

Enrolment in crisis: A UK-wide strategy for exciting, engaging and retaining students in the geosciences

A joint report from The Geological Society of London and University Geoscience UK

Introduction

We are living in the Anthropocene, the age in which human activity is the dominant influence on the Earth. Research and practice in the geosciences allow us to better understand and predict the interactions between people and Earth's systems and resources. Such expertise is essential to developing solutions to critical economic, environmental, health, and safety challenges in the 21st Century, including:

- Managing secure and sustainable supplies of clean water
- Developing sustainable energy and net zero targets
- Securing the raw materials for a sustainable future
- Reducing environmental degradation
- Building resilience to natural hazards and adapting to climate change

Therefore, the accelerating decline in Earth Science graduates across the United Kingdom seen in recent years poses a serious and economically damaging skills shortage, particularly at a critical time of transition for many industries and businesses that rely on geological expertise.

The Future of Geoscience Education in the UK – current trends

There is a clearly a key role for geoscientists to play in a sustainable, carbon neutral economy, yet there is an accelerating decline in geology graduates across the United Kingdom. The number of students studying geology (F600) at university has declined year-on-year since 2014, a total decrease of 43%, far outpacing any dip expected purely due to demographics (ca. 9.5% over the same period). Degree-level geoscience qualifications also fail to attract students from a wide range of backgrounds; in the 2018/2019 school year, BAME students made up only 11% of students studying toward their first degree, in contrast to 18% in the physical sciences ([HESA student data](#)). Enrolment in A-level geology is also declining from a peak of 2,240 in 2015 to 1,268 in 2019.

What is driving this decline? There is a lack of public awareness of the many roles that geoscientists play in supporting societal and economic development. As a consequence, many parents, teachers, and higher education advisors may assume that geoscience is solely linked to "dirty" industries or that a geoscience qualification does not lead to professional jobs or careers. Others who are aware of the opportunities offered by geoscience may assume that such qualifications are only suitable for students who enjoy and excel at outdoor activities like hiking and camping. This view may become entrenched if students and families are not able to access topical museums or outreach activities in their area or school system.

Geoscience incorporates the core disciplines of geology, geophysics, geochemistry, engineering and resource geology. Students are exposed to these core concepts of geoscience throughout their studies in primary and secondary education. However, many concepts, such plate tectonics, the rock cycle and geomorphology, are

covered within the curriculum of other subjects such as geography and chemistry. Whilst this highlights the broader importance and applied nature of the geoscience, it does lead to confusion over whether the core disciplines of geoscience constitute useful qualifications in their own right. The dispersal of topics can also pose challenges to teachers who don't have extensive experience in teaching complex three and four-dimensional concepts. It doesn't help that geology, geoscience, and Earth sciences are used broadly interchangeably as a subject descriptor, and that it can be difficult to distinguish between geology and physical geography at a student level. These factors result in the lack of a clear subject identity to attract prospective students.

On 24 June 2020, the Geological Society of London convened a summit of 50 representatives from academia, education, informal education and industry to examine the many factors leading to the decline in enrolment to geoscience education. The workshop explored the challenges faced at the primary and secondary school level, as well as social and cultural barriers to entry to the geosciences.

As a result of the summit, five strategic aims have been developed to increase the visibility and uptake of geoscience education in the UK, to restore brand identity and to confirm UK geoscience as world-leading.

Draft Strategic Aims for UK Geoscience Education 2020-2025

- S1. Create an effective forum for collaboration between the diverse range of geoscience bodies in the UK, facilitated by the Geological Society, to develop a unified voice for the geosciences and to promote a coherent narrative of geoscience as a STEM subject of vital importance to addressing societal challenges.
- S2. Engage with various government departments and agencies, to ensure that the importance of the geosciences to meeting net zero targets, addressing the UN SDGs and leading the UK through the energy transition and underpinning "clean and green growth" is recognised and to ensure geosciences are accurately reflected in research and industrial strategies.
- S3. Develop a unified voice and view of what geoscience encompasses, its place among the STEM subjects, and its importance to society that can be communicated through education and outreach programming.
- S4. Attract and support people from a diverse range of background, culture and gender to become geoscientists, creating a vibrant community fit for the grand challenges facing industry and academia in the UK.
- S5. Support teachers of STEM subjects, higher education advisors, career counsellors and parents in confidently teaching geoscience concepts and their relevance to society in a way that emphasizes geoscience careers as essential to providing solutions for grand challenges and for community development

