The Lack of Clarity in the Precautionary Principle

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ABSTRACT

The precautionary principle states, roughly, that it is better to take precautionary measures now than to deal with serious harms to the environment or human health later on. This paper builds on the work of Neil A. Manson in order to show that the precautionary principle, in all of its forms, is fraught with vagueness and ambiguity. We examine the version of the precautionary principle that was formulated at the Wingspread Conference sponsored by the Science and Environmental Health Network in 1998. That version fails to indicate who must bear the cost of precaution; what constitutes a threat of harm; how much precaution is too much; and what should be done when environmental concerns and concern for human health pull in different directions. Whether this vagueness is a strength or weakness of the principle depends on what purpose(s) the precautionary principle is supposed to serve.

KEYWORDS

Precautionary principle, cost-benefit analysis

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1. INTRODUCTION

The precautionary principle has been widely invoked in recent debates concerning environmental policy and biotechnology (see, e.g., Miller and Conko) and even in debates concerning the treatment of non-human animals (e.g. Bradshaw 1998) and engineering of the human germ line. The precautionary principle's first major appearance in an international treaty was in 1987, when the countries bordering the North Sea, out of concern for North Sea fisheries, adopted a version of it as a guide to the regulation of pollutants (Buhl-Mortensen and Welin 1998: 403ff.). Since then, the precautionary principle has had a great deal of influence on public policy in Europe, especially with regard to agricultural biotechnology. In recent years, a growing number of environmentalists and bioethicists in the United States have begun to take the precautionary principle seriously. The literature contains numerous different formulations of the precautionary principle, but the common theme to all of them is that it is better to be safe than sorry when it comes to human health and the environment.[1]

In a recent paper entitled 'Formulating the Precautionary Principle', Neil A. Manson acknowledges the growing importance of the precautionary principle in bioethics and environmental ethics, while calling attention to 'the lack of uniformity regarding its formulation' – a bit of an understatement (2002: 263). He claims to have identified the 'core structure' that is common to all versions of the precautionary principle. According to his analysis, every formulation of the principle has a three-part structure. First, there is a suggested damage condition, which specifies some foreseeable and harmful effect that some activity might have for the environment or for human health. Second, there is a knowledge condition, which 'specifies the status of knowledge regarding the causal connections' between the activity in question and the harmful effect (2002: 265). Finally, there is a suggested remedy, and the remedies can include anything from cessation of the potentially harmful activity, to funding for research on alternatives, to regulation. Manson then shows, in a clear and elegant way, how it is possible to generate different formulations of the precautionary principle by plugging in different suggested damage conditions, knowledge conditions, and remedies.

One such formulation of the precautionary principle, which Manson terms the 'catastrophe principle', is vulnerable to an objection that parallels the well-known many gods objection to Pascal's wager. In the catastrophe principle, the foreseeable environmental effect is catastrophic, and the knowledge condition is mere epistemic possibility. One can think of Pascal as recommending Christian belief as a kind of precautionary measure – i.e. as the only way to avoid catastrophic harms that might occur in the afterlife. The mere possibility of eternal suffering in the afterlife as punishment for unbelief is reason enough to form and sustain Christian beliefs. Objectors have pointed out that for all anyone knows, Christian belief could also have catastrophic consequences.

For all anyone knows, God rewards those who proportion their beliefs to the empirical evidence and severely punishes those who form their beliefs in order to avoid future harms. Manson therefore objects to the catastrophe principle on the grounds that it is always epistemically possible that proposed precautionary measures will themselves lead to catastrophic harms in the long run.

But of course the catastrophe principle is just one of the many formulations of the precautionary principle that share the 'core structure' identified by Manson. He concludes his paper by throwing down the gauntlet. Proponents of the precautionary principle, he argues, need to produce a formulation that avoids the problems of the catastrophe principle while satisfying a number of adequacy conditions, one of which is that 'the component concepts should be clearly defined' (2002: 274).

