International Association of Hydrogeologists
the World-wide Groundwater Organisation

Considering a career in Groundwater?

The International Association of Hydrogeologists (IAH/AIH) is a scientific and educational charitable organisation for professionals working in the field of groundwater. It is the premier international networking association for hydrogeologists, bringing together people, skills and knowledge. Our mission is to further the understanding, wise use and protection of groundwater resources throughout the world.

"A hydrogeologist studies the ways that groundwater (hydro) exists within and moves through the soil and rock of the earth (geology). How we use this knowledge for the good of the environment and society will lead to our success as hydrogeologists and environmental game-changers. Within the broad field of hydrogeology there exist several specialist domains. One may be more of a specialist in groundwater supply, resource management and monitoring issues. Or one may concentrate on subsurface contamination issues. Or be more slightly removed in areas such as geophysics and specialised modelling. Field experience as a young hydrogeologist is essential to establish a foundation for good science. Early specialisation [can be] to the detriment of first understanding the essentials of basic hydrogeology. Data collection, collation, interrogation and interpretation all contribute to the report. It is the presentation of the findings in a manner that can be understood by the layman, general public and authority groups that is important." (Ritchie Morris, IAH Applied Hydrogeologist Award winner, 2022).

Sectors that employ hydrogeologists

Hydrogeologists are employed in various roles and organisations e.g. policy, regulation, governance, water supply, NGO, academic, consultancy, laboratory, in the field or office. Success in these areas of work needs good overall knowledge, competency and skills in hydrogeology. Specialist knowledge will often be needed for further development of your career as a hydrogeologist.

Employers include:

- environmental and engineering consultancies
- research organisations
- government regulators
- water supply companies and utilities
- mining or quarrying organisations whose work may have an impact on or require the management of groundwater
- drilling companies
- the nuclear energy industry
- waste disposal companies that operate landfill facilities
- industries that have significant contaminated land issues, e.g. pharmaceuticals, steel, chemical and oil/petroleum
- universities with specialist courses, for specific academic research and lecturing posts
- renewable energy companies and organisations, for the evaluation of renewable-energy schemes and ground-source heat schemes
- international organisations, such as United Nations and World Bank
- Non-Governmental Organisations (NGOs), including aid organisations, establishing safe water supplies in developing countries, and environmental management and protection.

Knowledge of and expertise in groundwater is also relevant in other fields of employment, such as planning and wider environmental matters. Not everyone needs to be a specialist in hydrogeology but understanding of groundwater matters can be highly valuable in the 'wider world'.

Qualifications

Generally, a degree is required to work as a professional in the field of hydrogeology. Often a master's degree is expected and sometimes a doctorate, especially for academic careers. A good first degree in geology, environmental science, geophysics, other sciences or engineering, with a postgraduate qualification in hydrogeology, geochemistry, engineering, geology or environmental science is the usual requirement.

The qualifications you need will depend on the role and also the country that you practise in. Some countries have specific requirements to demonstrate professional status e.g. licences, membership of professional bodies, and without this you may not be able to practise as a hydrogeologist. In some countries requirements may be less formal, although being able to demonstrate hydrogeological expertise and practical experience will always be essential.

In some cases, technical training other than degrees may allow for practising as a 'technician', but you may still want to undertake further professional training beyond this.

Knowledge and skills

A general knowledge of hydrogeology, as found in many university courses, would include:

- Geology
- The water cycle – how groundwater fits in
- Groundwater hydrology and resources
- Borehole design, construction and development
- Borehole yield testing (Hydraulic Aquifer and Pump Testing)
- Groundwater quality
    - Natural groundwater geochemistry
    - Pollution and pollutant behaviour
- Groundwater characterisation, conceptual and numerical models
- Policy, governance and protection

Specialisations, that are often offered as additional options in university courses but may also be developed in other ways, include:

- Engineering applications
- Isotopes in groundwater
- Ecosystem biogeochemistry
- Geophysics
- Saline intrusion
- Irrigation
- Geothermal groundwater
- Groundwater remediation
- Hydrogeological impact and risk assessments
- Remote sensing
- Numerical modelling

- Education and socio- hydrogeology
- Managed Aquifer Recharge (MAR)

