Environmental Philosophy: Beyond Environmental Ethics

MARK COLYVAN*

Environmental ethics concerns itself with ethical issues arising from humans' relationship with their natural environment. Of particular interest are ethical considerations in relation to human efforts to conserve the natural environment. Some of the key environmental ethics issues are whether environmental value is intrinsic or instrumental, whether biodiversity is valuable in itself or whether it is an indicator of some other value(s), and what the appropriate time scale is for conservation planning. But there is much more to environmental philosophy than environmental ethics. For a start, environmental philosophy covers a whole raft of issues in philosophy of science such as the role of mathematical models in population ecology,[1] the relationship between the stability of ecosystems and the complexity of those ecosystems,[2] the representation and treatment of uncertainty in ecological and conservation biology applications,[3] and whether ecology has laws.[4] None of these issues has anything to do with ethics. But there is another sense in which environmental philosophy is much broader than environmental ethics: even in relation to topics where there are value or ethical issues, there are other philosophical issues that we would do well to disentangle from the ethics. I would argue that it is a mistake to think of the philosophical issues in question as merely environmental ethics.

I will argue for this conclusion by way of some examples. I will consider a few places where environmental ethics might be thought to

* *Mark Colyvan is a Professorial Research Fellow in the Department of Philosophy at the University of Sydney. This lecture was delivered to the Arts Association on 25 October, 2007.*

be important for decisions about conserving our natural environment. I will show that philosophy has much more to contribute to the topics in question than what might properly be thought of as environmental ethics, and, what is more, it is hard to see how progress can be made on the problems in question without invoking the extra philosophical resources I am suggesting (primarily philosophy of science, epistemology, and decision theory).

Also, by way of introduction, I should draw attention to the style of philosophy I am engaging in here. Most of the work I will be discussing in this paper is the product of interdisciplinary, collaborative research teams who publish in both philosophy and science journals and are interested in pursuing philosophical problems that are of direct relevance to scientists working in the areas in question. Moreover, the problems in question are approached by bringing philosophical expertise to bear on them, but this is done from within the scientific enterprise. There is no so-called 'first philosophy', where philosophers sit back in the armchair and contemplate science from a privileged vantage point outside science. The approach I will adopt here in this paper (and the approach adopted by my team of postdoctoral fellows and postgraduate students working here at the University of Sydney) is one where the philosophy always engages with the science: the original problems come from science, the solutions are typically sought by way of collaborations between scientists and philosophers, and the solutions arrived at must be scientifically acceptable and are often published in science journals.[5] The work addressed in this paper can thus be thought to be an example of what my colleague Paul Griffiths calls 'Biohumanities'.[6]

Hypothesis Testing

I will start with a place where philosophy is turning out to be very useful in environmental science: hypothesis testing. This is not a topic traditionally thought of as falling within the purview of environmental ethics but, as we will see, there are some important questions of value tied up in hypothesis testing and these could very easily be overlooked unless we are open to the idea of environmental philosophy going beyond environmental ethics. The extra-ethical philosophy in this case is philosophy of statistics and confirmation theory.

The standard model of hypothesis testing has us compare an alternative hypothesis ('there is some effect') with the null hypothesis ('there is no effect'). We then need to consider the evidence and see how our two hypotheses stack up in light of the evidence. The standard assumption is that accepting the alternative hypothesis when there is no effect (a false positive or type-I error) is worse than failing to reject the null hypothesis when there is an effect (a false negative or type-II error). The test is thus designed so that the probability of type-I error is low. (This probability is called α and is typically arbitrarily set at 0.05.) The experimenter then tries to minimise the probability of type-II error (the probability of which is called β). This is very standard scientific practice, not just in environmental science, but elsewhere as well.

