LES 15

O B S E R V A T O R Y
ENVIRONMENTAL SCIENCE AND TECHNOLOGY (EST)
Teacher's Guide A
Second Year of Secondary Cycle Two

THREAT OR SOLUTION?

STUDENT LOG

WORKING DOCUMENTS

EVALUATION DOCUMENTS

INFORMATION DOCUMENTS

PROCEDURE AND EVALUATION: SSC2 – SCIENCE

Observatory / Guide
11129-A

Name: _____ Group: _____ EST

The controversy

Notice of meeting

Longueuil, September 27, 2008

To: Members of the board of directors of African Perspectives

From: CEO of African Perspectives

Subject: Notice of the next meeting of the board of directors

Dear Board Members:

I am pleased to invite you to the next meeting of the board of directors of African Perspectives. During this meeting, the board members must decide whether to fund a project to spray DDT inside homes in Mali. DDT is a recognized toxic substance, but it effectively prevents malaria. The meeting will be held at the following time and place:

Date: Tuesday, October 28, 2008

Time: 7 p.m.

Place: Victor-Rousselot Room – Lemelin Community Centre

Meeting agenda:

1. Welcome and introductions

2. Appointment of a chairperson for the meeting

3. Reading and adoption of the agenda

4. Roundtable: Each board member will explain his or her position on the proposal to approve the funding application.

5. Discussion of the proposal to approve the funding application

6. Decision by consensus of the board

7. Adjournment

Enclosed is an excerpt from the funding application submitted by the organization Focus along with a document summarizing the terms of the Stockholm Convention on the use of DDT. During this meeting, the board of directors must reach a consensus on whether to approve the application for funding.

Yours truly,

Francine Boulet

Francine Boulet
CEO of African Perspectives

In this context, you will play the role of a member of the board of directors of African Perspectives. You are invited to attend the board meeting at which you must give your opinion on funding the project. You will debate the issue with four other students playing the roles of other board members of African Perspectives, and the five of you must reach a consensus.

The controversy (*continued*)

Excerpt from the application submitted by Focus for funding to reduce the incidence of malaria in Mali

According to the World Health Organization, every 30 seconds, a child in sub-Saharan Africa dies of malaria. Malaria (also known as *paludism*) is caused by a parasite of the genus *Plasmodium*, which is transmitted by the bites of infected mosquitoes. In the human body, the parasite multiplies in the liver and then infects the red blood cells. The principal symptoms of malaria include fever, headache and vomiting. If left untreated, malaria can quickly become life-threatening by disrupting the blood supply to vital organs.

Faced with this scourge, Mali has implemented a national program to fight malaria with DDT. We are asking for your financial assistance to spray homes in Mali with this chemical. Our efforts to combat malaria are waged from a global perspective and focus on prevention. For this reason, Focus plans to spray DDT inside homes to destroy mosquito breeding grounds. We need your help.

To date, we have organized vaccination campaigns during which we also distributed free bed nets treated with pesticide. Our goal is to reduce malaria by at least 50 percent, and malaria-caused deaths by at least 80 percent. We need your financial support to guarantee the success of malaria prevention in Mali. Our spraying campaign will cost thousands of dollars, and your contribution will make a huge difference.

We trust our funding application will meet with the approval of African Perspectives.

Yours truly,

Ramata Tembely
Director of the national program to fight malaria
Focus

The controversy (*continued*)

Things you need to know about DDT use under the Stockholm Convention

The following will apply to all parties to the Stockholm Convention on Persistent Organic Pollutants (POPs[1]):

