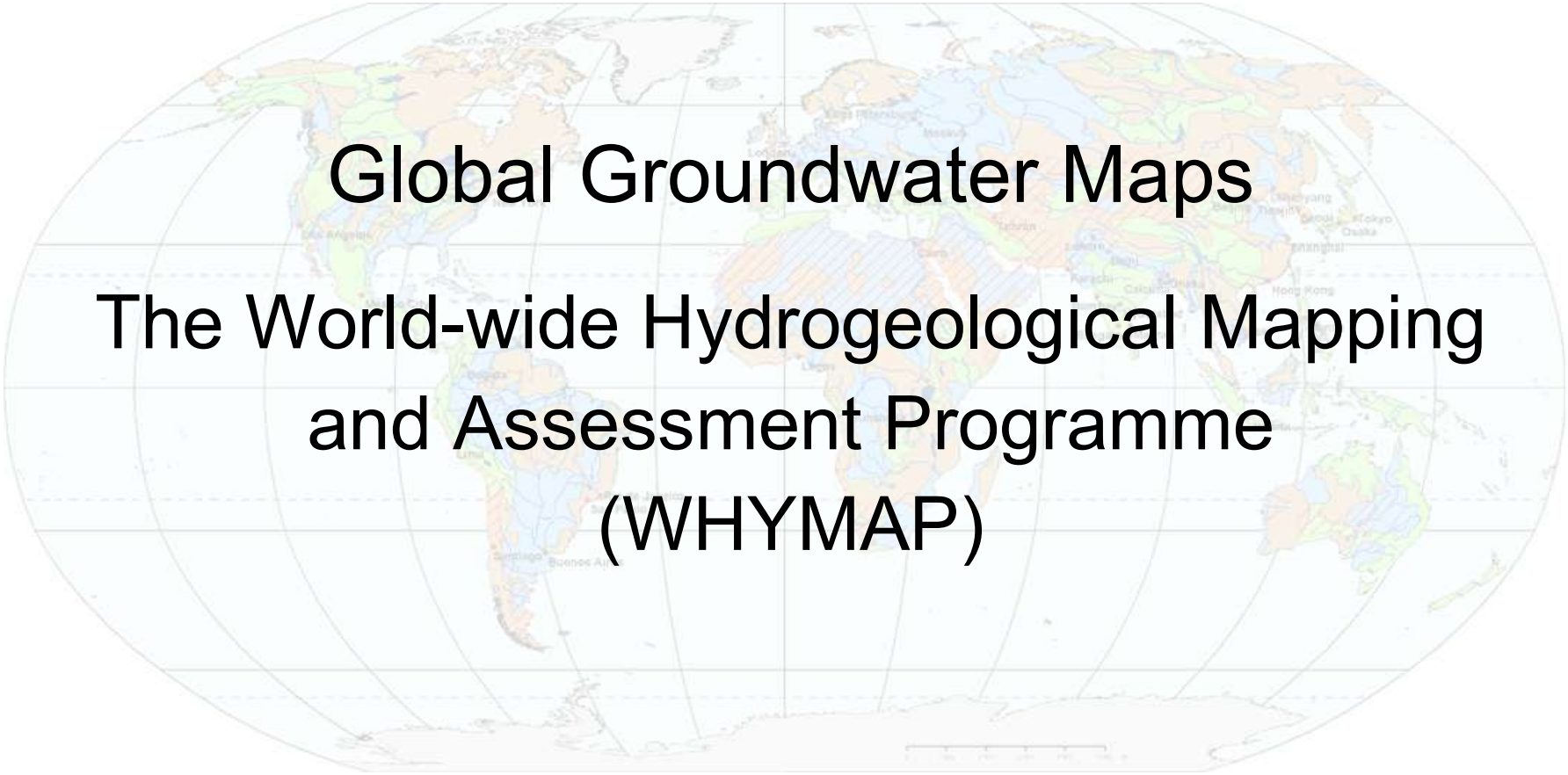


Global Groundwater Maps

The World-wide Hydrogeological Mapping and Assessment Programme (WHYMAP)

Andrea Richts, Sandra Groth & Uta Philipp

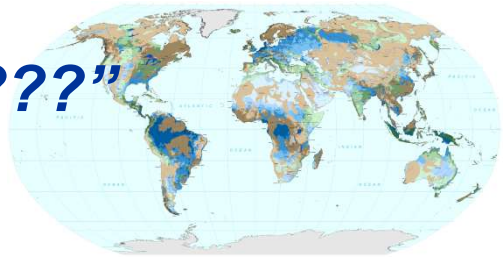
Federal Institute for Geosciences and Natural Resources (BGR)

BGR Bundesanstalt für Geowissenschaften und Rohstoffe

GEOZENTRUM HANNOVER

Motivation

"WHY this MAP ???"



- rising political and public awareness of groundwater in discussions on global water issues

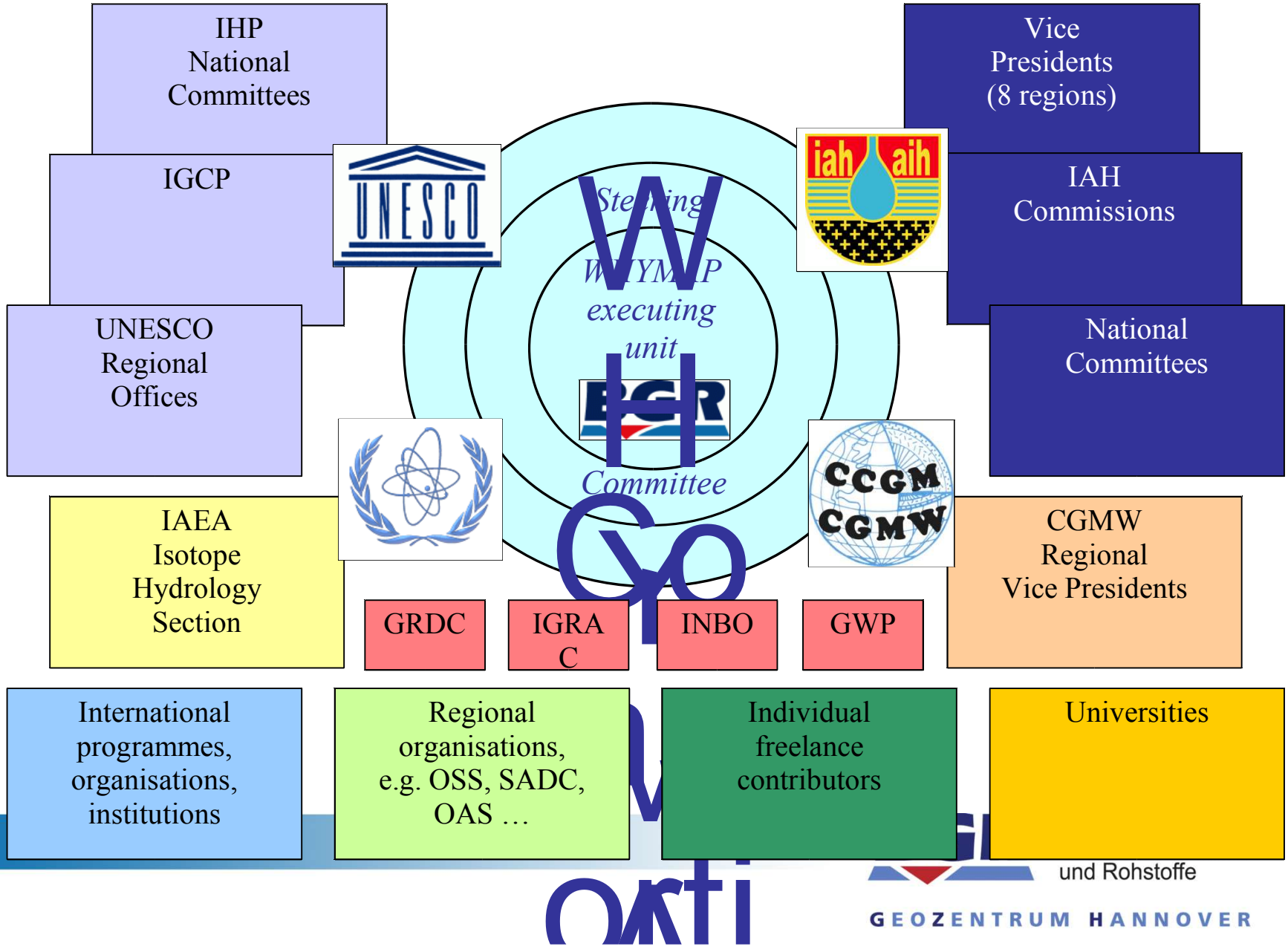
- communicate groundwater related information in an appropriate way to experts as well as non-experts

