Groundwater — Resources and Management

BGR

Sustainable Groundwater Management for Tomorrow's Livelihoods

Strategies and Products

Federal Institute for Geosciences and Natural Resources (BGR), Germany

Commissioned by:

Federal Ministry for Economic Cooperation and Development

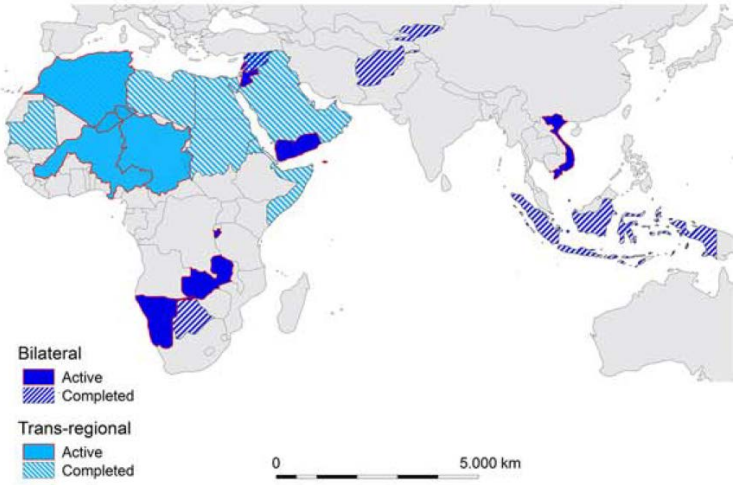
Making Groundwater an Integral Part of Integrated Water Resources Management (IWRM)

BGR's Guiding Principle in the Field of Groundwater Management

As Germany's official implementing agency for development cooperation (DC) in the geo-sector, BGR supports partner countries in improving sustainability of groundwater management and embedding groundwater into integrated water management approaches. With adapted advisory instruments, BGR contributes to the broader process of implementing Integrated Water Resources Management (IWRM) and hence supports structural reforms in the water sector.

BGR has long lasting experience in advisory services to partner countries. Since the 1960's BGR has been working in more than 60 countries all over the world.

BGR Partner Countries in the Groundwater Sector in 2018



Applied Research and Implementation

The unique characteristic of BGR's development cooperation is the linkage between research experience and implementation. Through our in-house R&D capacities, we are able to provide scientifically based advice in all fields, from technical services to governance issues. In addition, BGR combines various geo-related disciplines and can thus build interdisciplinary teams that can analyse groundwater related tasks from different angles.

Networking and International Cooperation

BGR cooperates with a large number of German and international organisations to create synergies and to bring its knowledge into political processes. In the projects in the groundwater sector BGR closely cooperates with other agencies of the German DC or international donors, e.g. the World Bank.

In addition, we are involved in international policy dialogues to support and influence global water policy with regard to groundwater.

Informed Decisions for IWRM

Assessing Resources - Managing Resources – Securing Future Livelihoods

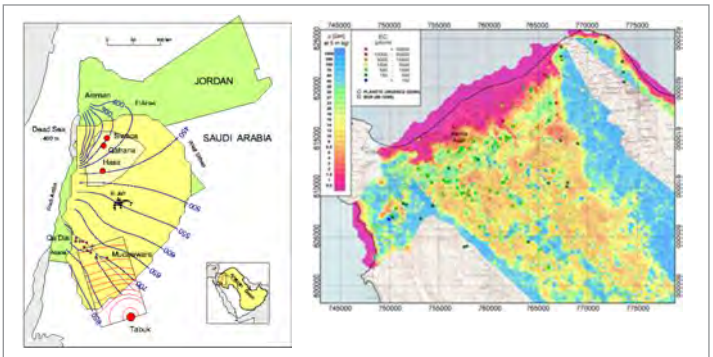
Integrated Water Resources Management requires reliable information on the resources as well as on socio-economic developments. In many countries however, such information is not sufficiently available. A lack of capacity and institutional constraints often hinder the gathering and exchange of information on groundwater. Therefore BGR supports partner organisations in implementing monitoring programmes, analysing data and providing information for decision making. BGR also implements capacity building programmes and support organisational reforms for improving the performance of sector institutions in partner countries. The main fields of activities include:

Resources Assessment

- Groundwater investigation using geophysical, hydrogeological and geochemical field methods
- Establishment of monitoring programmes (assessment of groundwater levels, groundwater quantity and quality, variability and recharge mechanisms)
- Identification of surface water - groundwater interactions
- Modelling of groundwater flow systems

Human Impacts on Natural Systems

- Risk and vulnerability mapping
- Identification of pollution sources, pathways and receptors
- Recommendations for adequate groundwater treatment /rehabilitation
- Identification of appropriate forms of land use (e.g. location of waste dumps)
- Delineation of water protection zones
- Modelling of contaminant transport in groundwater



Modelling and geophysical assessment are important management tools and part of BGR´s key competences

Information for Decision Making

- Development of Decision Support Systems (DSS)
- Enhancing data exchange mechanisms and strengthening dialogue between institutions
- Prognosis about anthropogenic impacts (e.g. change in long term use) on groundwater systems
- Assessment of alternative water sources (e.g. artificial recharge or usage of brackish groundwater)

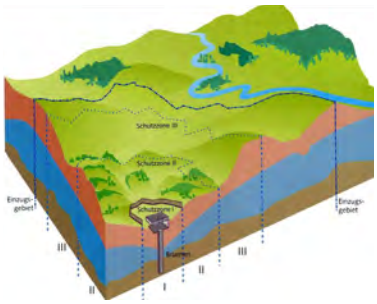
Framework for Sustainable Water Management

Good Groundwater Governance

Water management often requires difficult decisions on the allocation of scarce resources among concurring interests. Therefore a balance between economic, social and ecological considerations needs to be found for each individual location / case. Participative and transparent decision making is thus fundamental for sustainable water management. BGR contributes to this process by enhancing science based knowledge management and informed decisions which enable the partner countries to build functioning governance structures for their groundwater resources.

