



A GUIDE TO ONLINE AND ACCESSIBLE RESOURCES ON GROUNDWATER

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INTRODUCTION

Groundwater is essential for people and ecosystems world-wide, especially in low income countries where large water utilities that use surface water are less common. For example, between two-thirds and three-quarters of Sub-Saharan Africans rely on groundwater for drinking, washing, cooking, livestock watering, and irrigation.¹ Yet the potential of groundwater is often misunderstood—too often, it is “out of sight, out of mind”. Challenges include how to access and use groundwater, as well as over-exploitation and pollution. Good information can support better use and management of this essential resource.

Many reports, guides, databases, text-books, maps, learning aids and other material with information on groundwater are available on-line for free; the challenge is to know where to find them. This Practices, Research and Operations in Water, Sanitation and Hygiene (PRO-WASH)² curated guide provides a list of some of the

¹ Cobbing and Hiller (2019) Waking a sleeping giant: Realizing the potential of groundwater in Sub-Saharan Africa. World Development 122 pp 597–613

² PRO-WASH is an initiative funded by USAID’s Bureau for Humanitarian Assistance (BHA) and led by Save the Children. PRO-WASH supports partners to improve WASH work through capacity strengthening, knowledge sharing, and applied WASH research opportunities. Please contact us at prowash@savechildren.org

organizations and websites that make these knowledge resources available. The main audience for this guide is the US Agency for International Development (USAID)'s Resilience Food Security Activities (RFSAs) and other partners working on water, sanitation and hygiene (WASH), food security, and integrated water resource management (IWRM). The guide is focused on Sub-Saharan Africa, but is also relevant to groundwater elsewhere. The resources provide useful information in many areas, such as planning and managing water supplies; improving resilience; boosting food security, capacity strengthening and teaching; and green infrastructure management.

The listings are in alphabetical order, with the following icons as a guide to help you in what you're looking for:



Groundwater reports, databases, maps, and spatial data



Groundwater resources for teachers and children



Groundwater textbooks and manuals



Offers direct advice by email or phone on groundwater issues



Mentoring, support and resources for young groundwater practitioners



News, announcements, webinars, conferences and other groundwater-related events

Most of the resources listed here are free to view or download. Please observe and respect copyright or other restrictions that are placed on the material by the publishers, and give proper credit for their use where required. **USAID and PRO-WASH are not responsible for the accuracy of any of the resources, and cannot be held liable for their use.** Please email us at PRO-WASH (prowash@savechildren.org) if you are searching for something specific and cannot find it, or have a groundwater-related problem but are not sure which resource would be most helpful.



AFRICA GROUNDWATER ATLAS

<https://www2.bgs.ac.uk/africagroundwateratlas/index.cfm>



Much of the data that already exists on groundwater in Africa is not easily available to the people who could make use of it. The **Unlocking the Potential of Groundwater** for the Poor (UPGRO) Project and the **British Geological Survey** (BGS) have worked with partners across Africa to make more of this information freely accessible. Users must register on the website to help BGS support future developments, but this is simple and downloads are free.

The information is divided into two parts:

1. The **Africa Groundwater Atlas** summarizes the hydrogeology of each African country and provides a gateway to further information. The “Hydrogeology by Country” section of the atlas includes downloadable country hydrogeology maps in geographic information system (GIS) format (shapefile or .shp) for thirty-eight African countries.
2. The **Africa Groundwater Literature Archive** is a searchable online database with nearly 7,000 references for literature about groundwater in Africa. There are thousands of links to downloadable full-text documents and abstracts, including BGS reports, which are free of charge.

AFRICA GROUNDWATER NETWORK

<http://agw-net.org/>



The **Africa Groundwater Network** (AGW-NET) was established to increase awareness across the continent of the value of groundwater and to contribute to capacity building in the groundwater sector. New members working in groundwater in Africa are welcome to join the Network. AGW-NET facilitates groundwater training, and has produced a **manual** on *Integration of Groundwater Management into Transboundary Basin Organizations in Africa*. AGW-NET publishes groundwater studies and research, and offers to answer groundwater-related questions via their website.