- educational purposes

- contribute to the world-wide efforts to better study and manage aquifer resources (knowledge still weak in many places)

- groundwater as a possible solution of increasing water shortage problems ("water crisis")

The WHYMAP Network



und Rohstoffe

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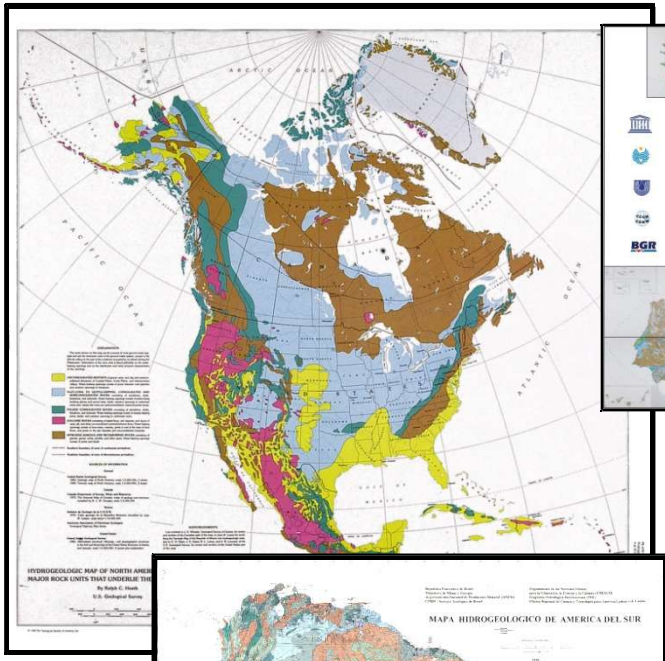
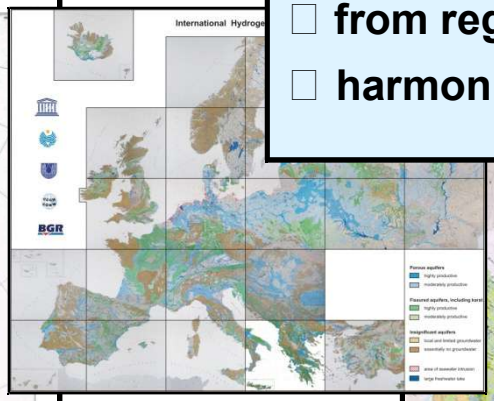
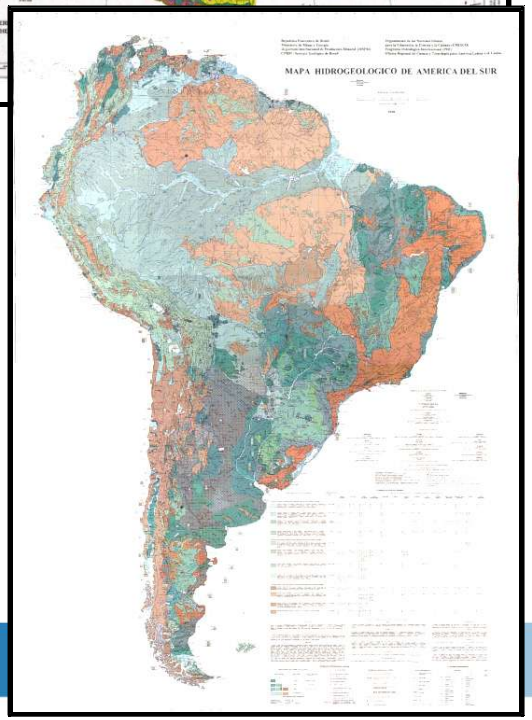
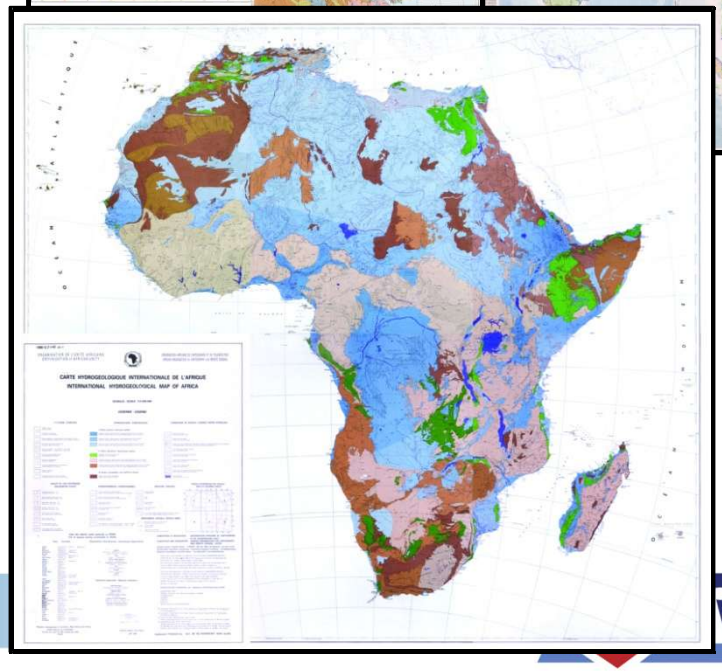
key ideas

- from regional and continental to global
- harmonised view of groundwater resources









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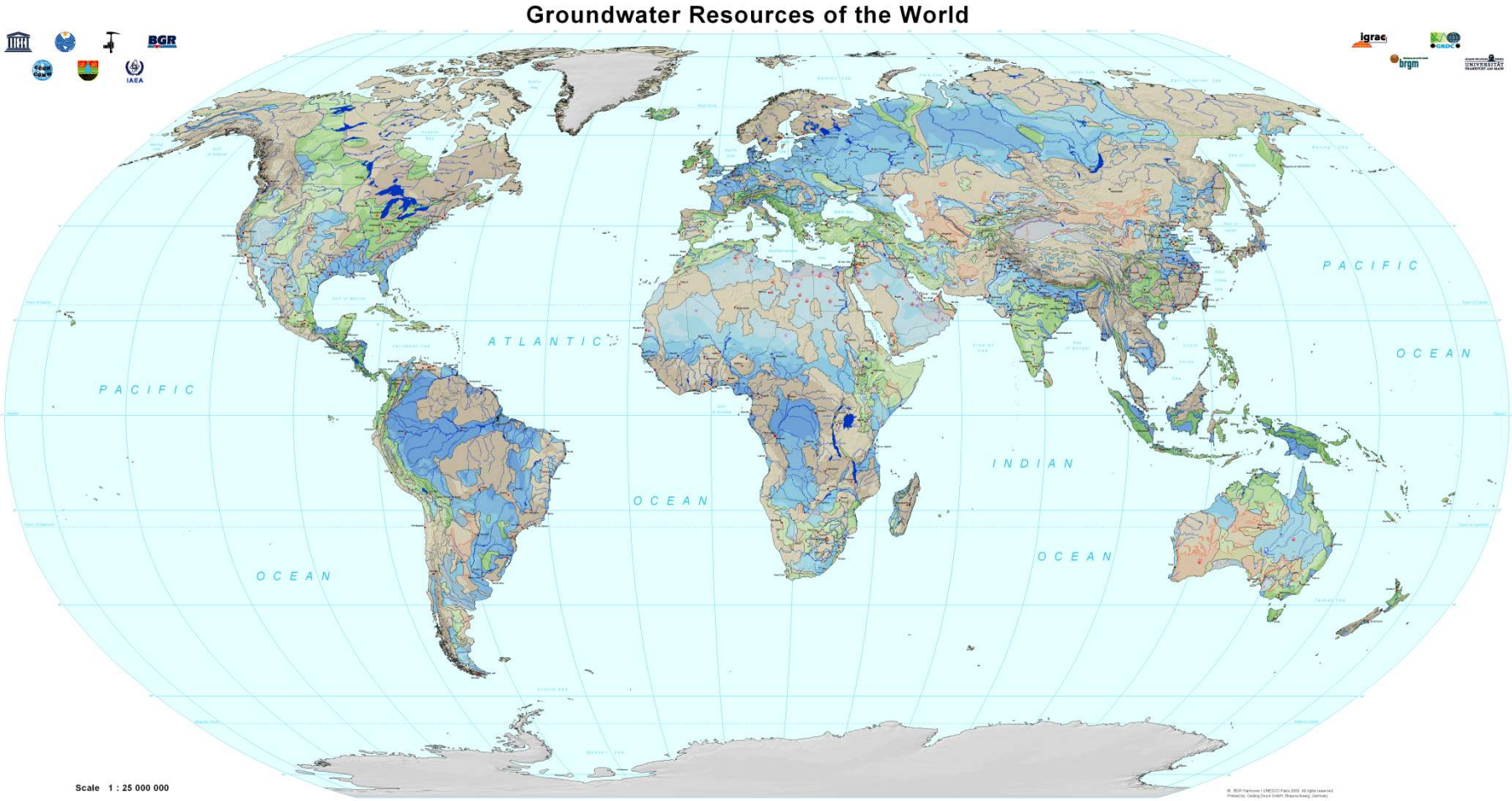
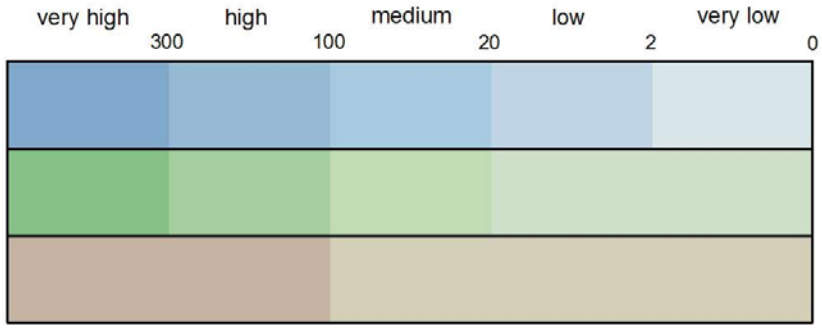
global map of groundwater resources