We are grateful to Manson for raising the level of discussion of the precautionary principle. In this paper we propose to pick up where he leaves off. The problem with current discussions of the precautionary principle is not merely that there are many formulations of that principle, some of which are vulnerable to serious objections. We suspect that *no* extant formulations of the precautionary principle will satisfy Manson's condition of conceptual clarity. There is a bit of a trade-off here: The more precise the formulation, the more vulnerable it is to decisive objections, such as Manson's own objection to the catastrophe principle. Our strategy in this paper will be to consider one popular formulation of the precautionary principle that appears not to be vulnerable to Manson's objection to the catastrophe principle. We consider several revisions of the principle with the aim of eliminating, or at least reducing, its vagueness and ambiguity, but we conclude that there is no way of gaining precision and conceptual clarity without sacrificing plausibility.

2. THE WINGSPREAD PRINCIPLE

The closest thing to a canonical version of the precautionary principle is the formulation that emerged from the Wingspread Conference, held in 1998 by the Science and Environmental Health Network.

WSP. When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically (Raffensperger and Tickner 1999: 8).

WSP clearly has the 'core structure' identified by Manson. Here the suggested damage condition is *any harm at all* to human health or the environment. The suggested remedy is some sort of *precautionary measure*, and the knowledge condition is rather weak: There must be a *threat* of harm, but a complete understanding of the relevant causal relationships is not required. The problem with

WSP is that all three of the basic components of the precautionary principle – the damage condition, the knowledge condition, and the suggested remedy – are left vague.

In most cases to which WSP would apply, it is impossible or impractical to determine whether a given risky activity *A* will have the harmful effect(s) *E*. The probability of *E* given *A*, or prob(*E*|*A*), in the event that no precautionary measures are taken, is unknown. Ongoing debates concerning the possible long-term environmental and health effects of genetically modified crops illustrate this point. Fears have been raised concerning the interactions between GM crops and other parts of the natural environment: Does bt corn harm monarch butterflies? What if transgenic salmon escapes from fish farms? In such cases, it has been difficult to estimate both the likelihood that an environmental harm will occur and the severity of the harm. WSP seems to imply that, in these cases of scientific uncertainty, it would be better to be safe than sorry.

Some versions of the precautionary principle say little more than that scientific uncertainty is no excuse for the failure to take precautionary measures. For instance, the following language made it into the United Nations Agenda 21, which was adopted at Rio in 1992:

> Where there are threats of serious or irreversible damage, lack of scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation (1992: 10).

As others (e.g. Cranor 2001: 314–15) have pointed out, this formulation says nothing about what is or is not morally required. The authors of these lines from the Rio Declaration were no doubt addressing sceptics about global warming who would argue for the postponement of regulation of emissions of greenhouse gases until all the scientific evidence is in. However, so long as someone who takes no precautionary measures when engaging in a risky activity does not justify their actions by referencing scientific uncertainty, they are acting in perfect conformity with this formulation of the precautionary principle.

Hans Jonas, who gave an early version of the precautionary principle in *The Imperative of Responsibility* (1984), saw quite clearly that uncertainty about the likelihood of harm as well as the degree of harm is precisely why a precautionary principle is needed:

> But just this uncertainty, which threatens to make the ethical insight ineffectual for the long-range responsibility toward the future . . . has itself to be included in the ethical theory and become the cause of a new principle, which on its part can yield a not uncertain rule for decision-making. It is the rule, stated primitively, that the prophecy of doom is to be given greater heed than the prophecy of bliss (1984: 31).

Jonas, unfortunately, does not tell us how much greater heed should be given to the prophecy of doom.

