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ETHICS AND CODE OF CONDUCT

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The topic of research ethics has taken a front burner in recent years. It is important for students to learn what the expectations are for protecting the integrity of data, protecting ourselves, and respecting each other. Here we use the term “geoethics” to encompass the ethics of the broader geoscience community. This chapter will outline the topics to be covered and provide resources, including case studies.

Ethical and Responsible Research

According to National Science Foundation (NSF) website, the responsible and ethical conduct of research involves not only a responsibility to generate and disseminate knowledge with rigor and integrity, but also a responsibility to:

1. conduct peer review with the highest ethical standards;
2. diligently protect proprietary information and intellectual property from inappropriate disclosure; and
3. treat students and colleagues fairly and with respect.

Many resources to assist researchers and educators with incorporating responsible and ethical conduct of research into their teaching and mentoring are available here from NSF.

Why is ethics training important?

Ethics training provides a reference framework that we can refer to when we are witness to, experiencing, or considering the ethics of our own choices. Reasons to teach ethics include:

- Ethics Education is an increasingly important component of the pre-professional training of (geo)scientists.
- Funding agencies (NSF, NIH) require training of students in the responsible conduct of research.
- Employers are increasingly expecting their workers to have basic training in ethics, and
- The public demands the highest standards of ethical conduct by scientists.

Examples of ethics education might include:

- Learning about the falsification of data in one's research project.
- Hearing about a researcher using a student's ideas without acknowledgement.
- Choosing to go into an area recently hit by an earthquake to collect data and displacing first responders.
- Dealing with unethical treatment based on gender or race.

Note: In this chapter, we refer to ethics in the geosciences as “geoethics.” *"Geoethics consists of the research and reflection on those values upon which to base appropriate behaviours and practices where human activities intersect the Geosphere. Geoethics deals with the ethical, social and cultural implications of Earth Sciences research and practice, providing a point of intersection for Geosciences, Sociology and Philosophy. Geoethics represents an opportunity for Geoscientists to become more conscious of their social role and responsibilities in conducting their activities. Geoethics is a tool to influence the awareness of society regarding problems related to geo-resources and geo-environment.” -- IAPG Constitution, visit the International Association for Promoting Geoethics at: https://www.geoethics.org/*

Aspiring to a Professional Code of Conduct

A **virtue** is a trait or quality that is deemed to be morally good and thus is valued as a foundation of principle and good moral being.

What are the human virtues that are encompassed by Geoethics?

- Power (used to enhance and enable or abuse)
- Trust
- Respect
- Responsibility
- Fairness
- Justice (environmental, generational, distributional)
- Integrity

These virtues are reflected in our professional codes of conduct. They typically include a *microethics* component - how we behave as individuals and in relations with colleagues - and a *macroethics* component - how we look beyond the profession to society and Earth. Some professional codes of conduct include those written by science societies like:

- Council for Undergraduate Research (CUR)
- American Geosciences Institute
- Geological Society of America
- American Geophysical Union

We need to make students aware of these codes of conduct as they enter the community of practice. The idea is to understand what the expectations and responsibilities are, and how to hold these up and be a good model for others. A good resource is the book On Being a Scientist: A Guide to Responsible Conduct in Research (*National Academy of Sciences*, 2009).

Responsible Conduct of Research

Significant ethical problems in research include the handling of data, publishing, and reviewing ethics, including authorship. These are the day-to-day things we do in the lab or field that have ethical considerations. Some big issues in this realm include:

1. **Fabrication** – making up data/results and recording/reporting them
2. **Falsification** – manipulating research materials, equipment, or processes or changing/omitting data
3. **Plagiarism** – appropriation of another person's ideas, processes, results, or words without giving credit

A pillar of scientific integrity is trust: within the scientific community colleagues and collaborators must trust that scientific research is done to the highest standards regarding data collection and interpretation, and reporting of results; the public must trust that scientific research results are an honest and accurate reflection of a researcher's work, that funding is used appropriately and ethically, and that scientific results are used appropriately to inform public policy decisions. Ethical issues that reflect violations of trust may include:

- Treatment of data and data management; documentation and quality of lab notes
- Mistakes and negligence
- Research misconduct
- Response to violation, whistleblowing
- Laboratory safety
- Sharing results - who has access to and right to use data, instruments?
- Authorship - credit; rights and recognition in publication
- Intellectual property
- Peer review, performance review, letters of recommendation
- Conflicts of interest, transparency, confidentiality, privacy issues
- Competing interests, commitments, values

Additional resources on Responsible Conduct of Research can be found at: https://serc.carleton.edu/geoethics/rcr_responsible.html