Map legend

Groundwater Resources of the World 1 : 25 000 000

Groundwater resources and recharge (mm/year)



in major groundwater basins

in areas with complex hydrogeological structure

in areas with local and shallow aquifers

Special groundwater features

area of saline groundwater (> 5 g/l total dissolved solids (TDS))

natural groundwater discharge area in arid regions

area of heavy groundwater abstraction with over-exploitation

area of groundwater mining

selected wetland, mostly groundwater related

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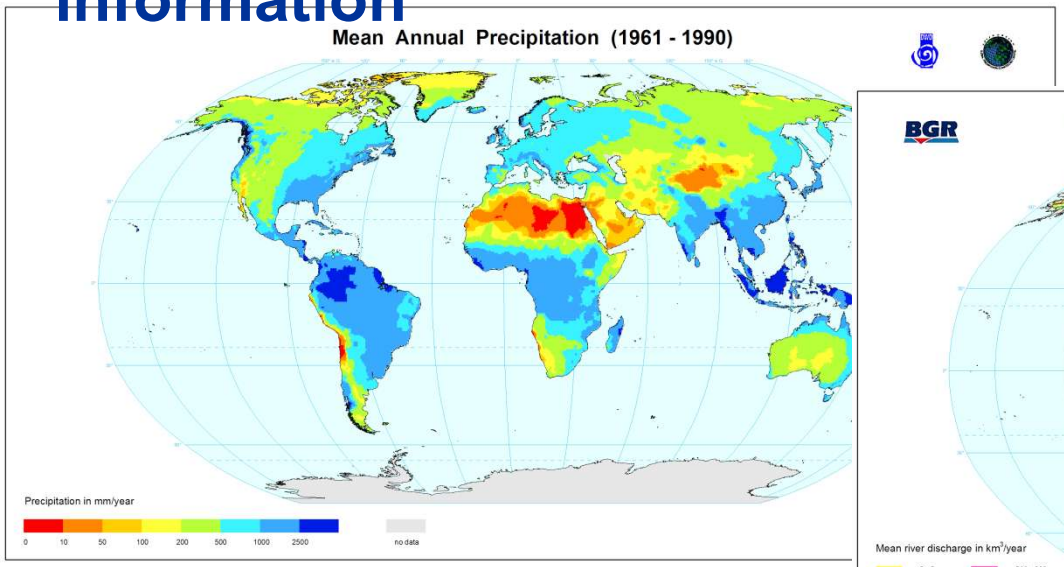
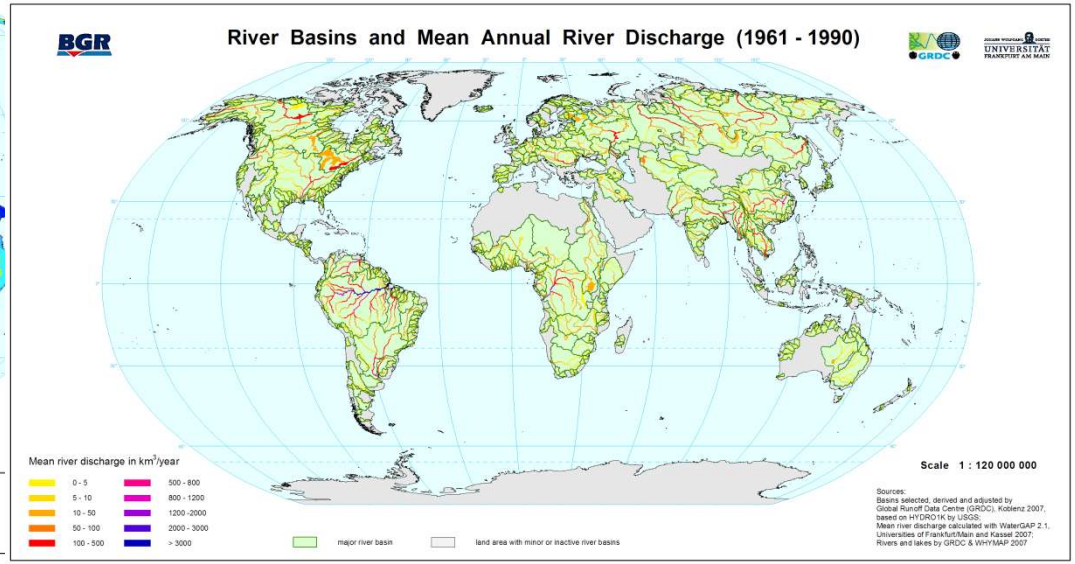
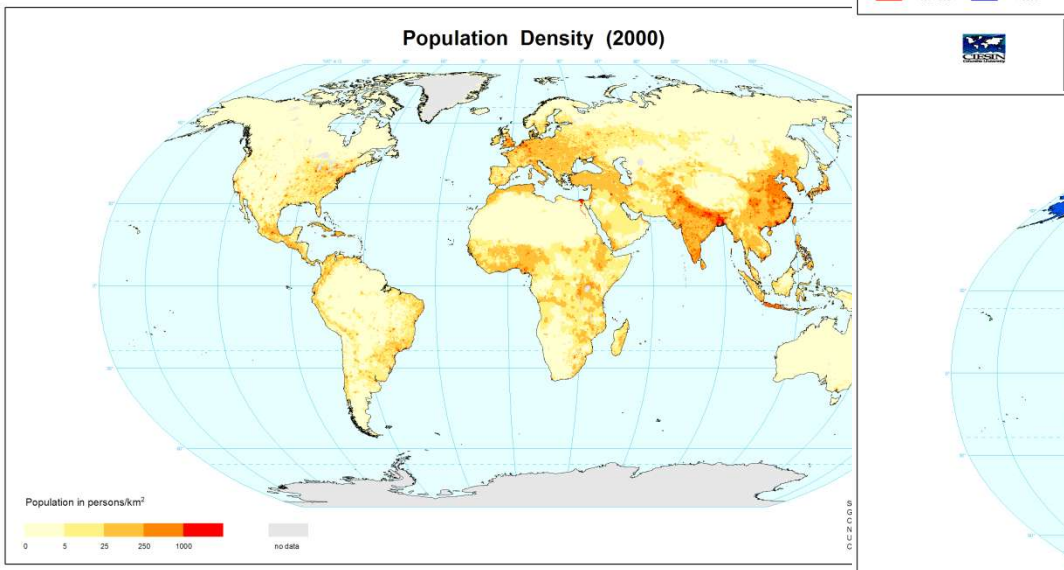
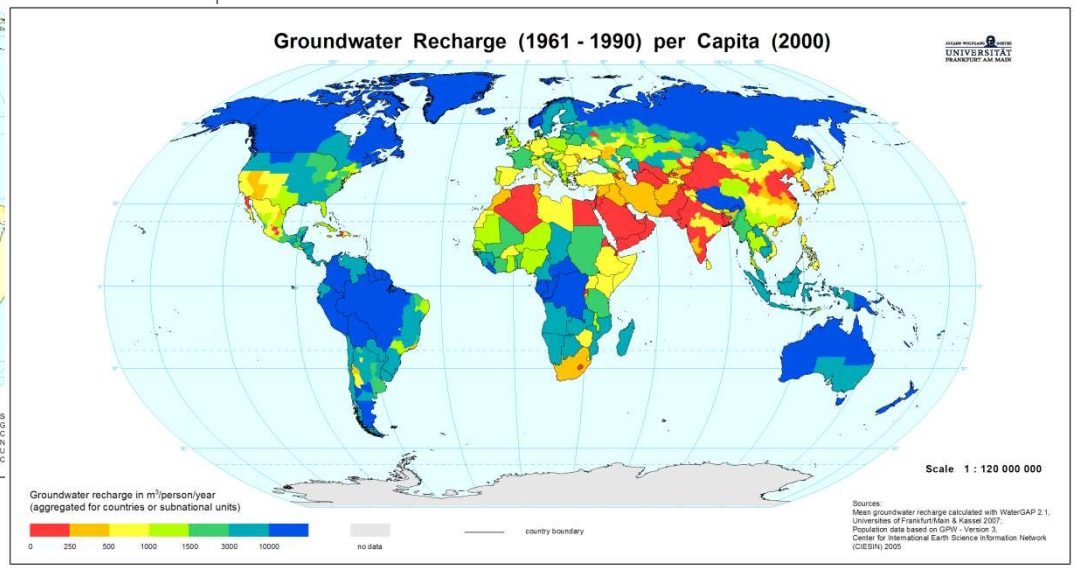
Insert maps with additional groundwater related information

