

Hydrogeologist

Job Description

Hydrogeologists investigate the occurrence, circulation and distribution of water flowing through the ground. By developing an understanding of the recharge volumes, mechanisms of flow and discharge outlets, they are able to define sustainable development strategies, which can be at any scale.

Hydrogeologists are concerned with deep groundwater (as opposed to a hydrologist whose primary concern is with surface water). The role involves studying the quality of groundwater for both natural and man-made constituents. Hydrogeologists develop hydrogeochemical models of water quality evolution and study how contaminants move through the ground. Such models help them to understand the complexities of groundwater flow.

Typical Work Activities

The work can vary considerably according to employer, but general work activities will include:

- using basic geological skills to determine the nature of and relationships between different rock types and relating these to the water-bearing capacity of the formations and exchanges between them;
- understanding the distribution and occurrence of groundwater by use of maps, records, models and reports;
- developing monitoring regimes for both groundwater quality and groundwater levels;
- evaluating the relationship between groundwater and surface waters;
- assessing effects of environmental changes on groundwater;
- assisting in the management and/or protection of groundwater;
- developing sustainable groundwater use strategies;
- ensuring compliance with regulatory and environmental legislation;
- undertaking environmental impact assessments of groundwater activities;
- undertaking fieldwork and site visits for investigative/monitoring purposes;
- liaising with specialists, consultants, regulators and public/private organisations;
- developing computer simulation models to aid understanding and make impact assessments;
- undertaking geophysical and geological investigations (including test drilling) to determine subsurface structures;
- undertaking pumping tests to allow evaluation of well performance, aquifer response and quality changes;
- evaluating water table changes (including seasonal variation), storage potential, permeability and flow distribution;
- assessing the impact of landfills or other development plans, such as major excavations for mining or civil engineering;
- investigating the effects of waste disposal or agricultural development and other land uses on the short and long-term quality of groundwater supplies;
- reporting investigation studies and producing recommendations for further work.

Work Conditions

- Range of typical starting salaries: £20,000 - £29,000 (salary data collected Jul 07).
- Range of typical salaries at senior level/with experience (e.g. after 10-15 years in the role): £26,500 - £45,000 (salary data collected Jul 07).
- Some employers have performance-related pay schemes. You may also receive a car allowance/pool vehicle and, in some cases, an invitation to join a share option scheme.
- Working conditions vary quite considerably between the public and private sectors. Those based in the private sector typically receive higher salaries, work longer hours and travel/work away from home for the duration of a project, either in the UK or overseas.
- Flexitime is possible, although this will depend on your employer.
- Most jobs are office-based with a considerable need for fieldwork in a variety of weather conditions. Field/site work is more common during the early part of a career and for more technically-orientated roles.
- Many tasks revolve around projects, which may be short or long term. Projects are often team-based, but you may also work alone. It is not unusual to be involved in several projects at once.
- There are opportunities for career breaks, but very little in the way of part-time work.
- Self-employment/freelance work is sometimes possible. Short-term contract work is often available via agencies. There is the opportunity for consultancy work for those with experience. It is possible, but not as common, to go straight into consultancy with a specialist PhD background.
- Jobs are quite widely available with opportunities in the water industry, environmental agencies and public bodies throughout England and Wales. Opportunities in Scotland can be found with the Scottish Environment Protection Agency (SEPA) (www.sepa.org.uk). With the necessary experience, there can also be opportunities in consultancies that specialise in water and environmental management.
- About 30% of hydrogeologists are women, but the proportion is increasing. The profession is still male-dominated at senior levels, although there is evidence that the balance is changing.
- Long hours working under pressure may be required, depending on the employer.
- Given that some field work requires access to difficult-to-reach sites, the work would be difficult for anyone with a mobility disability.
- Travel within a working day is frequent with occasional absence from home at night. There are some opportunities for overseas work or travel.

Entry Requirements

A good first degree in geology/earth sciences together with a postgraduate qualification such as an MSc in Hydrogeology or relevant PhD is usually sought. Other relevant degree subjects include physical/mathematical/applied science and engineering. In particular, the following subjects may increase your chances:

- geology;
- physics;
- environmental science;
- geophysics/geotechnology;
- geochemistry;
- civil/structural engineering.

It is not possible to enter this profession with an HND only - the necessary scientific background can be obtained only through study to degree level or beyond. Opportunities for Diplomates may exist at technical officer level, although these will be limited as graduate trainees do most of this work.

A pre-entry postgraduate qualification may be needed, usually an MSc in Hydrogeology (offered at the universities of Birmingham, Leeds, Cardiff and Sheffield), although a good BSc in Geology may be accepted on its own if significant IT/resource management components have been taken. Related postgraduate courses are offered at other universities.

