Can we achieve a shared understanding of some **primacy principles** (*e.g.*, protecting human safety and environmental health) and **foundational ethical concepts** (*e.g.*, equal dignity, justice, and truth within the limits of uncertainty) in both science and society?

Vincent S. Cronin (Vince_Cronin@CroninProjects.org)
International Association for Promoting Geoethics (www.geoethics.org) and Baylor University

http://CroninProjects.org/Ethics-AGU-GSS2019/index.html

Primacy principles are the most important ethical constraints for our work, just as primacy clauses in professional codes of ethics remind us of the most important considerations for a given profession. For example, the Hippocratic Oath is an ancient expression of primacy principles under which a medical healer must work.

Some primacy principles for geoscientists include the following:

- *Professional scientists are obligated to express scientific methods, data, results and interpretations truthfully in a manner that also conveys the corresponding level of uncertainty.* We seek to approach truth through reproducible observations and testable hypotheses, and know that our observations always exist within some range of uncertainty.
- Geoscientists have an ethical duty to the public. In our professional work, *the health, safety, and wellbeing of the public are paramount*.
- Geoscientists have a responsibility to act in ways that promote, protect, and sustain the health of the Earth environment. Because of their knowledge of Earth and its history, systems, processes, resources, and vulnerabilities, *geoscientists have stewardship obligations toward Earth*. Geoscientists are expert intermediaries between society and the Earth environment upon which we all depend.

Science is the quest to discover reliable information about the world.
That knowledge belongs to us all.

An essential vocabulary of words and concepts related to practical ethics, (mostly) skewed toward positive terms*

*an incomplete draft — your input is welcome

Those of us who have been privileged to gain advanced knowledge through the global network of universities (funded by society) must know a fundamental truth: ***we hold our increased knowledge and understanding in trust for all humankind.***

Scientists are part of society. In addition to their duty to communicate their scientific ideas and results within the research community, scientists have an obligation to help the research community explain important results to the rest of society.

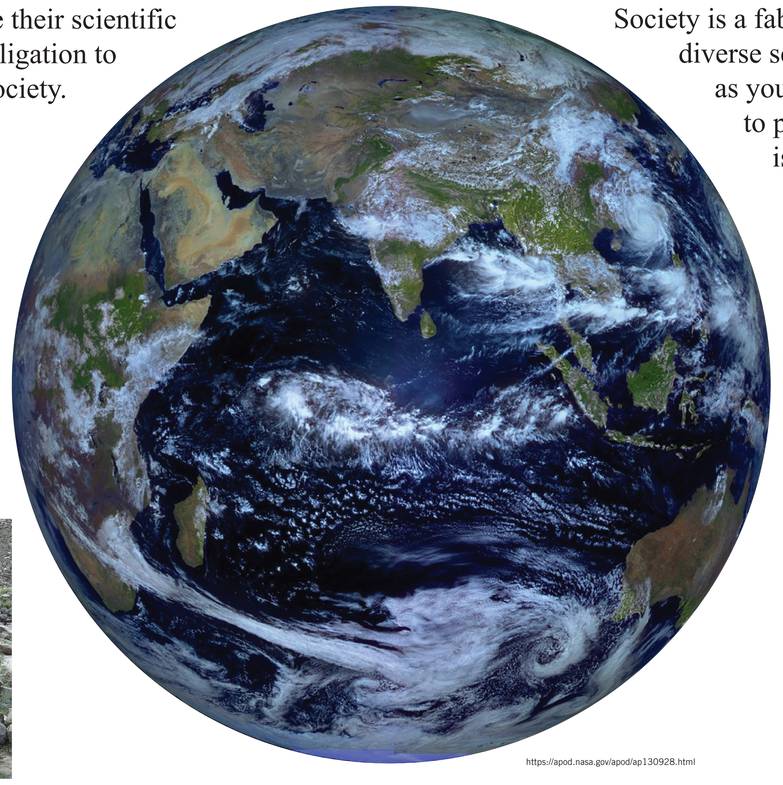
Does society have a parallel set of duties and obligations toward the science community?

Do we need to build bridges between science and society, or simply learn how to listen respectfully and share with humility?

This man's work is to harvest woody plants in the Karakoram Mountains above Skardu. This is the only local source of fuel for cooking and heating. Deforestation in a warming climate facilitates the process of desertification. How can we help supply needed energy to people who have little money.

ABOVE These three men hike to a glacier above ~4 km elevation to harvest ice. **RIGHT** Then they carry the blocks ~20 km into town. Karakoram glaciers are retreating, which will have an adverse impact on the water supply in this semi-arid mountain range. How can we support people who live in places where the affects of a warming climate are particularly acute?