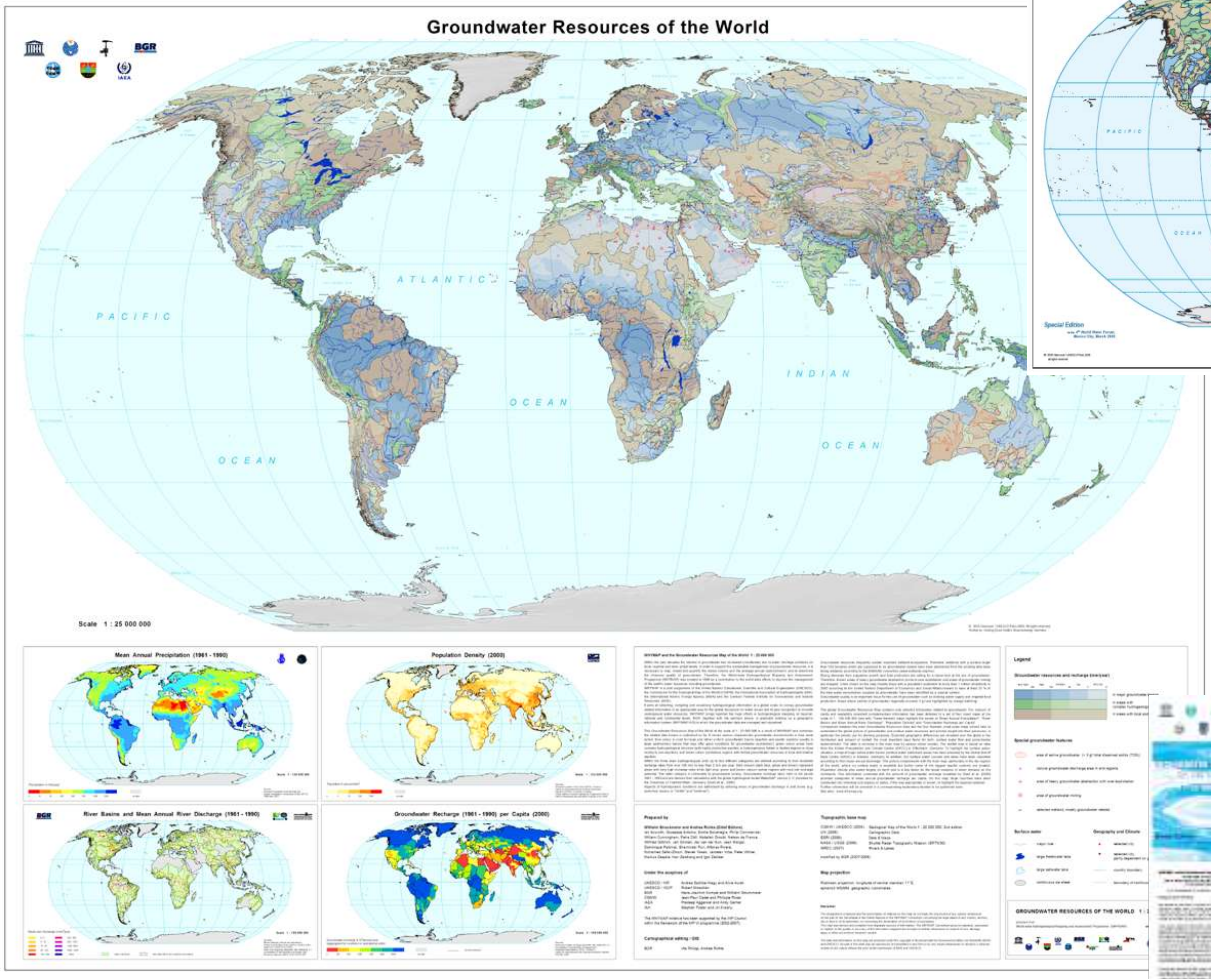


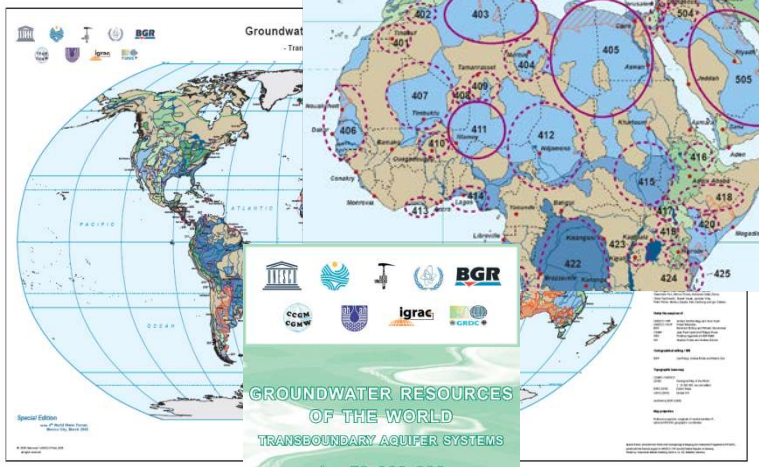


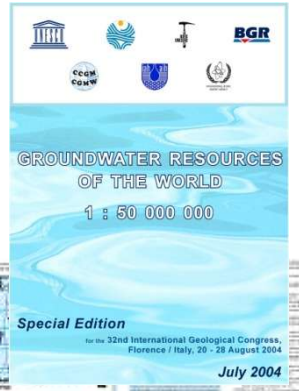




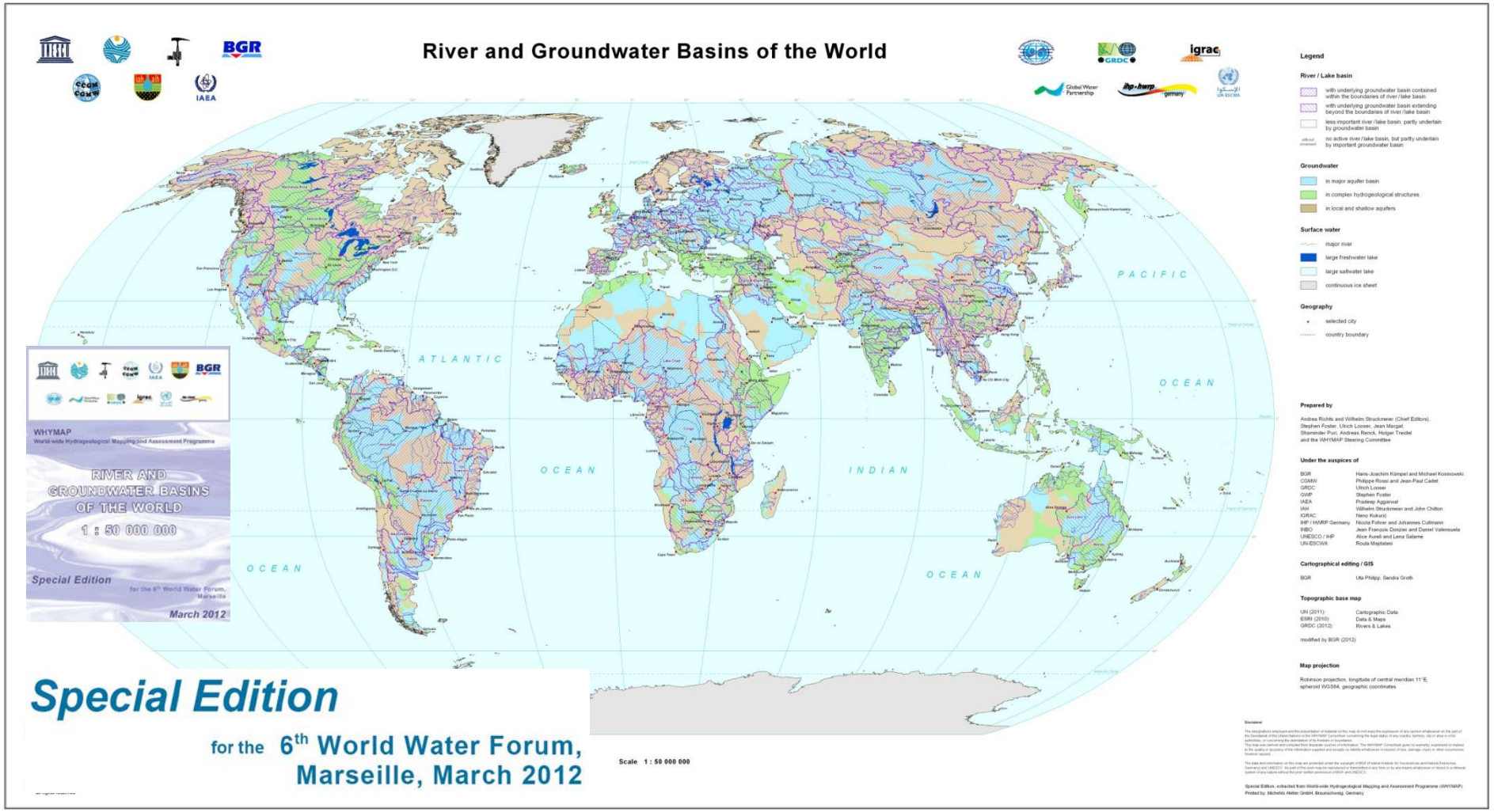
The global groundwater resources maps 1/25 M and 1/50M





