Bridging The Gap Between Science And Faith Through Environmental Studies: Theoretical Considerations And Implications For Environmental Policy And Practice

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Abstract

The metaphysical implications of some of the scientific advances of the twentieth century have been under-appreciated to a considerable degree in terms of their potential to provide a theoretical bridge between science-based and faith-based understanding. In fact, even the bedrock scientific disciplines, such as physics and mathematics, can be seen to contribute greatly to a theoretical perspective that provides a deeper appreciation of the validity of these different approaches to knowledge, both through rational science and intuitive faith. The complementarity paradigm of quantum mechanics and the incompleteness theorems of mathematical logic provide examples supporting the existence of a mind-independent reality, akin to the Platonic ideal form, which cannot be entirely explained on a rational basis alone but which must be partly appreciated intuitively. Although it remains unclear how this perspective may help resolve all conflicts of science and faith, another area of recent scientific and religious inquiry, namely the environment, appears to offer great promise for uniting these theoretical lines of thought to provide some reconciliation of the two on a practical level. For example, environmental science and ecotheology both share a common understanding of rational and intuitive arguments for protecting the environment that incorporate appreciation of principles of science as well as religion. Furthermore, applications that combine the strengths of both environmental science and ecotheology are much more likely to be successful in influencing environmental policies and practices than reliance on either alone. Thus, environmental studies can make a significant contribution not only to building a better world but also to building a better bridge between science and faith.

"Science without religion is lame, religion without science is blind." Albert Einstein

Introduction

Recent public clashes between science and faith, perhaps best epitomized by the creationism/intelligent design versus evolution debate in the United States, have raised public perception of the existence of a great, seemingly unbridgeable cosmologic divide which is clearly the cause of considerable unease among professionals and the public alike.[1] One easy response has been to declare that the divide exists but it is not a problem because, as Stephen Jay Gould has characterized them, science and faith are "non-overlapping magisteria"[2]. They belong to separate realms where science can explain the "how" and faith can explain the "why", and ne'er the twains shall meet or shall need to meet. And yet in court rooms over evolution and in government policy on stem cells and

in many other instances the twains have collided forcibly and the outcomes seem to suggest that the divide and the problems it engenders are real and urgent. Is one world-view right and the other wrong, or is it possible to have a more measured conversation and attempt to bridge the divide and find a common ground?

The work of science over the past few centuries must certainly be considered one of the crowning achievements of human reason in the modern age. Despite the fears of religious authorities dating back at least to Galileo that the success of science in explaining the natural world threatened to replace god with materialism and drain moral meaning from humanity, the proponents of including a faith-based understanding of our existence remain strong among the general public. However, even such a conservative faith-based institution as the Catholic Church does not deny the value of scientific rationality in helping to explain the workings of the world, including in clearly controversial areas such as evolution. Thus, from a faith-based perspective there seems to be room for accommodation. This same may be true among scientists. Though a far greater proportion (>60%) of American scientists classify themselves as non-believers in a supernatural deity compared to the general public (<10%)[3], this still leaves a sizable minority open to the possibility that science cannot explain everything, particularly when faced with the seeming violations of intuition and common sense inherent, for example, in a quantum mechanics-based world.

As a scientist, it seems to me scientifically sound to concede that science may be a path to the truth but necessarily the only path to the truth. As Jon Meacham recently eloquently put it, “Light can neither enter into nor emanate from a closed mind, and intellectual humility – acknowledging what we do not, and cannot know – is the

beginning of wisdom" so "allowing for the existence of a transcendent order seems sounder than flatly denying the possibility altogether."[4] Indeed, scientific advances in the last century themselves seem to have allowed for this possibility and potentially provide a theoretical bridge between science-based and faith–based understanding.

Discussion

Theoretical Considerations: Allowing for the Existence of a Transcendent Order

Most scientists would concede that the bedrocks of modern science are physics and mathematics. In the twentieth century, the most significant and fundamental discoveries in both of these disciplines can be viewed as having provided examples supporting the existence of a mind-independent reality, akin to the Platonic ideal form, which cannot be explained on a rational basis alone but which must be partly appreciated intuitively. Thus, they could allow for the possibility of the validity of different approaches to knowledge, both through rational science and intuitive faith.