It is rare – and inadvisable – that hydrogeology is practised without a good appreciation of the context that it exists in and supporting tools that can be used, and knowledge of a range of these is valuable, including:

- Geographical information systems (GIS)
- Environmental impact assessment
- The conduct, ethics and communication of science
- Water in a changing climate
- Data management and analysis

As your career develops, personal management and professional skills will become more critical, such as:

- Interpersonal and persuasive communication skills
- Writing and speaking for decision makers
- Managing teams and leading people
- Innovation and organisational change
- Financial management
- Project management

How IAH can help – https://iah.org/

IAH has a wide range of resources that can help you in developing and maintaining your careers, at all stages. This includes national, scientific and technical groups, national and international conferences, scientific and policy publications, as well as its many members who are often willing to offer advice.

IAH and its members endeavour to raise awareness of groundwater issues and work with national and international agencies to promote the use of groundwater to ensure ready access to safe drinking water. We promote the protection of aquifers against pollution, the improvement of aquifer storage and the management of groundwater resources to assure the sustainability of groundwater-dependent ecosystems.

IAH is a world-wide association, with more than 4500 members in 130 countries, 50 national chapters (see https://iah.org/groups/national-chapters), and 15 scientific/topic based commissions and networks (see https://iah.org/groups/commissions-networks). You don't need to be a member of IAH to participate in our commissions and networks.

We have a widely respected and effective voice internationally. Our annual World Groundwater Congress is a major event in which hundreds of scientific papers are presented and which attracts hundreds of delegates from across the world. Some sessions are also presented online. Our national chapters and commissions and networks also hold many conferences, and often present webinars online. (See https://iah.org/events).

Advice from others on how they have developed their careers in hydrogeology is helpful. For younger members, IAH has an active Early Career Hydrogeologists' Network (https://echn.iah.org/). This provides a forum and support for hydrogeologists at the start of their professional or academic careers. IAH has a popular mentoring scheme for its members where mentors can offer support to 'mentees' through their knowledge of a particular branch of

hydrogeological science, knowledge of regions or aquifer types, and on career options and pathways. (Mentoring - IAH - The International Association of Hydrogeologists)

Our highly-regarded 'Hydrogeology Journal' (HJ), with top-class peer-reviewed scientific papers from authors across the world, is published as eight issues each year and is free to IAH members (https://iah.org/hydrogeology-journal). HJ's publisher, Springer Nature, encourages use of a Reviewer Recognition Service and offers guidance at https://www.springer.com/gp/editorial-policies/peer-review-policy-process

Our book-series aim to spread the science and knowledge of hydrogeology and include papers from IAH's congresses and meetings, its commissions and networks, and a variety of other sources. Subjects include case studies, regional descriptions, analyses of sub-disciplines and outputs from major international programmes (https://iah.org/iah-book-series). We publish short papers on topical issues.

Our 'Technical Insight Series' is designed both to inform professionals in other sectors of key interactions with groundwater resources and hydrogeological science, and to guide IAH members in their outreach to related sectors (https://iah.org/education/professionals/technical_insight_series).

Our 'Strategic Overview Series' aims to inform other professionals in various sectors, whose roles may demand a knowledge of key interactions with groundwater resources and hydrogeological science (https://iah.org/education/professionals/strategic-overview-series). They are also invaluable reading for those who are curious about groundwater. They support us in engaging with and influencing the international community, including organisations in the UN family, governments, NGOs and businesses across the world (https://iah.org/about).

We have a variety of video and other recordings for professionals and students, which can be found at https://iah.org/education/professionals/watch-and-listen. We support the 'Time Capsule', which is a collection of video interviews of eminent hydrogeologists who have made a material difference to our profession since its inception (see https://timecapsule.iah.org/). We also actively support the Groundwater Project https://gw-project.org/) and Groundwater U (https://groundwateru.org/), which provide invaluable resources of books and videos on a wide range of hydrogeology topics.

We encourage universities to publicise their degree courses on the IAH website (https://iah.org/education/professionals/degree-courses). Shorter training courses are advertised at https://iah.org/education/professionals/training.

You can find out more about how IAH supports hydrogeological education for students and professionals at https://iah.org/education/professionals.