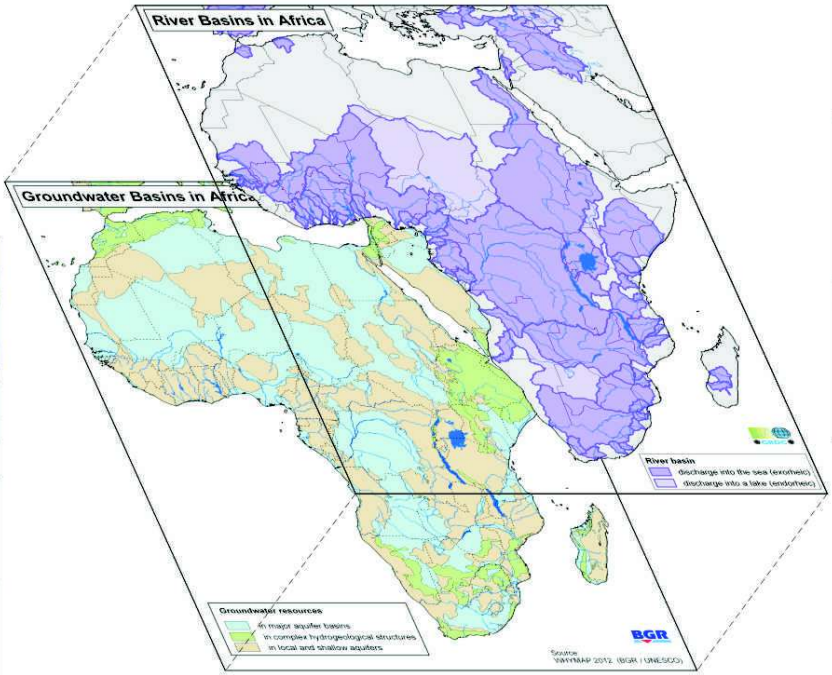


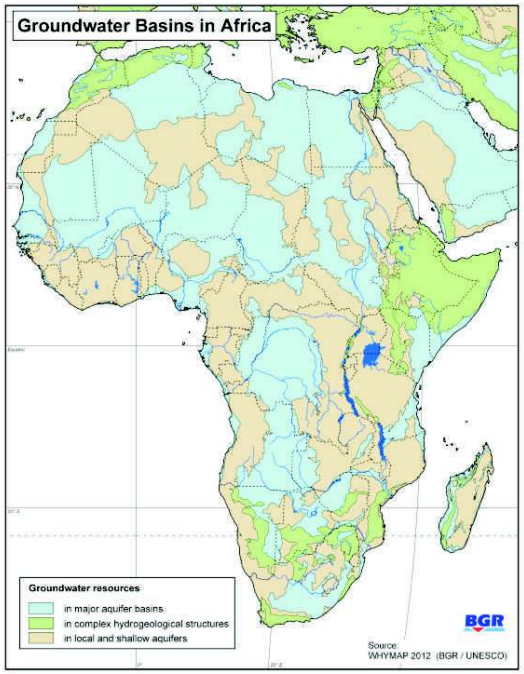
Global Map of River and Groundwater Basins

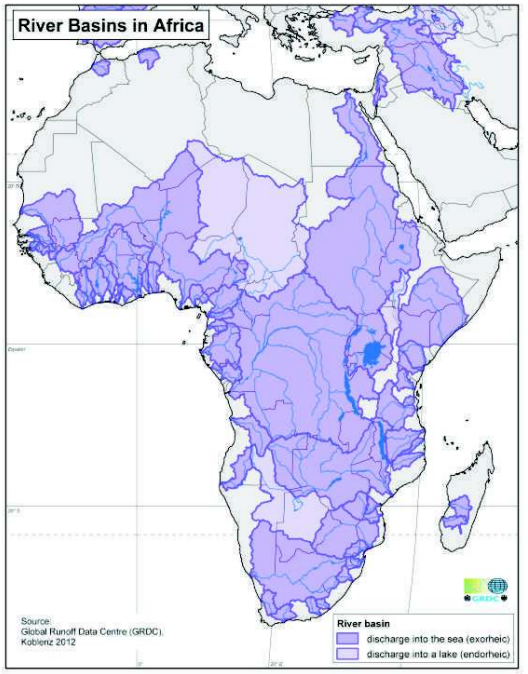


Surface Water vs. Groundwater

- comparing river/lake basins and aquifer systems



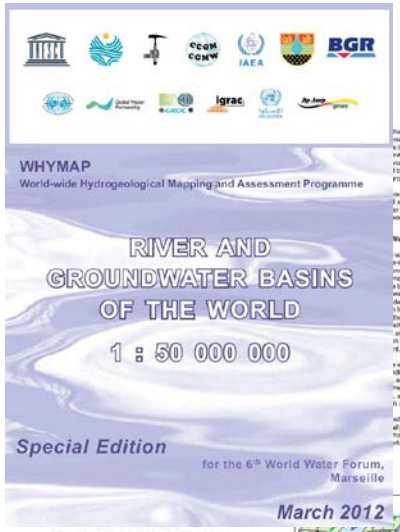


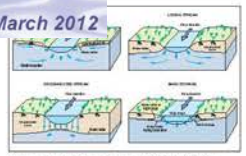


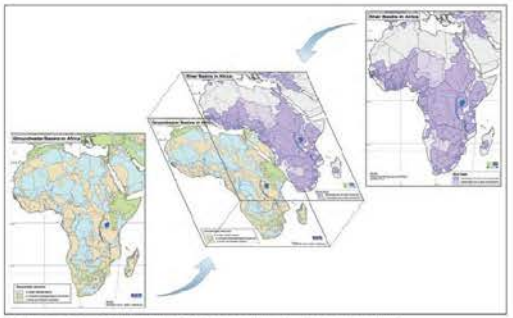
- boundaries and sizes often differ radically → management units
- both have to be addressed in IWRM

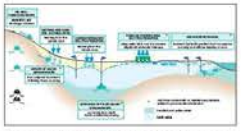
Global Map of River and Groundwater Basins