BURDON GROUNDWATER NETWORK FOR INTERNATIONAL DEVELOPMENT

<https://burdon.iah.org/>



The **Burdon Network for International Development** (BGID) is a network within the **International Association of Hydrogeologists** (IAH) that concentrates on groundwater issues in low-income countries, particularly in Sub-Saharan Africa. The BGID seeks to connect people, build capacity, make existing knowledge more accessible, and advocate for hydrogeology in low-income countries. The BGID **website** includes news and announcements, a free book initiative for groundwater professionals, and other **downloadable resources**. These resources include the useful introductory textbook *Developing Groundwater: A Guide for Rural Water Supply*.

DEPARTMENT OF WATER AND SANITATION, SOUTH AFRICA

<https://www.dws.gov.za/>



The **South African Department of Water and Sanitation** (DWS) is the national department responsible for South Africa's water resources. The DWS website includes a **searchable portal** with links to hundreds of downloadable reports, guidelines, strategies, tools and pamphlets, including many on groundwater. Employment opportunities, tenders, projects and programs, events, and other useful links are also available.

FOOD SECURITY AND NUTRITION NETWORK



<https://www.fsnnetwork.org/>

The **Food Security and Nutrition (FSN) Network**, funded by USAID, is a global community of food security and nutrition practitioners where they can access and share **resources**, information on **events**, newsletters, and **opportunities** such as research grants and jobs. These include surface water- and groundwater-related themes, particularly those connected to food security and development. The **PRO-WASH website** can be accessed via the FSN Network, and focuses specifically on water, sanitation and hygiene (WASH) support and resources.

GROUNDWATER MANAGEMENT INSTITUTE OF THE SOUTHERN AFRICAN DEVELOPMENT COMMUNITY



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

The **Groundwater Management Institute** (GMI) of the Southern African Development Community (SADC) is a Centre of Excellence in promoting equitable and sustainable groundwater management in the SADC Region. The SADC GMI mandate is to promote sustainable groundwater management and provide solutions to groundwater challenges across the region, which is part of SADC's goal to further cooperation and integration among fifteen southern African states. The SADC GMI website provides links to a groundwater **resource center**, including newsletters and publications, projects and activities, maps, a groundwater dictionary, a drillers' directory, and more.

THE GROUNDWATER PROJECT: ONLINE PLATFORM FOR GROUNDWATER KNOWLEDGE



<https://gw-project.org/>

The **Groundwater Project** is a nonprofit online platform for groundwater knowledge. It provides accessible, engaging, high-quality educational materials, available free of charge online in many languages, for all who want to learn about groundwater and understand how it relates to and sustains ecological systems and humanity. The project's **books and materials** cover four domains: children's books, introductory books, overview books, and specialized books. Some of the publications were originally published elsewhere, while other material has been developed especially for The Groundwater Project. New publications are regularly being added. The Groundwater Project may also be able to answer individual groundwater queries via the contact details.

GROUNDWATER RELIEF



<https://groundwater-relief.org/>

Groundwater Relief is a charitable organization of groundwater specialists based in the United Kingdom that provides technical support to organizations in the humanitarian and development sector that are developing water resources for people living in poverty or those who are displaced. Groundwater Relief provides this support via a global membership of over 300 groundwater experts. Where possible, they work on projects with in-country members. These specialists provide advice on groundwater management and groundwater supply; they also offer a **Rapid Response Unit** that pairs experienced professionals with organizations working in emergency water supply. Groundwater Relief also offers downloadable **case studies** and technical training courses and advice.

GROUNDWATER SOLUTIONS INITIATIVE FOR POLICY AND PRACTICE (GRIPP)



<https://gripp.iwmi.org/>

The Groundwater Solutions Initiative for Policy and Practice (GRIPP) is a groundwater partnership led by the International Water Management Institute (IWMI) that seeks to strengthen, expand, and connect current groundwater initiatives. GRIPP's case profile series is a series of useful reports on various aspects of groundwater, discussed using detailed case studies. The news section of the GRIPP website includes details of groundwater events, conferences, publications, webinars, and other items of interest to groundwater professionals. Anyone can sign up on the GRIPP website to receive email updates.