As alluded to above, ever since Albert Einstein's 1905 paper raised the specter of a quantum mechanical world by noting the complementary nature of light,[5] namely that it behaved as a particle as well as a wave, physicists have been existentially perturbed by the weirdness, absurdity and seeming irrationality of the theory.[6] As the physicists Boris Podolsky and Nathan Rosen put it in 1935, "No reasonable definition of reality could be expected to permit this", or, as N. David Mermin recently described it, it's "the closest thing we have to magic."[7] And yet numerous experiments have supported the notion of the complementarity of light and subatomic particles as well as Schrodinger's probabilistic wave function of matter and Heisenberg's uncertainty principle and have

suggested even stranger implications of quantum mechanics such as "cat states" of matter, "spooky action at a distance (entanglement)" of particles and a universe of "many worlds".[8] If we experience light as a wave or as a particle depending on how we choose to measure it, then at any given time we can only see one aspect of it's true form (one shadow of it on Plato's cave wall), but in reality it must be both (Plato's true form). As the physicist Anton Zeilinger has put it, the results of quantum mechanics are "the strongest indication we have of a reality 'out there' existing independently of us."[8] However, the scientific reasoning of quantum mechanics only hints that this reality is "out there" but does not, apparently cannot, explain what it really is, so it seems we are left to rely on our intuition. Even Einstein appreciated the religious implications of this: "I think that a particle must have a separate reality independent of the measurements…" and so "[t]o know that which is impenetrable for us really exists…is the core of the true religious sentiment."[9]

The reality "out there" seems to encompass not just the physical truths of quantum mechanics but the abstract truths of mathematics as well. Just as Einstein's complementarity paradigm has challenged our understanding of the physical truth, so has Kurt Godel's incompleteness theorem challenged our understanding of the mathematical truth. I believe physicists as well as mathematicians would accept that mathematical logic brings us as close to the truth as we can get, but Godel's theorem shattered any illusions that reason alone can define that truth. In 1930-1, Godel revealed his proof that in any formal mathematical system adequate for number theory there exists an undecidable formula, or, in other words, there exist truths in mathematics that cannot be proven.[10] It is clear that Godel accepted and embraced the implications of this for a

Platonist view of the world, namely, as evidence of an objective truth independent of the human mind, i.e., a suprasensible reality "out there" of eternal truths, which can only be comprehended imperfectly in a rational way. Of course, a Platonist world-view, whether based on complementarity in physics or incompleteness in mathematics, is not synonymous with a faith-based religious world-view. However, there are many similarities in these world-views, and, as Rebecca Goldstein has recently pointed out, even Godel himself, one of the staunchest defenders of logic and reason, was receptive to the idea that his theorem had serious religious implications.[11] In a letter to his mother in 1963, Godel wrote, "It was something to be expected that sooner or later my proof will be made useful for religion, since that is doubtless also justified in a certain sense."[11] In fact, it seems likely that Godel believed that one of the implications of his work was that some version of the "ontological proof of God's existence" was achievable, however incomplete.[11]

The point of these examples is that there are reasons within physics and mathematics to allow for the possibility of truths that are only partially accessible through rational science alone, perhaps partially accessible by an intuitive faith alone, and thus fully accessible by neither alone. The existence of a transcendent reality, a Platonist realm of forms of truth, may be plausible. However, although there may now be some theoretical basis for an accommodation of science and faith, it is probably unlikely that this will resolve all the conflict on a practical level, but it may provide some reconciliation of the two in certain areas. One area that appears to offer great promise for such a reconciliation is the environment.

Practical Implications: The Environment as a Matter of Science and Faith

The term environmental studies has come to encompass a broad range of disciplines aimed at understanding the world around us and our role in it. Although areas such as economics, history, political science, the social sciences and the arts all have contributions to make to environmental studies, for the purposes of this discussion let us limit ourselves to the areas of environmental science and environmental ethics, in particular the religious-based environmental ethic that has been labeled ecotheology.

Environmental science can be viewed as an applied science that itself draws on many different disciplines (e.g., the biological sciences of ecology, evolutionary biology and population biology, the physical sciences of geology, oceanography, atmospheric science and climatology, the engineering sciences of industrial ecology, resource management, risk assessment and pollution prevention and remediation, and the health sciences of epidemiology, toxicology and medical anthropology and psychology) in order to understand how the various earth systems work together. At their root, all of these disciplines incorporate the principles of physics and mathematics, and so, like them, environmental sciences can also allow for their same possibility of the existence of a transcendent order. In addition, since environmental sciences is an applied science, there is the implicit assumption that the understanding will be put to some good use.