Water Resources Planning

- Assessment of hydrogeological, ecological, social and economic consequences of management decisions concerning water and land use
- Integration of best practices of sustainable groundwater management into national water policy
- Support to participative mechanisms



BGR supports partner countries in delineating and implementing groundwater protection zones.

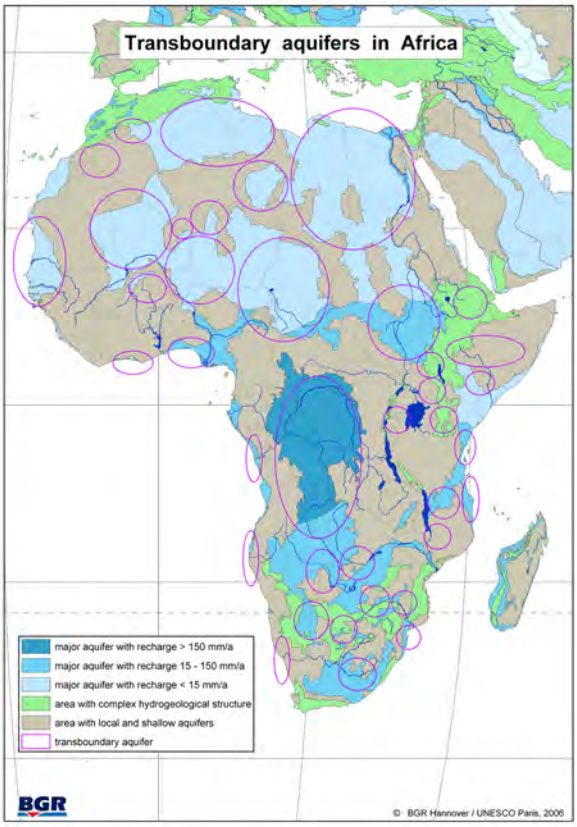
Legal Regulations

- Licensing of groundwater investigations, drilling of boreholes and groundwater abstractions
- Developing and improving national water laws and by-laws as well as international law with regard to groundwater use and protection
- Elaboration of water quality standards
- Establishment of transparent reporting systems

Cooperation on Transboundary Groundwater Resources

From Scientific to Political Cooperation

Managing water within its natural basin structures is a fundamental principle of IWRM. Groundwater flows in complex three dimensional geological structures often crossing political borders. Hence a cooperative management and sharing of benefits between the respective riparian states help to avoid negative transboundary impacts. However, managing transboundary aquifers is challenging, as the hydrogeological boundaries of aquifers -if at all known- often do not coincide with the boundaries of surface water catchments. This is particularly important in arid and semi-arid regions. BGR supports cooperation efforts by technical assistance to national or regional (transboundary) institutions as well as on the political level.



Political Agenda Setting

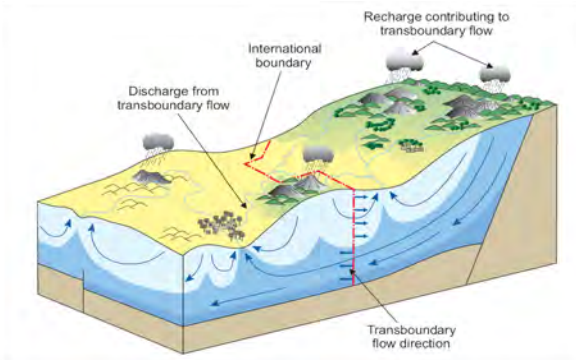
- Engagement in international dialogues on transboundary water and groundwater
- Lobbying for regional and global legal arrangements, as well as financing mechanisms to provide incentives for cross-border cooperation

Support for Institution Building

- Advise to River / Lake Basin Organisations for integrating groundwater into their scope of work
- Support for setting up and developing Aquifer Management Organisations
- Integration of national information at regional level

Strengthening Regional Capacity

- Convening regional fora for knowledge exchange and support of regional networks
- Development of technical guidance and recommendations for transboundary groundwater management



Source: Adapted from UNESCO/ISARM 20004

Groundwater flow systems are generally more complex than surface water systems

Conclusions and Outlook: The Growing Importance of Groundwater

Groundwater for Human Development

In large parts of the world, groundwater is the main resource for drinking water supply and an important factor for economic growth. Without an integrated management, however, people will not be able to develop long lasting benefits from these resources and patterns of usage will tend to be unsustainable.

Future global and regional climate scenarios tell us today that temparature and precipitation patterns will change around the globe. In many places longer and more frequent droughts as well as an increase in torrential rainfall events may be the consequences. This will also have its impact on groundwater recharge and in the long term on the availability of groundwater.

The changing natural conditions require adequate measures of adaptation. The sustainable use of groundwater will be a vital element of adaptation strategies as these resources are less vulnerable to seasonal variations in precipitation and may still offer water years after rivers ran dry. Thus the enhanced support to improve groundwater management is one of the key tasks for ensuring tomorrow's water supply.

BGR supports partner countries with science based advisory services to manage their water resources in a sustainable manner. This contributes directly to the improvement of people's living conditions and to the conservation of nature without compromising the needs of further generations.

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