7 Step Guide to Ethical Decision Making (*Davis*, 1999)

1. **State the problem**
   - » For example, "there's something that makes me uncomfortable" or "do I have a conflict of interest?".
2. **Check the facts**
   - » For example, persons involved, laws, professional codes.
3. **Identify relevant factors** (internal and external)
   - » Who is involved, who is impacted, who benefits, who loses, what are the risks, can permanent damage be done, …?
4. **Develop a list of options**
   - » Be imaginative, try to avoid "dilemma"; not "yes" or" no" but whom to go to, what to say, what to do. Beneficence: Do no harm!
5. **Test the options** - Use some of the following tests:
   - » *harm test*: Does this option do less harm than the alternatives?
   - » *publicity test*: Would I want my choice of this option published in the newspaper? Could I define the decision/action to the public?
   - » *defensibility test*: Could I defend my choice of this option before a congressional committee or committee of peers?
   - » *reversibility test*: Would I still think this option was a good choice if there were adverse effects? Could I go back and try something else?
   - » *colleague test*: What do my colleagues say when I describe my problem and suggest this option as my solution?
   - » *professional test*: What might my profession's governing body for ethics say about this option?
   - » *organization test*: What does my company's ethics officer or legal counsel say about this?
6. **Make a choice** - based on steps 1-5
7. **Review steps 1-6** - How can you reduce the likelihood that you will need to make a similar decision again?
   - » Are there any cautions you can take as an individual?
   - » Is there any way to have more support next time?
   - » Is there any way to change the organization (for example, suggest policy change at the next departmental meeting)?

Having made a decision based on the process above, are you now prepared to ACT?

Ethical Responsibilities in Society

How to act and communicate responsibly with the public with respect to geohazards

Geoscientists have an ethical responsibility to work for the benefit of society. More generally, AAAS (2015) conducted a survey of scientists, and reports that "if the U.S. is to respond effectively to the challenges of the 21st century, we must find ways to reorganize our science and technology enterprise to address tomorrow's needs and aspirations":

Authorship

Authorship can be a point of conflict for most people in science, particularly because we collaborate with each other in writing proposals, carrying out research, and writing papers. It is not always clear who should be an author, or in what order authors should be listed. The following has been adapted from a Yale University Website "Guidance on Authorship in Scholarly or Scientific Publications":

All co-authors should have been directly involved in all three of the following:

1. Significant involvement in study conception or design, data collection, or data analysis/interpretation;
2. Involvement in writing or revising manuscript;
3. Approval of final version of manuscript for publication, at least as it pertains to their roles in the project; and
4. Responsibility for accuracy and integrity of all aspects of research.

Those who have made other contributions to the work (such as data collection without interpretation) or only parts of the above criteria should be credited in the acknowledgements, but not receive authorship.

A more complete treatment of ethics in publishing can be found at the Committee on Publication Ethics: https://publicationethics.org/

- Maintaining global sustainability,
- Improving human health,
- Addressing economic disparities,
- Understanding our place in the universe,
- Promoting peace and security, and
- Directing the products of technology toward the betterment of society, nationally, and worldwide.

What are one's professional ethical responsibilities when:

- Going into consulting (confidentiality, safety, liability),
- Serving as an expert witness (litigation in courts; conflicts of interest),
- Assisting with public planning of projects (transparency, not overstating credentials),
- Responsibly communicating with the public (via numerous media, e.g., with journalists, posting on your own blog) about topics such as geohazards, resource utilization, public safety and health issues, particularly when there is often a high degree of associated uncertainty.
- In consideration of cultural sensitivity when working with diverse populations; being respectful of cultural norms.

Responsible Conduct of Research

The primary responsibility is to be respectful of each other. This is awareness of how we behave towards each other, as this ultimately impacts the overall scientific enterprise, and workplace climate. Resources are available on building an inclusive and diverse workplace. To ensure an inclusive workplace, we need to talk about microaggressions, bias, harassment, bystander intervention (responsibility to be prepared and act); and make our workplaces welcoming, inclusive, safe and productive, so that everyone can do their best work. Note that the updated American Geophysical Union Scientific Ethics and Integrity Policy (2017) specifically calls out sexual harassment and bullying as forms of scientific misconduct, with consequences of formal sanctions or expulsion. These behaviors ultimately impacts the ability of all scientists to work in a safe, inclusive, and productive workplace which also impact the overall progress of Science. Ethics are an individual choice and we must decide every day how to act. There are consequences for unethical behavior. An ethical breach can destroy a career and tarnish an institution.

Resources

Who should get credit? Clip from the Big Bang Theory show. (2:45)

TED Talk: Trust in research -- the ethics of knowledge production by Garry Gray (12:24)

TED Talk: We have to change the culture of science to do better research by Uri Alon (16:15)

Building an inclusive and diverse Department/Program/Profession from the National Association of Geoscience Teachers (NAGT) On the Cutting Edge: Teach the Earth.

Mogk, D. Geoethics and Professionalism: The Responsible Conduct of Scientists. from the National Association of Geoscience Teachers (NAGT) On the Cutting Edge: Teach the Earth.

Mogk, D. Responsible Code of Conduct. from the National Association of Geoscience Teachers (NAGT) On the Cutting Edge: Teach the Earth.

Mogk, D. Teaching Geoethics Across the Geoscience Curriculum from the National Association of Geoscience Teachers (NAGT) On the Cutting Edge: Teach the Earth.

Further Reading

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