- DDT may be produced and used only for disease vector[2] control and according to the recommendations and guidelines of the World Health Organization. DDT will be used when safe, effective and affordable alternatives are not locally available in a country.
- The World Health Organization recommends only **indoor residual spraying**[3] (spraying only on the inside walls of buildings) of DDT for disease vector control. . . .
- Every three years, each country that uses DDT will be required to provide to the Convention Secretariat and the World Health Organization information on the amount of DDT used, the conditions under which it is being used, and how such use relates to the country's disease management strategy. . . .
- Countries using DDT will be supported and encouraged to strengthen their vector control programs. The intention is to reduce and ultimately eliminate the use of DDT over time, by making such use unnecessary. In this connection, each country will be assisted to develop a national action plan that will include:
  - (i) The development of regulatory and other mechanisms to ensure that DDT is used **only** for disease vector control.
  - (ii) The implementation of alternative products, methods and strategies, including vector resistance management strategies to ensure that the DDT alternatives remain effective.
  - (iii) Actions to strengthen health care and reduce disease incidence.
- Appropriate research will be promoted to develop safe alternative chemical and non-chemical products, methods and strategies that are relevant to the conditions in those countries using DDT, with the goal of reducing the human and economic burden of disease.
- In developing such DDT alternatives, adequate consideration will be given to ensuring that viable alternatives present less risk to human health and the environment, and also that the alternatives are suitable for disease control within the particular context of each country. . . .

Source: World Health Organization, excerpts from the document "10 things you need to know about DDT use under the Stockholm Convention," [PDF document], 2005 (accessed July 13, 2009).

1. A class of pollutants that includes DDT.
2. A vector is a mosquito or other insect that transmits a pathogen from one organism to another.
3. An effect that persists after spraying.

Name: _____ Group: _____ EST

Creating the context

I ask myself questions

1. What is malaria?

_____

_____

2. What is DDT?

_____

_____

_____

3. What is a vaccination campaign?

_____

_____

_____

4. What is a parasite?

_____

_____

5. What is a convention ?

_____

_____

6. What is a vector?

_____

_____

7. What is a spraying campaign?

_____

_____

8. Who are the main players in this situation?

_____

_____

_____

Creating the context (*continued*)

9. What questions should the board members consider before approving the funding application?

I must

10. Reformulate the goal of the controversy.

I think

11. Do you think it is a good idea to subsidize a project to use DDT to prevent malaria? Explain your answer.

Name: _____ Group: _____ EST

Creating the context (*continued*)

What I know and what I must find out

12. Write the information you already know and the information you need to find out.

What I know	What I must find out

I prepare my work

13. Where will you find the information you need to settle this controversy?

14. Describe the main steps of your work in chronological order.

Reflection

	Yes	No
Do I fully understand what I have to do?	☐	☐

Name: _____ Group: _____ EST

Gathering information

I do research

1. What is the hydrosphere?

2. What is the lithosphere?

3. What are trophic relationships?

4. What is a contaminant?

5. What is contamination?

6. Is DDT a source of contamination of the lithosphere? Explain your answer.

Gathering information (*continued*)

7. Is DDT a point source or a non-point source of contamination of the hydrosphere? Explain your answer.

8. What is the toxicity threshold?

9. What is the toxicity threshold of DDT? Explain your answer.

10. What is bioaccumulation?

11. Is DDT bioaccumulative? Explain your answer.

12. What is bioconcentration?

Gathering information (*continued*)

13. Can DDT be at the root of an occurrence of bioconcentration? Explain your answer.

14. Highlight the information you consider relevant in your information documents. Copy this information in the tables in questions 15 and 16. Distinguish between the arguments for and the arguments against using DDT.

I apply my research results

15. What are the arguments in favour of using DDT to reduce the spread of malaria? Copy the relevant information into the following table. Remember to cite your sources.

Arguments in favour of using DDT	Sources

Name: _____ Group: _____ EST

Gathering information (*continued*)

Arguments in favour of using DDT (*continued*)	**Sources** (*continued*)

Gathering information (*continued*)

16. What are the arguments against using DDT to reduce the spread of malaria? Copy the relevant information into the following table. Remember to cite your sources.

Arguments against using DDT	Sources

Name: _____ Group: _____ EST

Gathering information (*continued*)

Arguments against using DDT (*continued*)	**Sources** (*continued*)

Name: _____ Group: _____ EST

Gathering information (*continued*)

Arguments against using DDT (*continued*)	**Sources** (*continued*)

Name: _____ Group: _____ EST

Gathering information (*continued*)

Arguments against using DDT (*continued*)	Sources (*continued*)

Reflection

	Yes	No
Do I fully understand the following concepts:		
• contamination?	☐	☐
• contaminant?	☐	☐
• bioaccumulation?	☐	☐
• bioconcentration?	☐	☐
• toxicity threshold?	☐	☐

Name: _____ Group: _____ EST

Resolving the controversy

I make suggestions

Based on your readings, summarize your personal opinion on the question of funding the project. Formulate arguments to support the position you will defend before the four other board members. Remember to cite your sources of information.