It is clear that in many contexts, type-I error is much worse than type-II error. For example, from a certain, broadly liberal point of view, convicting an innocent person (false positive) is worse than failing to convict a guilty person (false negative). And, arguably, there are many scientific contexts where this is so as well. But it is far from clear that in conservation biology type-I error is always the bad guy. Consider the problem of trying to determine the conservation status of a particular species—the Eastern Quoll (*Dasyurus viverrinus*), say. Let's suppose we are wondering whether we should upgrade its conservation status to 'threatened' (from 'near threatened'). Here the type-I error is the error of classifying the Quoll as threatened when it is not, and the type-II error is failing to upgrade its conservation status (i.e. leaving it at 'near threatened') when it is in fact threatened. From a certain green-sympathetic perspective, at least, it can be argued that the dangerous mistake is the type-II error. After all, the type-II error would stand in the way of conservation efforts (because the Eastern Quoll is not thought to be threatened) and may lead to further deleterious effects on its long-term survival prospects. The type-I error, on the other hand, does license conservation efforts to help the Eastern Quoll's long-term survival. It might be that in the latter case these efforts are unnecessary, but they would not do any harm. In particular, they would not be as harmful as doing nothing when the Eastern Quoll is creeping towards extinction.

As I pointed out, this line of thought does depend on 'a certain green-sympathetic perspective' and so does involve values. But values have no place in the objective business of scientific hypothesis testing, it might be protested. This, you might think, suggests that we reject the above 'green' line of argument and stick with the standard model of hypothesis testing. But this is to ignore the values entering into the picture on the standard model of hypothesis testing. Reverting to the standard assumption that type-I error is worse than type-II error is also to make a value judgement. These kinds of value judgements in science cannot be swept aside; they must be faced up to and addressed properly. What are the appropriate values to hold here? That's the question we need to focus on. Adopting the standard model of hypothesis testing and ignoring the value-laden nature of the model does not make the business of hypothesis testing more objective.[7]

Decision Theory and Triage

Another place where philosophy has been able to help advance debates in environmental science has been in the application of decision-theoretic methods in conservation management. Decision theory provides us with a way of making decisions in an uncertain world and is generally thought to be the theory of rational choice. The theory assumes that an agent has a number of actions at her disposal, A_1–A_n, and that the world might be in any number of different states, S_1–S_m. Outcomes are just an act-state pair: O_{ij} is the result of the agent choosing action A_i while the world is in state S_j. Probabilities, p_{ij} and utilities u_{ij} are assigned to each outcome O_{ij}. The expected utility of act A_i is just

$$EU(A_i) = \sum_{k=1}^{m} u_{ik} p_{ik}$$

where $\sum_{k=1}^{m} p_{ik} = 1$. The decision rule is: *choose the action with the greatest expected utility*, if there is such an action.[8]

So far so good, but what has this got to do with conserving the environment? Conservation managers have limited resources to do the work required of them. They must make some choices about where to spend these resources. One approach would be to use the resources on the most pressing problems: captive breeding programs for the most endangered animal species, for example. But this advice very often flies in the face of the advice of decision theory. Decision theory urges us to consider the probability of success as well as the relevant utilities. So even if we assume that there is more benefit in saving a critically endangered species than in saving a merely endangered species, that does not in itself suggest that the best way to spend the limited resources is by trying to save the critically endangered species. After all, the chances of success in saving critically endangered species is typically rather low. In many circumstances, the best thing for the conservation manager to do will be to invest the resources in a program directed at species other than the most endangered. This approach is well known in medical circles (especially emergency departments and war-time military hospitals) and is known as *triage*. It amounts to an assessment of the urgency of the cases and the probability of success with each of them. From this it is determined, based on sound decision theoretic reasoning or rules of thumb that give similar results, the order in which the cases will be dealt with. In some circumstances, cases will not be dealt with at all (some critically-ill patients will be left to die and some critically endangered species will be left to proceed to extinction).