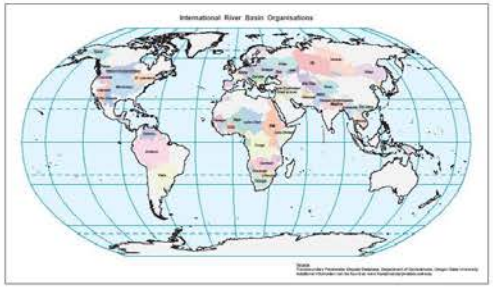
- explanatory notes -

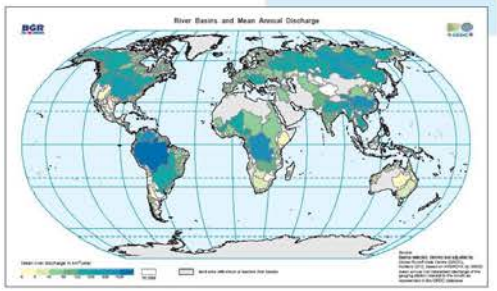












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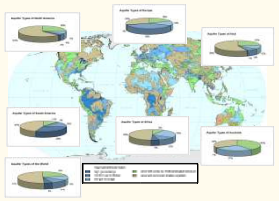
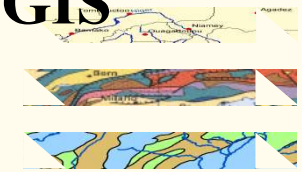
Products

groundwater resources **maps** 1/50 M & 1/25 M

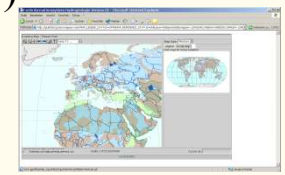
analyses



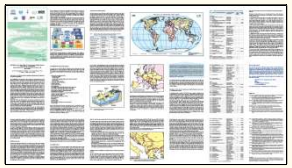
WHYMAP GIS



Mapping Application for visualisation of WHYMAP data & information system on hydrogeological mapping („**WHYMIS**“)



explanatory notes / booklet



contributions to external publications, atlases, etc.

e.g. small **sketch-maps**

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BGR - Whymap - Mozilla Firefox

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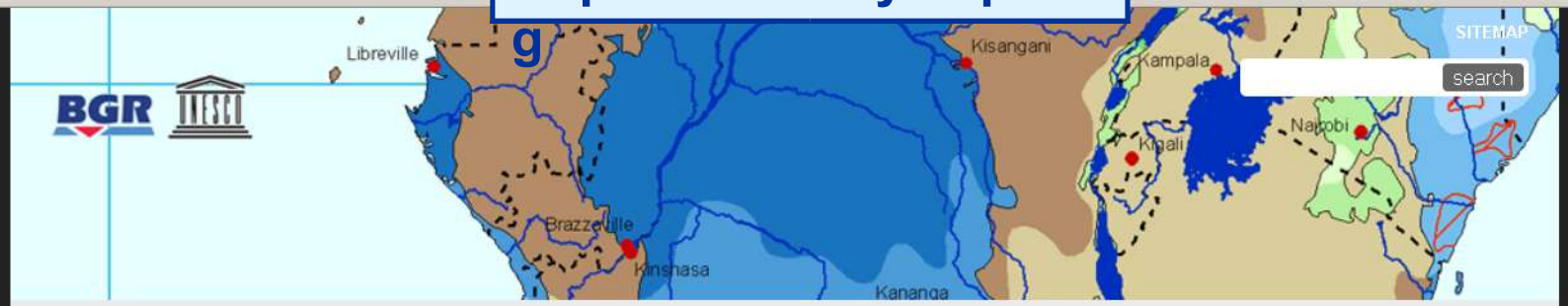
BGR - Whymap

www.whymap.org/whymap/EN/Home/whymap_node.html

http://www.whymap.org

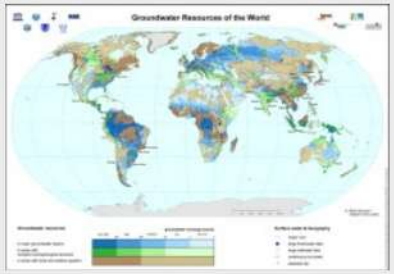
Google



- **About WHYMAP**
- **Products**
- **Statistics**
- **Map applications/services**
- **Downloads**

Whymap

World-wide Hydrogeological Mapping and Assessment Programme (WHYMAP)



Groundwater resources of the world
Source: *BGR & UNESCO*

Groundwater is the largest accessible and often still untapped freshwater reservoir on earth. Its world-wide resources are assessed at 10.5 million km³. The increasing number of regional water shortages and water crises can only be met with a rational and sustainable use of this resource. Such sustainable use requires understanding and knowledge as well as careful planning and management. Yet, information on this hidden resource is still weak in many places.

In order to provide data and information about the major groundwater resources of the world and thus make a contribution to their reasonable management and protection the World-wide Hydrogeological Mapping and Assessment Programme (WHYMAP) was launched in 2000.

The programme compiles data on groundwater from national, regional and global sources, and visualises them in maps, web map applications and services. The generated products provide information on quantity, quality and vulnerability of the groundwater resources on earth and help communicating groundwater related issues to water experts as well as decision makers and the general public.

Service

Contact

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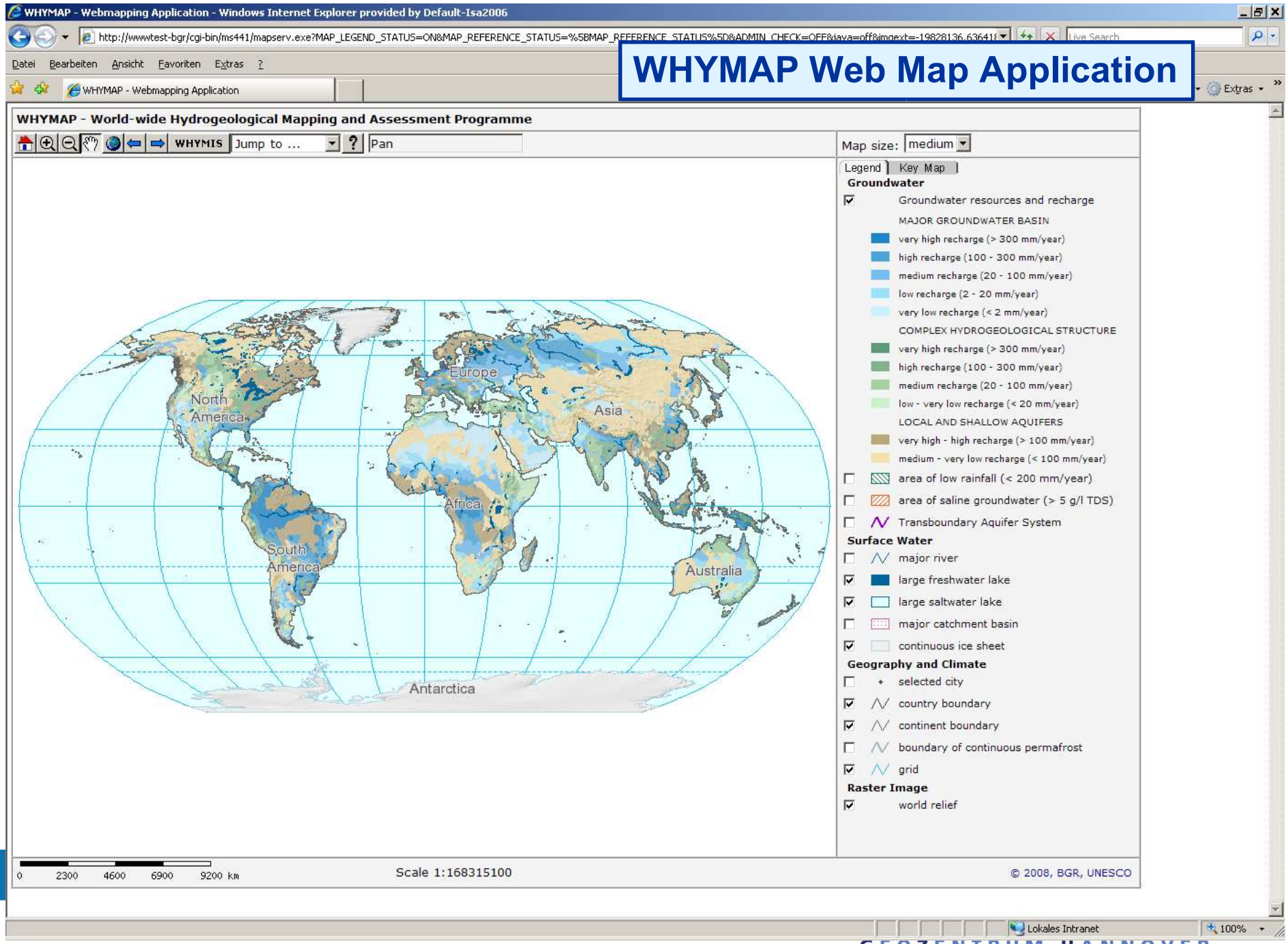
WHYMAP Web Map Application



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WHYMIS – Map Information System