Reflection

	Yes	No
Have I considered other approaches?	☐	☐

Name: _____ Group: _____ EST

Validating the solution

Form a team of five to represent the members of the board of directors. Discuss your opinion with the other board members, following the meeting agenda. Your team must reach a consensus. Then, answer the following questions.

I justify my approach

1. What decision did your team make? Explain your answer.

2. Did your team manage to reach a consensus? If so, describe the difficulties you had to overcome to reach an agreement. If not, explain why you could not reach a consensus.

Validating the solution (*continued*)

3. Name at least one advantage of the decision made by your team.

4. Name at least one disadvantage of the decision made by your team.

Name: _____ Group: _____ EST

My evaluation

Use the evaluation grid on the following page to evaluate yourself. Write A, B, C, D or E in the "Me" column of the chart below.

SSC2—Makes the most of his/her knowledge of science and technology				
Criteria*	**Observable indicators**	**Me**	**Teacher**	**Comments**
1	**Creating the context** Definition of the goal and formulation of the questions for gathering information		☐ With help	
2	**Gathering information** Relevance of the arguments for and against the use of DDT		☐ With help	
3	**Resolving the controversy** Summary of the personal opinion on the funding application		☐ With help	
4	**Validating the solution** Justification of the decision made by the board of directors		☐ With help	

*** Evaluation criteria**

1 Formulation of appropriate questions
2 Appropriate use of scientific and technological concepts, laws, models and theories
3 Relevant explanations or solutions
4 Suitable justification of explanations, solutions, decisions or opinions

Name: _____ Group: _____ EST

Evaluation grid

SSC2 Makes the most of his/her knowledge of science and technology

Criteria*	Observable indicators	A	B	C	D	E
1	**Creating the context** Definition of the goal and formulation of the questions for gathering information	The goal of the controversy is very clearly defined, and the questions for gathering information are relevant.	The goal of the controversy is clearly defined, and the questions for gathering information are relevant.	The goal of the controversy is not very clearly defined, OR the questions for gathering information are not very relevant.	The goal of the controversy is not very clearly defined, AND the questions for gathering information are not very relevant.	The work must be done again.
2	**Gathering information** Relevance of the arguments for and against the use of DDT	All of the advantages and disadvantages of the use of DDT are properly classified and relevant.	Most of the advantages and disadvantages of the use of DDT are properly classified and relevant.	Some of the advantages and disadvantages of the use of DDT are not properly classified, OR they are not very relevant.	Most of the advantages and disadvantages of the use of DDT are not properly classified, AND they are irrelevant.	The work must be done again.
3	**Resolving the controversy** Summary of the personal opinion on the funding application	The summary is very clearly formulated, and the arguments support the student's position very well.	The summary is clearly formulated, and the arguments support the student's position.	The summary is not very clearly formulated, but the arguments support the student's position.	The summary is not very clearly formulated, and the arguments do not support the student's position.	The work must be done again.
4	**Validating the solution** Justification of the decision made by the board of directors	The justification is very clearly formulated and based on relevant arguments. More than one advantage and disadvantage of the decision are relevant.	The justification is clearly formulated and based on relevant arguments. One advantage and one disadvantage of the decision are relevant.	The justification is based on arguments that are not very relevant, OR the advantage and disadvantage of the decision are not very relevant.	The justification is based on arguments that are not very relevant, AND the advantage and disadvantage are not very relevant.	The work must be done again.

*** Evaluation criteria**

1 Formulation of appropriate questions

2 Appropriate use of scientific and technological concepts, laws, models and theories

3 Relevant explanations or solutions

4 Suitable justification of explanations, solutions, decisions or opinions

WHO gives indoor use of DDT a clean bill of health for controlling malaria

SEPTEMBER 15, 2006 | WASHINGTON, D.C. – Nearly 30 years after phasing out the widespread use of indoor spraying with DDT and other insecticides to control malaria, the World Health Organization (WHO) today announced that this intervention will once again play a major role in its efforts to fight the disease. WHO is now recommending the use of indoor residual spraying (IRS) not only in epidemic areas but also in areas with constant and high malaria transmission, including throughout Africa.