Gentleness is the antidote for cruelty.
--Phaedrus



https://apod.nasa.gov/apod/ap130928.html

Society is a fabric woven of the astoundingly diverse threads of humanity, and equally diverse sets of human motivations. It is a mistake to think that everyone thinks as you do, or would if they were just honest with themselves. It is a mistake to project your life experience and worldview on all the rest. None of us is always right. None has a monopoly on good ideas.

Humans are social animals and require contact with other humans to survive intact. But humans also have a tendency for tribalism as they have sought personal and family security. As we confront global challenges, we have no choice but to face them together. Earth — our lifeboat in space — is a series of linked systems, so people and their political groups need to think globally as they make decisions about their personal, family, and community wellbeing.

A warming climate is expected to result in more frequent high-intensity storms as well as rising sea level that will slowly move the coastline inland. Some island nations will not be viable, or will be submerged, as sea level rises just 2 m, which is possible by around 2150. Major coastal cities will also face daunting and expensive choices. Much of their current near-shore infrastructure will have to be replaced with facilities that are flexible enough to function as sea level continues to rise. Wealthy countries might be able to cope with these challenges. What about the rest of the world? Significant population migration seems likely.

Weather disasters like this devastation caused by Hurricane Irma will continue to cause death, injury, and destruction, and are expected to occur more frequently and with greater intensity in the future due to a warming climate. In addition to severe losses to individual persons and families, these major natural disasters can suppress national economies for years afterwards.

Political and economic refugees already pose a grave humanitarian crisis. Climate refugees escaping rising seas and desertification will amplify the problem, as persons and families move away from their homes to improve their chances for survival.

In the interior of continents, far away from moving shorelines and expanding deserts, severe weather and related flooding results in losses and great human suffering that can devastate local economies.

Lack of secure access to safe water already affects much of the world, leading to many avoidable deaths. Rising populations and uncontrolled pollution place communities at risk, even in wealthy countries. In poor countries, lack of sufficient clean water can have catastrophic effects.

Given our foretaste of significant weather-related disasters and our understanding of a rising sea level now and for perhaps centuries to come, can we not agree that this generation must begin to mitigate the underlying problems with all of the scientific and technical expertise that is available to us? Are such solutions only for the wealthy?

We know much about earthquakes and how to make earthquake-resilient structures. Why does this scene recur every year? Why don't building codes and practices keep up with advances in scientific and technical knowledge?

Scientists must learn to communicate with the rest of society in useful ways. Society needs to utilize this knowledge for the benefit of ***all*** people, now and in the future. No solution to a global problem will be successful if it is not accessible to those who are without power or wealth.

Laiba Hazra, age 6 — and Afghan refugee in Islamabad, Pakistan.
AP photo by Muhammed Muheisen (2014).

Each person is the moral equivalent of every other person. There is no "us" and "them," no "übermenschen" or "untermenschen" — just "us."

Acceptance of the equal dignity or moral equivalence of all humans is a necessary first step in addressing many of society's most vexing issues. The preamble to the Universal Declaration of Human Rights (1948) states that "the inherent dignity and of the equal and inalienable rights of all members of the human family is the foundation of freedom, justice and peace in the world," and acknowledges that "disregard and contempt for human rights have resulted in barbarous acts which have outraged the conscience of mankind." Through this document, the nations of the world set the goal of "a world in which human beings shall enjoy freedom of speech and belief and freedom from fear and want."

Humanity faces a host of problems and challenges. The human population of Earth has tripled in the last ~75 years, and the rate of increase has steadily increased. Rising sea level will reduce the land area above sea level, completely inundating some populated islands as well as heavily populated coastal cities. A warming climate might lead to increased desertification, further constricting the surface area available for cultivation and habitation. Significant population migrations seem inevitable. Supplies of clean (unpolluted) potable water in some areas will become (indeed, have become) restricted or unavailable. The acquisition and economical availability of some important mineral and energy resources will be an increasing challenge, as will the just and equitable allocation/distribution of resources.

The reason geoscientists should be concerned about the health of Earth's environment is the danger that an unhealthy environment poses for all of us, worldwide, rich and poor. But the risks will be borne disproportionately by people who are least able to afford to mitigate or avoid those risks. Global problems require cooperative solutions that are implemented worldwide.

Every person is worthy of our care, concern, and help. That truth motivates scientists to work in the public interest.

The wrong idea has taken root in the world.
And the idea is this:
There just might be some lives out there
that matter less than other lives.

--Greg Boyle, S.J. (2004)