Relevant pre-entry experience is desirable, such as hands-on knowledge of practical techniques. Candidates with practical experience and those who demonstrate an understanding of what hydrogeology actually involves will stand out. MSc projects sponsored by employers are a good way to get contacts. Get actively involved with the local/specialist groups of professional institutions.

There is increasing demand for hydrogeologists because of the growing awareness of groundwater issues. A 2007 review by the UK Groundwater Forum (www.groundwateruk.org) states that many vacancies in the UK are not being filled because of a shortage of graduate hydrogeologists.

Potential candidates will need to show evidence of the following skills:

- numeracy;
- mathematical modelling;
- computer programming skills;
- the ability to visualise geology in three dimensions;
- the ability to evaluate complex data;
- chemistry (especially in relation to contaminants);
- good oral and written communication skills;
- teamwork;
- the ability to acquire knowledge of applicable environmental law.

A current driving licence is essential. Knowledge of modern languages will be useful if you wish to work overseas.

It is illegal for employers to discriminate against candidates on the grounds of age, gender, race, disability, sexual orientation or religious faith. For more information on equality and diversity in the job market and how to handle discrimination, see the AGCAS publication, Handling Discrimination (www.prospects.ac.uk/links/discrimination).

Training

Training is mostly in-service via seminars, conferences and short courses. Practical hands-on coaching and mentoring by senior colleagues is also common. Typically, in consultancies and the public sector, employees are trained in technical subjects via short courses/coaching. They are also encouraged to develop other skills, such as:

- project management;
- report writing;
- presentation;
- contract management;
- selling;
- customer care.

Professional status is obtained through the Geological Society (www.geolsoc.org.uk), which offers chartered geologist (CGeol) and chartered scientist (CSci) status, or the Chartered Institution of Water and Environmental Management (CIWEM) (www.ciwem.org), which offers chartered environmental scientist (CEnv) status.

It is usual to aim to achieve CGeol status as part of your training. Full professional accreditation requires at least five years' relevant postgraduate experience following a first degree in geology, or from seven to ten years' experience for graduates whose first degree contained at least 25% geology/earth science.

Professional hydrogeologists normally have an MSc in Hydrogeology or a closely related discipline. The Geological Society of London specifically accredits a number of courses for continuing professional development (CPD). Professional accreditation through CIWEM is also possible.

The number of universities offering specialist hydrogeological training has decreased markedly over the past five years, but it is possible to specialise further in certain aspects of hydrogeology.

Career Development

Career development is dependent on ability, experience and availability of jobs. Gaining chartered status will assist the process. The public sector and most medium to large consultancies have a recognised progression path, which usually leads to becoming a specialist/expert hydrogeologist or a technical manager. Progression may be possible with your existing employer, although you may have to move to another company.

New entrants work in a supporting role, acquiring and processing data for others to interpret. With experience, they progress to interpreting results, and later to supervising others. In addition to gaining technical competence, experience in other aspects of project management, such as developing and leading a team, financial accounting and the production of reports, is critical to ensure further progression.

Depending on the employer, junior staff normally progress to more senior positions within five years of graduation. Specialisation can aid and sometimes accelerate the process. In industry, hydrogeologists are more likely to be specialists within a multidisciplinary team so opportunities to progress to an expert technical role may be more limited. In some organisations, progression is typically into the management or protection of groundwater systems. This is particularly true of government agencies.

Further advancement is to senior management or specialist consultancy roles. For those who develop key technical specialisms the main route to promotion is as a consultant to one or more organisations.

Teaching and working in research and development provide alternative career paths.

Typical Employers

Hydrogeologists work in a variety of settings; all of the following take on staff with a range of experience:

- environmental regulators such as the Environment Agency (EA) (www.environment-agency.gov.uk) and the Scottish Environment Protection Agency (SEPA) (www.sepa.org.uk);
- government research institutes such as the British Geological Survey (BGS) (www.bgs.ac.uk);
- engineering consultancies;
- environmental and hydrogeological consultancies;
- water companies;
- local authorities;
- land developers;
- landfill and waste management operators;
- mining companies;
- gravel extractors;
- some petrochemical companies;
- charitable aid organisations.

Work in consultancies is usually project-based. The BGS combines project and research work. The EA and water companies tend to focus on long-term policy/regulation issues and groundwater management decisions supported by external projects. Those who work for engineering, environmental and hydrogeological consultancies probably have most variety in their work, with opportunities to travel widely throughout the UK and overseas. See the UK Groundwater Forum (www.groundwateruk.org) for an extensive list of links. For water projects in Europe, see the European Commission (ec.europa.eu) under 'environment'.