"The scientific and programmatic evidence clearly supports this reassessment," said Dr. Anarfi Asamoa-Baah, WHO Assistant Director-General for HIV/AIDS, TB and Malaria. "Indoor residual spraying is useful to quickly reduce the number of infections caused by malaria-carrying mosquitoes. IRS has proven to be just as cost-effective as other malaria prevention measures, and DDT presents no health risk when used properly."

WHO actively promoted indoor residual spraying for malaria control until the early 1980s, when increased health and environmental concerns surrounding DDT caused the organization to stop promoting its use and to focus instead on other means of prevention. Extensive research and testing has since demonstrated that well-managed indoor residual spraying programs using DDT pose no harm to wildlife or to humans.

Source: World Health Organization, "WHO gives indoor use of DDT a clean bill of health for controlling malaria" [online news release], September 15, 2006 (accessed July 13, 2009).

Persistent organic pollutants

POP stands for "persistent organic pollutants." They are organic molecules—molecules composed primarily of carbon and hydrogen atoms—whose presence in the environment causes problems because of specific properties: low biodegradation (persistence), toxic effects at very low doses and the ability to accumulate in the food chain (bioaccumulation). This persistence combined with a certain degree of volatility explains why POPs can be found far from their points of emission, carried by ocean or atmospheric currents. The elimination of POP sources is thus a global issue. . . .

One organochlorine pesticide is **DDT**, the miracle insecticide of the 1950s, still used to fight malaria in Africa despite its persistence and toxicity, which were denounced by Rachel Carson in 1962 in her book *Silent Spring*. . . .

The impact of POPs on the health of living organisms

Researchers have linked exposure to POPs to a wide range of effects on the health of living organisms. All chemical substances have a direct or "acute" toxicity. As demonstrated by the industrial disasters at Bhopal (1984) and Seveso (1976), overexposure to such toxicity can immediately result in various health problems (skin, stomach or liver disorders, nervous impairment) or even death (2500 deaths within a few hours at Bhopal).

The long-term effects (chronic toxicity) of exposure to minute doses of POPs are more pernicious since they are felt over time and their scientific assessment runs counter to industrial interests: carcinogenic effects, impaired fertility, disruption of the nervous, immune and endocrine (hormone regulation) systems. . . .

The recent Stockholm Convention on POPs goes beyond its first step of banning organochlorine pesticides; it is also the first international tool for combatting a whole set of chemical substances based on their common properties: persistence, bioaccumulation and CMR (carcinogenic, mutagenic and reproduction-affecting) toxicity. . . .

Source: Greenpeace France, "Polluants organiques persistants" [Web page] (accessed July 7, 2008). *[Translation]*

Controlling malaria in Mexico using alternatives to DDT

Long-term goal

. . . The long-term objective of the Mexican malaria control program (MCP) is to prevent future outbreaks of malaria, without harming the local environment. Since the 1940s, DDT has been the weapon of choice against malaria, but the chemical is a persistent organic pollutant that builds up in animal tissues. DDT is known to affect reproduction in wildlife and, at high enough levels, to damage the human nervous system. . . .

Pond algae

So far, the algae removal strategy has been tried in several inland villages. Local women and men are removing the pond algae within a one-kilometre radius of their villages—and with good results. The population of adult mosquitoes is decreasing in these villages, which means there is less need to spray insecticides. . . .

Focal control

Another innovation involves the focal or targeted control of malaria. . . . "Instead of treating everyone and spraying all the houses in a community, the MCP approach now is to give chemoprophylactic—a malaria medicine—to those people who had malaria in the year or two before the current transmission season to stop them from having a malaria episode and, then, spray their homes. In this way, we think we can block the cycle of transmission and relapse," says [Dr. Mario Rodriguez, director of the Centre for Research on Infectious Diseases at the National Institute of Public Health]. "It's important that we don't give prophylaxis (preventative treatment) to everyone, mainly because of the cost but also because the malaria parasite will become increasingly drug-resistant."