I like to make the analogy between environmental science and medical science. Medicine is an applied science that draws on many different disciplines (e.g., biochemistry, molecular and cellular biology, anatomy, physiology, pathology and pharmacology) in order to understand how the various systems of the body work together. This understanding has the purpose of achieving healthy humans, a certain quality of life for people that is perhaps best characterized by the World Health

Organization definition of health as "a state of complete, physical, mental, and social well-being and not merely the absence of disease or infirmity."[12] This implies much more than the traditional concept of medicine as diagnosing and treating disease once it has occurred. It implies a more holistic and precautionary approach of working to maintain an optimal state of the individual to prevent, as long as possible, disease from occurring in the future. Similarly, the understanding of the earth through environmental science has the purpose of achieving a healthy environment, a certain quality of life for the planet that is perhaps best characterized by the term sustainability as defined by the Brundtland World Commission on Environment and Development as meeting "the needs of the present generation without compromising the needs of future generations."[13] Just like medicine at its best then, the practice of environmental science implies much more than simply identifying and fixing defects in particular earth systems once they occur. It implies a more holistic and precautionary approach of working to maintain an optimal state of the planet today to prevent, as long as possible, environmental problems from occurring in the future. What both of these conceptions of medical science and environmental science have in common is a preventive approach that places great value on the future. Even though we know that each person will eventually die and that the earth itself will "die" when the sun burns out, these conceptions of medical science and environmental science suggest that, if we fully understand how our bodies and our planet function, there is an optimal path to follow for the course of a human life or the earth's life. Environmental scientists have generally accepted out of a sense of rational efficiency an optimal course of sustainability into the future. This valuing of the future of

the planet is one area (although there are certainly others such as environmental justice) where environmental science can find common cause with ecotheology.

This is plausible because religions generally encompass a concept of the divine on a scale that is cosmically vast and timeless, so they can embody belief systems with the long view necessary to provide the underpinnings for a sustainable approach to the environment. Many of the world's religions have at their core a respect for the environment and a concern for the welfare of future generations that capture the same idea as the environmental scientists' definition of sustainability. This has perhaps been most evident in Eastern cultures dominated by Buddhism, Hinduism, Jainism, Shintoism, Taoism and Confucianism with their emphasis on continuity and the unity and harmony of all existence and hence compassion for all things. They generally do not consider man, nature and the divine to be distinct but rather intimately interconnected. This affirmation of the interdependency of all things naturally leads to an approach of moderation and respect now and for all time. Today, the Dalai Lama probably best personifies these Eastern traditions for the rest of the world. His strong support for environmental causes, as well as his efforts to unite science and religion (as expressed by his desire to be reincarnated as a naturalist), provide an excellent example of ecotheology in sympathy with environmental science.[14] However, there are other examples. Native American belief systems, although difficult to generalize about because they comprise many different cultures, do share a common regard for the environment as a whole. Since the Great Spirit is all pervasive, all entities in the environment are unified and deserving of respect. In consequence, man should live in harmony with nature taking only what is necessary for survival or risk provoking the wrath of nature and the

withdrawal of its sustenance.[15] For example, the tradition of the Blackfeet Indians holds "a sense of reverence for nature that made them want to move through the world carefully, leaving as little mark behind them as possible."[16] Many of these ideas are also captured in the traditions of the Haudenosaunee (Six Nations of the Iroquois Confederacy) which, according to the Faithkeeper of the tribes, put respect and thanksgiving at the center of man's relationship to the environment,[14] as well as consideration of the consequences of one's decisions extending out to the seventh generation,[17] surely an ecotheologic approach of sustainability.

However, until recently, the dominant themes in Western religious thought could not be characterized as ecotheologic. This largely derives from an interpretation of Genesis 1 where God says to man "…let him have dominion over…the whole earth, and every creeping creature…" and "…fill the earth and subdue it and rule over…all living creatures that move upon the earth."[18] In the mainstream Judeo-Christian tradition this was interpreted to place humans at the center of concern with absolute dominion over the rest of nature. This anthropocentric worldview that places humans above and separate from the environment allowed Western civilization to consider depletion of natural resources, disregard for other species, and despoliation of the environment as part of mankind's birthright to use for the improvement of his own condition. This approach jibed particularly well with the needs of the scientific revolution, the industrial revolution and the American concept of the frontier ethic. However, a seminal article by Lynn White in 1967 pointed out the errors of this anthropocentric approach and allowed the re-emergence of different interpretive strains of Judeo-Christian theology that had long been suppressed.[19]

An alternative interpretation of Genesis 1 takes the meaning of dominion to be custody or stewardship, i.e., a responsibility of man to take care of and nurture God's creation. It has been pointed out that the role of humans in the Garden in Genesis 2 to "avad" and "shamar" does not just mean to work the land but to serve and guard it as something that one does not own because it belongs to God, not man.[17] Throughout history, various theologians have continued to draw on these interpretations. In his Canticle of All Creatures, St. Francis of Assisi values nature in celebrating "Sister Earth and her flowers, herbs and fruits"[18], and in his Summa Theologica, St. Thomas Aquinas expresses appreciation for biodiversity noting "a multiplicity of species adds more to the goodness of the universe"[17]. Nevertheless, until recently, these sentiments were not serious challenges to the dominant philosophy.

