THE GEOLOGICAL SOCIETY OF AMERICA®

GSA Position Statement

EXPANDING AND IMPROVING GEOSCIENCE IN HIGHER EDUCATION

Photo created by Anne Egger; Credit: NASA and Kaatje Kraft

Position Summary. Robust geoscience programs at institutions of higher learning equip students with the scientific literacy required to address crucial societal issues and planetary challenges. Providing geoscience instruction that is accessible to all higher-education students will thus help society develop the scientific literacy it needs to address the major challenges facing our planet.

This position statement (1) summarizes GSA's consensus views on the role of geoscience education in institutions of higher learning; (2) highlights future environmental, climate, and resource issues that will provide great impetus and opportunity for geoscience programs to significantly increase enrollments; (3) stresses the importance of investment from governments, the private sector, and higher-education institutions in collegiate geoscience education; and (4) provides a communication tool for use by GSA and its members to discuss why a strengthened commitment to geoscience education is critical to future global prosperity.

CONCLUSIONS AND RECOMMENDATIONS

Geoscience education and literacy are essential components of higher education. Government funding enables innovative research and training that fuels industrial advancement. Field and laboratory work are fundamental components of geoscience research. GSA recommends the following:

- Policy makers should make available new sources of funding for programs to educate the next generation of Earth scientists, whose efforts will be vital to the maintenance of public health, economic strength, and global security.
- During times of budgetary shortfall, federal and state governments and higher education institutions must prioritize funding for geoscience programs to sustain this geoscience workforce.
- College and university administrators should sustain geoscience programs in order to prepare the next generation geoscience workforce, educate non-majors, and train future Earth-science educators at all levels (K–12 to collegiate).
- To provide the most innovative geoscience workforce possible, institutions of higher education and policy makers should take concrete, intentional steps to ensure that underrepresented minority groups have the resources and support they need to become successful geoscientists.
- Universities should recognize the importance of career-focused skills in the 21st century workplace—whether field-based, lab-based, or digital.
- Colleges and universities should sustain and enhance their geoscience programs through continued integration of field and laboratory experiences. Universities should provide immersive, inclusive, and accessible field experiences including field camp

or field camp "modules" or student-driven independent research projects.

- Industries in the private sector, such as those involved in energy development, mineral exploration and extraction, water and land management, or environmental and civil engineering, should advocate for increased funds to support and enhance geoscience education. Whenever possible, industries should directly support geoscience departments and initiatives, such as internship opportunities and workshops, which are responsible for training their future workforce.

RATIONALE

Citizens and public officials increasingly recognize the important roles geoscientists play in supporting environmental and economic health and security. Geoscientists identify Earth's finite supply of mineral and energy resources, secure and manage supplies of clean water for both urban and rural populations, and identify, quantify, and help mitigate the potential impact of natural hazards on communities and infrastructure. Resource limitations challenge our technology, infrastructure, and national security, requiring solutions by well-trained geoscientists.

Natural and human-induced hazardous events in the early twenty-first century have significantly increased the visibility of the Earth sciences to the general public and the critical role that geoscientists play in assessing and responding to them. Such examples include the 2011 Tohoku-Oki earthquake and tsunami (which triggered the Fukushima nuclear disaster), the recognition and mitigation of human-induced earthquakes in Oklahoma, and the ability of scientists to assist Hawai'i County authorities and residents to respond to the 2018 eruption of Kīlauea Volcano—its largest eruption in over 200 years[1]. Furthermore, the impacts of climate change and the increased frequency and severity of weather-related disasters threaten food and water supplies, housing, and infrastructure. Three of the U.S.'s five costliest hurricanes have occurred since 2015[2]. Some of the costliest fire seasons worldwide have also occurred just within the last half decade. As the global population continues to surge, demand for energy is predicted to grow significantly[3]. Geoscientists play an essential role in the exploration for and extraction of natural resources needed for energy and technical sectors (footnote to PS).

Robust and inclusive training in both field and laboratory research at the undergraduate and graduate levels provides the next generation of geoscientists with critical skills for enhancing their professional development. These experiences also enable geoscience students to form partnerships with government agencies, academic and research institutions, and non-profit organizations, which in turn provide internship and career opportunities. Geoscience is important in related fields, including civil and environmental engineering, environmental studies, agricultural sciences, atmospheric and ocean sciences, life sciences, materials research, homeland security and emergency services, medicine, law, and public administration. Geoscience plays an increasing role in many disciplines, such as public health, ecology, and economics, fields that have not traditionally relied on geoscience expertise but that recognize the dependence of a healthy society on its soils, rocks, and water.

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Opportunities for GSA and its Members to Help Implement Recommendations

To strengthen geoscience programs at colleges and universities, The Geological Society of America recommends:

- GSA members should continually stress the importance of geoscience awareness and literacy among students, the general public, university administrators and elected officials by focusing courses, curricula, and outreach activities on the crucial issues that will face the planet in coming decades, including climate change, the supply and quality of natural and water resources, and geologic hazards.
- All stakeholders (faculty, students, and alumni) should educate policy makers and university administrators about changing demographics in the geoscience workforce and the increasing potential for employment.
- Geoscience departments and programs at all institutions of higher learning should partner with K–12 institutions to encourage early awareness of geoscience as an important field of study, provide field and laboratory experiences, and enhance the diversity of students entering as geoscience majors.
- Stakeholders should advocate for public support and public investment in geoscience programs at institutions of higher education.
- GSA members should identify legislation that affects public investments in geoscience education and alert GSA's Geology and Public Policy Committee (GPPC), GSA's Geology and Society Division, and GSA's Associated Societies if action by the GSA membership and affiliated organizations can help improve the scientific basis for any particular decision. The GPPC, Geology and Society Division, and the Director of Geoscience Policy, often working with GSA members, can also bring this Position Statement to the attention of lawmakers when legislation affects public investments in geoscience education.

REFERENCES

1. USGS Hawaiian Volcano Observatory. (2019). *Overview of Kīlauea Volcano's 2018 lower East Rift Zone eruption and summit collapse*. https://volcanoes.usgs.gov/vsc/file_mngr/file-224/OVERVIEW_Kil2018_LERZ-Summit_June%202019.pdf
2. National Hurricane Center. (2018). *Costliest U.S. tropical cyclones tables updated*. https://www.nhc.noaa.gov/news/UpdatedCostliest.pdf
3. EIA International Energy Outlook 2017 U.S. Energy Information Agency (EIA)