Rapid diagnosis

Lastly, Dr. Rodriguez and his colleagues are promoting a rapid diagnostic test "not as a means of finding malaria but as a means of controlling malaria," he stresses. According to Dr. Juan Hernandez [director of informatics at the National Institute of Public Health], the traditional surveillance system is based on community participation: volunteer health workers take blood smears from people with malaria symptoms. . . .

With the rapid diagnostic test, "we are empowering the community to treat themselves," stresses Dr. Hernandez. The test involves placing a drop of blood on a dipstick, which is put in a reagent mixture for 15-30 minutes. "If the test shows that you have malaria, the complete treatment can begin right away, and hence the malaria transmission cycle can be broken."

Signs of success

The research team is currently evaluating the rapid diagnostic approach in 20 different localities. But there are already signs the new control strategies are working. Since 1998, the number of malaria cases in Mexico has fallen sharply. There were just 2000 cases last year, and only about 200 cases up to the end of May 2001, reports Dr. Rodriguez. "It's the first time in Mexico that an outbreak of malaria has been controlled without using DDT," he concludes.

Source: John Eberlee, "Controlling Malaria in Mexico Using Alternatives to DDT," Archives of the International Development Research Centre (Canada) [online], September 14, 2001 (accessed July 13, 2009).

Name: _____ Group: _____ EST

DDT no longer used in North America

The production and use of DDT (dichlorodiphenyltrichloroethane) has been eliminated in Canada, Mexico, and the United States under a North American Regional Action Plan (NARAP) negotiated by the three signatory countries to the North American Agreement on Environmental Cooperation (NAAEC). . . .

What is DDT?

DDT is a potent nerve poison used to kill mosquitoes, black flies and other insects that carry malaria, typhus and yellow fever. First synthesized in 1874, its insecticidal property was discovered in 1939. In the 1950s and '60s, DDT was embraced as a cheap, effective, broad-spectrum chemical pesticide. It was used worldwide and applied generously to protect agricultural crops and to prevent the spread of vector-borne diseases. In 1962, the year that saw publication of Rachel Carson's *Silent Spring*, over half a billion dollars worth of DDT was sold in the United States alone. . . .

Production of DDT in Mexico ceased in 1997, and the use of DDT was halted in 2000, exceeding the initial target in the DDT NARAP of an 80-percent reduction by 2002. . . .

The effects of DDT

DDT is a persistent, bioaccumulative toxic substance. It degrades very slowly in the environment, and under certain conditions can remain active for more than 30 years, as small amounts of the chemical remain in the soil and are slowly transferred to crops or washed into watercourses.

DDT is not easily metabolized in the body and tends to build up over time. It accumulates in the fatty tissue of fish, birds and animals and is transferred in increasingly concentrated amounts from prey to predator at each step up the food chain. It delivers the highest doses to those at the top, such as predatory birds, mammals and humans.

Like other POPs, DDT can be transported over long distances through the atmosphere. It vaporizes and condenses, touching down on oceans and freshwater bodies, where it begins the cycle again. This is known as the "grasshopper effect." POPs tend to accumulate in colder climates such as the Arctic, where they are trapped by low evaporation rates.

DDT is a recognized carcinogen. It is also a developmental and reproductive toxicant, and is suspected of causing neurological, respiratory and cardiovascular ailments and other health effects in humans. It is a suspected endocrine-disrupting substance. Indigenous peoples who rely heavily on animal fat and protein in their traditional diets are particularly at risk from the effects of DDT and other POPs. Babies who have been heavily exposed to DDT in the womb or through breast-feeding may have impaired immunity. DDT is ubiquitous in the environment and food supply, and we all have at least trace amounts in our bodies.

DDT has also been shown to have adverse effects on wildlife reproduction. It has been linked with thinning eggshells and declining populations of a variety of bird species.

Source: North American Commission for Environmental Cooperation, "DDT no longer used in North America" [PDF document], April 2003 (accessed July 14, 2009).