From a decision-theoretic perspective, environmental triage is all fairly straight forward and makes good sense. Such environmental triage, however, is very controversial. It is not entirely clear why it is so controversial, but one possibility is the intrusion of certain ethical theories into some people's thinking about these issues. For instance, in the medical case, there will be ethical theories that rule against leaving a patient to die, even if the chance of saving the patient's life is low. Similarly, some ethical theories will rule against leaving a species to go extinct, even if the chances of successfully turning things around are low. But so much the worse for such ethical intrusions, I say. The relevant ethical theories may be well motivated and may even deliver the right results when resources are not limited and where there is no uncertainty (i.e. where we know what the result of our actions will be). But sadly we do not live in such a world and in this, the actual world, such ethical theories are useless. There is still a place for ethics in the decision-theoretic framework I'm advocating. The place for ethics will be in helping to determine the relevant utilities in the decision problem. This is, admittedly, a more modest role than some might envisage for ethics in environmental decision making, but so be it. To think that ethics alone can tell us what to do in an uncertain world is to make a very dangerous mistake: it is to confuse ethics with decision theory.[9]

The Precautionary Principle

The precautionary principle is thought to be some over-arching ethical principle that advises us not to take chances with the environment. When considering some course of action where we are uncertain about the outcomes, the precautionary principle tells us not to choose actions that may have disastrous consequences. But beyond this rather imprecise statement, it is unclear what the principle amounts to. It can't simply advise against any course of action with possibly disastrous consequences, for that, in effect, rules out every course of action—including doing nothing (which, in many environmental settings, can result in the most disastrous outcomes). There are many questions about this problematic principle: does the precautionary principle conflict with standard decision theory?; does it advise against the use of standard decision theory?; is it simply the maximin rule, for when the probabilities are not known?;[10] how is the principle to be implemented in practice? The difficulties encountered in providing satisfying answers to these and other questions have led some to doubt whether the precautionary principle can provide any guidance in environmental decision making.

Katie Steele[11] has recently argued that the precautionary principle is best seen as advice about framing environmental decision problems. One important aspect of this framing is the separation of the fact and value dimensions of a decision problem. On the value side of things, the precautionary principle can be understood as espousing the ideals of sustainable development, where this includes a serious commitment to public goods and the wellbeing of future generations. On the factual side, the precautionary principle gives us guidance about what states or consequences of actions are scientifically plausible, and thus what is the appropriate way to set up a given decision problem. This is, in large part, a scientific issue and involves an appreciation of the relevant states, the consequences of implementing various environmental strategies, and the uncertainties in question. It might be the case that available evidence is such that we have uncertainties about the probabilities in question (so-called *metauncertainty*) so that we can only provide 'ball park' probability assignments to the states in the decision problem. Similarly, we might only have uncertainty about the utilities and only 'ball park' utility assignments. That is, we might not be able to provide precise probabilities / utilities for each outcome, but instead have imprecise probabilities / utilities (intervals in place of single real numbers). In such a situation, standard decision theory breaks down, since it depends on a single real number for the probabilities / utilities in question.

There are, however, variants of standard decision theory capable of dealing with such scenarios but these variants require the decision maker to take a stance on her attitude towards risk: be cautious, gung-ho, or something in between. In environmental decision-making, at least, a strong case can be made for a precautionary attitude in the face of metauncertainty and uncertainty about utilities. For example, strategy *A* might be better than strategy *B* if the unknown probabilities / utilities turn out one way, but *B* might be better than *A* if the unknown probabilities / utilities turn out differently. Here the precautionary principle might kick in and advise us to choose the strategy that is best for the environment in the worst cases not already eliminated. In effect, the precautionary principle amounts to a limited application of maxi-min reasoning in cases where metauncertainty or uncertainty about utilities prevents a clear answer about the preferred action. There is an ethical component to this issue—when setting up the problem, err on the side of the environment or sustainable development—but, once again, it is not simply ethics. There is a significant contribution being made from (non-standard) decision theory and epistemology (in the recognition and treatment of the metauncertainty and uncertainty about the utilities).