WHYMIS, World-wide Hydrogeological Map Information System - Mozilla Firefox

Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe

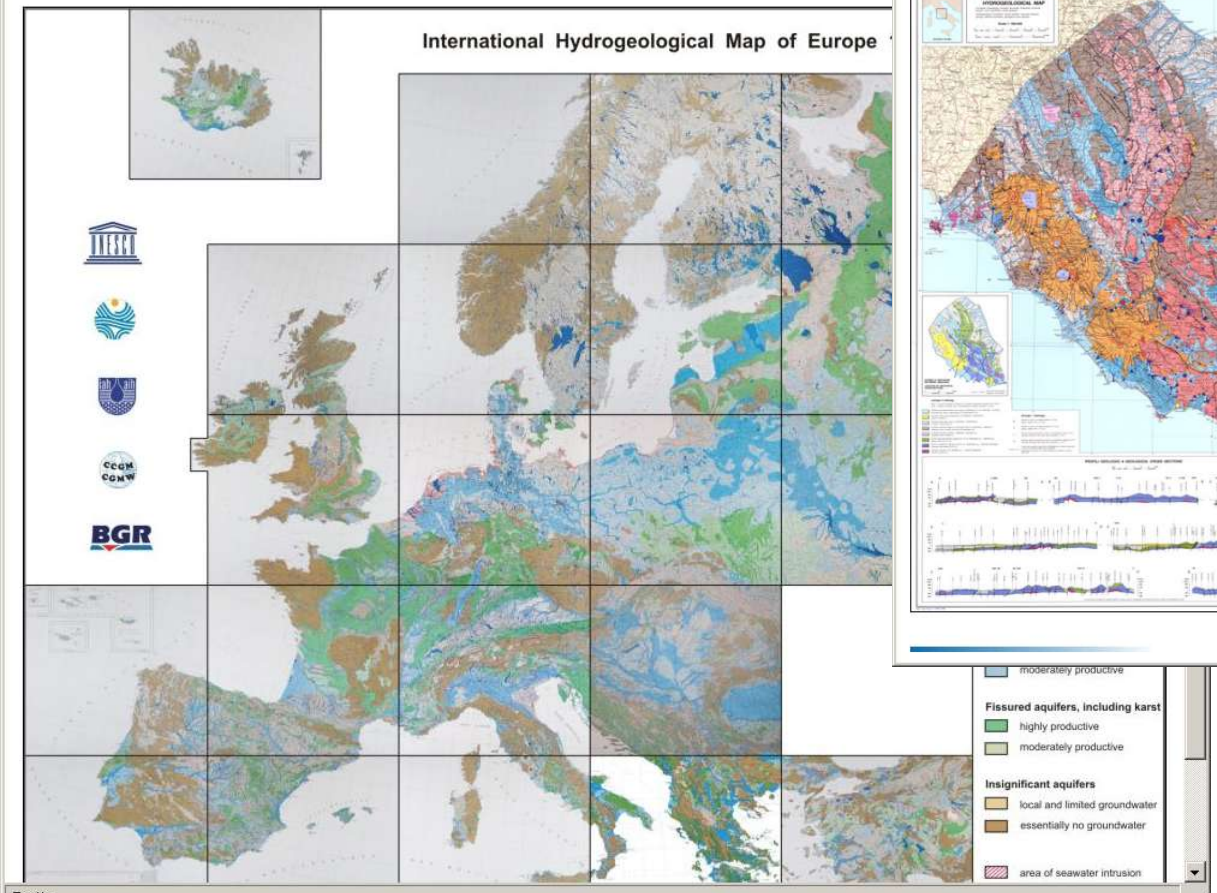
http://www.bgr.de/app/fishy/whymis/index.php?type=continent&id=3

Meistbesuchte Seiten Erste Schritte Aktuelle Nachrichten - ...

WHYMIS, World-wide Hydrogeological Map Information System

Europe

Title:	International Hydrogeological Map of Europe (IHME 1500)
Scale:	1: 1 500 000
Year:	1960 - 2005
Publisher:	Federal Institute for Geosciences and Natural Resources (BGR) & United Nations Educational, Scientific and Cultural Organization (UNESCO)
Internet:	http://www.bgr.bund.de
Web Mapping:	http://www.bgr.de/app/ihme1500/
Legend:	Legend



Fertig

Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe

BGR - Map applications and services | WHYMIS, World-wide Hydrogeological Ma...

www.bgr.de/app/fishy/whymis/index.php?&type=country&id=ITA

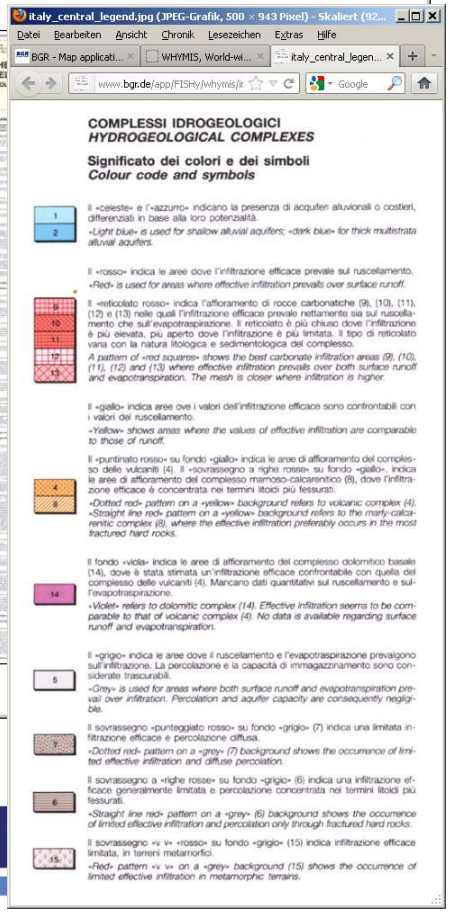
WHYMIS, World-wide Hydrogeological Map Information System

Italy

Title:	Hydrogeological Scheme of Central Italy - Hydrogeological Map / Shema Idrogeologico dell'Italia Centrale - Carta Idrogeologica
Scale:	1 : 500 000
Year:	1987
Editor:	Boni, C., Bono, P. & Capelli, G.
Publisher:	Centro di Studio per la Geologia dell'Italia Centrale, Roma
Int. Number:	ISSN 0375-9857
Legend:	Legend

italy_central_legend.jpg (JPEG-Grafik, 500 × 943 Pixel) - Skaliert (92...

Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe



COMPLESSI IDROGEOLOGICI
HYDROGEOLOGICAL COMPLEXES

Significato dei colori e dei simboli
Colour code and symbols

1 2

Il «celeste» e l'«azzurro» indicano la presenza di acquiferi alluvionali o costieri, differenziati in base alla loro potenzialità.
«Light blue» is used for shallow alluvial aquifers; «dark blue» for thick multistrata alluvial aquifers.

Il «rosso» indica le aree dove l'infiltrazione efficace prevale sul ruscellamento.
«Red» is used for areas where effective infiltration prevails over surface runoff.

9 10 11 12 13

Il «reticolato rosso» indica l'affioramento di rocce carbonatiche (9), (10), (11), (12) e (13) nelle quali l'infiltrazione efficace prevale nettamente sia sul ruscellamento che sull'evapotraspirazione. Il reticolato è più chiuso dove l'infiltrazione è più elevata, più aperto dove l'infiltrazione è più limitata. Il tipo di reticolato varia con la natura litologica e sedimentologica del complesso.
A pattern of «red squares» shows the best carbonate infiltration areas (9), (10), (11), (12) and (13) where effective infiltration prevails over both surface runoff and evapotranspiration. The mesh is closer where infiltration is higher.

Il «giallo» indica aree ove i valori dell'infiltrazione efficace sono confrontabili con i valori del ruscellamento.
«Yellow» shows areas where the values of effective infiltration are comparable to those of runoff.

4 8

Il «puntinato rosso» su fondo «giallo» indica le aree di affioramento del complesso delle vulcaniti (4). Il «sovrassegno a righe rosse» su fondo «giallo», indica le aree di affioramento del complesso marnoso-calcarenitico (8), dove l'infiltrazione efficace è concentrata nei termini litoidi più fessurati.
«Dotted red» pattern on a «yellow» background refers to volcanic complex (4). «Straight line red» pattern on a «yellow» background refers to the marly-calcarenitic complex (8), where the effective infiltration preferably occurs in the most fractured hard rocks.

14

Il fondo «viola» indica le aree di affioramento del complesso dolomitico basale (14), dove è stata stimata un'infiltrazione efficace confrontabile con quella del complesso delle vulcaniti (4). Mancano dati quantitativi sul ruscellamento e sull'evapotraspirazione.
«Violet» refers to dolomitic complex (14). Effective infiltration seems to be comparable to that of volcanic complex (4). No data is available regarding surface runoff and evapotranspiration.

5

Il «grigio» indica le aree dove il ruscellamento e l'evapotraspirazione prevalgono sull'infiltrazione. La percolazione e la capacità di immagazzinamento sono considerate trascurabili.
«Grey» is used for areas where both surface runoff and evapotranspiration prevail over infiltration. Percolation and aquifer capacity are consequently negligible.