The 'even if …' clause in WSP is designed to address our ignorance of the likelihood and the seriousness of harms that could result from a risky activity. One could say that WSP requires precautionary measures *in spite of* our ignorance about the likelihood and seriousness of harm. It might be more accurate, however, to say that WSP makes precautionary measures a moral requirement *because of* this ignorance. Some proponents of the precautionary principle would say that this ignorance is what prevents us from thinking about the case of GM foods (to give just one example) in the way that an economist might. The economist's approach would be to quantify as much as possible, so as to facilitate the calculation of risks, costs, and benefits. The trouble is that since we do not know with precision the likelihood of long-term harm or the degree of harm, our cost-benefit calculations would have to be based on rough estimates, at best.

Thus, in a recent Op-Ed piece in the *New York Times,* which heralded the arrival of the precautionary principle in the United States, Michael Pollan made the following argument:

> [Risk analysis] is very good at measuring what we can know – say, the weight a suspension bridge can bear – but it has trouble calculating subtler, less quantifiable risks . . . Whatever can't be quantified falls out of the risk analyst's equations, and so in the absence of proven, measurable harms, technologies are simply allowed to go forward (Pollan 2001: 92).

There are many interesting cases in which neither the likelihood nor the degree of harm to the environment or human health can be precisely quantified. If we try to employ risk-cost-benefit analysis in those cases, Pollan argues, human health and the environment are liable to suffer. This is because potentially harmful effects to human health or the environment will never make it into our calculations.

3. PROBLEMS WITH THE WINGSPREAD PRINCIPLE

3.1 Who must bear the cost of precaution?

Raffensperger and Tickner explain that part of the idea behind the Wingspread precautionary principle is that 'the proponent of an activity, rather than the public, should bear the burden of proof of safety' (1999: 8–9). Indeed, many defenders of the precautionary principle see it as bringing about a radical shift in the burden of argument. While this claim appears to be desirable, WSP does not logically imply that the burden of argument be shifted in this manner. WSP says, in the passive voice, that 'precautionary measures should be taken', with-

out indicating *who* should take these measures or who should bear the cost of precaution. Precautionary measures are never free. Even abstinence has a cost. That passive voice construction of WSP leaves it open just who is obligated to take precautionary measures. In some cases, the costs of precautionary measures should be distributed, and there will always be difficult questions about how to distribute them fairly.

Perhaps WSP needs to be strengthened in the following way:

PP. When an activity *A* raises threats of harm to the environment or human health, whoever is doing or contributing to *A* must take precautionary measures, even if some of the cause and effect relationships are not fully established scientifically.

Rather than leaving it completely ambiguous who is responsible for taking precautionary measures, PP assigns moral responsibilityto the agent who is doing or contributing to some risky activity. However, the notion of contribution is somewhat vague. Contribution to a risky activity could include either an action or an omission, so that perhaps even a failure to regulate activity *A* could count as contributing to *A*. Many of the products available in grocery stores in the U.S. are made, in whole or in part, from genetically modified organisms. Are people who purchase those products contributing to the potentially harmful activity? Even if the products are not labeled? PP is an improvement, but it still does not settle the question of who is obligated to take precautionary measures in cases in which the activity in question is a widely shared social practice, or in which many people contribute to the activity in different ways (e.g. by conducting agbiotech research, by purchasing certain products, by regulating the labeling of those products, and so on).

3.2 Human Health vs. the Environment

PP contains a problematic disjunction. According to PP, precautionary measures are called for whenever an activity raises a threat of harm to human health *or* the environment. A policy that benefits human health, however, may harm the environment. It might seem that whatever is good for the environment is good for human health, since the latter is so intricately bound up with the overall quality of the environment. Nevertheless, the debate over GM foods once again illustrates the way in which concern for the environment and concern for human welfare can pull in different directions. One of the familiar arguments in favour of GM foods is that they will help address the problems of hunger and malnourishment in the developing world. Opponents of GM foods sometimes argue that this short-term human payoff must be balanced against the threat of long-term environmental harms. To be sure, many of the opponents of GM foods believe that renouncing biotechnology would be best for human health as well as the environment in the long run, but the dialectic concerning GM

foods does show how tension could arise between environmental concerns and concern for human welfare.