Conclusion

I have outlined a few of the ways in which environmental philosophy goes beyond environmental ethics. Environmental philosophy has made, and continues to make, contributions towards debates about hypothesis testing, the implementation of decision-theoretic methods in conservation management, and understanding the application and limitations of precautionary reasoning. These are just some of the places we might have looked for such contributions. Others include the role of diverse committees in environmental decision-making,[12] the scope and limits of biobanking[13] and questions about the nature of environmental value.[14] In this paper I have argued that, treating these extra-ethical, philosophical issues as belonging to environmental ethics is not only a misrepresentation of the nature of the issues, it is a dangerous mistake. For to ignore these other philosophical issues—epistemological and decision theoretic issues, for instance—we may fail to avail ourselves of the most appropriate tools for dealing with the problems at hand—the various tools of epistemology and decision theory, for instance. There is, of course, still a role for environmental ethics in all this, but it's a more modest role than might have been previously thought. And the role of ethics in environmental decision-making needs to be properly understood in relation to the relevant epistemology, philosophy of science and especially decision theory.[15]

Notes

1 L. R. Ginzburg, and M. Colyvan, *Ecological Orbits: How Planets Move and Populations Grow*, New York, 2004.
2 J. Justus, 'Ecological and Lyapunov stability', *Philosophy of Science*, forthcoming.
3 H. M. Regan, M. Colyvan, and M. A. Burgman, 'A taxonomy and treatment of uncertainty for ecology and conservation biology', *Ecological*

Applications, 12,2 (2002): 618–28.

4 M. Colyvan and L. R. Ginzburg, 'Laws of nature and laws of ecology', *Oikos*, 101,3 (2003): 649–53.

5 I should say that I do think there is a place for a less science-centred philosophy of science, where the problems tackled are perhaps more philosophical than those contemplated by the typical working scientist. A great deal of this work is theoretically very interesting and of great value. It is not what I am doing here though.

6 See K. Stotz and P. E. Griffiths, 'Biohumanities: rethinking the relationship between biosciences, philosophy and history of science, and society', *Quarterly Review of Biology*, forthcoming. More generally, we might think of this relationship between the humanities and science as 'scientific humanities', to distinguish it from the more traditional approach to humanities research.

7 See M. Colyvan, 'Population ecology', in S. Sarkar and A. Plutynski, eds, *A Companion to the Philosophy of Biology*, Blackwell, 2007, 301–20, for more on this issue.

8 See R. Jeffrey, *The Logic of Decision*, 2nd edn, Chicago, 1990, for further technical details of decision theory. But do not read too much into the use of the word 'utility' here. In particular, do not conclude that this theory is utilitarian, at least as it stands. The utilities in question are just ways of representing the degree of value the agent in question attaches to the various outcomes. In M. Colyvan, D. Cox, and K. Steele, 'Modelling the Moral Dimension of Decisions', to appear, we attempt to reconcile this standard decision-theoretic framework with other ethical theories besides utilitarianism, namely, virtue ethics and deontology.

9 J. Baron, *Against Bioethics*, Cambridge, Mass., 2006, makes similar points about the role of bioethics. These issues are pursued further in M. Colyvan and K. Steele, 'Ecology and environmental decisions', in B. Brown and K. de Laplante, eds, *Handbook of the Philosophy of Science Volume 11: Philosophy of Ecology*, North Holland / Elsevier, 2008.

10 The maxi-min rule does not rely on probabilities (and is thus useful when one is in a situation of complete ignorance). It suggests choosing the actions whose worst-case scenario is the best of those available (the best of the worst, hence the name maxi-min rule).

11 K. Steele, 'The precautionary principle: a new approach to public decision-making?', *Law, Probability and Risk*, 5, 1 (2006): 19–31.

12 K. Steele, H. M. Regan, M. Colyvan and M. A. Burgman, 'Right decisions or happy decision makers?', *Social Epistemology*, 21, 4 (2007).

13 S. A. Bekessy, B. A. Wintle, M. Colyvan, B. Langford, D. B. Lindenmayer and H. P. Possingham, 'The biodiversity bank should be nature's savings bank, not a shifty credit provider', to appear.

14 M. Colyvan, S. Linquist, W. Grey, P. E. Griffiths, J. Odenbaugh and H. P. Possingham, 'A field guide to the philosophy of ecology', to appear.

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