

# Soliciting Community Input on Culture and Ethics of Geologic Sampling

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## ETHICS OF SAMPLING

It is common for earth scientists to collect samples from a wide range of environments and settings as a routine part of our work. Samples may include a range of earth and planetary materials such as rocks, minerals, fossils, soils/sediments, meteorites, and natural fluids, and comprise the full range of sizes, from large dinosaur bones to microscopic fossils. In our Anthropocene age of increasing world populations, decreased accessibility to field sites, shrinking resources, more sensitivity to cultural Indigenous areas, and unprecedented pressures on unique geoh heritage sites, the ethics of sampling is important to all geoscientists. The provenance of samples that support our research—where they came from, how they were collected, terms of permission for access and use, and their ultimate fate in archives or disposal—really do matter (e.g., Planavsky et al., 2020). As a discipline, we need to examine: What is our culture of sampling? Do we, or should we, have established guidelines or standard sampling codes we abide by (e.g., *Nature Geoscience*, 2021)? Should we teach sampling ethics to our students as part of our training of the next generations of geoscientists? Ethics examine the moral principles that affect both our personal and professional behavior, and the ethics of sampling may reveal conflicting values with personal, professional, environmental, and societal implications.

Over the past half century, the rising international geoconservation movement has recognized that special geological features need to be protected and managed as part of our geoh heritage. The Geological Society of America (GSA) Position Statement on Geoh heritage defines “sites or areas of geologic features with significant scientific, educational, cultural, and/or aesthetic value,” which are key to advancing knowledge and support the broad understanding of the environment, its geodiversity and biodiversity, and the factors that influence climate change (see America’s Geo-

heritage II workshop proceedings [National Academies of Sciences, Engineering, and Medicine et al., 2021]). Furthermore, there is a growing body of literature and commentary on the broader field of geoehtics (e.g., Di Capua et al., 2021) that embraces our responsibility to protect our geoh heritage.

The ethics of geological sampling is a long-standing issue because there is an increased international awareness of the need to protect and preserve iconic geologic sites for future generations (e.g., through geoh heritage initiatives such as the UNESCO Global Geopark Network, the International Union of Geological Sciences [IUGS] International Commission on Geoh heritage, and the International Union for Conservation of Nature [IUCN] World Commission on Protected Areas Geoh heritage Specialist Group, to identify classical geosites). Notwithstanding these international programs to identify and preserve classic geologic sites, rock outcrops are being irreversibly damaged (Fig. 1) due to indiscriminate sampling in the name of science (e.g., MacFadyen, 2010; Druguet et al., 2013; Butler, 2015; Chan and Kamola, 2017; Foss, 2019; Di Capua et al., 2022). In addition, many geologic sites also hold significant cultural and spiritual value for Indigenous people, landowners, and local communities, and there is a need to minimize the impacts of sampling activities or marking outcrops. It is increasingly important for geoscientists to examine the ethics of our communal sampling practices,

and our personal responsibilities as scientists and citizens for stewardship of Earth, its resources, and its people.

## GSA’S ROLE IN EVALUATING ETHICS

Community input is needed to find a path forward for our professional societies to influence sampling practices. Thus, the purpose of this short paper is to (1) raise awareness about the ethics of sampling, and (2) offer the opportunity for the GSA membership, and geoscientists at-large, to provide input on our current culture of sampling through two venues—an online survey to collect data about geoscientists’ attitudes and practices, and an interactive Noontime Lecture forum at GSA Connects 2022 in Denver, Colorado, USA. We are soliciting the input of geoscientists from diverse backgrounds and experience, and at all career stages from interested students to experienced professionals, to obtain the broadest representation of perspectives and attitudes to evaluate the existing culture of geologic sampling. The survey and interactive forum build on liaisons with the American Geophysical Union (AGU) and the Town Hall on geological sampling convened at their 2021 Fall Meeting.

## SURVEY—OPEN TO ALL GEOSCIENTISTS

We invite *all* GSA members as well as allied professional society members to participate in a pre-meeting survey with the purpose of collecting information to better



Figure 1. This pre-2017 example of geovandalism (sampling without a permit), shown by paleomagnetic drill holes (red arrows), is a reminder of exceptionally poor judgement that left a scarred arch-aeological petroglyph site on a Miocene tuff, Nevada, USA. What personal or professional values guided the decision to sample here? What are the consequences? What information or training could have led to better decision-making? Image credit: S. Foss.

understand past and current attitudes and practices of geologic sampling. Please help us start this conversation by participating in the short survey (open until 15 Sept.: [www.surveymonkey.com/r/geologic-sampling](http://www.surveymonkey.com/r/geologic-sampling)). The anonymous, aggregated information will serve as a springboard for discussions at an interactive forum at GSA Connects 2022 and will also provide important baseline data to be considered in developing future recommendations or guidelines or a possible GSA Position Statement on geologic sampling.

## INVITATION TO THE LECTURE FORUM

The 2022 GSA Connects meeting will highlight an informal one-hour Noontime Lecture forum titled **Culture and Ethics of Geologic Sampling**, on Monday, 10 Oct. This forum will present some of the survey results and will utilize small interest-group discussions to explore contemporary attitudes and practices of the geoscience community about sampling natural sites, as well as review relevant policies and guidelines that already exist from related professional societies. In particular, this interactive forum will explore topics such as:

- A. **Experiences** encompassing levels of priorities/needs for samples.
- B. **Alternatives** to renewed or continuing sampling, such as multi-use purposes for samples, openly shared databases for available samples and repositories, and sample exchanges.
- C. **Archiving** and maintaining current sample collections.
- D. **Legal** and liability issues involving permitting, permissions, and licenses. (Note: What is legal is not necessarily ethical and sampling guidelines may differ internationally.)
- E. **Best practices** for sampling on lands of Indigenous people and other culturally sensitive areas, and possible repatriation.
- F. **Limits on sampling** and a possible process for oversight, particularly for sensitive geoheritage sites.
- G. **Impacts** and consequences of sampling (including unintended), including marking outcrops.

## FUTURE

Responsible sampling is relevant to protecting exemplary sites, being respectful of Indigenous cultures, and other societal issues. Sampling is a global issue related to geodiversity and geoconservation and is important to all geoscientists. It is also

related to much larger issues of extractive industries, as well as colonialism in the field and parachute science that can be intertwined with ethics of collecting without input or participation by local Indigenous communities (e.g., Monarrez et al., 2021; Cisneros et al., 2022; Raja et al., 2022).

Community responses via survey data and input from the Noontime Lecture forum will comprise a foundation to formulate actionable recommendations for a future GSA Position Statement, potential ethical sample guidelines for publishing in Society journals, as well as educational training materials for geoscience curriculum. Although some guidelines exist in various societies (e.g., Society of Vertebrate Paleontology, the Geological Society of London [see references]), GSA has yet to adopt any sampling guidelines or requirements. Another desirable outcome is to encourage reduced needs for physical sampling through alternatives that could involve better archiving of existing samples, infrastructure that is related to preservation of samples, and more sample sharing or repurposing. Now is the time for GSA to have more open communication and involvement on this relevant topic that affects teaching, research, and our geoheritage.

The GSA survey and Noontime Lecture forum on **Culture and Ethics of Geologic Sampling** are co-sponsored by the U.S. National Committee on Geological Sciences (USNC-GS), AGU, the American Geosciences Institute (AGI), the Mineralogical Society of America (MSA), the National Association of Geoscience Teachers (NAGT), and the International Association for Promoting Geoethics (IAPG).

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