Awareness of the impact of development and other activities upon the environment is increasing. Issues such as pollution from rusting tanks at a disused petrol station, pesticides leaching from farm land into the water supply, water scarcity, disposal of radioactive waste, and reclamation of coalfields all require the skills of hydrogeologists.

Sources of Vacancies

- Environmental Data Services (ENDS) (www.ends.co.uk);
- Earthworks (www.earthworks-jobs.com);
- New Scientist (www.newscientist.com);
- Geoscientist (www.geolsoc.org.uk/template.cfm?name=journals_geoscientist_home_page);
- some specialist periodicals, such as New Civil Engineer (www.nceplus.co.uk);
- Ground Engineering (www.geplus.co.uk);
- trade magazines connected with water and the environment, such as Water and Environment Magazine;
- the national press.

The UK Groundwater Forum (www.groundwateruk.org) and Water UK (www.water.org.uk) have lists of employers who recruit hydrogeologists.

Related Occupations

- Engineering geologist
- Geophysicist (field seismologist)
- Geoscientist
- Hydrologist
- Mining engineer
- Quarry manager
- Wellsite geologist

Information Sources

Bibliography

AGCAS and Graduate Prospects products are available from higher education careers services.

AGCAS Publications

[Energy and Utilities Sector](#), AGCAS Sector Briefing
[Environment and Agriculture Sector](#), AGCAS Sector Briefing
[Handling Discrimination](#), AGCAS Information Booklet
[Options with Environmental Science](#), AGCAS Options Series
[Options with Geology](#), AGCAS Options Series

Other Publications

[Geoscientist](#), Geological Society Publishing House, Monthly
[Ground Engineering](#), EMAP
[New Civil Engineer](#), EMAP, Weekly
[New Scientist](#), Reed Business Information, Weekly
Quarterly Journal of Engineering Geology and Hydrogeology, [Geological Society Publishing House](#), Quarterly
Water and Environment Magazine, [Chartered Institution of Water and Environmental Management \(CIWEM\)](#), 10/yr

Websites

Earthworks, www.earthworks-jobs.com
Environmental Careers, www.environmentalcareers.org.uk
Environmental Data Services (ENDS), www.ends.co.uk
European Commission, ec.europa.eu
Foundation for Water Research (FWR), www.fwr.org/
Natural Environment Research Council (NERC), www.nerc.ac.uk
UK Groundwater Forum, www.groundwateruk.org
Water UK, www.water.org.uk
Well Drillers Association (WDA), www.welldrillers.org.uk/

Addresses

British Geological Survey (BGS), Kingsley Dunham Centre, Keyworth, Nottingham NG12 5GG Tel: 0115 936 3100 URL: www.bgs.ac.uk

British Hydrological Society, Institution of Civil Engineers, 1 Great George Street, London SW1P 3AA Tel: 020 7222 7722 URL: www.hydrology.org.uk

Chartered Institution of Water and Environmental Management (CIWEM), 15 John Street, London WC1N 2EB Tel: 020 7831 3110 URL: www.ciwem.org

Department for Environment, Food and Rural Affairs (DEFRA), Customer Contact Unit, Eastbury House, 30 - 34 Albert Embankment, London SE1 7TL Tel: 08459 33 55 77 URL: www.defra.gov.uk

Environment Agency (EA), Visit the EA website to check for details of regional offices Tel: 08708 506 506 URL: www.environment-agency.gov.uk

Geological Society, Burlington House, Piccadilly, London W1J 0BG Tel: 020 7434 9944 URL: www.geolsoc.org.uk

Hydrogeological Group, See the The Geological Society website for current contact details Tel: 020 7434 9944 URL: www.geolsoc.org.uk

Institution of Civil Engineers (ICE), 1 Great George Street, Westminster, London SW1P 3AA Tel: 020 7222 7722 URL: www.ice.org.uk

Institution of Water Officers (IWO), 4 Carlton Court, Team Valley, Gateshead, Tyne and Wear NE11 0AZ Tel: 0191 422 0088 URL: www.iwo.org.uk

International Association of Hydrogeologists (IAH), PO Box 9, Kenilworth CV8 1JG Tel: 0870 762 4462 URL: www.iah.org

Scottish Environment Protection Agency (SEPA), Erskine Court, Castle Business Park, Stirling FK9 4TR Tel: 01786 457700 URL: www.sepa.org.uk

WaterAid, 2nd Floor, 47-49 Durham Street, London SE11 5JD Tel: 020 7793 4500 URL: www.wateraid.org.uk