

Appropriate Science: Evaluating Environmental Risks in a Sustainable World

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ABSTRACT

The education of environmental and health professionals must keep pace with the increasingly complex, uncertain, and interconnected risks that they will be called on to characterize and address. There is a growing awareness of the limitations of mainstream science in the face of global threats, and a greater appreciation of the need to find ways to explicitly manage the uncertainties that complicate nearly every important environmental debate.

One example is the looming crisis of global warming, which has pushed to center stage a debate over the weight of evidence needed to act – a debate which has until recently been carried on in professional journals and conferences, but has not reached down into undergraduate education. The public has now been made aware of the potential necessities and risks of acting in the face of uncertainty. The greenhouse gas controversy has also taught another important lesson – about the interconnectedness of ecosystems and health, and the necessity of studying planetary systems in all of their complexity.

The precautionary principle is another recent development that brings attention to the interface between the science and policy of environmental protection. The precautionary principle has generated considerable interest among environmental and community activists and many policy makers who see it as a way to engage in debates over the kind of evidence needed for action – debates that have been traditionally conducted in terms of highly technical rules over the best way to calculate “acceptable risks” and the like.

These and other developments lead us to propose that students in the environmental and health sciences can become more effective agents of change if they receive training in what we call “appropriate science”. By appropriate, we mean that the methods have been chosen to fit the nature and complexity of the problem, and the social and political constraints of the communities concerned. Within the bounds of traditional scientific methods, there are many tools and approaches, but too often a narrow set is used for reasons of disciplinary tradition, perceived “rigor” and other aspects of professional practice. Sometimes “less is more” – a modest descriptive research program may be as useful to stimulate preventive action as an expensive and lengthy (and potentially unsuccessful) research campaign to understand the fine details of the problem. In the face of highly complex risks the research program to understand the fine details of the problem may miss the bigger picture, resulting in a highly precise answer to the wrong problem.

In this paper, we will argue that undergraduates should be taught environmental and health science through engagement with real world problems, and that they should develop an understanding of the science–policy interface alongside their introduction to

the basic tools of the scientific method. This training should include exposure to a wide range of disciplines and methodologies – including both quantitative and qualitative tools, as well as attention to the ethical responsibilities towards those who will be affected by one's professional actions.