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Comments on 'Key issues for attention from ecological economists' by Paul Ehrlich

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Paul Ehrlich has a clear message for the economics profession: humanity faces a number of serious environmental problems and economists have a central role to play if we are to successfully address them. The article lays out an important research agenda for economists, which includes climate change, loss of biodiversity, release of toxic substances, epidemiological concerns, population, and over-consumption. Even if one disagrees with some of the particulars, and my guess is that many economists who read the article will, the big ideas contained in this article and the main messages are worthy of close attention. Rather than being on the periphery of the economics profession, those of us in economics who focus on environmental issues, whether called ecological economists, environmental economists or resource economists, should be at the heart of an economics profession focused on the most important and relevant issues facing society.

Tackling the list of important environmental issues will require a better knowledge base about the environment on the part of economists and greater attention to some core methodological issues within economics. Economists have a powerful set of analytical tools that can be applied to environmental issues. Economics has a disciplined approach to analyze the efficiency and effectiveness of environmental policy in ways that cannot be done by natural scientists working alone. But applying these tools sensibly requires that economists understand the basic environmental science relevant to these issue. For example, analyzing biodiversity conservation requires understanding the major threats to biodiversity, the strategies that can be used to reduce these threats, and the specific benefits that particular conservation strategies are likely to generate. Are there thresholds below which a population is unlikely to survive? What is the effect of habitat fragmentation? How well can a species disperse among distinct patches of habitat? These are all ecological questions that have an important bearing on how economists should model the issue. With an economic modeling approach, informed by relevant ecological knowledge, efficient conservation strategies can be designed, and incentive and policy design issues can be addressed (e.g., Ando *et al.*, 1998; Brock and Xepapadeas, 2003). In addition, being well grounded in the scientific literature also helps focus attention on the really important environmental issues.

Environmental issues raise some basic methodological issues within economics that deserve further attention. I will briefly discuss three such issues: (a) utility, (b) discounting, and (c) uncertainty. In most work, economists use a very simple utility function that assumes that the welfare of an individual depends only on the individual's own consumption. This approach has proved quite useful but it has also steered economists away from analyzing issues important to environment and development. As the article by Ehrlich rightly points out, there are legitimate questions about the link between greater material consumption and utility once basic physical needs have been met. If so, this would argue for giving greater weight to development issues, providing a basic standard of living to all people, and to preserving the environment and natural capital for current and future generations. Recent work by economists and psychologists have explored other approaches to utility and their implications (e.g., Camerer *et al.*, 2003, Camerer *et al.*, 2005) and insights generated in this literature may be important for the analysis of environmental issues. I think it is also true that understanding the interaction of humans and the natural world may yield more general insights into the basic structure of utility that would be important in other branches of economics.

Climate change, loss of biodiversity and other environmental issues have important inter-temporal aspects making discounting a central topic. Work on climate change in particular has forced economists to think more deeply about inter-temporal choices (Portney and Weyant, 1999). How should we think about the value of strategies that generate current benefits but have potentially large negative consequences in the far distant future? What rate of discount should be applied, and should the discount rate be zero or possibly negative (Dasgupta, forthcoming)? Long-run, large-scale environmental consequences add additional dimensions to inter-temporal choice problems that may require economists to rethink or expand their tool set for aggregating values over time.

Finally, virtually all important environmental issues have a large degree of uncertainty surrounding the costs and benefits of alternative policy options. How will human actions change the probability of extinction of particular species and what are the consequences for human welfare from loss of species? How much damage will there be from climate change in 50 or 100 years? As with inter-temporal choice, environmental issues pose sharp problems for economists in finding optimal decisions under uncertainty that may lead to new economic methods. For example, in thinking about choices of development versus wilderness preservation, Arrow and Fisher (1974) explained the basic principle of option value, i.e. there is value to avoiding irreversible decisions until after potential learning takes place.

At the time of Adam Smith when the material standard of living for the majority of the population was quite low and people were far less numerous than at present, it made sense to focus attention on consumption and production of material goods. In the twenty-first century with its large population and higher standards of living, attention needs to shift toward the larger set of consequences of economic activity on social relationships and environmental impacts. Externalities could be safely ignored when small groups of people lived in relative isolation. But externalities are

a central feature of a world with over six billion people living in a highly interconnected global economy. The study of externalities is a core feature of environmental economics. Understanding of institutional failure and suggestions for overcoming institutional failure, valuing non-market goods and services and incorporating the wider set of benefits and costs into a consistent framework are topics where economists studying the environment can offer valuable insights to the general economics profession.

Another issue raised by Ehrlich in his article is the failure of economists to clearly communicate their results to decision makers and the general public. The economic approach can involve complicated reasoning and interconnected arguments that are not always easy to explain to those who are unfamiliar with basic economic logic. It can be challenging to explain the methods and results of economic analysis to other scientists, decision makers, and the general public in clear simple terms. But we often make the job of communicating the results of economic analysis more difficult than it needs to be. For example, when economists use a utility function that depends on consumption, we understand that consumption can represent anything that people might care about. In this sense, consumption could include how much food a person eats but it could also include the aesthetic pleasure a person experiences at viewing a sunset or a beautiful vista. To non-economists, consumption signals the former but not the latter, leading to the opinion that economics is incapable of dealing with much that is important with regard to the environment. Economists should rethink how we express our models and results when talking to the broader community in order to more clearly demonstrate the true scope and power of economic analysis applied to environmental issues.

It has also proved challenging to communicate the importance of environmental issues to other economists. The article raises a troubling question: why are economists willing to devote attention to college sports, gift cards and hedge funds but largely ignore the loss of biodiversity, release of toxic substances, or epidemiological concerns, all of which could have major impacts on the welfare of current and future generations? Besides their fundamental importance, environmental issues raise core methodological issues as discussed in the prior paragraphs. We need to attract the best minds in economics to tackle environmental issues. Focusing on the environment is not a backwater but a central channel for keeping economics vital and relevant.

In sum, as the article by Ehrlich makes amply clear, economists who focus on the environment have much important work to do.

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