Precautionary measures, as we have said, are means to the end of harm prevention. But we must ask: prevention of harm to whom or what? Different principles, with different consequences, can be arrived at by filling in the blank in different ways:

> When an activity *A* raises threats of harm to _____, whoever is doing or contributing to *A* must take precautionary measures, even if some of the cause and effect relationships are not fully established scientifically.

If we fill in the blank with 'the environment', the result is an *environmental precautionary principle* (EPP). On the other hand, if we fill in the blank with 'human health', the result is a *human health precautionary principle* (HHPP).[2]

Should we accept both EPP and HHPP, or only one of them? If we accept both of them, then we have pretty much the same problem as before. What should we do in a case in which a precautionary measure required by EPP harms human health, or a case in which a measure required by HHPP harms the environment? One possibility is to rank our ends. Bearing in mind that precautionary measures are means to the end of preventing harm to someone or something, when there is a conflict of interests we might simply have to decide which is the more important aim: preventing harm to human health or preventing harm to the environment.

3.3 What is a threat of harm?

The precautionary principle applies to situations in which there is a threat of harm to human health or the environment. But what is a harm? More importantly, what is a threat of harm? The answers to these questions about the damage condition and the knowledge condition are much more difficult than might be expected.

At what point, for instance, do chemical pesticides begin to harm the environment? That large-scale applications of agricultural pesticides can harm the environment is uncontroversial. What about a person who uses a small amount of weed killer in a kitchen garden? While defining a harm to the environment is difficult, defining a threat of harm to the environment is even more difficult. On the weakest possible view, a threat of harm arises whenever there is the slightest indication that some activity *A* could have a harmful effect *E*, given the most liberal conception of what a harm is. According to this weak view, every risky activity raises a threat of harm. One problem with this weak view is that in the past, our intuitions have often turned out to be wrong. For many years, people thought that forest fires always harmed the environment, but ecological scientists now tell us otherwise.

Since our intuitions about risk and harm have so often been wrong, someone might therefore take a stronger view of what constitutes a threat of harm. Someone might think that in order for there to be a genuine threat of harm at all, there must be (*a*) some preliminary evidence that activity *A* will produce harmful effect *E*; and (*b*) some reason to think that the possible effect *E* would be quite harmful if it occurred. Unfortunately, this stronger view leads to what might be called the *threshold problem*. How much scientific evidence do we need concerning the likelihood that activity *A* will have a consequence *E,* and that *E* will be harmful, before we judge that *A* poses a threat of harm? The answer to this question is not clear-cut. This is another way of putting Manson's point that the knowledge condition of the precautionary principle can be specified in different ways. In arguing against the catastrophe principle, Manson targets a version of the precautionary principle whose knowledge condition is the weakest possible. What Manson does not point out is that strengthening the knowledge condition too much yields a principle that is no longer applicable in cases of scientific uncertainty. The higher we set our standards for determining what counts as a threat of harm – i.e. the more stringent the knowledge condition – the more scientific evidence we need to activate the precautionary principle. Where there is scientific uncertainty concerning what constitutes a harm to the environment or human health, it will be impossible to say whether an activity 'raises a threat of harm to the environment or human health.' Ironically, a principle that is introduced in order to handle the problem of scientific uncertainty could run afoul of scientific uncertainty.

3.4 What is a precautionary measure?

Proponents of the precautionary principle have not always noticed that the very term 'precautionary measure' is ambiguous. It is important to distinguish among abstinence, prevention, mitigation and amelioration.

Suppose we are considering a risky activity *A* that might or might not have some harmful effect *E*. One kind of precautionary measure would be to abstain from doing *A*. On the other hand, one could take action to reduce prob(*E*|*A*). This would be a preventive measure that makes the harmful effect less likely than it would otherwise have been. Mitigative measures reduce the amount of harm incurred by an activity without actually halting the activity. Ameliorative measures are taken after the fact in order to fix the damage done by the harmful activity. It may seem odd to think of amelioration as a kind of precautionary measure, but there is no reason why proponents of a potentially harmful activity could not put in place in advance a system for remedying any damages that occur as a result of that activity.