Malaria, mosquitoes and DDT:
The toxic war against a global disease

This year, like every other year within the past couple of decades, uncountable trillions of mosquitoes will inject malaria parasites into human blood streams billions of times. Some 300 to 500 million full-blown cases of malaria will result, and between one and three million people will die. . . .

Learning to live with the mosquitoes

A group of French researchers recently announced some very encouraging results for a new antimalarial drug known as G25. The drug was given to infected aotus monkeys, and it appears to have cleared the parasites from their systems. Although extensive testing will be necessary before it is known whether the drug can be safely given to people, these results have raised the hope of a cure for the disease.

Of course, it would be wonderful if G25, or some other new drug, lives up to that promise. But even in the absence of a cure, there are opportunities for progress that may one day make the current incidence of malaria look like some dark-age horror. . . . Many of these opportunities have been incorporated into an initiative that began in 1998, called the Roll Back Malaria (RBM) campaign. . . . Below are four "operating principles" that are, in one way or another, implicit in RBM or likely to reinforce its progress.

1. Do away with all taxes and tariffs on bednets, on pesticides intended for treating bednets and on antimalarial drugs. Failure to act on this front certainly undercuts claims for the necessity of DDT; it may also undercut claims for antimalaria foreign aid.

2. Emphasize appropriate technologies. Where, for example, the need for mud to replaster walls is creating lots of pothole-sized cavities near houses—cavities that fill with water and then with mosquito larvae—it makes more sense to help people improve their housing maintenance than it does to set up a program for squirting pesticide into every pothole.

   To be "appropriate," a technology has to be both affordable and culturally acceptable. Improving home maintenance should pass this test; so should bednets. And of course there are many other possibilities. In Kenya, for example, a research institution called the International Centre for Insect Physiology and Ecology has identified at least a dozen native east African plants that repel *Anopheles gambiae* in lab tests. Some of these plants could be important additions to household gardens.

3. Use existing networks whenever possible, instead of building new ones. In Tanzania, for example, an established healthcare program (UNICEF's Integrated Management of Childhood Illness Program) now dispenses antimalarial drugs—and instruction on how to use them. The UNICEF program was already operating, so it was simple and cheap to add the malaria component. Reported instances of severe malaria and anemia in infants have declined, apparently as a result. In Zambia, the government is planning to use health and prenatal clinics as the network for a coupon system that subsidizes bednets for the poor. Qualifying patients would pick up coupons at the clinics and redeem them at stores for the nets.

Malaria, mosquitoes and DDT:

The toxic war against a global disease (*continued*)

4. . . . Malaria is not just a health problem—it's a social problem, an economic problem, an environmental problem, an agricultural problem, an urban-planning problem. Health officials alone cannot possibly just make it go away. When the disease flares, there is a strong and understandable temptation to strap on the spray equipment and douse the mosquitoes. But if this approach actually worked, we wouldn't be in this situation today. Arguably the biggest opportunity for progress against the disease lies not in our capacity for chemical innovation but in our capacity for organizational innovation—in our ability to build an awareness of the threat across a broad range of policy activities. For example, when government officials are considering loans to irrigation projects, they should be asking: Has the potential for malaria been addressed? When foreign donors are designing antipoverty programs, they should be asking: Do people need bednets? Routine inquiries of this sort could go a vast distance to reducing the disease.

   Where is the DDT in all of this? There isn't any, and that's the point. We now have half a century of evidence that routine use of DDT simply will not prevail against the mosquitoes. Most countries have already absorbed this lesson and banned the chemical or relegated it to emergency-only status. Now the RBM campaign and associated efforts are showing that the frequency and intensity of those emergencies can be reduced through systematic attention to the chronic aspects of the disease. There is less and less justification for DDT, and the futility of using it as matter of routine is becoming increasingly apparent: in order to control a disease, why should we poison our soils, our waters and ourselves?

Source: Anne Plat McGinn, researcher at the Worldwatch Institute, "Malaria, mosquitoes, and DDT: The toxic war against a global disease" [online article], Worldwatch Institute, 2002 (accessed July 14, 2009).