7

Il sovrassegno «punteggiato rosso» su fondo «grigio» (7) indica una limitata infiltrazione efficace e percolazione diffusa.
«Dotted red» pattern on a «grey» (7) background shows the occurrence of limited effective infiltration and diffuse percolation.

6

Il sovrassegno a «righe rosse» su fondo «grigio» (6) indica una infiltrazione efficace generalmente limitata e percolazione concentrata nei termini litoidi più fessurati.
«Straight line red» pattern on a «grey» (6) background shows the occurrence of limited effective infiltration and percolation only through fractured hard rocks.

15

Il sovrassegno «v v» «rosso» su fondo «grigio» (15) indica infiltrazione efficace limitata, in terreni metamorfici.
«Red» pattern «v v» on a «grey» background (15) shows the occurrence of limited effective infiltration in metamorphic terrains.

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GEOZENTRUM HANNOVER

WHYMIS – Map Information System

WHYMIS, World-wide Hydrogeological Map Information System - Mozilla Firefox

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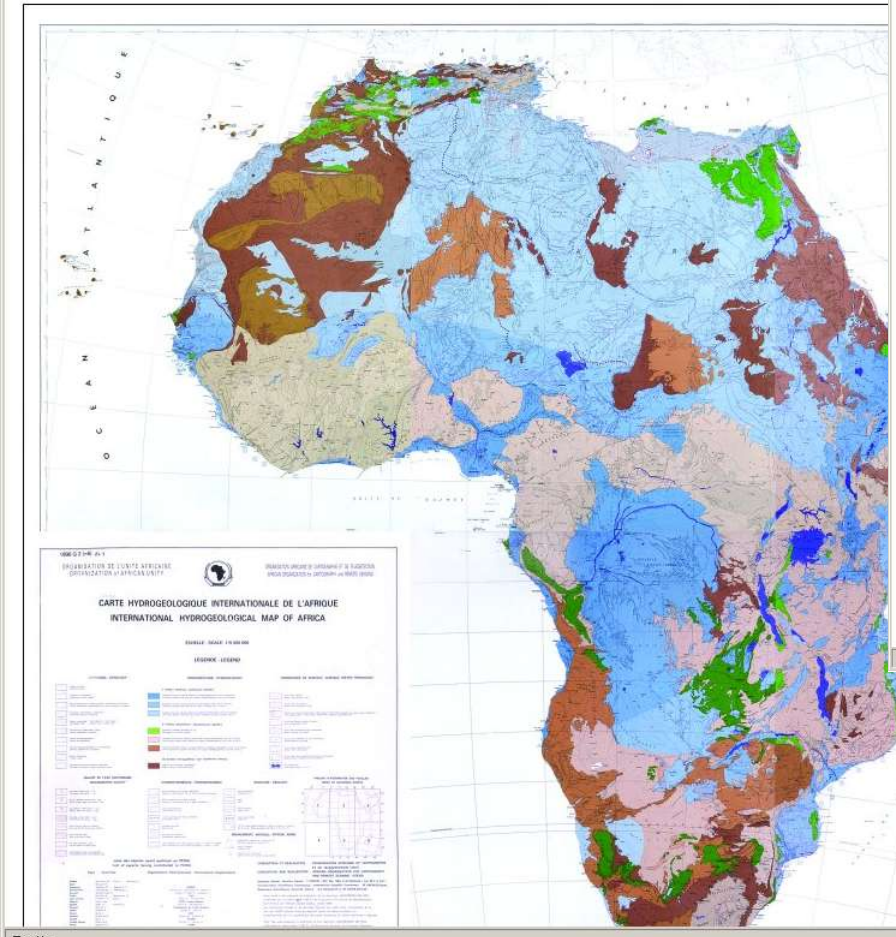
http://www.bgr.de/app/fishy/whymis/index.php?type=continent&id=4

Meistbesuchte Seiten Erste Schritte Aktuelle Nachrichten - ...

WHYMIS, World-wide Hydrogeological Map Information System

Africa

Title:	International Hydrogeological Map of Africa
Scale:	1: 5 000 000
Year:	1992
Editor:	Safar Zitoun, M. & Nouiouat, A.C.
Publisher:	Organisation Africaine de Cartographie et de Télédétection (OACT)
Legend:	Legend



Fertig

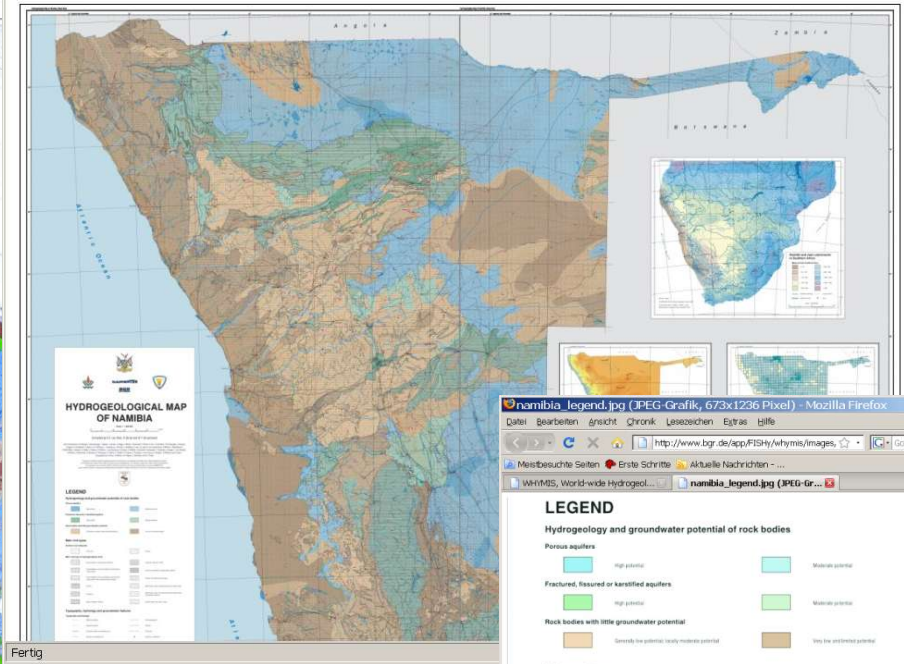
Meistbesuchte Seiten Erste Schritte Aktuelle Nachrichten - ...

WHYMIS, World-wide Hydrogeological Map Information System

Namibia

Map no. 1

Title:	Hydrogeological Map of Namibia
Scale:	1 : 1 000 000
Year:	2001
Editor:	Wyk, A.E. van, Strub, H. & Struckmeier, W.F.
Publisher:	Geological Survey Namibia, Department of Water Affairs, Windhoek & Bundesanstalt für Geowissenschaften und Rohstoffe (BGR), Hannover
Int. Number:	ISBN 0-86976-571-X
Legend:	Legend



Fertig

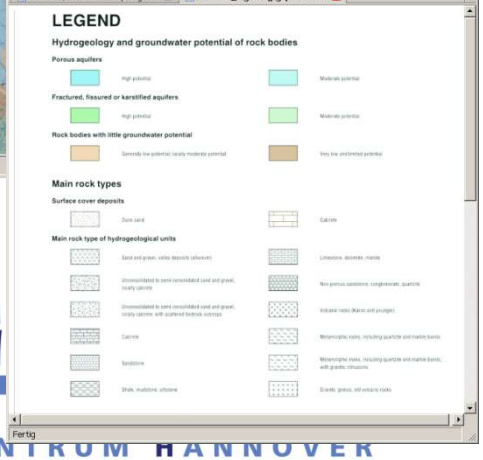
namibia_legend.jpg (JPEG-Grafik, 673x1236 Pixel) - Mozilla Firefox

Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe

http://www.bgr.de/app/FISHy/whymis/images,

Meistbesuchte Seiten Erste Schritte Aktuelle Nachrichten - ...

WHYMIS, World-wide Hydrogeol... namibia_legend.jpg (JPEG-Gr...



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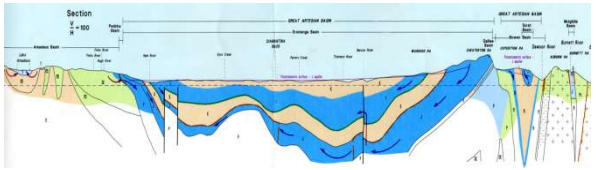
Outlook: next steps of WHYMAP

- **correction and improvement of the existing maps**
- **compilation of new thematic** layers (e.g. karst, submarine gw-discharge, climate change/population growth, etc.)
- **towards the third dimension: include hydrogeological sections**



- **preparation of new map products**
- **WHYMAP information system “WHYMIS”: complete / establish a network and information base for “map makers” of gw maps**

more information available at

www.whymap.org

contact:

whymap@bgr.de

THANK YOU!

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