Letter to the Editor

Allenby, B. 2001. Letter to the editor regarding Boons and Roome's (Spring 2000) "Industrial Ecology as a Cultural Phenomenon: On Objectivity as a Normative Position," *Journal of Industrial Ecology* 4(2): 49–54.

I welcome the comments of Boons and Roome (2001) on my recent column regarding culture and industrial ecology (Allenby 1999) as the beginning of a useful dialog, and agree with many of their points. This is an extraordinarily complex area of study, requiring as it does contributions from not just engineering and the physical sciences, but also from the social sciences, especially at this nascent state of the art, and I am pleased they have raised their objections forcefully and directly. There are, however, several points I would make in amplifying this discussion.

There seems to be some confusion about where the objective and the normative are desirable, or even possible. This may perhaps be clarified by considering three views of industrial ecology, each of which requires a different balance between subjectivity and objectivity. The first and broadest perspective is that of industrial ecology as part of the scientific and technological (S&T) enterprise. At this scale, I agree with Boons and Roome that, like any human activity, S&T is in many ways contextual and contingent (Bijker et al. 1977; Hacking 1999). The second is the level of industrial ecology taken as an object of study itself--industrial ecology, for example, viewed as a case study from the perspective of the sociology of science. This is the viewpoint taken by Kuhn (1970) towards science generally, and much of the discussion provided by Boons and Roome implicitly reflects this posture. Here, again, I think we all agree with the general proposition that normative issues are important to this perspective, and that sociology, anthropology, and other disciplines contribute significantly to the discourse.

The third level is that of method within the scientific, and industrial ecology, disciplines themselves, and here we do appear to disagree somewhat. It appears that Boons and Roome (on page 52) are critical of the my position that scientific method should strive to be objective, at least as regards industrial ecology, and that they do not believe that there should be a separation between industrial ecology as a field of study, and as a field of practice. In particular, they criticize my argument that there should be a field of study that provides an objective analysis upon which social decisions can then be based, apparently on the grounds that there should be no differentiation between the practice of industrial ecology--a social and cultural phenomenon--and industrial ecology research.

Some of this discomfort appears to arise from the term "objective" itself, and reflects language differences between the physical and the social sciences (Harvey 1996; Hacking 1999). It also no doubt reflects the postmodernist concern about "totalizing discourses" (i.e., assertions about the universal validity of different ways of looking at the world), especially those involving S&T (Lyotard 1979; Rorty 1989). This sort of "translation gap" between disciplines is only to be expected, and to be addressed with what one hopes is good will and

reasonable humor by all involved. But my argument is not, as they suggest, that science is a completely objective activity, a position which even most scientists recognize as oversimplistic (Kuhn 1970). Rather, this is a necessary goal of scientific method, whether it is ever reached in practice or not; as Russell (1972 [1945], at 836) comments: "In the welter of conflicting fanaticisms, one of the few unifying forces is scientific truthfulness, by which I mean the habit of basing our beliefs upon observations and inferences as impersonal, and as much divested of local and temperamental bias, as is possible for human beings."

What we are dealing with here is a fundamental ontological confusion - that is, differences in the assumptions about being and reality. I may enjoy studying the sociology of building a jet plane, and its role in society, but I most emphatically want the plane design itself to reflect S&T and the scientific method. It is not the case that physics explains anthropology or sociology; but it is also not the case that sociology engineers airplanes. Each discipline has its own, contextual ontological basis (that is, its own assumptions about what is real). Moreover, despite the mental models of those trained in that discipline, no single ontology is foundational to experience and the world as a whole (there are no totalizing ontologies). The attempt to impose one discipline's implicit ontology on another is a category failure. Not only does it generate unnecessary conflict (a.k.a. "the culture wars"), but it shows a profound lack of appreciation for the complexity of reality. Understanding this does not require that scientists and engineers not be activists, or not be committed to various causes, or not be subjective; nor does it deny Kuhn's point that science and technology are practiced within a particular social and historical context. It does, however, require that the professional work performed by scientists and engineers reflect the scientific methodology and respect for data elucidated by Russell.

The need for objective data and study is particularly important in the fields of environmental science and industrial ecology because of the powerful institutional and personal pressures to substitute subjective attitudes for analysis. For example, Powell (1999, at 136) quotes a USEPA official as complaining that "It's hard to avoid being perceived as an intellectual gadfly or snob when you understand your mission to be cajoling [EPA] program offices into taking science seriously and not playing games with the numbers to prop up a political position." Subjectively preferred myths, endemic in the environmental policy arena, can do substantial environmental damage when countervailing data are ignored or not developed. For example, few activities are regarded as so environmentally preferable as organic farming, yet a recent article in Nature notes that it requires much more land per unit food produced (conventional farming matches organic yields using only 50 to 70 percent of the land); results in higher concentrations of fungi-produced carcinogens such as fumonisin and patoulin in food; and even tends to produce the same nitrate leaching rates as conventional farming (Trewavas 2001; but see Reganold et al., 2001). Whether this is true, and under what circumstances, is subject to scientific investigation; if the outcome of that investigation is predetermined by subjective or ideological bias, the potential for environmental damage arising from implementation of the environmentally less preferable option is apparent. Moreover, when environmental science or industrial ecology becomes a subjective exercise, it has unfortunate political implications, in that it enables those who, for whatever reason, want to avoid change to do so. It is, then, simply my observation that industrial ecology can become a fad, or a subjective concept like "sustainable development," which Boons and Roome suggest would be a good thing--but if it does so, the implications for policy and natural systems are likely to be negative. Objective information does not preclude

unfortunate social and environmental impacts, but the lack of it does facilitate evasion of ethical responsibility for them.

I am sorry, however, that Boons and Roome take my pieces as attempting to limit, rather than encourage, dialog. My intent in the two pieces they cite was, in fact, the opposite: to stimulate contributions from, and recognition of, the importance of social science and other discourses to the industrial ecology dialog, which tends to be dominated by technologists. Indeed, it stimulated their response. Given the difficult and complex multidisciplinary issues raised by industrial ecology in any event, and the difficulties posed by disciplinary language and cultural barriers, open and substantive discussion, and the avoidance of ad hominem attack, is highly desirable.

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