However, the last few decades have seen a marked shift toward this latter interpretation. In his 1990 encyclical Gaudium et Spes, Pope John Paul II noted the need for respect of our natural resources and an ethical requirement to care for the earth so that it would be a worthy habitat for all humanity.[18] The Pope has noted that "Protecting the world's environment is part of the natural order, and those who damage it are showing contempt for the divine nature of all created things."[16] In 1995, the Ecumenical Patriarch of the Eastern Orthodox Church Bartholomew I organized a series of symposia on Religion, Science and Environment to bring together scientists and religious leaders to consider ways to address environmental issues.[14] In a 1997 speech, the Patriarch noted that to

> …commit a crime against the natural world is a sin. For humans to cause species to become extinct and to destroy the biological diversity of God's

> creation; for humans to degrade the integrity of Earth by causing changes in its climate, by stripping the Earth of its natural forests, or destroying its wetlands; for humans to injure other humans with disease; for humans to contaminate the Earth's waters, its land, its air, and its life with poisonous substances: These are sins.[14]

Protestant churches have expressed similar sentiments through their World Council of Churches.[18]

Perhaps more importantly, the words have been accompanied by actions that are working to shift environmental policies and practices in more sustainable directions. By 1996, the Alliance of Religions and Conservation had already identified more than 120,000 religious-environmental projects worldwide.[14] In the U.S., the joint efforts of the National Council of Churches of Christ, the U.S. Catholic Bishops Conference, the Coalition on the Environment and Jewish Life, and the Evangelical Environmental Network have led to the formation of the National Religious Partnership for the Environment to jointly address environmental issues at a policy level.[17] Since 2001 in California, local chapters of the National Council of Catholic Women and Women of Reform Judaism, along with Protestant, Orthodox Christian and other groups, have spearheaded the California Interfaith Partnership for Children's Health and the Environment which has sponsored workshops to educate congregations in the state to raise the level of awareness about environmental concerns, as well as organizing a series of legislative hearings to promote state bills to reduce environmental hazards.[17] In the past year, many of these efforts have focused more specifically on the potentially most critical environmental issue of global warming. In February, eighty-six evangelical

Christian leaders backed an initiative to combat global warming, and, in October, Christian, Muslim, Jewish and Buddhist leaders came together in Philadelphia to try to address the problem in a unified way; following this, the religious-based association Interfaith Power and Light organized the screening of films on global warming, including "An Inconvenient Truth", for 4,000 congregations of various faiths around the country to raise awareness of the issue and mobilize action to address it, including both personal responses such as energy audits and collective responses through policy initiatives.[20] Similarly, the Evangelical Environmental Network has recently launched a campaign around the slogan "What would Jesus drive?" to focus attention on all of the environmental consequences of driving fuel-inefficient vehicles, including global climate change but also related issues such as ill health and environmental justice.[21] The argument they make clearly combines the rational appeals of science with the faith-based appeals of religion:

> Of all the choices we make as consumers, the cars we drive have the single biggest impact on all of God's creation. Car pollution causes illness and death, and mostly afflicts the elderly, poor, sick and young. It also contributes to global warming, putting millions at risk from drought, flood, hunger and homelessness. Transportation is now a moral choice and an issue of Christian reflection. It's about more than engineering – it's about ethics. About obedience. About loving your neighbor. So what *would* Jesus drive?[17]

These and similar efforts are successfully refocusing religious ethics on environmental issues and marrying these faith-based principles with scientific principles to help translate ecotheology into environmental activism.

Conclusion

Bridging the Gap for a Better World

In recent years, environmental sciences has provided increasingly overwhelming empirical evidence that human activity is dramatically altering our world in ways that are potentially destructive on a global scale and thus threaten its very existence. However, the rational arguments of environmental science alone have thus far been insufficient to move the political, economic and social systems to adopt the changes dictated by the science to avoid catastrophe. Clearly, additional appeals beyond the rational are needed to get people to accept the environmentally sustainable solutions that science would dictate. Ecotheology provides a faith-based belief system compatible with most religious traditions that is clearly consistent with the principles of environmental science and has the potential to move both the scientific and religious interests in this area forward. People of faith and people of science should both be able to accept the idea of the world as a gift, whether you believe it is an intentional gift of God or an accidental gift of quantum mechanical randomness. What we do with that gift is an issue we can all find common cause in because it would be equally religiously immoral and scientifically irrational to degrade the gift to the point where we can no longer exist to appreciate its wonders.

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