

## **The Malaria-DDT Dilemma: Science, Policy, and Law**

A Research Conference Sponsored by Duke University's:  
Integrated Toxicology Program and Superfund Basic Research Center  
Center for Environmental Solutions  
Undergraduate Programs in Environmental Sciences and Policy

World Health Organization (WHO) data indicate that approximately 3,000 people die from malaria daily, or over one million per year. WHO estimates that 300-400 million clinical cases of malaria arise each year, with children accounting for over three-quarters of these cases. More generally, children, pregnant women, travelers, refugees, and laborers in endemic areas are most at risk for malarial infections. Beyond mortality losses, the treatment and prevention of malaria, as well as the indirect costs of lost productivity, impose devastating impacts on local economies, especially in the tropical developing world where malaria most often occurs.

After substantial progress in battling the spread of malaria in the 1960s and 1970s, more recently the number of malaria cases and the geographic extent of the disease have both grown dramatically. Activities that change land use patterns, such as road building, irrigation for farming, and mining, place humans in areas with a high endemism of mosquitoes and other disease vectors. The movement of human communities into newly cleared areas correlates with exposure to *Anopheles* mosquito populations. Factors such as climate, geography, and seasonality of rainfall contribute to the growth of mosquito populations, which in turn drives the transmission of malaria. And in some countries, anti-malaria efforts have been curtailed or their effectiveness diminished. Meanwhile, global warming may foster the spread of malaria vectors into new ranges outside the tropics.

Anti-malarial programs can include two very different approaches: treating the disease or treating the vector. The former includes prophylactic use of anti-malarial medication, early diagnosis and treatment, and [as yet undeveloped] vaccines. Treating the vector includes pesticide application to mosquito breeding areas and the use of pesticide-infused bed nets. Many areas of the world now host malaria parasites that are resistant to the first line of defense anti-malarial medications. In addition, mosquito populations may develop resistance to pesticides.

Perhaps the most controversial strategy for battling malaria is the application of DDT. Chlorinated hydrocarbon pesticides such as DDT, which became widely used in the 1940s, are slowly metabolized, accumulate in living tissue, and can affect the health of humans and wildlife. For example, DDT received considerable attention for its ability to cause eggshell thinning in birds, which was associated with large-scale declines in many populations of birds of prey. Currently, considerable controversy exists concerning the ability of DDT and other pesticides to perturb endocrine systems of humans and wildlife. Pesticides are transported through all media—soil, air, water, and animals—and, as a result, can affect organisms all over the world. The ban of a chemical in one nation will not prevent the pesticide from traveling across national or political borders.

In light of such concerns, the United States banned the use of DDT in 1973. In the late 1990s, advocates of a treaty on "POPs" (persistent organic pollutants) sought to ban DDT worldwide. But public health experts, including the WHO, argued that DDT should remain available to combat malaria, especially in poorer countries. This dilemma presented a classic and complex "risk-risk tradeoff" (Graham & Wiener 1995). It led to compromise language in the POPs Treaty (Stockholm Convention 2001) that bans several POPs immediately but allows further use of DDT until adequate alternatives are developed (though the criteria for that determination remain unclear).

The tradeoff between preventing malaria and placing individuals and ecosystems at risk for exposure to toxic chemicals creates an enormous policy dilemma. The Malaria-DDT Dilemma research conference at Duke University will address this risk-risk tradeoff and potential solutions, by examining topics including: the human toll of malaria; causes and consequences of the changing geography of malaria risk; medical strategies for preventing malaria, as well as better diagnosis and treatment of the disease; modern toxicological understanding of DDT and its human health and ecological risks; potential alternatives to DDT; regulatory policy options for reconciling the competing risks; the international political economy of the POPs treaty; and institutional capacity to manage global risks.

This one-day conference will feature distinguished experts in toxicology, public health, economics, public policy, law, and related fields. The conference may generate a set of papers to be published as a symposium issue of a leading journal.

## References

- Graham, John D. and Jonathan Baert Wiener. Risk vs. Risk: Tradeoffs in Protecting Health and the Environment (Harvard University Press, 1995).
- Miranda, Marie Lynn (2000). Pesticides in the Environment: DDT and Malaria. Unpublished manuscript.
- Stockholm Convention on Persistent Organic Pollutants (POPs) adopted 23 May 2001, available at <http://www.chem.unep.ch/pops>.
- World Health Organization (WHO). 2000. Heymann, D. L. Statement Before the Committee on International Relations U.S. House of Representatives. "The Urgency of a Massive Effort Against Infectious Diseases."
- World Health Organization. 1998. "Malaria: Fact Sheet No. 94." <http://www.who.int/inf-fs/en/fact094.html>.

# The Malaria-DDT Dilemma: Science, Policy, and Law

Thursday, November 7, 2002

Von Canon Room C, Bryan Center, Duke University

## AGENDA

- 8:00 – 8:30 Coffee and Bagels
- 8:30 – 8:45 Conference Overview  
*Rich Di Giulio (ITP), Jonathan Wiener (CES), Marie Lynn Miranda (EN)*
- 8:45 – 10:00 **Malaria: Impacts on Health and Society**  
*Kathryn Saterson, Duke University (CES), Moderator*  
*Randy Kramer, Duke University*  
*Vance Fowler, Duke University Medical Center*  
*Nick Anstey, Menzies School of Health Research, Darwin, Australia*
- 10:00 – 10:15 Break
- 10:15 – 11:45 **DDT and Alternatives: Human Health Impacts**  
*Ed Levin, Duke University (ITP), Moderator*  
*Fumio Matsumura, University of California, Davis*  
*Matthew Longnecker, National Institute of Environmental Health Sciences*
- 11:45 – 12:30 **DDT and Alternatives: Ecological Health Impacts**  
*Rich Di Giulio, Duke University (ITP), Moderator*  
*Louis Guillette, University of Florida*
- 12:30 – 1:30 Buffet Lunch in Von Canon B
- 1:30 – 3:15 **The POPs Treaty and National Policies**  
*Jonathan Wiener, Duke University (CES), Moderator*  
*Indur Goklany, US Department of Interior*  
*Amir Attaran, Harvard University*  
*Brooks Yeager, World Wildlife Fund US*
- 3:15 – 3:30 Break
- 3:30 – 5:30 Choices and Solutions: Toward Resolving the Malaria-DDT Dilemma  
*Marie Lynn Miranda, Duke University (EN), Moderator*  
*Jacob Williams, World Health Organization, Roll Back Malaria Project*  
*Robert Musil, Physicians for Social Responsibility*
- Open Discussion