In light of these distinctions, one might think that PP is too vague. It is not enough to be told simply that precautionary measures are obligatory. How would the proponent of PP reply to this complaint? We must think of precautionary

measures – whether they take the form of abstinence, prevention, or amelioration – as means to the end of harm prevention. These considerations might lead us to make the following refinement to PP:

PP* When an activity *A* raises threats of harm to the environment or human health, whoever is doing or contributing to *A* must take what they judge to be the *most effective* precautionary measures, even if some of the cause and effect relationships are not fully established scientifically.

PP* has one big advantage over PP. Sometimes people take precautionary measures that they know to be ineffective, mainly for the benefit of onlookers. Yet, PP* offers no guidance to the proponent of a potentially harmful activity as to what the most effective precautionary measures would be in any given case. Given the scientific uncertainty involved in the cases to which PP* applies, it will be difficult to determine what the most effective precautionary measures are. There is a tension here between the suggested remedy and the knowledge condition. How could anyone possibly know what the most effective precautionary measures will be without having some understanding of the relevant causal relations?

This point is closely related to Manson's observation that different versions of the precautionary principle contain different suggested remedies, including everything from a ban on the potentially harmful activity to encouraging research on alternatives to the activity in question. What Manson does not say is that there is a tension between the knowledge condition and the suggested remedy. The weaker the knowledge condition, the less scientific evidence will be required to activate the precautionary principle, the less anyone will be able to determine which precautionary measures are most effective.

3.5 Precautionary Excess

All of the versions of the precautionary principle thus far considered can be seen as requiring *precautionary excess*. That is, they place no upper limit on the precautionary measures that must be taken given a threat of harm. The only way of handling this problem is to reintroduce economic thinking, but that, as we have seen, is exactly the approach that the precautionary principle is designed to avoid.

No matter how the precautionary principle is formulated, it requires that precautionary measures be taken when there is a threat of harm to human health and/or the environment. Even once preventive and mitigative precautionary measures have been taken, it is nearly always possible to imagine some further measure that would reduce either the likelihood of harm or the degree of harm in a given situation leading to precautionary excess. There is such a thing as being too careful, but how much precaution is too much? Although excessive precaution usually is the most effective means to the end of harm prevention, in

addition to being effective, we also want our precautionary measures to be *cost-effective*. Putting it very roughly, we might say that the precautionary measures need to be *appropriate*, or that they need to be proportionate (in some sense) to the degree of risk associated with the activity in question.

PP is easily revised so as to take this consideration into account. We will call this the *cost conscious precautionary principle*:

CCPP. When an activity *A* raises threats of harm to the environment or human health, whoever is doing or contributing to *A* should take the *most cost-effective* precautionary measures available, even where there is ignorance concerning the likelihood of harm and/or the seriousness of harm.

In fact, some versions of the precautionary principle that one finds in the literature, such as the one quoted earlier from the Rio Declaration on Environment and Development, do contain the fudge word 'cost-effective.'

By claiming that precautionary measures need to be cost-effective, one avoids the problem of precautionary excess. On the other hand, this move introduces another serious epistemological problem. How is anyone to determine which proposed precautionary measure or combination of measures is the most cost-effective? When deciding between two proposed precautionary measures, how is one to determine which of the two is more cost-effective than the other? Unfortunately, part of the rationale for introducing the precautionary principle in the first place was to make up for some of the shortcomings of economic cost/benefit thinking, as well as to deal with the problem of scientific uncertainty. It is difficult to see how we could know which precautionary measures are most cost-effective without running a risk-cost-benefit analysis, and without understanding the relevant causal relationships. Once again, there may be some tension between the knowledge condition and the suggested remedy: If the knowledge condition is weak, then the precautionary principle will be activated in cases in which we do not know enough about the relevant causal relationships to determine which precautionary measures would be most cost-effective.

