

Robert Frodeman. *Geo-Logic: Breaking Ground between Philosophy and the Earth Sciences*. Albany: State University of New York Press, 2003. 184 pages.

Robert Frodeman's *Geo-Logic* intertwines philosophical, environmental, and political issues in a discussion that seeks to reveal unexpected connections between divergent fields of knowledge and to prepare a way of thinking about environmental questions that incorporates currently neglected but decidedly crucial considerations. The monograph analyzes metaphysical and rhetorical contexts of environmental controversies, notably abandoned mine remediation in southern Colorado's San Juan Mountains, from perspectives informed by ancient Greek and continental philosophy, and includes comments about the policy implications of the analysis.

*Geo-Logic's* narrative mingles anecdotes, observations, and aesthetic meditations together with more traditional scholarship. The book contains eight chapters that fall into three themes: political controversies regarding acid mine drainage (chaps. 2–3), the nature of geological field science in relation to traditional philosophy of science (chaps. 4–6), and the challenges and potential new roles facing public Earth scientists (chaps. 7–8) (p. 16). The book's overriding purpose is to uncover "the hidden metaphysical assumptions underlying modern culture" (p. 39) in order to make better use of our "intellectual resources" (p. 16) regarding both public science and environmental policy.

Frodeman advocates a number of ambitious and unorthodox ideas regarding science, the humanities, and public policy, which he depicts as more intimately related to one another than modernist institutional structures typically recognize. For instance, Frodeman implies that the division of knowledge into discrete domains reflects "scientific" parameters that enframe and limit public discourse concerning values, intuitions, and "authentic" responses to the Earth. Frodeman would like to see scientific parameters broadened to include such responses, claiming that "some values are better than others" (p. 6) and that values can be rationally factored into scientific pursuits and policy debates.

Armed with such convictions, Frodeman envisions public policy roles for both geology and environmental ethics that are grounded in principles routinely shunned in public and "scientific" discourses. The feasibility of integrating authentic responses within such discourses hinges upon Frodeman's claim that geological field science employs tenets, judgments, and practices traditionally ascribed to the humanities. In other words, intuition and value-sensitive interpretation, which presently have at best tacit roles in scientific and policy-related activities, have potentially explicit roles to play in these arenas.

According to Frodeman, environmentalists are "lured into environmental debates by one set of intuitions, only to find [their] interests redescribed in terms that are intellectually more respectable" (p. 38). Frodeman describes this process as "a kind of intellectual bait and switch" (p. 38) that substitutes one

set of terms for another, ostensibly for the sake of rational democratic debate, yet precludes addressing rationally the very motivations that drive the debates in the first place. Aesthetic, theological, and metaphysical judgments have been “inadmissible” (p. 40) in scientific (p. 57), political (p. 40), and other discourses since the Enlightenment (p. 46). Frodeman acknowledges that the very modernist presumptions that stifle these judgments have also brought about clear societal advances; but he points out that they nevertheless mask important aspects of human experience and hence claim more than they can deliver: the “bait and switch” process implies that what counts as reality tends to be limited to what is “discoverable through the process of the scientific method” (p. 56).

The problem, according to Frodeman, is that what is traditionally understood as the scientific method and its results are inadequate to address many of the concerns that animate environmental debates. Despite the common tendency for policy makers to turn to science for solutions to dilemmas, science cannot resolve many of these debates, as evidenced by the fact that it “seldom speaks with one voice” (p. 40) when it steps outside its proper bounds. Consequently, environmental problems are not being effectively addressed. By framing what are essentially concerns arising from metaphysical intuitions in scientific (or economic, or legal, or epidemiological [p. 40]) language, Frodeman suggests we unwittingly abandon any rational recourse to engaging the intuitions and hence addressing the concerns. Unchecked, and when combined with massive technological power, the “positivist dream,” that is partly responsible for the bait and switch phenomenon, threatens to eclipse political debate altogether with Cartesian certainty (p. 72).

Frodeman seeks an alternative understanding of rationality that will accommodate a richer and more environmentally welcoming “reality.” Turning to philosophy of science, which lays the foundation for public conceptions of science, knowledge, and truth, he tempers the centrality of the laboratory-based, heavens-gazing paradigm of physics and astronomy with the Earth-based science of field geology. Traditional philosophy of science, in adopting the laboratory as standard (p. 64), has engendered a definition of *logos* (“a pattern or rational order to the world” [p. 77]) that is “distant, regular, immutable, and certain” (p. 78) as opposed to one that elicits the “overall structure or context within which things take on significance” (p. 114)—a characteristic of scientific knowledge that emerges instead in the realm of field. Pursuing this alternative model of science, Frodeman develops a “philosophy of (field) science” (p. 95) that includes an explanation of methods practiced by field geologists that ostensibly relate more directly to environmental sensibilities and, by extension, to sustainable outcomes. These methods, says Frodeman, are able to take on more contextualized dimensions and hence be more socially and culturally applicable.