Defining an action plan

Reversing the student decline and building community interest in geology will require action and commitments from a diverse range of stakeholders. The Summit on 24 June 2020 identified a number of actions, as well as the categories of stakeholders to be brought together in the collective forum, with The Geological Society serving to facilitate these actions and deliverables:

Geoscience education policy: This group includes organisations such as GSL, UGUK, ESTA, BGS, and NERC. The actions identified under this remit are:

- Universities to include outreach activities in workload models, and recognise outreach as an important faculty and student output.
- University departments to develop sustainable engagement models in regional clusters to ensure widespread student engagement, potentially through the use of a Geobus-type model, and/or through engaging with local groups or organisations focusing on student outreach (**S4, S5**).
- Obtain HESA data on the characteristics of students choosing to study geology and related disciplines, and fund an RA to carry out analyses (**S4**)
- Share best practice and materials to support Virtual Open Days that allow departments to remove physical and financial barriers to attendance (**S4, S5**)

University – school links: This group to include organisations such as UGUK, GSL, ESTA, and BGS. This cohort will focus on:

- Better engage with HE advisors, including the creation of a database of HE advisors by region, the development and sharing of best practice on how to effectively engage HE advisors, and the development of materials to share with HE and career guidance advisors (**S3, S4, S5**).
- Develop materials to help parents understand the career potential offered by a degree in the geosciences (**S4, S5**).
- Work to embed geological concepts in Geography and other STEM subjects through engagement with exam boards and the development of teacher plans for existing specifications, while clearly defining geology as a subject in its own right. Teacher training and CPD programmes will need to be supported and expanded to enable effective teaching of these concepts (**S3, S4, S5**).
- Ensure that the review of the Geological Society's degree accreditation scheme proceeds at pace, to better enable departments the flexibility to attract students and prepare them for a changing employment market (**S3, S4, S5**).

Education – Industry links (including professional accreditation): This group to include GSL, UGUK, BGS and representative industry groups, and deliver:

- Engage with the apprenticeship programme to increase the number of apprenticeships in the geosciences, in order to create alternative pathways into careers in geology (**S3, S4**)
- Commission of a report assessing the value of geoscience to the UK PLC (**S2, S3, S5**)
- Build links with potential corporate sponsors to fund the work plans (**ALL**)

Diversity and Accessibility: This group will include DiG-UK, GSL, UGUK, and funders where appropriate, in order to:

- Develop best practice for accessible fieldwork and highlight its availability (**S4**)
- Better engage with HE advisors, including the creation of a database of HE advisors by region, the development and sharing of best practice on how to effectively engage HE advisors, and the development of materials to share with HE and career guidance advisors (**S3, S4, S5**).
- Develop materials to help parents understand the career potential offered by a degree in the geosciences (**S4, S5**).
- Develop and share recommendations to tackle underlying inequalities in the geoscience community that may act as a barrier to diversity and inclusivity (**S4**)

Narrative and marketing: This group to include GSL, UGUK, ESTA, GfGD, and others to:

- Develop a community-wide communications strategy and marketing plan to engage with students, teachers, the government, politicians, and the wider public (**S1, S2, S3**).
- Showcase the importance of geology to meeting the Sustainable Development Goals and delivering a low-carbon future (**S2, S3**).
- Ensure that the review of the Geological Society's degree accreditation scheme proceeds at pace, to better enable departments the flexibility to attract students and prepare them for a changing employment market (**S3, S4, S5**).
- Better engage with HE advisors, including the creation of a database of HE advisors by region, the development and sharing of best practice on how to effectively engage HE advisors, and the development of materials to share with HE and career guidance advisors (**S3, S4, S5**).
- Develop materials to help parents understand the career potential offered by a degree in the geosciences (**S4, S5**).