4. CONCLUSION

Neil A. Manson has given us a helpful account of the core structure of the precautionary principle. However, we have not found any way of specifying the damage condition, knowledge condition, and suggested remedy so as to reduce the vagueness of the principle without thereby reducing its plausibility. We suspect that the plausibility of the principle actually depends on its vagueness, and therefore that one of Manson's adequacy conditions – that 'the component concepts [of the precautionary principle] should be clearly defined' – cannot be met.

One possible response to the argument of this paper is that far from being a problem, the vagueness of the precautionary principle is in fact one of its virtues.[3] This surely depends on what sort of principle the precautionary principle is supposed to be, and what purpose(s) it is intended to serve. If it is supposed to be a moral principle, then the vagueness will be a problem, because a vague principle will not yield specific verdicts about specific cases. If it is supposed to be a rule for decision-making (as suggested by Resnik 2003), then the vagueness will likewise be a problem, because a vague rule will not yield specific policy recommendations in any given case. On the other hand, there is an argument to be made that the precautionary principle has come to serve as something more like a banner that signifies a shared commitment to the welfare of the environment and of future persons, as well as shared reservations about economic cost-benefit analysis. In this case, the vagueness of the principle might well be a virtue, just as the vagueness of a term like 'sustainability' might be necessary if that term is to play a certain role in environmental debates. However, we think that the vagueness of the precautionary principle can only be seen as a good thing from a rhetorical perspective. From the perspectives of moral philosophy and practical decision-making, the vagueness can only be seen as a weakness. One of the most glaring problems with the precautionary principle is that no one – not even Manson – has been sufficiently clear about what kind of principle it is supposed to be.

NOTES

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[1] For a discussion of the development of the precautionary principle over the last ten or fifteen years, see Morris (2000).

[2] David DeGrazia has recently suggested to us that the precautionary principle might also apply to activities that raise threats of harm to sentient animals. The possibility of a *sentient animal precautionary principle* (SAPP) further complicates things.

[3] We thank an anonymous referee for this journal for making this suggestion.

REFERENCES

Bradshaw, R.H. 1998. 'Consciousness in Non-human Animals: Adopting the Precautionary Principle', *Journal of Consciousness Studies* **5**(1): 108–114.

Buhl-Mortensen, L., and S. Welin. 1998. 'The Ethics of Doing Policy Relevant Science: The Precautionary Principle and the Significance of Non-Significant Results', *Science and Engineering Ethics* **4**(4): 401–412.

Cranor, C.F. 2001. 'Learning from the Law to Address Uncertainty in the Precautionary Principle', *Science and Engineering Ethics* **7**(3): 313–326.

Jonas, H. 1984. *The Imperative of Responsibility*. Chicago: University of Chicago Press.

Manson, N.A. 2002. 'Formulating the Precautionary Principle', *Environmental Ethics* **24**: 263–274.

Miller, H.I. and G. Conko. 2000. 'Genetically Modified Fear and the International Regulation of Biotechnology', in J. Morris (ed.), *Rethinking Risk and the Precautionary Principle*. Oxford: Butterworth Heinemann, pp. 84–104.

Morris, J. 2001. 'Defining the Precautionary Principle', in J. Morris (ed.), *Rethinking Risk and the Precautionary Principle*. Oxford: Butterworth Heinemann, pp. 1–21.

Pollan, M. 2001. 'The Year in Ideas: A to Z; Precautionary Principle', *New York Times*, late ed. (M Dec 9) sec 6: 92.

Raffensperger, C. and J. Tickner, eds. 1999. *Protecting Public Health and the Environment: Implementing the Precautionary Principle*. Washington: Island Press.

Resnik, D.B. 2003. 'Is the Precautionary Principle Unscientific?' *Studies in History and Philosophy of Biological and Biomedical Sciences* **34**C(2): 329–344.

The United Nations Agenda 21: The United Nations Programme of Action from Rio. 1992. New York: The United Nations Publications.