Philosophy of field science, as Frodeman depicts it, takes into account richer,

fuller ways of knowing that resemble artistic, poetic, theological, literary, and philosophical practices. Says Frodeman, "geological reasoning provides an outstanding model of another type of scientific reasoning based in the approaches of hermeneutics" (p. 93), where hermeneutics "claims that our original goals and assumptions result in our discovering certain facts rather than others" (p. 90). Accordingly, a philosophy of field science can be sensitive to the very intuitions that originally inspire environmental concerns: the fundamentally hermeneutical character of knowledge "makes the question of human interests—personal, ethical and political, and metaphysical—intrinsic rather than extrinsic to the work of science" (p. 87).

Frodeman sees a unique function for the Earth sciences in relating science to the public interest; geology takes into account fundamental human conceptions and, furthermore, can inform these conceptions by becoming the science of natural limits. Postmodern culture lives "under the sign of infinity" (p. 120) and hence operates without any sense of the natural as proper, as *telos*, or as limit (p. 121). Says Frodeman, "the default position in ethics today is that each of us should be able to do exactly as he or she pleases, answering only to ourselves, with the only proviso that pursuing our desires does not conflict with the right of others to do the same" (p. 119). Geology, writes Frodeman, "in the sense of a *logos* of the Earth that includes geopoetics, geopolitics, geology and geoscience," would address and temper this ultimately futile situation by "defining the term of the natural" (p. 128): "This (postmodern) sense of geology would be concerned with identifying the increasingly obvious limits of space and resources that society will face in the twenty-first century" (p. 128). "Such a science would help move toward "a rough consensus on a wide range of societal issues" (p. 143).

Understandably, Frodeman recognizes that the suggestion that "values" can be engaged rationally at all is sure to "draw fire." Yet Frodeman pulls no punches: "few would disagree with the claim that open-mindedness is better than dogmatism" (p. 162, n. 6). Frodeman does not see this position as challenging either the First Amendment or the validity of scientific results within their proper domains. Instead, he posits, as it were, a third way, noting, "the lived experience of the sacred is distinct from questions about the place of organized, doctrinal religion in public life" (p. 55). As an example of a policy-making orientation that is informed by this "lived experience," Frodeman suggests a thought experiment in a political issue surrounding acid mine drainage:

The sacred implies the centrality of the notion of care—the capacity to restrain oneself, to control one's desires in order to make space for another. Only then can another being manifest its own nature through the process of self-emergence that the Greeks called *phusis*. *Phusis* and care provide us with another, nonhuman-centered standard for measuring our environmental responsibilities. Placing care at the center of an environmental metaphysics or theology offers us a criterion

other than that of pH and conductivity for approaching the problems of acid mine drainage. (p. 55)

Frodeman's analysis of the process whereby authentic and initial responses to the environment lead to less than satisfactory public ones—and of the causally connected deeper divide between the sciences and the humanities—unfolds in a rich and gradual way. The rhetorical qualities of *Geo-Logic* are largely meant to be illustrative of the kind of radical interdisciplinary rethinking that Frodeman both advocates and pioneers, ultimately in the service of relating self and society.

The reader of *Geo-Logic* must bear in mind that the term *science* can apply both to traditional lab science, said to be inadequate for resolving environmental policy debates, and geological field science, said potentially to be capable of informing them. This ambiguity, however, is cleared up by Frodeman's invaluable and descriptive exposition of an alternative account of science—which account has a different set of societal implications. In short, the method, not science itself, is what he seeks to challenge.

Frodeman's vision for a new geology has great appeal; however, it is not fully clear why such a science would have any more credence with the public (and special interest groups) than does the current geology: in each case, "science" could presumably fail to resolve environmental policy debates precisely because it speaks with many voices. In other words, how would policy dilemmas be resolved if several new sciences that were based on conflicting values outlined competing courses of action? For it is unclear that a science of limits would be unsusceptible to multiple definitions or applications of the idea of "limit," or that it would not be opposed by a science of, *e.g.*, "resources."

*Geo-Logic* is somewhat hasty in its treatment of two movements that could potentially be enlisted as allies to its cause. While Frodeman sees light at the end of the tunnel for environmental ethics, his critiques of feminism and of earth systems engineering and management do not cultivate the possibility of shared goals with his agenda. Overall fascinating and highly enjoyable, *Geo-Logic* is a remarkable and refreshing work that raises necessary questions and attempts to engage them practically with a wide range of epistemological tools currently reserved for strictly theoretical pursuits. The short book offers a compelling look into the capacity for "wide" interdisciplinary research to map insightful relationships across thinking, discourse, and decision making. Although its recommendations may strike some as unworkable, at least in the foreseeable future, it is well worth the read and serves to introduce vital philosophical considerations into thinking about public policy decisions.

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