



BRIEF ANALYSIS

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Applying the Precautionary Principle to DDT

by Indur M. Goklany

In the past quarter-century environmentalists re-discovered the old adage, “better safe than sorry,” repackaged it as the “precautionary principle,” and with the aid of their allies in European governments, succeeded in incorporating it into several multilateral environmental agreements. Several versions of the principle are now en-sconced in the Rio Declaration of 1992, the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity, and the Stockholm Convention on Persistent Organic Pollutants, among others.

While there is no single, agreed-upon definition of the principle, all of its formulations call for reducing, if not eliminating, risks to public health, the environment or both. One formulation that has gained wide currency is the so-called Wingspread Declaration: “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 established scientifically.”

Both proponents and opponents interpret this statement as a license to bypass science-based risk analysis. Although opponents view this as a dangerous shortcoming, many environmentalists welcome it. For instance, writing on the best new ideas of 2001, *New York Times* environmental reporter Michael Pollan hailed the Wingspread Declaration as “revolutionary.” He contended that it offers a superior approach to managing the potential risks of new technologies (or actions or policies) than that currently employed in American society and by the World Trade Organization.

Pitting Health Risks Against Environmental Risks. In practice, many environmentalists do not

eschew risk analysis when they apply the principle; rather, they use it selectively to advance preconceived agendas, cherry-picking scientific risk assessments and information in order to restrict technologies that they dislike — such as biotechnology, DDT, fossil fuels, nuclear energy — and to advance technologies that they favor, including forms of renewable energy, organic farming and light-weight vehicles.

For example, the precautionary principle has been used to justify a global ban on the pesticide DDT in order to reduce risks to wildlife and many hypothesized (but unverified) risks to human health. However, this justification ignores the fact that banning DDT today would increase malaria, a disease that annually strikes about 400 million people and kills one million or more, mainly in impoverished Africa. Thus, contrary to claims that a global DDT ban is based on caution, such a ban would increase the overall risks to human health. Unfortunately, standard versions of the principle do not provide any guidance on resolving this wildlife-versus-human-health dilemma.

Nevertheless, based on the principle, environmental advocates of the global DDT ban contend that since DDT is not proven to be entirely safe, it should be banned, thus implicitly favoring wildlife over human life without having to explicitly state their preference.

A Framework for Applying the Precautionary Principle. Any use of this principle ought to result in an outcome that is at worst “risk neutral” — that is, does not increase risks to the environment and public health. In fact, the objective should be to help identify policies that would most reduce risks overall.

This objective is easily met if a policy reduces risks to both health and the environment. In that case, all other things being equal, we should adopt the policy. Similarly, if a policy only increases risks, the decision is equally simple: avoid that policy. But, as in the case of DDT, few policies are that unequivocal: most reduce some public health and environmental risks while increasing or prolonging others. The only truly

Comparing Health Risks & Benefits of DDT Ban

Principle	Human Health Impact*	
	Risks	Benefits
Expectation value (magnitude)	very large	small, if any
Severity	very severe	unknown
Certainty	certain	uncertain
Immediacy	swift	long lag time
Reversibility	irreversible	unknown
*Assumes DDT restricted to spraying indoors, absent any ban. Hence, environmental concentrations should be relatively low.		
Source: I. M. Goklany.		

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precautionary policy is, for every proposal, to compare the risks of adopting it against the risks of the status quo. Thus, despite the claims of both proponents and opponents that the principle differs from risk analysis, it forces us into risk-risk assessment.

However, the various versions of the principle are silent on how it should be applied if a policy results in both positive and negative outcomes, especially where both sets of outcomes are uncertain. *The Precautionary Principle: A Critical Appraisal of Environmental Risk Assessment* (Cato Institute, Washington, DC, 2001), provides a framework for applying the principle in such fuzzy situations. The framework is based on common-sense criteria that allow risks to be ranked and compared based on their nature, severity, magnitude, certainty, immediacy and other characteristics. For instance, all else being equal, immediacy gives greater weight to more imminent threats, uncertainty to more certain threats, expectation value to those that are larger, adaptation to those with which it is more difficult or costly to cope, and irreversibility to those which are harder to reverse. One criterion, however, is based on ethics. This is a two-part public health criterion. The first part, the human *mortality* criterion, essentially holds that the risk of death to a human being outweighs similar risks to members of any other species. The second part, the human *morbidity* criterion, acknowledges that there might be some circumstances where the harm to other species outweighs the harm to humans — depending on the nature, severity and extent of the non-lethal consequences to humans.

This (unapologetically) anthropocentric criterion allows us to make the necessary trade-offs when a policy's net effect on environmental risks takes the opposite direction from its net effects on human health.

The Case of DDT. When applied to policies on DDT, for example, this framework leads to the conclusion that a global ban on DDT is unjustified. DDT was an important factor in the virtual extermination of malaria in several developed countries including the United States, and it was spectacularly successful in developing countries such as India and Sri Lanka. But it was a victim of its own success. No longer fearful of malaria, industrialized nations prohibited DDT's manufacture and use because of its adverse effects on birds of prey — and fears of its potential but unverified long-term impacts on human health. However, DDT is still the most cost-effective insecticide available for

use against many mosquitoes that spread malaria, which mostly affects developing countries. DDT is relatively inexpensive and much more effective than the next best alternative insecticide.

Ethically, since the risk of death to humans trumps the health threats posed to non-human animals, including raptors, continued use of DDT in the developing world is justified. This is especially true if DDT is used in a way that limits the exposure of wildlife. Today, DDT is applied only to walls and indoor furnishings, rather than being sprayed on wetlands, fields and yards as it was in the past.

When comparing the relative risks from banning DDT use to the risk of continued targeted use indoors, it is clear that a proper application of the precautionary principle would not only support continued use, but ethics would also require it. [See the table.] The experiences of developing countries where DDT use was first discontinued (because it had been stigmatized by environmental lobbyists and Western governments) and then restarted, indicates that the harm to public health caused by banning DDT would be immediate, severe, certain and, particularly for those killed by malaria, irreversible. By contrast, the health risk to humans from continued limited use are uncertain at best, are not immediate, and of unknown severity. The best case for harms caused by DDT is for raptors; these harms have, over the long term, proven reversible as the affected species have recovered and the DDT residues measured in their tissues have declined.

Conclusion. To be true to its name, the precautionary principle requires risk-risk analysis using a framework that allows a comprehensive evaluation not only of new risks that a policy would create but also of existing risks that the policy would reduce, prolong or exacerbate. This suggests an alternative formulation of the principle: "Precautionary policies should strive to minimize net risks to human health and the environment based on the best available scientific information regarding the nature, severity, magnitude, certainty, immediacy and other characteristics of the various risks, and their net anticipated costs to society."

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