The DDT dilemma
To ban or not to ban:
That's not the question

Canada and 121 other countries negotiated a landmark anti-pollution treaty in December [2000] and bargained DDT right off the list of immediately banned poisons. The treaty is all the better for that. DDT is no doubt a widespread and pernicious menace, and it must be banned completely. But not yet.

The insecticide DDT is one of the 12 nasty chemicals addressed by the new global treaty on POPs—persistent organic pollutants. The treaty, once in force, would subject most of these poisons to an immediate ban. DDT was exempted, after long argument and only for the control of malaria, until cheap, effective and safer alternatives can be developed.

Fair compromise

Notwithstanding DDT's dreadful dangers, the POPs treaty represents a fair compromise for the moment. What's needed now is well-funded research to find better strategies against malaria and the suffering it causes.

DDT for agricultural use has been banned for years almost everywhere—and for powerful reasons. The chemical and its breakdown residues (especially one known as DDE) have done proven damage to wildlife around the world. Canada's bald eagle and peregrine falcon populations were ravaged by DDT's damage to shells and embryos. There are disturbing possibilities that DDT harms humans, too—with suspected links to breast cancer, liver cancer and disturbances to embryo development and reproduction.

Weapon of choice

Meanwhile, however, since the 1940s DDT has become the weapon of choice against malaria. It is an affordable, readily supplied and instantly lethal poison to the mosquitoes that carry the malaria-causing protozoa. DDT application, typically on the inside walls of houses where the disease is endemic, indisputably saves lives.

Some of the harms of DDT are proven. Other risks are still insufficiently understood by scientists. All are insidious: the damage can emerge years after DDT is introduced into the environment and can appear tens of thousands of kilometres away as airborne residues migrate across hemispheres.

Unfair to the poor

Considering the known and suspected dangers to human health and the environment, it would be nice to be able to ban DDT immediately. But banning it, without providing adequate alternatives, would be ruinously unfair to those who suffer worst from malaria—the poor, in poor countries. In fact, malaria rates are already rising. Next year alone, it is predicted, one million or more children will die of this single disease. Infection rates have increased in part because of reduced applications of DDT already,

The DDT dilemma
To ban or not to ban: That's not the question (*continued*)

and in part because the parasitic protozoa and mosquitoes quickly develop resistance to the drugs and chemicals used against them. (This is another reason to find replacements for DDT: it can lose effectiveness as mosquitoes produce new generations resistant to the spray.) So it is true to say that DDT saves thousands of lives every year. It is also true to say that the people who contract and die of malaria are mostly poor. Cutting off supplies of DDT, without first providing safe and efficient alternatives, would count as a real blunder—and an injustice.

Transboundary pollutant

And that is our dilemma. DDT is an environmental toxic that honours no borders. Tissues of mammals in the Canadian Arctic, and of the humans who eat them, show accumulated DDT metabolites that originated with DDT sprays in the tropics. But in the malarial areas of Latin America, Africa and Asia, people desperately need DDT as a matter of life and death.

How to escape the dilemma? . . .

Alternative weapons

Sprayed on walls, DDT works by killing mosquitoes on contact. But there are alternatives. . . . In Africa, success has been achieved in some communities by dipping bednets in pyrethroids—a low-cost alternative in some cases, but one that needs active community involvement.

Drugs work against malaria by killing the parasite in the human host and by creating immunity. But again, protozoa soon breed generations resistant to each new drug that comes along. And each new drug tends to carry a higher price than the one before. One promising response, now being tested, is the distribution of diagnostic "dipsticks" that detect malarial infection instantly from a drop of blood—and so direct expensive drug therapy only to those who need it. An over-arching problem here is that pharmaceutical firms are not much interested in researching new drugs when most of the would-be customers are too poor to pay. . . .

Complex problems demand complex solutions. . . . All these strategies—mosquito control, drugs, environmental approaches, with community participation—need time and money to be tried and succeed. In principle, that is what the new POPs treaty provides: time, and the commitment of rich governments (including our own) to help finance the phasing out of these globally destructive pollutants. Banning DDT must be part of that effort. But not yet.

Source: Jean Lebel, "The DDT Dilemma, To Ban or Not to Ban: That's Not the Question," Archives of the International Development Research Centre (Canada) [online], January 2001 (accessed July 7, 2009).