HYDROGEOLOGISTS WITHOUT BORDERS



<http://hydrogeologistswithoutborders.org/wordpress/>

Hydrogeologists Without Borders (HWB) is a charitable organization that builds capacity in resource-poor regions to provide safe, sustainable water supplies. It is made up of hydrogeologists, water well technicians, groundwater specialists, and groundwater organizations who share concern about the critical importance of groundwater in low-income countries. HWB volunteers may be able to assist with specific groundwater-related queries; contact information is available on their website. HWB also makes publications freely available, including the classic hydrogeology text book Groundwater by R. Allan Freeze and John A. Cherry, available to download in Arabic, Chinese, English, French, Italian, Portuguese, and Spanish.



INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS (IAH)

<https://iah.org/>



The **International Association of Hydrogeologists** (IAH) is a scientific and educational charitable organization for scientists, engineers, water managers, and other professionals working in groundwater resource planning, management, and protection. The IAH mission is to further the understanding, wise use, and protection of groundwater resources throughout the world. The IAH works through its national chapters, commissions and networks, arranging conferences, publishing books, linking with international partners, producing videos, arranging courses, and sharing information. The IAH offers low fees for students, and sponsored membership may also be available to applicants from low-income countries. The IAH also runs a **mentoring program** and an **Early Career Hydrogeologists' Group**. The IAH "Links and Resources" page contains links to free online courses, tips for paper writing and career development, and links to many other groundwater events, topics and resources. IAH's downloadable **Strategic Overview Series** provides short, illustrated guides to key issues around groundwater, such as energy, climate change, and food security. The IAH makes its **out-of-print publications** available for free download. IAH also publishes **Hydrogeology Journal**, which has a substantial worldwide readership.

INTERNATIONAL GROUNDWATER RESOURCES ASSESSMENT CENTER

<https://www.un-igrac.org/>



The **International Groundwater Resources Assessment Centre** (IGRAC) facilitates and promotes international sharing of information and knowledge required for sustainable groundwater resources development and management worldwide. Since 2003, IGRAC has provided groundwater content and process support, focusing particularly on transboundary aquifer assessment and groundwater monitoring. IGRAC's **Global Groundwater Information System** (GGIS) is a web-based portal to groundwater-related information and knowledge. The GGIS has several modules and themes, each with its own map-based viewer. These include global country data, on groundwater conditions per country, **groundwater resources in Africa**, resources for managed aquifer recharge (MAR), and resources for groundwater monitoring. IGRAC also makes various reports and textbooks available online, including the United Nations Educational, Scientific and Cultural Organization's International Hydrological Program (UNESCO-IHP) and IGRAC publication **Groundwater around the World - A geographic synopsis** by J. Margat and J. van der Gun.

QUANTITATIVE GROUNDWATER MAPS FOR AFRICA

<https://www2.bgs.ac.uk/groundwater/international/africanGroundwater/maps.html>



The **British Geological Survey** (BGS) has developed **quantitative groundwater maps** covering the whole continent of Africa. They are intended to be used at the continental or regional scale, and not for national or local planning. These maps are available as digital spatial data coverages. The data, a description of the mapping project, a journal paper, and a report discussing the methodology are all available on the project **website**. Users must complete a simple and free registration on the site. Three separate coverages are available:

1. Aquifer productivity (six yield classes, from >0.1L/s to <20L/s)
2. Aquifer flow and storage type (five classes)
3. Aquifer saturated thickness (four classes)

RURAL WATER SUPPLY NETWORK (RWSN)

<https://www.rural-water-supply.net/en/>



The **Rural Water Supply Network** (RWSN) is a global network for rural water supply professionals, with 10,000 members in more than 150 countries. RWSN is a strategic global platform for knowledge sharing and collaboration in the water sector that focuses on achieving universal access to safe, affordable water supplies. RWSN began as a network of hand pump experts, and today its geographic focus includes Africa, Asia, and Latin America. RWSN has a substantial online **library** on all aspects of rural water supply, including a large section on sustainable groundwater development, as well as training and capacity building materials. The documents and reports are written by a variety of organizations and individuals and are free to download. There is a particular **focus** on low-cost and manual drilling techniques. RWSN also has water supply-related news, events, blogs, and a recently announced **mentoring program**. They also engage with **young professionals** in the sector.

UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION/GERMAN FEDERAL INSTITUTE FOR GEOSCIENCES AND NATURAL RESOURCES GROUNDWATER MAPS OF THE WORLD



<https://www.whymap.org/whymap/EN/About>

The **United Nations Educational, Scientific and Cultural Organization** (UNESCO) and the **German Federal Institute for Geosciences and Natural Resources** (BGR) have collaborated to produce and make available a series of groundwater maps of the world as part of the World-wide Hydrogeological Mapping and Assessment Programme or **WHYMAP**. These include River and Groundwater Basins of the World, Global Groundwater Vulnerability to Floods and Droughts, World Karst Aquifer Map, and Groundwater Resources of the World. This last map shows three main types of aquifer, and up to five different categories for groundwater recharge. Continental groundwater maps are also available, including a hydrogeological map of Africa at a scale of 1:12,500,000. Many of the maps can be viewed in the on-line viewer, or downloaded as PDF files or as shapefiles for GIS. The resources are available **here**. Lower-resolution country hydrogeological maps can also be viewed and downloaded as JPEGs from the **WHYMAP viewer**.



UNITED STATES GEOLOGICAL SURVEY

<https://www.usgs.gov/>



The **United States Geological Survey** (USGS) provides scientific information about water, energy, minerals, and other natural resources; the health of ecosystems and the environment; and the impacts of climate and land-use change. The searchable USGS **library** offers more than 160,000 publications authored by USGS scientists over the 100+ year history of the organization, including many on groundwater topics. These publications primarily concern the United States, but they also include some international content and many classic papers and reports. GIS data can be downloaded [here](#), including **world geological maps**.

WATER RESEARCH COMMISSION

<http://www.wrc.org.za/>



The **Water Research Commission** (WRC) is an organization funded by the South African government that promotes coordination and cooperation in water research in South Africa and regionally in Africa. The WRC coordinates, stimulates, and funds research into all aspects of water resources, water treatment, and water governance through its programs. These programs include Women in Water and **Kidz Stuff**. The WRC issues **annual calls** for specific research topics (“directed research”) that it funds, and open calls where research topics are proposed by applicants. The WRC also publishes the respected open access journal **Water SA** and the bimonthly **Water Wheel** magazine. The WRC’s Knowledge Hub offers hundreds of research publications, toolkits, **software**, and other resources on groundwater and surface water available for free download via a **searchable web interface**.

WORLD BANK/GROUNDWATER MANAGEMENT ADVISORY TEAM GROUNDWATER RESOURCES

<https://www.un-igrac.org/special-project/gw-mate>



The World Bank is a useful resource for water-related **publications** and **data**. From 2000–2010, the World Bank’s Groundwater Management Advisory Team (GW-MATE) produced a comprehensive series of briefing notes, case profiles, and strategic overviews on groundwater planning and management world-wide. These are made available [here](#) by **IGRAC**. GW-MATE material includes information on groundwater management, groundwater-dependent ecosystems, groundwater monitoring, groundwater protection, and other topics.

RECOMMENDED CITATION

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PHOTO CREDITS

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CONTACT INFORMATION

PRO-WASH

PRO-WASH is an initiative funded by USAID's Bureau for Humanitarian Assistance (BHA) and led by Save the Children. PRO-WASH aims to provide support to implementing partners in order to strengthen the quality of WASH interventions through capacity strengthening, knowledge-sharing and applied WASH research opportunities.

This is a living document: please contact PRO-WASH with suggestions for additional online groundwater resources to be considered for inclusion in this guide, to add to or correct any of the entries, or to give us feedback:

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<https://www.fsnnetwork.org/PRO-WASH>



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